Make it Yourself

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MAKE IT YOURSELF

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whether amateur or professional, young or old,
will take pride in making many of the
things described in this book

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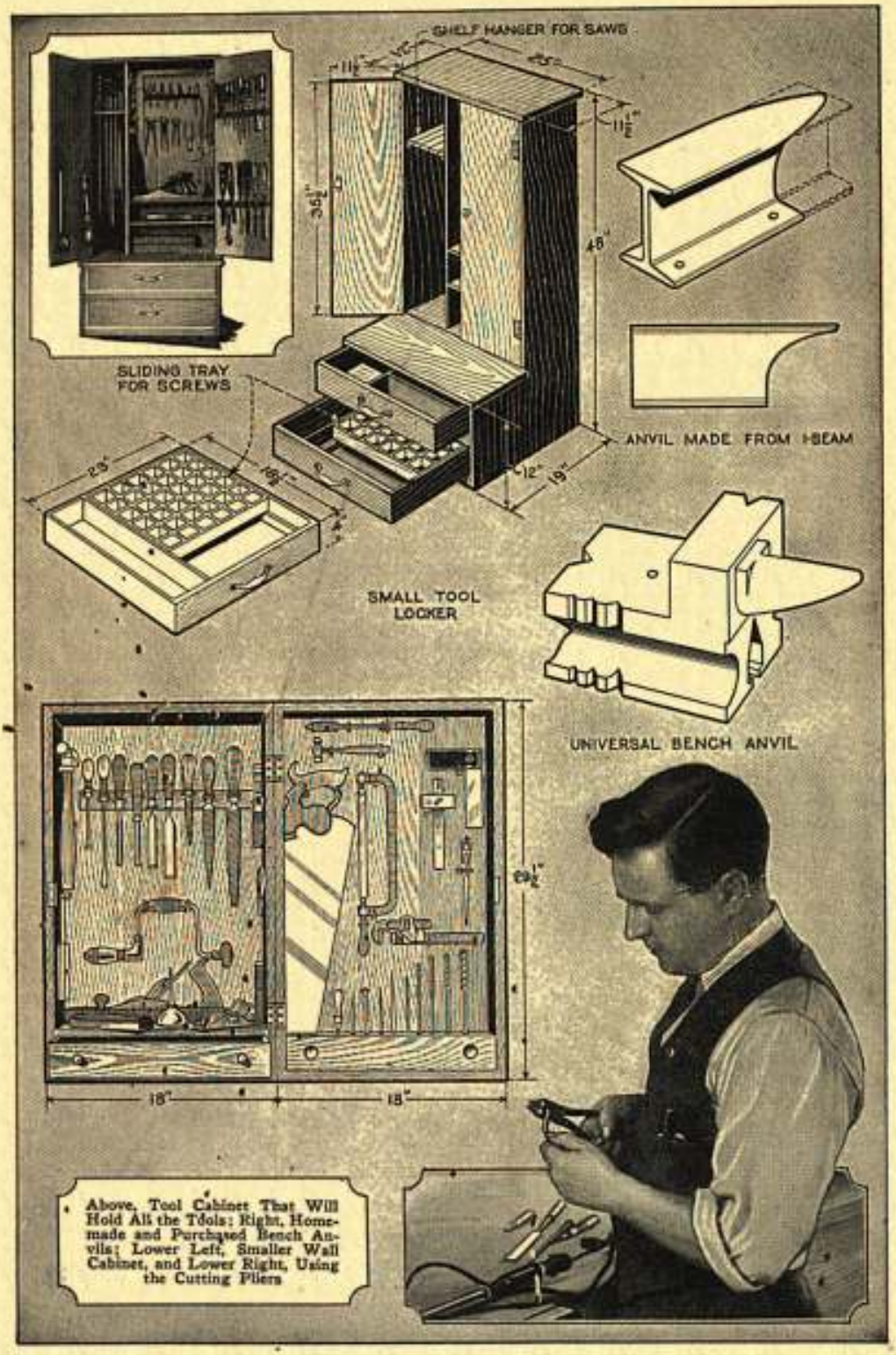


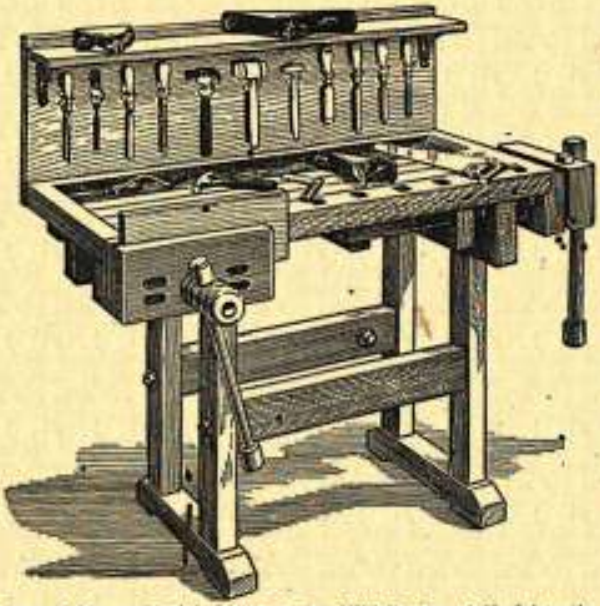
Above, Tool Cabinet That Will Hold All the Tools; Right, Home-made and Purchased Bench Anvils; Lower Left, Smaller Wall Cabinet, and Lower Right, Using the Cutting Pliers

Tools for the Home Mechanic

by J. Jate

THE man who likes to fuss with tools around the home—and what home owner doesn't?—is a rare and fortunate mortal if he has not discovered, to his exasperation, when halfway through a job, that some essential tool is not among his kit. Few of us tinkerers have all the tools we'd like to own, and no doubt many of those we'd like to buy would only be of use to us once in ten years, but how many men, when planning a house, or selecting the fixtures and furniture for it, spare a thought to the tools necessary for their upkeep? We take care that Mrs. Amateur Mechanic has all the tools she needs in her kitchen (if we don't, she does, so it amounts to the same thing), but what about the time when the handle will fall off the coffeepot? When the "missus" wants a few shelves knocked up in the closet? When the new storm door won't fit, or when the toaster cord breaks? Then, will we be able to go to the tool chest or workbench and dig up the screwdriver, saw, plane or pliers we need, or must we run out and try to buy them? Of course, this is not addressed to the man who says, "Oh, we'll get a carpenter" (or a plumber or an electrician, as the case may be). It is directed to Mr. Amateur Mechanic; to the man who gets more fun out of twenty dollars' worth of time spent in tinkering with tools than in paying out five to have the job done. Not that the ratio is always like that, far from it, but all Amateur Mechanics will agree that it's sometimes that way.

The list of tools to be included in the equipment for the home must, of course, be selected finally by the individual. The list given herewith may be too small for some; may contain too many tools for others; perhaps has not enough woodworking tools for some; not enough metal-working tools for some one else. It represents the average, however; and the man who has this kit, will find that it will take care of most of the jobs that are within his ability. The case of the man who wishes to work only in wood, or in metal, or has some other hobby, will be taken up in other articles; this one merely considers the requirements of the home worker.



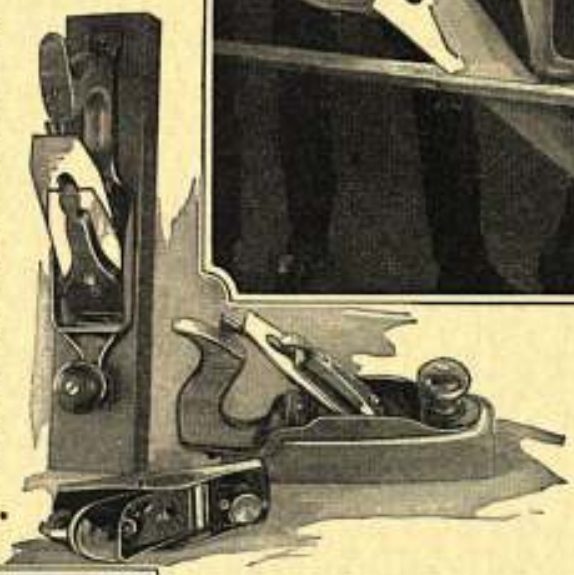
Type of Manual-Training Bench That Will Be Found Useful to the Home Mechanic; Note the Backboard for Tools

First in importance is the workbench, and it should be urged on all prospective home mechanics that the workshop be built around this. No serious work can be done without one. It need not be an elaborate affair—all drawers and compartments—in fact, the writer must confess to rather a prejudice against drawers and doors in a bench where woodworking

is done. It always seems to happen that, when one has a wide and heavy door clamped in the vise, one discovers a tool essential for the job is in one of the drawers behind the work! However, where space is at a premium, a few drawers help considerably. The construction of the bench is rather outside the scope of this article, and will be treated next month, but if the reader wishes to purchase his bench rather than make it, he will do well to purchase one of the sturdy little benches made for manual training. These are well made, with side and tail vises, and will serve for any job the amateur is likely to run against.

The tools, which are selected from the equipment of Popular Mechanics Model Workshop, are listed below.

This is not a "complete" set of tools. There is no such thing. Nor is it the minimum that a good amateur craftsman requires; it is to be regarded merely as a list from which to select or at which to aim. For example, the ripsaw may be omitted, as most odd-job work consists of cross cutting; the smooth or the jack plane may be omitted, as, on small jobs, a 6 or 8-in. block plane will serve very well; the gimlet, the 1-in. chisel and gouge; the 6-ft. rule; the 6-in. screwdriver; the reamer and countersink; the scraper; the 10-in. monkey wrench and pipe wrench; the

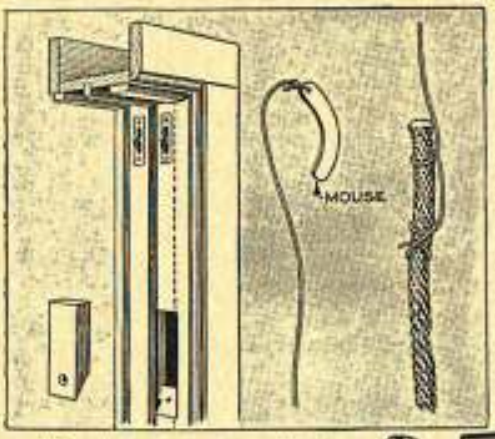


Above, Use of the Ripsaw; Center, Jack, Smooth and Block Planes; Below, Using the Crosscut Saw

long-nose pliers; the flat bastard and half-round smooth files; the blowtorch and anvil may all be omitted, and the tool kit still be satisfactory for its purpose. Nevertheless, there is not a tool in the whole list that would not at one time or another serve better than a substitute, and for this reason we recommend that, if it is at all possible, the whole outfit be purchased. It will then be an emergency indeed that will find the tool chest wanting.

Crosscut saw; 26 in.; 8 points.
Ripsaw; 26 in.; 5 points.
Nest of saws, containing compass saw, keyhole saw and nail-cutting saw, with handle.
Jack plane, iron; or iron with wood bottom.
Smooth plane, iron; or iron with wood bottom.
Block plane, iron.
Butt or pocket chisels, ¼ in., ½ in. and 1 in.
Firmer gouges, ½ in. and 1 in.
Auger bits, Irwin pattern; ⅜, ½, ⅝, ¾ and 1 in.
Expansive bit, ¾ to 3 in.
Brace, 8 or 10-in. sweep, with ratchet.
Gimlet, wooden handle.
Push drill.
Nail hammer with bell face.
Riveting hammer.

Mallet.
Ball-peen hammer, 13 oz.
Nail set, 1-16-in., cup face.
Try-square, 6-in.
Rules, 2-ft. folding; 6-ft. zigzag.
Screwdrivers, 4, 6 and 8-in.
Oilstone, soft Arkansas or Washita.
Oilcan.
Taper reamer.
Rose countersink for wood.
Cabinet scraper, 4-in.
Cabinet rasp, 10-in. half-round.
Hand drill.
Metal twist drills, 1-16 to ¼ in., also ⅜ in.
Hacksaw frame, 10-in.
Hacksaw blades, three, 10-in.
Cold chisels, ¼ and ½ in.
Monkey wrenches, 6 and 10-in.
Pipe wrenches, 6 and 10-in.
Pliers, slip-joint, 6-in.
Pliers, heavy cutting, 7-in.
Pliers, small long-nose.
Files, 6-in. saw; 10-in. flat bastard; 10-in. half-round bastard; 10-in. half-round smooth; 8-in. round; 6-in. knife.
File handles, 3 large; 3 small.
Soldering iron, plain or electric.
Blowtorch.
Centerpunch.
C-clamps, 6-in., two.
Putty knife.
Trowel, masons', 6 or 8-in.



"Mouse" for Rethreading Window-Sash Cord, and Method of Tying Mouse Cord to Sash Cord

Glass cutter and straightedge.
Small bench vise.
Small bench anvil.
Tool grinder, hand-driven.
Small wrecking bar.
Mouse.
Solder and flux, or acid-core and rosin-core solder.

A cheap tool is "a snare and a delusion," while a good tool, on the other hand, is "a joy forever"—or thereabouts. This is especially true of woodworking tools. Buy only those that bear the stamp of a reputable maker, and you won't have to spend time that should be used in productive work in trying to make and keep poor tools sharp and in good condition.

Little need be said about the use of the crosscut and ripsaws; their names are an indication of their purpose. The nest of saws, however, deserves a word. This consists of three blades, a compass, keyhole and another blade, which should be tempered to cut nails. All three blades are exceedingly useful, but only the man who has ruined a good saw when cutting through a partition or plaster will appreciate the third.

The jack plane, which should be about 15 in. long, with a 2¼-in. cutter, is used to bring the surface of work to a fairly true plane, and to give it the first "smoothing." The smooth plane is shorter, and, as its name implies, it brings the surface to a finer finish, as it cuts in the hollows that the longer jack plane does not touch. The block plane has its blade set at a smaller angle than either, and is very useful for cutting across the end of the grain.

There are three types of chisels, butt, pocket and firmer; each of these is divided into straight-edge and beveled-edge, and into tang and socket chisels. The tang chisels have a tang or shank that is driven into a hole in the end of the handle; the socket-chisel handles fit down into a tapered socket on the chisels, and this is the preferable construction for the amateur. Whether to get beveled or straight-edge chisels is a matter of individual choice; I prefer the beveled-edge chisel, but that is partly because I do not like to strike a chisel with a mallet, other than a regular mortise

Left, a Small Vise Is a Convenient Tool; Center, Push Drill and Nest of Saws; Right, Socket Firmer Chisels, Showing How the Handles Fit

chisel, preferring to use it as a paring tool. However, it is convenient on occasion to use a mallet—never a hammer—on a chisel or gouge, and for that reason the socket chisels are recommended.

The remaining tools need little or no description. The oilstone, it will be noted, may either be Arkansas or Washita. There are two grades of Arkansas stones, the hard and the soft. The former is especially adapted to sharpening highly tempered tools, requiring very keen, smooth edges, and pointed tools such as are used by engravers, die sinkers, etc. The soft Arkansas stone is better adapted to the home mechanic, as he uses it only for chisels, plane irons, etc. The Washita stone, of which the best grade is the "Lily White," is also an excellent one for the home worker, and is generally used by carpenters and joiners. It is capable of cutting rapidly and of leaving a smooth, lasting edge. Another good stone is the India, and "slips" of India stone can be had in a number of shapes, for sharpening gouges and special plane bits.

The bench anvil may be any heavy iron, steel or cast-iron block that will serve the amateur mechanic to "pound" on. Pieces of iron bar or heavy wire very often have to be straightened, and, in the absence of anything else, the temptation is strong to use the light vise. Don't do it! There are nice bench anvils to be bought, but this is not necessary; an 8 or 10-in. length of 6-in. I-beam makes a splendid anvil, and one flange can be cut away to make a horn if desired. A good heavy piece of flat steel will serve if nothing else is available, and will save breaking a corner off the stove, or chipping up the door step, when a length of ½-in. iron bar must be straightened. The last item on the list may puzzle some; this little "rodent" is a common carpenter's tool, however, and is very useful to the home mechanic when he has to replace a broken sash cord. It is nothing more than a curved strip of lead, about 3 in. long and ⅜ in. wide, with a small hole in one end to which is attached a piece of twine long enough to reach from the top to the bottom of the window. The free end of the string is attached to the end of the new sash cord, and the "mouse" is passed over the pulley and allowed to fall inside the box. It is then brought out through the pocket and the sash cord drawn after it. The weight is then fastened to the cord.

Boring a Large Hole in a Board with the Expansion Bit and Brace

The manner of storing tools is again a matter of choice. I am, in this case, looking at the matter from the point of view of the house dweller. The inhabitant of a flat has only Hobson's choice—lock 'em up. The home owner, however, usually can find some space that he can call his workshop, and he can either have all his tools in plain sight or keep them in a locker as he chooses. I prefer the former method. A board, about 12 in. wide, and as long as the bench—or as long as necessary—is attached to the back of the bench, or to the wall behind the bench, and the tools are fastened to this with spring clips so that they can be "grabbed" instantly. Holders that will accommodate almost any tool handle can be obtained from tool-supply houses, and brass L-hooks will hold the remainder. The saws are hung on hooks at the right-hand end of the bench, and the planes are laid on edge on a 6-in. shelf above the backboard. A large number of tools can be accommodated in this way. When the tools are in place, take a pencil and run it around each tool, making an outline of the tools, in their proper places on the board, then fill in the outlines with black paint. The silhouettes tell instantly where each tool belongs, and actually help in keeping the bench tidy. It has been the experience of a number of home mechanics, the writer included, that this system is not only preferable to the locker, in point of handiness, but also discourages borrowing. There is no more fear of tools rusting when exposed in this way than when closed in drawers or in a locker. The bright parts of the tools should be wiped occasionally with a cloth saturated and wrung out in good light machine oil,

Above, Using the Jack Plane; Center, the Smooth Plane in Action; Below, a Sawhorse Kit That Will Take the Bench to the Job

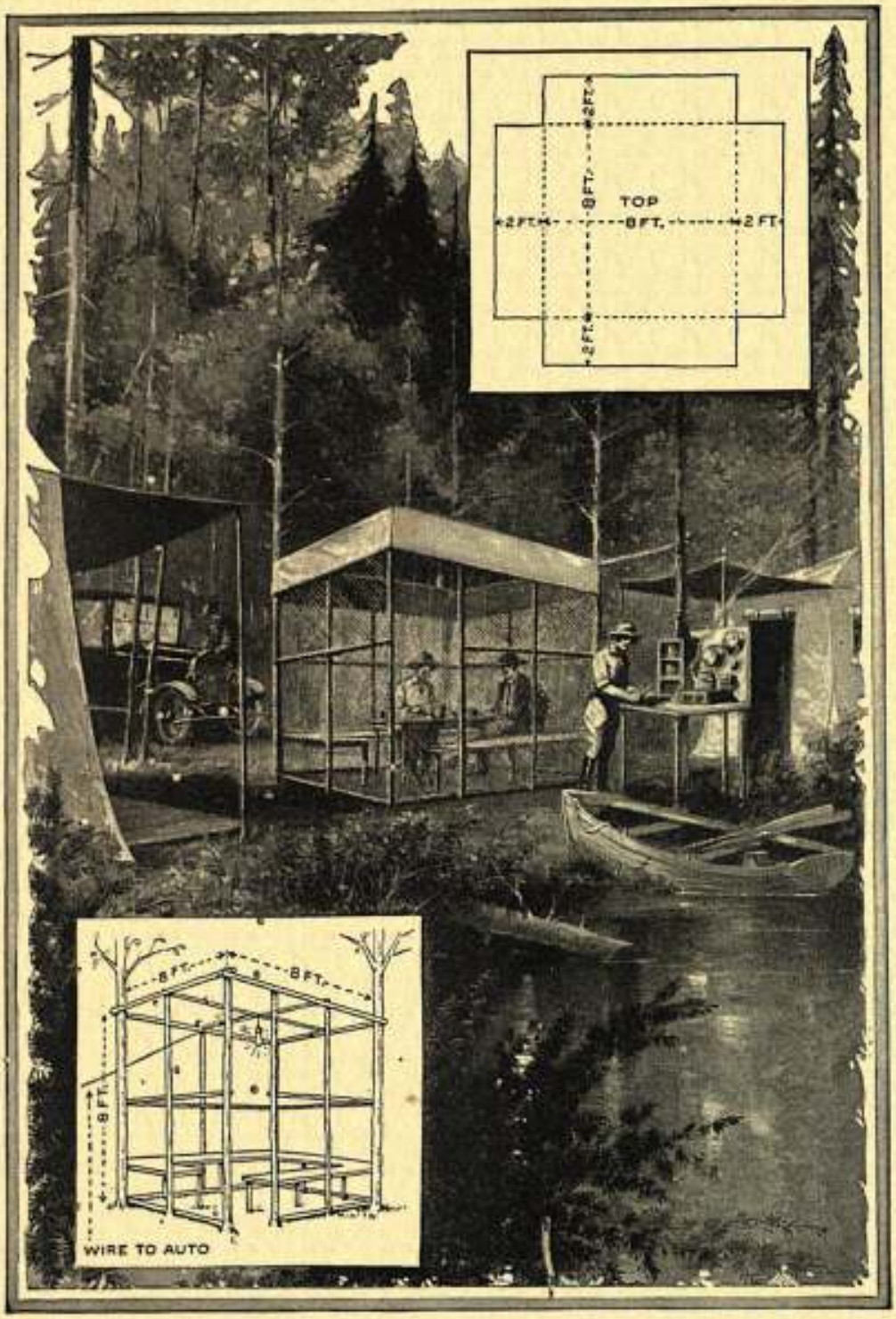
in either case. Don't use linseed oil; it will oxidize the steel.

For those who prefer the locker, two styles are shown in the accompanying illustrations. One is a large one, and will hold all the tools listed, with room to spare. It is made almost entirely of 1 by 12-in. finished lumber, and is divided into two sections. The cabinet section provides space for the larger tools and the drawer section contains nails, small tools, screws, etc. The details of the cabinet may, of course, be varied to suit the taste of the builder. The other is intended to be used in a flat, or where the full list of tools is not desired. Another scheme that was used by a reader of this magazine is shown in the drawing of the combination sawhorse and tool container. No description of this is necessary; it will not hold a great number of tools, but it forms a very convenient method of taking the bench to the job, as a small vise can be clamped to the top of the horse and many small jobs done right at the spot, instead of running back and forth to the workshop or bench.

Succeeding articles, to appear from time to time, will tell how to sharpen and care for the tools, as well as how to use them. Plan for the tool equipment of your home as you would for the remainder of it. Good tools are an investment that will return the home owner dividends in many hours of enjoyment, and, as he grows expert, in money saved by doing jobs himself.

Homemade Furniture Polish

A homemade furniture polish, which is cheap enough to permit its use on floors and woodwork, can be made from equal parts of benzine and rubbing oil, mixed thoroughly. This polish will not gum and will add considerable luster to the finest wood. About eight times as much of the polish can be made for the price ordinarily asked for a single bottle of prepared polish.



Flies, Mosquitoes and Other Insects, Which Make Camping Unsanitary and Uncomfortable, Can Be Eliminated by a Simple Rustic Inclosure, Screened with Netting; a Canvas Top Sheds Rain and Provides Shade

The TRICKS of CAMPING OUT

by Bob Becker

WHEN summer comes thousands of city dwellers feel the call of the outdoors and the lure of camp life, which means a restful, gypsylike existence far from crowds and noisy streets. To the man who knows the tricks or the "art" of camping, several weeks in a tent is a restful, carefree experience, as a knowledge of how to live in the woods means the difference between comfort and discomfort after leaving behind the world of gas stoves, spring beds and refrigerators.

The outdoor fan who chooses to put a canvas roof over his head on the bank of a stream or lake is on "his own." He must know a few things about choosing a camp site. He should know how to fix up his camp for comfort, keep perishable foods, make a bough bed and other things which contribute to the success of his "back-to-nature" existence.

The first problem that confronts the tent dweller when he arrives in vacationland is the choice of a camp site. Where the tent shall be pitched is an important matter. Briefly, the trick of "getting set" in a tent home involves the following:

Pure drinking water, a fairly level spot for the tent, an ample supply of firewood, exposure that insures sunlight part of the day, and drainage. The inexperienced camper may dream about his ideal camp buried in the heart of the forest primeval, but the experienced outdoorsman shuns such a site in the summertime, as he wants his camp to be bathed with sunshine part of the day and also swept by breezes. Therefore, a high, well-drained spot on a river or one jutting out in a lake or stream and not too densely covered with trees is an ideal location for the permanent camp.

And which way shall the tent be faced? As a rule an easterly exposure is best. Next comes the southeasterly exposure. In any event, face your tent away from that point of the compass which is apt to produce heavy blows and squalls. After the camper has scanned the landscape for the best site, found the high ground and is ready to make his decision, the common blunder usually made is to pitch the tent under a big tree. The big tree may be all right when there's blue sky overhead but during a storm it's another story. Avoid the big ones, especially those with dead limbs which may come hurtling down upon you some night.

If you are in a country that offers few fairly level spots, smooth off the floor area of your future outdoor home and cut a narrow trench around the outside of it. This should be close to the wall of the tent, about 3 in. deep and 3 or 4 in. wide.

In case of a heavy rain any water having an inclination to drain down the slope into your quarters will be caught by this "trough" and diverted.

For a permanent camp a site in dense timber into which the sunlight can hardly penetrate is to be avoided. The average city dweller who goes into the woods for his first camping experience is apt to think of shade first of all as he selects a spot for his tent. All shade and no sunlight means damp food, damp blankets or sleeping bag, unhealthy sleeping conditions and eventually mildewed equipment. Unobstructed sunlight upon your tent for several hours every day is almost a necessity if one is to be comfortable and healthy during the period spent in the woods.

Anchoring a tent in a country that has little top soil, thus making it difficult to drive the tent pegs into the ground, presents a problem that can be solved by using large logs over the guy ropes. Drive in the pegs as far as possible and then swing the ax on a log to cut a chunk to fit your needs. Roll this wood over the guy ropes next to the pegs, and it will back up the stakes in their work of holding your tent against wind. If a wall tent is used, one can dispense with the small pegs commonly used to hold the walls to the ground by having more logs or big bowlders. Allow several inches of the wall to rest on the ground. Over this place your logs or bowlders, and no pegs will be needed.

The camper needs a tool kit in order to make himself comfortable in the woods. To make rough camp furniture, cut wood, and repair equipment the following items should be taken into the woods: a good ax, hatchet, a spade (for trenching the tent, digging a refuse pit, etc.), a hammer, an assortment of nails, a ball of heavy twine, about 20 ft. of heavy wire for hooks, 1 spool of annealed wire, a small saw (if you wish to make your camp table and other furniture) and a coil of heavy sash cord or ¼-in. rope. With these tools one can play carpenter and in a

few hours have an array of equipment that will make for orderliness, comfort and health. For example, it is uncomfortable to eat while sitting on the ground, so the first job is to build a table if a folding dining table is not included in the camp equipment. Here is where the man handy with tools earns his salt the very first day in camp. He can drive four stakes into the ground for legs, nail cleats across the ends and then proceed with the top. If one has a few packing cases in camp, the top of the table can be made from them. If boards are not available, straight sticks will do. When finished the table should be about 30 in. high. Benches for it can be made in the same manner. A tent fly, tarpaulin or other fabric spread over this table completes the job.

The disorderly camper strews his equipment around, can never find anything, ignores his food supplies and then wonders why camping is more work than play. The orderly tent dweller spends several hours the first day getting things shipshape and making some of the following things for his outdoor home. First, a rack for the cooking utensils which can be made as follows: Drive two forked sticks into the ground until they are about 30 in. high. Lay a pole, 4 or 5 ft. long and 2 or 3 in. in diameter, across these. Wire or nail the ends of the pole to the supports. Then dig up that coil of heavy wire and make five or six S-hooks to be hung on the pole. With these in place you have a rack for the skillets, cooking pots, coffee pot and other cooking utensils. If there is a tree close to the "kitchen," it can be converted into a rack by nailing to the trunk inverted crotches. In the commissary tent (and every camping party should have a small tent for this purpose, with an awning to work and cook under in wet weather) we used a trimmed bush as a rack for the dish towels, etc. Ten minutes do the trick. Take your ax, go into the woods, find a bush with a number of branches and cut it down. Then trim it so that the stubs of the branches will remain. Drive this skeleton into the ground where you want it, and you have an excellent rack for the dish towels.

A camping party that stays more than one or two nights in one place should fit up the sleeping tent with a little rustic

equipment which can be made quite easily. Where to hang things is always a problem for the city man who comes fresh from a world of closets, coat hangers and furniture with capacious drawers. Here is the way to take care of the clothes, guns, tackle and other things in the sleeping tent so that they won't be cluttering up the quarters: If you are using a wall tent, sink a forked stick in each corner and then lay poles on them. Drive nails in these poles six, eight or ten inches apart or make some more wire hooks for them, and you have hooks aplenty on which to hang things. The advantage of this arrangement is apparent when bedtime comes around. One can undress, hang his clothes high and dry and in the morning simply reach up for his outfit, which has been kept out of the dirt and dampness. Guns and fishing rods can be cared for in much the same manner by forked sticks and poles placed closer to the ground. These articles may be ruined if left to lie on the floor of the tent. A rack built outside of the tent is a handy thing for fishing rods during the day, but these delicate accessories should not be left out overnight.

Although manufacturers have devised many ingenious types of lanterns and other lighting equipment for the camper, usually there comes a time when the old candle must serve after the sun goes down. They are a nuisance and a menace unless fitted into a candle holder which keeps them standing straight up. A tin can makes a serviceable candle holder if it is filled with moist earth. Tamp it down around the candle and you will have a lighting equipment fit to be used.

Although it is thrilling to read about the woodsman who rises with the sun, strides down to the crystal brook and plunges his face into the water to perform his morning ablutions, the average camper prefers a more convenient set-up, which involves a wash stand. If two trees are standing fairly close together, one can make a shelf out of sticks and a few nails on which the wash basin can be placed; if a small box is available this is still better. If the back-to-nature method of washing in the lake or stream is preferred, better give the bar of soap a fair shake by at least making a soap container as follows: Drive a stake into the ground near the water and nail into its top a small piece of birch bark, the top of a tin box or a flattened tin can which will serve as a soap dish.

In tackling the problems of keeping perishable food fresh in camp or sleeping comfortably, the city dweller camping for the first time is apt to be stumped. Food especially is a stickler. Here are some tricks that can be worked to keep such articles as butter, milk or fresh meat cool without the use of ice. In the first place use friction-top tins for butter, lard and

similar food articles. These can be purchased at any sporting-goods store. Secondly, make a sort of an "icebox" for your perishables. If you have a spring near camp your cooling box can be placed in it. Take an ordinary packing box such as the grocer will use to pack your supplies and put it down two, three or four inches in the spring or in the rivulet which flows from a spring. There should be two or more holes in each end of the box near the bottom of it so that the cool water can flow through. Place the tin of butter, the can of lard or other foodstuffs on flat rocks inside of the box, and even in the warmest weather things will keep cool. This back-to-nature type of icebox has only one drawback. It may be a lure for prowling mammals, so it is well to keep the top fastened down. A big rock will do the trick. Although this spring box will keep milk, butter and other things cool and sweet, it won't keep them from being tainted if you put fish in the cooler as the former pick up odors from other foods. If you are not near a spring, dig a hole in the moist earth for the box.

If you should be one of those fortunate campers in a not too remote area where ice can be had, you'll have to go to the nearest town for a barrel before you start to work on your icebox. A good-sized barrel is the simplest ice chest that can be devised for camp. Provide a couple of holes in the bottom of it for drainage, put the ice in the bottom and you're prepared for any temperature.

To hold such foodstuffs as beans, rice, flour, sugar, salt and similar items there is nothing like the waterproofed bags which can be purchased in nearly any sporting-goods store. They are tough, will stand punishment, do not absorb moisture and can be obtained in any size. When labeled they are ideal for carrying foodstuffs.

At least one-third of a camper's time is spent in bed, so the matter of sleeping arrangements in camp cannot be overlooked. One can stand most any kind of a hardship during the day, but when night comes there is just one thing that will keep a man going and that is restful sleep on a good bed. The camper has a wide range of bedding materials and outfits to choose from, including folding camp cots, sleeping bags, bough beds and air mattresses, all of which are recommended. The trick of keeping warm on a camp cot is in having more blankets under you than over you, as there is a big circulating air space between you and the floor of the tent which "draws" the body heat. Air mattresses make soft beds, but they need several layers of woolen-blanket insulation. While on an Alaskan big-game hunt we carried air mattresses on the entire trip, but with plenty of spruce boughs available for beds, we stuck to the latter and with a sleeping bag for warmth our sleeping facilities were top-notch.

Every camper should know how to make a browse bed even though he is in a permanent camp with cots, springs or other appurtenances of civilization. Here is

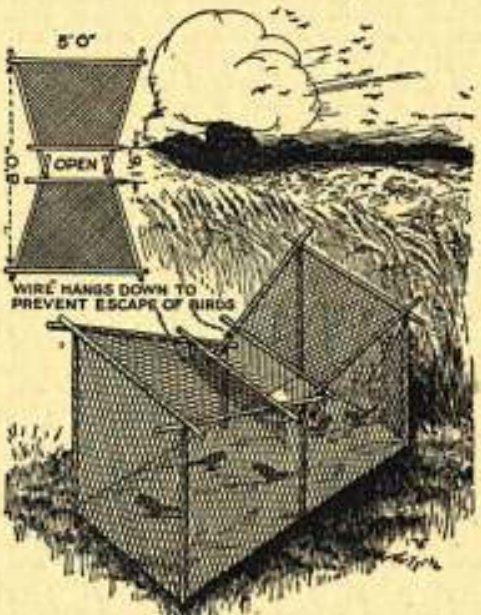
the method and, if followed, it will produce a springy, fragrant bed. First the material. Let the poet sing of his "bed of pine boughs," but when you select material for your browse bed look for hemlock or balsam trees as your sources of material. Cedar and spruce will serve very well, but pine-tree branches are quite hopeless as they haven't the bulk. With an ample supply of short twigs start at the foot or the head of your bed where short logs staked down will help to keep the boughs in place. Stick the twigs in the ground so that the tips will be exposed and lay a row across the bed. Then lay down row after row of the boughs so that only the tips will be in the air while the hard stems will be burrowing underneath. After covering the ground with a mat of this sort you're ready for the second operation. With the hatchet cut a plentiful supply of smaller branches, just long enough to keep their heads above the first layer when stuck through it. Pad the bed from one end to the other with these. If time permits, go over the bed with another layer of small twigs as a browse bed is soft and springy in proportion to the time and material used on it. Throw your blankets on this mattress, or your sleeping bag, and you needn't worry about a restful night's sleep. Another good kink is to make up mattresses from ticking; just a simple bag that will fit a camp cot. Fold them up and pack them among the dunnage. When camped, fill the mattresses with hay, straw, or even dry long grass, and you will have comfortable, warm beds.

A Wallpapering Kink

Amateurs who do small jobs of papering in their homes will find the labor simplified considerably if the paste is applied to the wall instead of the paper. This makes the handling and trimming of the strips on the table much easier, and there is less danger of soiling or tearing.

Effective Crow Trap

Traps of the kind shown in the drawing have been found very effective for catching crows. It is an easy matter for the bird to get inside from the top but impossible for it to get out again. Four light wooden posts, about 6 ft. long; two stakes, about 3½ ft.; eight poles, varying in length from 4 to 5½ ft., and some wire poultry mesh are all the materials required. The trap is located at any desirable spot, which is usually along marshes or lakes, near woods or around outlying buildings. The posts are driven into the ground, and the crosspieces and

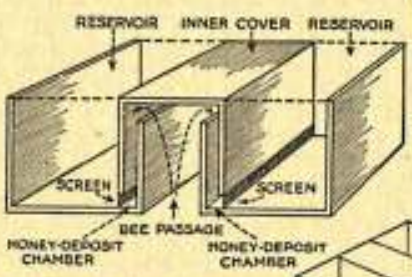


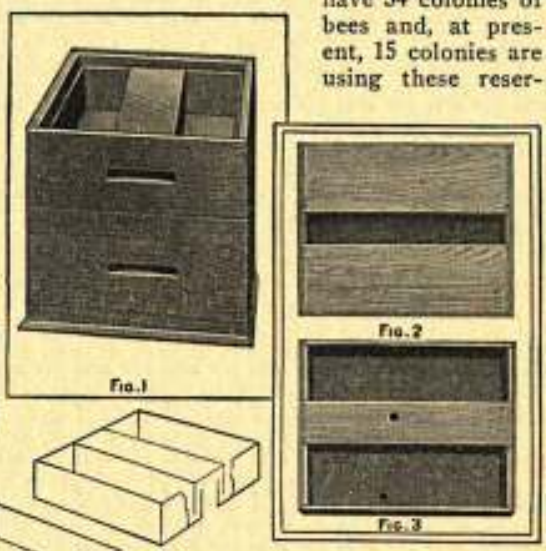
An Effective Crow Trap Which Can Be Made of Old Poles and Poultry Mesh

wire mesh are attached as shown in the illustration. Old weather-beaten material is preferable to new, and chipping marks on the surfaces of the poles should be avoided, as the crow is a wary bird. Do not go near the trap during the day, but visit it after dark.

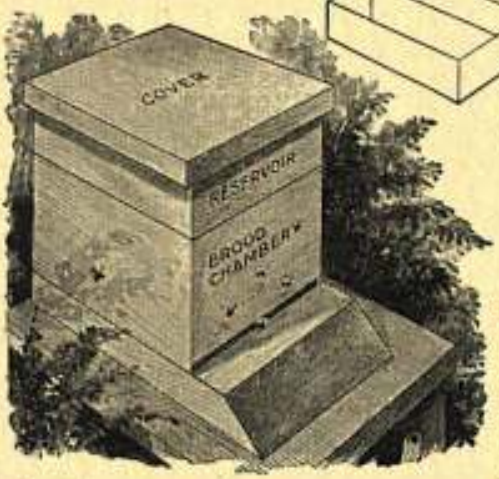
Efficient Honey Reservoirs

Liquid honey is usually obtained by separating it from the wax comb, either by the modern centrifugal extractor or by the older method of crushing the comb and straining out





Honey Reservoir Which Is Placed on the Brood Chamber. Bees Deposit Honey in It without Making Combs



the honey. I tried to have bees store honey directly in a reservoir instead of in combs and found this method highly successful. The construction of the reservoir is shown in the drawing. It is made of ⅜-in. dressed boards, leak-proofed at the joints with beeswax or paraffin wax. The reservoir does not interfere with the brood nest at all. The brood is reared as usual. Small quantities of honey and pollen are carried up and deposited in the reservoirs at either side of the hive. During the gathering season the bee master may go each evening and dip the honey, without interference from flying bees, into pails for marketing. I have 34 colonies of bees and, at present, 15 colonies are using these reservoirs and I expect to equip all my colonies with them.—L. Wilson, Ottawa, Canada.

Reassembling Furnace-Pipe Sections

When long runs of furnace pipes are dismantled it is often difficult to get the sections together again in their proper places. This is important in order to have the joints tight, and applies particularly to sections that have been keyed together to prevent sagging. The trouble may be overcome by numbering each section with black stovepipe paint and drawing a line across the union of adjoining sections. When the pipe line was to be reassembled the sections were joined in numerical order with the marks meeting, and then the keys or pins could be inserted without difficulty or loss of time.

To avoid brush marks when painting glass, clean the glass with alcohol; use thin colors ground in japan, with flatting oil to which a small amount of varnish is added, then stipple the colors on the glass.

Grass Catcher for the Lawn Mower

When you need a new grass catcher on the lawn mower, try using an ordinary basket, attached as shown in the drawing,

Homemade Grass Catcher for the Lawn Mower

and you may find this improvised catcher just as good as the commercial kind. Cut out one side of the basket and the handle, and tack short lengths of lath on the cut edges. Run two lengths of wire from the handle to the corners of the basket. The handle is fastened to the lawn mower as indicated in the lower insert.—Wilson G. Walters, Rochester, N. Y.

Improving Appearance of Bell Wiring

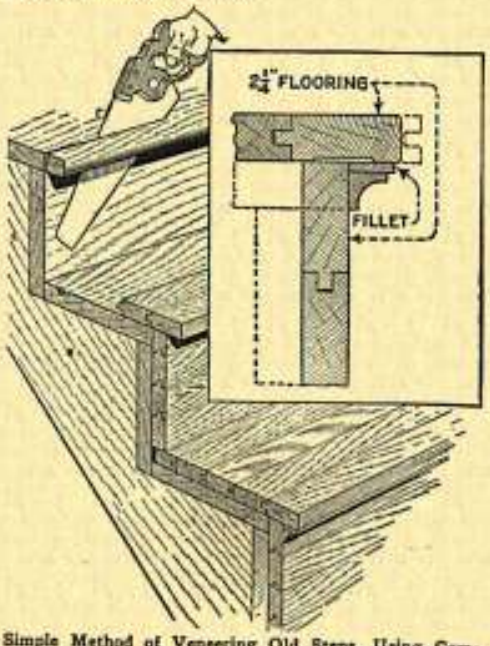
Wires leading to electric bells in houses are usually allowed to look untidy by sagging and collecting dust. In most cases the wires are coiled about a pencil and attached to the bell in a careless manner, and the insulation at the ends is allowed to fray. A couple of lengths of spaghetti tubing, such as is used in radio work, will make a much neater-appearing job. Scrape the insulation from the wire clear down to the wall. Then slip a length of spaghetti over the bared wire so that it is completely covered and the spaghetti enters the hole in the plaster. If the spaghetti is selected to match the walls, neatness is even more assured. Wrap the bottom ends of the spaghetti with a short strip of friction or adhesive tape and stick the torn wallpaper down, and you will be surprised at the improvement.—L. B. Robbins, Harwich, Mass.

Veneering Old Steps

Not so long ago my attention was called to a simple method of veneering old stair steps. At first, I was a little skeptical, but after the method had been thoroughly explained I was satisfied that it was really a successful method of repair.

The veneering used in the case illustrated in the drawing is 2¼-in. oak flooring. The nosing of the old treads is to be cut off before the veneering is put in place. The last board of the riser is ripped off in such a manner that the nosing piece will rest tightly onto it, as shown by the drawing. Then the nosing piece is nailed into place and the tread covered with flooring.

The inset detail shows how the nosing can be made out of a piece of flooring, by placing a fillet between the nosing board and the cove. It is shown with square corners, but if round ones are desired, they can easily be cut down.—H. H. Siegele, Emporia, Kans.



Simple Method of Veneering Old Steps, Using Common Oak Flooring

The SHIP-MODEL MAKER'S TOOLS

By James Hall

ONE of the beauties of ship-model making as a hobby is that such splendid results can be obtained with a minimum of tools and equipment. Many of us have seen very fine models turned out by sailors during long watches below at sea, with no more tool equipment than a jackknife, and made of wood from old packing cases, and the beautifully detailed models made by French prisoners of war in England during the Napoleonic struggle were often made from the soup bones from their daily rations, their only tools, also, being their jackknives. However, while there is an element of interest in the fact that a model has been made under such conditions, the amateur who wants to do really good work, as in every other line, should provide himself with tools specially adapted for his hobby. These are not many in number, nor are they expensive, but they will add greatly to the ease with which the model is constructed, as well as to the finished effect of the work, and besides, they all, of course, can be used for doing all kinds of other work as well.

If the Model Maker Glues Up His Own Hulls, Several Large Clamps Are Essential

There is ordinarily a small saw in the place, used for odd jobs, and this will do quite well for the rougher work of cutting off stock, etc., when the model is begun. If no saw is handy, the model maker will do well to get a panel saw, about 16 in. long. Then there is a small dovetail saw made that should be in the modeler's kit; this is about 4 in. long, and has very fine teeth, about 32 to the inch. Even this will be found too heavy for some work, and a still finer saw can be made from a hacksaw blade, provided with a wooden or sheet-metal back and a wooden handle. The blade should have about 32 teeth to the inch. Further, an ordinary hacksaw frame, with fine-tooth blades, is indispensable, and a coping saw, with blades for both wood and metal, will also be found necessary for such work as cutting lifts to

The Hacksaw with the Tube Back Is a Very Useful Homemade Tool, Also the Drill-Rod Chisel Which May Be Made in Any Shape

shape, and operations of a similar nature. There are two styles of the latter tool used by model makers; one is the ordinary coping saw, and the other is the jewelers' saw. The latter is the smaller of the two, and is thus easier to handle on some work, but the ordinary coping saw will answer the purpose just as well for ordinary work.

Chisels and other cutting tools are the next consideration. There should be at least one good-sized chisel in the tool kit, one about 1 in. wide. The best form is the beveled-edge socket chisel, and a paring gouge of similar size should also be obtained. The smaller chisels, 3/8, 1/4 and 1/8-in., and three gouges of similar width, may be of the "butt" or pocket type, with a blade about 3 or 3½ in. long. These short chisels will be found exceedingly handy. For fine work, and for reaching into places inaccessible by means of the ordinary straight chisel, some bent carving tools will be found, if not essential, at least very useful. One maker puts up small carving tools in sets of six, with a variety of cutting edges, and the smallest size of these should be purchased. One model maker fashions his own small chisels from 1/8-in. drill rod, grinding the end down and sometimes bending it, to suit the shape of edge he requires, and driving on a handle made from a piece of dowel rod. A good spokeshave is an indispensable part of the tool equipment; this may either be of the wooden type, which the writer prefers, or one with a metal body. A very good form, although a little more expensive than the ordinary, is a pattern-makers' spokeshave, which can be adjusted for either straight or curved work, as the job in hand may require.

A smoothing plane, while a handy thing to have around, is not essential, since the stock can usually be obtained surfaced at the mill, but a small block-plane, about 3½ in. long, is quite necessary. These are very cheap; in fact, five planes of this size can be obtained at the five and ten-cent stores which are good enough, provided the blade is kept sharp, and this is necessary with all cutting tools, regardless of their quality. There

is a small tool used in making musical instruments, called a thumb plane, which is a very valuable one. The body of this tool is held between the thumb and forefinger, and the "handle" butts against the palm of the hand. In case the reader cannot buy one of these tools, a drawing is given so that he can make it himself. The body is preferably of beech, although any good hardwood with a fine, close grain will do, and is made in two parts, afterward doweled and glued together, for convenience in cutting and filing the small slot and wedge seat. The handle is a short piece of dowel rod, with a hardwood knob on the end. The knob may be a slice from a broomstick, rounded on top and drilled on the bottom for the end of the dowel. The blade may be ground from a piece of hacksaw, or made from similar steel. The bottom of the plane may be flat, concave or convex, for different work, and the cutting edge of the blade ground and honed to suit. The cutter should not project more than a "hair" from the bottom of the plane.

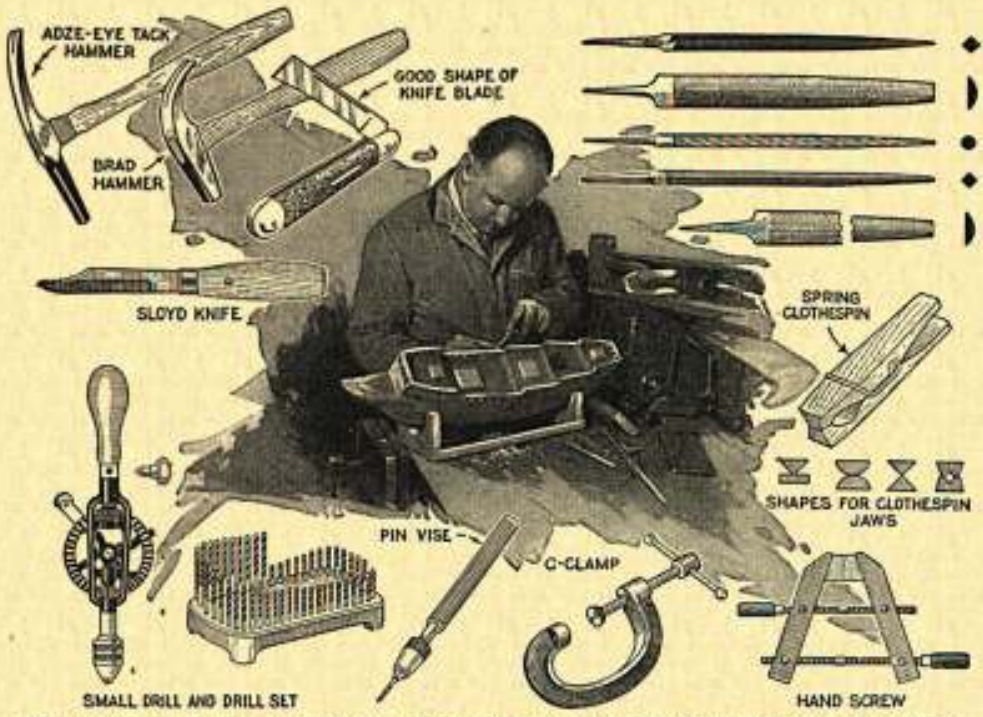
The most important of the cutting tools, after all, is the humble knife. The shape of the handle matters not in the least, nor the cost of the tool, provided the blade will take and hold a good edge. A couple of "sloyd" knives, of different sizes, are also handy, but I prefer a blade somewhat concave along its length, instead of convex as a sloyd knife is; however, that is a matter of taste. Quite good carving knives can be made from broken hacksaw blades, ground to shape and honed to a keen edge; the simplest form of handle for these is made by wrapping layers of tape around the end.

No matter what the cost of a cutting tool may be, the satisfaction it will give depends entirely on the care given the edge, since no tool is better than its cutting edge. Keep the oilstone constantly at hand and give the edge a few licks

At the Lower Left Are Detailed Drawings for Making a "Thumb Plane," in Case the Reader Cannot Buy This Useful Tool

every once in a while as the tool is used. Tools kept sharp in this way do very much better work than when they are allowed to become comparatively dull before they are sharpened. In sharpening the carving tools, finish the edges, after honing, on a razor strop, as these tools must have the very best edge obtainable, if clean cuts are to be made.

Next to his cutting tools, the modeler's best friends



The Pin Vise and the Homemade Clothespin Clamps Are Indispensable in Gluing and Drilling Small Parts; the Knife Blade Will Also Be Found More Useful When Honed to the Shape Shown

are his files. A 10- or 12-in. flat or half-round bastard file will remove a surprising amount of wood from a rough hull in a short time, and there is not nearly the danger of cutting too deeply that there is with a drawknife or chisel. It may not be good woodworking practice to use a file on work of this kind, but the model maker should not let that worry him. In addition to the large flat file, 6-in. pillar, triangular, square, and round files should be in the kit; the pillar, round and square files should be bastard-cut, and the triangular one a second-cut; an ordinary saw file is fine. These will be found exceedingly handy when making

TO THE MASTER OF THE GOODE SHIPPE "HALVE MAEN":

Dear Captain:

And now we have come to the end of the few months of shipbuilding under your masterly direction, months which should have found a grown man and a father at other things, no doubt, than bruising his fingers and cutting his mitts with planes and drawshaves, gluing the whole cellar from laundry to dog's bed with liquid cows' toenails, extracting slivers like fence rails, cussing in three languages (including Seneca Indian), when my compass steered me wrong in figuring out plans and specifications so clear that my young son could read them, but which, to me, were like the third declension of the irregular verb in Sanscrit; but at last, Captain, she stands on 'er ways as slick an' trim as the blue-eyed barmaid of the Purple Boar tavern, an'—shiver me timbers!—I'm proud of 'er!

The hours spent with my boy and dog while doing your delightful ship have been so very much worth while in the feeling of companionship and understanding which has come to the boy and me as a result of our mutual interest in this ship and its making. I find double return for any trouble and labor. That alone is pay enough, indeed, but that is not all, for we have learned many things that were mysteries; the way of ships, the meaning of many strange salty terms and expressions which fascinate boys and old boys as long as they live, and the knowing and understanding of which give a new flavor to tales of the sea. Lanyard, crow's nest, gammoning, belaying pin, lubber's hole, crow-foot—they meant nothing to us before, but now, when we read of a sailor on the foretop's'l yard, we see that tar and know he isn't down in the foc'sle . . . . The busy professional man like myself I advise, without charge, that he take his boy and his tools, go down to the cellar with those copies of P. M. and learn many worthy things. It will teach him patience, perseverance—and his boy, and when he has 'er done, and the lady of his heart who dwells upstairs pats her two boys on the head and says, "It really looks just like the pictures Mr. Miller made of his ship; put it on that table near the window," he'll feel so darned proud and so thrilled with the feeling of having seen the thing through that he'll no doubt do just what I have already done—start two more.—Dr. E. W. Flagg, Auburn, N. Y.

small parts, especially by the man who is not any too sure of his control over small chisels. In addition to these, a set of needle files should be obtained. These need no handles, and come in seven or eight different shapes; if these cannot be obtained easily, get die sinkers' files. The latter are somewhat similar to the needle files, but are used with small handles. Don't use a rasp instead of the large rough file; the latter will take off almost as much stock in the same time as the rasp, but will leave the work in much better shape for subsequent operations.

As for drills, about the largest ever used for model work is ½ in., and one each of the ½, ⅜ and ¼-in. sizes should be all that is necessary in the fractional sizes. In the wire sizes, the worker should buy a set numbered from 1 to 60, and a couple each of the No. 65, 70, 75 and 80 sizes. To hold the drills, one of the small hand drills sold for radio work is ideal, except for the ⅜ and ½-in. drills. For the small drills, from No. 60 up, and when drilling delicate work, such as futtock holes in crosstrees, get a pin vise from a jewelers' supply house, fasten a drill in it, and drill the hole by twirling the vise with thumb and forefinger.

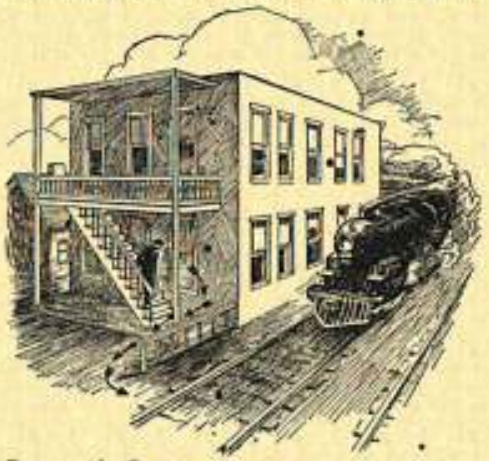
There will usually be a claw hammer around the house, and for the infrequent occasions on which a large hammer is necessary this will serve nicely. There is far more occasion for several small hammers. Get an 8-oz. ball-peen hammer, a 5-oz. tack hammer and a 7-oz. adze-eye hammer with a long nose and claw, somewhat like an upholsterers' hammer, and you will be well equipped. These need not be expensive, since the work they are called on to do is very light. The writer has some hammers of the kind mentioned that cost only ten cents a piece, and has been using them for years with satisfaction.

Among the miscellaneous tools that will be found handy around the bench are a good square, with at least an 8-in. blade, an awl, a pair of good small tweezers, a crochet hook, and a number of small clamps. The crochet hook seems rather a peculiar "tool," but it will be found very handy in rigging. Among the clamps should be several sizes of small C-clamps; also, if possible, at least two, opening 6 in., known as carriage clamps, and two regular wood clamps. If you can get a cabinetmaker to glue up your hulls, the large clamps will not be necessary, but the small clamps are essential. Very good clamps for light work can be made from ordinary spring clothespins, the jaws being cut into several different shapes to suit the work.

The individual can add to this stock as he progresses and finds that he needs one or more tools of a size not specified. There are some tools not mentioned that may be preferred for certain work by some modelers, such as a drawknife, and, of course, one needs an oilstone and oil slips for sharpening chisels, gouges, etc., as well as sandpaper of different grades for finishing work.

Safety Fence Prevents Railroad Accidents

In many towns railroads run close to buildings, and to reduce the number of



Fence at the Bottom of Stairway Minimizes the Risk of Railroad Accidents.

accidents, a safety fence of the kind shown in the drawing will be found effective. When coming down the stairs behind the building a person may not hear or see an approaching train, and unless there is some barrier, he is apt to walk from the steps directly onto the track. A railing, about 3 or 4 ft. high, can be built at the bottom so that a person descending the steps is compelled to follow the route indicated by the arrows, which gives him time and opportunity to see whether or not the track is clear.—J. S. Hagans, Chicago, Ill.

Build Your Own Ship Model

By J. EARLE MILLER

BUILDING one of the ship models which have attained such favor for interior decoration is a simple task, once the secret of the carving of the hull has been mastered. This job has scared many prospective model builders, but by the "bread and butter" method used by professional model makers the hull is, in fact, the easiest and simplest part to make.

This is the story of the building of a model of Hendrick Hudson's "Half Moon," one of four model ships recently constructed in the Popular Mechanics experimental shop. While no authentic plans of the actual "Half Moon" exist, this model represents what the ship must have been like, according to contemporary accounts and plans.

To start with, the builder will need four 2 ft. lengths of 7/8-in. net white pine, 10 in. wide and free from knots; a cigar box or two for thinner wood; a dozen lengths of

round dowel stock, equally divided between the 3/16, 1/4, 5/16 and 7/16-in. sizes, to make the masts, yards, bowsprit and flagpole. The dowel stock can be obtained from a hardware store and the white pine, which should be well seasoned and dried, from a lumber dealer.

Above, the Rough Hull Ready for Carving to Shape; Upper Left, Gluing the Lifts Together; Note How the Sawed Boards Show the Shape of the Hull Lines

The templates represent the "bread and butter" method lines as taken from the blueprints, and are one-quarter the size of the actual boards. In this system, the hull is reduced to a series of flat boards or "lifts," which are glued together and then carved down with draw and spokeshaves, chisels and files. As the inner edge, where each two lifts meet, represents the hull line at that point, it is only necessary to carve off the projecting corners. The carving of this hull was completed in less than an hour.

The tools needed include a coping saw, a drawshave and spokeshave, flat chisels and gouges, several flat, half-round and round files, a wood-carver's knife, or, in its stead, a strong, sharp jackknife, a gluepot and supply of a good grade of glue, two or three large clamps and a half dozen of the small metal clamps sold in the dime stores.

Blueprints for this, and a wide range of other ships, are sold at prices ranging from $2.50 to $10 a set, depending upon their completeness. A full set of five prints purchased from a model designer for this ship costs $10, but the ship can be built without the use of prints by laying out the hull from the templates given.

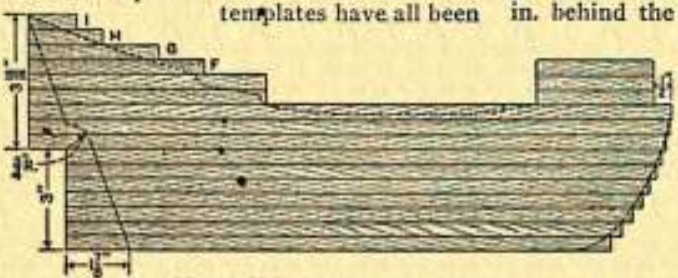
The hull templates, as given, were laid out for lifts 7/16 in. thick, which happened to be the size on hand. Take a large sheet of drawing or heavy wrapping paper and lay it out in 1-in. squares. Using one of the horizontal lines as a center, lay off the full-size half-template according to the squares given for line No. 1. Then fold the paper along the center line and cut both thicknesses at the same time. Unfold, and you have the full template for the first plank below the finished deck. Follow

the same process for the other eight lifts in the hull, and for the shorter pieces of the poop and forecastle (fo'c'sle). The rounded ends of the templates are the bow ends. The templates are then laid out on the pine boards, marked, and are then ready for sawing. The bow or stern ends of each piece should be indicated, and the center marks at bow and stern transferred from the templates to the wood. The lifts are then sawed out with the coping saw, and are ready for gluing, after the center lines have been marked down one face and both ends.

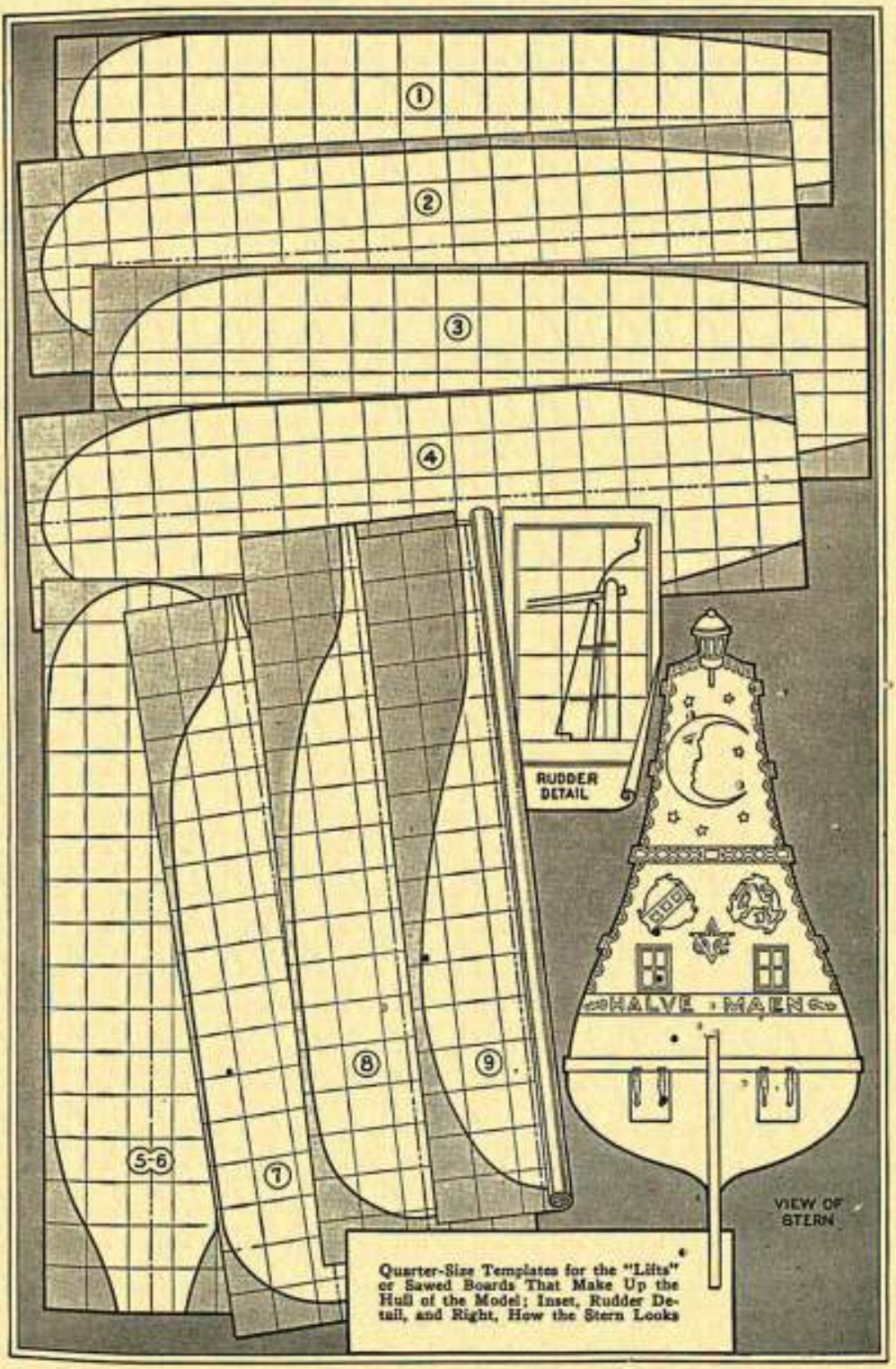
Start with lift No. 1, coat it with glue on the side bearing the center mark, and coat the unmarked side of lift No. 2; place the two glued surfaces together and line them up by the center marks. As No. 1 is the first lift under the deck line, you are building the hull from the deck down to the keel, so that the center lines will be face up, and as the lifts get smaller toward the keel, each succeeding one can be lined up by the end marks. At the stern the templates have all been continued to the same length, and the ends are lined up vertically as the gluing proceeds, while the bow ends get progressively shorter, simplifying the later carving of the stem. When plank 9 has been glued in place, clamp the entire hull tight and set it aside for twenty-four hours. While it is setting, the laminations of the poop and quarterdeck and the forecastle can be glued together in the same way and placed in clamps or a vise.

View of the Completed "Half Moon" Model, Fitted with Sails

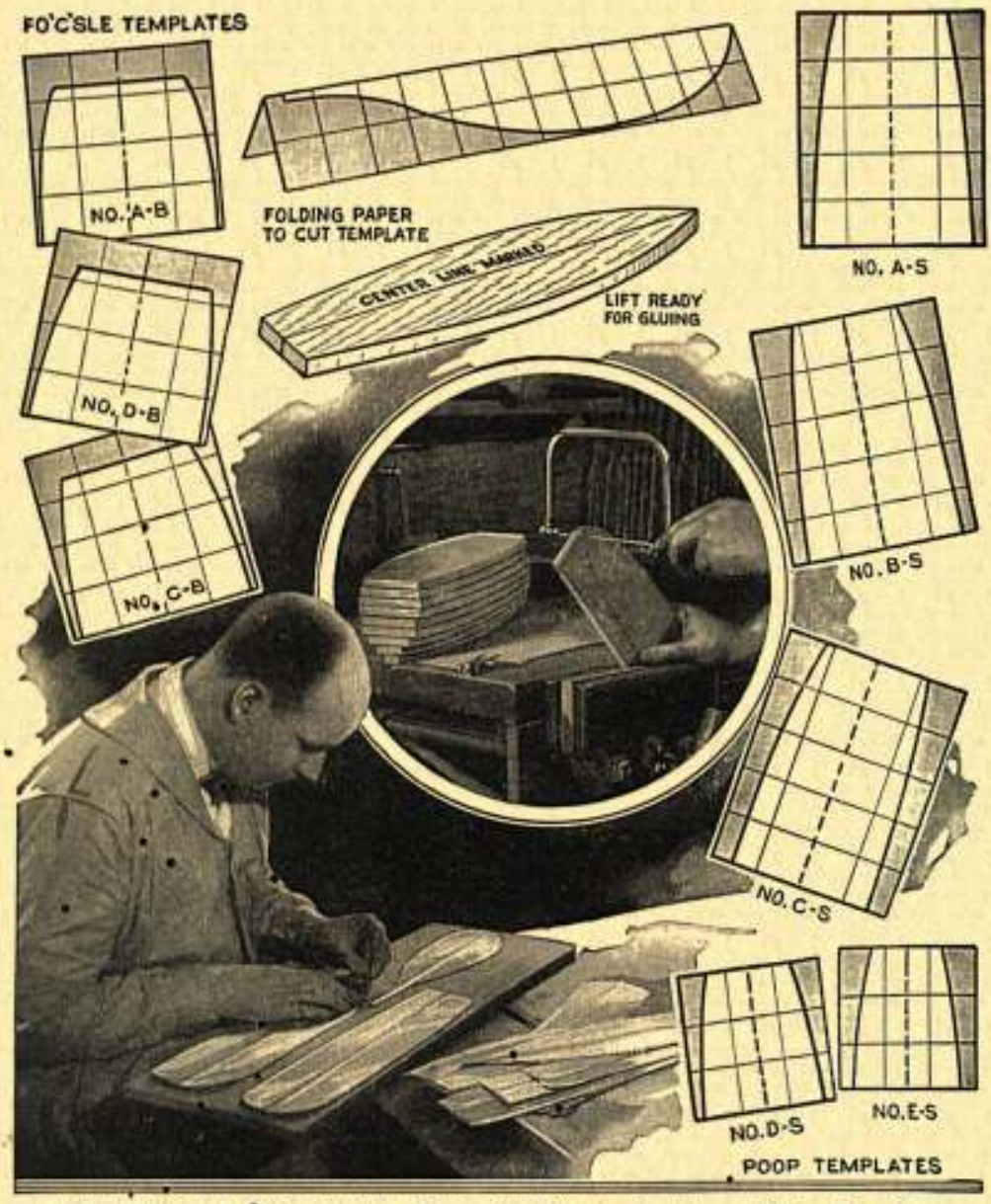
After the glue has set, the forecastle and stern superstructures are glued to the main hull and held in place with the large clamps. Like the hull parts, the pieces of the poop and quarterdeck are cut to line up at the stern, and, in gluing, they are centered in the same way as the hull parts. In assembling the stern superstructure to the hull the upper works project over the stern 1⅛ in. to take care of the extreme rake of the stern, which is sawed out later. After the stern sections are glued and clamped in place a line is drawn across the deck ½ in. behind the forward end of the upper lamination of the hull proper, and the forecastle glued on, with its front edge on this line. The completely assembled hull and superstructure, ready to start carving, is shown in the photograph on page 21. The first step is to saw



Side Elevation of Rough Hull, Showing How the Stern Rake Is Sawed



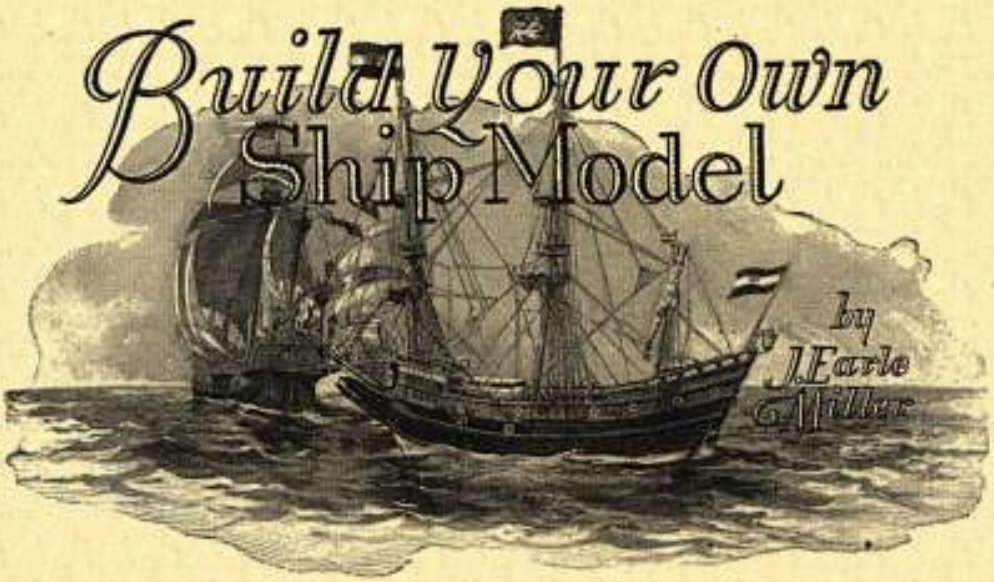
Quarter-Size Templates for the "Lifts" or Sawed Boards That Make Up the Hull of the Model; Inset, Rudder Detail, and Right, How the Stern Looks



Details of Making and Using Templates, Marking Out Lifts from Templates, and Sawing Them Out

the rake of the stern. Draw a line down the side from the extreme rear of the topmost plank in the poopdeck, to the point where the superstructure meets the main hull. Next mark a point 1⅝ in. from the stern end on the keel plank, and a second point $3^{15}/_{16}$ in. up from the bottom of the keel plank and ¾ in. in from the stern, and connect this point with the one on the keel plank. From the upper point draw a ¾-in. arc, and then, with hand and coping saws, saw out the stern rake. Next shave off the last inch or two of the hull down to the stern lines. With that much completed, it is easy to shave off the projecting edges of the remainder of the hull until the rounded lines are completed.

Build Your Own Ship Model



by J. Earle Miller

SHAVE the bow lines down to the edges of the lifts, but do not finish the bow at this stage, since a wooden stem piece must later be fitted here.

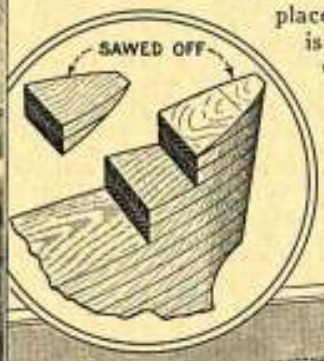
The deck lines may be cut down to size before or after the hull carving, following outline, marked side view of rough hull. The main, or well deck, in the space between the forward end of the stern section and the rear of the forecastle, is slightly curved, being 3/16 in. deeper at a point 5 in. forward from the stern section, than it is at the ends. Extreme care is not necessary in cutting down, because the surfaces will be covered by the deck planking.

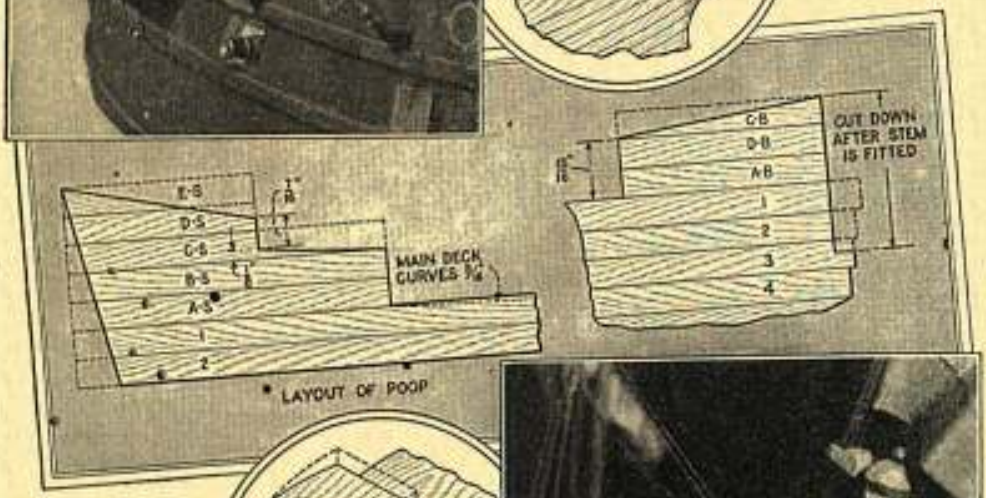
If clear white basswood is available, it makes excellent decks, but a selected piece of clear white pine will do in its absence. The deck planking is 3/16 in. thick, and the pieces for well, quarter, and forecastle decks are cut slightly wider than the hull so that they may be trimmed down after being glued in place. Cut out the four pieces, lay them in place and, at each end, mark the points where the edges, after they are finished, will come. Measure in 3/8 in. from these points, and connect the inner marks with curved lines corresponding to the curvature of the hull. Then halve the distance between these lines at each end, and connect the centers with a straight line. On either side of this straight line lay off parallel lines 3/16 in. apart. With the point of a knife, score the edge curved lines and the other straight ones lightly, and then, with a well-sharpened pencil, run lines in the knife cuts. Next, at

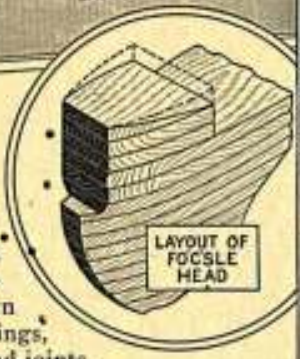
View of Quarter, Showing Rake of Bulwark and Quarterdeck, Also Deck-Plank Lining

look old and well worn. After the shellac has dried, glue the decks in place and then trim the edges down to meet the hull lines. It is not necessary to clamp them on and wait for the glue to set. They can be nailed in place with small brads or pins, cut down to brad size, and later the heads can be countersunk and puttied over.

After the decks are in place, the next step is to make the bulwarks around the forecastle top and stern superstructure. Cut a piece of 3/32-in. thick white pine or







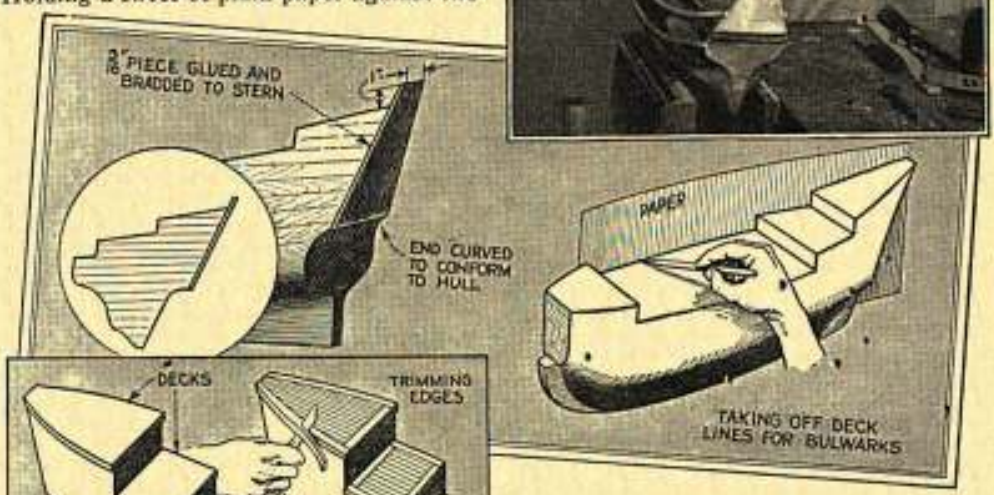
Upper Left, Fo'c'sle Head and Deck on Finished Model; Center, Poop and Fo'c'sle Layout; Lower Right, Photo of Stern

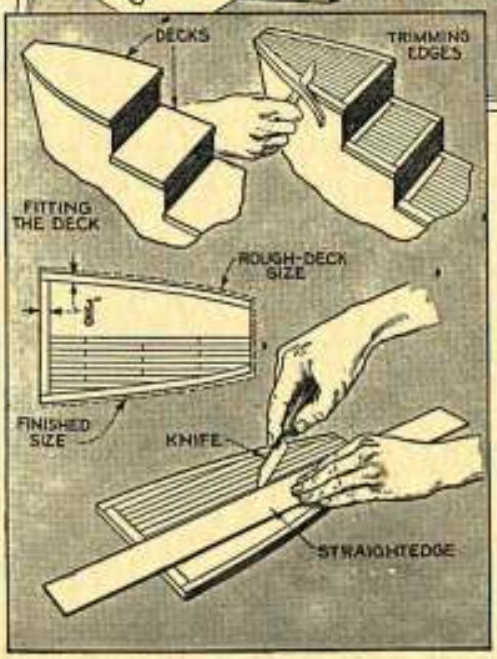
intervals of 2 in., cut and pencil in cross marks in the planking, as shown in one of the drawings, to represent the end joints.

If you wish to show the deck spikes they can be pricked in with a needle point and brought out with a sharp pencil. After all the deck planks are marked, sand the surface clear of dirt and then shellack it. The sanding process will dust over the pencil marks in the grooves and dim their newness, so that the shellacked surface will

basswood, a little longer and wider than the stern, and glue and nail it to the stern, with the top edge projecting 1 in. above the deck, and the lower edge just even with the point where the superstructure ends and the stern curves inward before starting the straight downward rake to the keel. With a half-round file smooth off the lower edge to conform to the stern curve, and trim down the edges to match the sides of the superstructure. The 1-in. projection above the stern of the poop-deck furnishes the rear bulwark, and the flat piece itself gives a better surface on which to paint the decorations of the stern, than would be the case if the end grain of the hull wood was left bare.

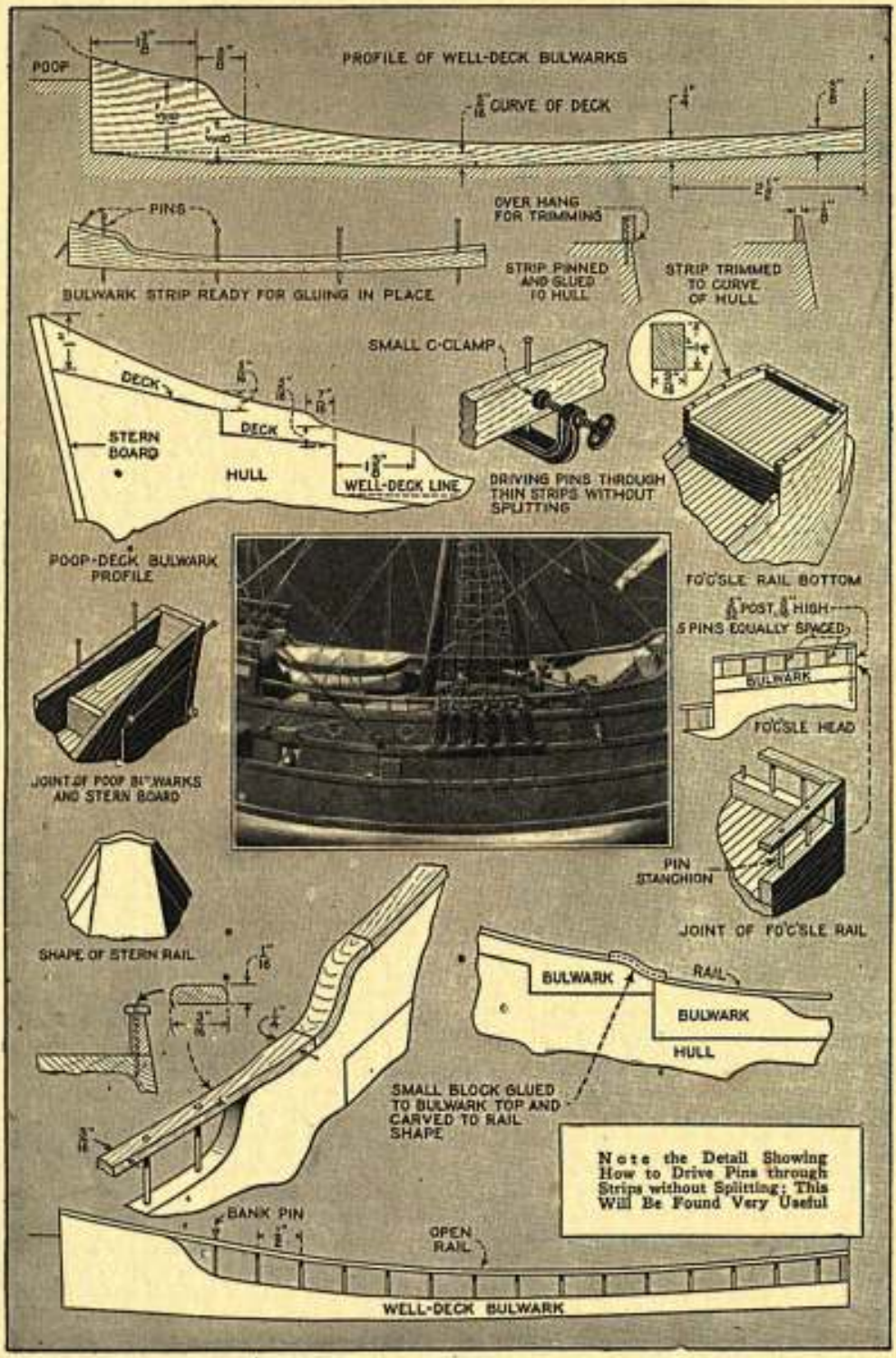
Next cut and fit the side bulwarks. Holding a sheet of plain paper against the





Above, Photo Showing Half-Finished Hull; the Drawings Illustrate Details of Hull Construction

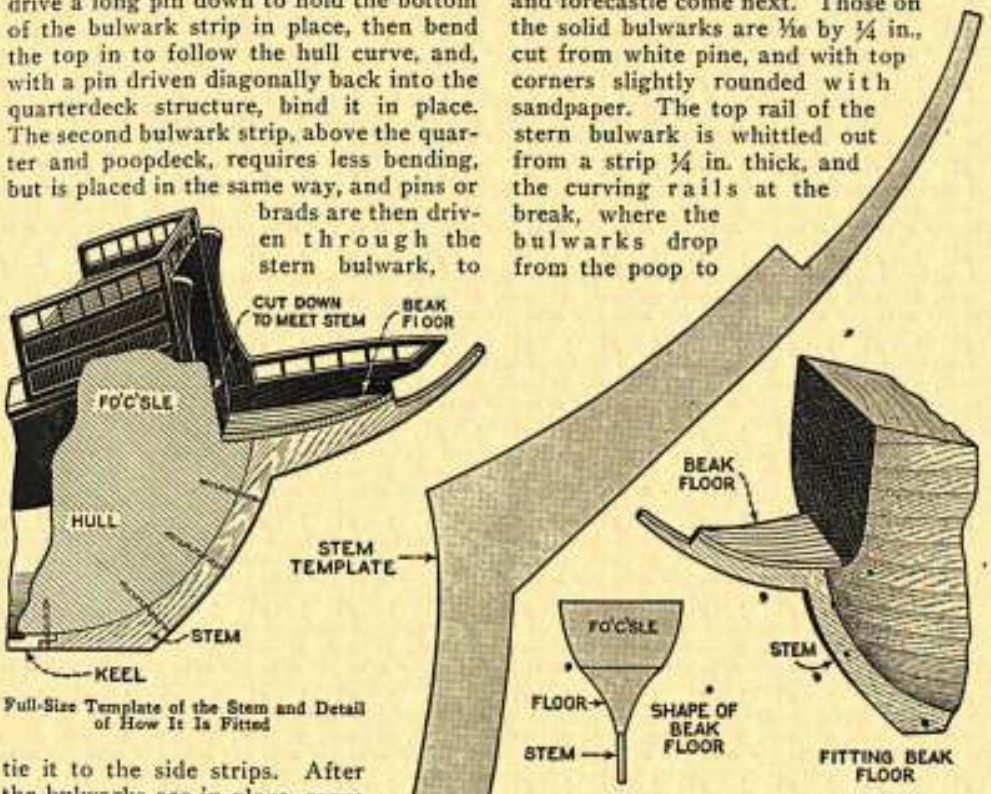
side of the ship, the deck lines can be traced on it, to give the lower edge of the bulwarks. They should be sawed out of ¼-in. soft white pine, and carved down to ⅛ in. in thickness, after being glued in place. The bulwarks take considerable curving to fit the hull lines, which accounts for the need of the extra ⅛ in. of material. After they have been sawed out and fitted, take several ordinary pins and drive them down through the bulwarks, then coat the lower edges of the strips with glue. Starting just aft of the forecastle, pin the bulwark strip in place, allowing its outer edge to project slightly past the hull line. At intervals of 1 or 1½


PROFILE OF WELL-DECK BULWARKS
POOP
CURVE OF DECK
PINS
BULWARK STRIP READY FOR GLUING IN PLACE
OVER HANG FOR TRIMMING
STRIP PINNED AND GLUED TO HULL
STRIP TRIMMED TO CURVE OF HULL
SMALL C-CLAMP
DECK
DECK
STERN BOARD
HULL
WELL-DECK LINE
DRIVING PINS THROUGH THIN STRIPS WITHOUT SPLITTING
POOP-DECK BULWARK PROFILE
FO'C'SLE RAIL BOTTOM
POST HIGH
5 PINS EQUALLY SPACED
BULWARK
FO'C'SLE HEAD
JOINT OF POOP BULWARKS AND STERN BOARD
PIN STANCHION
JOINT OF FO'C'SLE RAIL
SHAPE OF STERN RAIL
BULWARK
RAIL
BULWARK
HULL
SMALL BLOCK GLUED TO BULWARK TOP AND CARVED TO RAIL SHAPE
Note the Detail Showing How to Drive Pins through Strips without Splitting; This Will Be Found Very Useful
BANK PIN
OPEN RAIL
WELL-DECK BULWARK

in., working toward the stern, drive in additional pins, bending the bulwark strip to fit the hull line, but always allowing it to project slightly, so that it may later be shaved, filed and sanded down to fit. When you reach the break of the quarterdeck, where it rises above the main deck, drive a long pin down to hold the bottom of the bulwark strip in place, then bend the top in to follow the hull curve, and, with a pin driven diagonally back into the quarterdeck structure, bind it in place. The second bulwark strip, above the quarter and poopdeck, requires less bending, but is placed in the same way, and pins or brads are then driven through the stern bulwark, to tie it to the side strips. After the bulwarks are in place, carve the outer surface down to fit the hull lines and then, with a knife, shave off the inside until the bulwark has been reduced to ⅛ in., at the top at least. The shaving process will reduce the overhang and widen the deck space.

The forecastle bulwarks, around the two sides and front, are ¼ in. high and 5/16 in. thick. The strips that are to go along the sides of the bulwarks must be bent to conform to the curvature of the forecastle. Cut them to size and length and drop them in a kettle of boiling water for a half hour, by which time they will be pliable enough to be glued and pinned in place.

The rails on top of the solid bulwarks aft, and the open rails of the well deck and forecastle come next. Those on the solid bulwarks are 1/16 by ¼ in., cut from white pine, and with top corners slightly rounded with sandpaper. The top rail of the stern bulwark is whittled out from a strip ¼ in. thick, and the curving rails at the break, where the bulwarks drop from the poop to the lower level of the quarterdeck, are whittled out and fitted in the same way. Next, glue the straight rails along the bulwarks from the stern to the break, and then cut the long pieces, which stretch from the break to the forecastle. Before gluing them in place, the portion that is to be left as an open rail, can be shaved down to 5/16 in. in width, since it has no solid bulwark to project over. Mark the open-rail section, and at ½-in. intervals drill holes through it with a No. 60 drill. Then cut two small pieces, 1/16 in. thick, ⅛ in. wide and ⅜ in. long, and glue one on top of the bulwark and to the forecastle on either side, on which the rails will rest. Glue the rails in place, and you are ready to put in the stanchions of the open rail-



Full-Size Template of the Stem and Detail of How It Is Fitted

ing. These are made from the long, heavy pins known as "bank pins." Cut them off ⅝ in. from the point, lay the tops away for future use, and use the point sections for stanchions. Push them through the holes drilled in the rail, slip a ⅜-in. block between bulwark and rail, and drive the pins down into the bulwark. If the latter shows a tendency to split, take one of the small metal clamps and tighten it on the rail at the point where the pin is penetrating. After the pins are all driven down flush with the rail top, they may be countersunk slightly, and the holes filled with putty or a prepared crack and crevice filler.

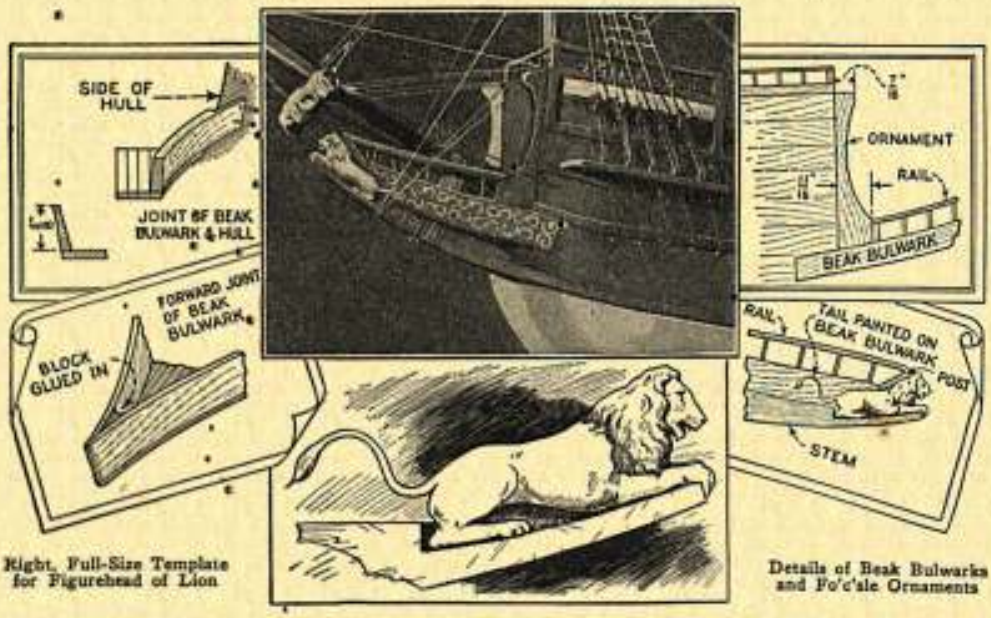
The fo'c'sle bulwark rails are made in the same way, except that the corner posts are of wood, ⅛ in. square and ⅜ in. high. Clamp the posts in a vise and carefully drive small pins down to help the glue hold them in place. Then glue the rails on top and add the pin stanchions.

The next step is to build the beak, which, in these old ships, still retains distinct traces of its ancestor, the fighting beak of the Roman galleys.

Using the template on page 853, lay out the stem on a piece of white pine or basswood, 5/16 in. thick, turning the template in such a way that the grain of the wood will run as straight as possible with the thin fore-end to which the deck of the beak must later be fastened. The stem is designed to project slightly under the hull, and later the keel will be joined to it and continue aft.

Glue and pin the stem to the hull and then, with a handsaw, cut the bow straight down from the front end of the forecastle to the level of the stem top. Next saw out the beak floor from 1/16-in. white pine, and mark the deck planking in the same manner as for the main decks. Glue the floor in place and you are ready to start building up the bulwarks. Their lower edges, where they join the floor, are beveled at an angle of about 30°, so as to give them an outward flare. They can be cut from ¼-in. white pine, and at the rear end 5/16 in. is whittled down to a thickness of 1/16 in., to bend around and join to the hull, as shown in the detail sketch. It will be necessary to steam them by boiling. A half dozen of the small clamps will not be too many to hold them as they are bent, glued and pinned in place.

The figurehead of the lion comes next. It is carved from ⅜-in. soft wood. Cut a strip to the proper length and height and lay out the lines shown in the figurehead drawing (actual size) on this page. The space under the belly and back of the hindlegs is carved out, but the pairs of legs are not separated. Instead they run through the full width, for greater strength.



Right, Full-Size Template for Figurehead of Lion

Details of Beak Bulwarks and Fo'c'sle Ornaments

Glue the figurehead in place on top of the projecting end of the stem and beneath the front end of the bulwarks. A small stanchion, ⅛ in. square and ⅛ in. long, fastens on top the bulwarks and extends along the lion's back to form the forward support of the beak rails.

The ornamental extensions of the bulwarks up the sides of the forecastle come next. They are from ½-in. stock, carved out to fit the curves of the hull, and brought down to a finished thickness of ⅛ in. Their side view is shown in the detail, and further dimensions are valueless, since they can best be fitted to the hull and beak by cut-and-try methods. The rails from these pieces to the strip above the lion's back, and the pin stanchions, are added in the same way as those on the other decks.

False Eyes Make Comic Design

This pair of false eyes can be made by anyone. The eyes themselves are made from two oval pieces of heavy white cardboard, about 1¼ in. long by 1 in. wide. Soak them in water until pliable and then lay between two spoon bowls, pressing the two, until the paper becomes convex, with a weight. Let the paper dry for 24 hours. Paint the convex sides like eyes and glue between them a wire bow as shown. Drill a small hole in each pupil. Place this pair of glasses on your nose so that they cover your eyes completely. You can see through the holes well enough to get about and the disguise will prove very comical, especially if the eyes are made to represent crossed eyes or are of different colors.

Small, Collapsible Footstool Found Convenient When Sitting on Pullman Berth

Small Footstool Convenient on Train

A rather short woman whose feet could not touch the floor when she sat on the berth of a railroad coach, carried with her a little collapsible footstool. The construction of the stool is shown in the drawing. It is about 8 or 10 in. long, 6 in. wide and about 3 in. high. When in use, the sides are braced and held in position by a 1-in. strip of wood, which is hinged to the underside of the top. When the stool is collapsed, this strip is pushed into a groove cut for this purpose, so that it is flush with the underside of the top, and then the sides are folded in. The legs can be made more or less ornamental.

After burning soft coal all winter, the chimney is so dirty that a fire in it may occur. An easy way of cleaning it is to throw a piece of sheet zinc about 4 by 4 in., into the furnace when there is a hot fire. This will change the soot into small white flakes so light that the draft blows them out of the smokestack.

Draining Vapor Lamps

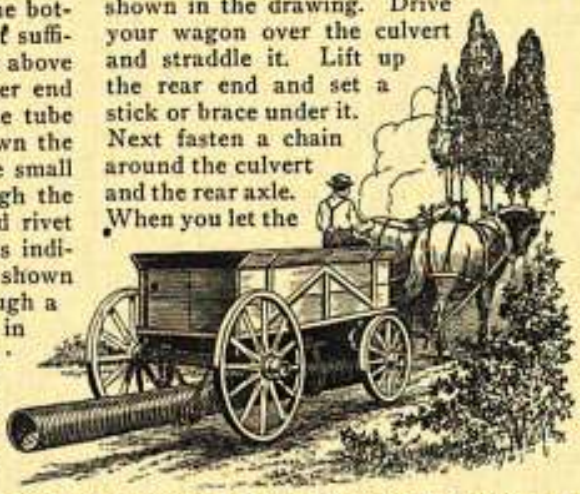
Vapor lamps burning kerosene or gasoline depend upon clean fuel for the best operation. Dirty liquid must be removed before it carbonizes or clogs the delicate

Getting All the Dirty Gas Out of Vapor Lamps with a Siphon

jet in the burner. Getting all the gasoline out of the lamp by inverting it is almost impossible, but by using a siphon, as shown in the drawing, the job is easy. A siphon can be made as follows: Straighten out two old generator tubes and force out the asbestos filling with a steel wire. Saw off one tube so that it will reach the bottom edge of the fount by curving it sufficiently and will project a short way above the fount. Slightly pinch the lower end so that a lead shot, dropped in the tube from the top, will travel easily down the tube, but will not come out of the small end. Then drill a fine hole through the tube, ½ in. above the bottom, and rivet a piece of pin through the tube, as indicated. This forms a check valve, as shown in the detail. Push the tube through a rubber stopper with a notch cut in the side to make an air intake to the fount. When properly adjusted the check valve should nearly touch the bottom of the fount with the cork in place. Then fit about 2 ft. of rubber tubing to the top of this tube. Make a suction pump from a 4-in. length of brass tubing with an inside diameter just large enough to let the generator tubing slide up and down in it. Solder a short piece of the smaller tubing in one end and in the other end insert a 4-in. length of generator tube that has been straightened perfectly. The flanged end may be used for the plunger and can be filed down to make a snug fit. The operation of the siphon is as follows: Tip the lamp at an angle on the table and arrange a pan at a lower level near by. Insert the first tube and let the suction pump hang over the pan, always at a lower level. Push the plunger of the lamp almost in and, placing the finger over the opening, pull the plunger out sharply nearly its entire length. Repeat this two or three times, and the liquid will be drawn up and flow by itself out of the open end of the plunger. Each time the plunger is drawn out it pulls the liquid up, which cannot return because of the check valve. Two or three such operations will fill the tube so that the siphon is started. To work properly, the generator tube must be a good fit in the brass tubing.—L. B. Robbins, Harwich, Mass.

Sling for Transporting Culverts Single-Handed

Moving culverts or tubes made of corrugated steel is quite a heavy task for one man when they are 16 or 18 ft. long. However, an easy method of doing this is shown in the drawing. Drive your wagon over the culvert and straddle it. Lift up the rear end and set a stick or brace under it. Next fasten a chain around the culvert and the rear axle. When you let the culvert down it will be suspended beneath the wagon as shown in the illustration. A chain may then be fastened around the culvert and the coupling pole of the wagon.



Moving Long Culverts Is No One-Man Job, But This Method Is an Easy One

Build Your Own Ship Model

By J. EARLE MILLER

YOU are now ready for the strakes, or bands of molding, along the hull, which serve both for ornament and as bumpers to protect the ship when rubbing against the dock. The strakes are 3/32 in. thick and 5/32 in. wide. Start with the top band along the poop. It begins on the line of the main-deck rail, where the latter curves sharply upward to meet the poop rail, and runs back, parallel to the latter and 3/8 in. beneath it. Glue and pin it in place. The next strake runs along the top edge of the solid main-deck bulwark, just beneath the stanchions, and continues the full length from stern to fo'c'sle. The curve of the bulwark gives the correct line, and when carried out to the stern, the strake will be parallel to the first one. The same curve is carried forward and upward along the fo'c'sle so that the strake is parallel to the fo'c'sle bulwark line. A short strake is glued along the bulwark, just beneath the open rail, and uprights connect it at front and back of the forecastle with the long strake below. Between the uprights, a narrower strake divides the fo'c'sle side into two panels. It is so placed as to continue the main-deck rail line. The next long strake starts at the beak rail, and continues aft the length of the ship, parallel to the strake above.

Another full-length strake starts at the top of the beak bulwarks and continues aft, parallel to the one above. The final strake, marking the water line, carries the line of the lower edge of the stem back in a gentle sweep to the point of greatest width at the stern, just above where the hull turns in sharply to form the stern lines. Instead of following the stem and hull lines it starts with a knee, roughly triangular in shape, forming additional bracing for the stem. Cut the knee to the shape shown, and carve or file down the edges to fit the lines of the stem and hull. Glue and pin it in place, and then fit the long strake. The final task on each side is to break up the top panel beneath the poop rail with five ornamental uprights. Cut a strip of basswood, 3/8 in. wide and 1/16 in. thick. At intervals of 3/8 in. along its center line drill 5/32-in. holes, and then, with a knife, cut off sections, slicing through the center line of each hole. The result is small pieces, somewhat like an hourglass in shape. Five are required for each side, placing them equally. Only two strakes are required across the stern, placed as shown. From the same stock, cut three pieces and glue and pin them across the break of the poop, quarter and fo'c'sle decks, flush with the deck line.

The cradle may be made at any time, but is handy to have before the rigging starts, as it keeps the boat upright. It is cut from 1/2-in. white pine, using two pieces 2 1/2 by 6 1/2 in. They are joined by two braces, 6 1/2 in. long, which may be made of round dowel stock, square, or, if

a lathe is available, turned to an attractive shape, as was done in the case of this model. The end members are cut as shown in the sketch. Find the center point on the keel, measure 3¼ in. each way and bend two pieces of radio bus wire or wire solder to shape around the keel and sides of the hull. Lay the wire down on the end members of the cradle, adjusting it so that it comes just within the ends, keeping the center on the center line of the wood. Mark along the inner edge of the wire with a pencil, and, with a coping saw, cut out the cradle. After it is assembled, final fitting can be done with a file. The cradle is completed by gluing strips of green or brown felt along the top and bottom surfaces.

The deck furniture comes next. The inside of the bulwarks and the ends of the poop, quarterdeck and forecastle should be painted at this stage, and windows and doors added. The color scheme decided on for this boat was light gray or white underbody, black upperworks, with a French gray or white panel below the rails, so a deeper, pure gray was used for deck furniture and the inside surfaces. The best results are obtained by using automobile paints ground in japan, and sold in 4-oz. tubes. The japan colors dry much quicker than paints mixed in oil, and this is emphasized by cutting the paints as they come from the tube with enough turpentine to make a thick cream.

The doors to deck house and forecastle are cut from the grained paper pasted on cigar boxes to imitate wood, and a narrow black border is painted around them to represent the frame. The windows are painted with black bowlers and crossbars, and aluminum paint, the kind that comes in powder form with a separate can of solvent, is used for glass, while the shadows are touched up with a dash of light blue in the corner of the glass.

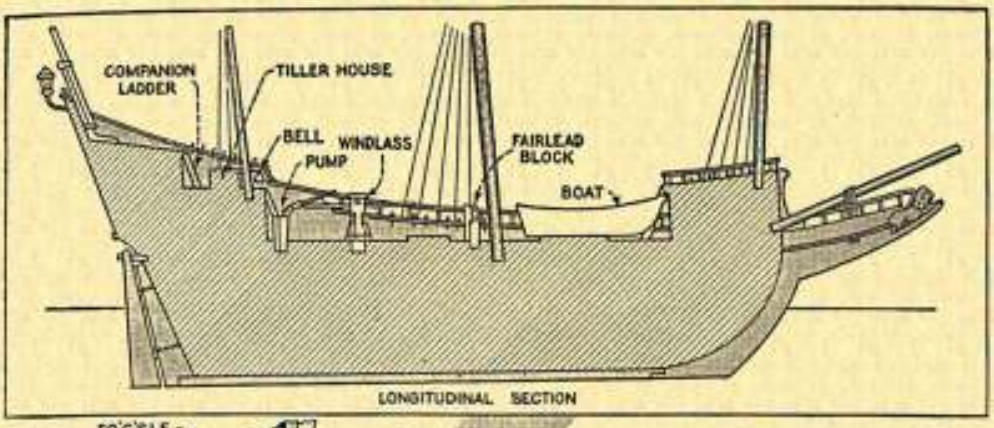
The deck furniture needed for this model includes four hatch covers, one windlass, a lifeboat, pump, a carved block and a bitt or bollard. The details of all are given in the sketches. The hatch covers are cut from ⅛-in. wood; their edges and a band around the top are painted black to represent the hatch coaming, and the center is painted a light brown, to represent time-worn and sea-stained canvas covers. The windlass and pump are made from pieces of ⅛ and 7/16-in. dowel stock. The base of the capstan is notched to take the pawls, which are cut from wood and glued to the deck (see deck plan). The pump handle is glued in the notched support which in turn is glued to the side of the upright barrel; a spout, cut from ⅛-in. dowel rod and hollowed out, is glued in a hole drilled in the side, and the inner end of the pump handle is fastened to a wire which passes down through a hole drilled through the center of the barrel.

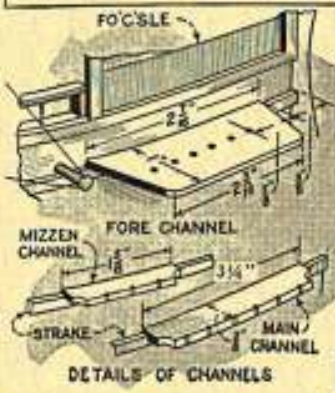
The lifeboat can be whittled from a piece of 1-in. pine. The top is beveled down ⅛ in. on each side, and this surface painted the same brown as is used on the hatch covers, to represent the canvas cover. Lashing ropes are painted around the sides, and the underbody is white, with a black band around the gunwale. When assembled, the boat is lashed with black linen thread to short pins driven into the sides of the largest hatch cover, and the latter is then glued in place on the deck.

The carved figure or fairlead block that carries in its middle the block by which the main-yard lifts are led aft to the capstan, and from there to the belaying bitt, presented the greatest difficulty. Such carved figures were common on these old ships. The difficulty was finally solved when a set of tiny 1½ in. high Noah's-ark figures, carved from wood and painted, were found in a toy store. Two small holes were drilled through Noah's stomach, spacing them ⅜ in. apart, and the space between carved slightly, so that it resembled the pulley wheel of a block.

Three sets of ladders, to forecastle, quarter and poopdecks, complete the deck equipment. They are cut from 1/16 by 5/16-in. white pine. The ends are beveled off to fit deck and wall, and steps, ⅜ in. long, glued in place, each assembly being held together with the small clamps until the glue has set thoroughly.

All the deck furniture is painted before being glued in place. Pure gray, the same as on the bulwarks, was used, with black for the ends of the pump handle and capstan bars, and the part of the bitt where the rope would chafe. The ladder treads were done in gray and the sides in black.

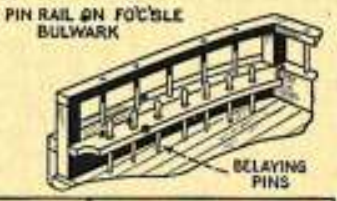


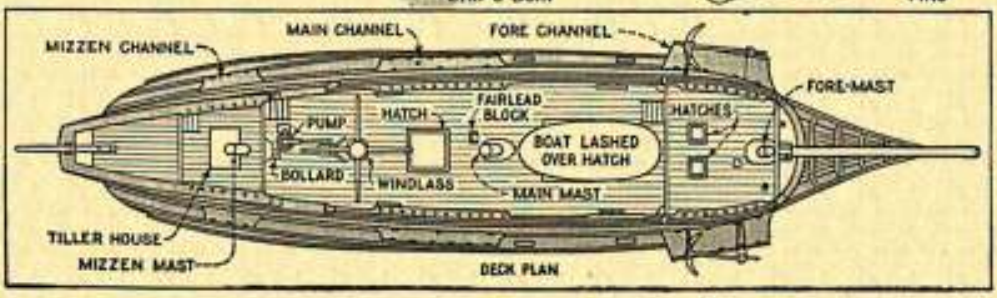


The deck plan shown will be sufficient guide for placing the furniture.

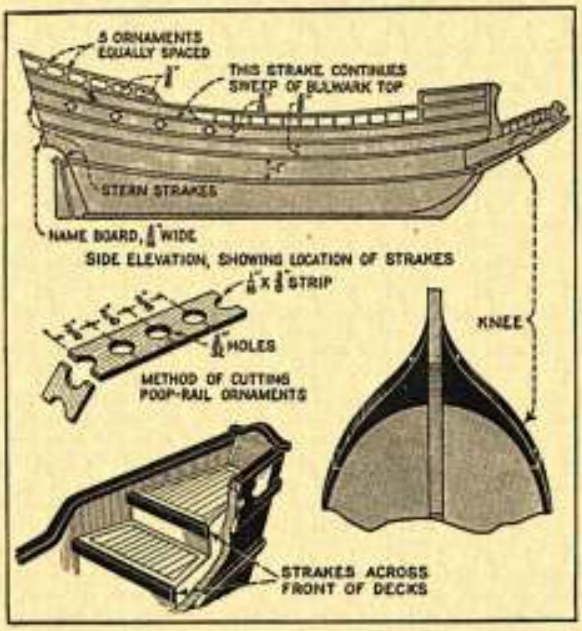
Pin rails, to carry the belaying pins, channels, through which the shrouds are fastened, guns, gun ports and port covers, and the ornaments of the stern, complete the work on the hull. There are three channels on each side, cut from 3/32-in. basswood, and glued and pinned in place in notches cut to half the width of the first strake below the main-deck line. Their position is shown in the plan view, and dimensions for cutting them are also given.

For the gun ports, draw a line straight down from the after end of the forecastle, then measure back ¾ in., between the second and third strakes. That gives the front line of the open gun port. Lay out a ½-in. square, drill holes in each corner, ¼ in. deep, and, with a chisel, cut out the port. The gun is made from 5/16-in. dowel stock, ¾ in. long, ½ in. showing and





the other ¼ in. glued into a hole drilled in the back of the port. Paint the inside of the open port dark gray, gild the gun itself with gold enamel, and paint the tip of the muzzle either with black or silver paint. The port cover is ½ in. square, cut from ⅛-in. basswood. Drill a small hole near the edge in the center of one side and fasten a short piece of wire. Drill a No. 60 hole through the bulwark, just above the deck line, pass the wire through, twist the end to prevent its pulling out, and glue the other edge of the port cover to the top of the port opening, letting it stand out at an angle of 45 degrees.



The front edge of the second port cover is 2 in. aft of the rear edge of the open gun port. The cover is cut to the same size as that for the open port, a similar wire lanyard attached and fastened through the bulwark, and the cover itself glued flat to the hull.

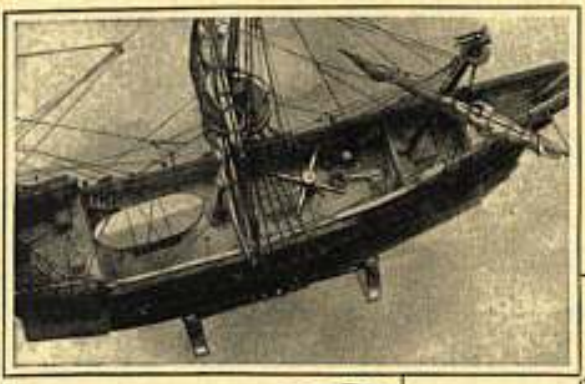
The pin rails are cut from ⅛ by ¼-in. basswood. The foremast rails run the length of the fo'c'sle deck on each side, and are glued and pinned to the bulwarks, flush with their top. The mainmast pin rails are 3½ in. long, and are fastened in the same way to the bulwarks of the main deck, their front end being 3¾ in. aft of the forecastle. The mizzenmast pin rails are 1¾ in. long and are fastened to the solid bulwarks of the poop, about ⅜ in. above the deck and approximately on the same line as the main-deck rail. Before attaching the pin rails drill No. 60 holes in them at ¼-in. intervals, to take the belaying pins, to which all the loose tackle ends later will be fastened.

The stern ornaments include a lamp, the half moon, two small shields and two windows, painted on port covers. The lamp, 5/16 in. thick at its greatest width and 1 5/16 in. high, can be cut from an ordinary cork, or carved from wood. A bead, glued to the top will serve as the ball. The five faces are cut down flat and painted with aluminum paint, to represent the glass, while narrow black lines between them take the place of the iron bars of the frame. The top is gilded, and the ball painted black, as is the base. Drill a No. 58 hole in the center of the base, and a corresponding hole in the stern bulwark, ⅜ in. below the rail top. Cut a short piece of wire, insert one end in the bulwark hole and the other in the lamp, and then bend it upward until the lamp is parallel to the stern.

The half moon is sawed from a piece of 1/16-in. basswood. Gild it with gold paint and then add the eye, nose and mouth lines with black paint. The shields for the two coats of arms are cut from the same thickness of wood and painted red for the background, the lion on the one in gold, and the bend on the other in gold, with three small crosses of black. The windows are painted on ½-in. port covers with aluminum paint, set off with black borders and cross lines. (See the stern view in Part I.)

Beneath the windows, and just above the sharp break where the stern is cut inward, a name board, ¼ in. wide by ⅛ in. thick, is glued in place.

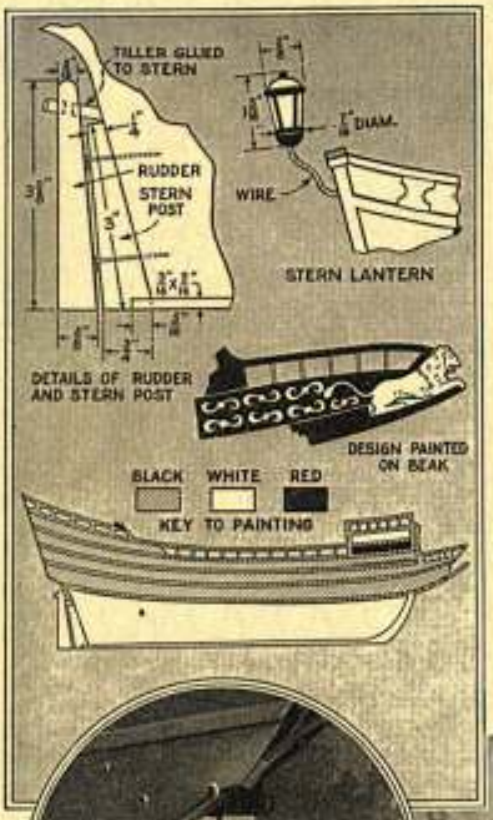
Add the keel, rudder and rudder post, made and fitted as shown, and you are ready to start painting the hull. The keel,

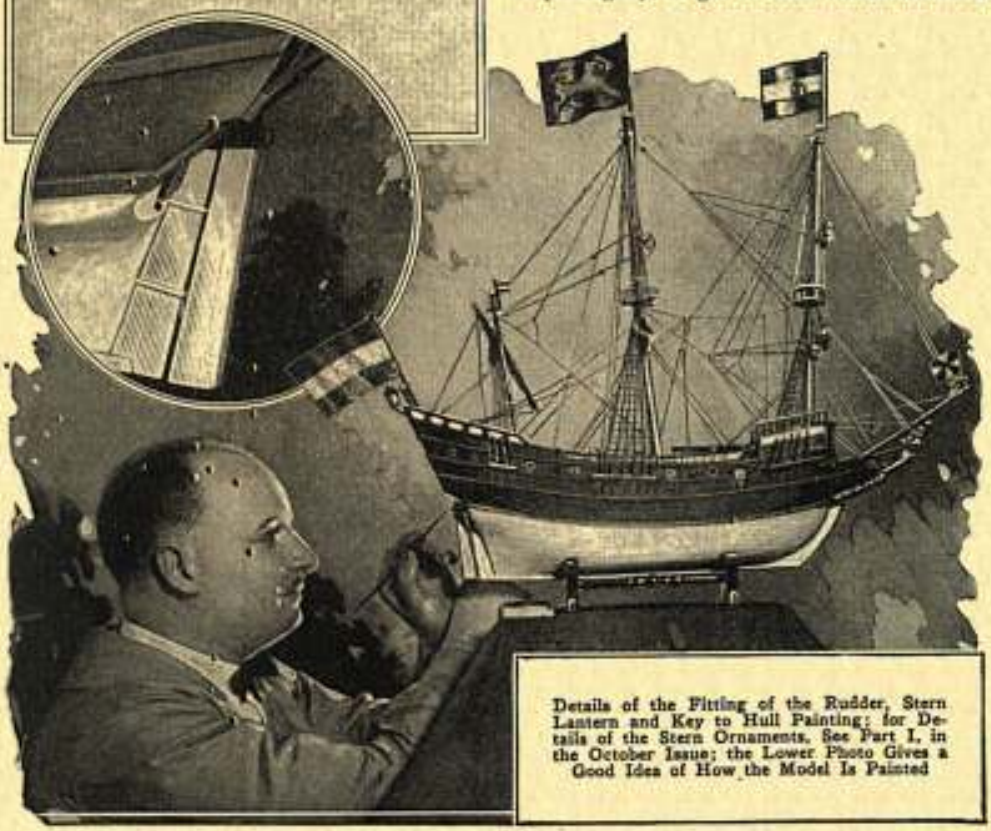


⅜₂ by ⅜₂ in., runs from the lower end of the stem to a point ⅝₂ in. beyond the stern. The rudder post is notched to fit over this projection. After you have sawed out the rudder post, cut the heads off two long bank pins, bend them into staples, glue the post in place

and then slip the staples around it and drive them into the hull. Leave the staples projecting slightly from the post until the rudder is attached. Cut the rudder, like the rudder post, from 7/16-in. basswood, drill a 3/32-in. hole through it to take the tiller bar, which is made in two sections, 7/16 in. wide and 1/8 in. thick. Round the ends to fit into the 3/32-in. hole, and glue them in. Next cut the heads from two common pins, bend them to form right angles, and drive the pointed ends into the rudder at the proper points so that, when the ends projecting downward are slipped into the staples around the rudder post, the lower end of the rudder will be on a line with the keel. Two more port covers, each 1/2-in. square, are glued on either side of the rudder, just below the water-line strake.

The boat is now ready for painting. The color scheme for this boat called for a light gray underbody, which was obtained by mixing French gray and a small amount of pure gray, to get a color which avoided





Details of the Fitting of the Rudder, Stern Lantern and Key to Hull Painting; for Details of the Stern Ornaments, See Part I, in the October Issue; the Lower Photo Gives a Good Idea of How the Model Is Painted

the chalky appearance of straight French gray. White can be used if desired. Underbody, stem up to the knees, and the rudder and rudder post below the water-line, were painted with this. The two port covers on the stern, below the painted water line, were done in black.

The upper part of the hull was painted a dead black, with the exception of the top panel on the poop and the two panels on the forecastle sides. The upper one of these, and the space between the ornaments on the poop panel, were painted with French gray, and the lower of the forecastle panels with the oriental red used on the coats of arms on the stern. The beak bulwarks and that part of the stem including the knees, which comes above the water line, were painted black, the figurehead was gilded, and two bands of gilded designs run, one along the beak bulwarks and the other along the stem, from the lion's tail back to the hull, filling in the space between the knees and the floor of the beak. Six gold ornaments were painted along the sides, as indicated in the sketches. These are simply ½-in. circles, with four projecting arms, forming the tips of a cross. The closed gun ports were given a narrow gold border to make them stand out from the hull.

The upper part of the stern requires more work. The bulwark rail, the edges down to the name plate, including the ends of the strakes, were given the effect of molding by painting a simple running design. The space around the half moon was broken up with four small gold stars, the name plate "Halve Maen" painted in gold, and the monogram of the company owning the boat, the Ostindische Cie van Amsterdam, painted between the two coats of arms, which represent the heraldic figures of the municipal arms of Amsterdam at the time of Hudson's adventures in America.

Next month's article will tell how to make the masts and spars and rig the ship.

If body vibration in your auto comes from the door panel or cowl, remove the upholstery, obtain some thick felt and cement it to the inside surface of the metal with thick shellac; this will nearly always remedy the trouble so that it ceases to be annoying.

Clip Keeps Notebook in Vest Pocket

Machinists, foremen, and others who carry a notebook or price list in their vest pocket, frequently lose them when stooping over. By obtaining an ordinary pencil clip and attaching it to the book, as shown in the drawing, this can be avoided, and it also prevents the book from falling to the bottom of a deep pocket.—A. Bereskin, Winnipeg, Can.

Safety Catch for Door Hook

Often it is desired to lock covers of boxes, doors and cupboards by means of ordinary hooks, and in cases where these might open by vibration or sudden jars, it is a good idea to provide a safety catch to prevent this. Get a brass plate, about the size, in proportion to the hook, shown in the illustration, bend it at right angles at one end and drill a hole in it as indicated. The screw on which the hook catches is removed and is then replaced with the brass plate in position. It must, of course, be free to turn easily. When the plate is held in the position indicated by the dotted lines of the left-hand detail, the hook can be slipped off the screw, but when in the horizontal position, to which it naturally falls by gravity, the hook is securely locked.

Swing for Indoor or Outdoor Use Is Adjustable and Can Be Used Also as a Trapeze

Combined Swing and Trapeze Adjustable for Children of Various Ages

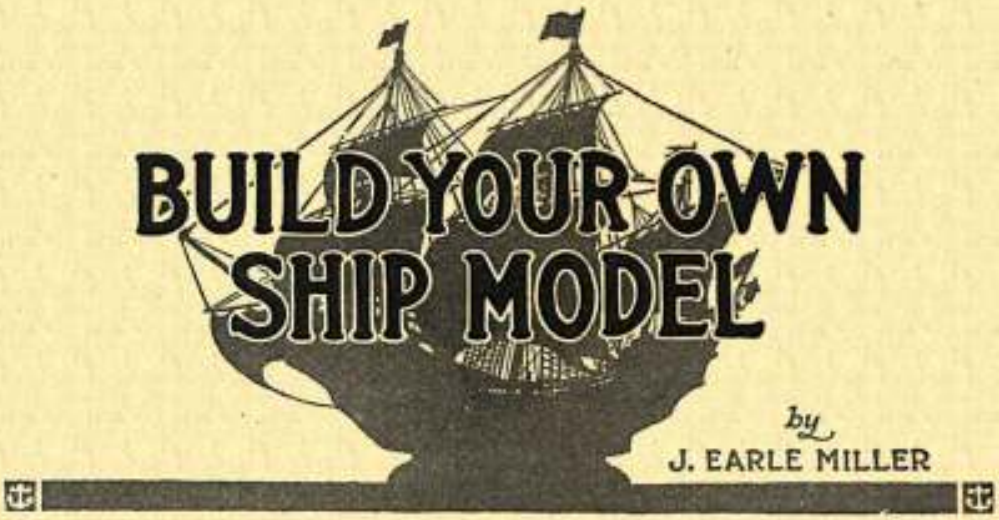
All youngsters love to swing. The problem of making one swing serve for children of various ages and sizes was solved in the following manner: A sufficient length of ⅞-in. manila rope, two 25-cent swivel rope hitches, a pair of iron rings and a plain-board seat were obtained. If available, a pair of swinging rings, such as are shown in the photo, come in handy but are not essential. The height of the seat can be regulated by lengthening or shortening the free ends of the suspension ropes through the hitches. The advantages of the latter are that they do away with the tying of knots, are easily adjusted and do not slip as a carelessly tied knot may do. By removing the seat and raising the rings a swinging trapeze is formed which is much enjoyed by children, as well as adults. The swing can be arranged either indoors or outdoors.—Elizabeth S. Friedman, Washington, D. C.

Refinishing Old Canvas Canoes

Canvas canoes, which have been painted from year to year with all the colors of the rainbow, sometimes need a good treatment of paint remover. To get rid of the coats of old paint without damage to the canvas offers a problem to many, but can be done in the following way: Apply any good paint or varnish remover and allow it to stand 10 minutes; then use a scrubbing brush dipped in gasoline. This should be done outdoors where there is plenty circulation of air. Never use a putty knife, as this has put more holes in canvas canoes than any other method of removing paint. A stiff scrubbing brush or large-size nail brush will do the work nicely. A little hard work with the brush and gasoline and paint remover will prove far more efficient than any other method, as the chance of slipping and cutting holes is eliminated.—L. Georger, Buffalo, N. Y.

Safety Blocks Hold Auto Wheels

It is rather a serious matter if any of the cars fitted with disk or wire wheels run off the jack when changing wheels. To prevent this, it is a good plan to carry a pair of half-round wooden blocks, about 5 by 8 in., as shown in the drawing. The blocks can be quickly placed in front and behind one of the wheels. A handle can be made of a large corner iron, nailed or screwed to the end of each block and wrapped with tape. The handles allow the blocks to be placed without danger of pinching the fingers.



BUILD YOUR OWN SHIP MODEL

by J. EARLE MILLER

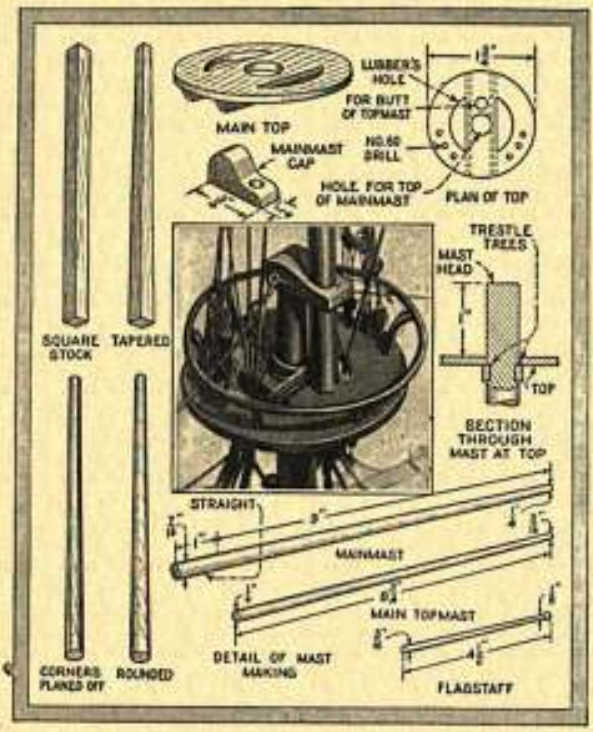
WITH the painting out of the way, the time it is drying can be filled in making the masts and yards of the boat. The "Half Moon" had three masts—a foremast rising from the forecastle, mainmast and a mizzenmast on the poop. In addition, the bowsprit, projecting from the beak, carried a sail in accordance with the custom of the time. Instead of the straight-pole masts of an earlier day, the masts were broken up into lower and topmasts, and the latter were surmounted by smaller poles carrying flags.

Each section of the masts tapers from butt to tip, and the yards taper from the center to the ends. There are several ways of making them, depending upon the tools and equipment available. For the average home-shop conditions, they can either be produced from dowel stock, or from squared spruce. If dowel stock is used, the taper can be put in by shaving the lengths down with a knife or scraper and finishing them smooth and round with various grades of sandpaper. Using spruce, the lengths should be squared to the dimensions of the mast butt or yard center, and the taper then planed on all four sides, after which the corners can be rounded off and smoothed.

The mainmast (lower part) is 9 in. long and 7/16 in. thick at the butt. To this length must be added 1 in. to be let into the hole bored in the deck. The top of the lower section is 1/4 in. in diameter. Lay it out on a 10-in. length of dowel stock or squared spruce, 7/16 in. thick, tapering the length from 1 in. above the butt to the tip. The maintopmast is 8 1/4 in. long, 1/4 in. thick at the butt and 3/16 in. at the tip, so that a very slight taper is required. The final section of the mainmast, the flagstaff surmounting it, is 4 1/2 in. long, 3/16 in. thick at the butt, tapering to 1/8 in. just below the top, with a small ball, or truck, above. If the ball breaks off in cutting, it can be replaced by a bead, but it is more satisfactory to have it an integral part of the mast, since the flag halyard passes through a hole drilled in the ball.

With the three parts completed, the next task is to assemble them. For this purpose, the parts used are trestle trees, tops with their railings, and caps which are set on top of the lower mast and through which the topmast above passes. Details of these parts are shown in the sketches. Starting with the main, or lower, top, cut a disk of 1/8-in. basswood, 1 3/4 in. in diameter, and, through the center, drill a hole large enough to admit the lower masthead for a distance 1 in. below its tip. Slide the top of the mast and mark where its underside comes. Cut two lengths of basswood, 1 3/4 in. long, 7/16 in. wide and 1/8 in. thick, and then cut two small notches in opposite sides of the mast, just below where the top is to rest, making them 7/16 in. wide, so that the trestle trees will rest in them. They should be cut to about half the thick-

ness of the trestle trees, or 1/16 in. deep. Slip the top on the mast, hold the trees in place, and mark on the underside of the top the outer line of the trees. Using these marks as the inner lines, lay out the two semicircular lubbers' holes shown in the drawings. With a small drill, bore a number of holes just inside the lines, and cut out the center with the knife. In the assembly, the lubbers' holes should come on either side of the mast, parallel to the length of the ship. Keeping their position in mind, drill three No. 60 holes in either side of the top, 1/8 in. from the outer rim, approximately 3/16 in. apart, and with the front hole back of a line drawn through the mast hole. These are for the topmast shrouds. Next lay out and drill six other holes, spacing them so the after ones on the sides fall between two shroud holes. These six are for the rail stanchions, and the drill used should be slightly smaller than the diameter of round radio bus wire.



Bend a length of bus wire around the outer edge of the top, so as to form a 1 3/8-in. circle and solder the ends together. This forms the rail. Next cut six pieces of bus wire, 5/8 in. long, and stick them in the six stanchion holes. As the latter are drilled 1/8 in. from the edge of the top, it will be necessary to bend the stanchions outward to meet the rail, which is soldered to them, after which the top and the trestle trees can be glued to the mast.

The cap on the tip of the lower mast comes next. It is cut from 1/4 by 1/4-in. basswood and is 3/4 in. long. A hole is drilled halfway through it, to take the tip of the lower mast, and another all the way through for the topmast. Owing to the danger of splitting the wood in drilling these holes it is best to take a strip of 1/4-in. wood, 1 in. or so wide and several inches long, and drill the holes first, then cut out the cap and shape it. The tip of the lower mast may be reduced in size, so that a smaller hole can be used for it. The upper top is 1/8 in. thick and 3/4 in. in diameter, and is drilled to slide down the top mast 9/16 in. below its tip. There are no lubbers' holes and no rails, but two 1/16-in. holes are drilled, one on either side, through which the shroud lines pass. Owing to the small diameter of the top, no trestle trees are necessary. The maintopmast cap is made in the same way as that on the mainmast, and the flagpole is then glued in place. This completes the building of the mainmast.

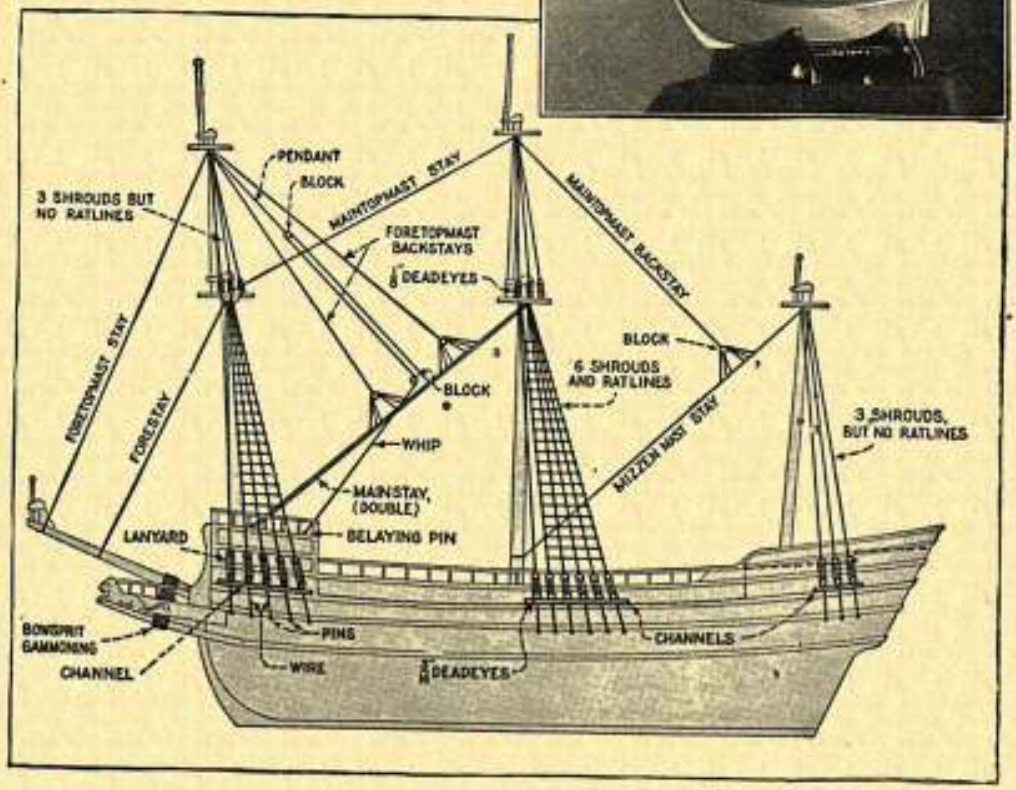
The construction of the foremast is exactly the same. The lower mast is 7 1/4 in. tall, from the deck line, and another inch is added to slip into the hole in the hull. It is 5/16 in. thick at the base and tapers to 1/4 in. at the tip. The foretopmast measures 8 3/4 in., is 3/16 in. thick at the butt and 1/8 in. at the tip. The flag spar topping it is cut from 1/8-in. stock, 3 15/16 in. long, tapering to slightly over 1/16 in. in diameter just below the truck, or ball, which tops it.

The mizzenmast is a single stick, projecting 7 in. above the deck, 1 in. below it, measuring 1/4 in. through at the butt and 5/32 in. at the tip. It is surmounted by a

¾-in. solid top, with two small holes for the shrouds and by a cap holding a 1⅜-in. flagpole, ⅛ in. thick at the base and 1/16 in. just below the ⅛-in. truck.

The bowsprit is 7 in. long, plus 1 in. buried in the hull. It is 5/16 in. thick at the butt and 1/32 in. at the end, which is surmounted by a small knee, a cap and 2-in. flagpole. The stern flagstaff is 6 in. above the deck, and ½ in. enters the hull. It is reinforced by a second spar, projecting 3½ in. above the deck, the two being tied together by a cap like those on the masts. Both flagstaff and supporting spar are made from ⅛-in. stock, the former ending in the usual truck. A No. 60 hole is drilled through the balls on each flagpole, to take the place of the block through which the flag halyard will run.

The yards come next, lower and topsail yards on the main and foremast, a bowsprit sail yard on the bowsprit, and a lateen yard on the mizzen. As stated before, they taper from the center to the ends and offer no difficulty in making, so only the following dimensions are necessary: The main lower yard is 8 in. long and ¼ in. thick in the center, tapering to slightly less than ⅛ in. at the ends; the main topsail yard is 5 in. long and 3/16 in. thick in the center; foremast lower and topsail spars are, respectively, 6⅞ by ¼ in. in the center and 4⅜ by 5/16 in.; the



spritsail yard is 5½ by 3/16 in., and that on the mizzenmast is a long thin spar. 10½ in. over all and 3/16 in. in diameter at the center.

The dark, yellowish-brown furniture stain, known as golden oak, gives a good color for masts and yards, and can be obtained in small cans. They should be painted and set aside to dry before being installed. The tops and rails are painted black, and the tip of each yard, for ⅜ in. from the end, is painted black also.

The holes for the masts are drilled on the center line of the boat, that for the foremast being 5/16 in. aft of the inner line of the bulwark across the front of the forecastle. The mainmast is stepped 4 3/16 in. aft of the forecastle, and the mizzenmast ½ in. back of the front line of the poop deck. Both main and mizzenmast have a slight rake backward, leaning some 5 or 6° from the vertical. The foremast has about the same rake forward. The two holes for the stern flagpole are drilled just inside the bulwark, so that the pole will project in the same plane as the stern lines. The bowsprit is stepped in a hole drilled into the hull ½ in. above the floor of the beak, and at such an angle that it will pass approximately 1 in. above the head of the lion figurehead.

In assembling and mounting the masts, it should be noted that the topmasts are forward of the lower masts, and the flagstaffs forward of the topmasts. It is not necessary to glue the masts in place, since the shrouds and rigging will brace them, but the bowsprit should be glued.

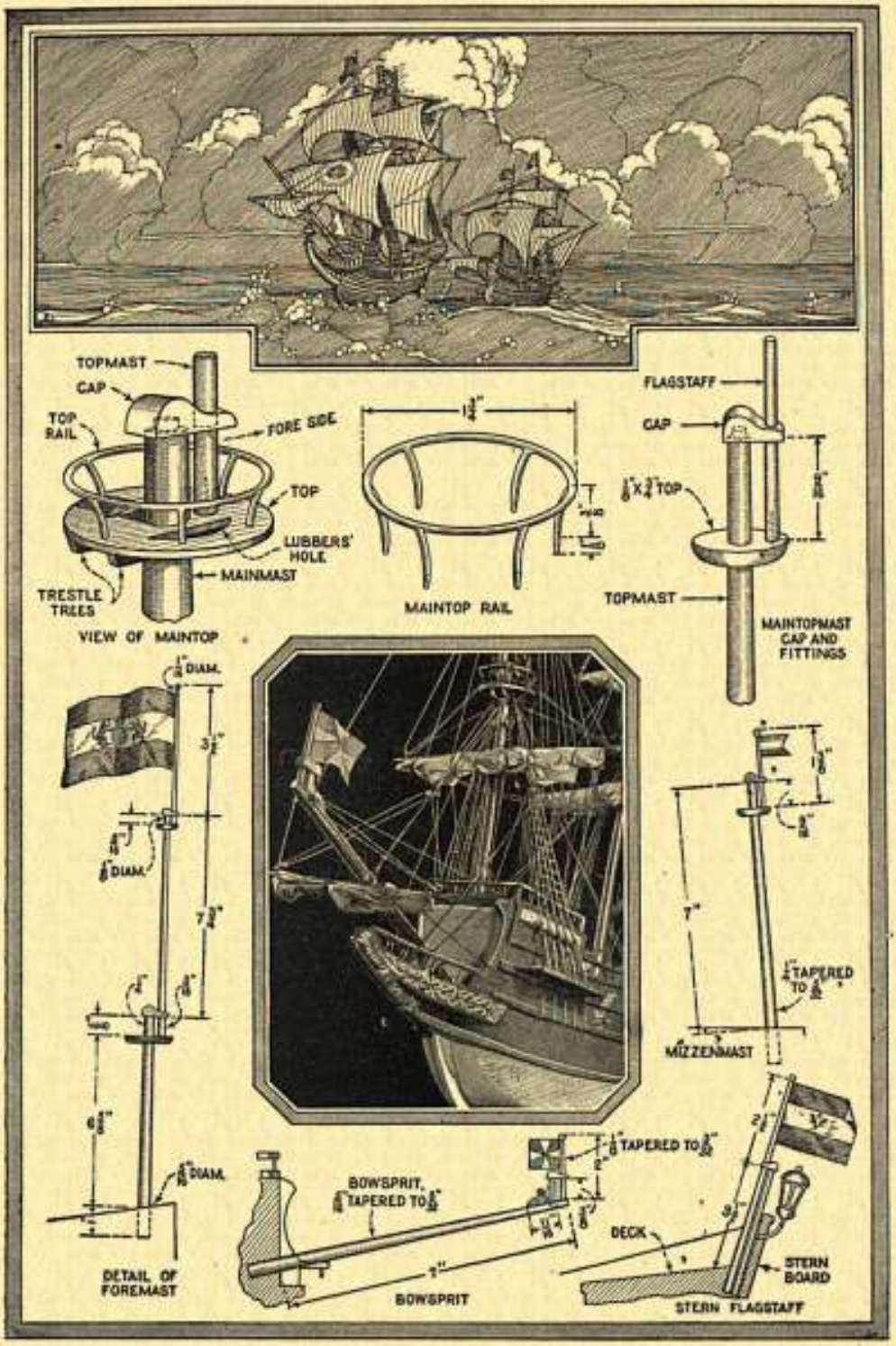
You are now ready to start the rigging, which looks exceedingly difficult, but actually only requires time and patience. Rigging of a vessel is divided into two parts, standing and running. The standing rigging includes the shrouds, stays and backstays of the masts, the fixed lines which are permanently installed and tarred as protection against the weather. The running rigging includes all the movable lines, the blocks and tackle by which the yards and sails are handled.

The standing rigging comes first, starting with the shrouds. They are the sets of side braces which hold the masts, and to which cross lines, or ratlines, are tied to form the rope ladders by which the sailors climb to the yards. Each shroud is set up with a pair of deadeyes, circular fasteners, each with three holes, with a lanyard laced back and forth between them, serving to tighten each shroud. The deadeyes for the lower shrouds are 3/16 in. in diameter and those for the upper shrouds ⅛ in. They can be purchased from professional model-makers' supply companies, or made at home. In the latter event, the best material is the black-celluloid knitting needles sold in ten-cent and department stores. If they are used, they should be cut up in lengths of 3/16 in. for the lower deadeyes and 1/16 in. for those on the upper shrouds, and drilled according to the sketch on page 156. A No. 58 drill will do for the larger ones, and a No. 60 for the smaller. It is recommended that deadeyes and blocks be purchased.

The shroud lines should be of strong linen. No. 6 linen fishing line, which can be obtained at a sporting-goods store at about 30 cents for a 25-yd. card, is best for the lower shrouds. The upper shroud lines, and most of the running rigging are made from black-linen button thread. A 100-yd. spool will be enough.

Starting on the lower mainmast, which requires six shrouds on either side, pass the end of the fishline up through one lubber's hole in the lower top, around the mast, and back down through the hole; bring the end down 1 in. or so below the level of the bulwark, and cut off the piece, making two shrouds. Now withdraw the section, and, using it as a guide, cut five more pieces the same length. Pass the ends of three lengths up through the lubbers' hole on either side, around the mast and back down through the hole, giving the six shroud ends on either side.

Next take one of the 3/16-in. deadeyes, pass the end of a shroud around it in the groove provided for the purpose and seize the end to the shroud by wrapping it with fine steel "hair" wire. Cut a 3-in. length of the wire and twist one end around a second deadeye. Then turn both deadeyes so that the center hole of the upper one is nearest the shroud and the center hole of the other nearest the wire, and they are ready for the lanyard. This is made of the black-linen button thread, and will only come out right when put on the proper way. The object is to have three straight and parallel lines on the


TOPMAST
CAP
TOP RAIL
FORE SIDE
TOP
LUBBERS' HOLE
MAINMAST
TRESTLE TREES
VIEW OF MAINTOP
MAINTOP RAIL
FLAGSTAFF
CAP
TOPMAST
MAINTOPMAST CAP AND FITTINGS
DIAM.
TAPERED TO
MIZZENMAST
DETAIL OF FOREMAST
BOWSPRIT, TAPERED TO
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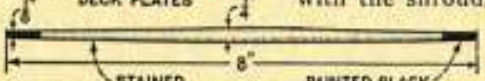
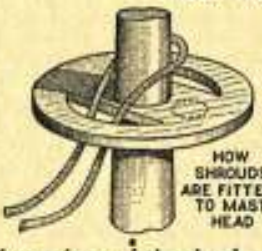
DECK
STERN BOARD
STERN FLAGSTAFF



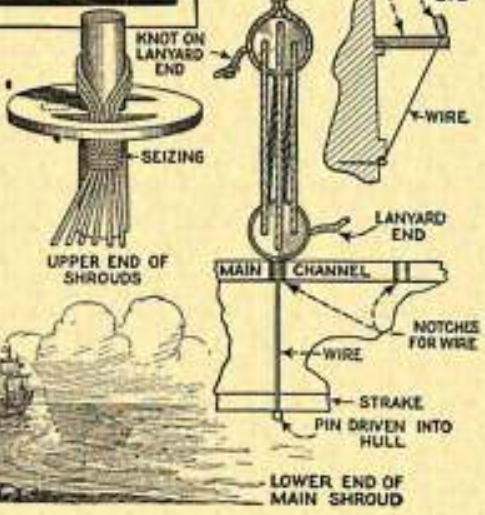


which it is knotted around the shroud, over the wire seizing on the shroud end.

Next, with a knife, cut six small notches in the outer edge of the mainmast channel. The forward notch, for the front shroud, is so placed that the shroud will stretch straight downward from the mast top, and, because of the rake of the mast, bring it slightly aft of the rear line of the mast butt. The other five are equally spaced over the channel. Just above the next strake below the channel, and alined with the shroud, beneath the first notch, drive a pin into the hull, and twist the end of the wire from the lower deadeye around the pin, adjusting it so that the lower deadeye will come just above the top edge of the channel. Drive the pin the rest of the way into the hull. Next pull in or let out the lanyard until the top deadeye comes on a line with about the center of the deck rail, and then tie the end around the shroud and cut off the excess thread.

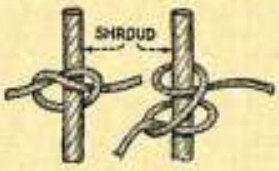
Find the other end of the same shroud, catch a deadeye in the bight of the cord, and then, holding it alongside the completed shroud, draw it taut and adjust the deadeye until it comes even with the first one. Next make it secure, as on the first shroud,

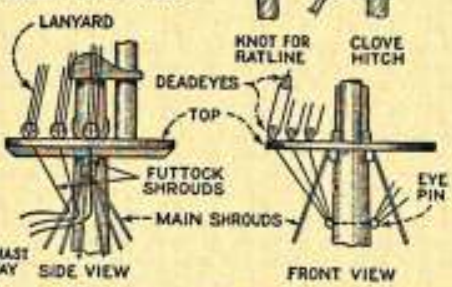
front face of the deadeyes, the center line being the longest. Tie a knot in one end of a 10-in. piece of button thread, making the knot big enough not to slip through the deadeye hole. Then pass the other end through one of the side holes in the deadeye fixed to the shroud. The knot side will then be the back side of that deadeye. Next pass the end of the lanyard through the corresponding side hole of the deadeye on the end of the wire. The side which it enters will then be the front side of that deadeye. Coming out the back of this lower deadeye, the lanyard goes diagonally up the back to the hole in the center of the upper deadeye, entering from the back. Coming out the front, it is threaded as shown in the drawing, and the end left loose to tighten and "set up" the shroud later, following

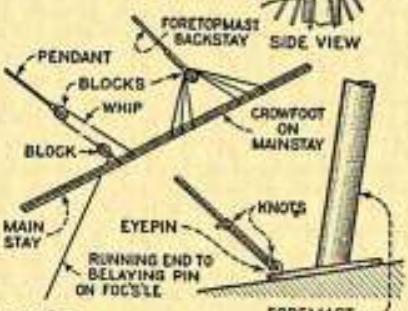


with wire seizing, and then proceed to set up the lower deadeye and lanyard like that already completed. The rest of the shrouds are set up in the same way, taking care to adjust them so that the masts are held upright and in line. The foremast takes five shrouds to the side and the mizzen three. The odd shroud on each is wrapped once around the mast, with an end passed down each side through the holes in the top.

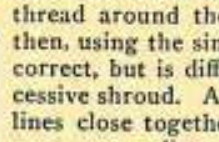
The fore and maintopmasts each take three shrouds on each side, using the ⅛-in. deadeyes. The topmast shrouds are made of the button thread, and the lanyards of a smaller size of black-linen thread, small enough to pass through the deadeye holes. Instead of a wire from the lower deadeye, attach 6-in. lengths of button thread, poke the ends (known as futtock shrouds) down through the shroud holes in the top, pass them through the lower shrouds, and knot them to a wire ring fastened to the lower mast. For this purpose a No. 60 hole is drilled through the mast, an eye bent in a short length of wire, using the nose of a small pair of pliers or a small nail to form it, both ends of the wire passed through the hole, and an eye formed on the opposite side of the mast by placing a nail, or the end of a scriber, between the wires and then twisting the ends together, after which the ends are clipped off close to the eye. The fishline lower shrouds should then be painted black, to represent tar.

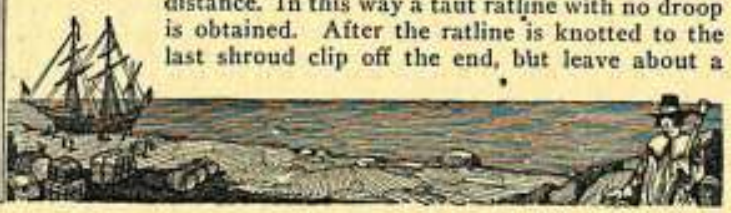






The shrouds on the lower fore and mainmasts require ratlines in order that the sailors may climb to the tops. None are required on the mizzen or topmasts. The ratlines are made of button thread, and are easy to install, though patience is required in tying so many knots. There is some question whether ratlines were attached to all shrouds in Hudson's day, but the more modern practice is to leave them off the forward shroud, or "swifter," and this saves quite a few knots, so that method was followed in this model. Knot one end of a piece of the thread around the second shroud, just above the rail and then, using the simple overhand knot shown (a clove hitch is correct, but is difficult to make so small), tie it to each successive shroud. As the knots are drawn tight, pull the shroud lines close together, and then expand them to their proper distance. In this way a taut ratline with no droop is obtained. After the ratline is knotted to the last shroud clip off the end, but leave about a





quarter of an inch beyond the knot to prevent its working loose. After all the ratlines are in place coat shrouds and ratlines with white shellac, allow it to set, and then clip off the loose ends close to the knots. The shellac fixes the knots firmly and prevents their working loose in the future.

The fore-and-aft stays for the masts come next. Start with the mainstay, which is the heaviest on the model. With the knife, cut a small groove around the mainmast just below the top. Cut a 24-in. piece of the linen fishing line, knot the middle around the mast, and pass the two ends, from opposite sides, through a small eye, made of a pin and driven in the deck ¼ in. back of the foremast. Pull the stay taut and knot the ends, then knot them again around the stay itself, about ⅝ in. above the eye, as shown in the detail sketch. This prevents the knots from working loose, and gives extra cord to enable taking up the stay at any time in the future, if necessary.

The mizzenmast is stayed to the mainmast by another piece of the linen line, one end being knotted around the mast just below the top, and the other around a groove cut in the mainmast, 1¼ in. above the deck. The forestay runs to the bowsprit, being knotted around a groove cut in the latter above and just forward of the head of the lion figurehead.

Button thread is used for both the fore and aft stays of the topmasts. The foretopmast is stayed to a wire eye fastened around the knee which supports the flagstaff on the tip of the bowsprit, and the maintopmast stay runs from the top of the maintopmast to the foremast head, being knotted around it just above the lower top, and beneath the cap. The foretopmast backstays, of which there are two, are fastened to the mainstay, the strain being distributed by "crowfeet," made of the light thread used for the upper shroud lanyards. The stay itself is knotted around a block, through which three lengths of the fine thread pass, their ends being knotted along the stay, as shown in the standing-rigging sketch. Running down between the two foretopmast backstays is a "pendant," a short length of light thread carrying a block at the end. One end of a longer piece of the same thread is tied to the mainstay midway between the crowfeet, and the other end passed around the block on the end of the pendant, then through a block seized to the mainstay as shown in the detail, and the running end carried down to a belaying pin on the forecastle pin rail. The blocks are the same as used in setting up the running rigging. The only remaining stay is the maintopmast backstay running from the maintopmast down to the mizzenmast stay, to which it is attached with another crowfoot, as shown in the rigging sketch.

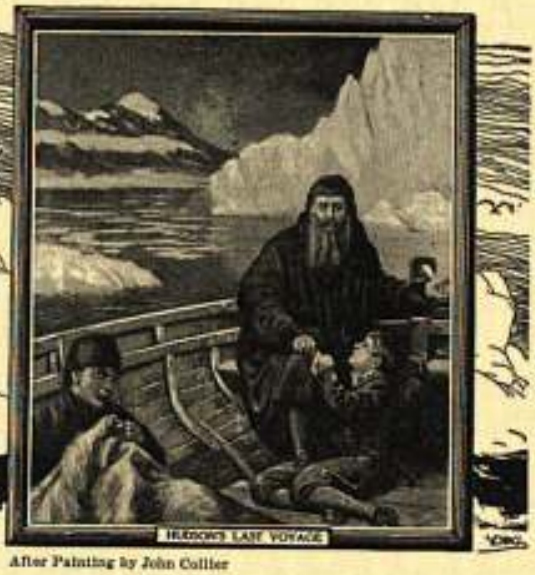
This completes the standing rigging, with the exception of the bowsprit gammoning. Owing to the system of stays, all the strain of all the masts eventually falls on the bowsprit, so extra-strong construction is necessary to carry the burden. Cut eight small notches, as close together as possible, in the top surface of the bowsprit, starting about 1½ in. from the butt. Directly beneath them, either drill eight small holes in the beak floor on either side of the bowsprit, or cut a narrow slot ½ in. long through the flooring. Take a couple of feet of the linen fishline and, starting underneath the beak, push the end up through the slot, over the bowsprit, letting it lie in the first notch; down the other side and through the slot in the beak floor, on that side of the stem. Thence it goes around the stem, up the first side, and so on, until eight lines have been passed around. Draw it as taut as possible, bearing down on the bowsprit until every stay is tight, and then knot the ends beneath the stem, shellac and trim them close, after first painting the cord black to represent the tarring.

How to Bleach Glue

Often it is necessary to have a colorless glue. To obtain this, dissolve the flake glue in water by the heating method and then add one part oxalic acid and one part zinc oxide, the two together making a quantity equal to at least one per cent of the mass of the glue. After every trace of color has disappeared, strain the glue through a piece of doubled cheesecloth or similar material. The whole operation should take no more or less than an hour. —L. H. Georger, Buffalo, N. Y.

BUILD YOUR OWN SHIP MODEL

by J. Earle Miller



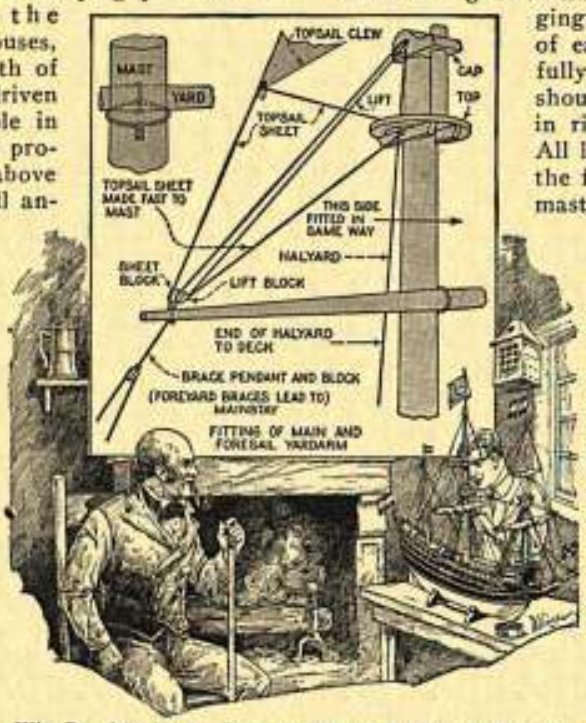
After Painting by John Collier

YOU are now ready for the job of fitting the running rigging, and for this 84 blocks are required, of the size shown in one of the drawings in the preceding article. They can be obtained from the model-supply house. Department stores sell hard wooden beads, about ⅛ in. in diameter, and these can be made into very effective blocks; they require to be flattened on two sides and trimmed to shape, as shown in the drawings, and this means patient work, but it will save some money. Another way to make them is to get a cheap folding rule, in the ten-cent store, cut it into strips and make the blocks from these. Be sure the rule is made of boxwood. The strapped blocks have a fine wire twisted around them, in the "score" on the sides, some with a hook on top, and some with a hook on top and an eye at the bottom. Examination of the enlarged sketch of the lift block in one of the drawings will make this clear.

The first step is to attach the yards and the lifts, the latter being the tackle by means of which the yards are raised and lowered. The yard is held to the mast by means of a wire "parrel" (shown in the top left-hand corner of illustration on page 322), one ring of the wire embracing the mast and another the yard. The lifts of the main and fore lower yards are fitted in the same manner. Number 60 holes are drilled through the yardarms, just inside the black tips, and an eye, made of fine wire, fastened through the holes, the eye being on top of the yard. Hook a block in the eye, then fasten another block to an eye on the cap of the lower mast and attach the end of a length of button thread to the eye on the bottom of the strap. The button thread may be black, but it is better to use the light-tan thread sold in the ten-cent store, as it is more nearly the color of the actual rope. The end of the thread is now passed through the block on the yardarm, from the bottom to the top, then around the block hooked to the cap of the lower mast, and passed through the lubbers' hole to the deck; the part that leads on to the deck is the halyard, and the main-yard halyard is passed through one of the holes in "Noah," around the windlass and belayed, or made fast, to the bollard. The foreyard halyards are belayed to pins driven through the lower mast about ¾ in. above the deck. Remember that in most of the drawings only the rigging on one side of the yards is shown, and that the other side is rigged in exactly the same manner. The rigging on the model, while following very closely the original, has been simplified to a certain extent, as it is almost an endless task to build a model of this size exactly to scale in every respect.

The lifts and halyards for the fore and maintopsail yards are fitted in the same way, but the lift for the lateen yard on the mizzen is single, and attached at the center of the yard, the upper block being hooked into the end of a short length of thread—a pendant—fastened just under the mizzen top, and the halyard belayed at the starboard pin rail.

Very neat brass belaying pins can be obtained from the model-supply houses, but a short length of an ordinary pin, driven through the hole in the pin rail and projecting ¼ in. above and below it, will answer just as well. The ends of the lines should be belayed to these in the form of a figure eight, not simply wound around them; a drop of shellac keeps them from coming free. Owing to the difficulty of getting the hands among the rigging, all lines should be cut about 1 ft. longer than necessary. Take an 8-in. length of 1/16-in. wire, grind the ends down to about 1/32 in. for a distance of 1 or 2 in., and then form a small eye on one end and a hook on the other. By threading the end of the thread through the eye, then holding the end in one hand, so as to keep it taut, and the wire in the other, it is possible, working from the opposite side of the model, to belay the ends without difficulty.



Wire Parrel for Yards; Details of "Dummy" Sheets on Topsails, and Lifts and Halyards of Main and Foreyards

The lateen yard hangs at an angle of 45° to the yard, and is fitted with a peak halyard at the upper (the left or port) yardarm. This is attached by means of a crowfoot, as shown, and a euphroe can be used instead of a block for the latter. This fitting simply consists of a thin sliver of boxwood, drilled for the crowfoot threads and the end of the halyard. The other end of the halyard runs through a block under the maintopmast cap, then down to a block about 2 in. away from the mast. From an eye on the starboard side of the quarterdeck rail, a length of thread runs around this block, and then back to the quarterdeck pin rail, where it is made fast.

The drawings show all details of the rigging, and if the lead of each rope is carefully studied, there should be no trouble in rigging the model. All lines leading from the fore and maintopmasts straight down to the deck go through the lubbers' holes in the tops. Do not set up any of the lines on one side too taut until the corresponding line on the other side has been rigged, otherwise the trim of the yards will suffer. The spritsail yard, on the bowsprit, is parreled to the latter in the same manner as the other yards are attached to the masts, but the lifts, on this yard, become "outhauls." The cargo whips, shown in one of the drawings, need little description. They are attached by means of pendants to a heavy thread stretched from main to foremast, under the tops.

The braces are the tackle by means of which the yards are swung from side to side, and these are fitted next. The braces on the spritsail are rigged as shown in the bow view, the standing end (the end made fast) being attached to the forestay, 3 in. up from the bowsprit. The other end goes down around a block on the yardarm, up through another block on the forestay, just above the standing end,

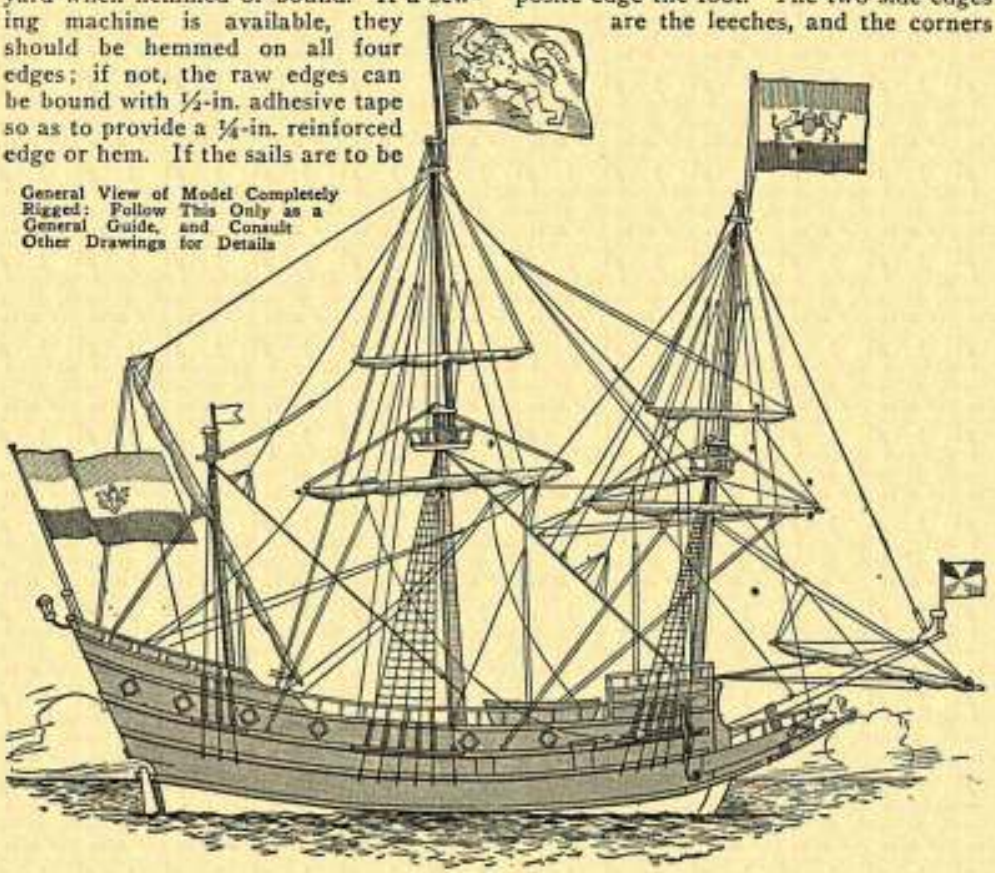
through a block under the top and down to the pin rail. Both sides are rigged alike.

The foreyard braces are led straight back to the mainstay, and the foretopsail-yard braces to the maintopmast stay. The latter run up to a point on the stay 3½ in. from the upper end. The main braces run back to blocks hooked to eyes on the quarterdeck bulwark rail, and the maintopsail braces to blocks hooked under the mizzen top. Remember there is a brace on each side of the yard. The lateen-yard braces are clearly shown.

The sails and their lines come next in order. On this model the sails are furled, but, of course, the reader can have them spread if he desires. The material used is unbleached muslin, which is of a light-tan color. Do not use white. In order to make a neat job of furling, the sails were cut the full width, but only half the "drop" or height. All the sails are cut so that they will be 1 in. shorter than the yard when hemmed or bound. If a sewing machine is available, they should be hemmed on all four edges; if not, the raw edges can be bound with ½-in. adhesive tape so as to provide a ¼-in. reinforced edge or hem. If the sails are to be furled, the drop of the main and foresails is 3½ in.; that of the maintopsail, foretopsail and spritsail 2½ in., and the triangular lateen sail measures 9½ in. along the yard, 7½ in. along the foot and 3½ in. along the leech, or short side. The foot, with the yard at 45°, is parallel to the deck plane.

If the sails are to be set, the mainsail should be 6 in. in the drop, the maintopsail 6 in., the foresail 4½ in., foretopsail 5 in., spritsail 3 in., and the lateen sail 6 in. When the sails are set, the yards are attached as high on their respective masts as they will go, hoisted up, in other words, and the spritsail yard is hauled out on the bowsprit. When furled sails are used, the yards are dropped down to about the points shown on the assembly drawing and, of course, the spritsail yard also is hauled in.

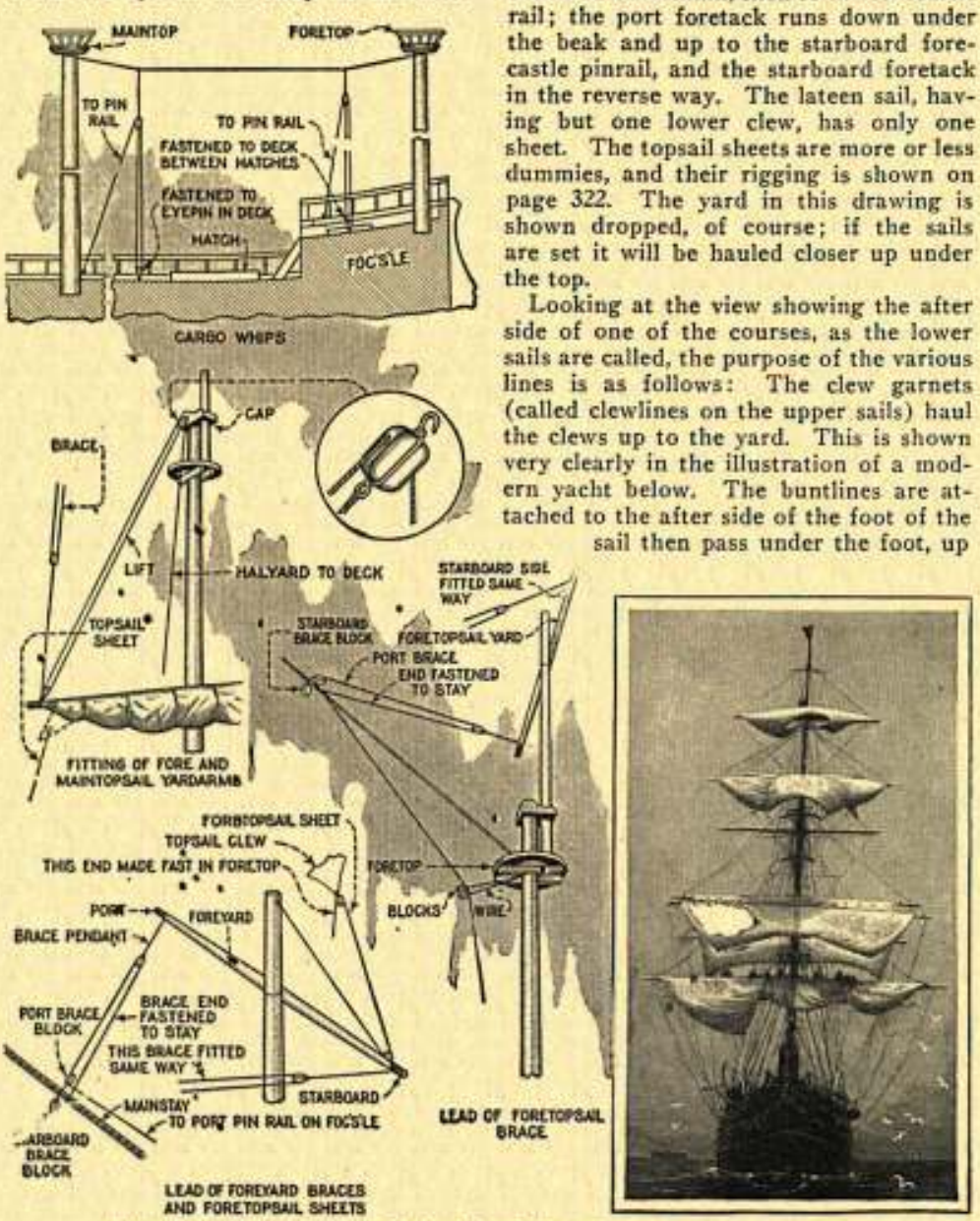
On the sails, the edge that is attached to the yard is called the head and the opposite edge the foot. The two side edges are the leeches, and the corners



General View of Model Completely Rigged: Follow This Only as a General Guide, and Consult Other Drawings for Details

of the sail the clews. The middle of the sail is the bunt. The sheets are not the sails, but the tackle attached to the lower clews of the sails for handling them and holding them fast against the pressure of the wind. The sheet blocks are fastened by means of fine wire to the lower clews of the sails. The port main sheet runs from the eye in the strap of the sheet block around a block wired to the after boomkin, then around the sheet block again and down to the main pin rail. The port side is rigged the same way. There is also a single line (the tack) leading from each clew of the mainsail down through a hole in the forward boomkin and back to the rail. The foresheets are rigged to the middle boomkin, then to the forecastle rail; the port foretack runs down under the beak and up to the starboard forecastle pinrail, and the starboard foretack in the reverse way. The lateen sail, having but one lower clew, has only one sheet. The topsail sheets are more or less dummies, and their rigging is shown on page 322. The yard in this drawing is shown dropped, of course; if the sails are set it will be hauled closer up under the top.

Looking at the view showing the after side of one of the courses, as the lower sails are called, the purpose of the various lines is as follows: The clew garnets (called clewlines on the upper sails) haul the clews up to the yard. This is shown very clearly in the illustration of a modern yacht below. The buntlines are attached to the after side of the foot of the sail then pass under the foot, up

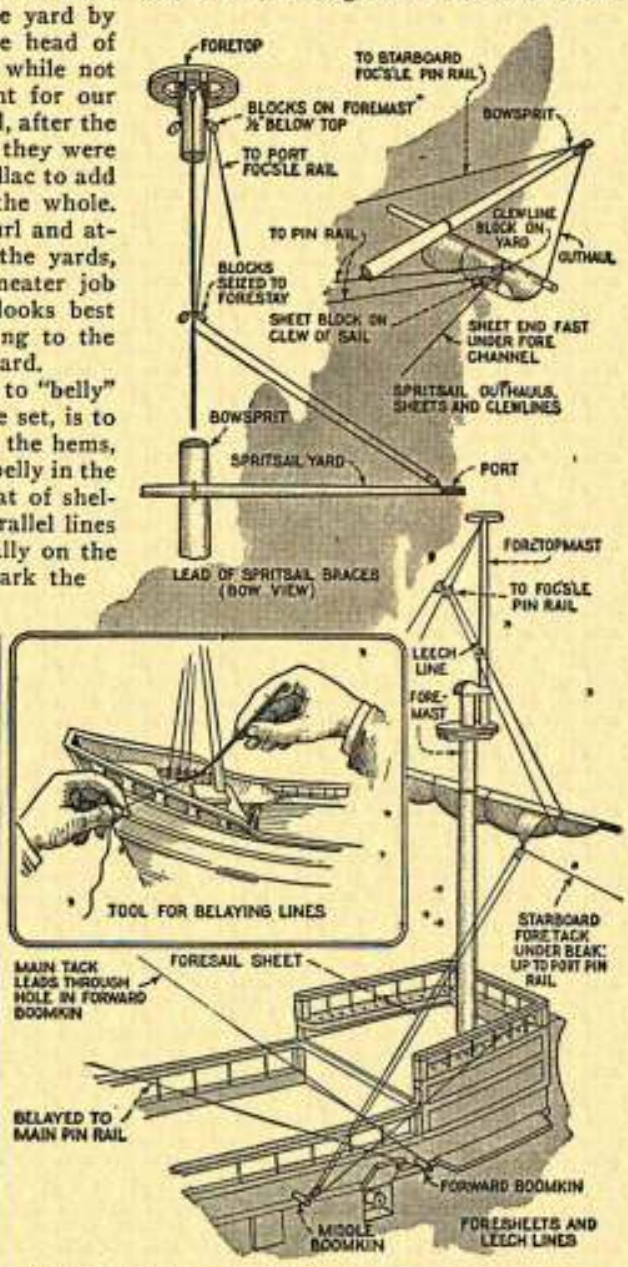


Right, Modern Yacht "Aloha," Showing How Sails Are Clewed Up Ready for Furling

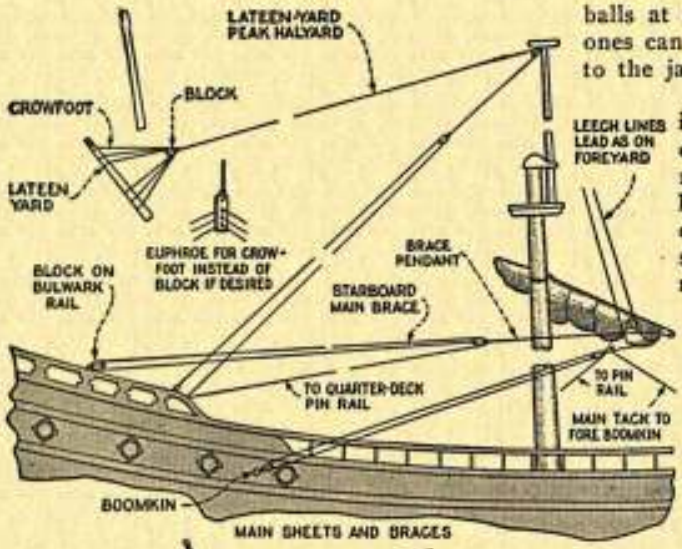
to blocks on the forward side, as shown, and down to the deck; they are for hauling the body or the bunt of the sail upward and forward for convenience in furling and stowing. The leech lines serve a similar purpose. While these lines can be dispensed with, they add considerably to the realism and appearance of the model. The sail is attached to the yard by wire rings passing through the head of the sail and around the yard; while not exactly correct, this is sufficient for our purpose. On the original model, after the sails were attached and furled, they were given a light coat of orange shellac to add to the antique appearance of the whole. If the reader desires, he can furl and attach the sails before slinging the yards, and probably he can make a neater job in this way. The furled sail looks best when full at the center, tapering to the yardarms and well up on the yard.

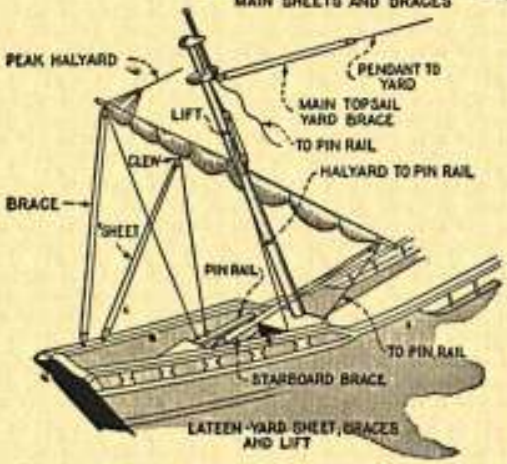
About the only practical way to "belly" the sails, if they are made to be set, is to sew soft copper or iron wire in the hems, and bend the wires to keep the belly in the sail, also giving the latter a coat of shellac. It is well, too, to draw parallel lines with a soft black pencil vertically on the sails, about 5/8 in. apart, to mark the cloths making up the sail.

The dimensions of the various flags are as follows: The flag at the main, which was the banner of the Dutch States General, is 4½ by 2⅞ in.; the fore flag, which was the flag of Amsterdam, is 3 by 2¼ in.; the mizzen, the pennant of the city, ½ by ⅜ in. with a ¼-in. swallow tail; the stern staff, the flag of the East India Com-

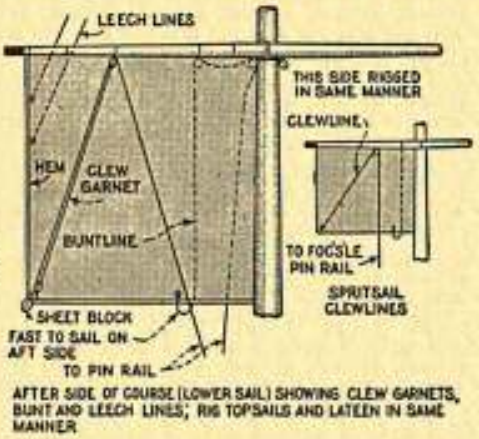


How the Wire Tool Is Used for Belaying the Running Rigging; Note Wire Pendants for Leech Line Blocks

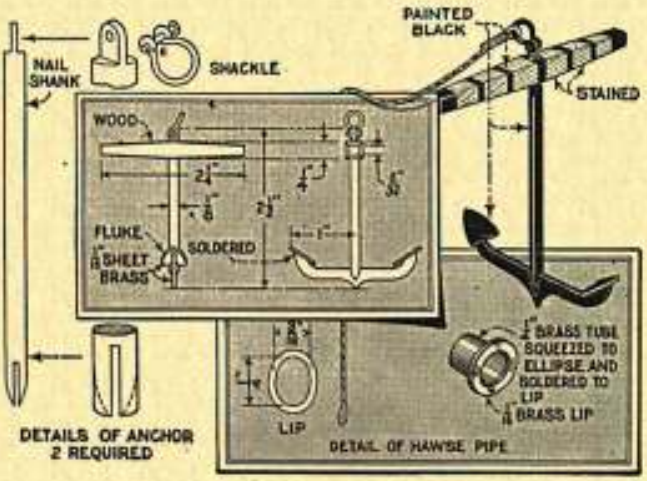




The Lower View Shows How to Construct Very Simple but Effective Built-Up Anchors



AFTER SIDE OF COURSE (LOWER SAIL) SHOWING CLEW GARNETS, BUNT AND LEECH LINES; RIG TOPSAILS AND LATEEN IN SAME MANNER



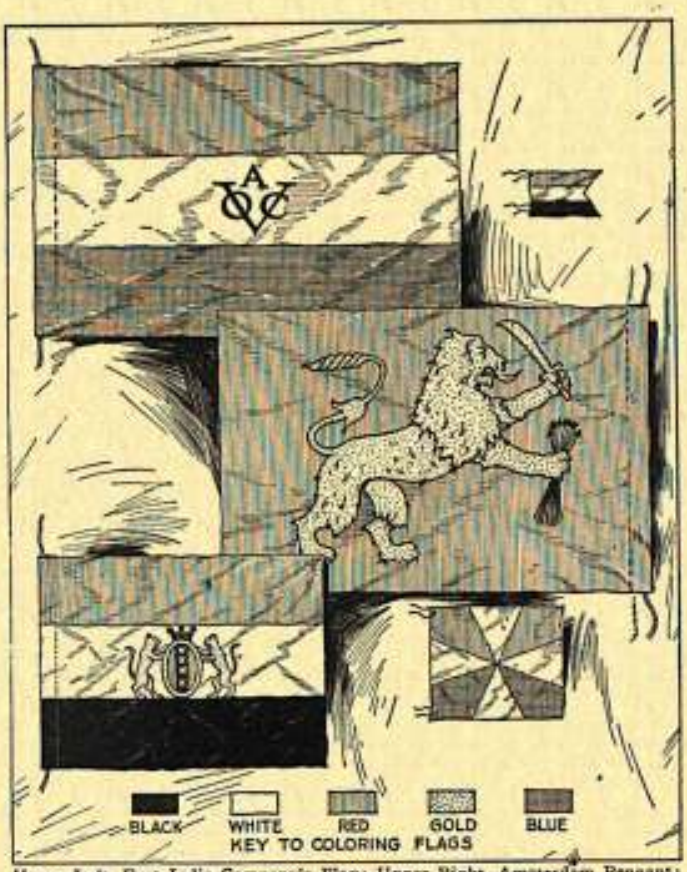
pany (Ost Indische Cie Van Amsterdam), 4½ by 2⅞ in., and the flag on the bowsprit, which was a "prinzen gosch" of the States General, 1½ by 1⅛ in. A key to the colors is given in the drawing of the flags. They are made of unbleached muslin, given a coat of shellac, to stiffen them and to prevent the paint from running. The flags on main, fore and the stern staff are hoisted on halyards that run through holes drilled in the balls at the masthead; the smaller ones can be attached with fine wire to the jackstaffs.

The last job is the making of the anchors, and full details for this and the making of the hawse-pipe lips are given in one of the drawings. The anchors are stowed on the fore channels and lashed to the shrouds. Do not use chain for the anchor cables, as chain was not in use at the period of the "Half Moon"; use heavy cord that looks as much like rope as possible. Now go over the model and retouch all

necessary parts with paint, including the touching up with flat black paint of all pinheads and wire fittings, and your model will be completed.

One final word. You have been instructed previously to use automobile paints ground in japan for the model. Now, the color scheme used on the original model may be modified or changed in any way that appeals to the maker, but you should stick to the flat paint specified, and, on no account, use a shiny paint or enamel anywhere. After several coats of the flat paint have been applied, and have dried, if the paint is rubbed briskly with a clean soft rag, it will acquire a soft polish that makes the hull look as if the surface had been worn by handling for years; in other words, it gives a sort of artificial "patina," that antique collectors talk about. As the cloth polishes only the high spots, and the corners of the strake joints, etc., remain flat, the effect of age is heightened. If the color scheme is changed, keep the new colors as subdued as possible, consistent with good decorative effect, since glaring, new-looking colors on a model of this type are entirely out of place. You do not want to make a fake antique, of course, but neither do you want a model of a vessel of this period to look like a cheap factory-made toy. A number of ways to "age" the model will occur to the builder, such as smudging the brighter colors with darker paint, but do not overdo these things, or it may easily happen that you will spoil the very effect you are trying to achieve.

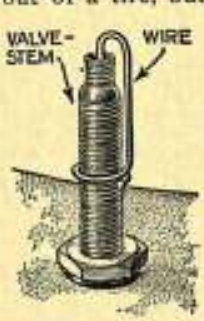
Owing to limitations of space, there may be some details that we have not made quite clear to the reader. In case of any doubt or difficulty, simply drop a line to Amateur Mechanics department, and we shall be very glad to serve you with advice and help in every possible way.



Upper Left, East India Company's Flag; Upper Right, Amsterdam Pennant; Center, Flag of States General; Lower Left, Flag of Amsterdam; Lower Right, "Prinzen Goach" of States General

Holding Tire Valves Open

It usually takes some time to let the air out of a tire, but the simple tool shown in the illustration, which holds the tire valve open, allows the air to escape and frees the motorist's hands to do other work. The tool is a short piece of wire with a hook bent at one end, to hold the valve open, and a loop on the other end, to catch the threads of the valve stem.—E. A. Goering, Langenburg, Sask., Can.



Running Lampcord through Metal Molding

Lampcord on the floor is broken and worn out rather easily and always collects dirt besides being a fire risk. To overcome these troubles, the installation

Lampcord Protected from Injury by Installing It in Metal Molding Screwed to Baseboard

shown in the drawing will be found practical. Metal molding of the kind used by electricians for concealing wires run over walls and ceilings is obtained, and an elbow fitting if a corner has to be passed. The molding comes in any color and shade desired to match woodwork. Run it along the baseboard and screw it in place, as indicated. The lampcord is inserted in the molding and the cover snapped on so that one can only see the plug and the socket end of the lampcord.

Dark-Room Light "Pirates"

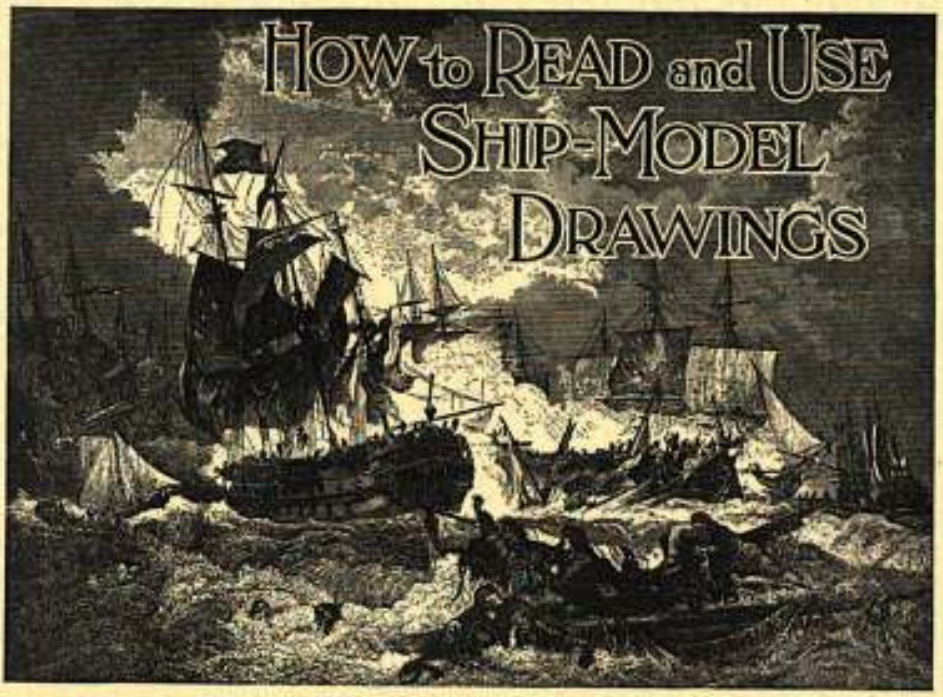
Recently I made some experiments to find out what damage was done by light "pirates" in the photographic dark room. My pirates consisted of a red light, a lighted cigaret, the rays from a luminous-dial wrist watch and the flash from an electric switch. For ordinary work these lights do no serious damage, but for the particular operator handling ordinary work, and for all work of precision, it is wise to guard against them. No so-called safety light is absolutely safe. The rays from any red light register upon a film, but it is rather a matter of how much exposure the film can stand without doing any serious damage. A red light, which I had always considered safe with portrait film, showed considerable registration upon a piece of dry film exposed for one minute at a distance of 3 in. Such long exposure to a dry film is seldom necessary, and it is true that a wet film is less sensitive, but this exaggerated result showed that some registration would take effect upon wet film while exposed to the red light for examination in the process of development.

There are a few photographers of my acquaintance who persist in smoking cigarets in the dark room. This is unsafe even in the most adverse working conditions. Cigaret light is white, and three puffs of a cigaret held 6 in. away from a piece of dry film resulted in considerable fogging and was sufficient to ruin the film. A 30-second exposure of a piece of portrait film to the luminous dial of a small wrist watch resulted in the complete breaking down of the silver deposit. One minute's exposure at a distance of 4 in. made a noticeable registration. A flash from an electric switch registered enough to ruin a film. Although this exposure was for a fraction of a second, the flash contained rays, to which portrait film is very sensitive.—Edward H. Flaharty, Parco, Wyo.

Emergency Tire Chain

Many motorists do not have chains, and during the summer months it sometimes happens that they are caught on soft ground or mud unexpectedly. It is better to be prepared for such emergencies by carrying along six endless ropes and two strong leather straps. When you get on soft ground where you cannot make any headway, slip the ropes over the wheels as shown in the drawing, holding them in place with the straps.

How to Read and Use Ship-Model Drawings



Admiral Duncan's Victory over the Dutch Fleet, 1797, from an engraving by J. Rogers

By JAMES TATE

BLUEPRINTS and drawings for almost every type of ship that the model enthusiast desires to make are easily obtained, but the amateur, who has been fired with the ambition to make a model of such historic ships as the "Mayflower," "Santa Maria" or "Constitution," or one of the famous clippers of the age of sail, often finds himself up against a dead wall when his blueprints arrive and he attempts to start the job, because of his inability to "read" the drawings. Not that ship drawings are at all hard to understand, but, just as in reading radio diagrams, one must be familiar with the conventions and symbols employed in order to read them without difficulties.

The drawings for the hull of the model ship, known as the lines of the ship, usually consist of three plans. One is the sheer plan, illustrated at the top of the full-page drawing, Fig. 1, the second, is the "half-breadth" plan, shown in the center of the same page, and the third, shown at the bottom, is the "body" plan. The sheer plan, as may be seen from the drawing, is simply a side view of the hull, and takes its name from the fact that it shows the sheer, or curve of the deck and hull lines from stem to stern. The sheer line is the line indicating the curve of the deck, and is shown, in Fig. 2, applied to a hull of the clipper type. The lines marked A, B, C and D on the sheer plan are the water lines. This may seem confusing to the beginner, who has understood that there is only one water line on a ship. This is true; there is only one real water line on the ship, and this is usually designated on the plans as "load water line," abbreviated to L. W. L., indicating the depth to which the hull sinks into the water when loaded. The other lines are simply called water lines for convenience, since they represent the same kind of section of the hull as the L. W. L. does. Suppose we took a block model of a hull, set it up in the vise, and sawed it straight through along the line A on the sheer plan. A plan view of the section sawed off would then have the

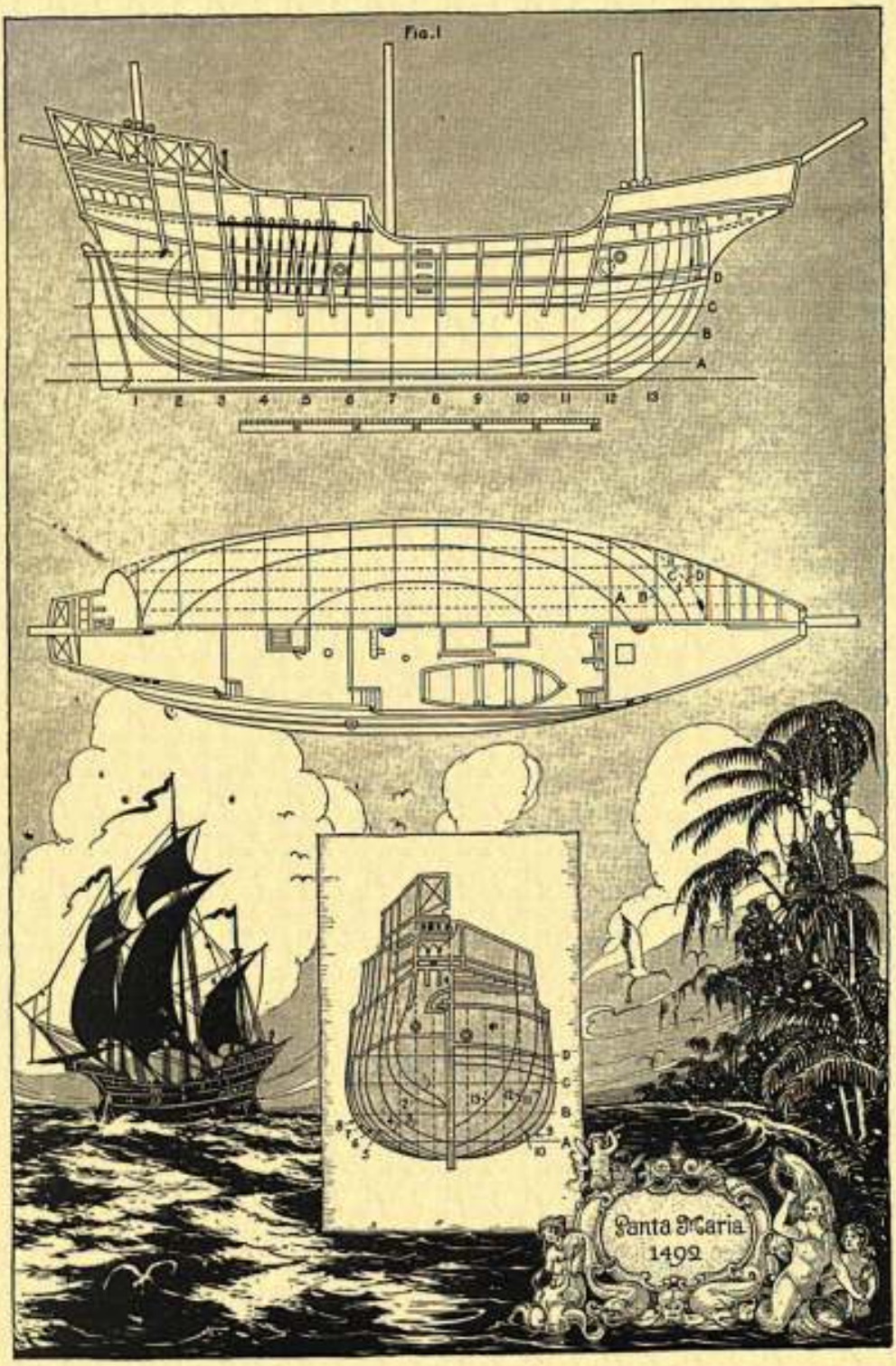


Fig. I
D
C
B
A
1 2 3 4 5 6 7 8 9 10 11 12 13
Santa Maria
1492

shape shown by line A in the half-breadth plan, and if another section were sawed off along line B, the shape of the upper side of the section would be the same as shown by the line B in the half-breadth plan, while the shape of the underside would, of course, have the form of line A. This is the principle upon which the bread-and-butter

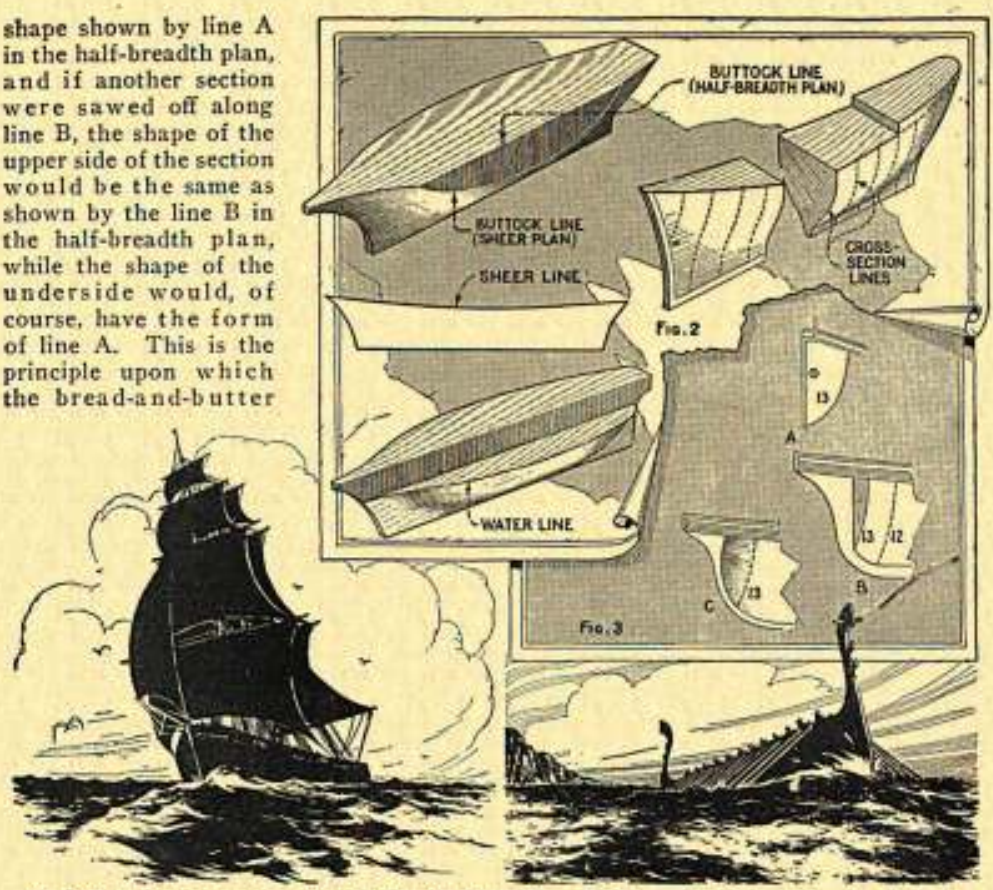
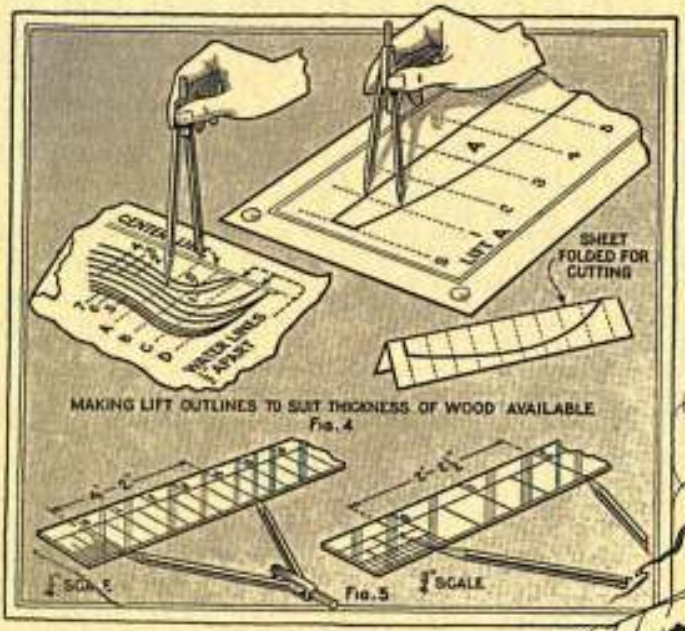


Fig. 2, What the Various Lines of a Ship Drawing Mean Shown by Means of a Block Model; Fig. 3, How to Interpret the Bow Lines

method of making the hull of the model "Half Moon," described in the October, 1926, number of the magazine, is based.

The half-breadth plan looks rather difficult to understand, at first sight, but it is not really so. This is a view of the ship looking down on it from above, but, in order to save making two drawings, the designer makes two in one. The plan below the center line represents a plan view of the deck, showing the arrangement of the deck fittings, such as the ship's boat, deck houses, companion ladders, masts, fife rails, etc., as well as the length of the forecastle and poop decks, and is just as the ship would appear if you looked directly down on it. The upper part of the drawing shows the shape of the sections that would be produced by sawing as described previously, and this, too, is illustrated, somewhat more graphically, in the lowest drawing in Fig. 2. Here a vertical saw cut has been made along the center line of the block model, down to a water line, and then the block is cut horizontally along the water line and the section removed. The line marked "water line" represents one of the curved lines shown in the upper half of the half-breadth plan. A little study will make this clear.

You will notice a number of dotted lines running fore and aft on the half-breadth plan, and a similar number of curved full lines on the side of the hull as shown in the sheer plan. These are buttock lines, and represent sections also shown graphically in Fig. 2. When a slice is cut vertically off the block near one side, the line of the cut on the deck is straight, while the line on the side is curved. These lines are of more importance to the designer than the model builder, but they do serve



How to Take Off the Lines of a Blueprint to Suit Different Thicknesses of Lifts; Below, Homemade Scales and Their Use

to point a warning, and that is, that, no matter from what angle the hull is viewed, when completed, all the curves should be "fair," as the designer calls them, that is, they should have a smooth, clean sweep from one end to the other, with no humps or hollows in them.

When we take a loaf of bread and slice it, we produce exactly the effect of the lines in the body plan. The lines in this plan represent cross sections of the body as they would appear if the block were cut straight across at regular intervals along its length. Note the upper right-hand drawing in Fig. 2. These lines are very important for the modeler, since from them he cuts the templates that enable him to give his hull the correct shape. The cross sections are taken, as stated, at regular intervals along the hull; these are called the stations, and are numbered from 1 to 13 in Fig. 1. The stations are similarly marked on both sheer and half-breadth plans. The designer does another thing with the body plan that puzzles the beginner. In order to show all the cross sections on one plan without confusion, what he does, in effect, is the same as if he had split his hull in two down the center and then turned one half end for end. That is, the left-hand half of the body plan, in Fig. 1, shows the cross sections of the ship as viewed from the stern, while the right-hand half shows the cross-section lines as viewed from the bow. This can be understood by comparing the numbers of the lines on the body plan with those on

the sheer plan. Line No. 1 on the body plan is a cross section of the hull at station 1 on the sheer plan, and line No. 13 on the body plan is a section at station 13 on the sheer plan.

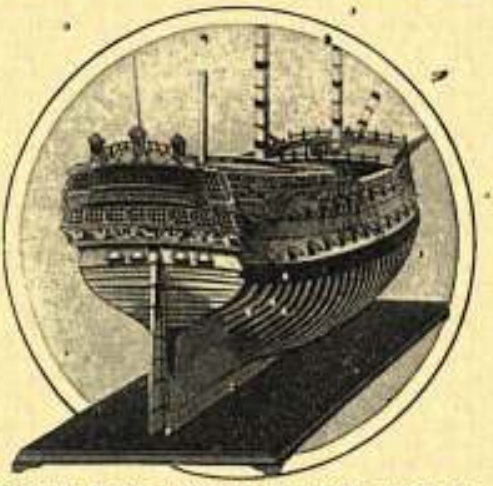
There is one thing to bear in mind in connection with the last-mentioned line, No. 13, and that is, that the bow curves forward to the stem from this line. This may seem apparent, and it is easily seen from the sheer and half-breadth plans, but I have seen model makers very puzzled over this. Line 13 is shown at A in Fig. 3, and the model makers referred to were carving the hull as though the side were cut straight in at this point, as indicated at B. The proper shape, of course, is shown at C.

Where the blueprints or drawings are made to such a scale that they are the full size of the proposed model, their use is simple. All one has to do is to trace the

water lines on the half-breadth plan on heavy wrapping paper and cut out the templates for making the lifts, as described in the article on the "Half Moon" previously mentioned. Care must be taken to make the wood used for the lifts the same thickness as the distance between the water lines. If working from a small drawing, as in a magazine or book, the lines of the hull can usually be enlarged without much trouble also. For example, the drawings of the "Santa Maria," given here, show a hull 4⅜ in. over all. If this is enlarged twice, it will make a model 8¾ in. long, which would be suitable for a small space; enlarged three times it would be 13⅛ in. long, which is a very nice size for a larger model. The procedure of enlarging is simple. Draw a center line on a sheet of paper, measure the distance from station to station with a pair of dividers, then, starting at station 1, step off this distance twice with the dividers and make this point station 2. Do the same all along the line for the other stations. At these points erect perpendiculars to the center lines, then take off, on the original half-breadth plan, the distance from the center line to the point where the first water line crosses station line No. 1. Step this off twice on the new plan, then do the same with stations 2, 3, and so on. This will give a series of marks through which the new water line can be drawn. The same method is used for making all the drawings, taking the measurement on the original with the dividers and stepping it off twice on the new plan. If the design is to be enlarged three times, step all the dimensions off accordingly.

Occasionally the distance between the water lines on the blueprints is an odd fraction, like 7/16 in., and no lumber this thickness can be obtained for the lifts, or the modeler may want to use wood of a different thickness, which he has on hand. Suppose we have wood ½ in. thick we want to use, and that the distance between the water lines on the drawing is some other measurement. To make new water lines for the lift templates is easy. Take the body plan, and, starting at the top water line, draw new lines on the print ½ in. apart, taking care to keep them at right angles to the vertical center line. (See Fig. 4.) Now draw a center line on the piece of paper to be used as a template, and draw the station lines at right angles to this. Number them as on the blueprint. To make a new water line A, take off with the dividers the distance from the center line to the point where the cross-section line of the stern, marked S, crosses line A, and transfer this measurement to the template. Then, still on line A, take off the measurement of cross section 1 and transfer this to the template at station 1. This is shown in Fig. 4. Still keeping on line A, transfer all the cross-section points to the corresponding station marks on the template, then draw, through the marks, the new water line. This need only be done on one side of the center line on the template, as, if the template is folded along the center line and cut on the line as indicated, both sides will be alike.

Where the scale of the original is unsuitable, and the model is to be made to a different scale, it is well to have a set of paper scales, which can be obtained from drafting-supply houses. In the absence of these, the model builder can make his own. Suppose the original scale is ¼ in. to the foot, and the model is to be made to ¾-in. scale. Make two scales from pieces of bristol board, about 12 in. long and ¾ in. wide. Graduate one of them every ¼ in.



Built-Up Model of English Man-of-War "Valiant"; Ribs Shown Correspond to Cross-Section Lines

and the other every ¾ in., as shown in Fig. 5. Make the first graduation from the left-hand end of the scale zero, and the remainder 1, 2, 3, etc. Every graduation will then represent 1 ft. Divide the

space to the left of the zero mark into twelve equal spaces, which will each represent 1 in. Marks for the half inches should be omitted, as this fraction can easily be estimated, and the marks will only make the scale hard to read. Now, the dimensions of the original drawing are read on the ¼-in. scale, and those of the new model laid out with the ¾-in. one.

Slotted Sawhorse Saves Time

A carpenter engaged in repair work away from the shop found himself inconvenienced at times by his inability to hold small boards or pieces for ripping or cross-sawing. The difficulty was at length overcome by sawing a wide slot through the top member of a sawhorse, vertically in the center. The slot received the saw and allowed the smallest pieces to be held firmly upon the horse while cutting or trimming. It also kept the saw in a position most convenient for intermittent usage.

Removing Effects of Fire with Chemicals

Not long ago our telephone bell rang, and the following question was asked: "Can you tell us how to get the smoke odor out of our house? We had a little fire a couple of nights ago and the house was all filled with smoke. We have had all the windows and doors open since then, but it still makes us almost sick to come into the house." We replied that we would be around in about an hour and see what could be done. We armed ourselves with three large beakers, a supply of potassium permanganate and hydrochloric acid and proceeded to the house. We found that a bed had caught fire in some way and that the covers, mattress and feather pillows had been smoldering for some time before it was discovered. The whole house had been filled with an intensely disagreeable odor and everything was coated with a dark deposit. The house had five rooms on one floor, opening into each other. We removed all the delicate textile materials as well as those which were dyed with bright colors. All exposed metal parts, such as nickeled plumbing fixtures, etc., were then rubbed with a cloth, well moistened with paraffin oil, in order to protect them. The windows and outside doors were all closed and after placing the granite beakers about the rooms we poured the hydrochloric acid over the potassium permanganate in the beakers and left the chlorine, thus generated, to do its work. The beakers were set on newspapers as the contents spattered somewhat. In a couple of hours we returned and opened all the doors and windows, and after airing the house for about an hour, we went in to note the results. The odor was almost entirely gone. In order to get rid of it completely we sprayed the rooms quite freely with a mixture of one part of eucalyptus oil to nine parts of paraffin oil. In a short while the owners returned and were delighted with the results. They slept in their home that night. Much to our surprise the shades, which had been a grayish tan in color when new, but which had been blackened by the smoke, had changed back to their original appearance by the treatment.

Some of the water used by the firemen in extinguishing the fire got on the furniture and made white spots. We speedily removed these with methyl alcohol. By this time our employer was sold on chemistry. He had some fine new oak

floors, which were as black as the rest of the house. He was told that resanding and refinishing were necessary, which was expensive for five rooms. We offered to try to remove this deposit and our offer was accepted. The floors had been varnished and waxed and the varnish was not yet worn off. We prepared some Javelle water and, using this diluted with an equal volume of hot water, applied it to the floor with a rag. The deposit disappeared almost as soon as the rag touched it, leaving the floor just as clean as when it was first finished. Several people who were present showed a great interest in this preparation. The information that it was Javelle water meant nothing to them, notwithstanding the fact that most cans in which bleaching powder is sold have the directions for its preparation on them. Small portions of the floor were treated at a time and were thoroughly washed off at once with plenty of fresh water. The varnish was partly removed in some places but nowhere did it come off completely. The mopboards were all given a light coat of paraffin oil in order to protect them against the action of the Javelle water. After the floors were dried they were given a coat of shellac, as varnish would not have dried well due to the wax, which was not entirely removed, and then it was waxed again. This completed the chemist's job. The paperhangers, painters and professional cleaners performed what remained to be done.—A. T. B., Ottawa, Kans.

To Increase Life of Umbrella

Umbrella ribs or spokes are usually broken when the stitches that hold them to the cover come loose. To prevent this trouble and to double the life of an umbrella it is a good idea to sew some more stitches around the ribs with strong thread as shown in the illustration. This should be done as soon as the umbrella is purchased.—J. P. Bowles, New York City.

Rubber Feet for Camera Tripod

When camera tripods are used on wooden or tile floors, they will have a tendency to slip. If, accidentally, the tripod falls, the camera may be ruined. You can prevent this by providing the tripod with rubber feet. Go to the neighboring drug store, ask for three rubber crutch tips, which come in assorted sizes and slip them over the ends of the tripod legs.—G. S. Tompkins, Monroe City, Mo.

Removing Glass Stoppers from Bottles

Sometimes glass stoppers in bottles fit so tightly that they cannot be removed. Tapping is liable to break them unless it is done in the following way: Press the thumb of the left hand against the stopper, as shown in the illustration, and then tap on the opposite side with a small wooden mallet or a piece of wood. Do not use a piece of metal or stone to do the tapping.—R. Bohn, Bakersfield, Calif.

Anti-Knock Compound Saves Gasoline

An anti-knock compound for low-test gas that is cheap to make, is a real gasoline saver, adds a noticeable amount of power and leaves little carbon, is composed of 70 per cent benzol and 30 per cent aniline oil, to which is added three moth balls. I have tested this out in two cars under varying conditions, and the results are as stated. One pint of the mixture is added to 10 gal. of gasoline.—Philip C. Shera, Columbus, Ohio.

Detachable Bracket on Broom Handle Hangs High Curtains

To avoid the dangers of climbing onto chairs and other pieces of furniture to remove or replace curtain rods, one housewife devised a very simple tool which can be quickly attached to the handle of the broom. A length of heavy-gauge wire is bent in the shape shown in the illustration, and a small hole is drilled to a depth of 3 in. in the end of the broom handle to receive it. The hooks of this device may be made to engage and support the curtain rod in a horizontal position while the curtain is being raised or lowered. When not in use, the attachment may be instantly removed from the broom and stored in the broom closet.—G. E. Hendrickson, Argyle, Wis.

Wire Bracket on Broom Handle Hangs Curtain Poles without Need of Climbing

Grading Lawns

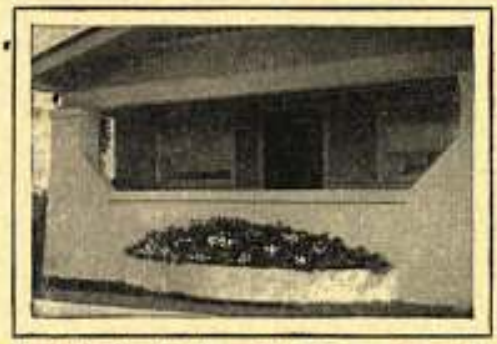
The home owner should first examine the kind of soil he intends to use for grading so that he will know about how much it will settle. After clay is dug up and loosened, its bulk is increased about 25 per cent and it will then settle gradually about 20 per cent in height and 16 per cent in bulk within a comparatively short time. This must always be taken into consideration, and a grade should never be run to the exact level where it is desired but it should be run over this level. Should you find a great deal of sand, it is well to know that this increases 8 per cent in bulk when dug and settles 25 per cent in height.—L. H. Georger, Buffalo, N. Y.

Black Paint for Tires

Oil paints deteriorate rubber and should not be used for blackening tires. However, a good tire paint which will preserve the rubber and give the tire an attractive dull-black appearance can be made as follows: To 2 oz. of flake graphite add 2 oz. of ordinary lampblack; mix thoroughly and add ¼ pt. of shellac. This mixture can be thinned to the proper consistency with denatured alcohol. It will adhere readily to the rubber and is flexible and tough, so that it will not crack.—H. A. Rogers, Springfield, Ohio.

Unusual Flower Bed

The photo shows an unusual flower bed with which a Los Angeles builder has ornamented the front of his house. It is built onto the side of the porch wall as a sort of baylike extension, semicircular in design. It is about 10 ft. long, its maximum width is 2 ft. and the height of the curved wall is 14 in. Both the porch wall and the flower container are constructed of brick and finished with white cement stucco. Filled with earth to within 2 or 3 in. of the top, it contains a charming planting of begonias and asparagus sprengeri.—Charles Alma Byers, Los Angeles, Calif.



Novel Semicircular Flower Bed Built as an Extension from the Side of the Porch

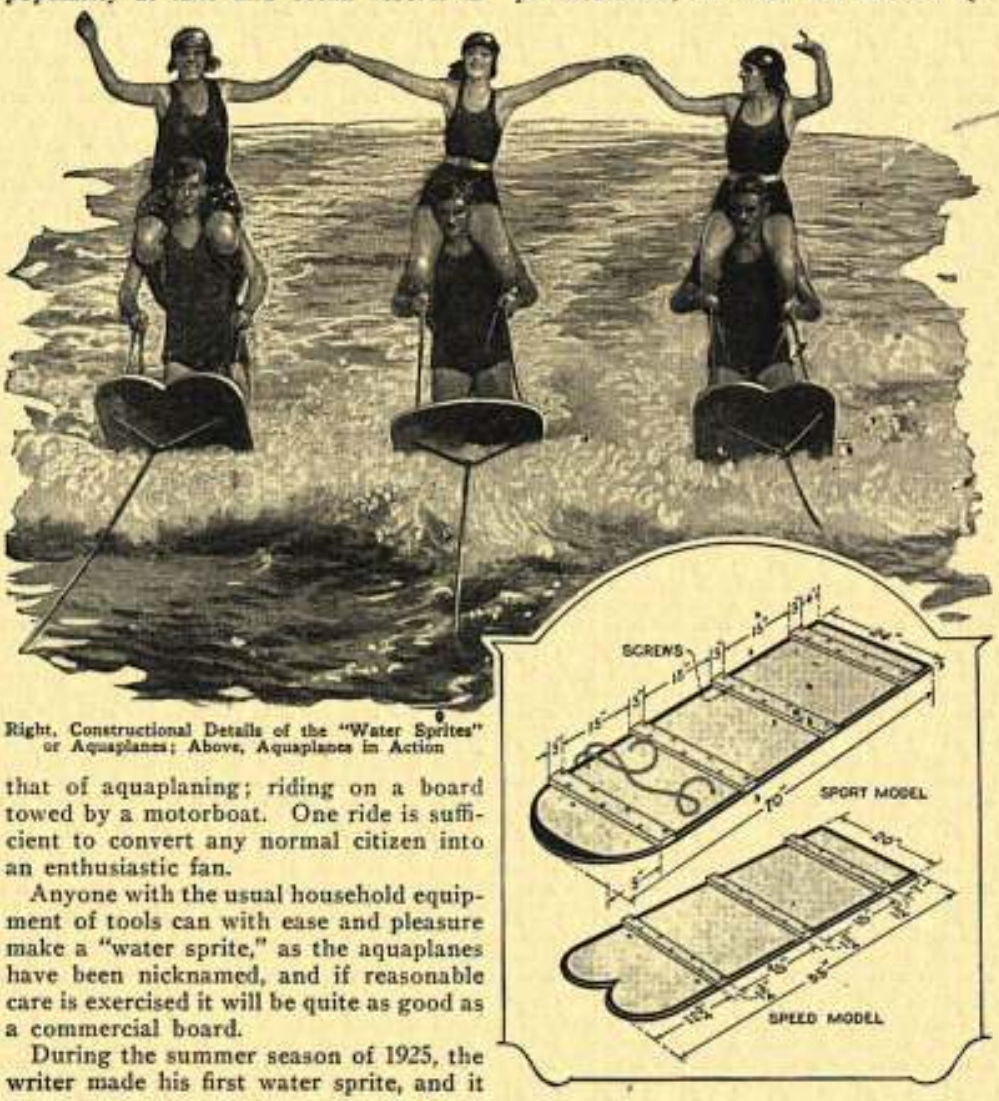
Build Yourself a "Water Sprite"

By R. L. SIMONS

A SPORT that has, during recent seasons, experienced a great wave of popularity at lake and ocean resorts is that of aquaplaning; riding on a board towed by a motorboat. One ride is sufficient to convert any normal citizen into an enthusiastic fan.

Anyone with the usual household equipment of tools can with ease and pleasure make a "water sprite," as the aquaplanes have been nicknamed, and if reasonable care is exercised it will be quite as good as a commercial board.

During the summer season of 1925, the writer made his first water sprite, and it afforded so much pleasure that he made several others for friends. After some experimentation, two sizes were decided up-



Right, Constructional Details of the "Water Sprites" or Aquaplanes; Above, Aquaplanes in Action

on as most satisfactory, the sport model and the speed model. The former is a larger plane, capable of being towed by a slower boat and carrying as many as three passengers. The latter is a smaller board which, having less area exposed to the water, must be drawn faster in order to plane with its single passenger. It offers the greater kick of the two styles, for it travels faster and requires greater skill in balancing and riding. The larger or sport model—family model one spectator called it—will plane with one passenger at a speed of six miles an hour, though the real thrill comes at higher speeds. The speed model, and the sport type when it is carrying two passengers, require about double this speed.

Left, the Sport Model, for One or More Persons; Right, the Speed Model for One

Dimensions for both types are given in the drawing. There is nothing arbitrary about these sizes, and they may be varied at will, but as they have been found satisfactory there would be no point in departing too far from them, unless the material available made this necessary. If the sprite is too narrow it will be very nearly impossible to stay on it; on the other hand, it should not be too wide. Any smooth, unsplintered wood may be used for the board part, on which the rider stands, or tries to stand. In the case of the writer, the board was made of tongued-and-grooved white-pine stock, clamped up with marine glue in the joints and strengthened by cleats, but such elaborate joints are an entirely unnecessary refinement, and were used only to improve the looks of the finished sprite.

It will be quite satisfactory to hold the boards together by three or four cleats running across. These should be held firmly in place by flat-head countersunk wood screws, staggered to distribute the strain, as the water sprite receives a great deal of pounding while in use, and all precautions should be taken to have it strong enough. The edges of the cleats should be beveled, as the rider braces his feet against them. Similarly, the edges of the board should be beveled, as the rider will find himself grasping at the side to climb back on, after inevitably losing his balance. The towrope should be passed through holes bored into the forward cleat and under part, for greater strength, in the speed model, and the second cleat in the sport model. The rope to which the rider holds should be put through holes in front of the towline. Each rope is held by a knot on the end. The towline is led out on the bottom side of the board, and knotted on top. The sprite may be finished with clear varnish or painted in color. The writer has tried both and favors the natural wood, varnished, as presenting the more professional-looking job. However, the board, while in use, has the appearance of snap and life if painted in brilliant colors. The writer further embellished his boards with seagulls on one, a diving girl on another, and other marine suggestions, the decoration being on the forward part. A stripe of color around it, near the rim, also looks well.

In use the water sprite runs 15 or 20 ft. astern of the towing boat. Very little in the way of instructions can be offered for riding the board, as it is largely a matter of experience. The writer's practice is to lie flat on the board, taking a short hold on the hand rope and allowing plenty of slack cord, between the stomach and the sprite. As it gains speed I slide back, keeping the weight well aft, for if the weight is too far forward, the stern will tip up, the bow will dive and the entire board will spin around. As the sprite attains

full speed I assume a squatting, then a standing, position. Practice will enable the rider to do various stunts. A friend of the writer can carry another person on his shoulders, can stand on his head and hands on the fast-moving board, and can ride without the use of the hand rope.

Raising a Sagging Door

When a door sags and the bottom scrapes on the floor, it may be raised to clear the threshold by slipping a hairpin, or other similarly bent wire, under the upper half of one of the hinges around the pin and then twisting it. This will serve as well as an extra washer. In replacing a door which has been removed, the hinges can more easily be brought into alinement if the bottom of the door is rested on the toe of the boot and steadied while the hinge pins are guided into the holes.—Dexter W. Allis, Everett, Mass.

Combination Steps and Driveway

A novel method of combining steps and an automobile driveway, where the house is built on a terrace, is shown in the photo. The steps are built inside of the concrete strips which form the roadway and curbs are laid on the outside of these. By this method of construction a passage is provided for deliveries to the rear of the house without taking up additional room, which is a feature worth considering where the house is built on a narrow lot. In order to make steps easy for ascent and descent they should be proportioned so that the height of two risers plus the width of one tread will be about 24 in. Thus steps 6 in. high should be 12 in. wide. A wooden float should be used in finishing.

Combination Steps and Auto Drive on Terraced Lawns Found Convenient and Space-Saving

Lens Mounted on Sewing Table

Magnifying Lens Mounted on Edge of Sewing Machine or Table Eliminates Eye Strain

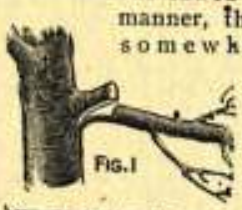
Eye strain can be eliminated to some extent by attaching a reading glass to the sewing table. A spring and washer on a pivot screw serve to hold the handle of the glass against a beveled block and a small collar on the pivot screw enters a recess in the handle, as shown. The glass is removed by pressing it down from the catch and pulling it away from the pivot. When not in use, the glass is swung under the table top where it is safe. The beveled block should have such a slant that the lens will be held at an angle convenient for threading needles. Cloth, held on the knees, can be cut along a thread without strain, and certain knots in embroidery may be tied much more quickly. — Harold E. Benson, Boulder, Colorado.

Chair-Arm Ash Trays

Individual ash trays for use on the arms of overstuffed chairs can easily be made in a few moments. Obtain a piece of silk velvet, about 2 in. wide by 1 ft. long, of a color to harmonize with the chair. Get a little tray, and two small strips of lead or iron to weight the ends of the piece of velvet. The strips should not be over 2 in. wide, and should be of sufficient weight to hold the tray in place. Punch a small hole in the bottom of the tray and attach it to the center of the cloth by using a small split brake-band rivet, or else punch two small holes in it and sew the tray to the cloth. The weights are attached by folding the ends of the cloth over them, and sewing them in place as shown in the drawing.—Glen F. Stillwell, Collinsville, Ill.

Cutting Large Branches

When large tree branches are to be removed, care must be taken in cutting them off so that the tree trunk will not be torn. If the limb is sawed off in the ordinary manner, the result will be somewhat similar to that shown in Fig. 1. If, however, three cuts are made as shown in Fig. 2, the branch may be removed in a workmanlike manner without any damage. The first cut should be made by sawing into the underside of the limb until the weight of the limb pinches the tool. Then the upper cut is made, deep enough to cause the limb to break off and fall. The remaining stub may then be cut off close to the trunk so that the wound will heal over without decay. —G. E. Hendrickson, Argyle, Wis.



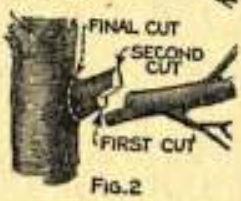


FIG. 2

Guide for Tapping Holes

When tapping a hole in a steel or metal block, it is difficult to keep the tap vertical while cutting the first few threads. Unless started right the threads will have the wrong pitch and make a poor fit for the screw or bolt. One way to overcome this trouble is to bore several hardwood blocks with exactly vertical holes of sizes to fit the taps. One of the wood blocks is placed over the hole to be tapped and the tap is started through the hole in the block. This will keep it plumb or at right angles to the work and insure a good job without breaking the tap.

Lock for Box-Camera Shutter

Nearly everyone owning a box camera has at some time or other found that the shutter was accidentally snapped and a section of film spoiled. This can be prevented by means of a simple lock as shown in the drawing. It costs practically nothing for material. First cut out a bar of stiff brass, 1 in. long and as wide as the space crossed by the shutter when it is pushed to each end of the slot. Turn up one end of the bar for a finger pull, polish it and smooth off the edges. Make a pair of slides from the same material. One is ½ in. square and the other ½ in. long and ¼ in. wide. Bend them so that the bar will slide under them. Drill small holes in the flanges for fastening, and polish them. The lock is assembled as indicated. The bar crosses the slot in the middle and the slides are screwed to the camera box, the large slide to the left and the small one to the right. Be sure that the finger pull

is to the left. To lock the shutter, push the bar across the slot. To snap a picture, pull the bar back across the slot until the finger pull hits a stop pin placed behind it at the left. This pin can be made from a phonograph needle driven into the wood and snipped off where desired.—L. B. Robbins, Harwich, Mass.

How to Wash the Car

Cold or luke-warm water should always be used for washing a car. Hot water is injurious. If you use a hose, let the water run out slowly. If it comes out with force, the finish of the car will be ruined as the dirt will be driven into the varnish. Grease and oil should be removed with gasoline. After most of the dirt has been washed off, clean the surface with luke-warm water and a mild grade of laundry soap or linseed-oil soap. Rinse with cold water, rub dry and polish with chamois skin. To add to the luster of the finish you can use a good grade of automobile or furniture polish. The nickel parts of the car can be polished with any good metal polish, which does not contain too much abrasive matter, and a soft cloth, which will not scratch, should be used for this purpose.

Cleaning Straw Hats

In cleaning straw or panama hats, considerable inconvenience is usually experienced on account of the necessity of removing the band and bow to prevent the cleaning and bleaching liquid from staining them. This difficulty can readily be overcome by placing two wide rubber bands around the hat, as shown, one to cover the upper edge of the ribbon and one the lower, and the cleaning can then be done without soiling them.

Clothes Hangers Keep Children's Room Tidy

Clothes hangers of the kind shown in the drawing are quite novel and aid in teaching children to hang their clothes neatly when going to bed. The figure can be made of wood, painted in appropriate colors. The desired pattern, which may represent a French maid, a brownie, an elf, clown, pierrot, dancing Indian warrior, or any other thing interesting to a child, is first drawn on a large sheet of paper. It should be from 30 to 36 in. high. After cutting it out, it is traced on a ½-in. board and the outer parts of the wood sawed off with a band or jigsaw. The arms, which are separate pieces, are nailed on and the figure is mounted on a base.—Mrs. E. W. DeHuff, Santa Fe, N. Mex.

Ornamental Figures in Child's Bedroom Hold Clothes Neatly at Night

Bath-Spray Nozzle Made from Oilcan

Desiring to have a spray attachment for his bathtub, one man punched holes in the bottom of a cheap oilcan, cut off most of the spout and stuck the remainder into the end of a rubber gas tube. This outfit was connected to the hot-and-cold combination faucet provided on the tub and made an excellent spray nozzle.

Toy Flipper Easily Made of Thermostatic Metal Amuses Everyone

Jumping Disk Proves Amusing

There are available on the market several so-called thermostatic metals, consisting of two layers of different kinds welded together. From this material an amusing toy can be made. It is simply a 1¼-in. disk, dished in the center by means of a ball-peen hammer. If the disk is heated and placed on a table, it will jump suddenly upon cooling. In making the disk, carefully notice the difference of the two sides One is usually yellowish in color and the other bluish-white. The former is the one to be dished until its center is about 1/16 in. below the edge. File the edge smooth. To use the toy, heat the disk carefully until the yellow side bulges outward, making the disk the reverse of what it was before heating. Then place the disk with the yellow side on a cool surface, so that it will contract. When the contraction reaches a certain point, the disk will reverse again and jump up suddenly, perhaps about 6 ft. or more. Other ways to make such a toy are to cut two strips of the same material, dishing both and riveting them together to form a cross, as shown in Fig. 3, or fastening the ends to a ring, as shown in Fig. 4. These do not require the careful dishing that is necessary in the case of the disk, and will not jump so suddenly nor so high. The explanation of the action lies in the fact that the two layers of metal expand and contract at different rates, when being heated or cooled, the yellow one usually having the higher rate.—James G. Zimmerman, Madison, Wis.

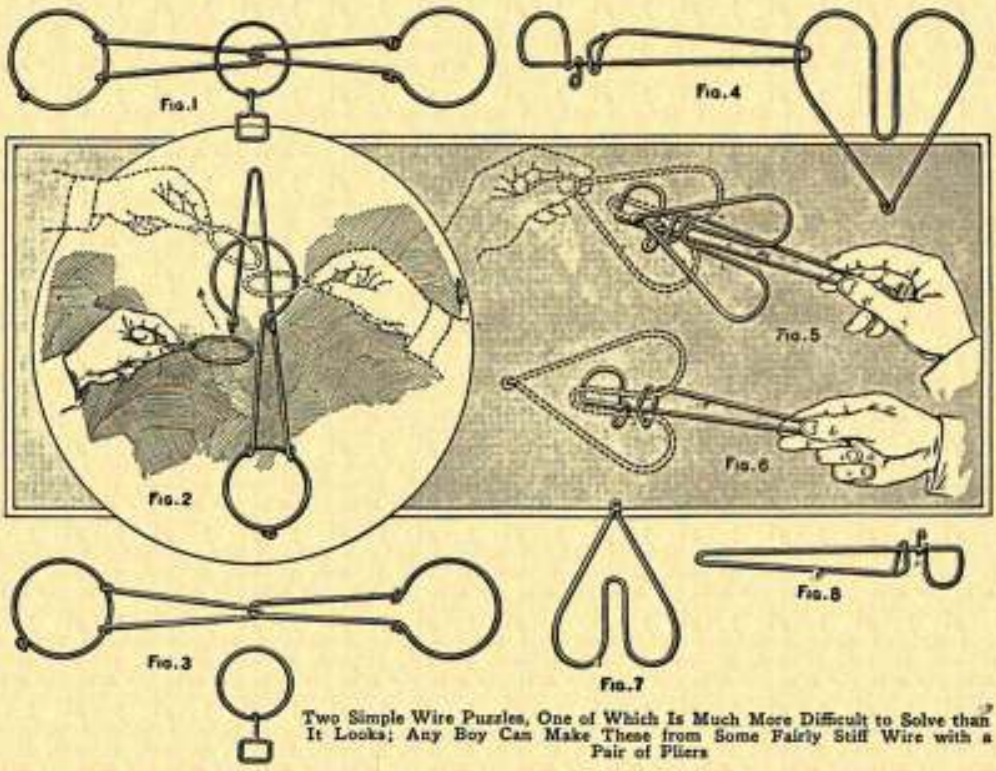
Anchors Made of Concrete

A traveler recently returned from Europe brought an interesting picture of concrete anchors used extensively by the fishermen along the Danish coast and also, to some extent, for mooring yachts and other pleasure and commercial craft. The concrete block is 18 in. square at the bottom, 12 in. square at the top and about 5 ft. high. To increase the holding power protruding arms of 3-in. T-irons, bent up to form hooks, are imbedded in the concrete. A simple square wooden box form is used for molding the anchors. Fillet strips are used to cut off the corners, the sides being mortised so that the T-irons can project. The top form is similarly mortised to accommodate the lifting hook, which is a length of ½-in. round steel bar, bent to a U-shape and extending into the concrete about 10 or 12 in. The anchors cost very little to make.—A. J. R. Curtis, Chicago, Ill.

Concrete Anchors, Used by Danish Fishermen, Are Cheap and Have Great Holding Power

These Will Puzzle Your Friends

WIRE puzzles, while they are very easy to make, and very easy to solve (when you know how), may be made to provide a lot of amusement. Any boy, with the aid of a pair of pliers, can make the two shown in the illustration, which, simple as they seem, will make even his elders spend many minutes in trying to solve them.



Two Simple Wire Puzzles, One of Which Is Much More Difficult to Solve than It Looks; Any Boy Can Make These from Some Fairly Stiff Wire with a Pair of Pliers

The puzzle shown in Fig. 1, while it looks the simpler of the two, has been found the more difficult. It consists of two hairpin-shaped pieces of wire linked together and to two rings, one of which is open and the other closed. The hairpins are each 1½ in. long and the rings at each end are 1 in. in diameter. Assembled, the puzzle looks as in Fig. 1, the central ring being about ¾ in. in diameter. The problem is to get the central ring off. The wire chosen to make puzzles of this character should be so stiff that it cannot be sprung or forced easily when the puzzle is made up, otherwise too enthusiastic solvers will quickly knock it out of joint; on the other hand, it need not be too heavy and stiff, or it will be difficult to form.

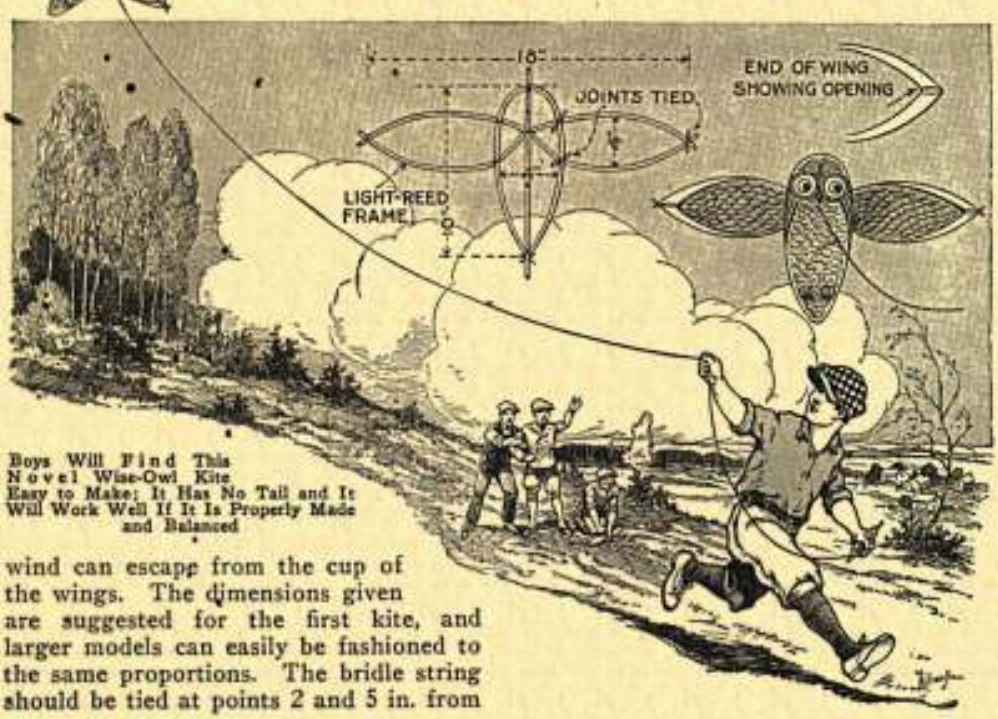
The solution is simplicity itself. The open ring is folded back against its hairpin, as shown in Fig. 2, when the loose ring can be passed around both and off. This may seem almost too simple, but that is the beauty of this puzzle. It is the exception rather than the rule to find anyone who can take the ring off in less than twenty minutes, and many give it up entirely. With a little practice, the owner of the puzzle can hold it behind his back for a second and—presto!—the ring is off, thus adding to the mystification of the person who gave it up.

The second puzzle, shown in Figs. 4 to 8, is simpler to solve, but even this keeps many people occupied for a considerable time. The left-hand piece in Fig. 4 is sword-shaped, and is 3 in. long over all. The handle of the "sword" is about ½ in. long and ⅝ in. wide, and the lower loop is 2¼ in. long. The heart is 2½ in. long and

1¾ in. wide at the top. The loop in the center of the heart must be narrow enough to pass through the closed hook at the top of the lower loop of the sword. The solution is shown in Figs. 5 and 6. The point of the heart is grasped and the loop in its center drawn through the hook in the sword, then over the handle and down through the hook again, the hook being sprung inward slightly to enable this last operation to be performed easily. The whole thing can be done quicker than it can be described, and a minute's practice with the puzzle will show the method.

Tailless "Wise-Owl" Kite

Boys who are looking for something new in kite construction will find the wise-owl kite an easy one to make and quite novel. The frame is made of lightweight reed or bamboo and is covered with light but stiff paper. The paper is cupped, lapped over and pasted, and attached to the frame by several narrow strips of paper on the back side. An opening is left in the end of each wing, as shown in the detail, so that the wind can escape from the cup of the wings. The dimensions given are suggested for the first kite, and larger models can easily be fashioned to the same proportions. The bridle string should be tied at points 2 and 5 in. from the top, and experiment will show the correct place at which the flying string should be permanently fastened to the bridle. Starting at the lines where they join the body, the wings slope back in the cupped surface mentioned above until at the tip they have receded a distance of 1¼ in. If properly made and balanced this kite will need no tail.



Boys Will Find This Novel Wise-Owl Kite Easy to Make; It Has No Tail and It Will Work Well If It Is Properly Made and Balanced

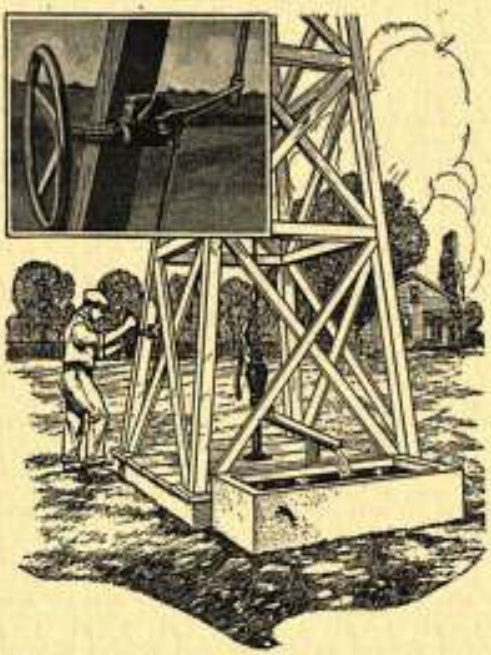
Removing Broken Transmission Key

Several manufacturers of automobiles equip them with transmission locks. This lock is an excellent feature, but it has the disadvantage that the key is easily broken in the lock by someone striking against it with the foot. In several makes, it is necessary to saw the lock off the transmission in order to remove the broken key. However, it is sometimes possible to get the key out in the following way: Scrape the visible portion of the key near the top of the slot with the tang of a small file, and, with a toothpick or other small piece of wood, rub some soldering flux on it. Get a strip of copper, about ¼ in. wide and 6 in. long. The thickness does not matter so much provided it is not so thick as the

broken key in the lock. Clean the end of this strip, put soldering flux on it and heat it sufficiently to pick up a small drop of solder. Now set the strip above the broken key with the soldered end touching the end of the key. With a small portable blowtorch, or blowpipe of some sort, heat the copper strip as close to the end as is possible without setting anything on fire. As soon as the drop of solder starts to melt and run onto the key, remove the torch, taking care not to jar the copper strip, and when the solder is cooled, it should have made a joint between the copper strip and the broken key; then, all that remains to be done is to put a few drops of oil around the key and carefully pull it out with the copper strip.

Quickly Detachable Lawn Hose

To add to the convenience of the lawn hose and the outdoor hydrant, the method of attaching the hose can be simplified so that it can be done almost instantly. Two gaspipe nipples, a tee, a suitable length of discarded shovel handle and a stout coil spring are assembled as shown in the drawing. The upper threads of the top nipple are filed down so that it can be easily inserted into the outlet of the hydrant. When the assembly is completed, the hose is permanently attached to the nipple, screwed into the tee and the device is ready for use. To attach it to the hydrant, a rubber washer is slipped over the smooth nipple, and the supporting spring at the lower end of the device is pressed down against the ground so that the nipple may be inserted into the hydrant opening. The tension of the spring compresses the rubber washer between the mouth of the hydrant and the shoulder of the tee so that a watertight connection is made.



Old Auto Steering Device Attached to Windmill Frame for Controlling the Fan

Control for Windmill Rotor

Frequently the lever used to control the rotor on a windmill becomes loose so that the mill runs wild if no one is around, and besides, the usual lever is rather hard to operate. A decided improvement in the fan control is shown in the accompanying illustration. It consists of the steering device of a discarded auto. The arm is turned by the worm gear and will stay where it is set, no matter how hard the wind blows.

High-Speed Commutator Needs Plenty of Oil

Due to its high speed, the Ford commutator will soon become badly worn unless its parts are lubricated sufficiently, which most owners forget to do. Keeping the commutator in good condition by oiling it properly is necessary to keep the engine in good firing condition. If the contact points do not make perfect contact with the roller, the engine will misfire at fair speed. Put a little good, light oil into the commutator every day if you use the car considerably, or after every 200 miles of driving.

Opening Tin Cans

If the point of the opener is inserted just below the beading of the can top, with its heel at the left of the vertical seam,

Cutting Tin Cans through the Side Is Easy and Permits All the Food to Be Removed

it can be run around the can with much less effort than is required in cutting through the top. Besides, by using this method, the extra force needed to make the flat blade follow a curved path is eliminated. Opened in this way, the can is emptied readily and completely, while a top-opened can usually leaves a jagged edge that retains some of the food and is much more likely to cause injuries than the comparatively clean edge produced by side cutting.—Chester Lynndelle, Trenton, N. J.

Removing Play in Ford Fan

The new style Ford fans often develop end play due to excessive wear. As the front end of such fans is closed, the fan would have to be taken off and the blades removed from the pulley before the shaft could be turned in to remedy the play in the usual way. A better method of taking up this play is to remove the cotter pin from the locknut at the rear end of the fan shaft and loosen the lock about one full turn. Then place a cotter pin through the nut and the fan shaft, but do not spread the ends. Next, turn the locknut with a wrench and the fan shaft will turn with it. Turn the shaft in until only a very slight end play can be felt. Then remove the cotter pin through the locknut and tighten it. Replace the cotter pin through the locknut and spread the ends. The locknut on such fans must be kept tight and the cotter pin in place, or the fan will eventually turn the shaft in so tightly that the fan will stop.—E. T. Gunderson, Humboldt, Iowa.

Nickelplating Brass

Some time ago I had some brass boat parts which I desired to nickelplate. A friend of mine told me how it could be done without using an electric current. The following is his method: Dissolve 8 oz. of sal ammoniac and 8 oz. of double nickel salts in 1 gal. of water, then heat the solution nearly to the boiling point. Now put in your brass or copper articles together with some scrap aluminum, taking care that the aluminum touches the articles to be nickeled. In a short time a nickel deposit will be found on the brass. Although this deposit is not as heavy as that obtained by electroplating, it may be lightly buffed and will be satisfactory in many cases.—Ralph Hanenkratt, Albany, N. Y.

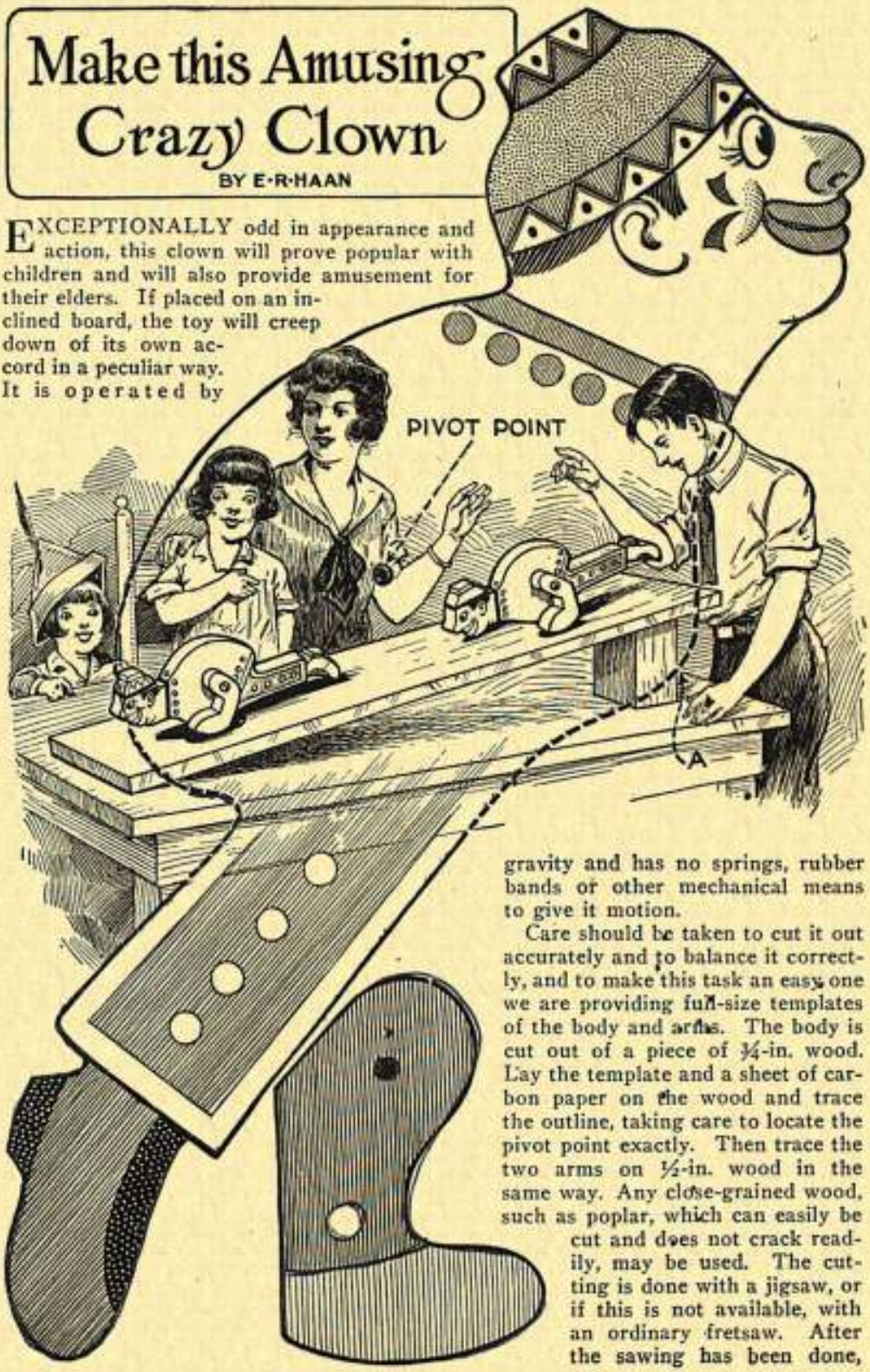
Counterweight on Cellar Door Aids in Operating

Cellar doors of the type shown in the photo are more or less difficult to handle and there is always danger of their falling down, which may cause a serious accident when one is ascending or descending the steps. A counterweight eliminates this risk entirely. Simply attach a pulley to the side of the house and run a length of sash cord over it, fastening one end of the cord to the cellar door and the other to a suitable counterweight. A 2-in. pipe filled with concrete will serve nicely for this purpose.

Make this Amusing Crazy Clown

BY E·R·HAAN

EXCEPTIONALLY odd in appearance and action, this clown will prove popular with children and will also provide amusement for their elders. If placed on an inclined board, the toy will creep down of its own accord in a peculiar way. It is operated by gravity and has no springs, rubber bands or other mechanical means to give it motion.



Care should be taken to cut it out accurately and to balance it correctly, and to make this task an easy one we are providing full-size templates of the body and arms. The body is cut out of a piece of ¾-in. wood. Lay the template and a sheet of carbon paper on the wood and trace the outline, taking care to locate the pivot point exactly. Then trace the two arms on ½-in. wood in the same way. Any close-grained wood, such as poplar, which can easily be cut and does not crack readily, may be used. The cutting is done with a jigsaw, or if this is not available, with an ordinary fretsaw. After the sawing has been done,

Parts of the "Crazy Clown," Showing How It Is Assembled

sandpaper the edges and sides and drill a hole through the pivot point on the arms to take a 1-in. round-head wood screw loosely. Drill two smaller holes in the "elbows" to receive a short length of wire. This connects the arms so that they move together and also limits their swing. The holes should not be drilled entirely through the arms but only deep enough to hold the wire snugly.

After boring a small hole at the pivot point screw the arms to the body and slip a washer over the end of the screw before driving it in, to reduce friction between the arms and the body. Allow the arms to swing freely. The toy is then ready to be tested.

Hold the figure down so that the chin and the point A touch the inclined board. In this position, the arms should swing freely and just clear the board underneath. In some cases there may be too much space between the legs and the board so that it is necessary to reduce the bulge at A by sandpapering slightly. However, if the body and legs are exactly made according to the template there will be no trouble. After the test the toy is taken apart and painted, care being observed not to get paint in the holes in the arms. If this happens the holes should be thoroughly cleaned out before reassembling. Lacquer is recommended for painting, as it dries quickly. The toy, due to irregularities in the cutting, may not operate well on the first trial, but a little experimental work with sandpaper on the bulge A, or the bottom surfaces of the arms, will usually remedy this.

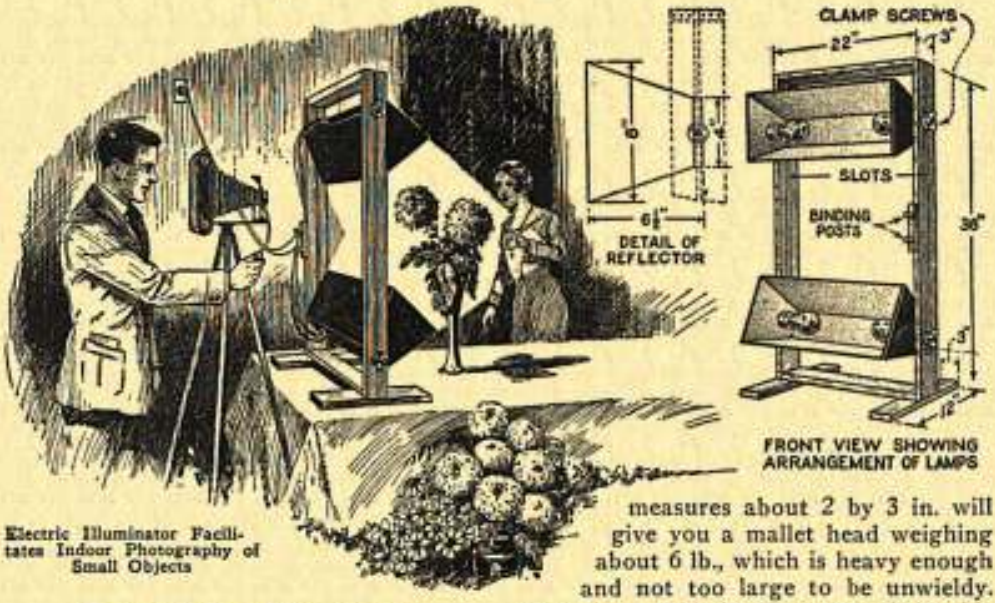
Watering Bees

Few bee keepers who have a small apiary know that it is essential to keep water for their bees. A bee will hunt the well and the watering trough to quench its thirst just as a dog or cat, but the bee is not so lucky when it falls in. It cannot get out of water easily. Therefore, a way should be provided for the bee to get its drink without effort or danger of drowning. To do this, keep fresh water in a pail or other vessel and put ground cork, which can be had at any fruit store, on the surface of the water. Keep quite a thick layer of the cork on the water and change it to keep the cork fresh. The cork will float the bees so they cannot fall in.

Rattrap for Scaling Fish

For cleaning and scaling of fish a novel and convenient device is shown in the accompanying illustration. It consists of a rattrap with the bait pan removed and several steel nails driven into the wooden base near the edge. The points are left projecting about ½ in. and are filed sharp. The trap is fastened to a post at a convenient height, and in use, the trap jaw is raised and the tail of the fish placed upon the projecting brads. Releasing the jaw presses the brads into the tail, so that the fish will hang head downward at a convenient height for scaling.

Many chickens are killed by feeding them too much grain; this is not seldom the cause when they die suddenly.



Electric Illuminator Facilitates Indoor Photography of Small Objects

Illuminator for the Amateur Photographer

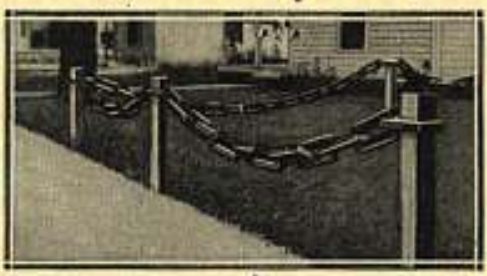
This simple, homemade illuminator comes in very handy for photographing small objects indoors. Copying and photographing objects, such as flowers, that might be moved by the slightest breeze if taken outdoors, may be done with this outfit indoors under absolute time and light control. The arrangement of the four lamps insures the additional advantage of eliminating all shadows on the object if desired. Two reflectors are attached on a wooden frame and these can be moved up or down and adjusted to any angle desired to suit the work at hand. The bottom and narrow sides of the reflectors are made of wood, while the long sides are of thin sheet metal. The inner sides of the reflectors are painted white. Four 75-watt lamps, connected in parallel, furnish the illumination.—Ernst Keil, Dayton, Ohio.

How to Make a Lead Mallet

One of the handiest tools for the man who works around his car is a lead mallet. With it he can drive out the most obstinate bolts, without injury to the threads, or do almost any job that requires a heavy, solid hammer. A mallet of this kind is very easily made. First, get a small tin can, without wrinkles or dents; one that measures about 2 by 3 in. will give you a mallet head weighing about 6 lb., which is heavy enough and not too large to be unwieldy. Cut a round hole in the center of the side of the can and insert a piece of ½-in. pipe for a handle, allowing it to project almost through the can. After warming the tin so that it is perfectly dry, quickly fill it with molten lead. Let the job cool and then tear off the can with a pair of pliers. When, after long usage, the mallet becomes too battered and rough for service, repeat the process.

Wooden Lawn Chain

Ornamental wooden chains for the garden or yard can be made by nailing together 1-in. strips to form links. The usual way is to cut some of the strips 6 in. and an equal number 1½ in. long, assembling them as shown in the photo.



Ornamental Wooden Chain Improves Appearance of Yards and Gardens

This gives a symmetry that is pleasing to the eye and prevents stiffness in the chain.

Theft Alarm Safeguards Car

The drawing shows a simple theft alarm that can be attached to any car, and will, when set, sound the horn and keep it

An Easily Made Theft Alarm That Sounds the Horn When the Emergency Brake is Released

sounding, the moment the emergency brake is released. It consists of a switch having two spring-contact blades located in a V-shaped slot, cut in the floorboard at right angles to the brake-lever slot, and a movable fiber arm that is pushed between the ends of the blades, after the brake lever is pulled back, so that the lever cannot be moved forward without dislodging the arm and closing the switch. When the owner uses the car, he pulls the arm back, so that the brake lever may be moved past without disturbing it. This circuit, of course, is independent of the regular horn circuit.

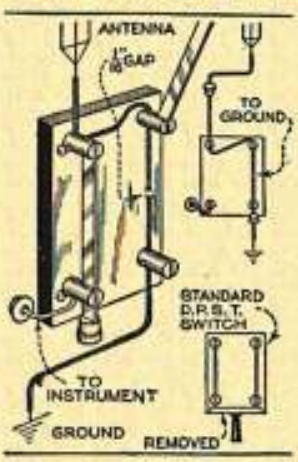
Cleaning Light Silk Fabrics

Georgette crêpes, crêpe de Chine, silk pongee, and other light silk fabrics that will not stand washing, are frequently dry-cleaned at home by washing in gasoline. If the soiled spots are caused by grease, oil, or other substances that are soluble in gasoline, this method is perfectly satisfactory. But when spots of sugar, candy, and ice cream are to be dealt with, as is frequently the case, gasoline cleaning alone will not suffice. Water must be used, but not without caution, for, when applied directly to the fabric, rings and discolorations are likely to result.

A method now practiced by many experienced cleaners can be imitated at home, and the garments can be cleaned without injury, if the following directions are carefully followed. Wash the garment carefully in gasoline as usual, then rinse in clean gasoline, and, without wringing, dip two or three times into a pail of clear soft water, to which has been added 3 or 4 oz. of vinegar. Remove quickly, shake out the surplus water, and hang the garment where it will dry in a short time. Do not allow heavy folds to form in the fabric, as the moisture will be retained in these too long. If hung on a line out of doors, where the wind will aid in drying, so much the better. The evaporating gasoline will carry with it the moisture.

Improvised Ground Switch

An antenna should not be hooked up without a ground switch just because there is no single-pole double-throw switch at hand. A 100-ampere, or larger, double-pole single-throw switch will do quite as well. The only change necessary is the removal of the handle and the insulating crossbar, and the fitting of individual knobs or handles to each blade, so that they can be thrown independently; composition caps of large binding posts are suitable for this purpose. To connect the switch in the circuit, the bared end of the lead-in wire is threaded through both pivot terminals. The ground lead is brought through the bottom post opposite the free end of the lead-in wire and is extended toward the latter as shown, allowing a 1/16-in. gap between the ends. This makes a good safety gap that will not interfere with incoming signals. The wire leading to the instruments is fastened to the remaining post, as shown. When receiving, the grounding blade is thrown open and the other closed; when idle, the positions of the blades are reversed.—E. J. Bachman, Fullerton, Pa.

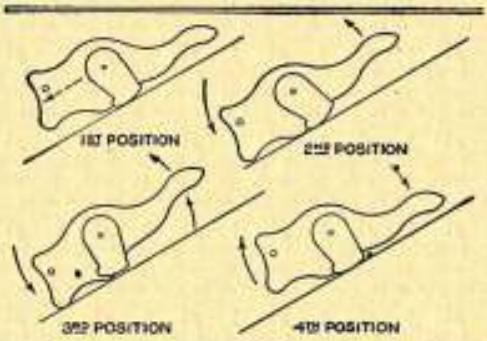


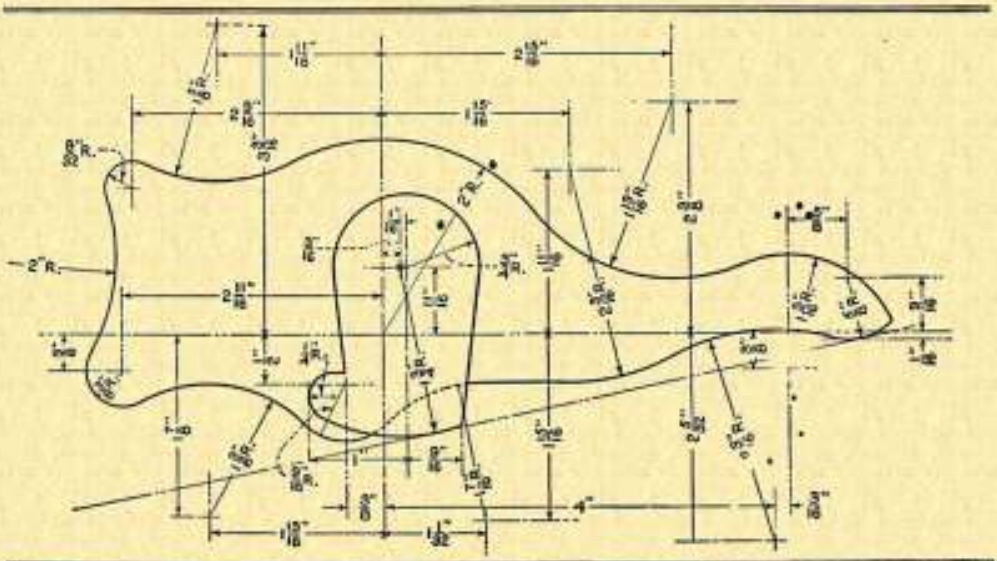
The "Walking Wampus"

By L. BOCHIER

THE toy shown in the illustration will please any child. When placed at the top of an inclined board, it will walk down in a comical manner without any assistance from springs or any other mechanical parts. The secret of the action lies in the placing of the pivot point for the legs. The pivot must be a little ahead of and a little above the center of gravity of the body. When this pivot is located correctly, the body falls forward on the legs, then tips forward slightly, allowing the legs to swing ahead again, and repeats the action until the bottom of the incline is reached.

The construction of the toy is made





A Weird Toy That will Delight the Youngsters: It Walks down an Inclined Board without the Aid of Springs, Gears, or Other Mechanical Parts

clear by the drawing. Material 1 in. thick, finished on both sides, is used for the body. If the center lines are drawn on the stock according to the dimensions given, the centers for the curves are quickly located and the toy is easily laid out.

The legs of the toy are made from ¼-in. material, finished on both sides. It is important that the curve of the feet be laid out carefully. Two legs will be needed, one for each side of the toy. A band saw is convenient when cutting out the body and legs, although a scroll or even a keyhole saw will do.

The holes in the legs should be large enough to be a loose fit on the wood screws used to fasten the legs to the body. A thin washer is placed between each of the legs and the body to reduce friction. An ordinary finishing nail or a piece of stiff wire will serve as the stop pin that joins the legs; this pin keeps the legs moving in unison, and prevents them from swinging too far forward or back.

Before the pivot holes in the body are marked out, it is a good plan to find the center of gravity of the body. The legs must be pivoted in correct relation to the center of gravity or the toy will not move. The approximate position for the pivot point is shown in the drawing. This should be checked, however, as a knot or a dense place in the wood used for the body may locate the point differently. The center of gravity of the body can be found by swinging the body between two uprights having nail points that clamp at right angles to the body. With a few trials a point can be found where the body will balance no matter in what position it is placed. The pivot for the legs is a little above and ahead of this.

The action of the toy is as follows: Starting with the legs drawn back against the rear pins, the center of weight or gravity, being behind a vertical line drawn through the pivot point of the legs, causes the body to "shoot" forward. The "bump" just in front of the legs strikes the board, and the momentum of the toy causes it to tip forward on its nose. This allows the legs to swing forward against the front pins; the toy then tips back so that the weight is again transferred to the legs, and the operations are repeated.

The exact shape of the toy, therefore, matters little. The nose, the bump ahead of the body, and the lowest point of the tail are the important points, in addition to the center of gravity and the length of the legs in relation to the position of the latter. Each toy is really a separate problem in balancing, although the drawing, as stated above, gives the dimensions of a toy that works perfectly. The block of wood used might have a dense spot, thus changing the position of the center of gravity; this would necessitate changing the pivot point for the legs and lengthening or shortening them to compensate for this, or weighting the toy to bring the center of gravity to the proper place, which can easily be done with small pieces of lead.

There are two pins driven into the body on each side, to limit the travel of the legs. The position of these pins is not shown, as this must be determined by experiment for each individual toy.

The color of the paint can be chosen according to the taste of the maker. The toy shown in the photograph has a yellow body striped with black, and red legs.

Simply Constructed Lawn Sprayer

A simple and practical lawn sprayer, consisting of a gaspipe tee, two plugs and a carriage bolt, can be made in a few minutes. One of the plugs is drilled to receive a ¼-in. carriage bolt, 10 in. long, and from this bolt the head is clipped and the shank filed to a sharp point, as indicated. A rubber or lead washer is used in assembling the bolt and plug to make a watertight joint. The plugs are screwed into the tee after an angular slot has been sawed in the latter, as shown. With the hose attached and the sharpened bolt inserted into the ground, the sprayer is ready for use and, in operation, will provide the wide mistlike spray so desired for the watering of lawns and gardens.

Protecting Cucumbers from Beetles

City gardeners who have but a few hills of cucumber, watermelon, or muskmelon vines that are preyed upon by striped beetles, will find that a few moth balls, broken in small pieces and scattered around the plants, persuade the assailants to retreat to other regions.—C. M. Wilcox, Torrington, Conn.

Convenient Stop Lever for Phonograph

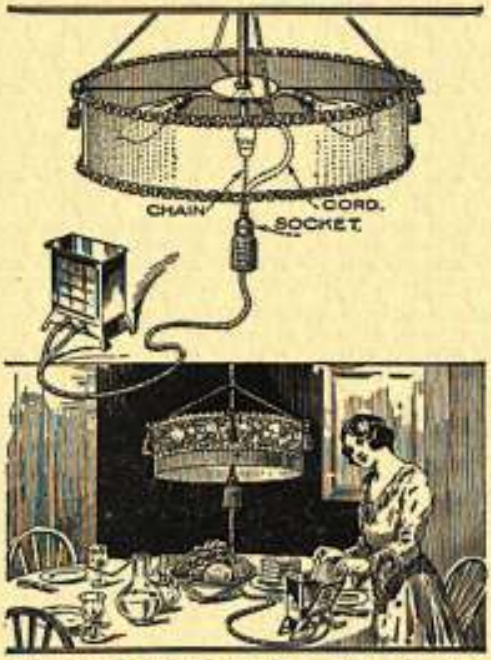
The phonograph stop lever illustrated can be operated when the top is down, eliminating the necessity of raising the top when no more records are to be played. The lever consists of a brass strip, about ¼ in. wide and 6 in. long, bent to the shape shown. It is pivoted on a small screw driven into the edge of the cabinet at the point indicated, one end of the lever projecting outside the cabinet, and the other end resting against the trip that stops the machine, so that when the lever is pushed the trip is operated. The lever, if made of brass, can be given a fine finish by heating, and then dipping into nitric acid (poison).

Mason Jar Used as Sap Bucket

Ordinary mason jars can be used to collect the sap when tapping maple trees, with the arrangement shown in the illustration. A bail to hold the jar is made of No. 8 galvanized-iron wire. This is made to fit inside the jar, and to spring outward against the neck as indicated. The bail is hung on the "tap" in the same manner as a regular sap bucket, notches being cut in the tap to prevent the bail from slipping off.—Harold Jackson, Kankakee, Ill.

Combined Tassel and Socket

Many women are making attractive silk light shades for the dining room, to be hung over the table instead of a glass



Convenient Method of Attaching an Extension Cord to a Lighting Fixture Having a Silk Shade

dome. It is desirable to have the bottom of these shades closed, but it then becomes a difficult matter to connect the extension cord of an electric appliance on the table unless the cord is run over the side of the fixture. This difficulty can, however, be overcome by letting through the center of the bottom a short length of portière cord, carrying within it an equal length of lamp cord, connected to one of the sockets inside. A socket, covered with a tassel to match the portière cord, is attached to the lower end of the lamp cord.

In cases where a pull-chain switch is used to control the fixture, the portière cord may be attached to it as shown in the upper detail, so that the tassel will then serve two purposes.—Ellis Levy, New York City.

¶The most convenient place for a hand-operated horn on a truck is underneath the floorboards, so that it can be worked with the foot. An opening is cut in the boards so that the plunger will project above the floor.

Stilts Help Home Owner to Paint House When Only a Short Ladder Is Available

He Paints on Stilts

Finding that his stepladder was too short to paint the siding of the house up to the top of the first-floor windows, one house owner made a pair of stilts which he used for the work and found them very convenient for this purpose. A short length of wood, notched at one end and nailed to the top of one stilt at the other end, serves as a pail hanger.

Cut Filler for Tires

Tires rapidly deteriorate because gravel and sand enter them if small cuts and holes are allowed to go unrepaired. Here is a simple method of permanently filling tire cuts or actually vulcanizing them without heat. Make a thick paste of live rubber, such as scrap rubber or rubber bands, dissolving it in acetone or other solvent. Then clean the cut with gasoline, and apply the paste. Mold the composition over the outside of the tire for an inch around the cut and allow it to dry overnight. The composition becomes a part of the tire and wears equally well. The same compound can be used to repair worn places in tires. Spread the composition over the worn places and smooth out with the moistened hand. A tread nearly as good as new, and that will give satisfactory service, will be the result.—Kenneth B. Murray, Sturgis, Mich.

Sawing Soft Metals

When sawing soft metals with a hacksaw, use two blades instead of one, and you will find that the cutting can be done much easier. One of the blades is inserted in the frame in the usual manner, while the other blade is reversed so that cutting takes place on both the forward and backward stroke. The sliding movement of one of the blades at all times will prevent the other blade from making too deep a cut.—W. Edmonds, Whitehall, N. Y.

Screen-Wire Crayon Sharpener

Woodworkers, shipping clerks and others who use marking crayons in their work are often inconvenienced by the necessity of sharpening them with a pocketknife so that they will serve for finer marking or lettering. However, a simple sharpener that will do the work very quickly and efficiently is shown in the illustration. Just above the workbench next to the receptacle containing the crayons, an 8 by 10-in. wood frame is hung, the front of which is covered with screen wire and the back with a door, hinged to the frame. A dull crayon needs merely to be drawn across the screen a few times to be sharpened. The shavings are caught and retained between the screen and the door of the frame and are easily removed at any time.—G. E. Hendrickson, Argyle, Wis.

Build a Winter Toboggan Slide

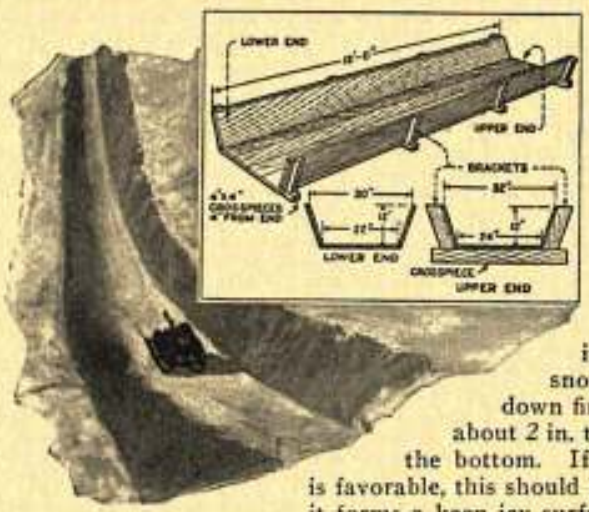
By EARLE W. GAGE

ALTHOUGH making a toboggan chute is a very simple matter, it must not be slighted in the least. As much attention should be paid to its building as the engineer pays to providing a track for an express train. In fact, few trains travel

"Zipping" Down an Icy Path at Ninety Miles an Hour, with Body Close to the Whizzing Face of the Ice—a Real Delight of Winter!

at the speed of the average toboggan. A slight miscalculation in a curve will make the swiftly moving toboggan turn turtle; a small deficiency in the edging of the track may turn the swooping thing loose in the unpacked snow and send its passengers to the hospital.

Tobogganing carried on in soft snows on hillsides is great fun, but the iced slides, where high speed can be attained, are the real sport. Such a slide usually crowns the summit of some slight elevation, and the depth of the drop is made gradual by supporting trestlework, the width of which varies according to the number of chutes desired. These chutes are virtually troughs, flooded and frozen, one separated from the other by means of a ridge of boards and ice at the starting platform, and by frozen-snow sides from that point on. Each groove is the width of a toboggan, so that steering is unnecessary, and the risk of upset and accident is reduced to a minimum.



A very satisfactory slide may be built of planed spruce boards in sections 12 ft. long, each being in the shape of a trough. The inside width of the trough should be 22 in. at the lower and 24 in. at the upper end, the sides being 12 in. high with a flare of 4 in. Four 4 by 4-in. crossbars are used to tie the boards together, each bar extending 4 in. beyond the bottom boards, and carrying a bracket cut from the same size of wood to hold the sides in place.

The crossbar on the upper end of the trough is exactly at the end of the boards; at the lower end it is 4 in. from the end. This allows one trough to lap 4 in. into the other. The bars should be so placed as to butt tightly against each other. The distance between them is divided to equalize the strength of the trough. All edges and corners are planed off to prevent splinters, and a sharp lookout must be kept on the edges.

The individual troughs are thoroughly nailed, but no nailing is done in putting the slide together. The troughs are simply placed in position on the ground, beginning at the lower end and fitting in each toward the top, leveling under the bars as the ground may require. This chute will be found a very convenient size. The sections are easily handled and packed away, and they will last for many years if they are given proper care.

In order to have the chute in good running order, the ice in it must be smooth and keen. It is best prepared by filling the chute with snow and beating it down firmly until a layer about 2 in. thick is formed in the bottom. If the temperature is favorable, this should be sprinkled until it forms a keen icy surface. After a few days' care and cold weather, the condition of the chute will improve. Should holes form in the ice, they may be patched with snow, sprinkled until it forms a slush and beaten smoothly into the holes.

A line should be drawn from the point in the field where the run is to end, straight to the bottom end of the toboggan slide, and the runs built from the bottom upward, so that the lower sections can be used while the construction of the upper part is still in progress. Sprinkle the snow that has been packed into a groove to provide an icy coat. Never use the run when there is the slightest chance of the runners cutting through, for this will ruin the slide.

The larger runs, where winter sports are the fashion, average anywhere from a quarter to a mile in length, and they have a drop of from a few feet up to several hundred feet. They may have every variety of turn, from the sharp corner to the most gentle curve. There is a 2,100-foot chute on the Hudson river, New York,

where the start is down a slope of not more than 30°, yet the speed attained at once is breathless. The all-wooden toboggans do the chute in from 20 to 26 seconds, and the steel-shod type in from 12 to 17 seconds.

The modern toboggan, described as a skeleton, consists of a light, but exceptionally strong, steel framework with a yard-long padded seat, on which the rider lies flat, steering the craft with hands and feet. In order to secure both strength and lightness, it is built narrow, of well-seasoned, straight-grained wood, fastened together by light crosspieces, usually of steel; the front end is bent up and over to form the hood, and fastened securely by means of wire or leather thongs. Toboggans are 4 to 9 ft. long, about 18 in. wide and hold from one to five passengers.

Indirect Illumination on Dash

Some of the latest and newest models of automobiles are being fitted with indirect dash lighting. To accomplish the same purpose it is possible to mount the light on the steering post as shown, so that the rays of light will not strike the driver's eyes.

Marking Films in the Dark Room

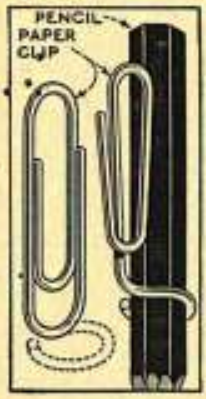
I have developed many thousands of films and for some time had difficulty in reading the numbers or names written on the red paper when working in the dark room. Finally I hit on the following simple remedy. All films were inscribed with a blue pencil. When looked at in the red light the blue inscription appeared black and made reading easy. Ordinary penciled or inked letters fade into the red paper when viewed under a red light.—L. B. Robbins, Harwich, Mass.

Emergency Gluepot

When a large quantity of glue has to be heated and no pot is available, a good one can be made in a few moments. Just get a 25-cent galvanized-iron pail at the hardware store, and pick up an empty 5-gal. oilcan at a neighboring garage. With tin snips, cut the latter off halfway from the top, as shown, bend the sharp edges over toward the inside and hammer them flat, so that there will be no danger of cutting one's hands. Fill this part about half full of water, put the glue in the pail and set the pail in the can. This makes as good a gluepot as you can wish for.—E. R. Haan, Chicago, Ill.

Paper Fastener Makes Neat Pencil Clip

In offices and schools, where pencils are frequently lost or mislaid and one finds it rather expensive to buy new clips all the time, it is much better to use the cheap and easily made clip shown in the illustration. It is formed from an ordinary paper clip; one end of the clip being bent down and around to form an eye that fits over the pencil snugly, as indicated by the dotted lines. A pair of long-nosed pliers is the best tool to use in doing the bending.



The burner of an acetylene bicycle lamp fitted to an ordinary gas jet will produce a very hot flame.

Continuous Supply of Paper for Drawing Table

Here is a drawing table that has a continuous supply of paper on hand. No

Drawing Paper Is Always Handy When a Roll Is Attached to the Table

dimensions are given for the table, but the front edge of the top should be at least 32 in. from the floor, with the top at the rear about 4 in. higher. The table proper should be about 3 ft. wide and 3 or 4 ft. long. Ordinary ¾-in. lumber can be used throughout, except for the legs. These are cut from 2 by 4-in. stock so that each is approximately 2 in. square. Set the legs through the bottom of the table so that they come to the top in each of the four corners, thus providing greater strength. Each leg can be braced at the end by mortising in 1 by 3-in. pieces, and a footrest can be provided if desired. Cut boards for the top with the edges well jointed and with cleats on the underside for additional strength. The top should project over the front about an inch to facilitate lifting and also to give greater arm room. Ordinary hinges can be attached for holding it in place. For the drawing-paper feature, erect two boards at the top and back of the table in an upright position, attaching them with screws through the underside or bracing them with additional pieces on the outside. Provide each upright with a notch to take the rod which holds the paper roll. Place the roll between the uprights and attach a strip of iron or brass to the table top, as shown, by means of bolts. The front edge of the iron strip should be beveled slightly so that the paper will tear smoothly. This strip should be held down snugly. To facilitate pulling out the paper after one piece has been torn off, cut a depression just under the middle of the iron strip in the table top or drill a hole clear through. This will give your thumb and finger room to grasp the paper and pull it.—Dale R. Van Horn, Walton, Nebr.

Priming Wood

Many painters have used yellow ocher for priming because it is cheap, but actually it is most expensive, because it is too coarse to penetrate the pores of the wood and get any kind of an anchorage. It also absorbs moisture, which naturally affects the succeeding coat of paint. Sometimes it comes to the surface after the job has been finished, causing blistering and peeling, and in some cases it has never dried. From these facts it is easy to see that there are some materials which may be inexpensive but lead to a great deal of extra work to correct the error of using them. —L. H. Georger, Buffalo, N. Y.

Photographic Prints Are Flattened in Roller Shade

Photo prints generally curl when drying, but can be readily flattened again by rolling them in a curtain as shown in the drawing. Of course, the prints are placed on the shade with the concave side down so that, when the shade is rolled, the prints will be turned in the direction opposite to the curl and this will flatten them. Sometimes it is necessary to repeat the operation a few times.—Walter X. Brennan, Mt. Clemens, Mich.

Effect of Temperature on Varnish

According to the best experience with varnish there are several points in its application which are of value to assure good work. The quantity of turpentine should be twice that of the oil. Turpentine must be used in all varnish or it will not dry, but less turpentine is needed in summer, because the heat causes the varnish to get thicker. In winter less oil should be used so that the varnish may dry rapidly, and more turpentine to increase the evaporation.

Christmas-Tree Decorations

In decorating Christmas trees a saving can be made by using burned-out electric lamps. They usually can be obtained for the asking, and should be prepared as follows. Using a drill press, small holes are bored through the cement in the base of the lamps. Wire loops, bent as shown, are slipped into these holes, the bend preventing their easy withdrawal, and the projecting wire is wrapped about the tree branch with ease. The bulbs are dipped into a dilute solution of shellac and dusted with ground glass, of which different colors are obtainable. While such decorations are, of course, suitable for the home tree, the idea was found especially valuable when it was necessary to decorate a large tree for a public square.—H. E. Benson, Boulder, Colo.

Corrosion in Hot-Water Pipes Prevented by Water Glass

Corrosion in hot-water or steam pipes can easily be prevented by adding ½ gal. of water glass to the water supply and letting it circulate for a day or so before the furnace firing is discontinued. The water glass forms a coating on the inside of the pipes, which effectively prevents rust after the water has been drained out.

Increasing Capacity of an Ordinary Swing So That Three Can Ride Comfortably

Increasing Capacity of Swing

Even young children have inventive ability, as is illustrated in the photo. Where it was possible for only one to use the swing previously, three children can now ride at once and with more comfort. An extra rope is used to hold a board horizontally. Large screweyes are driven into the underside of the board and the rope is passed through these so that it cannot slip from under the board while the swing is used.—James E. Noble, Toronto, Can.

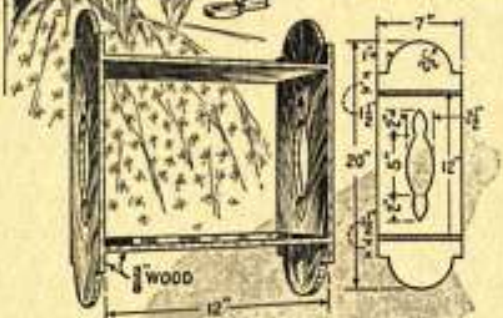
Shock-Absorbing Seat Cushion

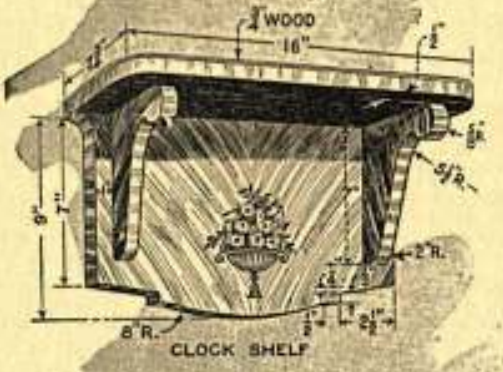
The driver of a Ford truck, hauling lumber from a portable mill over a rough road, devised a shock-absorbing seat cushion from an old inner tube. He claims that this device not only lessens road jar, but is also much cooler in summer than the usual upholstery. Such a cushion is made by folding an old inner tube as shown in the photo. It is kept in place by a length of rope.—F. Amos, Kalama, Wash.

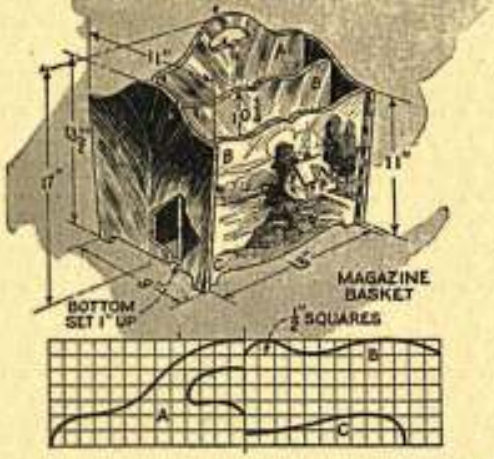
¶A clay pipe can be used as a crucible by breaking off and plugging the stem.

COLONIAL BRIC-A-BRAC *for the* AMATEUR

By R. O. Buck







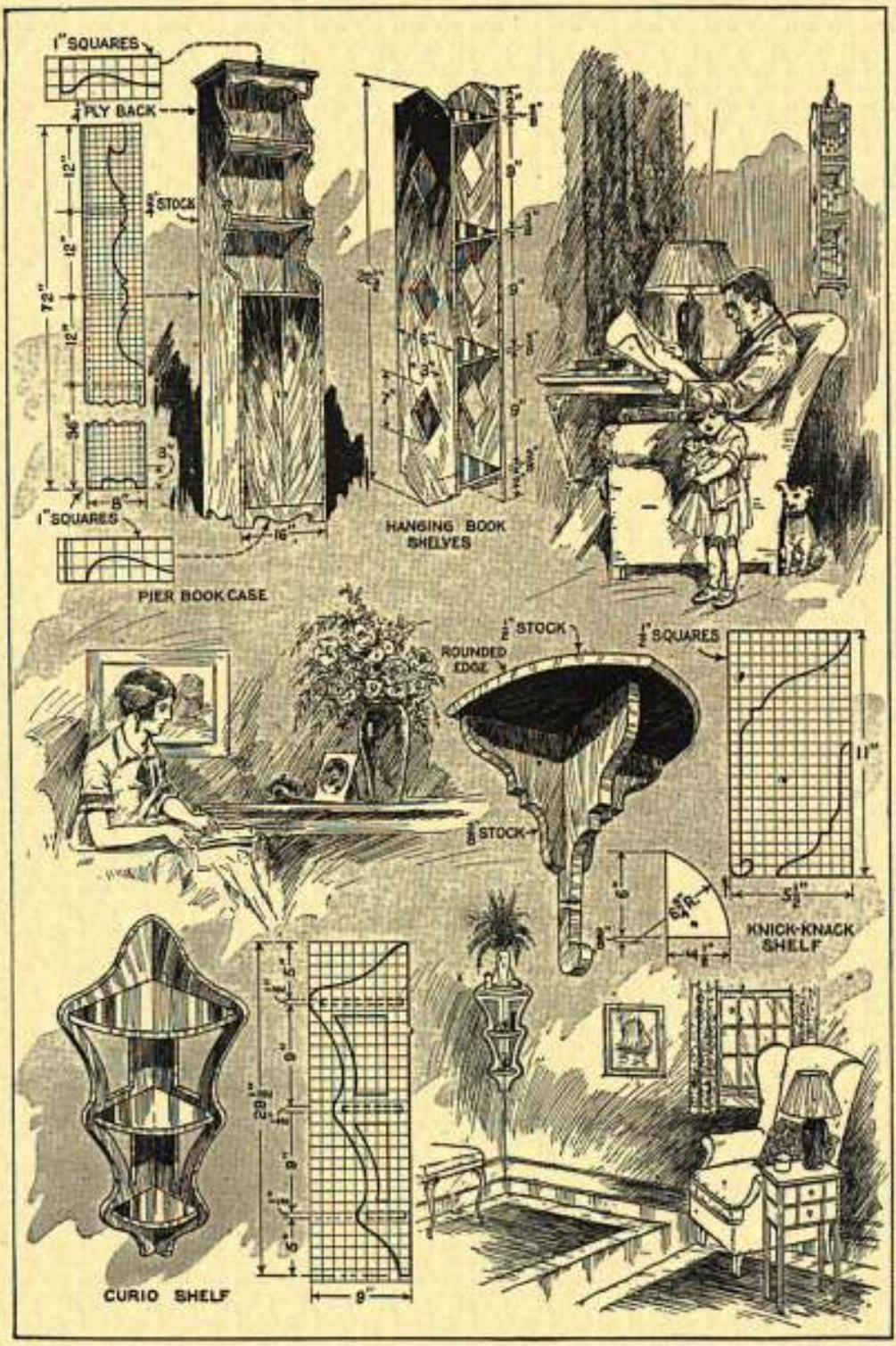
THE cycle is complete and the things our grandmothers considered smart are back with us again. The whatnot, corner shelves, wall brackets, and the like, have come into their own. Those of us who are fortunate enough to have some of these treasures of a former day in our attics can get them out, give them a bit of finishing and make them the envy of our less fortunate friends.

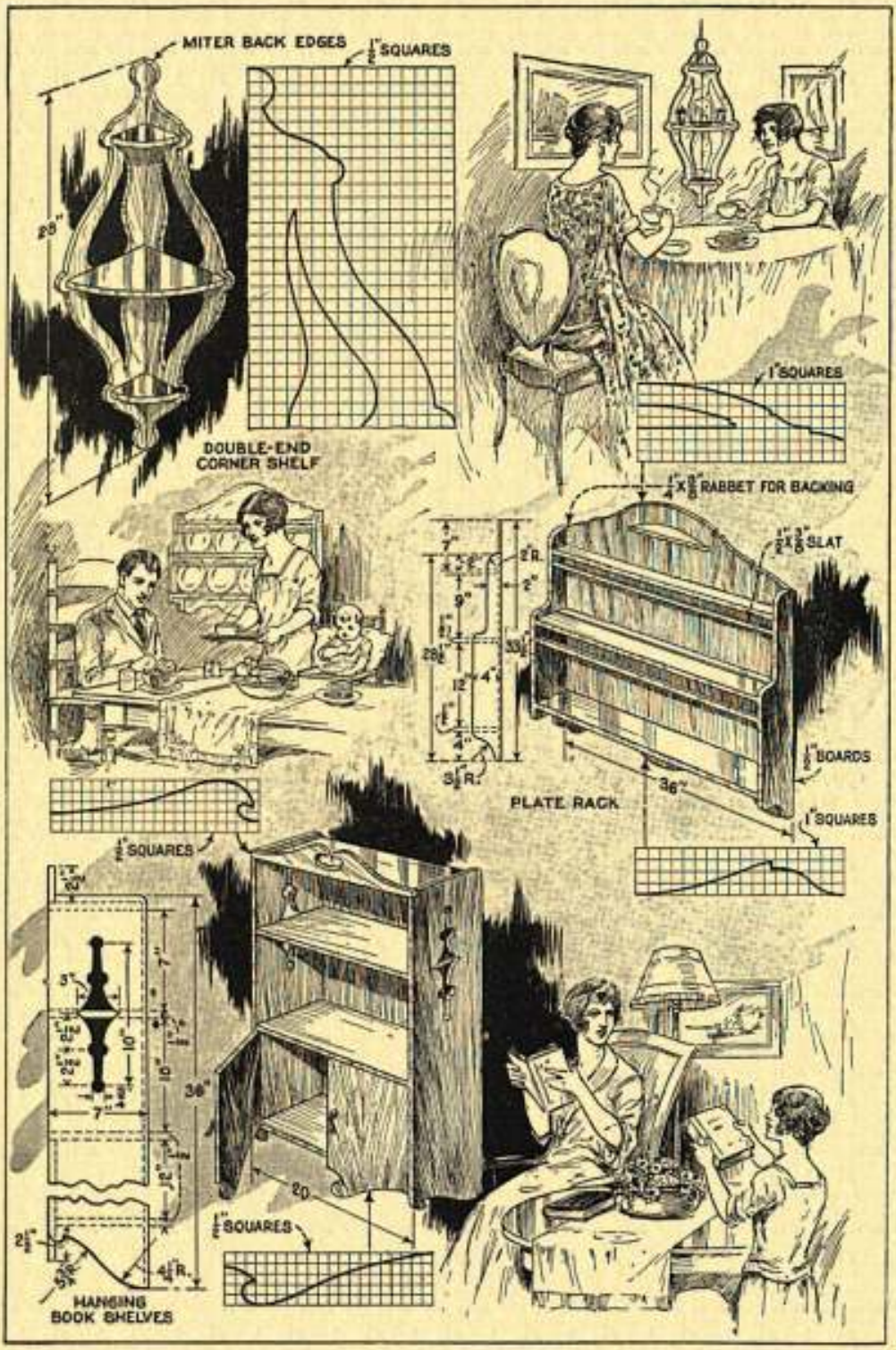
In case you happen to be one of the aforesaid friends, and possess neither attic nor heirlooms, you can, if you are handy with tools, make any of the articles illustrated with just the ordinary tool equipment found around a home. You will be agreeably surprised and pleased to note the change a few articles of this sort will make in a room. The home touch which you may have missed in your modernly furnished rooms can be added in just this way and with a very small expenditure of time and money.

Most of the articles illustrated are small and can be constructed of any close-grained soft wood of the thickness shown. Poplar, gum or white pine are all suitable for the purpose. For two or three of the larger articles, plywood is specified, so that greater width or strength may be obtained without the necessity of increasing the thickness of the pieces and producing a clumsy-looking piece of work.

A cross-section diagram is given of all the curved edges so that you can lay out a full-size pattern easily, or perhaps you may wish to design these curves yourself. If you do so, avoid sharp changes and rather make the lines of the curves long and sweeping.

Brads and finishing nails driven home with a fine nail set are best for fastening objects of this nature. Glue is not advis-


1" SQUARES
¼" PLY BACK
12"
12"
12"
36"
72"
¾" STOCK
8"
16"
PIER BOOK CASE
HANGING BOOK SHELVES
½" STOCK
ROUNDED EDGE
½" SQUARES
11"
5½"
¾" STOCK
KNICK-KNACK SHELF
CURIO SHELF
9"

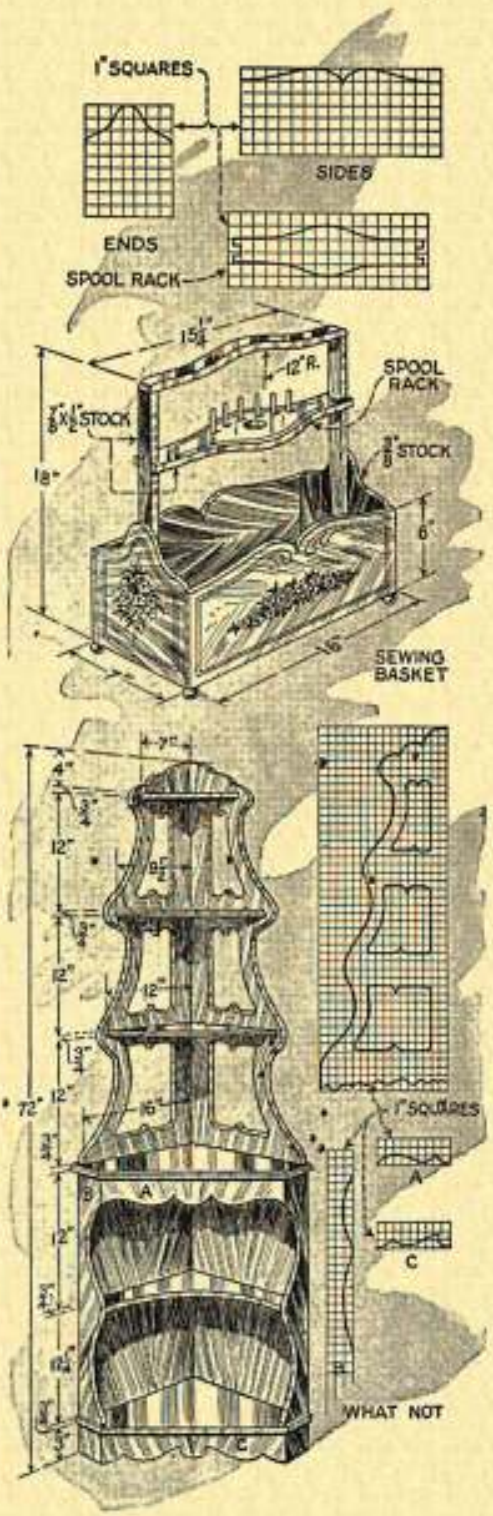

MITER BACK EDGES
1" SQUARES
28"
DOUBLE-END CORNER SHELF
1" SQUARES
¼" X ⅜" RABBET FOR BACKING
1½" X ⅜" SLAT
2" R.
9"
28½"
33½"
12"
4"
3½" R.
PLATE RACK
36"
⅜" BOARDS
1" SQUARES
½" SQUARES
20"
3"
10"
7"
36"
20
½" SQUARES
2½"
4½" R.
HANGING BOOK SHELVES

able owing to its likelihood of working through the finish. After the article selected is finished, it should be sanded carefully with No. 00 sandpaper. A piece of sandpaper wrapped on a dowel rod is excellent for smoothing the edges and scrollwork.

If your home is furnished with antiques you may wish to make your bric-a-brac of walnut, in which case a finish of linseed oil, hand-rubbed, is most suitable. The modern way of finishing these articles, however, is to use bright-colored paint or lacquer, so that they may give life and color to the room. Either Japan colors, followed by several coats of varnish rubbed to a dull luster, may be used, or, if you are anxious to put the articles to use and do not wish to wait several days for the various coats to dry, I would suggest the use of the new brushing lacquers which dry hard in half an hour. Take care in the selection of these, however, as there are some brands that are not altogether satisfactory. You will be safe in selecting the product of one of the high-grade manufacturers, if you follow the directions on the can explicitly.

Lacquer is flowed rather than brushed on a surface. A good quality, rubber-set chisel-shaped brush, about 1½ in. wide, is most suitable. Be sure to stir the contents of the can thoroughly so that a uniform color and consistency will be obtained. It is advisable at the start to wet your brush in some of the thinner furnished by the same manufacturer, so that the brush will be soft and pliable. Also, it should be well filled with the lacquer each time it is dipped and care should be taken not to brush too much. If the lacquer sets too rapidly a small amount of the thinner may be added, but unless the can has been opened before, it will likely be of the correct consistency.

Lacquer must be handled quickly as it dries almost as soon as applied. Be sure the surface is dust-free, clean and dry. Two coats are usually all that are required on new work and the second coat may be put on within an hour after the first was applied. A third coat, if needed, should never be given within 24 hours, as it may cut the under coats and raise the finish. The brush should be carefully cleaned with thinner before putting away or else



it is almost impossible to get the lacquer out of the brush. Lacquer is not only desirable because of its durability and quick-drying qualities, but also because of the beautiful colors which can be produced so easily. The popular colors for articles of this type are Chinese red, tobacco brown, jade green, Chinese yellow, Holland blue, nickel gray and black. Black may be used effectively for an all-over coat with red or gold stippling, or just for edges or blending. Roman gold is used in much the same way or as your ingenuity may suggest.

Designs similar to those sketched can be obtained in the form of transfers from most art-material dealers and add greatly to the beauty of these articles, especially if they have rather large parts of the surfaces exposed.

No home workshop member need hesitate about attempting any of the articles illustrated, as he can rely on the finish to cover up minor imperfections.

Box on Pole Stores Clothesline

Winding up the clothesline and taking it into the house is not necessary if the reel and holder shown in the illustration are used. The clothesline can be drawn tight with the crank and can also be held in place by pushing a ¼-in. carriage bolt through one of the holes in the side, as indicated. When not in use, the line is wound on the roller and the lid closed until wanted again.—Francis W. Henry, Pottsville, Pa.

Concrete Troughs Cast Upside Down

When wooden forms are made for casting concrete troughs, the builder is often confronted with the difficulty of removing the trough intact because the form swells after the concrete is poured. The work can be simplified and the expense of lumber reduced by casting the troughs upside down over earth forms. Lay several planks on the ground, close together and level. Build up a mound of earth, preferably clay or some close-binding soil, to the shape and size of the interior of the trough. Wet it, pat it down and then cover it with tar paper, pinning the latter in position with a few nails stuck through the paper into the form. Build a board form for the sides and ends of the trough, making it several inches wider and longer than the dirt form, and place it over the latter. The form should be about 4 in. higher than the mound. Pour in the concrete and allow it to set for three or four days. Then, by knocking off one side of the wooden form, the rest may be removed. The resulting trough can be picked up and turned over, and the rough corners and edges can then be smoothed off. This method saves much time in form building and gives just as good a job.—L. B. Robbins, Harwich, Mass.

Driving Screwhooks into Ceiling

When fastening screwhooks in ceilings or other places for ceiling fans, fixtures, gymnasium equipment, etc., I have found the following method entirely satisfactory. First drill a hole a little smaller than the screwhook and then insert another hook in the brace instead of the bit. Start the screwhook into the hole and drive it home as shown in the drawing.—Thos. F. Johnson, Schulenburg, Texas.

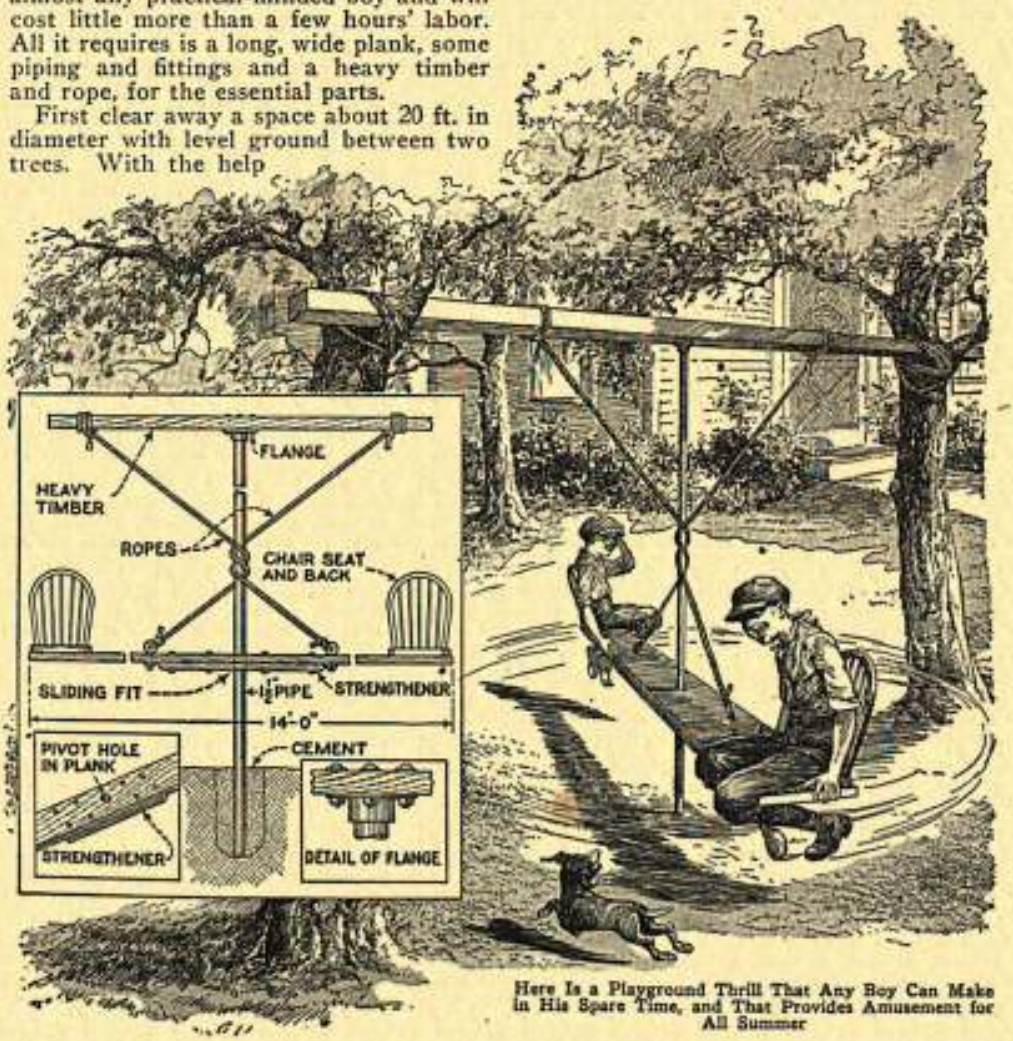
"Merry-Go-Twist" Gives Plenty of Thrills

By L. B. ROBBINS

TWIST it up; let it go, and there you are! How's that for fun? Three twists for a nickel. All aboard again, and let her go!

A "merry-go-twist" can be built by almost any practical-minded boy and will cost little more than a few hours' labor. All it requires is a long, wide plank, some piping and fittings and a heavy timber and rope, for the essential parts.

First clear away a space about 20 ft. in diameter with level ground between two trees. With the help of someone, raise the heavy timber, which may be a piece of four-by-four or similar stock, and lash it to the trees about 10 ft. from the ground. If two limbs about the same height can be found on the trees, the



Here Is a Playground Thrill That Any Boy Can Make in His Spare Time, and That Provides Amusement for All Summer

timber can be lashed over them, but if not, lash it firmly to the trunks and spike a block of wood below the ends so it will not slide down out of level. Then get an old piece of 1½-in. pipe, about 12 ft. long, and a floor flange that will thread on one end. Dig a 2-ft. hole under the middle of the timber for the foot of the pipe.

The plank should be cut about 14 ft. long and may be 2 by 8 or 2 by 10 in.; either size will do. Bolt a short piece under the center to strengthen it, and then bore a hole large enough to slip easily over the pipe in the exact center of the plank.

Remove the legs from two old kitchen chairs and nail one seat to each end of the plank. Set the hole in the plank over the hole in the ground, place the foot of the pipe through the plank and let it rest in the hole below. Then push the flange under the overhead timber and fasten it in place with lag screws or bolts. Block up the plank about 2 ft. off the ground and fasten a strong rope to a screweye bolted through the plank at each end of the strengthener. Twist each rope about the pipe once and tie the other end to the overhead timber at about the same angle as to the plank. It will be noticed that the chairs face in opposite directions on the plank. Twist the ropes so that, in untwisting, the chairs will be propelled front first. Then set the foot of the pipe by pouring cement in the hole and allow it to harden two or three days.

To operate the merry-go-twist, push the plank around a number of times until the ropes twist up tight on the pipe and will go no farther. Then let two passengers of equal weight climb into the seats and let go. As the ropes untwist from the pipe the speed will become greater and will not cease until the momentum of the plank winds them up several turns the opposite way. "Let the old cat die" before dismounting, and you will get all the fun there is out of it.

Convenient Towel Rack for Use on Hot-Water Heater

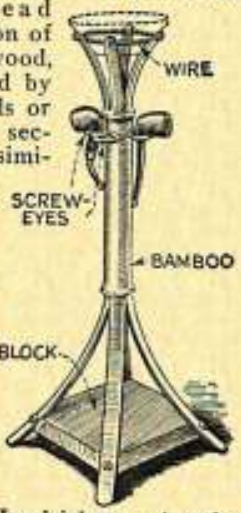
A handy and convenient rack for drying towels is shown in the illustration. A length of heavy wire is bent in the manner indicated to provide a series of hooks. The ends are clamped around the upright pipes on the boiler so that the hooks are suspended at a convenient height. When not in use this device is readily moved out of sight behind the boiler.

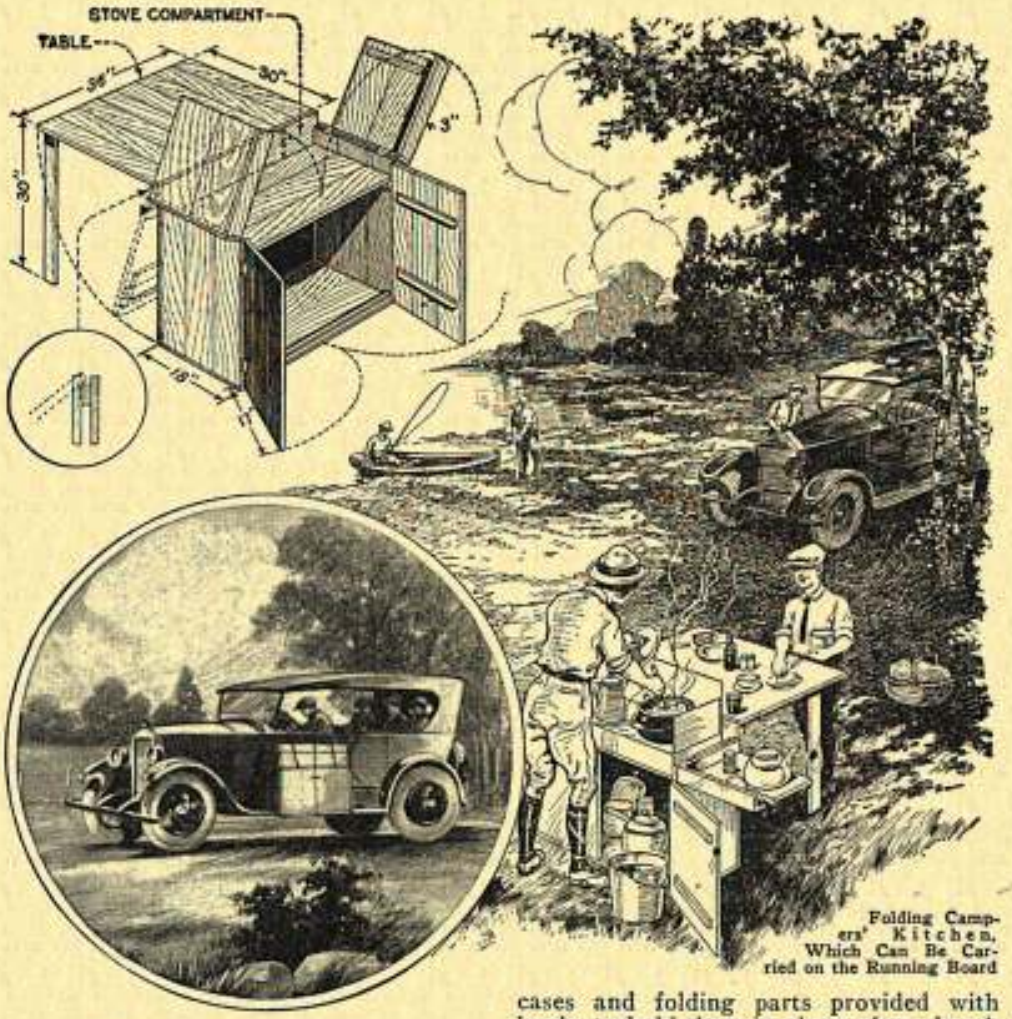
Doing Away with Cylinder Knock

There was a hammering noise in a Ford, sounding like a carbon knock, noticed when climbing hills and when pulling through sand or mud. The owner had the carbon cleaned out, and the knock disappeared for a time, but it soon started again as bad as before. He then took the cylinder head off, removed the carbon, replaced the top with an extra cylinder-head gasket, and was never troubled with the noise since. The car also runs and pulls much better.—Glen F. Stillwell, Collinsville, Ill.

Smokers' Stand Made of Bamboo

For use on the screened porch a simple and neat smokers' stand can be made from a short length of bamboo fish rod, as shown in the accompanying illustration. The butt end of the pole is sawed lengthwise into quarters to the first joint, and the pieces are spread apart for the insertion of a heavy block of wood, which is fastened by means of small brads or screws. The upper section of the pole is similarly quartered down to the second joint, and the ends are spread and wired securely to a heavy wire hoop of a diameter suitable to support a small dish or ashtray. To add to the convenience of the stand, several screweyes may be driven into the post for holding pipes.—G. E. Hendrickson, Argyle, Wisconsin.





Folding Campers' Kitchen, Which Can Be Carried on the Running Board

Folding Camp Kitchen

In this compact camp kitchen everything is in reach of the chef. When folded it is 19 in. deep, 30 in. high and 36 in. long, permitting it to be carried on the running board or in the rear compartment of an automobile. As shown in the drawing, the legs fold up under the table, which drops flat against the back of the cupboard. The covers of the stove compartment swing out to the side and form handy shelves. The cupboard may be partitioned and provided with shelves to suit the individual taste. A few hooks for dishcloths, pans, etc., will increase its convenience. The outfit is so simple that anyone can construct it easily with ordinary tools. All dimensions are based on the use of ½-in. lumber throughout. Hinges that fold flat should be used in all cases and folding parts provided with hooks to hold them in place when closed. A grab handle should be placed on each end of the cupboard to facilitate handling. The stove shelf, and all others, are set back ½ in. from the front to allow the cupboard doors to close. The table legs are spaced so that they will lie edge to edge when folded inward, and the table is hinged to the back of the cupboard as shown in the enlarged detail.—Ronald B. Clifton, Denver, Colo.

Preserving Seed from Weevils

If seed beans or peas are kept in an old inner tube, they are safe from weevils. Be sure that the tube is dry, then pour the beans into the hole where the blow-out was, and put on a cold patch to make it air-tight. The tube may be hung, on a nail or a hook, in the barn.—Fred Cornelius, El Paso, Tex.

Wooden Rack on Ladder Rung Holds Shingles

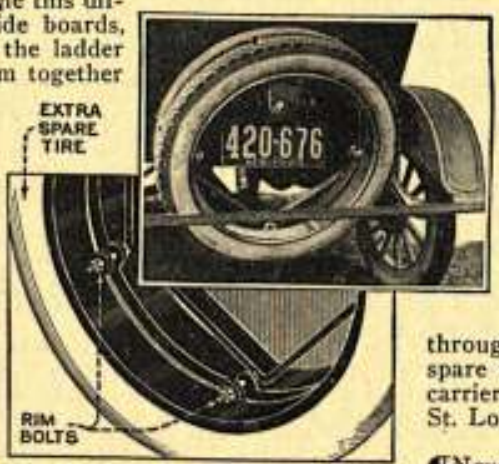
Shingle Rack for a Ladder

When nailing a few shingles to the side of the house or edge of the roof where it is necessary to stand on a ladder to do the work, it is nearly impossible to hold the shingles and do the work at the same time. A rack holding two or three dozen shingles and attachable to the ladder on any rung will overcome this difficulty. Get two wide boards, slightly longer than the ladder is wide, and nail them together at right angles to form a trough. Then cut two cleats, of hard pine or other hardwood, 2 or 3 in. longer than the width of the upright board. The cleats are shaped like hooks at the top so that they can be slipped over a rung, as shown in the detail. When a shingling job is to be done, fill the trough with shingles, carry it up the ladder and hang it on the rung just over your head. The shingles will then be accessible and will not interfere with the work.—L. B. Robbins, Harwich, Mass.

Making Soldering Easier

The inexperienced man who attempts to do a little soldering generally overlooks the fact that the piece of work must be hot before a neat application of solder can be made. That is why it is difficult to solder heavy metal. If you use an electric soldering iron, heat it while it is lying on the article to be soldered if possible. If the solder does not stick to the work rub the iron back and forth across the spot to be soldered and then try again. It is impossible to weld two iron rods together by just heating one of them, and it is just as impossible to solder properly without heating the work. Avoid, if possible, clamping the work in a large vise, as this tends to chill the work, due to the absorption of heat by the vise. Cleaning the part is another necessary soldering operation and one that is just as important as the first-mentioned, for securing a good job. However, if the parts are small and you wish to tin them, get them hot and dip them in acid, then do the tinning. To tin a large area, heat it with a torch and then apply acid with a squirt can. This will clean it quickly and easily and make the tinning process simpler. Acid will eat a hole in a metal squirt can in time, but a battery hydrometer with the float removed will make a good substitute.—Glen F. Stillwell, Collinsville, Ill.

Simple and Effective Tire Carrier



Rim Bolts Hold Extra Rims on the Carrier Securely

Three standard rim bolts solve the problem of holding the extra spare tire that many Ford motorists like to carry with them on a long trip. The recent-model rims have fixed lugs. The accompanying photograph shows how the rim bolts through these lugs hold the spare rims together on the carrier.—Charles E. Miner, St. Louis, Mo.

¶Never run a hacksaw too close to the vise jaws.

Beautifying Your Home Garden

By A. C. COLE

THE home owner who is able to use a few carpenters' tools can, at slight expense, add considerably to the appearance and value of his house. Few city or suburban lots are so small that there is no room for a simple rose arbor or trellis, a screen to hide an ugly alley view or to improve the appearance of the unattractive though useful garage, or a small pergola, even if it has no Corinthian columns leading to a long vista of formal garden. The examples shown in the accompanying illustrations are mostly very simple, and as before stated, need but little skill beyond the ability to handle hammer and saw, and occasionally a turning or keyhole saw.

The first thing is the selection of the lumber. The best all-around material for garden furniture of this type is cypress, or, if this is unobtainable locally, good yellow pine. It is sometimes hard to get cypress in "dimension" sizes, such as 4 by 4-in., and then yellow pine, which is generally available, can be used. Fir is also a good weathering wood, and one that takes paint well, and, where round posts are needed for any purpose, these will usually be of cedar, which is likewise a suitable wood. Lattice is mostly of cypress, and comes in standard 1, 1¼, 1½, 2 and 2½-in. widths.

Remember when ordering your lumber that this always comes in even lengths, beginning at 10 ft., then 12, 14, 16, 18 ft., and so on, so that if you order an 8-ft. board, it will have to be cut from a longer one and you will pay for the cutting and for the waste material. It pays to figure a little before ordering the lumber for any job, to see that the stock will cut without waste, or that it can be built from standard sizes. Also, remember that lumber sizes are always the size of the rough lumber, before planing, so that a two-by-four is really not more than 1¾ by 3¾ in. in size.

All posts that are to be sunk in the ground, like the bearing posts of arbors, fences and pergolas, should either have their butts painted with liquid tar before being placed in position, or at least thoroughly painted with two or three coats of white-lead paint. A thorough soaking with creosote is also good to minimize rotting. Also, these posts should be sunk at least 3 ft. in the ground, or below the frost level, so that the heaving of the ground will not throw the whole structure out of plumb the first winter.

Another important thing is the fastenings of the structures. Use galvanized roofing nails or brass screws, which will not rust. Fastenings that rust not only

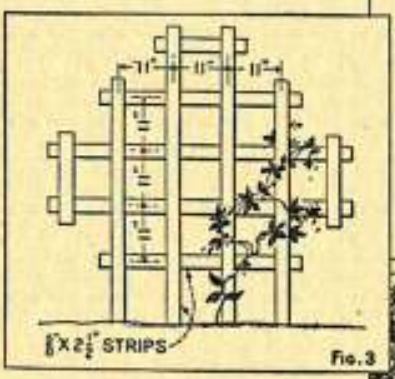


Fig. 3

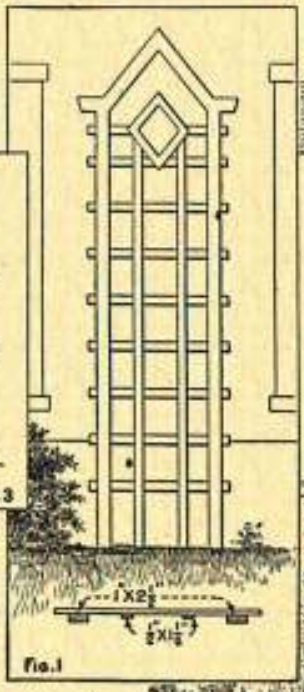


Fig. 1

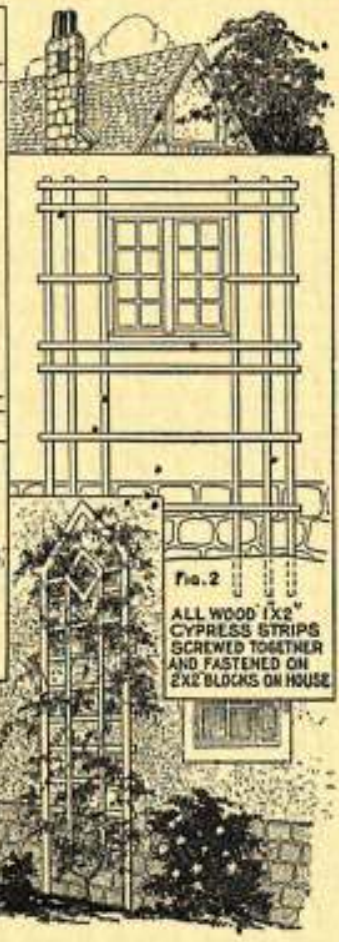
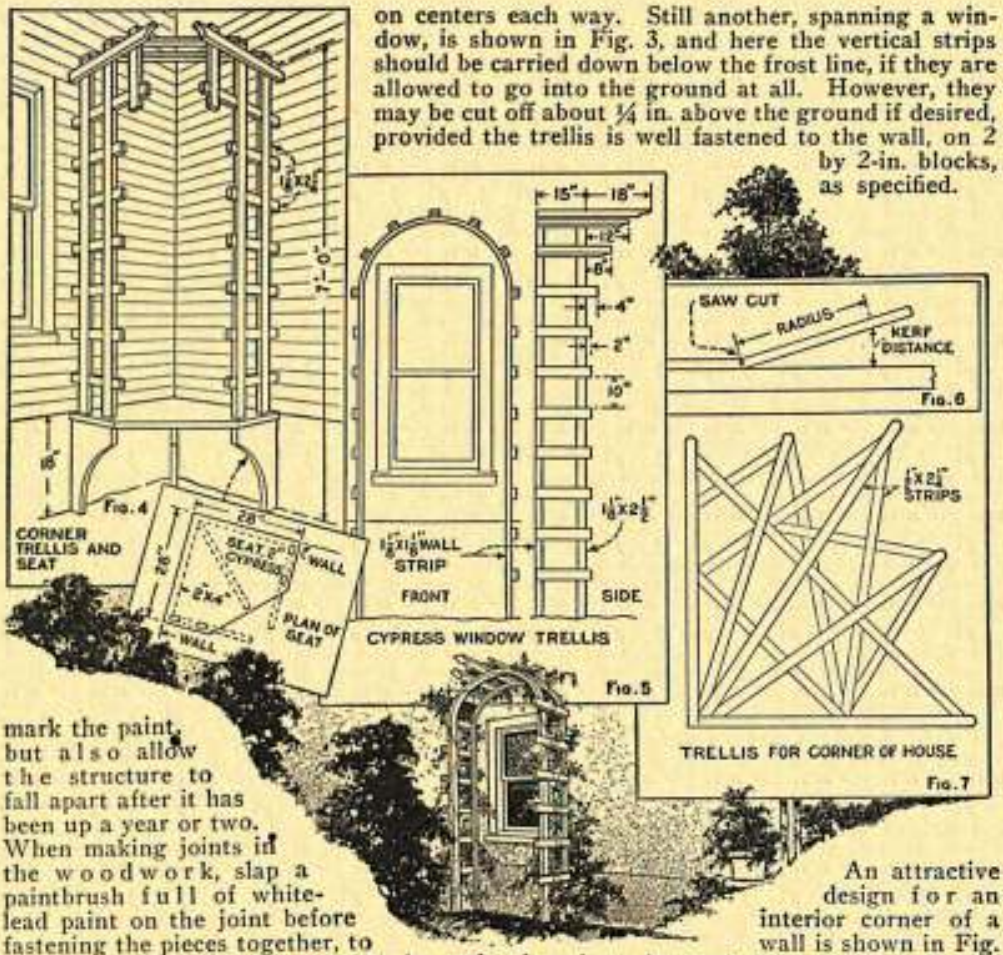


Fig. 2



on centers each way. Still another, spanning a window, is shown in Fig. 3, and here the vertical strips should be carried down below the frost line, if they are allowed to go into the ground at all. However, they may be cut off about ¼ in. above the ground if desired, provided the trellis is well fastened to the wall, on 2 by 2-in. blocks, as specified.

mark the paint, but also allow the structure to fall apart after it has been up a year or two. When making joints in the woodwork, slap a paintbrush full of white-lead paint on the joint before fastening the pieces together, to prevent moisture from creeping in and helping to rot the joints.

The simple wall ornament shown in Fig. 1 is made up from ⅛ by 1½ and 1 by 2½-in. cypress. The whole thing is assembled on the ground or in the home shop before erection, and then fastened to the wall with galvanized nails or brass screws, set into wood plugs, driven tightly into holes in the walls, if of brick. If the house is of frame construction, the wooden plugs are, of course, unnecessary, but 2 by 2-in. blocks should first be nailed to the wall, and the ornament fastened to the blocks. The important thing to observe in this, as in all lattice work, is to space the cross or lattice strips evenly. Unevenly spaced lattice work is apparent at once, and completely spoils the appearance of the finished work.

Another very simple trellis for the bottom of a low wall, or on which to train a small climber, is shown in Fig. 2. The strips here are ⅝ by 2½-in., spaced 11 in.

An attractive design for an interior corner of a wall is shown in Fig. 4, and can be used either as a corner seat or as a stand for a flowerpot. Used either way, it makes a charming decoration. Full details are given in the illustration.

In Fig. 5 is shown an arch for the window, and here the amateur is likely to run up against his first hard job, in bending the arch strips. The strips can be bent, however, by steaming them for half an hour or so, or soaking them, where the bend is to be made, for the same time in hot water. Steaming is best. Failing the necessary apparatus for this, the strips can be bent by cutting as detailed in Fig. 6. First make a saw kerf in the piece, at the place where the arch springs, about as deep as it is thought the kerfs should be. Measure from this a distance equal to the radius of the arch and make a mark on the strip. Now lay the strip down on the bench top, or on a level place on the sidewalk, and raise the end of the strip until the edges of the saw kerf meet. The distance from the radius mark on the strip

to the bench top, or sidewalk, will be the proper distance apart to make the saw kerfs. It will probably be found that cutting the kerfs half the thickness of the strip will be about right, but they must all be of uniform depth. The same method can be used for many other garden arches.

A trellis for the corner of the house is shown in

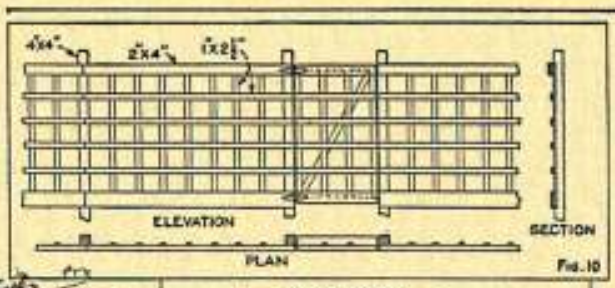


Fig. 10

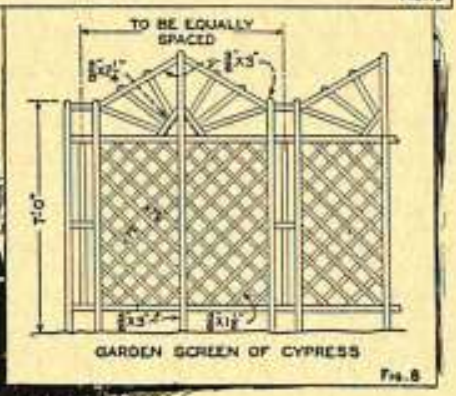


Fig. 8

Fig. 9

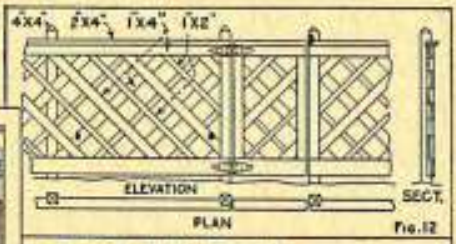


Fig. 12

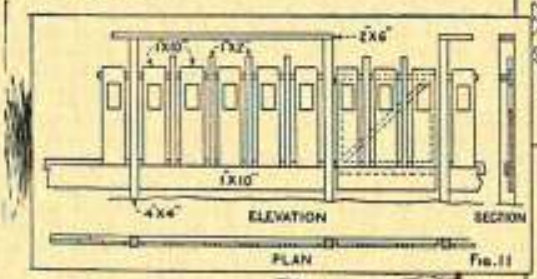


Fig. 11

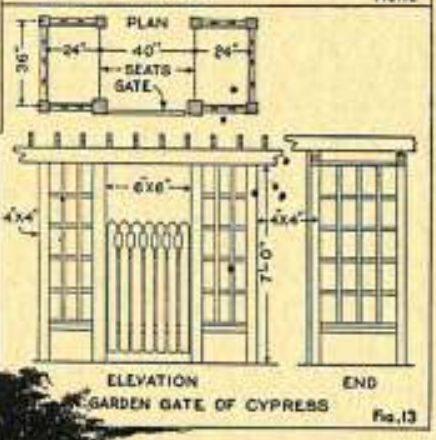


Fig. 13

Fig. 7. The strips here again are ½ by 2½ in., fastened to the house as were the others.

To screen off an undesirable view, or to divide the flower garden from the vegetable garden, the attractive screen shown in Fig. 8 may be used. No over-all dimensions are given for this, as these depend on the location. The spacing of the main members of the screen may be altered to suit the space at hand. This design may be modified in many ways; for instance, the triangular top work of the panels may be omitted, and the plain

Fig. 14

Fig. 15

Fig. 16

Fig. 17

lattice work instead carried up to within a couple of inches of the top of the vertical columns. The vertical members are ⅜ by 3 in., on each side of the lattice work, and they should be sunk in the ground at least 4 feet. On all work of this kind, where the sections are of considerable size, the best job is done by setting the posts or vertical members in concrete. If this is undesirable, the soil must be packed solidly around them, and the structure should be temporarily braced to posts on the side until the fill has packed down hard and will support the structure solidly. This is especially necessary in the case of screens, as they, unlike arbors and trellis arbors, have no side support.

Leaving the back yard for the moment, Fig. 9 shows how the arch trellis can be applied to the front of the house. The benches can be made of pine or fir, and the whole makes a very attractive entrance for the cottage or the colonial type of small house.

Three simple and attractive fences for the garden are shown in Figs. 10 and 12. Here the important things to remember are to keep the posts exactly in line, and to place them such a distance apart that the stock selected will cut without waste and still come evenly on the centers of the posts. The best way to erect the fence is to set up the end posts first, plumbing them until they are exactly perpendicular and then stretch a line between them. Set the intermediate posts to the line and plumb them, and the fence will be right. This applies to posts for pergolas and long arbors also.

Fig. 13 shows a very attractive combination garden entrance and seat, but the same design, without the seat or gate, can be used in any part of the garden. The design can also be adapted for use as a pergola. I have not shown any pergolas using round columns, as these are rather expensive, and, in any event, if the reader wants a pergola of this type, he can easily get a design from the catalogs of houses supplying this material.

So much of this work depends on individual taste that only a few of the designs shown are fully dimensioned. The other sketches accompanying this article contain suggestions that will enable the owner to work out his own sizes and details. In general, the amateur will be well advised to stick to designs employing straight lines, and to avoid curves as much as possible. The ends of rafters of pergolas and arbors, etc., can be ornamented in several very simple ways as illustrated in the various drawings, with no more tools than a compass or keyhole saw and a brace and expansion bit.

Care of the Iodine Bottle

Using iodine as a first-aid application in cases of slight injuries has long been advocated. Every home shop should have a small quantity easily accessible so that even the smallest cut or scratch will not be neglected. The usual history of the iodine bottle is one of mishaps. When first bought, it is used and then placed on a shelf. Next it is tipped over a few times, which allows the iodine to devour the cork in a short time. Before long the cork does not seal the bottle but merely sits on top of it. This permits evaporation of the lighter parts of the liquid, and finally there is no longer a tincture but a thickened mass not fit for use. To overcome these conditions it has been found satisfactory in one large garage, to suspend the iodine bottle from a nail in the wall of the washroom by a short cord. It is always in one place and easily reached. It is not necessary to take the bottle down to use it. The cord allows it to be tipped. By hanging it up in this way the bottle cannot be upset and the cork will not be wetted with iodine.—Sherwood J. Gee, Montpelier, Idaho.

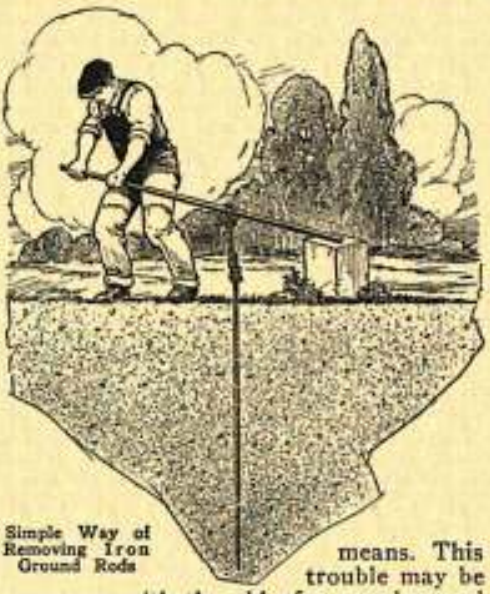
Ladder for Telephone Linemen

A telephone company provided its linemen with ladders that can be placed against curved or irregular surfaces of poles and trees without danger of slipping. The arrangement is simple enough; it consists of nothing more than a length of chain, that is substituted for the top rung of the ladder. The chain is attached to the stringers with eyebolts and a little slack is allowed so that it straddles the pole.

¶Do not apply furniture polish to soiled furniture, or it will never look bright; wring a cloth out of soapy water, and wipe the furniture carefully, then polish.

Removing Ground Rods

A ground rod, when driven into solid earth to a depth of 6 or 8 ft., usually resists any attempt to remove it by ordinary



Simple Way of Removing Iron Ground Rods

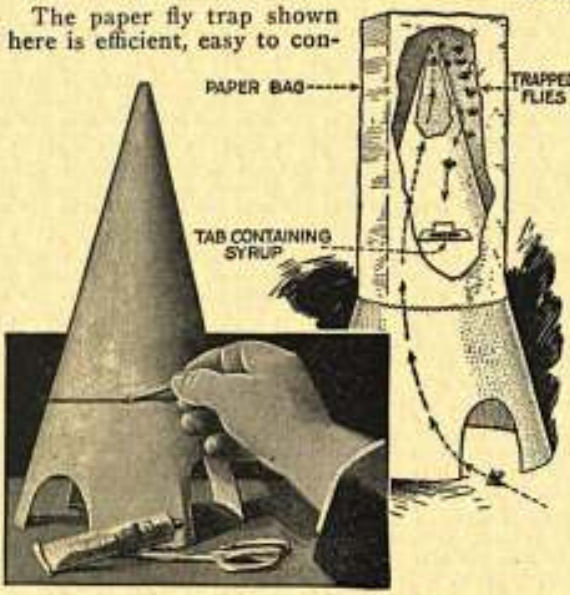
means. This trouble may be overcome with the aid of a crowbar and a trace chain. One end of the chain is fastened to the bar and a running loop on the ring end is slipped over the end of the ground rod. With the point of the bar resting on a solid support a foot or more above the ground, the rod is quickly started and removed by raising and lowering the bar a few times.—E. L. Goodwin, Warren, N. H.

Catching Drill Chips

When installing certain types of gas savers on the car, it is necessary to drill small holes in the manifold pipe. Care should be taken to see that none of the drill chips enter the pipe, for they might be drawn into the engine and lodge under a valve, causing serious trouble. Use of a stiff cup grease on the drill will hold the chips very well and keep them from getting into the engine. Through the entire drilling operation, the drill should be coated with grease in case the drill should penetrate faster than expected. But, if possible, this should be wiped off and a fresh coating applied just before the drill goes through the metal. It is well to cool the drill by dipping it in cold water before applying the final coating. After drilling, cup grease is used on the tap also. Magnetizing both the drill and the tap will add safety to the operation.

Fly Trap Made of Paper Is Efficient

The paper fly trap shown here is efficient, easy to construct, inexpensive and may be burned after it is filled with flies. It consists of a cone made of heavy wrapping paper. A small hole is left in the pointed end. The cone is trimmed even at the base and doorways provided as shown. A tab coated with sirup to attract the flies, is glued about halfway between the top and bottom on the inside, and glue is brushed around the outside on a line a short distance below the tab. A paper bag of suitable size is placed over the cone and its opening pressed against the ring of glue, to hold it in place. It is obvious that the flies, attracted by the sirup, will enter the doorways, pass through the small end of the cone and are then unable to escape.



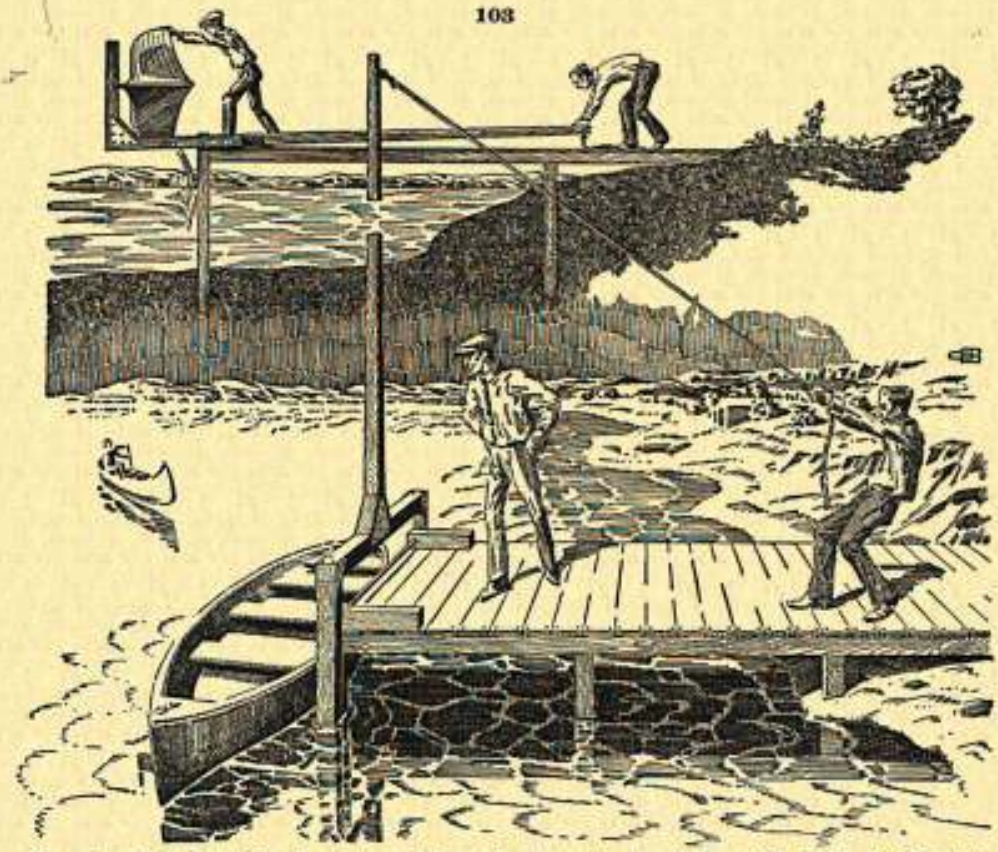
Cheap Paper Fly Trap Proves Effective and Can Be Burned after Use

Kinks for the Auto Tourist

If you are in doubt about which road to take while touring let the telephone wires be your guide. Telephone wires lead to the cities and towns, and the tourist need have no fear of going wrong if he follows the road having the most wires. If you wish to light a camp fire and discover that you have no matches, disconnect a spark-plug wire at the plug, saturate the end of a stick or cloth with gasoline and hold it between the spark plug and the end of the wire so that the spark will light the gasoline. A good place to carry spare grease is in the rear hub caps. Most light cars have no need for grease at this point, but it is a convenient place to carry it on those long drives when every bit of space counts. You do not always need to use the extra fan belt or light bulbs, but when you need them they are worth many times their cost; so be sure to have an extra one with you. Do not carry suitcases, etc., between the hood and the front fenders on a new car, as the varnish will soon be worn off by rubbing against the baggage, but secure them to the running boards. Don't forget to include a couple of wooden blocks or boards in the camping equipment, as they come in handy if you get into a mud hole. If your lights suddenly flare up and go out, do not install new ones until you have looked over all connections to the battery, making sure that they are tight; then do not install the lights with the motor running, for the generator may have burnt out the lights owing to a loose connection. You will generally find this loose connection at the battery terminals. Make sure of this by trying your starter. If it does not work, your battery connections are loose. If it does work, examine the connections at the junction block, ammeter or switch. Don't take it for granted that the battery connections are tight but tighten them as much as possible with a wrench or pair of pliers. Pay particular attention to the ground connections.

Mowing Heavy Grass

When lawnmowers are crowded to cut thick and heavy growths of grass, the stationary cutting bar and supporting roller frequently jump or "buck," leaving unsightly patches of long grass here and there about the lawn. By attaching the spring-and-roller device shown in the drawing, this trouble is readily overcome. The main leaf from a discarded wagon-seat spring



Convenient Hoist for Raising Rowboats and Canoes Is Attached to the Dock and Can Easily Be Operated by One Man

is bolted to the underside of the mower handle so that the two small wood disks, or wheels, mounted on the free end of the spring, will rest upon the wood roller of the mower when the handle is pressed down. In ordinary use, the spring plays no part, but when the mower is driven into rank grass, the handle may be held low enough to bring the rollers in contact, thus holding the rear part of the mower against "bucking."

Matches Save Ferns

If your potted ferns seem to wilt and die from no apparent cause, it is likely that they are being attacked by small worms that feed on the roots. A good remedy for this trouble is to bury a number of sulphur matches in the soil about the roots as shown in the illustration. The moisture will disintegrate the sulphur in the matches and this will kill or drive off the worms effectively.—C. M. Wilcox, Torrington, Connecticut.

Novel Boat Hoist

Where a great many boats or canoes are kept a boat hoist of the kind shown in the drawing will prove very useful. The hoist is made of 4 by 4-in. lumber and consists of a cradle, which is submerged so that the boat can be driven over it, and a lever, which extends vertically from the cradle and is pulled down to raise the cradle above the surface of the water. To permit this, the hoist must be pivoted on the edge of the dock as indicated. The pivot is a ¾ or ⅝-in. iron rod extending through the frame and also through two 4 by 4-in. blocks, securely bolted to the dock. A rope is attached to the top of the lever so that it can readily be pulled down. A large screweye is driven into the dock for fastening the rope.

¶A paste for cleaning greasy and inky hands can be made by pulverizing a cake of scouring soap and mixing it with a cup of hot lard. Stir well, and when it is partly cool, pour into a container. This is an ideal soap for printers, blacksmiths and auto mechanics.

Shading the Sand Pile

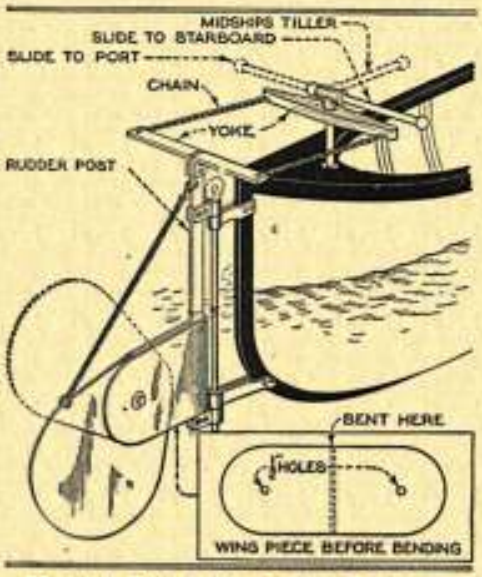
In many backyards there is no tree shade, and if there is a sand pile for the youngsters, they must play in the sun

Sunshade over Sand Pile Protects the Children from the Heat

most of the time. The photo shows a small sand pile, confined within a frame 4 ft. wide and 6 ft. long, with a muslin-covered roof. The roof comes to within a foot of the ground at the ends and the center is 4½ ft. high. After the muslin was sewed together and tacked in place, light strips of wood were nailed down over the edges to prevent it from being torn off.

Making a Drop Rudder

There is nothing like a drop rudder for a sailing canoe or rowboat, and although it may seem difficult to rival a manufactured job, it is an easy matter to make one at much less cost that will answer the purpose just as well. The material used is galvanized sheet iron; stock of 1/16-in. thickness is heavy enough for the biggest boat on which such a rudder is likely to be used. The exact dimensions, shape and weight of the material depend, of course, on the size and model of the boat. The blade is cut to the shape indicated, making sure that it is perfectly straight, and the edges are then smoothed off nicely. The rudder post is a length of ¼-in. flat steel, about 1½ in. wide. To the lower part of this post a wing piece is riveted as indicated, a ½-in. hole being drilled through it in the center of the round end, and the blade riveted between the wings so that it can move up and down rather stiffly. The application of a little heavy oil or graphite grease will make it work with sufficient freedom without becoming too loose. The rivet may be a short piece of ½-in. steel rod or a short ½-in. bolt. A hole is also drilled in the blade to receive the rivet and it should be enlarged to about ¾ in. in diameter, and a brass or iron washer, a trifle thicker than the blade, is filed down to a force fit in this hole and reamed out to fit on the rivet. To limit the downward swing of the blade a length of furnace chain is attached to the top and to the rudder post. To mount the rudder, the stern and rudder posts are fitted with eyes of flat steel, placed as indicated, so that the rudder cannot move up or down on the rod by which the assembly is held together. Removal of this rod allows the rudder to be taken off and lifted into the boat when desired. The steering gear may consist either of a simple yoke of strap iron riveted to the rudder post and moved by tiller ropes, or a double yoke, connected by chains and moved by a sliding tiller, the latter arrangement being more "shipshape." If the boat has a curved stern, the rudder post should be curved to correspond, except that part to which the wing piece is attached, and the locking rod must, of course, also be curved. The lower rudder and stern post must then be attached immediately above the wing piece.—Howard Greene, Washington, D. C.



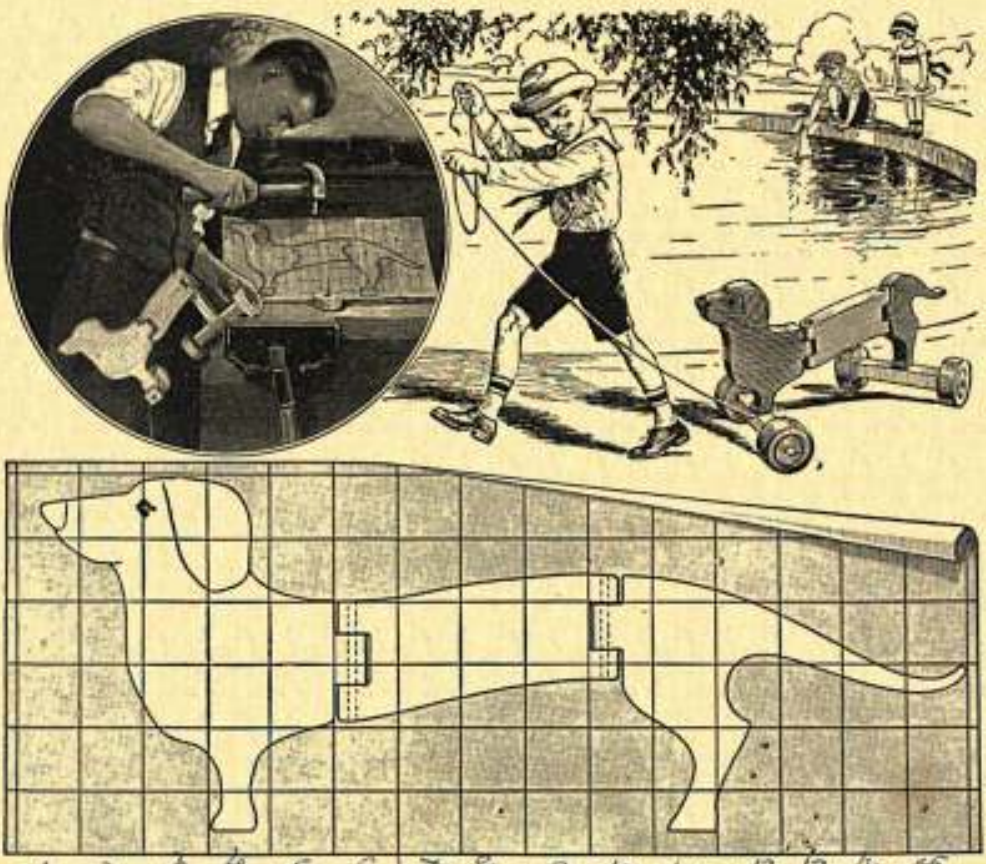
Detachable Drop Rudder for Sail and Rowboats

¶An old-type auto sidelight makes a good lamp for backing up at night. Placing it in the center of the tire support will be found to be about the most convenient location.

How You Can Make a Wiggling Pup

By B. VAN BUREN

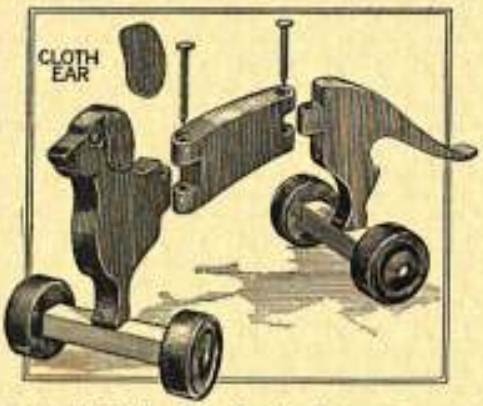
ANIMATED wooden toys on wheels are very popular, and are much enjoyed by children. The construction of the wiggling pup is simple and will prove an interesting pastime; the youngsters also will like it so much the better because some one of their own family made it. The feature of the toy is its jointed body, which causes it to dart from side to side as it is pulled along on the floor.



Simple Design for a Toy Pup Made of Wood and Having Flexible Joints; the Work of Assembling and Painting It Can Easily Be Done in an Hour

Any close-grained wood can be used, such as poplar or white pine. A piece of 1¼-in. stock, 6 in. wide and 15 in. long, is all the wood required to make it. First lay out the pattern on a piece of paper of that size, laid out in 1-in. squares, using the design in the accompanying illustration. Then get some carbon paper and trace the design on the wood after this has been well planed. Take care that the grain of the wood runs lengthwise of the board, or the tail will be easily broken off when it receives the more or less rough handling a child is certain to give it. Then, with a fretsaw, cut out the outline very carefully. After each section is cut out, round off the corners at the joints, drill holes through them as indicated and sandpaper the surface until it is smooth and ready for the application of paint or enamel. The axles can be made of the same stock; they are about ¾ in. square and 5 in. long. They are screwed to the feet, holes being drilled first to prevent splitting the wood. Almost any kind of wheels can be used and they are fastened to the axles with wood screws or nails, leaving them loose enough to turn easily. If one has access to a wood-turning lathe, neat wheels of the same thickness as that of the body of the pup can be turned out. A small hole is drilled through the center

of the front axle for a string to pull the toy with. Get the joints to work smoothly before applying paint or enamel. By using a file on the flat surface and then



Details of Wiggling Pup, Showing Pivoted Joints and Felt Ears

rubbing a little vaseline or hard oil on them, they will work very smoothly.

The natural color of the dog, which represents a dachshund, is black or brown. Glossy enamel will be found most effective on toys, and three coats of colored lacquer will give a good finish. However, if paint is handy, it can be used, and then a glossy finish can be had by applying a coat of varnish. Black for the axles and a bright red for the wheels will be pleasing to children. The wheels should, of course, be finished separately, and when they are put on the axle, an iron washer should be used to reduce friction between the wheel and the axle. The ears can be cut out of a piece of brown or black felt and are glued or tacked on. Nails are used for pivots on which the joints move and are cut off so that they will not project under the body. It is a good idea to counterbore the pivot holes at the top to take the nail heads.

Lubricating Keys

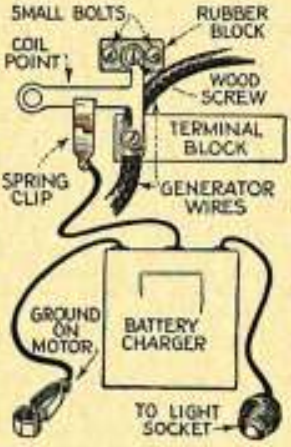
It is not a new thing to use graphite for lubricating the key in a lock to eliminate the grind of the metal surfaces against each other, but many believe that only powdered graphite should be used for this purpose. I recently met three men who were in the locksmith business, trying to lubricate a Yale-lock key with lubricating oil. When corrected and told to use a leadpencil for lubricating purposes in such instances, they were surprised that they had not thought of that before. There are many times when thin keys stick in the lock and give trouble, and a leadpencil stroked over the surfaces of the key will often eliminate the trouble.—Harry E. Gifford, Medford, Mass.

Testing Butter

If in doubt whether you are getting genuine butter or oleomargarine, you can settle the question by the following test: A level spoonful of the substance is held above a gas flame, and if the contents shows a sort of foam when heated it is real butter. Otherwise, the cow had no part in its manufacture.

Charger Connection for Ford

For a portable battery charger, a contact can be attached to the generator wire under the hood on a Ford car, the generator wire being used instead of the battery wire, because it is at the end of the terminal block and also because the charging rate will be shown on the ammeter of the car. The charger can be connected by simply raising the hood and attaching the positive clip to the generator wire and the negative clip to the cylinder-head screw, or some such part. This is much more convenient than raising the floorboards or the turtle back and connecting the charger directly to the battery. An upper point from a discarded Ford coil can be attached to the screw on the terminal block of the generator to extend beyond the end of the terminal block to facilitate attachment of the wire. If the car has a wooden dash, a wood screw and a short piece of tubing can be used to steady the upper end of the coil point. On a metal dash, use a piece of insulating material cut from a dash terminal block and fastened



to the dash with two small screws. Part of the lower edge of the coil point should be filed away to clear the upper edge of the terminal block and allow the ear on the point to come down far enough for the terminal-block screw to be replaced.

Cleaning Burnt Cooking Utensils

The black crust formed on the bottom of cooking pots and sauce pans by burning can readily be removed by first placing the vessel upon the stove and allowing it to heat thoroughly. Then cover the bottom with vinegar and add a teaspoonful of soda. Let it boil for several minutes, then empty the vinegar and remove the softened crust with a scraper.

Novel Garden Hoes

Some years ago a friend of mine had several hoes made of the kind shown in the drawing. They are especially useful while the plants are still very small. With this type of hoe you can work right up to the plants without any risk of injuring them, as the manner of attaching the blade to the handle with an open fork enables you to see just how far the hoe is cutting. This is almost impossible with the ordinary tool, especially when hoeing around small plants.—H. H. Siegele, Emporia, Kans.

Homemade Tray for Storage Battery

When placed upon the floor or table, storage batteries often cause acid stains of a more or less serious nature. This trouble can be prevented as follows: Obtain a shallow cardboard box, somewhat larger than the battery, and give the interior a liberal coating of rubber cement. When dry, this will provide an acid-proof and non-leaking receptacle for the battery.

Non-Slip Diving Board

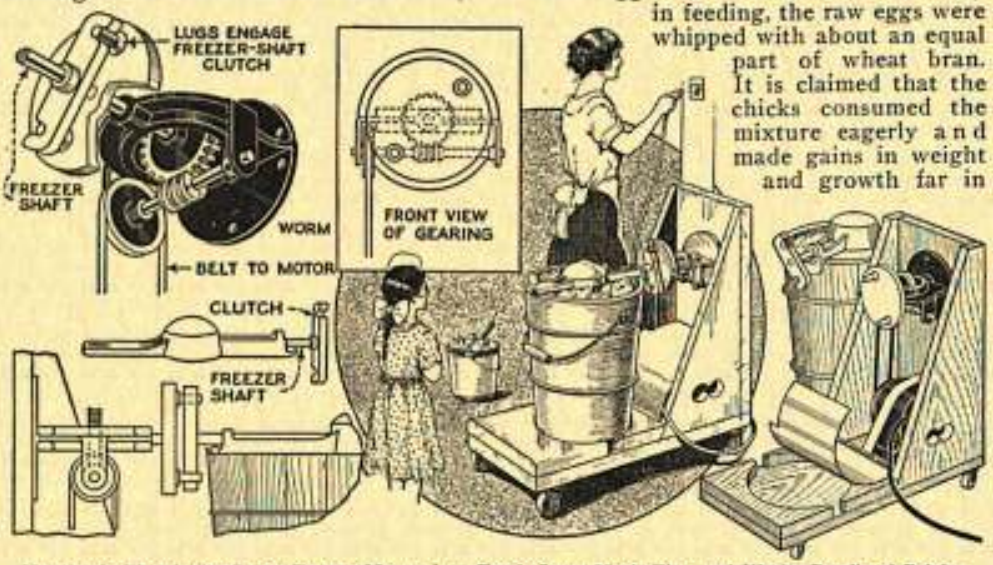
The slippery surface of a wet diving board is often the cause of injury to swimmers, so the manager of a lake resort devised a very simple and practical method for making the boards at his beach slip-proof. A number of rubber bands, about 2 in. wide, were cut from discarded inner tubes and snapped over the board, spaced about 1 in. apart. This provides enough friction to prevent the divers from slipping.—G. E. Hendrickson, Argyle, Wis.

Effective Crow and Hawk Trap

For trapping crows and hawks the method shown in the illustration has been found successful. In an open meadow twelve stakes are driven into the ground and left projecting about 1 ft.; they are spaced 4 in. apart. A small stake is driven into the ground in the center of this pen and a small chick is tied to the stake as a decoy. The sides and top are covered with light baling wires run back and forth to form a 4-in. mesh. A number of steel traps are then set outside of the pen. When the crow or hawk pounces down upon the chick the wire mesh throws it off, usually landing it with its claws in one of the traps, and it is impossible for it to get at the chick even if it isn't caught. This method has been used with great success.—Hugo Glitzke, Tonganoxie, Kans.

Changing the Ice-Cream Freezer for Motor Drive

Those who have had the experience of turning an ice-cream freezer occasionally, will appreciate the usefulness of the motor-driven outfit shown in the drawing. Both freezer and motor are mounted on a wooden truck, provided with casters so that it can be conveniently rolled around. A frame is built at one end to support the driving gear. The freezer itself is of the hand-crank type, but is adapted to the motor by removing the crank and substituting a wooden flange to which a worm gear is fastened, and a small belt is run from the motor to the worm gear to drive it. A ⅛ or ¼-hp. motor is strong enough to turn a 6-qt. freezer. A sheet-metal cover should be made, to shield the motor from water and ice. In use, the freezer is filled in the usual way and the truck then wheeled to a position near a wall socket so that the extension cord can be attached. In less than 30 minutes the ice cream will be ready to serve.—Mrs. H. T. Hixon, Auburn, Ala.



Homemade Electric Ice-Cream Freezer Mounted on Truck Saves Much Time and Work; Details of Driving Gear and Clutch That Takes Place of Hand Crank

Raw Eggs for Baby Chicks

In experimenting with the feeding of baby chicks a Wisconsin poultryman has found that the common practice of feeding them hard-boiled eggs for the first week or so does not bring about the results in growth and development that are obtained when the eggs are fed in a raw state. The tests were made on the theory that since nature supplied the chick with raw egg as its first food the delicate digestive organs of the young bird should be better able to assimilate this than a cooked egg. To overcome the difficulty in feeding, the raw eggs were whipped with about an equal part of wheat bran. It is claimed that the chicks consumed the mixture eagerly and made gains in weight and growth far in excess of those fed in the regular manner. —G. E. Hendrickson, Argyle, Wis.

Hose Attachment Sweeps Leaves from Lawn

Although built from scraps of wood, the hose attachment illustrated is very efficient in removing leaves from a lawn, as the stream of water is easily directed over the surface. Laid back on the handle, the device is also useful as a sprinkler. Cut a handle, about 3 ft. long, of 1 by 2-in. stock, and nail to one end an 8-in. length, which is braced at right angles to the handle by a strip nailed diagonally on each side. A thin strip tacked across these braces completes the device. In use, slip the hose nozzle under the cross strip until it lies at the bottom of the angle, as indicated.

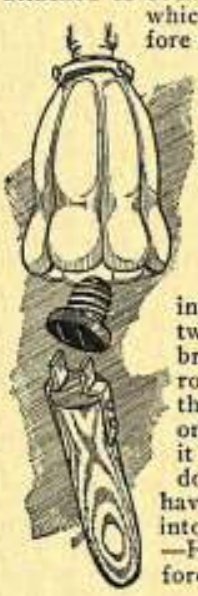
How to Repair a Slit Tube

When an inner tube bursts, the result is often a slit a few inches in length, which, if repaired with a patch on the outside in the ordinary manner, is likely to extend beyond the ends of the patch after a little more running. The tube may be repaired in a satisfactory manner, however, in the following way: At each end of the slit, cut a small round hole, and turn the inside edges of the slit out so that they can be cleaned. Then insert and cement a patch on the inside of the tube, and cement the usual patch on the outside.

A tube with a 4½-in. slit was repaired in this manner, and has since run over 600 miles without any sign of trouble developing.

Inserting Electric Plugs

In many homes electric appliances are attached to sockets having glass shades, which must be removed before the plug can be screwed in, as the hand is too large to enter the glass shade. Most plugs are separable, one part being threaded and the other part having two prongs, which are inserted in slots in the first part. To eliminate the necessity of removing the shade, I attached two short strips of sheet brass to the end of a short round stick, placed the threaded part of the plug on the prongs and screwed it in place. After this is done, the part of the plug having prongs can be pushed into place without difficulty. —Harry E. Gifford, Medford, Mass.



Killing Flies

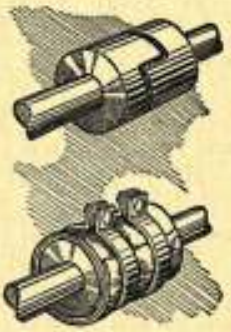
One objectionable feature of a fly trap is the killing of the flies with hot water. Fasten a can to the inside of the trap, fill it with water, and hang a sheet of poison fly paper over the edge of the can, one end of the paper in the water. The flies are sure to drink from the moist paper as there is no other source when they become thirsty. The dead flies are readily dumped out without the inconvenience of first killing them.—Gordon H. Sears, Salt Lake City, Utah.

Spring Aids in Driving Tacks

In making fly screens and screening in a porch my fingers were quickly bruised in starting the tacks, so I conceived the idea shown in the illustration. I first took a strip of tin to try the scheme and after finding it successful, I made a permanent one out of an old corset stay. A notch was filed in the latter and a hole punched at the other end, through which the spring was tacked to the hammer handle, as shown. The spring is turned to one side after starting large tacks or small nails for driving but for small tacks it is left on the face of the hammer. If a hammer having two faces is used, it can be reversed for driving.—G. M. Beerbower, Tarrytown, N. Y.

Noisy Jaw Clutch

There is a type of coupling used on many automobile engines for the purpose of driving the pump, generator or magneto, which is known as a straight-jaw clutch or Oldham coupling. After considerable wear, play occurs between the two halves of the coupling, and this play usually adds to the many noises which develop in an engine. From a discarded inner tube, cut a strip of rubber, long enough to wrap around the junction in the coupling twice and about 2 in. wide. Place two hose clamps side by side around the rubber and set the nuts tight on the clamping bolts. On some engines where the coupling is badly worn, it is suggested to remove it and to slip a piece of hose onto the shaft ends, holding it in place with hose clamps and letting the drive go through the hose.



Novel and Easily Made Signs That Attract Trade without Being Objectionable

Novel Signs Attract Business

Signs of the type shown in the illustration are often unobjectionable on highways where other kinds of signs would be thrown out by order of the police. The pigs shown in upper photo, which announce the approach to a barbecue stand, are cut from heavy tin and painted black. The first pig, from either approach, announces "Pig Stand No. 1" is just ahead. A herd of a dozen tin pigs are spread twelve feet apart before the stand. Each pig has a different message to tell. One tells of a hamburger, another of barbecued meats and a third announces soft beverages.

The pigs are life-size with the realistic curly tail up over the back. It is a unique form of telling the public what the merchant has to sell, and the very novelty pleased rather than raised objections, such as some signs would provoke if placed along the parkway.

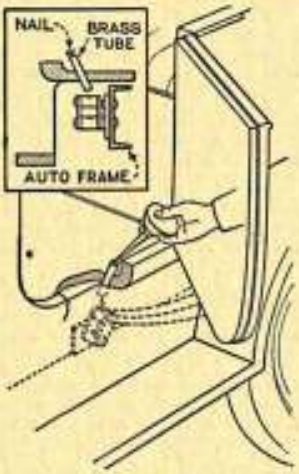
Pictures from a magazine, traced on tin and cut in silhouette, and letters cut from advertisements and pasted on a board, served to make another neat sign for a country tea garden just a few miles outside of Kansas City. The picture was from an advertisement setting forth the refreshing qualities of a certain well-known soft drink. Cut in tin and mounted on a stout baseboard, which was bolted to an angle and then mounted on a post, the sign was artistic and attractive. The picture sets forth emphatically the main item the merchant has to sell. The letters pasted on a plain oak board, give the name of the stand. The post set in the ground is solid and in harmony with the entire layout. —C. N. Cook, Kansas City, Kans.

Shoe Scraper for Car

Farmers and others who are forced to walk to and from their cars in heavy mud will find that a scraper fitted under the running board is a great convenience. An effective scraper can easily be made from a strip of 1 by ⅛-in. steel, bent and drilled to form a U-shaped stirrup, and then screwed to the underside of the running board. If desired, the scraper may be fitted with round-head bolts and wing-nuts so that it may be detached whenever it is not needed. The depth of the "U" should be such, of course, that the shoe can easily be inserted and drawn back. If only one is fitted, it should be on the driver's side, but one can be fitted on each side if desired.

Oiling Auto Springs

By drilling a ¼-in. hole through the floorboards on either side of his car at the point indicated in the drawing, an auto owner provided an easy means of oiling the rear springs. He found, however, that dirt soon clogged the holes, causing the oil to seep along the underside of the floor and over the outside of the apron, which accumulated dust and presented a dirty appearance. This trouble he remedied by inserting a short length of brass tubing, flared out at the top, in each hole. The tube extended about ½ in. below the running-board shield and was bent to come directly above the spring shackles. Short nails were used to plug the holes between oilings.—R. C. Tarr, Gloucester, Mass.



Drain Box for Overshoes

When not in use, rubbers and overshoes can be kept in a box having a grating halfway down and a water-tight tray in the bottom. The rubbers are placed in the box, and the water, mud or snow drains off into the tray. The tray can be taken out and emptied whenever necessary. The grating is best made of galvanized material to prevent rusting. The box should be large enough to hold one pair of rubbers for each person in the building and, perhaps, a few extra pairs belonging to visitors.—E. T. Gunderson, Jr., Humboldt, Iowa.

Fencing the Haystack

Stacks of hay and straw are frequently left in the fields during the rush of the season's work to remain until the farmer can take time for their removal to the barns or feed lot. As the live stock is usually pastured in these fields, it is necessary to protect the stacks by means of improvised fences. To accomplish this in the quickest manner possible and also eliminate the troublesome task of driving posts around the stack, a Wisconsin farmer has employed the novel method shown in the drawing. A number of sharpened stakes, 10 ft. long, are connected in pairs by bolting them together at the center as illustrated. When the stack is completed, these scissor-shaped braces are opened to an angle of about 25° and the sharp ends inserted horizontally into the stack at 10-ft. intervals and about 3 ft. above the ground. By stapling a strand or two of barbed wire to the projecting ends of the stakes, the fence is completed and prevents molestation by the live stock.

Scissor-Shaped Braces Supporting a Barbed-Wire Fence around the Haystack

Using Rubber Floor Mat as Water Carrier for Filling Radiator

Emergency Filler for Radiator

When one is in the country and discovers that the radiator has to be filled with water, but is handicapped by not having a pail or similar receptacle, the rubber floor mat will be found quite serviceable. By folding it, as shown in the detail, and holding the edges together firmly water can easily be carried in it and poured through the radiator opening.—Joseph A. Moffitt, Phoenix, Ariz.

Raising Flagpoles

When raising a long flagpole or radio mast, a stepladder or other short ladder can be used as a prop. The base of the pole is placed over a hole dug for it as usual, and the other end of the pole is lifted. When the men who do the lifting have raised the pole as high as they can reach, the ladder is placed under it, allowing the lifters to move on and take a new hold where the pole is not so high. The ladder serves the same purpose as the props with forked ends used by linemen when erecting telephone poles, but these are not available to most people. A stepladder is better than an ordinary ladder for such heavy loads as its top step is stronger than the top rung of the other type.

Bread crumbs rubbed over a drawing remove the dirt but not the pencil lines.

Shallow Pan on Running Board of Auto Carries Ice without the Need of Tying It

Carrying Ice in Auto

An autoist who lived some distance from the route of the ice man found it necessary to get his own supply of ice. Not wishing to put it inside of the car, he made a shallow pan of galvanized iron, about 12 in. wide, 24 in. long and ½ in. deep. The corners were soldered to prevent the pan from leaking. In use, it is attached to the running board of the car with two small C-clamps, obtainable at any hardware store. To hold the cake of ice in the pan securely and prevent it from sliding off while traveling or hitting the side of the car, a few roofing nails such as are used to fasten asphalt shingles were pounded through small pieces of galvanized iron and then soldered to the bottom of the pan so that the points projected upward.—R. C. Tarr, Gloucester, Mass.

Removing Insulation from Wires on Grinding Wheel

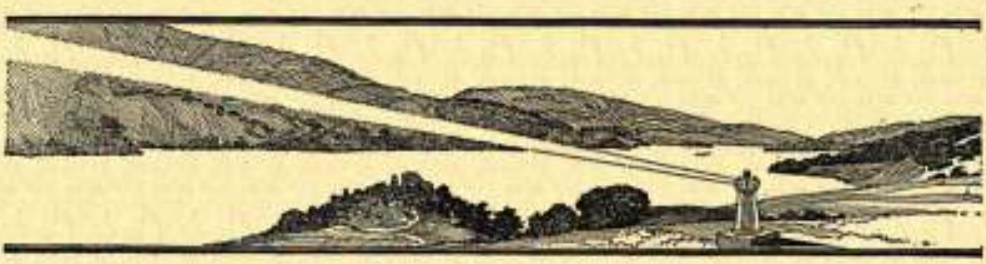
A grinding wheel can be used to remove the insulation from cotton-covered magnet wire by simply pulling it lightly across the face of the wheel. This cuts through the insulation on one side and the rest falls off. If the wheel is run slowly little damage will be done to the copper wire and no harm to the wheel. Most kinds of wire can be bared by this method, but there are some that will gum and fill the wheel, for instance, rubber-covered wire. The wire should be held in both hands if possible and drawn straight across the face of the wheel.—E. T. Gunderson, Humboldt, Iowa.

Easy Way of Pitting Cherries

One day, when it was necessary to can cherries immediately owing to other duties, and a cherry pitter was not available, I wondered how I was to pit them. I did not wish to crush them by pressing out the pits with the fingers, so I looked around the kitchen and found a wire from an ice-cream box. With this I pitted the cherries with the greatest ease and in a very short time without crushing them.—Miss C. Roskoten, Chicago, Ill.

Preventing Food from Burning

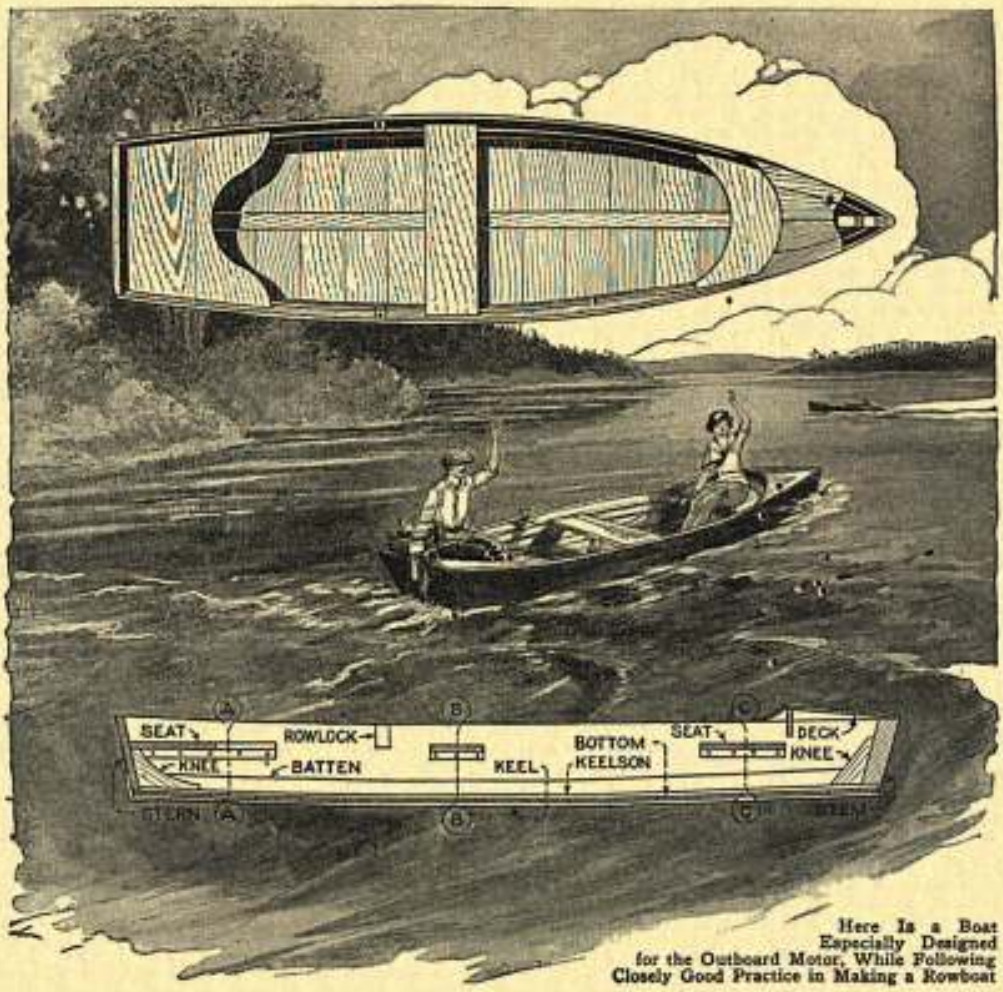
Practically all cooks, at times, place a plate in the bottom of a cooking pot to prevent puddings or other food from burning. Very often the hot fire drives the water from under the plate, which then becomes too hot and the food is at least scorched. To prevent this trouble, take a tin pie plate, put it over a piece of wood and with a nail and hammer punch a number of holes in the plate from the inside. This leaves all the roughness of the punched holes on the underside, which is placed on the bottom of the pan. There will be no danger of scorching or burning when this plate is used, because it is impossible to force all the water out on account of the numerous holes. There are factory-made articles used for this purpose, but a tin plate with punched holes as described is just as good.—James E. Noble, Toronto, Can.



A Boat for Your Outboard Motor

By B. FRANCIS DASHIELL

THE average rowboat is not entirely suitable for use with the outboard boat motor. The boat described in this article has been designed for the following: Perfect balance with the weight of the motor on the stern; a substantial stern and parts to carry the weight and hold up against vibration and strain; an easily riding bow that does not ship much water when the going is rough; large substantial seats; a front deck giving a motorboat appearance; light weight; ease



Here Is a Boat Especially Designed for the Outboard Motor, While Following Closely Good Practice in Making a Rowboat

of rowing, etc. The use of a motor on such a rowboat permits the builder to get into the motor-boat class to some extent, and a few of the refinements of the latter are embodied in the design. While this particular boat has been designed especially for use with an outboard motor, still the fundamentals of general rowboat practice have been closely followed.

The sides are two cypress boards, dressed on both sides, ⅞ in. in thickness, 16 in. wide, and 15 ft. 7 in. long, one to each side. No great difficulty should be experienced in obtaining these boards but in some localities it may be necessary to make them up by using two boards; for instance, a 12 and a 4-in. width, doweled along the edges and clamped with a butt strap piece along the entire length. However, this type of construction is not recommended. The boards must be sawed to the shape indicated by the drawing so as to give the proper curvature to the bow and stern. If a band saw is available, the two boards can be shaped together readily; otherwise, a narrow saw and plane must be used, doing the work by hand. Boards of this length will construct a boat 15 ft. in length.

The stem piece is made of oak. The use of this wood lessens the danger of splitting and will furnish a substantial anchor for the screws used in attaching the sides. A piece of oak 3 in. thick, 6 in. wide and about 20 in. long is necessary. Two grooves are cut on the opposite sides, as shown in the drawing, to receive the ends of the side boards. The top and bottom are cut flush with the edges of the sides after they have been placed and this is best done just before the bottom boards are put on, so that a watertight joint may be assured.

The stern is of cypress, not less than 1½ in. thick. It may be necessary, although somewhat poor practice, to build the stern up of two widths, splicing along the joined edges with dowels and a longitudinal butt strap, as well as cross battens. A single width is much to be preferred. The oak knees need be no particular shape, as they are simply braces. They should be about 2 in. in thickness, and used to strengthen the stem and stern. They are attached to the keelson and keel, preferably with bolts passing through these and the bottom. The knees cannot be set in place until the bottom, keelson and keel have been put on. The general shape is indicated in the drawings, but may be altered to suit any special condition.

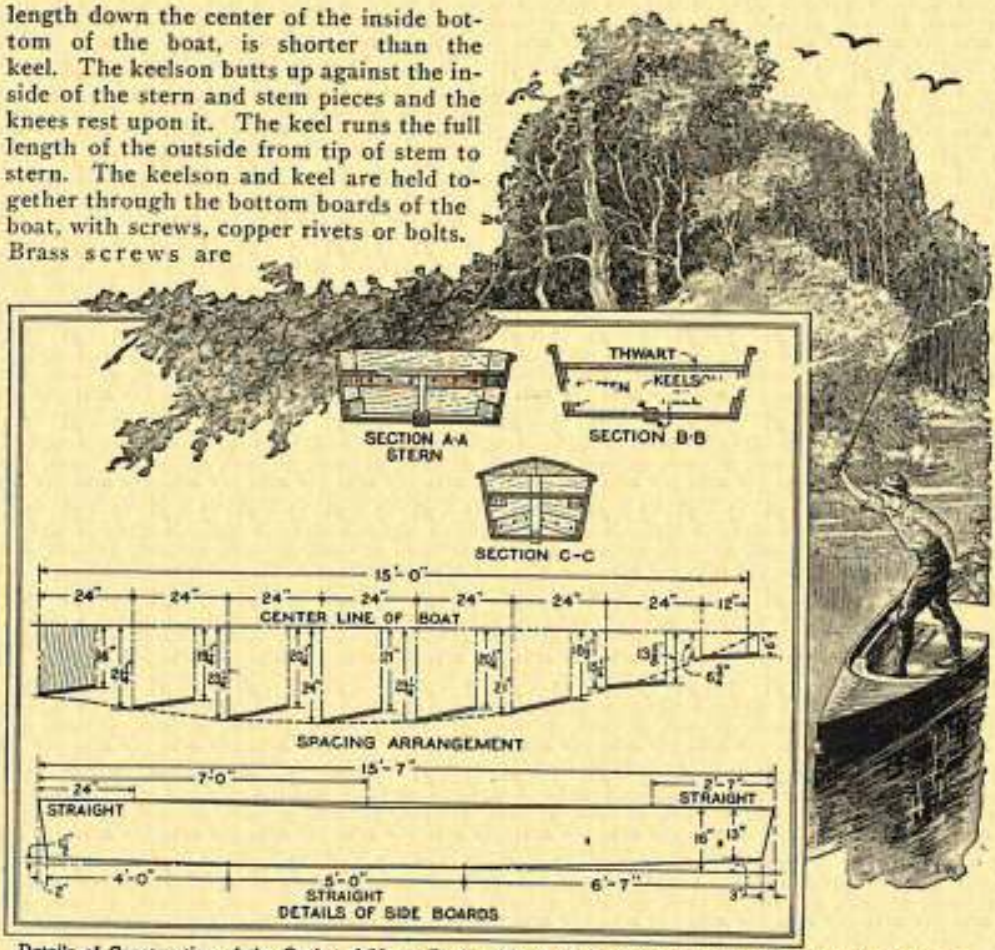
The battens consist of two cypress pieces, each 4 in. wide, dressed to ⅞-in. thickness, and running the full length of the side pieces, except for the thickness of the stern and the depth of the stem piece. One batten is attached along the inner lower side of each side board, and furnishes additional bearing and screwing surface for the bottom boards.

After the sides have been carefully shaped they are placed side by side on their edges, top down. Sixteen temporary cross pieces are cut from scrap material, about 1½ in. wide and ⅞ in. thick; eight for the top spacing and eight for the bottom. Nail the bottom cross pieces to the side boards at their respective positions as indicated in the drawing (spacing arrangement). Turn the whole over so that it rests on the temporary cross pieces and nail on the top spacing pieces. When this has been done the sides will then assume their proper curvature. If there is any apparent lack of symmetry in the lines of the boat it may be adjusted by releasing the proper cross pieces and re-nailing. The front ends of the sides should now be trimmed off and the stem piece inserted. If the fit is perfect, the sides should be permanently attached with screws. The stern is next fitted and the sides also attached with screws. The bottom is now put on, and the bottom temporary cross pieces should be removed, one at a time, as the screwing on of the bottom boards progresses.

The bottom is of cypress boards, dressed to ⅞-in. thickness and about 10 in. in width. These are attached to the boat, being placed across, and screwed firmly in place; screws being placed in the edges of the side and batten, alternately. The screws should be set in about 1 in. from the sides of the bottom boards and then spaced about 2 in. apart the rest of the distance across. The edges of the bottom boards and the side pieces should be fitted carefully so as to be parallel.

The keel and keelson are of the same size; 3 in. wide and ⅞ in. thick. However, the keelson, which runs the full

length down the center of the inside bottom of the boat, is shorter than the keel. The keelson butts up against the inside of the stern and stem pieces and the knees rest upon it. The keel runs the full length of the outside from tip of stem to stern. The keelson and keel are held together through the bottom boards of the boat, with screws, copper rivets or bolts. Brass screws are



Details of Construction of the Outboard-Motor Boat. This Craft Is Simple Enough for Any Handy Man to Build, with Ordinary Tools

used satisfactorily, in addition to small wood bolts, about 3½ in. in length, spaced about 12 in. apart along the entire length.

The midship thwart should be placed in position so as to give the boat more stability during the rest of the construction, after which the remaining temporary top cross spacers may be removed. The stern seat should be deep enough so that the operator can be seated while the motor is attached. The motor takes up a certain amount of inboard space and, in the average rowboat, the operator is compelled to sit to one side, resulting in an uneven balance. The rear seat should be low enough to allow plenty of clearance for the motor clamps. The bow seat should also be roomy, comfortable and low.

The deck may be arranged in any way desired. It should be somewhat higher at its inner end, so as to shed water. A cross or bulkhead piece is set across between the sides, and used to support the deck. Two of these may be fitted if desired, one just aft of the stem piece.

All joints in the stern and stem assembly, along the bottom and between the bottom boards should be made watertight. The surfaces in contact should be carefully fitted, and a good make of marine glue may be used between the surfaces before the parts are drawn up by screws. Thick white lead may also be used. A piece of calking cotton, or any loosely woven material may be placed between the joints. This cotton may be dipped in white lead or placed between joints which have been spread with marine glue. The

calking cotton is best used in the stem and stern assembly and along the sides of the bottom, while the joints between the bottom boards may be filled simply with the marine glue. The screws draw the parts together and force out surplus glue or lead, which, when set, will provide a boat that will stay dry for many seasons. However, unless built of very well-seasoned lumber, no boat will stay tight if it is permitted to remain out of water and exposed to the rays of the hot summer sun.

The outside upper edge of the sides should be finished off with a large half-round strip of molding, or a more elaborate coaming effect can be had by finishing with a flat strip around the top, projecting over the edge and filled in with a strip of quarter-round molding. Rowlocks should be set in the proper places, and brass rings attached to the stem and stern. If desired, a small steering wheel can be placed in the bow with line running around the sides to the motor or rudder. The hardware used in assembling the boat may be of galvanized iron and such galvanized screws, bolts, etc., will serve very well. No excessive sizes are necessary.

The boat should be thoroughly painted. No attempt will be made here to describe any particular finish as every individual has his own ideas as to colors. At least two coats of lead-oil primer should be given, followed by the top color coats which may be finished off with one or two coats of clear spar varnish. If a natural finish is desired, a coat of wood filler should be applied, followed by a shellac coat and two or three coats of good waterproof spar varnish.

Simple Tool Opens Seed Rows

The illustration shows a simple device for opening rows for seed. It is made by hinging a long stick to a beveled block as indicated. The handle must be long enough to allow one to walk in the furrow and push the tool along. It should be given a couple of coats of paint.—Miss Olive M. Rogers, Palatka, Fla.

New Use for Blowtorch

There are many uses for a gasoline blowtorch besides heating the soldering copper and burning away old paint. It will be found handy for spraying a mixture of oil and kerosene between the leaves of your automobile springs, and around the inaccessible spots in the wearing parts of the brake rods and pins, which always seem to elude the jet from the oil-can. For applying liquid insect exterminators a blowtorch is far superior to the old-fashioned squirt gun. The liquid is under an even pressure and the easily regulated spray may be directed into all the tiny cracks where the pests lie hidden.

Drip Catcher for Paintpots

When painting floors, a Wisconsin painter eliminates the need of placing papers on the floor under his paintpot pail by gluing a paper plate to the bottom of the pail, as shown in the illustration. The pail may then be moved about from place to place without annoyance and the drippings caused by laying the brush across the top of the pail, or wiping the bristles on the edge, will be caught on the plate.

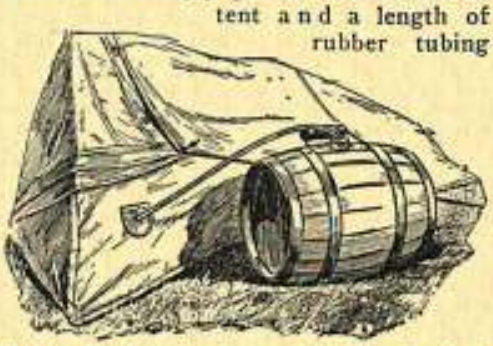
Saving Oil-Stove Wicks

Many oil stoves use a cotton wick held in a perforated cylindrical metal holder, the top of the wick extending above the holder. When the wick has burned down to the holder it is discarded and a

new one put in. As these wicks cost around 35 cents each, and, with this practice, are only worn down about ¾ in., the cost of wicks is quite an item. The expense can be materially reduced in the following way: Take old wicks and remove one wick from its holder without injuring it. Leave the other wick in its holder but cut it off all the way around and about an inch below the top of the holder. The cutting must be done carefully and accurately. Mark with a pencil and use a discarded safety-razor blade if available. Place the old wick removed from its holder on top of the wick just cut down. This gives a new wick of proper length and at no cost except a few minutes' work. The new wick will feed the oil perfectly, if the edges of its two parts are accurately fitted together. If there is any doubt as to this, make sure with a few thread stitches.

Campers' Water Canteen

While on a summer's camping trip and using a small tent having a sewed-in floor cloth, the writer experienced some trouble with the water canteen during sultry nights. Sometimes the stopper of the water bottle became dislodged through the unconscious movements of the sleeper, and it was often a problem how to stow this equipment so that there would be no danger of spilling water on the blanket yet have the water handy. The drawing shows how the problem was solved. The barrel was simply placed outside of the tent and a length of rubber tubing



Rubber Tube Supplies Camper with Water Inside of Tent from Outside Canteen

used as a siphon. A leather washer sewed both inside and outside, around the hole in the tent, prevented wear on the canvas. —Frank M. Small, Tampa, Fla.

A Bathtub Washboard Hook

If a laundry sink is not available, it is sometimes better to wash large, heavy articles in the bathtub than in a small wash-

Handy Hook on Washboard Facilitates Washing Clothes in Bathtub

tub, which does not provide sufficient room for handling them conveniently. The hook shown in the drawing engages the edge of the tub and retains the washboard at the proper angle. Without it, the board would slip down too far into the tub. The hook is made of No. 10 galvanized-iron wire. Estimate the length of wire needed, allowing about 6 in., or more, at the ends to give leverage for forming the eyes, which are easily made by bending the wire around a nail, or nails, driven into a board. The excess wire at the ends is then cut off. The hook is formed with a wrench and a hammer.

Cleaning Electric Coffee Pot

An easy way to clean the tube of your electric percolator and to remove any deposit on the inside is to put four heaping tablespoonfuls of salt in the coffee compartment. Use as much water as in cooking coffee and allow it to percolate for the same length of time. Any grains of coffee lodged in crevices will have fallen to the bottom and the brown deposit on the surface of the utensil will be gone, by the time this is done.

Novel Doll House

Two little girls abandoned an elaborate doll house for the table arrangement shown in the photo. They objected to the ceilings of the other house, which hampered them in moving their dolls and furniture about. One of them conceived the idea of having the rooms partitioned off with railings on top of a table. Later a taller table for an upper floor was added. Between the rooms, openings are left in the partitions to serve as doorways. The two tables are made of light pine, so that they can be easily moved about, and being separate, can form either a two-story house as shown, or placed end to end to make one long building. The upstairs partitions are higher than those on the lower table, because there they do not interfere with the child's reaching into the different rooms. The furniture is painted in some contrasting color. Most of the toy furniture was made by boys in the manual-training department of a school. The front of the lower table is cut out so that a stool may be used while playing. This house has been the most absorbing and useful toy these children ever owned.

New Departure in Children's Doll House Partitioned Off on Table Top with Railings

Saving the Rain-Water Barrel

When the hoops rust off and the old rain-water barrel seems ready to fall to pieces, go to the junk yard and get 10 or 12 ft. of old sprocket chain, make it into loops, the size of barrel hoops, slip over the barrel and tighten them securely. These serve as well, stay in place better and will never wear out.—Willis Mehanna, Bussey, Iowa.

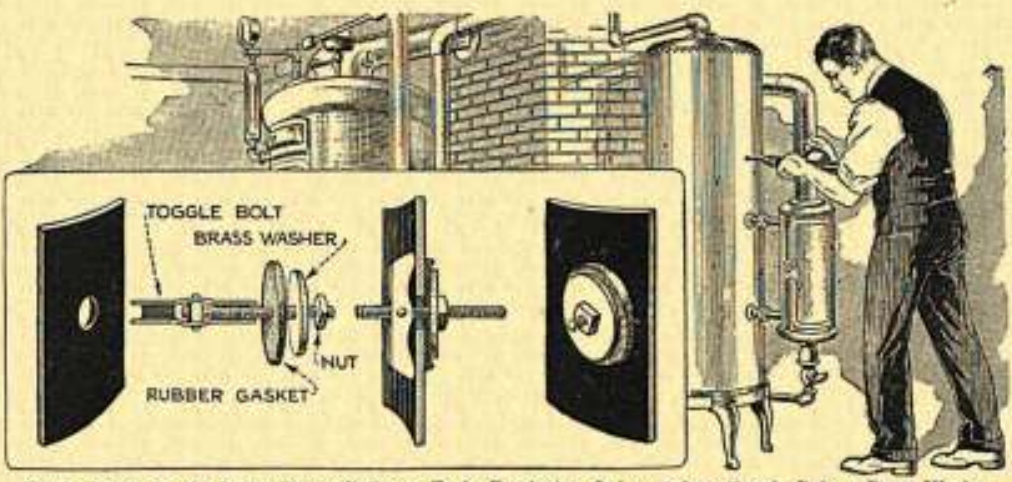
Cork Forms Removable Mount for Camera Lens

My reflex camera does not have a removable lens; so, wishing to use a lens of shorter focal length for close work, I provided a cork stopper to mount it on. The stopper was tapered slightly and made a tight fit in the threads on the front board to prevent leakage of light around the edges. The center of the stopper was cut out and smoothed down with a small round file, so that the new lens was a tight fit in the hole. After fastening the lens with small screws, the stopper was given two coats of black ink, both to improve its appearance and prevent reflections to the interior of the camera. By using a lens of which the focal length was not more than one-half of the available bellows extension of the camera, life-size photos of small objects, bugs and flowers could be obtained.—H. W. Rogers, Ithaca, N. Y.

Bicycle Lawn Mower

Mowing the lawn weekly proved too arduous a task for two boys, or at least they thought so, and, therefore, they rigged up the unusual mowing device shown in the photo. It consists of an ordinary grass mower attached to the front fork of a bicycle. The handle of the mower is removed and a short piece of wood of the same width and thickness is substituted. This piece is bolted to the fork at two points.

Boys Attach the Lawn Mower to Bicycle and Make Task a Pleasure



Simple Repair for the Leaky Range Boiler or Tank, Employing Only a 5-Cent Toggle Bolt, a Brass Washer and a Rubber Gasket

How to Fix That Leaky Tank

THERE are several ways of repairing a leak in a tank or range boiler. Sometimes a tapered steel punch is driven into the hole so as to turn the edges of the metal around the hole inward and thus form a surface that can be tapped for a common pipe plug. The plug should be coated with a mixture of litharge and glycerin before being screwed in. If the hole is in a tank of considerable thickness it can be quickly and easily repaired by using a special combination tap and plug that cuts and threads its way through the wall of the tank. A small leak in a seam may often be closed by merely rubbing a cold chisel along the edge of the seam or joint, but no attempt should be made to calk the seam unless the metal of the tank is of considerable thickness and the rivets are closely spaced and quite close to the seam edge, and even then extreme caution must be used.

One of the simplest repairs for a small hole in a range boiler, or any similar tank, for that matter, is shown in our illustration. Obtain, from the hardware store, or from the "five-and-ten," a 3/16 by 3-in. toggle bolt. This costs about a nickel. Also get a brass washer about 1½ to 2 in. in diameter, and with a hole a neat fit on the bolt. Cut a rubber washer or gasket a little larger in diameter than the brass washer from rubber about ⅛ in. thick; two pieces cut from an old inner tube will serve if no thicker rubber is available. Drill or file the small hole in the tank to a size that will pass the link of the bolt, pass the link through the hole, then put on the rubber and brass washers and tighten up the nut. It is advisable to curve the washer to the contour of the tank, and to file the metal beneath the gasket clean and smooth. A little candle wicking may be wrapped around the bolt shank to prevent leakage along the bolt.

Convenience in the Pantry

Our pantry is small and we have to make use of all the available shelving. The boxes on the top shelf could not be taken down conveniently and a box or chair was necessary to stand on. By attaching handles to the boxes, as shown in the illustration, the difficulty was entirely overcome. The handles should, of course, extend far enough down to be reached from the floor.—M. A. Veatch, Billings, Mont.

Gasoline Camp Lantern on Camera Tripod Improves Camp Illumination

Illuminating the Camp

Nearly every well-equipped camper carries a gasoline camp lantern, and there is usually a tripod from a camera available. These articles can be combined to give better camp illumination. It has been learned from experience that the efficiency of the camp lantern depends largely upon getting it so placed that the light is spread evenly over the camp site. Finding such a place isn't always easy, but by putting the lantern on the tripod, an ideal installation is obtained. Merely sweat a brass nut that fits the screw in the head of the tripod to the bottom of the lantern. Light the lantern, screw it onto the tripod head and set the tripod wherever light is needed. The bottom of the camp lantern is slightly recessed so that the nut soldered to the bottom of it in no way interferes with setting the lantern down on a flat surface.

Getting Rid of Gophers and Moles

Gophers and moles damaging lawns and gardens can be driven away by dropping moth balls into their burrows and runways. I was troubled by gophers in my lawn, and all efforts to trap or poison them were unsuccessful. I experimented by dropping a dozen or more moth balls into the several openings. That was three months ago, and we have not had a gopher or mole on the place since. Obviously, the camphor balls have no worse effect upon these rodents than to drive them away. Nevertheless, it is an effective means of getting rid of such pests, especially where children may be endangered by the use of either traps or poison. —P. B. Robinson, Los Angeles, Calif.

Inner-Tube Repairs

In repairing auto inner tubes, a lot of time is lost in letting the air out of the tube after the leak has been found, and unless one is very careful, there is a chance of losing the location of the leak while the air is being let out. This trouble can be overcome by letting the air out of the tube through the puncture, which is easily done by enlarging the hole slightly with a sharp instrument, such as an ice pick, nail or the point of a knife blade. The enlarged hole is easy to see and can be patched as effectively as a smaller one.

Split-Handle Hoe Eases Hand and Arm

A gardener, whose labor was greatly increased by the hard clay and gravel soil of his garden, devised the split-handle hoe shown in the drawing, and thus relieved his hands and arms from the strain commonly experienced in gripping a smooth, round handle. The handle was sawed through the center to about three-quarters of its entire length and the halve spread to receive the short round pieces which served as hand grips. In use the handle does not put so great a strain on the small muscles of the hands and arms, but more on the shoulders and upper arms.—G. E. Hendrickson, Argyle, Wis.

A Chinese Teaser for Your Wits

THE puzzle shown in the accompanying illustration is an ancient Chinese trick, and, while a very simple one, once the secret is known, will keep the uninitiated working for hours, and get him tangled up in all kinds of knots and snarls before he discovers the method of solution, if he ever does.

The puzzle consists of a small wooden ladder of four steps. This may be made of any size and any wood. The only thing to be careful of is to get the steps far enough apart so that the fingers will go between them comfortably; about 1½ in. apart will do. Two ⅛-in. holes are drilled in each step and another in the top of one side piece, and through these holes is threaded a length of fine fishing line, about a yard long. Between each pair of steps and on top of the upper one the line is also threaded through little round "counters." These may be cut from a large dowel, made from old corks, or, in fact made in any way handy; the exact size and shape do not matter in the least. They are from ⅛ to ⅛ in. thick, and have a ⅛-in. hole drilled in the center for the cord also. Fig. 1 shows how the puzzle looks when finished and threaded. The end of the line is threaded through the hole in the top left-hand corner of the ladder and a bead is knotted on the end to keep it from pulling out again. On the free end of the line a fine-wire needle is knotted. The problem is to get the line out of the holes in the ladder, but to leave the counters threaded on the line, as in Fig. 4.

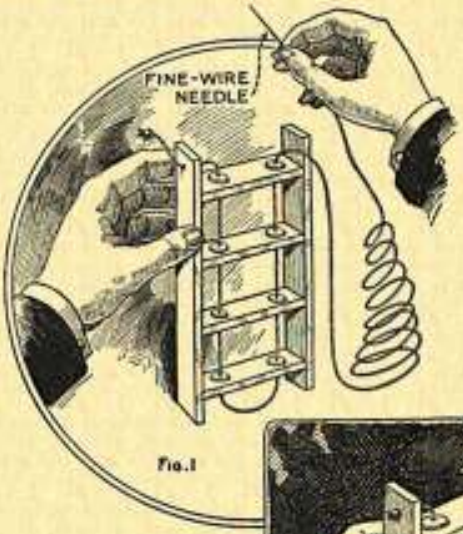


Fig. 1

A Puzzle from China, Which, Though Very Simple, Will Vastly Puzzle the Solver the First Time It Is Tried

Step No. 1 in the solution is shown in Fig. 2. Take a couple of turns of the line around the top right-hand end of the ladder, not too tight, but enough to hold the line. Then thread the line back again through all the counters and the holes in the ladder, down the right-hand side and up the left. As will be seen, this exactly reverses the original threading, and, if the turns were thrown off the upper end of the ladder the line could be drawn out of both ladder

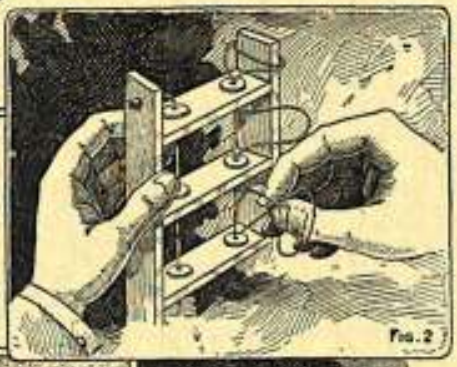


Fig. 2

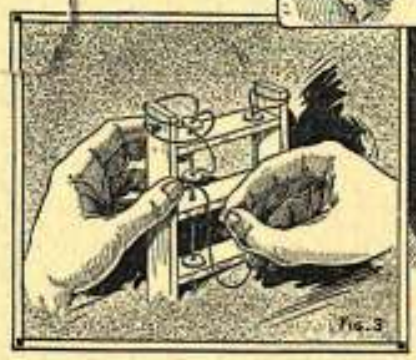


Fig. 3

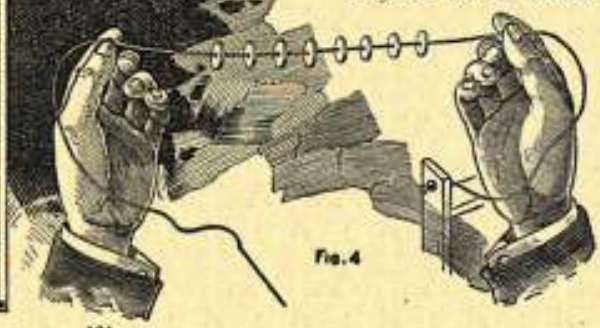


Fig. 4

and counters. This isn't what we want, however, so leave the turns on the upper right-hand side. After passing through the counter on the upper left-hand side of the ladder, take another two turns around the left side at the top, as shown in Fig. 3, and thread the line back again, this time, however, passing the line only through the counters, and not through the holes in the ladder. The turns on each side at the top of the ladder can now be thrown off, and the line can then be drawn out of the holes in the ladder, leaving the counters on the line, as shown in Fig. 4. During the two threadings in the solution of the puzzle the line may become crossed and may not pull clear of the ladder easily. This can be overcome, however, as will be seen the first time the solution is attempted.

Indoor Game for Air Rifle

In cold or rainy weather, when out-door games cannot be indulged in, the boy with an air rifle may while away the hours in an interesting game that will meet the approval of the most cautious parent.

"Shooting" the Cork into the Tumbler Provides Indoor Sport for Air-Rifle Enthusiasts

After first taking care to observe that the chamber of the gun is empty, a small bracket should be made from heavy-gauge wire, as shown. This is placed upon the edge of a convenient table and books piled upon the base portion to prevent it from tipping or moving while the game is in progress. From the upper arm of the rack, a small cork is suspended by means of a stout cord and a heavy cup or tumbler is placed upon the pile of books.

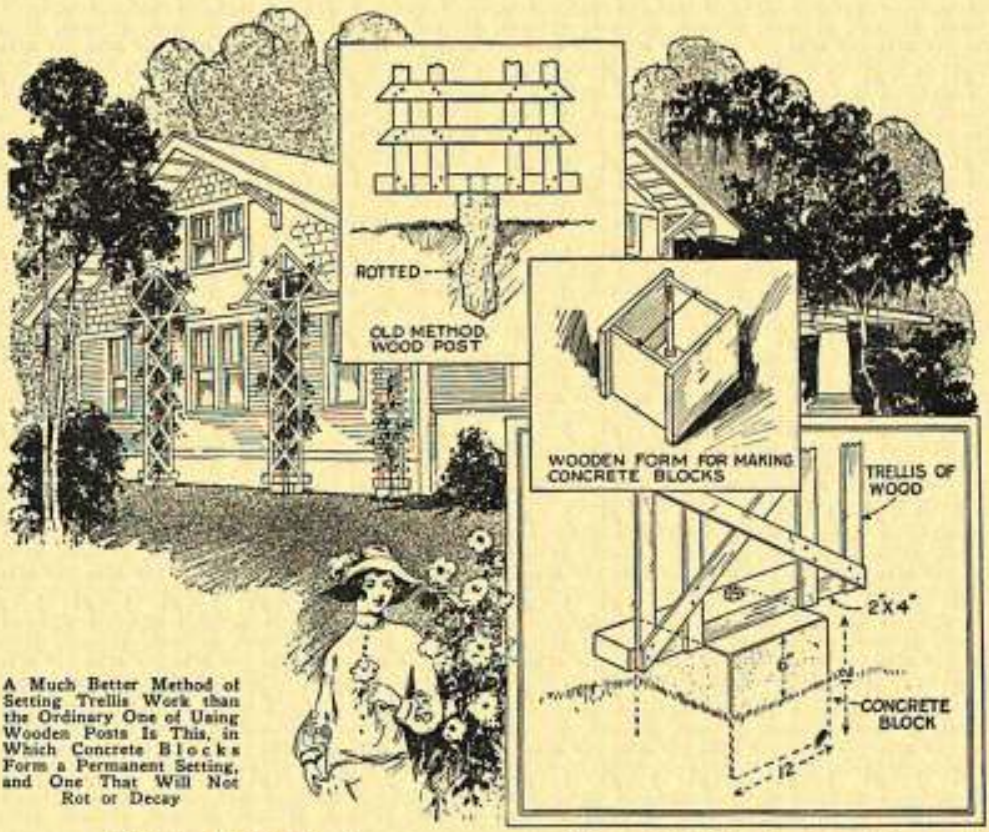
The barrel of the blank-loaded air rifle is placed near the cork and the gun fired in an endeavor to toss the cork into the tumbler. This is much more difficult than would at first appear, as the strength of the explosion, the angle of firing and the possible deflecting of the cork against the tumbler must all be considered. If several players take part in the game, each shooting in turn, it may be made highly interesting. The length of the string suspending the cork will depend upon the height of the rack and the height and position of the tumbler.

Gluing Linoleum to Iron Steps

To attach a strip of linoleum to an iron stair tread with glue seems nearly impossible. However, it can be done in the following way; Dissolve three parts of glue in eight parts of water and to it add one-half part of hydrochloric acid and three-quarters of a part of zinc vitriol. Let the whole boil for five or six hours. Apply this to both the stair tread and the back of the strip of linoleum with a brush. Place the linoleum in position and put a weight on it for at least twenty-four hours. The linoleum will stick to the iron and a cause of accidents on stairs will be avoided.

Garden Rocker Settee

With only a little work, one home owner turned out an attractive rocker settee for his garden. The legs of an old settee were removed and those taken from an old rocking-chair substituted, as shown in the photo. Before using, each joint was glued to make it as strong as possible. This settee was found to be the most popular piece of his garden furniture.



A Much Better Method of Setting Trellis Work than the Ordinary One of Using Wooden Posts Is This, in Which Concrete Blocks Form a Permanent Setting, and One That Will Not Rot or Decay

Setting Trellis Work

There is no question about the improvement that can be effected in the looks of the home by the employment of simple trellises, but the common method of setting these has one great defect. In this method the bottom of the trellis is nailed to a post sunk in the ground, and this rots in time. A much better way to set the trellises permanently is shown in the illustration. A simple wooden form is made that will hold 1 cu. ft. of concrete, as shown in the detail, and a bolt, about ½ by 14 in., is suspended by means of a twisted wire so that the head of the bolt is about 2 in. from the bottom of the form. The wire can be fastened to two nails partly driven into the upper edges of the box at the center. The form is then filled with concrete. After the concrete has cured, the block is removed from the form, and a short length of 2 by 4-in. stock drilled and fastened to the block by means of the bolt. The trellis is then nailed or screwed to the 2" by 4, using either galvanized roofing nails or brass screws.—Harry Lampert, Fillmore, Calif.

Adjustable Screen-Door Hook

When a screen door of the ordinary type is used, it may be necessary to change its position on account of swelling or sagging of the door. To overcome this, a hook made with an adjustable loop, as shown, may be used. The wire from which the hook is made should be stiff enough to hold the door securely but such that the loop may be opened with a screwdriver or closed with a pair of pliers to lengthen or shorten the latch as may be necessary.—G. E. Hendrickson, Argyle, Wis.

Mirror Helps Sign Painter

Gold-leaf lettering has to be put on from the inside and it is almost impossible for the workman to see just how his job

Mirror Hung on Outside Shows How Sign Is Progressing; Bracket Detail

is progressing unless he endangers his life by leaning out of the window to take a look at it. After lettering a number of office windows in the usual way, the writer devised the method of watching this work as shown in the illustration. It was no trick at all to rig up a bracket for holding the mirror. The bracket is made rigid, to keep the mirror from swinging, and folds up conveniently when carrying it from job to job. The bracket is fastened to the sash and moved along as the job progresses.—P. B. Robinson, Los Angeles, Calif.

Painting Brick Foundations

If paint is put over bricks in a home it may mean damp cellars as the temperature of a cellar is seldom the same as outdoors. In the summer it is cooler and in the winter, warmer. This difference in temperature, added to the fact that the larger part of the cellar wall is beneath the ground, makes for dampness within the basement. Except after a beating rainstorm the outside of the bricks will not be damp, because the constant circulation of air dries them. Inside the air is more stagnant. The dampness gathers on the bricks, and, as bricks are porous, soaks into them. If the bricks are unpainted, this dampness is drawn out of the bricks on the outside and evaporates, with a resulting dry cellar. If you paint the bricks, the lead in the paint fills these pores and prevents the dampness from getting out. —J. S. Hagans, Chicago, Ill.

Corn Cobs and Insulation

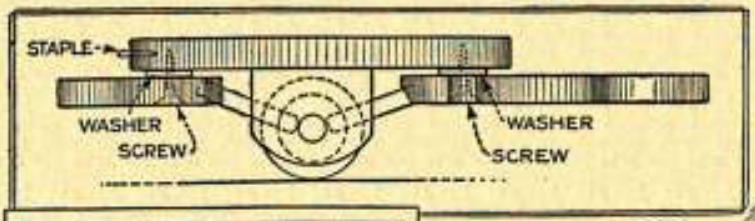
In erecting a new poultry house last fall, we were anxious to make it as warm as possible and decided to pack the walls with some insulating material. We had no sawdust, so someone suggested grinding up corn cobs in our feed grinder and using the cob meal for the purpose, and we turned out 40 bu. in about two hours. It was tamped between the walls and when doing so, we sprayed old crankcase oil on the meal to discourage insect life. The meal packs like sawdust and, as long as it is kept dry, is just as lasting.—G. G. McVicker, North Bend, Nebr.

Non-Slip Clothesline Pole

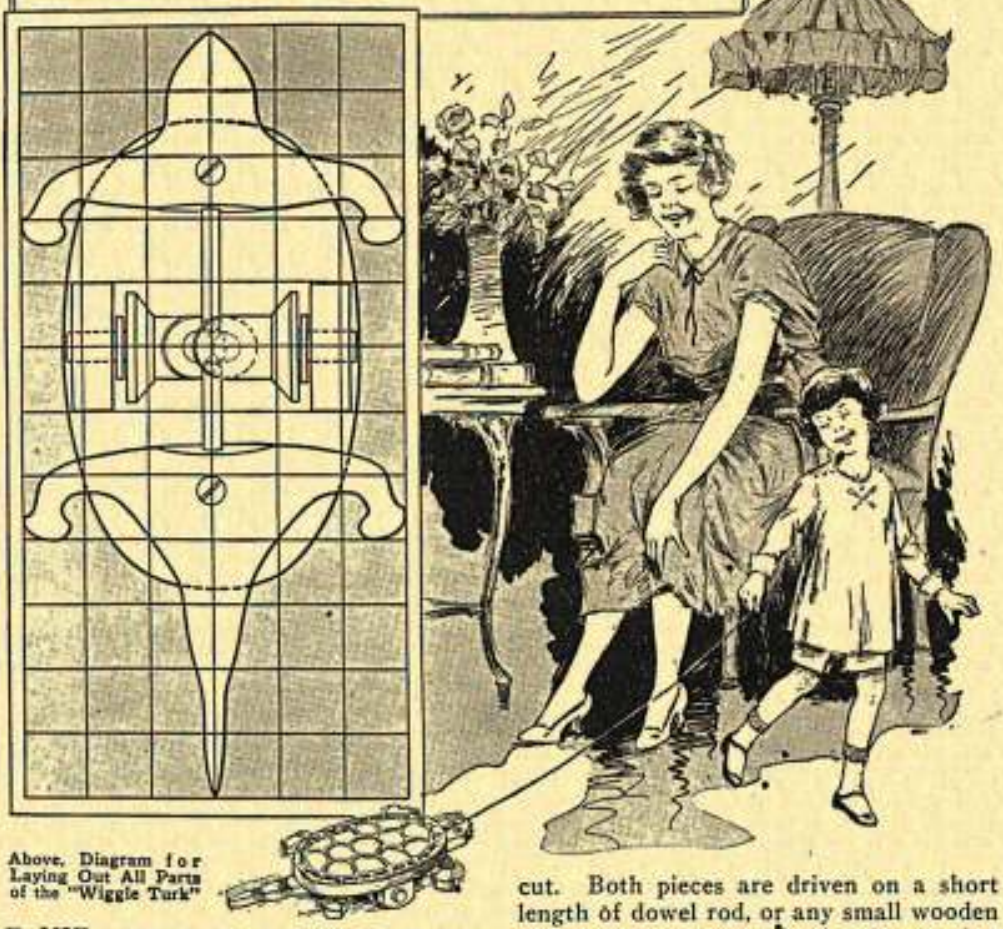
Clothesline poles often slide along the line during a high wind and fall on the ground, causing more or less damage to the suspended garments. To prevent this trouble, a deep slot should be sawed lengthwise into the butt of the pole and the two halves spread apart by a wooden wedge which is nailed in the crotch. This provides two legs for the pole and, although a clothesline supported with such a pole can swing back and forth, there is no lateral sliding, and it cannot be dislodged easily.—G. E. Hendrickson, Argyle, Wis.

This "Wiggle Turk" Amuses Everyone

By LEONARD J. LEBOLT



Toy Turtle, "Worked" by a Slotted Thread Spool, Moves Its Feet, Head and Tail, Which Makes It Appear Alive



Above, Diagram for Laying Out All Parts of the "Wiggle Turk"

LIKE a real turtle, as it moves all feet, tail and head while it is pulled over the floor, the toy wood "turk" shown in the illustration will be particularly appealing to children. It is made of ½-in. wood, which is obtainable almost anywhere, an empty thread spool of medium size and a few short lengths of ⅛ or 5/16-in. dowel rod. The head and front legs are one piece as well as the tail and hind legs. The activating mechanism is a thread spool, sawed in two pieces with a diagonal cut. Both pieces are driven on a short length of dowel rod, or any small wooden rod that happens to be handy, so that there will be a space of about ¼ in. between the parts of the spool. Washers are slipped on the shaft and it is then put in the bearings, which are made of ½-in. wood cut to the shape shown in the detail drawing. The bearings are nailed to the back with a few small finishing nails. Holes are drilled and countersunk through the center of the front and hind members as indicated and a hole is drilled diagonally in each member for a short piece

of dowel rod, which is cut long enough to project into the slot in the spool without binding. Then the front and hind members are screwed loosely to the underside

Details of the Turtle Showing Its Durable Construction and Simple Mechanism

of the body with flat-head screws, washers being provided between these members and body to reduce friction.

To get the same shape and design as that shown in the drawing cut a piece of paper 6 by 12 in. in dimensions and lay off lines to make 1-in. squares. Then proceed to reproduce the outline, drawing the curves through the same sections of the squares. It is, of course, necessary to do the cutting with a fret saw or jig saw. A fret saw can be purchased cheaply at almost any hardware store and will be found useful for many other purposes besides cutting out toys. After the parts are cut out, care being taken to have the grain of the wood run lengthwise through the narrow sections such as the tail, take a smooth half-round file and dress down the rough edges. Sandpaper is used to give the parts a smooth surface, and if desired to give the toy an exceptionally good finish, apply a coat of shellac.

The painting of the turtle is a factor which adds considerably to its appearance. Quick-drying lacquers, which can be obtained in most paint or hardware stores, are very adaptable to paint toys of this kind. Keep in mind that bright contrasting colors are most appealing to the children, and proceed to paint the likeness of a real turtle. After the painting has been completed and is dry, drive a small staple or tack into the edge of the body just over the head and attach a string by which the toy can be pulled over the floor. When this is done the spool is revolved and a side-to-side movement given to the front and hind members, which will make the turtle appear to be walking naturally. The faster the turtle is pulled the faster it will wiggle, until it seems to make a super-turtle speed.

Remedy for Overheating Auto

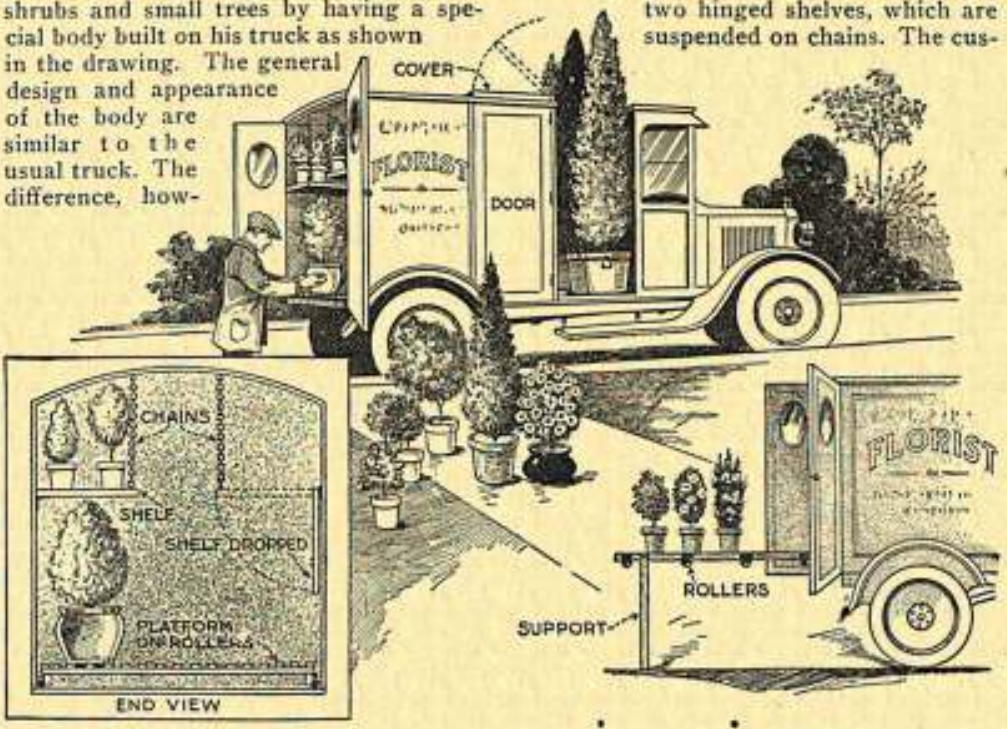
The owner of a popular make of auto was troubled with water boiling in the radiator after driving only a short distance. Several mechanics worked on the car in order to locate the trouble, but they all failed. The radiator was flushed out, the muffler was cleaned, work was done on the motor, the valves were ground, the carbon cleaned out and a new fan belt installed, but nothing seemed to help. In fact everything was tried except an ice pack. It was at last suggested that the fan blades might be bent out a little more to create more draft. The owner tried this and the trouble was over.

Carrier for Vacuum Bottle

When filled, an all-metal vacuum bottle is quite heavy and by providing a holder of the kind illustrated, the bottle can be handled much easier. The holder is made of strap leather, about ¾ in. wide and 1/32 in. thick, and is put together by riveting or sewing. Rivets are used to attach the bail so that it can pivot readily at this point.—R. D. Curtis, Dayton, Ohio.

Special Truck Body Aids Florist

A Long Island florist has solved the problem of carrying plants of all sizes, shrubs and small trees by having a special body built on his truck as shown in the drawing. The general design and appearance of the body are similar to the usual truck. The difference, however, is easily noted on closer examination. The forward part of the body, close behind the driver's seat, is cut out at the sides and the top to permit carrying tall shrubs and trees. Swinging doors are provided on the sides, hinged to open toward the back. These can be kept closed or open as the occasion requires. As the top of the opening is not braced or supported, the natural springiness of the frame causes the open space to vary at the top, and to prevent the doors from binding when this happens, they are simply allowed to rest against the side of the body and are fastened with a hook and eye instead of being set in frames. The hole on top is edged with a ridge front and back. This ridge helps to keep a hinged cover in place as shown. When no tall plants are to be carried, the doors and cover can be closed and the space used for other purposes. The remaining part of the body is also ingeniously arranged. A false bottom is fitted with rollers so that it can be slid partly out, providing easy access to the more or less fragile plants. Part way up on each side of the body are two hinged shelves, which are suspended on chains. The customary pair of doors are provided at the back.—Frank W. Hart, Bayside, N. Y.



Specially Built Body on Florist's Truck Accommodates All Kinds and Sizes of Plants and Shrubbery Conveniently and a Rolling False Bottom Facilitates Loading

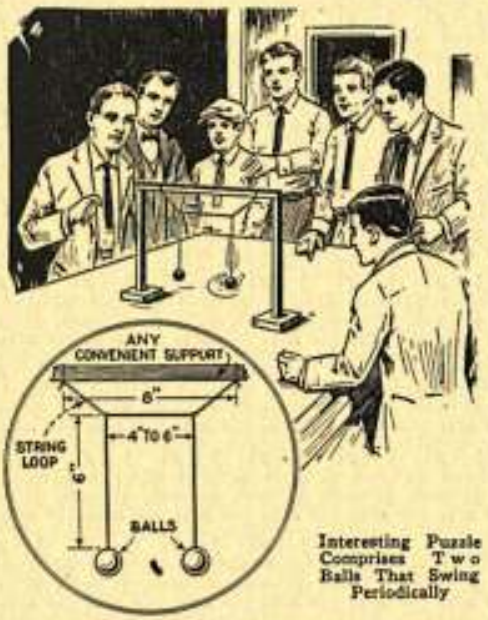
Floor Protectors

In trimming windows, waxing floors, etc., where the shoes are hard on the floor, protectors which slip over the shoes come in very handy. These can be made in a few minutes from an old inner tube. A Ford high-pressure tube is about the right width. Cut off a section as long as your foot and cut an oblong piece from the top side of this section to fit over the instep as shown in the drawing.

¶You will have no trouble in keeping lice from your fowls during warm weather if you use plenty of disinfectant, spraying it on with a spray pump.

Amusing Puzzle in Physics

The device shown in the drawing is interesting for grownups as well as children. It consists of two equal weights of 1 oz.



Interesting Puzzle Comprises Two Balls That Swing Periodically

or slightly less, two standards on bases and a horizontal bar of wood, preferably 1-in. material, and some string. Lead or iron balls are good to use for weights but heavy fish-line sinkers or hexagon nuts will do just as well. The apparatus is set up as shown, the two weights being attached to lengths of cord 6 or 7 in. long. The length of both must be exactly equal. A slack string is tied to the crosspiece at points about 8 in. apart, and the strings holding the balls are tied to this string at points 4 to 6 in. apart. The strings should be tied so that they can be slipped along to vary the distance between them. In operation, one ball is held stationary and the second ball is allowed to swing. The first ball is then released. The swinging ball will gradually impart its energy to the other ball and will then lose its own energy so that the other ball starts swinging vigorously. Then as soon as the ball is hanging at rest it absorbs energy from the other ball and starts swinging again, while the other one comes to a stop. This periodical action will be repeated several times.—Robert F. Payne, New York City.

Doubling Life of Typewriter Ribbons

When a typewriter ribbon becomes worn to such an extent that a new one must be provided, do not throw away the old one if it is not worn through, but sew it to the new one in such a manner that the old one will be on the side hit by the type bar of the machine. If the old one is attached firmly and evenly and wound carefully on the spool the first time, it will go on nicely, and it can easily be seen that by the type bar hitting the old one and making the impression through the new one that the wear on the new one will be reduced to a minimum. Constant striking of the type bars on the ribbon sometimes wears them through before the ribbon is really worn out so far as ink is concerned, and by this method the life of the average ribbon can be doubled. In offices where large numbers of machines are used, and where heavy work is done, worth-while saving can be made in this way.—Henry A. Courtney, Atlanta, Ga.

Loose-Leaf Binders

I had made up about 1,000 booklets to be put in loose-leaf binders, using two brass binding posts with screws. The screws were machine-threaded and fitted in a loose manner. Putting these together by hand proved a tedious job, so I devised the method shown in the illustration. When all my binders were ready, I laid as many as I could on a flat table and set up the two posts in each. I then started the screws into each of them, but instead of putting them all the way in by hand, I took a short piece of ordinary cotton twine, wrapped it around the top of the screw once, and, using it as a snubber, pulled the short end of the string forward, holding the other end in my hand.—Kenneth E. Peterson, Oakland, Calif.

A Black-Cat Bench for Children

By H. C. McKAY

CHILDREN are always interested in bits of furniture that incorporate animal designs. My own children have a number of pet cats, so I determined to construct a small settee or bench based upon a cat design. After some search I found a design, which, with a little alteration, I thought would serve very well for this purpose. The drawing shows one endpiece of the settee drawn to scale. As my children are quite small, the scale I used is 1 in. for each division of the scale. It is very easy to enlarge this design to any desired dimensions. The tails of the cats support the back, so it is evident that the endpieces should be cut with the grain of the wood vertical. Also a fairly close-grained hardwood should be used. The endpieces were cut from ⅝-in. material, a common fretsaw being used for the purpose. A piece for the back was cut from ⅝-in. material, 14 by 24 in. in size. The seat measures 8 by 24 in., and was cut from ⅞-in. stock. These were inserted as shown by the dotted lines in the drawing. It will be noticed that the front of the seat is higher than the back and that the angle between the two is somewhat greater than 90°. As the feet of the bench were cut across the grain they were reinforced with two pieces, 1½

Left, Design of the Ends of the Black-Cat Bench, to Scale; Right, Photo of the Completed Bench

in. square, nailed to the inside. To prevent splitting, the holes for the nails were drilled before nailing.

When all the material was ready for assembly, the back and seat were upholstered. The back had no padding. A piece of green-colored decorative burlap was fastened to the top edge of the back piece, the edges being turned under to make a smooth edge. This edge was fastened with small carpet tacks. The burlap was then stretched tight and tacked along both sides, but not turned over the edges. Finally the bottom was turned and tacked to the narrow edge of the back. Then, as a finish, gimp was nailed over all edges, using upholstering nails for this purpose.

The seat was next upholstered. Burlap was tacked to the bottom, about 1 in. from the edge, and gimp applied to provide a smooth edge. Next the ends of the burlap were drawn over the ends of the seat and fastened in like manner. The burlap was drawn firm but not stretched. When the three sides were fastened, curled hair was packed into the sack thus formed until it was about 1½ in. thick in the center, thinning out to all edges. Finally the back was drawn under and tacked to the bottom. The seat was then turned over and beaten with a lath until all lumps had disappeared and the hair was uniformly distributed.

In assembling, the back is inserted first and nailed into place. I used nails throughout so that they could be countersunk and puttied over. When the back had been placed, the seat was inserted so that the bottom edges of the back and the seat were flush. Then the seat was nailed in place.

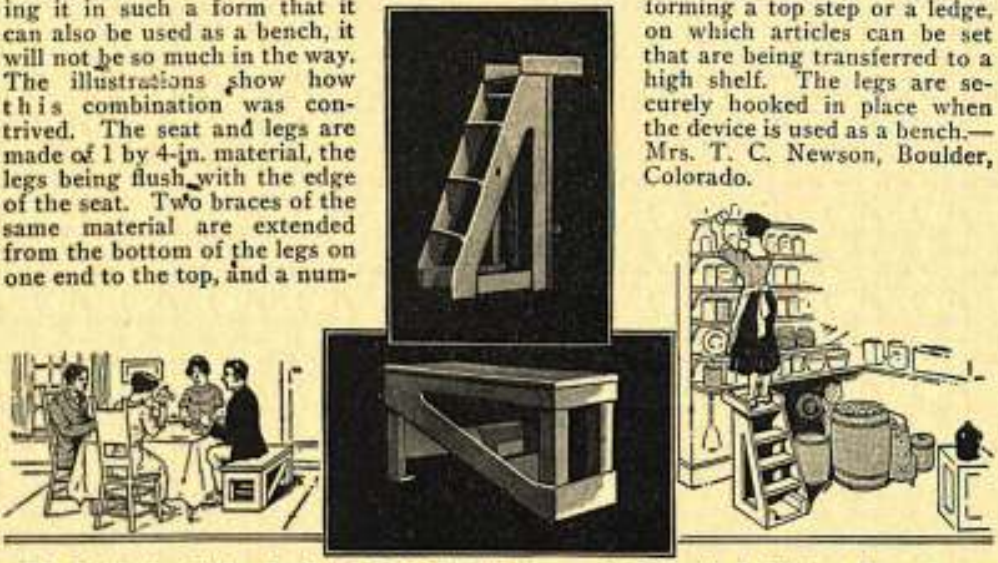
In finishing, the settee was given a coat of ordinary black paint followed by two coats of gloss-black enamel. When this was thoroughly dry, the eyes, mouths and whiskers were painted in white decorative enamel. An irregular band of white enamel was drawn just under the feet to separate them from the base proper. This settee has proved very popular with the kiddies, and they prefer it to any of their other chairs or seats.

The material required is:

2 pieces, 22 by 12 by ¾ in., for the ends.
1 piece, 24 by 14 by ⅜ in., for back.
1 piece, 24 by 8 by ⅞ in., for seat.
2 pieces, 12 by 1¼ by 1½ in., for base reinforcement.
Burlap, hair, paint, enamel, etc.

Combination Breakfast Bench and Stepladder

A small stepladder is a decided convenience in the kitchen and pantry, but limited space in most cases prohibits having one. However, by building it in such a form that it can also be used as a bench, it will not be so much in the way. The illustrations show how this combination was contrived. The seat and legs are made of 1 by 4-in. material, the legs being flush with the edge of the seat. Two braces of the same material are extended from the bottom of the legs on one end to the top, and a number of short boards fastened between the legs and braces to serve as treads of the stepladder; these treads are, of course, braced on their underside by small wooden blocks screwed to the sides. The legs at the other end of the bench are hinged so that they can be swung over, forming a top step or a ledge, on which articles can be set that are being transferred to a high shelf. The legs are securely hooked in place when the device is used as a bench.—Mrs. T. C. Newson, Boulder, Colorado.



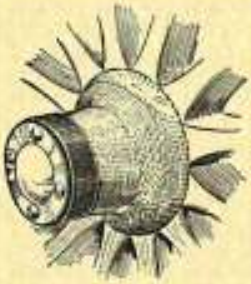
This Combination Kitchen Bench and Stepladder Will Prove a Useful Article in Kitchens, Where Space Is Always More or Less at a Premium

A Kink for Hunters

While on a hunting trip my supply of 12-gauge shells was exhausted. Unfortunately all the other hunters had 16-gauge guns, so I couldn't borrow any shells even if my fellows had had an oversupply. Rather than let my companions do all the shooting I decided to make shells, which I did in the following way: The metal base of a 12-gauge shell was cut away and a 16-gauge shell was placed in the hull, which it fitted exactly. This was then placed in the gun, care being taken to have the base of the shell flush with the rear end of the barrel so that the plunger pin could easily reach the primer, and I was soon shooting again. Plenty of 16-gauge shells were available and although it was troublesome to load and unload the gun, I did not miss all of the fun. When shooting at close range this method has its advantages, as the shot scatter much more than with the 12-gauge shells.—Bunyan Kennedy, McCool, Miss.

Dust Cap for Wagon Wheels

By providing a tin cap on the open end of the wheel hub, as shown in the illustration, dust cannot enter and the grease will be retained. The caps can be made of sheet iron cut to form a disk, the sharp edges being ground down if desired. The center may be dished a little to improve the appearance. Holes are drilled along the edge of the disk for wood screws, which are driven into the end of the hub to hold the disk securely.—H. H. Siegele, Emporia, Kans.



Magazine Pistol Shoots Rubber Bands

For shooting flies and other insects, or target practice, a simple repeating pistol of the kind shown in the illustration can be made by any boy. It consists of two lengths of wood, about ½ in. square, one serving as the barrel and the other as the stock or handle of the gun, these two pieces being nailed or screwed together as shown. A slot is cut in the barrel and a trigger is inserted and pivoted on a small pin driven through both. Six or eight small notches are cut in the end of the barrel and a corresponding number on the upper end of the trigger, which is beveled as indicated. A small tack or screw is driven into the underside of the barrel at the end and a fairly heavy rubber band is

Toy Pistol for Shooting Flies and Insects That Can Be Made by Any Boy

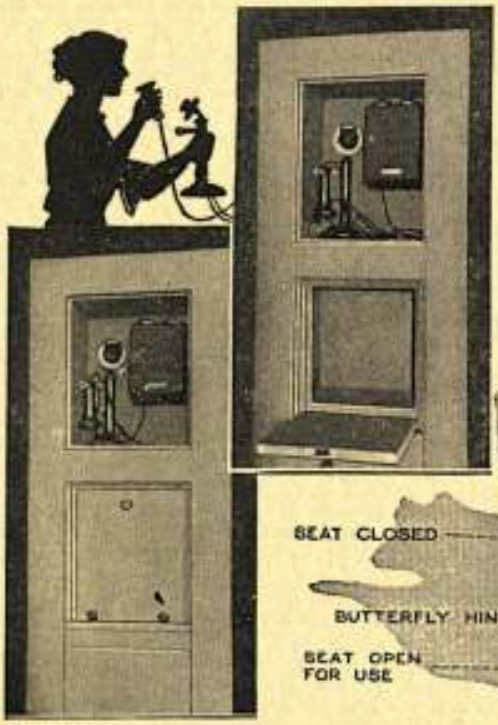
stretched from the tack to the trigger to keep the latter cocked. Lighter rubber bands are stretched from the notches at the end of the barrel to the corresponding ones on the trigger. In use, the trigger is pulled back just far enough to release the top band. After it has been "fired," the second one is released in the same way, and so on until all are discharged.—Frank Patecek, Jr., Covington, La.

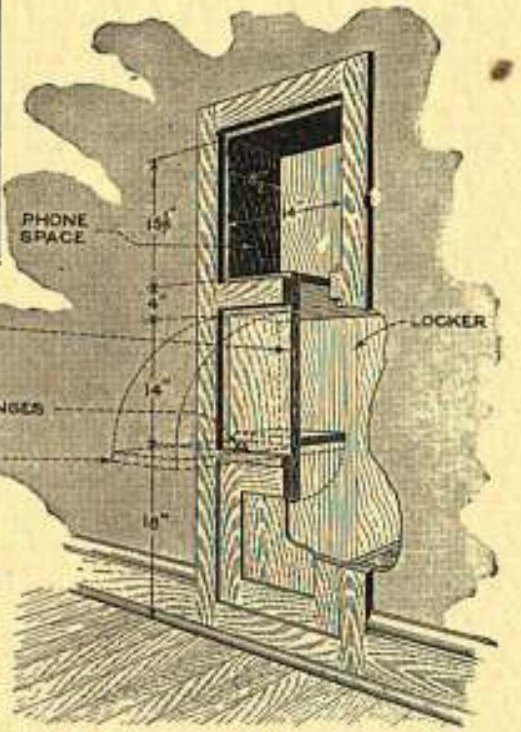
Emergency Repair for Rain-Water Spout

A rain-water spout which had rusted through and extended below ground, was repaired with a piece of inner tube as shown in the illustration. The rusted section was cut out with tin snips and the tube, which was a few inches longer than the cut-out section of the pipe, was fitted on securely. The tube was about ½ in. smaller in diameter than the pipe so that, after it had been pulled on, there was little chance of its slipping off.

Homemade Telephone Cabinet

This combination hall telephone cabinet and folding seat was made by a home carpenter at a fraction of the cost of a ready-made cabinet. An open-front box was built, 33½ by 14 by 8½ in. in dimensions, with two compartments, and recessed into the wall at a point where it extended into a closet on the other side of the wall, bringing the bottom of the box in this case 18 in. above the floor. For the seat, a 1 by 12 by 20-in. board, surfaced on sides and edges, was used. It was hinged to a rail about 14 in. from the free end of the seat, so that, as the 14-in. part of the seat descends, the concealed 6-in. length of the board moves upward until it rests firmly against the underside of the floorboard of the locker. Added pressure on the seat only causes it to press upward more firmly. In a vertical position, the seat closes the opening of the locker; it should be recessed about 1½ in. so that a glass knob, which is used as a handle, will be flush with the casing. The cabinet is finished with a 4-in. casing and lower panel to match the woodwork of the room, and a strip of the same width separates the two compartments. The locker contains telephone directories, pencil and pad.—A. Mfy Holaday, San Jose, Calif.





Combination Telephone Cabinet and Seat Built in Wall Proves Convenient and Space-Saving Feature

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Renewing Plush Coats

With the first cool days of fall plush coats that have been stored away for the summer are brought out and they usually are wrinkled to such an extent that they must be steamed and brushed to restore the set of the nap. This can be done in the following way: Place the garment upon a hanger and suspend it over the bathtub. Allow hot water to flow from the faucet into the tub so that steam will envelop the garment. After ten or fifteen minutes of steaming, the coat should be brushed with a fine brush and left on the hanger until entirely dry. The time necessary for steaming will vary according to the temperature of the room. The coat should be allowed to become warm before steaming, for, if the coat is cold, the rising steam will condense upon it, wetting the nap and making it difficult to restore it to its former luster.—G. E. Hendrickson, Argyle, Wis.

Winter Tug-of-War, Played with the Rope through a Snowbank, Is Healthful and Exhilarating Sport

Slicing Vegetables

For quick frying, potatoes should be sliced rather thin. This can easily be done with the aid of a slicer of the kind shown in the illustration. It consists of a paring knife and a wood screw, about 1¼ in. long. A hole is drilled in the end of the knife blade and made square with a small three-

Handy Potato Slicer Made from Paring Knife and Wood Screw

cornered file, and the shank of the screw above the thread is also filed square to fit this hole. After the potatoes are peeled, the screw is slipped through the hole in the knife and then driven into the potato. Turning the knife drives the screw farther in while the knife cuts a thin continuous slice. This method does not take longer than any other and the potatoes will fry thoroughly in a few minutes. The knife is not spoiled for other service as the hole does not interfere in any way.—Dale R. Van Horn, Walton, Nebr.

¶Windows and mirrors can be cleaned effectively with thin, cold starch, which is wiped off with a soft cloth after being allowed to dry thoroughly.

Winter Tug-of-War

When there is plenty of snow on the ground a variation of the tug-of-war game —"topple wall"—will prove a healthful and exhilarating sport. It is played in the same manner as the ordinary game but the object of the contestants is not only to pull the opposing boys off their feet but to drag them through a wall of snow built between them and through which the rope is run. To enable the wall to be pulled over, two perforated blocks of wood, about 1 ft. square, are provided in the middle of the rope and 8 ft. apart. They are fastened in position by means of pins pushed through knots in the rope, one on each side of the blocks. The wall of snow is first built up about 3 ft. high, then the rope is laid over it, with one block on either side, and the wall completed.

Rolling Cover for Outdoor Tables

Lunch tables left out in the open often become weather stained and otherwise soiled so that one dislikes to cover them with a clean linen tablecloth. This objection can, however, be overcome by providing a curtain roller of the ordinary kind on one side of the table, and fastening a piece of oilcloth to it as shown, so that the latter can be pulled over the table whenever it is used, and the linen then spread over it. The free end of the oilcloth is hemmed over to hold a steel rod so that the wind cannot blow it off.

Washing the Car

When washing cars care must be taken not to get any water under the hood on the engine, for if it gets on the distributor, coil, generator or wiring, trouble may be

Piece of Tarpaulin Provided over the Hood Prevents Soaking Parts of Electrical System

experienced in starting the engine. A good method of preventing this trouble is to cover the hood with a large piece of tarpaulin or other waterproof material. The water can then be sprayed against the car without wetting parts of the electrical system. Washing the hood can be done afterward by hand.—G. A. Luers, Washington, D. C.

Fastening Wire Trellis to Brick Wall

Often a vine has not the natural ability to cling to stone or brick walls, and a suitable trellis must be provided to support it. A wire trellis can easily be attached to such a wall by using screw anchors, which fit into holes drilled for them and expand under the pressure of the screw. Staples may also be used in walls laid in mortar. A 5/16-in. screw anchor will hold an ordinary fence staple, and requires a 3/16-in. hole. After the staple has been placed over the wire its ends are pinched together and driven into the anchor socket. The staple will then be held firmly and will support a considerable load. The trellis is first fastened to the wall, at the top. A chalk line aids in setting the wire straight. If carefully done, the trellis will hardly be noticeable.

A Blackboard for Children

A good blackboard for children can be made from a window shade mounted on the roller. Cut it to about 3 ft. in length, hem the lower edge and insert the stick in the hem in the usual manner. Procure some black slate paint and apply this to the shade on one side, giving it two coats, allowing sufficient time for the first coat to dry before applying the second coat. A blackboard of this kind is strong, and is very handy if attached to the wall with the shade fixtures, as it can then be rolled out of the way when not in use.

Auxiliary Roller Saves Window Shades

In homes, offices and shops, there are usually a few window shades that receive such constant usage that they are worn out while the other shades are still in good condition. This is mainly due to the fact that the shades are pulled toward one side or the other when raising or lowering them, and consequently the edges, rubbing against the brackets, soon become ragged. This common trouble can easily be prevented by providing a small auxiliary roller above the shade, as shown in the illustration. It is mounted in two brackets, made from spring wire, bent as indicated and screwed to the window casing. The roller itself is a short length of round wood such as a broom handle. The springs provide enough pressure between the rollers, to prevent the shade from running up or down unevenly.—G. E. Hendrickson, Argyle, Wis.

Marking the Water Line

Anyone who has attempted to stripe a water line around a boat has probably learned through bitter experience that this is an expert's job, if done without mechanical aid. A simple method of doing the job is shown in the illustration.

The boat is first put in the water to mark where the line should be when an average

load is carried. This can be done with a piece of crayon while a couple of assistants steady the boat. The boat is then hauled up on the beach and turned upside down. A marking guide, consisting of a long wooden crosspiece mortised to fit the keel snugly and two vertical members, one nailed at each end of the crosspiece, is then made and set in position on the keel. Pencil guides, which may be common staples fitting the pencils snugly, are then attached to the vertical members so that the pencils, when pushed in against the hull, will strike the crayon marks on each side. As there is considerable curve in the length of the hull of the average boat it is necessary to use lengths of round wood, fitting the pencil guides and having the pencils lashed to the ends, or better still, lengths of brass tubing in the ends of which the pencils may be forced; this enables the pencils to be gradually pushed in as the marker approaches the bow and stern and keeps the line parallel to the keel. It might seem as though the vertical members could be pivoted to the crosspieces, and the pencils be fastened to them and simply swung in as the marker is moved along. This, however, will not produce a line parallel to the keel, but one that curves downward (toward the keel) at the bow and stern. At the latter points, if the keel curves so as to throw the line

Simple Method of Marking an Accurate Water Line on a Small Boat

off, the line can easily be completed by means of a yardstick.

¶Flowers, which are placed in vases for display, will last much longer if the leaves that extend below the surface of the water in the vase are removed.

Hog Catcher and Holder

It is usually a difficult task to catch and hold a hog, especially if it is a large one. However, a device can be made from a

Catching a Hog with Simple Device That Enables One Man to Hold It

broomstick and a length of wire with which one man can hold any hog with ease. Two small holes are drilled diagonally, at one end of the stick, so that they come through the surface about 2 in. from the end. A strong, flexible wire is run through the holes to form a loop, one end of the wire being knotted or fastened to the stick, while the other is left loose, and has a small handle fastened to its end. The hog can be easily caught at feeding time by slipping the loop over its upper jaw and drawing the wire tight.—Robert H. Neill, Ottawa, Ohio.

Making Candles Last

When candles are burned part of the wax is wasted by running down the side of the candle. By preventing this drip almost all of the wax will be used up and the candle last much longer. Shellacking the candle will do this. The candle is held by the wick and dipped into the shellac two or three times. The shellac forms a thin coating around it, and as this coat does not melt so easily as the wax, it forms a cup at the burning end, which holds the melted wax until it is almost consumed.—Walter C. Michel, Jersey City, N. J.

Two Christmas Toys

by L. R. Butcher

Two Simple Toys, the Hopping Rabbit and the Walking Duck, That Can Be Made by Anyone Handy with Tools, and Will Delight the Children on Christmas Morning

VERY few tools and but common material are required for the construction of the toys described in this article. The first is a hopping rabbit in which an eccentric axle attached to the hind legs gives motion to the body as the toy is pulled along.

The rear axle of the toy, Fig. 1, is made from two pieces of ⅛-in. pipe bent to give the 1-in. offset, and threaded at the inside ends, where they are joined, between the rear feet, with a ⅛-in. pipe coupling. This construction allows the toy to be assembled after the axle pieces have been bent. The legs are kept from working out on the axle by ½-in. plain washers, secured by small cotter pins. The front axle is a straight piece of ⅛-in. pipe, of the same over-all length as the assembled rear axle.

A scroll, or band, saw is needed to cut out the body and legs. The approximate form of the body is obtained by dividing an 8 by 10-in. sheet of paper into 1-in. squares and sketching the shape, following Fig. 2 closely. A paper pattern may be cut and used as a guide in the layout of the body, or the layout may be done directly on the 1-in. board chosen for the body. The material for body and legs should be

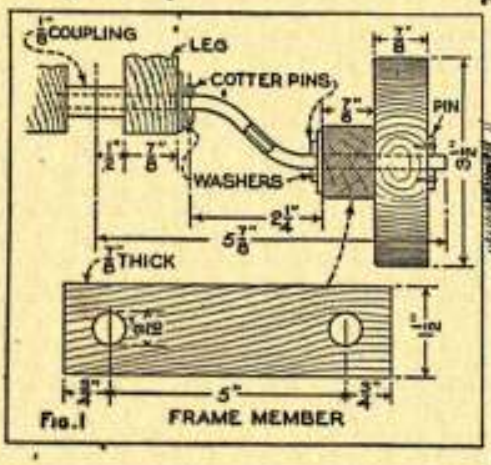


Fig. 1 FRAME MEMBER

close-grained and free from knots and cracks. The two pairs of legs are laid out in a manner similar to that followed in shaping the body. The location of the pivot points for the legs is given in the illustration. The holes at the feet are 9/16 in. in diameter, while those at the upper ends are large enough to accommodate ¼-in. bolts.

A frame member on each side of the toy spaces the axles to a distance of 5 in. from center to center. These members are assembled just inside of the wheels, and are kept in place by washers secured by cotter pins. Wheels, 3½ in. in diameter and of clear-grained wood, are slipped on just outside of the frame members. The wheels are kept in place by washers and cotter pins on the front axle, but at the rear of the toy, the axle is made to turn with the wheels by omitting the washers outside of the wheels. A staple on each side of the axle will hold the cotter pins tightly.

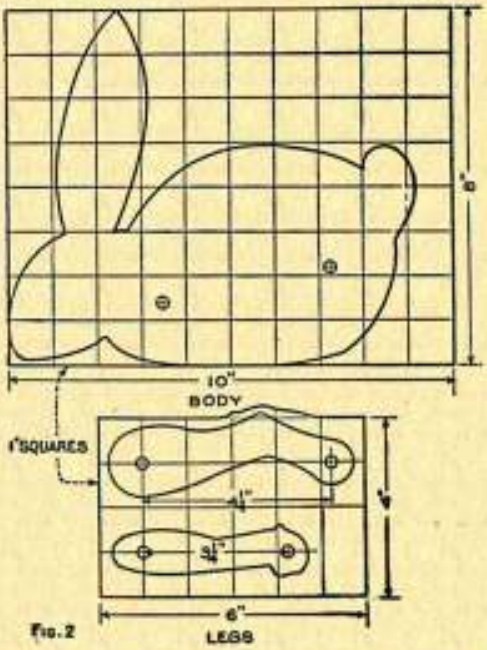


Fig. 2

The rear legs are pivoted to the body with an ordinary ¼-in. bolt. A washer, placed between each of the legs and the body, helps to reduce friction. The front legs are fastened firmly to the body, no provision being made for pivoting at this point. White paint for the body and legs and red for the wheels make an attractive color scheme. The body markings should be made with black paint. A looped cord attached to the front axle provides the means whereby the toy is drawn along.

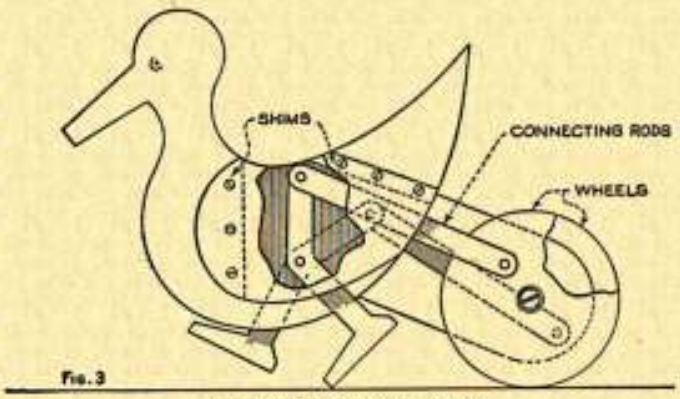
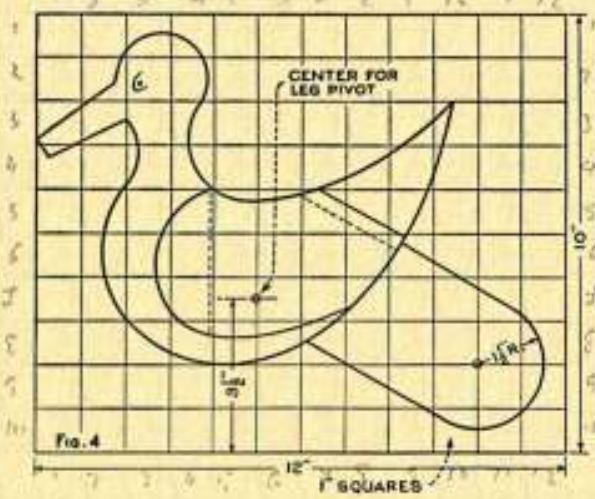


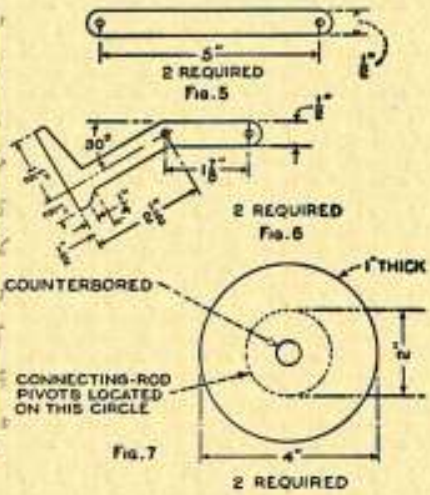
Fig. 3
ASSEMBLED VIEW OF DUCK

The toy illustrated in Figs. 3 and 4 has mechanical legs, which work in a lifelike manner as the toy is pulled along. Although the legs do not touch the floor, the duck appears to be trotting along after the youngster pulling it. The construction is very simple; no springs are used in it, and the finished toy is sturdy and almost unbreakable.

The layout of the body is shown in Fig. 4. By crosshatching a 10 by 12-in. sheet of paper into 1-in. squares, the approximate shape of the toy is easily sketched. While the shape may be only approximated, the two centers shown should be laid out with some care. The other parts of the toy are made to work from these centers. After the paper pattern has been marked, the shape may be transferred to the material used for the body. In order that the wheels may be far enough apart so that the toy will not tip over, it is best to use 2-in. material for the body. On each side of the toy, a wooden wing is nailed on. These are made of 1-in. wood and covered by a sheet-metal shield of the same shape. The pivot points for the legs should be laid out on the wing covering. As the legs and connecting rods work between the wings and the wing covers, there must be some clearance. This clearance is obtained by placing cardboard shims between the metal and the wood. The shapes of these shims should be such that they do not interfere with the concealed leg mechanism. In Fig. 3 the approximate shape of the shims is given. One is placed

at the forward end of the wing and the other at the tail. Figs. 4, 6 and 7 give the shapes and dimensions of the wheels and leg pieces. Two of each of these shapes will be needed as the leg mechanism is the same on both sides. The legs and connector arms (Fig. 5) are cut from stiff sheet metal, while the wheels are made of 1-in. wood. The legs are pivoted to the inside of the metal shields on either side of the duck by a rivet, according to the centers marked in Fig. 4. One end of each connecting rod is pivoted to the upper end of the leg with a rivet and the other end of the arm to the wheel, 1 in. off center. The wheels must be counterbored slightly to bring the head of the center fastening screws below the outer surface of the wheel. A washer is placed between the inside of the wheel and the body, and another between the screw head and the outside of the wheel.





The two wheels work independently of each other. If they are placed so that the eccentric points are exactly opposite, the leg on one side of the duck will be drawn back while the other is extended. All pivot points must work freely if the toy is to operate satisfactorily.

A handle made of ⅛ by 1-in. flat iron, ending in a loop for the hand, is fastened to the front of the toy. By painting the toy with contrasting colors, the representation will be more lifelike, but the coloring is a matter of individual taste, and is left to the artistry of the maker.

Kink for Home Dry-Cleaners

Thrifty housewives who do dry-cleaning at home will find that fabrics can seldom be cleaned satisfactorily in damp or rainy weather. This is due to the moisture in the atmosphere which penetrates and partly saturates the fibers of the material, causing it to resist the cleansing action of the gasoline. Although cotton goods gather more moisture than wool, silk, or other material, it is advisable in damp weather to dry all garments thoroughly before immersing them in the cleaning fluid, by hanging them over a warm radiator or near a hot stove.—G. E. Hendrickson, Argyle, Wis.

A piece of sheepskin with the raw wool on it makes a good windshield wiper that will keep the glass clear of frost and dew.

Keeping Doors Open

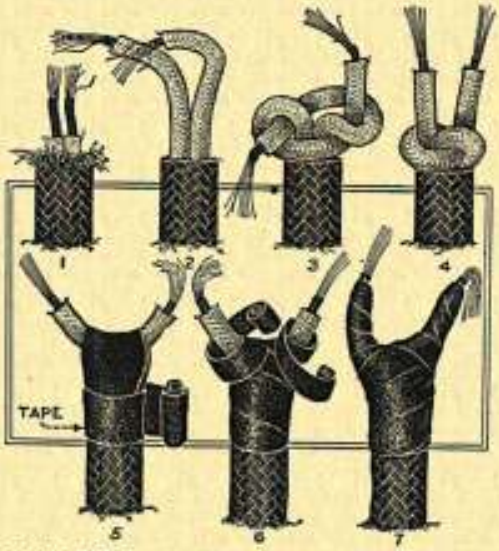
When doors have a tendency to swing shut, a spring-brass clip arranged above the door, as shown, will be found convenient. It is screwed to the underside of the frame just above the door so that the curved portion catches behind the door and prevents it from closing. A metal plate should be attached on the top of the door to prevent the catch from wearing a groove in the wood.

Preventing Rust on Tools

All good mechanics desire to keep their tools free from rust. Many methods are in use but all do not serve the purpose equally well. Calcium chloride, for example, will absorb all the moisture in a tool cabinet, but it soon becomes a saturated mess, which does more harm than good. However, a positive cure for the rusty-tool evil, which is very simple, is to place 10 or 15 cents' worth of animal charcoal (obtainable in any drug store) in a small tin box that has small holes drilled through the cover, and put it in the tool chest. It will absorb all the moisture without being dissolved, and when it can absorb no more, turns to a gray color, warning the user that it should be replaced with new charcoal. Replacement is needed only at long intervals, however.

Making Electric-Cord Connections

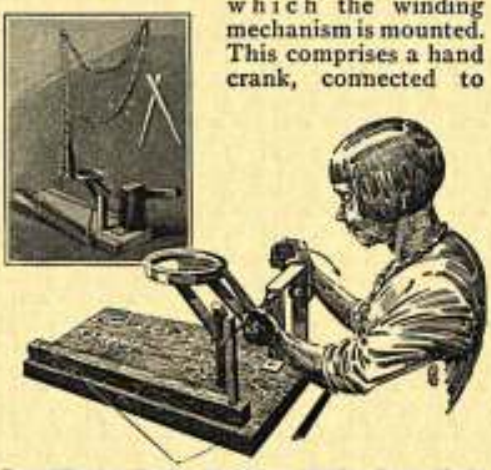
Trouble is often experienced with the cords used on electrical appliances. Almost invariably they are broken at the ends where the connections are made. This is because the removal of the insulation has made these parts more flexible than the rest of the cord and therefore the greatest bending strain takes place there. A good method of overcoming this trouble is shown in the illustration. Fig. 1 shows a cord cut off in the usual way, and Fig. 2 how to start to make a better job. With a sharp knife a cut is made around the cord through the braided covering and about halfway through the rubber. A scratch of the knife from this cut to the end loosens the braid, and then, by pulling the two wires apart, the rubber around them will separate, permitting it to be removed. The wires are tied together as shown in Figs. 3 and 4. Friction tape is next applied as indicated in Figs. 5 and 6, and the finished job should look as in Fig. 7, the bare ends of the wire projecting so that they can readily be attached to a fitting.



Method of Tying and Taping Electric Cords to Prevent Wires from Breaking

Beads for Paper Necklaces

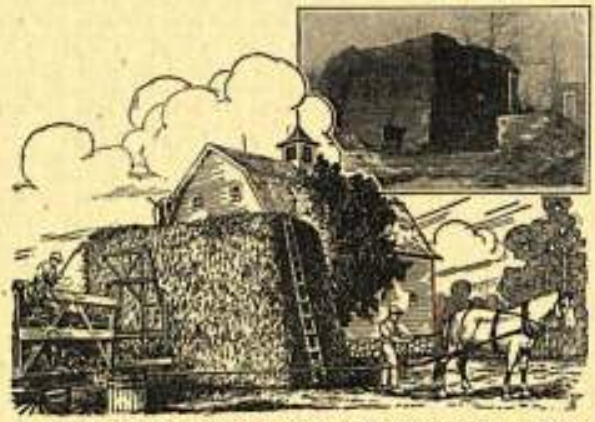
Paper beads can readily be made with the aid of the simple device shown in the illustration. It consists of a base upon which the winding mechanism is mounted. This comprises a hand crank, connected to a ⅜-in. shaft held in a flat-iron bracket; a split needle, which is engaged with the end of the shaft; a wooden support for the needle, which can be swung outward as indicated by the dotted lines, and a tray for holding paste or glue. The split needle is a ¼-in. rod, and the end is squared to fit snugly into a hole in the end of the shaft, which makes it easy to remove. A small gear is fitted to the end of the shaft to engage with a larger gear on the crank arm. The beads are made from tapered strips of paper, which can be cut from colored parts of magazines; the wide end being inserted in the split needle. A few turns of the crank will wind the whole strip into a compact roll. The end is dipped into the glue before it is wound on. The bead is then removed and given a coat of white shellac. The size and shape of the beads can be varied by varying the width and length of the paper strips.



Bead-Winding Device Facilitates Making Paper Necklaces

Storing Ensilage

Good silos are rather expensive to build and every farmer cannot afford one. The ensilage can, however, be stored outside in large stacks about 20 by 20 ft. square, as shown in the illustration, about fifty loads being put in such a stack. It can be built up flat as it need not necessarily shed water. It is a good idea to cut and stack the corn before frost, if possible, and stack it green, for if the corn is frosted or dry, due to lying out after being cut, it must be wetted while stacking, as is the customary practice when putting it in a silo. A hay stacker can be used to elevate the corn. It is necessary to build the stack as compactly as possible and for this reason it is advisable to build it high. By spreading the work over a week or so, the stack has time to settle. Care must be taken that the sides do not project beyond the base, or the stack is apt to slip. To guard against this, posts should be propped against it, with 2-in. boards at the top ends. A dairyman, who had more corn than he could put in his silo, and therefore stacked some of it in this way, says that his cows preferred this ensilage to that stored in the silo.



Economical Method of Storing Ensilage in Large Stacks to Avoid the Use of a Silo

Water-Heating Kink

In homes that are provided with a soft-water tank in the attic as well as hard water under pressure, the soft water is usually piped to the laundry and bath through a hot-water boiler, which is heated by the kitchen range or furnace. Should the supply of soft water give out, as it sometimes does, the fire in the range must be extinguished to prevent burning out the hot-water coil, to say nothing of the inconvenience of carrying water to the bath and laundry. This trouble can be avoided by fitting a short length of rubber hose over the faucets at the kitchen sink, as shown in the illustration. One end of the hose is attached to the hard-water faucet and the other to the soft-water faucet. Then, by opening both, the attic tank will be filled with hard water and the system kept in operation.

Preventing Tail-Light Theft

In some localities the theft of tail-lamp bulbs is prevalent. As it is such a simple matter to remove the bulb from a tail lamp, the mere pushing in of the thin celluloid window in the side of the lamp giving access to the bulb, motorists will appreciate an equally simple remedy, especially where police regulations are strictly enforced, as the absence of a tail light may mean a fine. In place of the flimsy celluloid, cut a section of strong open-mesh wire to the same size, and slip it into place; it may be soldered if desired, but if it is fitted tightly, this is not necessary. With this in place, the bulb can only be removed by taking out the red glass, and as the split-wire ring holding this in place is not usually easily taken out, the average sneak thief will transfer his attentions to some other car.

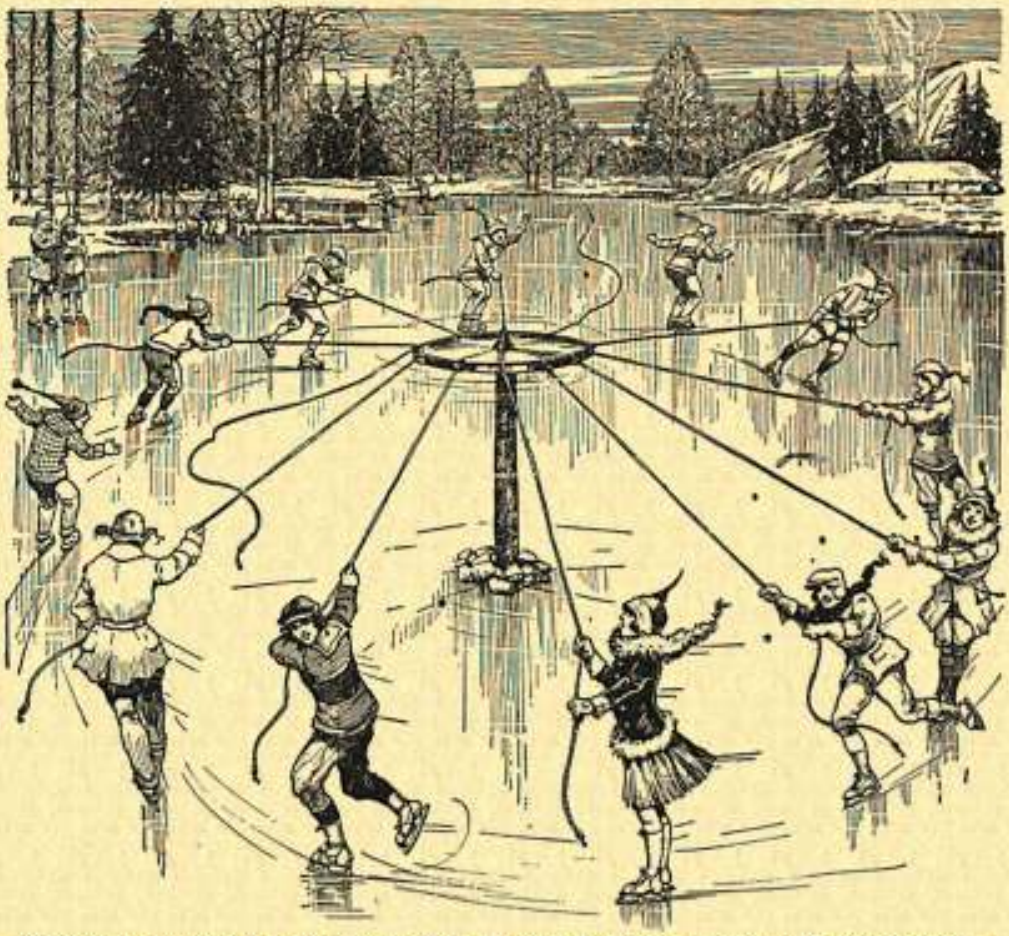
¶To get rid of the wrinkles in a sheet of paper stretched over a wooden frame, a sign painter simply touches a wet cloth to the center of the sheet, when it stretches out as tight as a drumhead.

A Skating Whirligig

By G. E. VAN HORN

THE skating whirligig can be used in a number of different ways, and once it is set up in one corner of the lake or river, it will give sport to skaters throughout the season. It can be made from an old hayrake wheel, an iron rod about twice the length of the wheel hub, a long post and a length of rope, and with the help of three or four industrious friends, any boy can construct it in an hour.

The spot chosen for the device should be quite a distance from the bank, to permit skaters to whirl in a 40 or 50-ft. circle if they desire. Chop a hole in the ice slightly larger than the butt of the post and set the post in the mud on the bottom



A Long Post, an Iron Rod, an Old Hayrake Wheel and Some Rope Make a Whirligig That Provides Exhilarating Sport for the Skaters on the Pond

so that about 6 ft. of it remains above the ice. Throw the chunks of ice back into the hole around the post and allow it to freeze over again, later carrying away the remainder of the ice chips, which might trip the skaters. With a saw or plane, go around the top edge of the post, making a wide bevel. Now bore a 1-in. hole into the top end of the post for a distance of 12 or 14 in. Drive the 1-in. iron rod into the post, leaving about half the length of the rod exposed to view. Place a washer over the rod and oil it well. Then slip the rake wheel in place. Cut a number of ropes into 8 or 10-ft. lengths and tie them to the spokes of the wheel. Two long ropes may also be attached, each 20 or 30 ft., but they should be on opposite sides of the wheel. When the long ropes are used, they should be coiled up and held by the skater, later being slowly payed out as he skates about the whirligig until he is swinging in a large circle.

There are two general ways of using the device, one being to start from a standstill, with a skater on each rope. The skating becomes faster and faster until all are coasting while one or two continue to skate. Another way is to catch at the ropes while it is in motion. First, one skater heads for the ropes at full speed, grasps one of the ropes as he passes by, and starts whirling about. A second boy skates up and catches a rope, being careful to watch for a good opening. Another skater flashes in and takes possession of another rope, and this is continued until the whirligig is flying around at a fast clip. By tying a rope which is 75 or 100 ft. long to the wheel and having the others skate around it, one can slowly start a huge track about the wheel, and as the speed increases, it will be necessary to coast to keep one's balance. Then release the hold on the rope and sail off in a wide arc. One can find a dozen other different stunts.

An Outdoor Fireplace

A Wisconsin tinsmith has devised a neat outdoor fireplace for campers and tourists, which allows the full enjoyment of cooking over an open fireplace without annoyance from smoke. The draft caused by this device also aids in building a fire quickly. It consists of a length of 8-in. galvanized-iron pipe with a 24-in. cone at the bottom and a wind-vane elbow at the top. It is supported on a length of 1¼-in. pipe, a bolt through the top of the elbow providing a pivot upon which it may turn with the wind. Two doubled lengths of strap iron are riveted at either end of the pipe on the inside, to strengthen the stack and hold it in a vertical position without interfering with its operation, and these rest on washers pinned to the supporting pipe. The latter is driven into the ground inside of a short length of 3-in. pipe, and the space between the two is packed with soil or ashes. A double loop of strap iron is clamped to the top of the 3-in. pipe to hold cooking utensils.

Outdoor Fireplace Eliminates Annoyance from Smoke and Provides Grate over the Fire

Preventing Snow from Sticking to Shovel

It is usually somewhat difficult to use a metal shovel for scooping snow as the snow has a tendency to stick to it. This trouble can easily be prevented by first cleaning the shovel so that it is absolutely free from dirt, heating the metal part, and then covering it well with melted paraffin or wax. When the paraffin is cold, the shovel can be used, and it will be found that the snow will not stick. Of course, this will last only as long as there is a film of wax on the shovel, but it is surprising how long it takes before this film is worn off. Wooden shovels may be treated with grease or rubbed with soap.—Geo. E. Steinberg, Paonia, Colo.

Making Useful Things from Leather Scraps

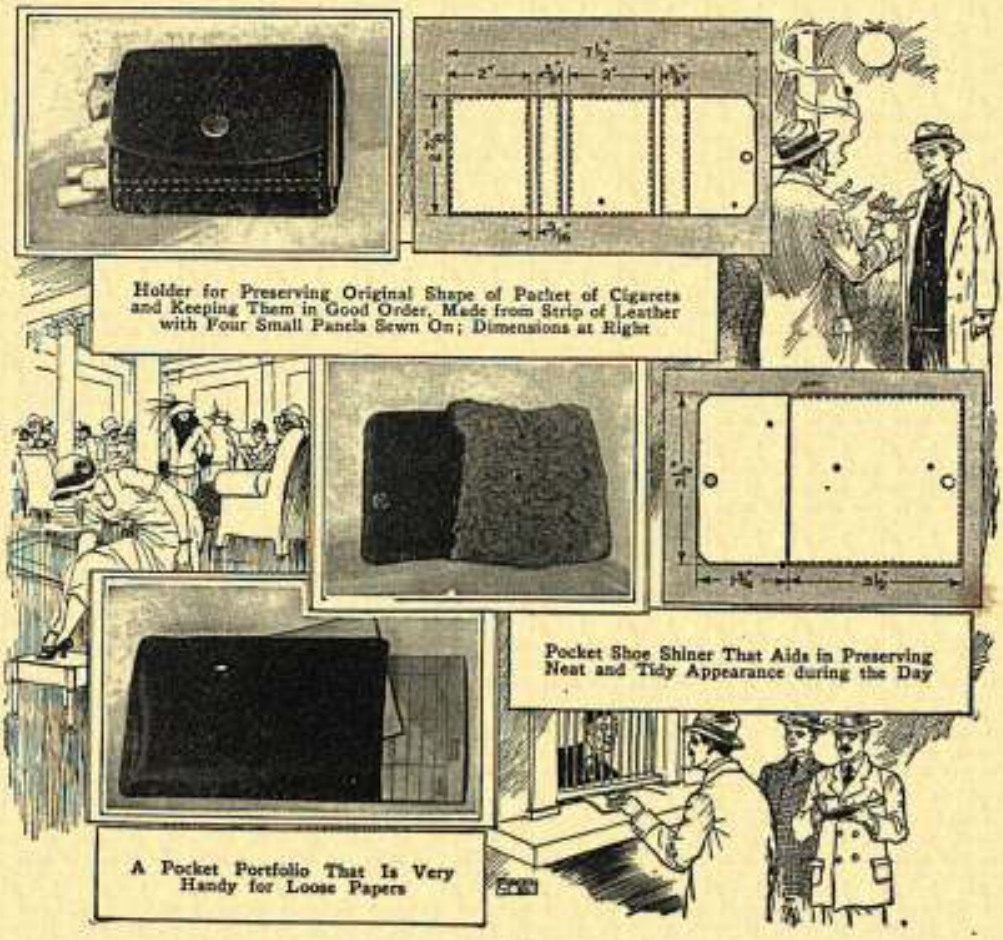
By EDWARD H. FLAHARTY

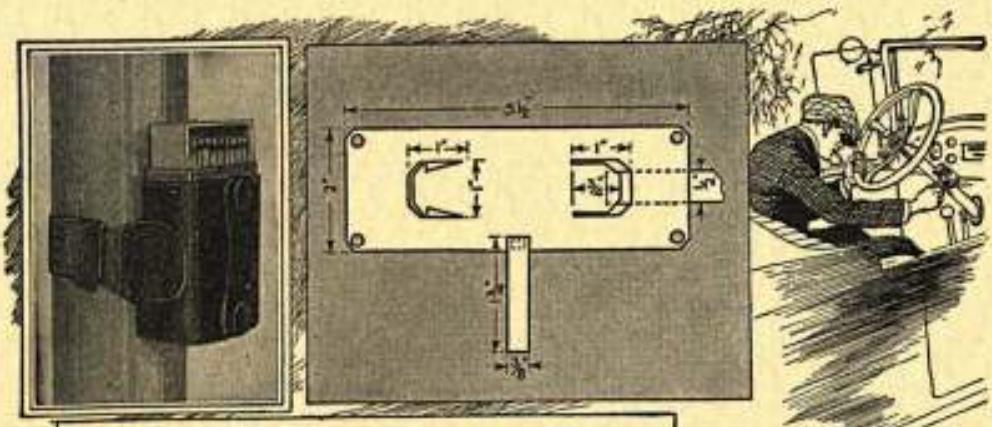
WITH some strips of scrap leather and lamb's hide, together with a little patience and ingenuity, a variety of novel and useful articles may be made. A number of these are shown in the accompanying illustrations. The first is a cigaret case. The usual packet of cigarets, when nearly exhausted, allows the remaining "smokes" to become crushed very easily. A pocket case remedies this, while not taking up much more space in the pocket than the original package, which it contains. It is made from a strip of flexible leather, 2¾ in. wide and 7½ in. long, with four small panels of thin but stiff leather sewn to it at the points indicated, to correspond to the sides of the packet. A snap fastener keeps the case closed.

The pocket shoe shiner shown below this will prove a boon to the man or woman who likes to keep the shoes neat and clean. Carrying a rag for this purpose has sometimes been done, but the rag rapidly becomes so dusty and dirty that other things carried in the pocket become soiled also. This little shiner, on the other hand, is rolled up and snapped shut when in the pocket, and can do no harm. It is also made from a strip of leather, with a strip of lamb's hide sewed to the inside. The hide is sewed to the leather on three sides, leaving one end open, as shown, so that the shiner can be slipped over the fingers like a mitten when in use.

The next article shown is a pocket case for loose papers, letters, etc., and is very easy to make. The portfolio is open along the top, and part way down one side. It is 7 in. long and 4½ in. wide when finished, sewn across the bottom and 2 in. up one side.

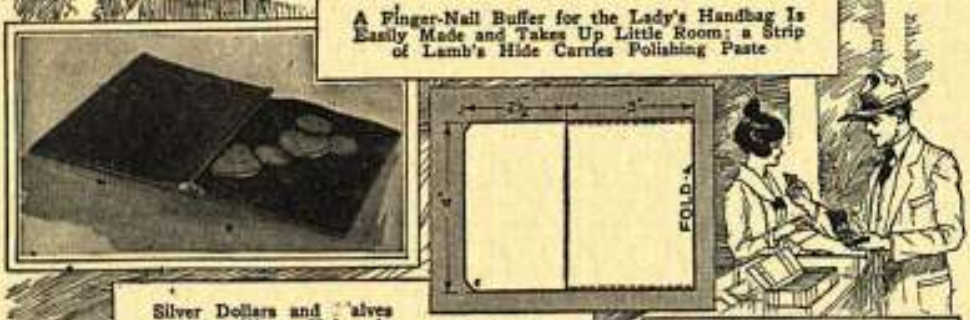
A steering-column matchbox holder is a very handy accessory for the motorist,





Handy Matchbox Holder for the Autoist; It Is Attached to the Steering Column at a Convenient Height

A Finger-Nail Buffer for the Lady's Handbag Is Easily Made and Takes Up Little Room; a Strip of Lamb's Hide Carries Polishing Paste



Silver Dollars and Halves Quickly Wear Holes in the Bottom of Pockets; This Little Case Solves the Problem and Keeps Loose Change Together as Well; It Also Holds Bills

A Compact and Sanitary Powder Puff Made from a Strip of Closely Clipped Lamb's Hide; the Puff Does Not Become Soiled, nor Does the Powder Spill Out

and the one shown in the illustration is an exceptionally neat one. The leather strip is 2 in. wide and 5½ in. long. Two sections are cut at each end, as shown in the detail drawing, to form ears for fastening the holder to the column. To one of the ears a strip of thin flexible leather, ½ in. wide, is sewn; this is cut long enough to pass around the steering column, and to the other end is attached a buckle. The other tab is cut so as to form ears that will catch in the buckle. Four snap fasteners, attached so as to hold the matchbox neatly, and a small strip of leather, sewed across the bottom of the holder to prevent the box from slipping through, complete the job.

The finger-nail buffer proves popular with the ladies, as it is very compact and takes up little space in the handbag. It is made by sewing a strip of the lamb's hide across the end of an oblong piece of light leather. The leather is 3 in. long, and the hide 2 in. long. The edge of the hide is sewed at a point 2 in. from one end of the leather. This allows 1 in. of the hide to overlap, and the overlapping piece is turned back and sewed on two edges, so as to form a pocket. The pocket is tightly stuffed with cotton wool and the remaining edge sewed. The back of the pocket is used as the buffer, and the polishing paste or powder is spread on the 1 in. of lamb's wool.

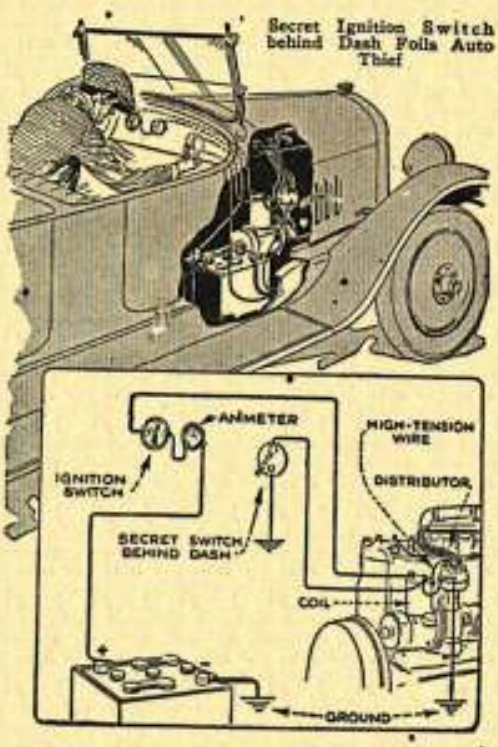
In the west and south, the silver dollar is very popular, but it quickly wears holes in the pockets, and the half-dollar is not far behind in this respect. The little coin case shown in the next illustration will effectively prevent this wear. It consists simply of a strip of fairly stiff leather, 4 in. wide and 8½ in. long. One end is folded so as to make a pocket 3 in. long and stitched on the sides. No snap fastener is needed with this case, as the folds can be made stiff enough to keep the case closed in the pocket. Bills may also be carried in this case, as it is wide enough to admit a roll of bills folded twice.

The last article shown is also a favorite with the ladies. It is a sanitary powder puff, made from a piece of lamb's hide, the wool of which has been clipped short. Dimensions are given at the right. A small leather strap is sewed to the back to form a support for the snap fastener. This puff rolls up and may be carried in the bag without becoming soiled and without losing any of the powder that is on it.

These are but a few of the many articles that can be made from scraps of leather and lamb's hide, but will serve to suggest a number of other possible uses for this material to the alert reader.

Secret Switch Prevents Auto Theft

With his snap-on jumper wire an auto thief can readily bridge the ignition wires of a car, when the switch is thrown off, and complete the circuit, which enables him to get away with the car. To prevent this many autoists have a secret ignition switch in addition to the regular one, but the auto thief, after first bridging the regular switch, notices that there is no discharge on the ammeter, which indicates an open circuit, and so he finds the second switch and bridges this one, too. However, the switch and connection shown in the drawing will foil the expert thief, as with this arrangement the correct discharge is shown on the ammeter after the regular switch has been bridged, but the coil is grounded so that the car cannot be operated. This is accomplished by mounting an extra switch behind the dash, of which one side is connected to the frame of the car and the other to the spark coil by carefully concealed wires. Ordinarily, when the car is running, this switch is open, but it is closed to make the ignition system theft-proof.—Richard P. Cole, Paterson, N. J.



Mail Box Opens at Both Ends

Constructed along lines entirely different from those of the ordinary mail box, the homemade one shown in the illustration is of unusual convenience, as the mail is dropped in at the top and removed at the bottom, and it provides sufficient space for fairly large packages, magazines, rolled-up newspapers, and the like. It consists of a sheet-metal shell, about 8 in. wide, 4 in. deep and 16 in. high, open at both ends. The edges of the metal are doubled over to prevent injury. The top and bottom, of 1-in. wood, are hinged to the wall on which the box is mounted and are held tightly against the openings by a heavy rubber band, cut from an old inner tube and attached to the inside of the top and bottom by means of hooks and screweyes, as shown. In use, the postman lifts the top and drops in the mail, while the owner removes it by pressing down the bottom as indicated.

Novel Mail Box with Hinged Top and Bottom Permits Easy Insertion and Removal of Mail

Silencing Automobile-Door Noises

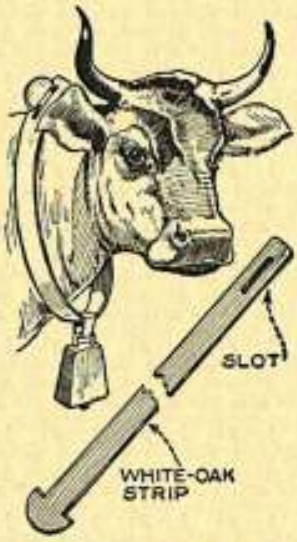
Squeaking automobile doors can sometimes be silenced by cleaning the rubber bumpers and the parts they touch with gasoline, wiping dry and powdering liberally with talc dust. Oil should never be used as it ruins the rubber. If the door rattles, see if the rubbers are pressing against the door. If not, readjust them with the setscrew, or by forcing small pieces of inner tube under them with a screwdriver. New bumpers may be needed. A few minutes' attention now and then will eliminate the annoyance.—Richard C. Tarr, Gloucester, Mass.

Repairing Stripped Thread

I was recently engaged in completing the inking-in of an extensive mechanical drawing. The work had entailed many curves, adjustments for the radii of which had caused frequent changes in my little bow-pen compass. When but a few minutes remained to complete the drawing, I found that the adjusting nut on the threaded shank of the compass refused to remain where placed. Seeing that the internal threads were worn, I went to the near-by machine shop, placed the nut in a vise and applied a moderate pressure so as to squeeze it to an oval shape. This changed also the shape of the hole in the nut, and the latter stuck on the shank.—Paul E. Garber, Washington, D. C.

Simple Cow Collar

Being a lumberman's daughter and interested in the use of wood for every possible purpose, I thought it worth while to pass along an idea I saw the other day—a wooden collar for a cow. The collar is really as simply made as can well be imagined. It consists of a strip of white oak of suitable width and length cut with the grain and planed down until it is quite flexible and can be bent in a circle. A slot is cut at one end so that the other rounded end can be slipped through it. The wood is bent around the cow's neck and will not come off readily because the twist in it will cause the strip to bind against the sides of the slot, holding the "head" at an angle to the latter.—Miss Reubena Potter, Aquene, N. C.

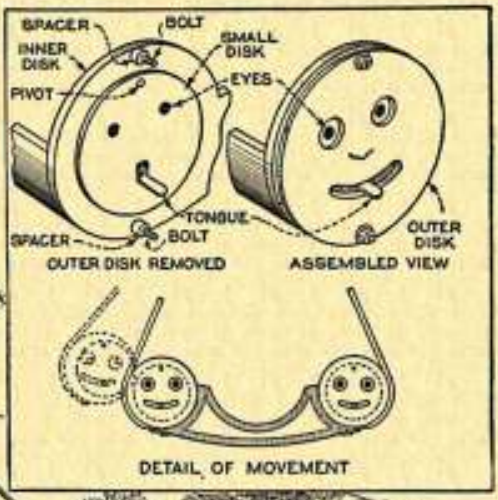


Chimney soot can be removed by throwing a handful of a mixture consisting of equal parts of sulphur and powdered saltpeter into the fire.

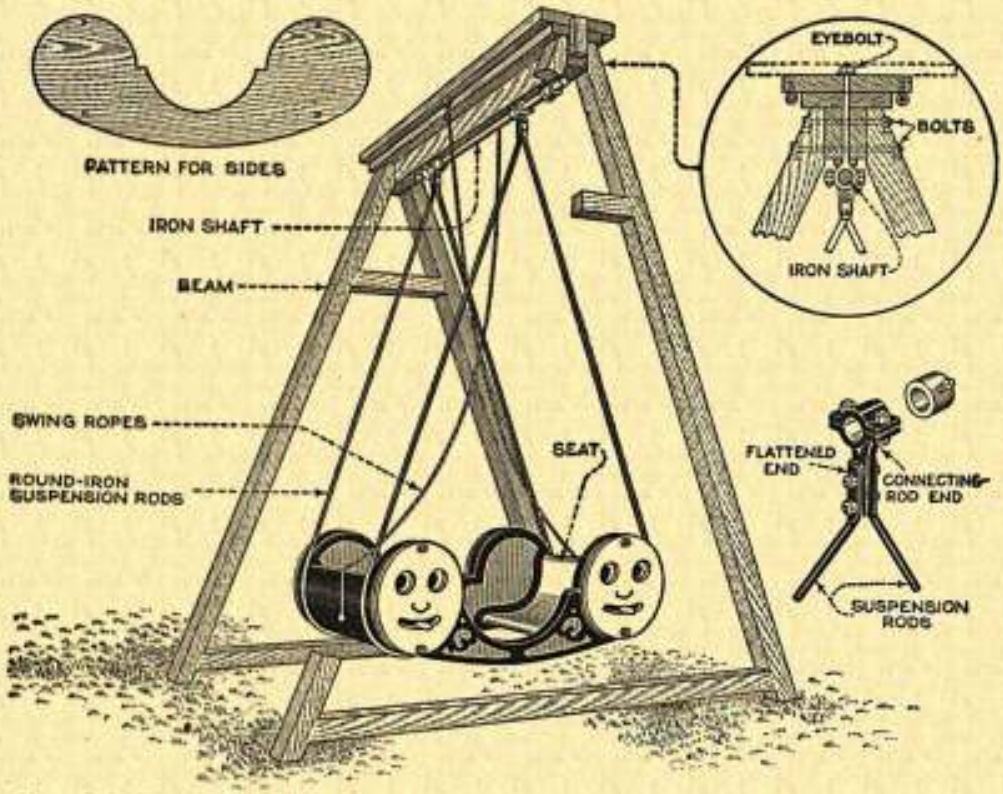
How to Make a Venetian Swing

By E. F. PRADER

THE Venetian or gondola swing is an old enough feature of amusement in public parks, but it is seldom used in private grounds, although it is not by any means hard to build, and is ideal for small children. Built properly, it will stand any



A Novel Swing of Simple Construction, That Will Keep the Youngsters Amused for Hours at a Stretch; It Is Quite Safe for Small Children, and May Be Made of Any Desired Size. When the Swing Is Operated the Eyes Roll and the Tongues Loll from Side to Side in a Realistic Manner



Upper Left, Pattern of Sides; Upper Right, Detail of Suspension; Center, Assembly Drawing, Showing Frame Construction, and Right, Method of Fastening Suspension Rods to Connecting-Rod End

amount of abuse, and the high sides of the gondola or car make it safe for the little ones. The design shown in the illustration has, moreover, an interesting feature that makes it a prime favorite with the children. The sides of the gondola have four disks painted to represent faces, the eyes of which roll and the tongues loll from side to side as the car swings.

The construction is simple. A pattern for the sides of the car, which may be of any size desired, is given in the detail drawing. The ends are perfectly circular, and four disks of the same size as the ends are cut at the same time, from the same material. Four smaller disks, about 3 or 4 in. less in diameter, may also be cut. A large disk is fitted to each end, as shown, by means of bolts, with spacers slipped over them so as to leave room for the smaller disks to work between. The outer disks may then be laid aside, the smaller ones centered on the ends of the car sides, and pivoted to them, either with heavy screws or with bolts, after which the position of the tongues may be marked on them. Two holes for the eyes are then bored in each of the larger disks, the location and length of the tongue slots or mouths marked, and the disks slotted.

The tongues are simply strips of flat iron, bent and screwed to the inner disks and painted red. The eyes on the disks are merely large black dots. When the swing is operated, the inner disks swing from side to side, the length of the swing being governed by the length of the mouth slots.

The car is suspended by means of four ⅜ or ½-in. iron rods. These are flattened at the bottom, bent to conform to the shape of the car, and screwed in place. They are also flattened at the top, bent, drilled and bolted to the cut-off ends of two old auto-engine connecting rods, and these are mounted on a shaft of proper size, secured by means of eyebolts to the crossbar of the swing frame. Collars should be provided at each end of the shaft, and on either side of the connecting rods, to prevent endwise motion.

The frame needs no description, but the method of operating the swing may perhaps be new to many. The top board of the frame cross member is made as wide and as stout as possible, and from it two

ropes are hung, in the center, and reaching down to the car. The ropes are crossed, and the occupants of the seats, by pulling the ropes alternately, set it in motion and keep it going. Of course, the farther apart the ropes are at the top, the easier it is to start and operate the swing, so an additional length of 2 by 4-in. lumber may be bolted at right angles to the upper frame cross member, as indicated by the dotted lines in the detail, and the ropes attached to the ends of this.

Simple Toy-Balloon Trick

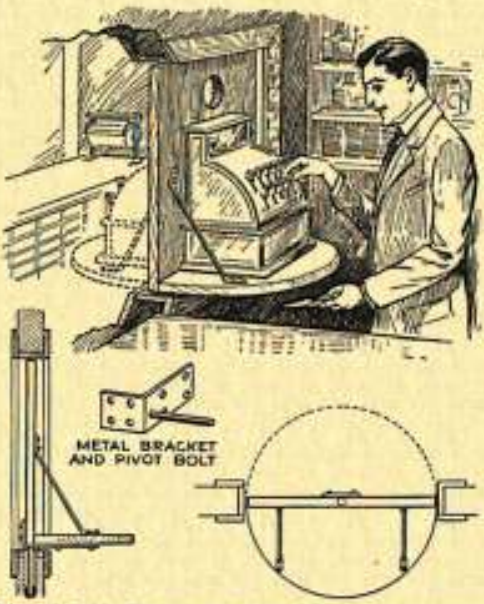
An amusing trick, which can be "put over" without any elaborate equipment, is as follows: Obtain in advance two ordinary toy rubber balloons of contrasting colors, and insert one in the other. When inflated the balloons present the appearance of a single balloon. The performer then announces that he is going to change the color of the balloon instantaneously. He pierces the outer balloon, at a spot where there is a space between the outer and the inner one. The outer balloon disappears with a loud report, leaving the inner balloon in full sight. The effect is startling and amusing, giving the delusion of having the balloon change color.—J. Joseph Alpine, South Amboy, N. J.

Cornstalk Noise Maker

For holiday and other celebrations where the youngsters like to make lots of noise, a simple and inexpensive noise producer can be made from two short lengths of dried cornstalk. The lengths should have solid joints at both ends and the pulp is removed from both. Then the blade of a sharp knife is inserted under the outer skin just below one joint and two slits are made to the other end. Small wooden wedges are then inserted under the strip thus formed, as indicated in the detail. The strip on each piece is rubbed with rosin, as is done on a violin bow. By rubbing the strips on both pieces of cornstalk together considerable noise can be made.—A. C. Cole, Chicago, Ill.

Double-Duty Cash Register

In a country hardware store a small radio department was opened and a partition erected to separate this section from the re of the store. As the owner did not feel justified in purchasing a separate cash register for the new department, he devised the plan illustrated, which made it possible to use one cash register on both sides of the partition. A square section, a little higher and wider than the cash register, was cut out of the partition and the opening finished with casing. The bottom of the opening was desk-high, and a wooden panel was fitted loosely in this opening. A semicircular shelf was fitted to the panel at the bottom and was supported by two iron-rod braces, as indicated, and a peephole, about 3 in. in diameter, was cut through the panel just above the top of the register. This allowed a clerk on one side to see whether or not a clerk on the other side was using the register. A hole was drilled in the center of the bottom casing to hold a socket for a strong pivot bolt, which was fitted with a metal bracket, screwed to the bottom of the shelf as indicated in the detail, which permitted the panel to swing freely. It is a good idea to place a washer in the upper casing to make the movement greater and the panel will turn more freely.—Edward Swanwick, Chelsea, Mass.



Pivoted Table Enables One Cash Register to Be Used in Two Sections of Store

Holder for Hot Curling Iron

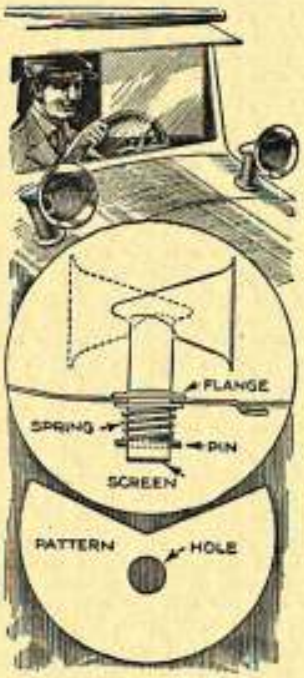
An electric curling iron is rather a nuisance when used at a dressing table, as it cannot be set down on the table without ruining the varnish, and the same applies to almost all other articles of furniture in the bedroom, yet the dressing table is the most convenient place for making up the hair. By providing a simple holder for the hot iron all danger of marring the surface is eliminated and curling the hair facilitated. The holder consists of a length of heavy wire, twisted and bent as shown in the insert in the illustration, and screwed to the under edge of one of the side panels, as shown in the larger view. The iron may be dropped into the holder in an instant and is still convenient to the hand when needed. The attachment may also be fastened to the mirror frame.—Dr. R. S. Hall, McLeansboro, Ill.

Getting Rid of Ants

There are several ways to get rid of ant hills, and to discourage ants from making nests in the lawn. One method is to pour boiling water on the hill in sufficient quantities to penetrate to quite a depth. Repeat this operation several times. Another method is to pour enough kerosene into and around the nest to saturate the ...till another way is to scoop off ...st and cover the depres... ...wdered borax. ...simplest methods ...beat the hill down ...ne of my neigh... ...f the pests in ... by taking a ...n. long and ...e end of this block of wood, he inserted a handle. With this maul he could pound the ground down firmly, and pack it so hard that even an ant would be discouraged. He made a practice of noting the location of ant hills on his lawn, and right after a rain shower he was busy with his maul. In a surprisingly short time there was no evidence of ant hills at all. In a dry season, the same result can be obtained with a maul by pouring two or three pails of water on the hill before tamping. It appears that this method of treatment packs the ground so closely that the ants are smothered. The advantage is that the grass is not harmed in the least by the treatment.—A. G. Meating, Appleton, Wis.

Ship-Type Ventilators for Auto

For ventilating the front compartment of his automobile a motorist adopted the ship-type ventilator with success, installing two of them on the cowl as illustrated. In the position shown, they allow cool air to enter the driver's compartment, and by reversing them, the air is exhausted, and the heat from the engine passes into the front part. Thus they will serve for both summer and winter driving. The construction is simple. The cone is cut from a piece of sheet brass bent and soldered at the edges. A length of brass tubing is soldered to the hole in the cone and a flange is soldered to it, so that the ventilator can be mounted in position on the cowl, as shown, a hole being cut through the latter for this purpose. On the part of the tube below the cowl, a coil spring is held by means of a washer and pin, and the lower end of the tube is fitted with a screen to keep out insects that may be caught by the draft.



Easy Way to Clean a Clock

When a clock stops it is a mistake to suppose that it must be taken to the workshop for repairs. In most cases clocks stop running simply because of an accumulation of dust particles, which clog the bearings. It is not even necessary to take the clock apart to clean it. A simple method, which has been found to work well, is the following: Soak a piece of cotton wool in kerosene and place this in a small saucer, a lid, or any similar small receptacle. Then put this in the case of the clock under the works. Close up the clock, and at the end of 24 hours, the cotton wool will be found to be covered with small black specks; these are the dust particles brought down by the fumes of the kerosene. Wind the clock and it will usually start again. Where the works of the clock are in an inclosed case, a few drops of kerosene should be poured through a small hole in the metal covering and the clock turned about a while so that the kerosene is well distributed. A small quantity is sufficient; too much will do more harm than good. After a short time the clock will usually run again.—Edwin Tarrisse, Washington, D. C.

Vegetable Slicer

Slicing cooked vegetables can be done easily and quickly by means of the simple device shown in the drawing, which can be made by anyone. It consists of a wooden frame, about 6 in. square, made of ½ by 1¼-in. material, preferably hardwood, and a number of lengths of fine piano wire. These are bent at each end at right angles, for about ¾ in., and strips of wood or strap iron are screwed tightly to the frame over the ends. Ordinary drawer pulls can be fastened to the frame to serve as handles. The method of using the slicer is self-evident.—James E. Noble, Toronto, Can.

Novel "One-Boy" Seesaw

Most playground seesaws require two persons to operate them. Finding this feature objectionable, a schoolboy with an inventive turn of mind devised a seesaw equipped with a movable counterweight, which enabled him to operate it alone. The counterweight consists of a wooden box placed near one end, and two lengths of 1 by 2-in. wood, attached to the box and to a pair of handles, which are pivoted on the seesaw within easy reach of the operator. The distance from the box to the center of the seesaw should be about the same as that from the center to the seat on the other end. A quantity of sand, approximately equal in weight to that of the one using the seesaw is put in the box, and then by moving the box back and forth the balance can be readily changed, causing the seesaw to work just as if two persons were operating it. The counterweight end of the seesaw is boarded in as shown to confine the movement of the sand box.

Novel "One-Boy" Seesaw Operated with Aid of Sand-Filled Counterweight

Dangers to Gems

As pearls consist of carbonate of lime, vinegar and other acids will eat away the polished surface in a short time. Hot water is fatal to an opal, destroying its fire and sometimes causing it to crack. Soap is a deadly enemy of the turquoise. If a turquoise ring is kept on the hand while washing, in a short time the blue stones will turn to a dingy green.—Mrs. Theo. Bush, Bay City, Mich.

Novel Sliding Gate

On farms where high fences are used, a sliding gate of the kind shown in the drawing will prove to be convenient. It can be made from materials available almost

Useful Sliding Gate Suspended by Flat-Iron Hangers on Rail Made of Pipe

everywhere. The rail is a length of ½ or ¾-in. pipe, supported at each end by an elbow, a short nipple and a flange, the latter being securely screwed to the post. The gate hangers are made of flat iron, screwed to the gate and bent over to slide easily on the rail. Grease is applied to the rail every two or three months, to reduce the friction and permit the gate to slide noiselessly. For large gates, it is advisable to provide a stop on the outside, near the bottom, to prevent them from swinging outward in a strong wind.—Dale. R. Van Horn, Walton, Nebr.

How to Design a Water Rheostat

It is seldom that the average experimenter gives more than a passing thought to the proper design of a water rheostat. The usual method is to use large plates in a container and add a sufficient quantity of salt or acid until the proper current flows. The results are often unsatisfactory, as the solution heats quickly, and may even boil; this gives a resistance that changes in value with the change of temperature and is not conducive to good results in experimenting. The problem of designing a water rheostat resolves itself into a question of the size and kind of plates, the density of the solution to be used, and the kind of chemical to be employed.

The maximum current that can be handled by a water rheostat depends, among other things, chiefly upon the amount of electrolyte in the container. It would appear that the energy absorbed would be limited by the radiation surface, but calculations on this basis do not check well with results.

To simplify the description we will assume that we wish to construct a rheostat for an arc light and have on hand a large porcelain jar from an Edison-type battery as a container, and iron plates. The cubical contents are a little over 422 cu. in. When used indoors without special cooling the capacity of the rheostat should be limited to 2 watts per cu. in., thus giving a rating of 2 times 422, which equals 844 watts for the rheostat. Some voltage drop across the rheostat must be assumed. Taking this to be 80 volts, the amperes passed by the rheostat can be calculated by dividing the wattage by the voltage drop, resulting, in this case, in approximately 10½ amperes. The allowable maximum current density for the plates is 1 amp. per sq. in. The plates must then be at least 10 sq. in. in area, but, since there is plenty of room, we may use plates 5 in. in diameter, giving an area of about 19.5 sq. in. This reduces the current density per sq. in. of plate, and consequently reduces polarization and plate resistance. The upper plate is perforated with holes made with a 20-penny nail, and is fastened to an adjusting rod by two bolts, one on either side of the plate. The lower plate is left plain, and a rubber-covered wire connected to it.

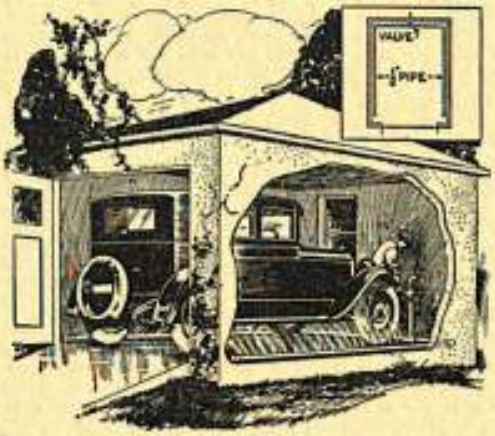
Having determined the mechanical design of the rheostat, the kind of solution to be used, and its density, must be determined. The chemical is a matter of judgment. We may make use of sodium sulphate, sodium chloride, or copper sulphate with iron plates. Where carbon or lead plates are used we may employ sulphuric acid. A simple rule for calculating the density of the solution in percentage is as follows: Multiply the maximum distance between plates by any one of the following constants: Sulphuric acid .08; sodium chloride .25; sodium sulphate .45; and copper sulphate .90; divide the result by the maximum voltage drop. Since copper sulphate does not polarize the plates

it is selected for the rheostat. This solution was made up and found to give the desired results.

By following the above method a rheostat for any other purpose may be constructed with full assurance that the device will do the work in a satisfactory manner. It is only necessary to bear in mind the relationship of the various factors, which may be listed as follows: The energy absorbed depends upon the volume of the electrolyte; the area of the plates is determined by the current, which should not exceed 1 amp. per sq. in. The voltage drop is determined by the maximum distance between the plates; where this is limited by the size of the container the density of the solution is varied to obtain the proper results.—Thos. W. Benson, Philadelphia, Pa.

Washing the Car Chassis

More mud and dirt collects under the body on the chassis than anywhere else on the car. A simple and efficient method of removing this is to use a stationary sprinkler of the kind shown in the drawing, provided water under pressure is available. It can be installed in any garage having a concrete floor and good drainage, and consists of two lengths of ½-in. water pipe, perforated with a number of small holes. The pipes are arranged along the sides of the garage and connected to the water supply. The distance between

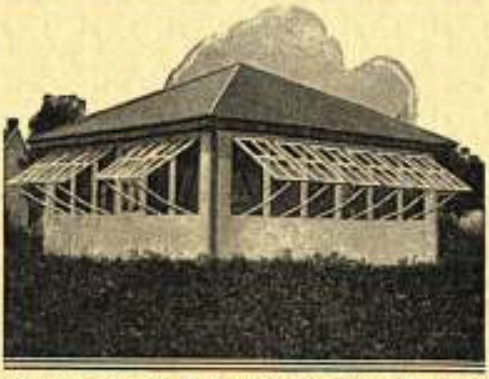


Water Sprayed against Underside of Car Chassis Removes Mud and Dirt

the pipes should be a little greater than the tread of the car so that the spray will strike the underside of the chassis. Thus the water will reach parts that are nearly inaccessible when using a hose.—G. A. Luers, Washington, D. C.

A Well-Ventilated Summer Kitchen

In the ordinary farm house the kitchen is the most used room and during the summer months it sometimes becomes unbearably hot as all the cooking is done



Open-Air Summer Kitchen on the Farm Has Good Appearance and Maximum Ventilation

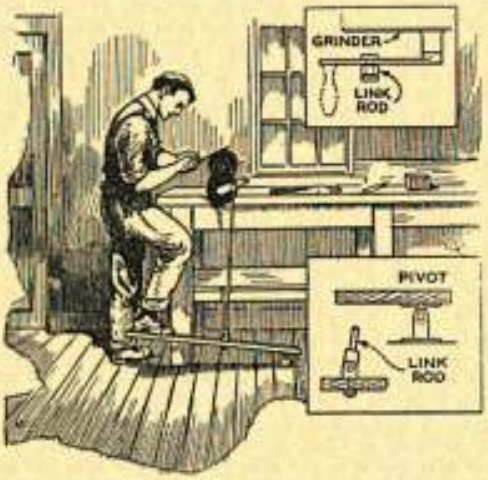
there. To provide relief, a summer kitchen and dining room of the kind shown, which is separated from the house, has been found very convenient for cooking and can also be used as a laundry. It is about 16 ft. square and has as many windows in the sides as possible in order to provide maximum ventilation and light. The windows are hinged at the top and open outward from the bottom, two-piece folding braces being used to hold them open; the braces are hinged at the center on the underside and the ends at the hinges are cut at a slight angle, so that the weight of the windows causes them to bow slightly downward as shown. Screens are, of course, provided on the inside to make the interior fly-proof. The outside may be painted white to preserve the wood and improve the appearance.

Thawing Frozen Radiators

When putting his car in the garage for the night, a motorist found his radiator frozen near the bottom and around the petcock. Not wishing to thaw it with hot water, or to steam it out in the morning, he bent the overflow tube so that it was directed against the cock and started the motor, until steam developed. The steam was thus ejected on the petcock, and in a short time the frozen part was thawed out so that the water could be drawn off. Care should be taken not to bend the tube so as to choke it or interfere with the operation of the fan.—Richard C. Tarr, Gloucester, Mass.

Treadle for Hand Grinder

Small bench grinders are often rather inconvenient to use because the worker cannot hold the work with both hands,



Simple Treadle Attachment Increases Usefulness of Hand Grinder

which is often necessary and always best. The drawing shows a simple attachment that permits one to run the grinder with the foot. It consists of a treadle pivoted at one end to the floor, as shown in the detail, and an iron connecting rod attached to the treadle and to the grinder crank. This attachment is easily made by anyone and well worth the making.—G. A. Luers, Washington, D. C.

Testing Painted Woodwork

To test the purity of paint on woodwork shave off a splinter with a knife and burn it with a match or hold it over a gas flame until it burns brightly. Then remove and hold it over some dark cloth or paper. If pure lead paint was used, little silverlike beads, which are metallic lead, will drop off the charred splinter. To test any paint to be used, dip a sliver into the paint, and after it is dry, test it the same way.—S. A. Pease, Wauwatosa, Wis.

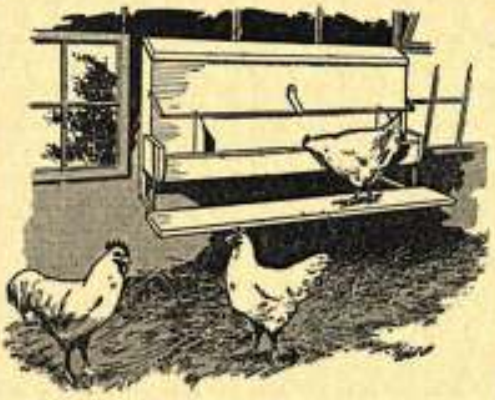
Fishing with an Umbrella

A handy net for catching killifish, which can be neatly folded and readily carried in a fishing-rod bag, may be made by recovering an old discarded umbrella frame with mosquito netting. Although primarily intended for catching "killies" by placing a few cracked clams or mussels in its center and lowering in shallow water not over 2 ft. deep, it can also be used for catching the beautiful silver-banded spearing by baiting it with a few pieces of shrimp. Tie the pieces to the frame near the center and suspend the net in deeper water near a sod bank. When codfish and flounders are running, the net, baited with shrimp, can be used from the end of a dock. One must be patient, allowing the net to remain down for some time before drawing it up, but when the fish are present at all, the number taken at one haul will more than make up for the time spent in waiting.

An old umbrella is also very convenient to have along when "bobbing" for eels at night. String a dozen or more worms on strong thread, winding them up into a ball and wrapping the thread well around the mass. Let the ball sink to the bottom and when a bite is felt draw in the line and shake the eel off into the umbrella, which has previously been hung over the side of the dock.—John D. Mayer, New York.

Substantial Poultry Hopper

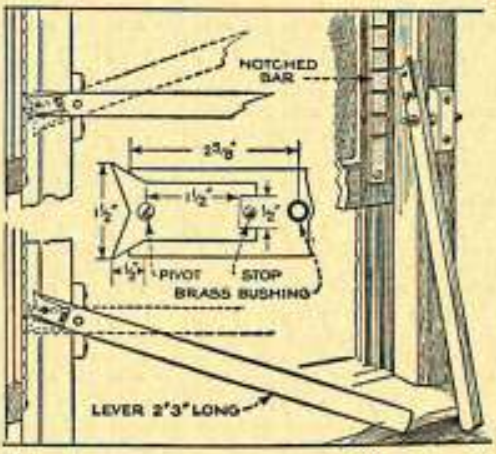
Unlike most grit and feed hoppers for the poultry house, the one shown in the illustration is set high above the floor, permitting the fowl to walk under it. To enable them to reach the contents easily, a broad platform, about 8 in. wide and supported by flat-iron braces, is attached to it, about 4 in. above the floor. The hopper is made of galvanized iron. It is divided into four compartments and the top is hinged. An iron rod runs from end to end, above the trough, to prevent restless birds from roosting on the edge. This rod should be placed so close to the side that the birds lose their balance if they try to perch on it.



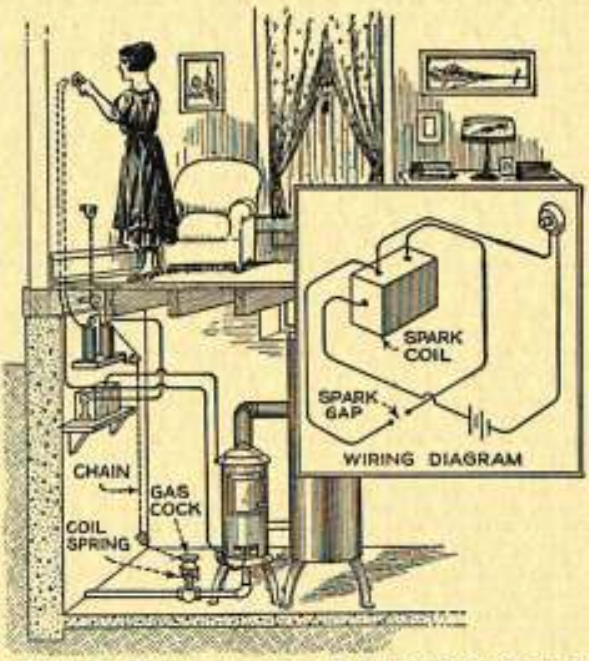
Galvanized-Iron Poultry Hopper Is Sanitary and Cannot Be Used as a Roosting Place

Handy Window Raiser

A bathroom window is often located just behind the tub, which makes it nearly impossible to open it without standing in the tub. This difficulty was eliminated in one case by providing a lifting jack of the kind shown in the illustration. It consists of a wooden lever, about 2 ft. long, pivoted on the side of the window casing, and provided with a movable dog at one end, which engages a notched bar screwed to the sash. The notches or grooves are about 1 in. apart and are cut with a hacksaw. The dog is cut from 3/16-in. steel plate to the shape indicated in the insert. It is pivoted to the lever at the V-notched end, and in the center of the square notch, at the other end, a wood screw is driven into the lever to limit the swing of the dog. A brass bushing is provided at the pivot point of the lever. In opening the window the lever is moved upward, as shown by the dotted lines in the top detail, until the upper tooth of the dog engages with a notch, and then down, which action causes the sash to be raised, the dog being prevented from slipping by the stop pin. A similar stroke is made for each notch. To close the window the action is reversed, and in this case it is the lower tooth of the dog that pushes the sash down. If the sash is not counterweighted, the device will not work.—D. O. Woodbury, Boston, Mass.



Inaccessible Window behind Bathtub Opened by Means of Simple Lifting Jack



Lighting the Water Heater from a Room Upstairs by Means of a High-Tension Spark

Electric Lighter for Water Heater

Many houses have a gas water heater in the basement for summer use. To light it it is necessary to go downstairs and this is rather unhandy. With the apparatus shown in the illustration, it is possible to turn on the gas and ignite it with an electric spark. The valve in the gas line is provided with a coil spring, which shuts off the gas automatically. It is opened by means of a length of furnace chain, wound on a spool that is attached to the valve as indicated. The chain is run over pulleys, through the wall into the room above, the end being fitted with a ring; a plate on the wall holds the chain up in the same manner as a furnace-damper control. These fixtures can be purchased at any hardware store. Two dry cells are connected in series to a Ford ignition coil, which can be obtained at a garage. One side of the coil is grounded on the stove and the other wire terminates about ¼-in. from the burner, directly above the gas holes so that after the gas has been turned on, a spark jumping this gap will immediately ignite it.—Harold Keckley, Toledo, Ohio.

¶Quicklime added to benzine, in the proportion of about 3 oz. to the gallon, will deodorize it. Shake well, then strain through cheesecloth.

Baby Carriage Stored Conveniently on Side of Stairway

Storing the Baby Carriage

In two-flat buildings the tenant often finds the hall too small to store a baby carriage. The problem of storing it can easily be overcome, however, if the stairway is of normal width. The baby carriage is usually just half as wide as the stairway, and it can easily be held to one of the treads by means of a hook, securely anchored in the tread with a screweye. The illustration clearly shows how this is done. The carriage is stored a few steps above the first floor and this allows plenty of space for people to pass. Of course, where there are three or four flats above the first floor this practice can hardly be used, but where only the owners of the carriage use the stairs there can be no objection raised.—H. Jackson, Chicago, Ill.

A Bacon-Rind Auto Bearing

When a tourist burns out two connecting-rod bearings, 40 miles from a town where repairs can be made, it is quite a temptation to ride on slowly, risking greater damage to the engine. Being in such a predicament recently, and not having any repair parts so that I could do the job at once, the most promising emergency repair which occurred to me was to use a piece of ordinary bacon rind as I well remembered how hard and tough this became when cooked. A strip, about 2 in. wide and 12 in. long, was hammered flat to drive out as much grease as possible, reducing it to a hard, tough piece. This was cut into a number of smaller strips just large enough to replace the babbitt burned from the bearings. They were carefully fitted in place and the connecting-rod caps drawn up tight. After replacing the oil pan and the oil, I started the motor and no knock of any kind was noticeable. I drove to the nearest town, but not finding the condition any worse, decided not to put in a new bearing there. Since that, I drove the car over 5,000 miles with these bacon-rind bearings without experiencing any trouble.—H. G. Borland, Asheville, North Carolina.

Blowtorch Stand

Blowtorches are often used to melt lead and other metals in ladles, but, as no part of the torch is adjustable, it is sometimes rather difficult to play the flame directly under the ladle. To eliminate the necessity of using blocks and shims to accomplish this, a simple adjustable stand, attached to the bottom of the blowtorch, has been found satisfactory. It consists of two disks with brackets in the center, the latter being formed by cutting the metal and bending the cut parts up at right angles, as shown. A bolt, sleeve and wingnut complete the assembly, holes being drilled through the brackets for the bolt. The lower disk must be of greater diameter than the upper one, so that it will hold the torch at any angle it may be set. Small lips left on the edge of the upper disk are bent over to grip the bottom of the torch. The fixture can readily be made by anyone and the details of construction are given in the illustration.—C. Homewood, Ontario, Calif.

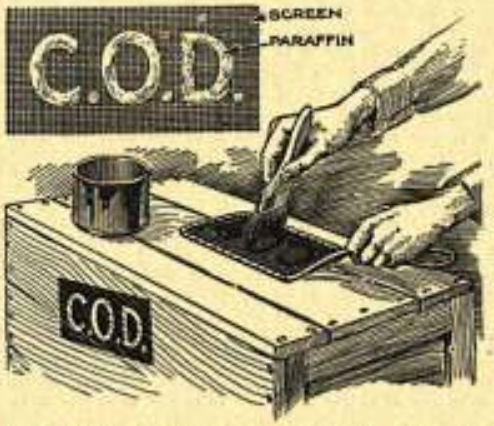
When the gas line on the truck or car springs a leak, it can be repaired temporarily with a strip of cloth heavily coated with yellow laundry soap, things that are obtainable anywhere.

Driving Nails Straight

An amateur doing odd carpenter jobs around the house will sometimes drive in a nail so that it comes out of the side when about halfway in. The usual practice is to pull it out and try to drive it in straight. Instead of that, I merely take my nail punch and, just as the nail point begins to come out of the side, I put the punch on the point and give it a blow with the hammer, which starts it back into the wood. Then I hit the nail alternately on the head and on the side until it is driven in entirely. In this way I, so to speak, drive the nail around a corner without other damage to the woodwork than the small impression that is made on the side by the punch and this can very easily be remedied by filling the hole with putty.—Geo. H. Mansfield, Cuyahoga Falls, Ohio.

An Easily Made Stencil

A simple stencil for lettering barrels, boxes and packages can be made from a piece of wire screen. This is cut to the desired size and placed flat upon a smooth surface, and the lettering is painted on it with melted paraffin. The paraffin hardens quickly, cementing itself to the wire. The stencil is used in the ordinary way. The background receives the paint and the lettering is left in the original color of the box or barrel. As the paraffin can be melted from the screen for the substitution of other lettering, it is a good idea to attach a steel-wire frame and handle, as

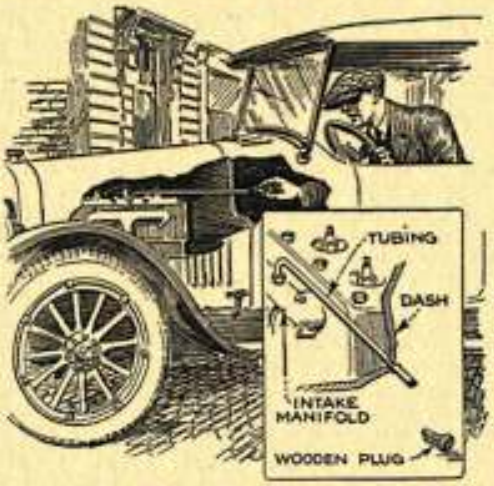


Easily Made Stencil for Lettering on Boxes and Barrels

shown, to make the stencil durable and easy to manipulate.—G. E. Hendrickson, Argyle, Wis.

Foiling the Auto Thief

A simple and effective method of foiling auto thieves or joyriders is shown in the drawing. Drill and tap a hole in the intake manifold for a ⅜-in. pipe or tube



Secret Opening Permits Excessive Air in Intake Manifold and Prevents Engine from Starting

fitting, and connect a length of pipe or tubing to extend back to the dash. The open end is flared out a trifle to receive a wooden plug made to fit in snugly. When the plug is in place, the engine will run normally but when the plug is removed, so much air is admitted to the cylinder that no combustion can take place and therefore, the car cannot very well be run off on its own power. If, however, the engine is started by excessive use of the choke, the firing will be so erratic that the thief will be glad to abandon the car in a block or so. Of course, the plugged end of the tube should be located in an unnoticeable place behind the instrument board.—Richard P. Cole, Paterson, N. J.

Improvised Scratch Brush

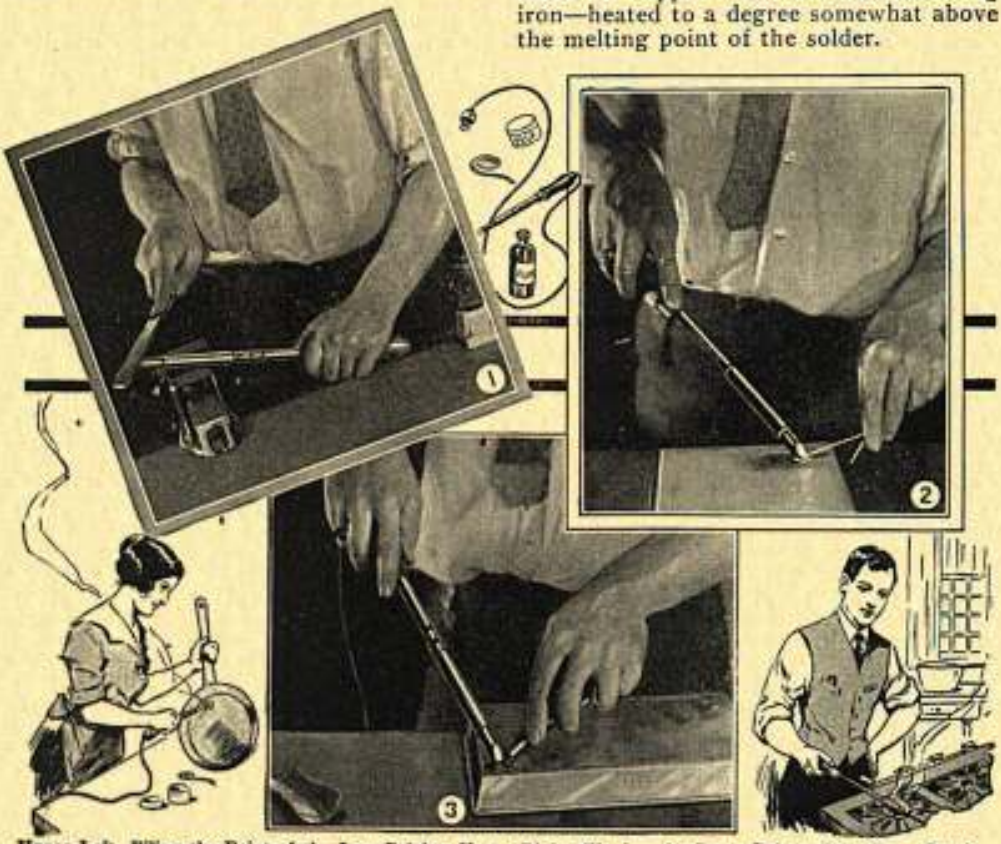
While painting my house I found it necessary to use a wire scratch brush and as I could not buy or borrow one in my neighborhood, I had to make a substitute. A piece of ordinary screen wire was rolled up tightly and a piece of paper wound around it to serve as a handle. The wire end was found to be just as good as any scratch brush. An advantage of such a brush is that it can be made any convenient size. It can be made anywhere, as screen is always available, and it can be fashioned in a few moments.—Otto T. C. Colonius, Kinlogh, Mo.

Soldering for the Home Mechanic

~by~ James Tate

THERE is nothing difficult or mysterious about the art of soldering. On the other hand, the mere possession of a soldering iron, a generous supply of solder, and a large tin of flux does not by any means guarantee a good job. All that is necessary to insure good work, however, is the observance of a few simple rules, together with a little common sense. There is no knack to be acquired, and a few practice jobs, bearing in mind always the rules, will soon make anyone a soldering expert. There are two kinds of soldering, hard and soft, but, as the occasions in which hard soldering (brazing and silver soldering) is required around the home are few and far between, only simple soft soldering will be considered in this article.

Soft solders are composed of tin and lead, alloyed in various proportions, ordinary tinner's solder being half-and-half; that is, composed of equal parts of tin and lead. As the melting point of these solders runs from about 330 to 440° F., they may be easily worked by means of a tool made of copper—the so-called soldering iron—heated to a degree somewhat above the melting point of the solder.



Upper Left, Filing the Point of the Iron Bright; Upper Right, Tinning the Iron; Below, Sweating a Patch over a Hole

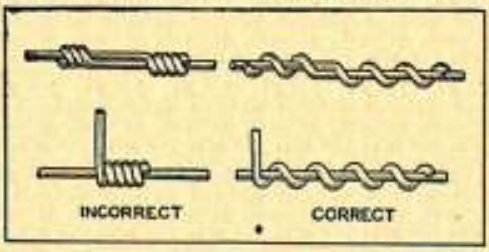
Soldering irons are made in various shapes and sizes; also plain, gas, alcohol and electric-heated. Good work may be done around the home with a plain soldering iron, heated on the gas stove or with a gasoline torch, but by far the best tool for all-around home use is the electric soldering iron. This can be plugged into a socket anywhere in the house or garage, thus avoiding the necessity of frequent trips to the kitchen to reheat the iron. The alcohol-heated iron is also a very useful tool, where electricity is not available.

SOLDERING FLUXES	
METAL	FLUX
IRON, STEEL	CHLORIDE OF ZINC, SAL AMMONIAC
COPPER, BRASS	ROSIN, SAL AMMONIAC
ZINC (OLD), ZINC (NEW)	CHLORIDE OF ZINC, HYDROCHLORIC ACID
TIN	ROSIN, CHLORIDE OF ZINC

The prime requirement, in every soldering job, from the simplest to the most complicated, is cleanliness. The parts to be soldered or joined must be chemically clean. To do this, it is first necessary to remove all rust, scale, oxide or dirt from the surfaces to be soldered by means of a file, scraper or emery cloth, using this until the surfaces are perfectly bright. The clean surfaces are protected from oxidizing and the flowing of the solder over them aided by the use of a flux.

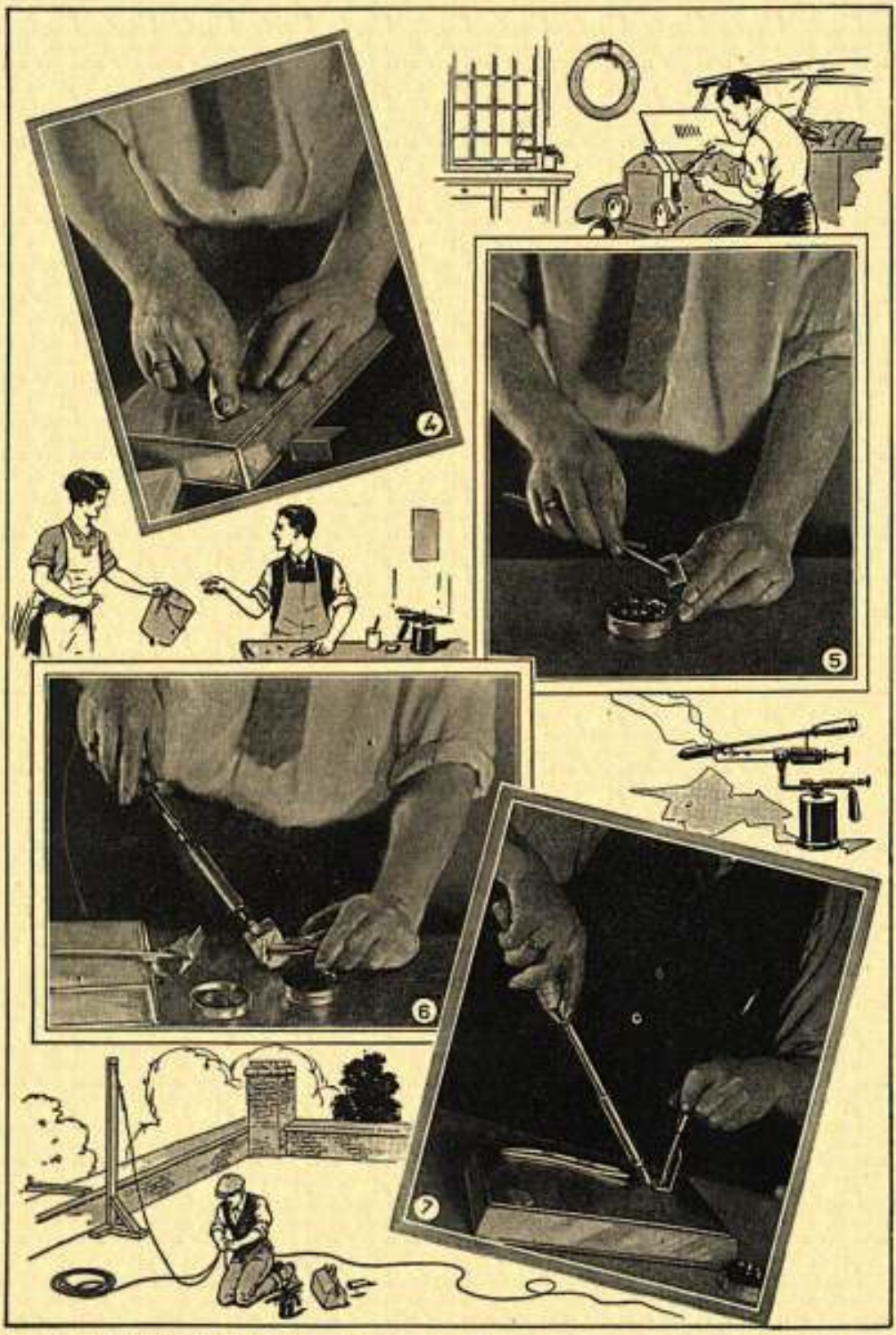
For all-around use in the home, the paste fluxes sold in small tin containers are about all that is required, or a supply of acid-core and rosin-core solder. The latter is a hollow ribbon of solder filled with an acid flux or a flux made of melted rosin, dispensing with the necessity for a separate flux.

For the man who likes to tinker around the home shop, the paste flux may be supplemented by a few others, which have been found better for particular uses. These fluxes, and the metals for which they are particularly suited, are listed in the accompanying table. The chloride of zinc, often called "killed spirits," is prepared by dropping zinc (not galvanized-iron) clippings into hydrochloric acid until the acid is "killed," that is, until bubbles cease to arise from the zinc. The acid may then be strained and kept in a glass-stoppered bottle. One caution is necessary in using this flux, and with straight hydrochloric acid also. Don't allow any of it to remain in an open container near tools, or they will become badly corroded. Also, when these fluxes are used, the work should be thoroughly washed afterward, or rust is likely to develop. Finally, never use an acid flux on electrical wiring, as corrosion is sure to follow; use rosin, rosin-core solder, or a paste flux specially prepared for this purpose.



Now for the actual soldering. The first thing to do is to "tin" the iron. Light the stove, if using a plain iron, or plug it into the socket, if an electric one, and, while the iron is heating, hunt up a small piece of tin, brass or copper. The inside of the flux-can lid will do if nothing else is available. Clean a spot on the surface, about 2 in. square, with emery cloth, and drop a little flux on it. If using a plain iron, don't let it get red-hot; it should be just hot enough to melt the solder well. When it has reached this point, remove it from the stove, hold it as shown in photo No. 1, and brighten the point, on all four sides, with a file. If the latter is not at hand, rub the point on a sheet of emery cloth until it is clean, then rub it back and forth on the clean surface of the tin on which the flux was spread, photo No. 2, applying some solder to the point while doing this. Don't forget the flux. The point of the iron will become evenly coated with the solder, and it is then ready for work. When reheating the iron afterward, take care that it doesn't get too hot, or the point will "burn" and must be retinned. When heated to the proper degree—a little experience soon enables the user to determine this—the point may become black or discolored, but the tinning is unharmed, and a dip in the flux quickly removes the discoloration. Most good electric irons need no attention in regard to the heat, and only require a dip in the flux now and then to keep the point bright.

Ordinary soldering is simplicity itself. To solder a leak in the seam of a pail, for example, the dirt must be cleared from around the leak with a scraper of some kind until the surface is as clean as it can be made. Too much emphasis cannot be laid on the cleaning in a job of this kind, as a small spot of grease or dirt will not



Upper Left, Polishing the Work; Upper Right, Applying Flux to Bracket before Tinning; Lower Left, Tinning the Bracket; Lower Right, Sweating the Bracket in Place

allow the solder to flow into the seam, and will cause a lot of trouble. Apply some flux to the surface, heat the tinned iron, and flow the solder into the seam, applying the end of the stick or ribbon of solder to the point of the iron. Don't attempt to stop the leak by dropping some solder from a height of a few inches onto the spot where the leak may be. The metal around the solder must be warm, nearly as hot as the solder, in order to cause it to run. Indeed, it is a good idea to heat the work before applying the solder, if this can be done—but not too hot, or the surface will oxidize, and must be recleaned. The proper way is to keep the iron pressed against the seam, so that it heats the metal, and feed the solder to the point so that it runs into the seam. Soldering a hole in a pail or other utensil is difficult if the hole is so large that the solder will not bridge it alone. In that case it is necessary to patch the hole. Cut a patch of the same metal large enough to cover the hole with plenty of overlap. Clean and polish one side of the patch, and also the spot it is to cover, and coat the cleaned surfaces with flux. Tin both cleaned surfaces with solder by rubbing the hot iron over them, feeding solder to the point; then apply some more flux, lay the patch over the hole and hold it down with some tool as in photo No. 3. Now, by running the hot iron slowly around the edge of the patch as shown in the photo, or holding it on top of the patch, the solder on the tinned portions will melt and unite. This is called "sweating." It sometimes helps to feed a little solder to the iron while running it around the edge of the patch, as the hot solder causes that on the tinned surfaces to melt quicker.

A similar procedure is followed in soldering one piece to another, as in the illustrations showing a small bracket being soldered to a pan. Both surfaces to be joined are polished with emery cloth, photo No. 4, and spread with flux as in No. 5. Each is then tinned, No. 6, and the bracket placed in position and sweated to the pan as shown in photo No. 7.

Small pieces may often be joined by tinning the parts, spreading some flux on them, placing them in the proper position and clamping them with a pair of pliers or tongs, then holding them over the flame of the stove or over a Bunsen burner until the solder melts. They are then quickly removed, and allowed to cool, while still keeping them clamped.

Many amateurs, when making joints in wiring, in their endeavor to make a neat job, coil one wire closely around the other as shown at the left in the detail drawing. This makes a neat connection, from the standpoint of looks, but a poor one electrically, as the close coils do not permit the solder to flow around the joint properly. It is better to make connections like those shown at the right. Here the coils are open, and the solder can make a good electrical connection between them. Remember also, an acid flux must not be used for soldering electrical connections.

When soldering some parts that are hard to hold together, it is usually a simple matter, once they are tinned, to wire them together while the iron or the gas-stove flame is applied to sweat the joint. A word of caution is necessary when using the flame to sweat joints. Don't apply the flame right at the joint, as it is apt to "burn" the solder, or oxidize the parts. Apply it some distance away, and let the heat run up through the metal to the joint. This also makes the heat easier to control. A few nails driven into the bench or worktable around the parts to be joined will also aid, in many cases, to hold them while applying the solder. It is hardly possible to give specific directions for holding work of this character, as every case is different, but the reader will experience little trouble in devising ways to hold the job.

Letting Chickens Unlock Door

Poultry seems to do best, generally speaking, when they can choose not only the hour for roosting but also the time to sally forth in the morning. With the doors of the chicken house open during the day, they go in when they please, but, if the house is closed overnight, they must wait in the morning until someone lets them out.

It is an easy matter, however, to provide an automatic device that will permit the fowl to open the door themselves. The door is fitted to slide upward, and a screweye is driven into its top, to which is attached a length of stout cord. The latter runs up over a pulley mounted above the door, and a heavy counterweight is attached to the other end of the cord. About a foot away from the door, and directly in front of it, the "trigger" is mounted. This consists of two pieces of wood nailed at right angles to each other, as shown in Fig. 1, and pivoted between two stakes driven into the floor. The trigger is set, with the part nearest the door in a vertical position, and near the top is nailed a small ledge upon which some kernels of corn may be scattered. From the top of this piece a wire runs to a nail pushed through the screweye in the top of the door and into a hole drilled directly behind the screweye in the side of the house.

When the trigger is set, the weight, dragging on the nail, keeps the door shut. The corn is, of course, scattered on the ledge the previous night, just before the farmer goes to bed, and in the morning, when a hungry hen steps on the trigger to reach the corn the additional weight pulls out the nail and the weight opens the door. Fig. 2 shows an adaptation of this device designed for houses where the floor is considerably above the level of the ground outside. In this case the door is hinged at the bottom, and, when dropped, forms a cleated incline to facilitate entrance and exit. A stiff piece of clock spring is fastened to the sill inside and bears against the door, so that, when closed, it will be under pressure. A screweye is driven into the door on the inside at the top, and directly above this two more are screwed into the wall of the house. A nail is dropped through these eyes to lock the door, and the nail is tied to the end of a length of cord running over a pulley and down to the trigger. The latter in this case consists of a single board, and the corn is placed in a small trough joining the tops of the stakes to which the trigger is pivoted.

Two Simple Devices That Enable the Fowl to Open the Door of the Poultry House in the Mornings

Cleaning Developing Trays

For a tray cleaner use a solution consisting of water, 32 oz.; potassium bichromate, 2¾ oz., and sulphuric acid, 3½ oz. Pour it into the tray to be cleaned and swab with a tuft of cotton. The solution may be poured off into a bottle and used several times.

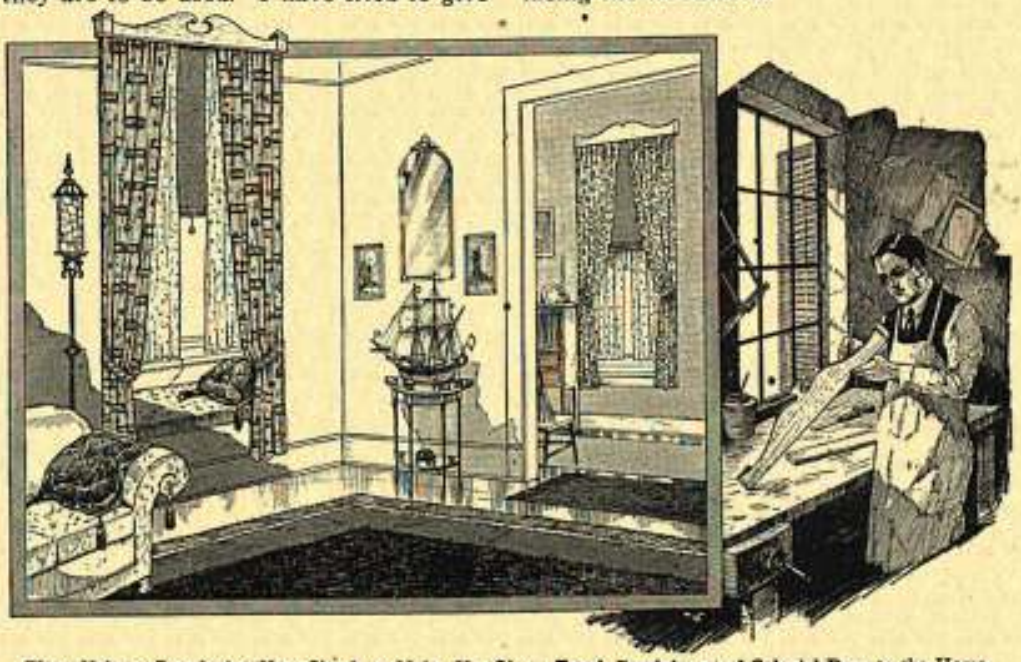
Valance Boards Are the Vogue

By RALPH O. BUCK

FEW of the decorations of former days lent so much charm and livableness to a room as the quaint valance boards which crowned each window. Interior decorators are suggesting and using valance boards a great deal these days, but unfortunately we cannot all afford this valuable service, nor are we always able to secure many of the things we would like for our homes in the locality in which we live. It is here that the homemaker with an artistic bent and some small ability with tools can make for himself what he must otherwise do without.

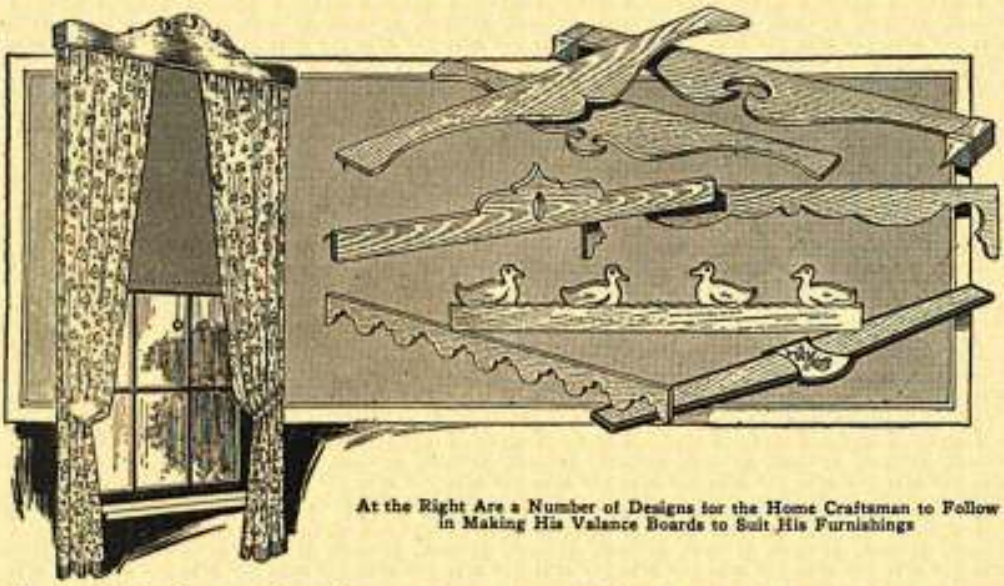
Your valance boards must harmonize with the furnishings of the room in which they are to be used. I have tried to give you typical examples so that you may have the pleasure of designing your own along the general lines of the suggested type you select. Make a full-size paper pattern about ½-in. longer than the cap or head trim of your window, and about 6 in. wide. The next step is to sketch your design on the pattern after having folded it in the center. Cut out the design, trim and fit until the desired effect is produced.

Little boards, as high as the width of the pattern at the ends and about 3 in. wide, are tacked to the valance boards to finish the ends. A hook fastened between the top of the board and the head casing will keep the former in place without defacing the woodwork.



These Valance Boards Are Very Simple to Make, Yet Give a Touch Reminiscent of Colonial Days to the Home, and Besides, Are Very Much in Vogue

Any thin wood, or wallboard, may be used as material, but a 3/16 or 1/4-in. piece of ply wood is preferable, because of the greater strength and the fact that it usually is finished smoother than you are likely to have facilities for doing.



At the Right Are a Number of Designs for the Home Craftsman to Follow in Making His Valance Boards to Suit His Furnishings

Valance boards may be finished in several ways. Stain, enamel, lacquer or a covering of fabric to match or harmonize with the drapes are all used effectively. The finish, of course, will depend to some extent on the type of board you select. Stencils and transfer designs are easily applied and may be obtained at most art stores, although a hand-painted design is usually more pleasing.

The board shown at the left in the first drawing is of colonial design, and is fitted with raised and capped corner posts; this is shown in more detail in the second drawing. The two boards beside it should be used with rather simple drapes and furnishings, while the one on the left, below, should crown heavy, straight-hung drapes. The more elaborate design to the right of this can be used with colonial furnishings to advantage, while the duck design, painted in bright colors, will be attractive for the nursery. Of the two designs at the bottom, that on the left goes well with a row of casement windows, and the one on the right, with a basket of flowers on a dark background painted on it, adds to the appearance of bright drapes.

Abrasion Marks on Prints

Abrasion marks on photos are a source of trouble to many amateur photographers. They are caused by a defect in the emulsion and appear on the developed print as black or dark lines. One well-known remedy is to rub the marks with alcohol until they disappear. However, they cannot always be eradicated by this method, but "Bon Ami," or similar compound, can be used with better results. Dampen a clean cloth with alcohol and rub it on the cake; then scrub the abrasion marks lightly but firmly, being careful not to scratch the emulsion. A slight circular motion will be found best. When the marks disappear, wipe off the soap with a clean cloth dipped in alcohol.—L. B. Robbins, Harwich, Mass.

How Furniture Should Be Polished

There are many kinds of furniture polish, but those to be described will meet the needs of the amateur in every way. Practically the same methods are employed in applying all of these polishes. Clean the surface to be polished with cold water and good soap to remove all grease and finger marks, then dry it thoroughly

and immediately apply the polish with a clean lintless rag and rub it perfectly dry with cheesecloth. A small 10-cent varnish brush can be used to apply the polish to the moldings and the carved work. All mildew, medicine and water marks should first be removed from the surface by rubbing all of these spots with pumice-stone and linseed oil mixed in an old saucer to a light, creamy mass, and then applied with a rag to the affected parts and rubbed in the direction of the grain of the wood. A very good polish can be made by filling a bottle with two-thirds of linseed oil and one-third of turpentine. When shaken well and applied to the wood, the turpentine will clean and the oil will polish the wood. Crude oil, thinly applied and rubbed out well, also is a cheap and good polish. If a beautiful velvety finish is desired, mix rottenstone to an easy flowing mass with pure linseed oil and rub it over the surface of the work with a piece of an old felt hat. Then remove the oil with clean, dry rags, and polish the surface with clean cloth.—Francis W. Henry, Pottsville, Pa.

Oiling Auto Springs

Lubrication of auto springs is often neglected as the oil cannot be applied easily between the leaves without spreading them apart. About the easiest method of doing this, except using a special tool, is shown in the drawing. A crosspiece of 2 by 4-in. material, or any wood or iron of sufficient thickness, is slipped under the frame as indicated, and a jack is applied under it. As the body of the car is raised the weight of the wheels will pull the leaves apart, and permit oiling them without difficulty.—G. A. Luers, Washington, D. C.

Buoyant One-Man Pond Raft

When used as a boat or raft, an ordinary dry-goods box, even though it be water-tight, is unstable and readily tips due to its small size. However, by adding an old inner tube, as indicated in the illustration, this trouble is eliminated. Get a box, which is large enough to sit in comfortably, and about 20 in. deep. The boards should be tongue-and-grooved stock if possible. Even then it will require two or possibly three coats of paint or preferably tar, to make the box water-tight. Calk the larger cracks first with tarred hemp or rope. After painting, stretch the inner tube around the box until it is about 8 in. below the upper edge. Then inflate the tube until it is round, except at the corners. Should the tube be too large to stay in place readily, tack small strips of wood just above it on all four sides. You will be surprised at the ease with which you can manipulate this raft without shipping any water.—Dale R. Van Horn, Walton, Nebr.

One-Man Box Canoe Made Buoyant with Auto Tube

Flexible Shellac

Shellac, which is valuable as a patcher, has one disadvantage—it becomes brittle as it hardens. To avoid this, add 10 or 15 per cent castor oil to the shellac after it has been dissolved in alcohol. The shellac will then remain flexible after drying.

Clothesline Poles of Piping Serve as Lawn Sprinklers

Clothesline poles of piping can be made to do double duty by fitting them on the inside with water pipe that has nozzles fitted at the top, to serve as lawn sprinklers. The top cap of each pole is removed and drilled out to permit adjustment of the nozzle. It will be noted that only one hole need be drilled in the side of the pole. A length of ¼-in. pipe with an elbow at the lower end is let down inside of the pole and a short piece screwed in from the side, as indicated. A bend is made to fit around the crossarm of the pole. The cap is then slipped over the nozzle and screwed into the pipe. This method of spraying any lawn is much to be preferred to holding a hose in the hand, as a finer spray can be used and a great deal of work is spared the home owner.—L. H. Georger, Buffalo, N. Y.

Installation of Water Pipe in Clothesline Poles Makes Them Serve as Lawn Sprinklers

How to Paint New Work

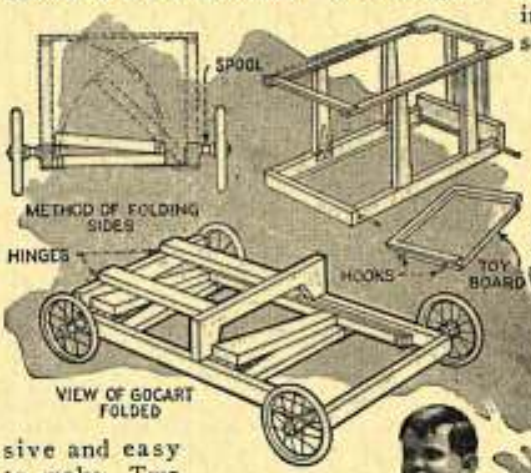
When painting new work, all projections, such as lumps of glue and other matter, must first be removed from the surface. Apply a thin coat of shellac to all knots so that the pitch and turpentine in the wood will not eat through and spoil the finishing coats. It is advisable to buy ready-mixed paints of the desired shades, especially if you have no experience in mixing and combining colors. After the knots have been shellacked, a thin coat of the paint is applied over the entire surface. This is called the first, or priming, coat and should be thinner than the following coats. It is made by pouring some of the paint into another pail, thinning it with turpentine and adding a teaspoonful of Japan drier to each pint of the liquid. After the priming coat has dried, all small holes should be puttied and the entire surface lightly sanded in the direction of the grain of the wood, with No. 1 sandpaper, and carefully dusted off before applying the next coat of paint. If the putty is applied before the priming coat, it will not adhere to the wood and will fall out of the holes. The paint should be applied in the direction of the grain of the wood, taking care to prevent brush marks. When painting inside doors, blinds or panel work, always paint the panels first, the crosspieces next and the uprights, or stiles, last. Use a small brush for the moldings and corners, and a larger one for the flat surfaces.—Francis W. Henry, Pottsville, Pa.

Door Closer Made from Mousetrap

We had a door that we wanted to keep closed and not having any suitable ready-made device at hand for the purpose, I made one from a spring rat trap. I sawed off the bait end of the trap, as shown, and screwed the remaining part to the door casing. The spring thus extended over the edge of the door next to it, which I protected against marring by a light piece of tin. This door closer works perfectly, and is cheap.—W. C. Loy, Rochester, Ind.

Combination Gocart, Baby Bed and Walker

The handiest article I have ever seen in the way of a baby vehicle is the combination gocart, baby bed and walker shown in the illustration. It is inexpensive and easy to make. Two posts on one side of the cart are fastened to its base and fitted with a bare-faced tenon as shown, the hinges on this side being screwed to the bottom of the post and to the bottom side of the base. The other two posts are hinged on top of the base so that they will fold over the other side. The board used for the rear base should be about twice as wide as the sidepieces, so that the rear end will fold over the side sections. As shown in the photo, the hinges are fastened to the outside and top of this board and to the bottom of the posts, so that they will fold either in or out. By putting the hinges on in this way, the rear section can be folded over the two side sections, or outward so that it may be lowered and held in place with straps when used for a bed. The top of the cart extends forward and a table for toys can be attached to this extension. The table is made of veneer or thin board and molding and is fastened with hooks so that it can be removed when the cart is folded. Any odds and ends about the home can be used to make it. The size of the wheels and axles is immaterial, the axles being threaded or drilled to hold the wheels on. The rods should be cut long enough to extend 1 in. or so beyond the sides of the cart, and sewing-thread spools are slipped over the axle between the wheels and cart. Rubber pads, cut from an old inner tube and tied over the hubs, prevent furniture from being scratched. Various kinds of seats may be used; a swinging seat attached by means of straps, or a piece of strong elastic buckled or pinned on with strong safety pins. The cart may be used for teaching the baby to sit alone, the swinging seat being lowered to the floor and used as a balancer. At a very early age, long before the infant is strong enough to carry very much weight on its feet, it learns to push the cart. The cart can be strapped to the seat or placed on the floor of an automobile and, if the seat is made of a baby swing or something similar, the child cannot possibly fall or be thrown out of it.

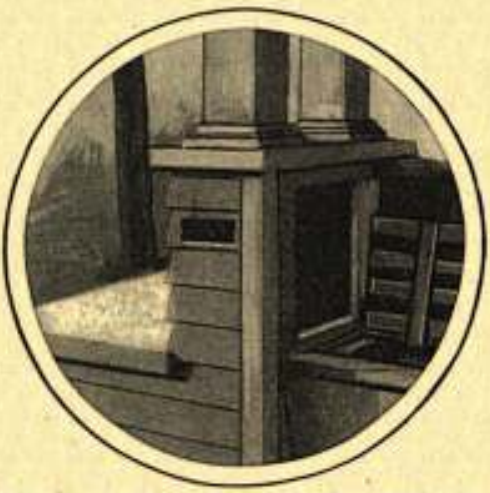


Combination Gocart, Baby Bed and Walker Can Be Used Both Indoors and Outdoors

The same construction may be used to make a cart that does not fold, using small nails or screws instead of hinges. If the cost of rubber-tired wheels is considered too high, ordinary casters will be found equally satisfactory.—Rose Scandlyn-Benziger, Knoxville, Tenn.

Make Your Porch Convenient

One of the most attractive porches in our town offers both convenience and utility. There is a porch bench on each



Built-In Mail Box and Recess under Seat Add to Convenience and Utility of Porch

side and the seat is hinged, forming the top of a recess in which rubbers and umbrellas may be stored. The mail box is also a built-in feature. It is out of the way and out of sight, and is convenient for both mail man and owner. The details are clearly shown in the photo.—Mrs. Ruth Darling Shultis, Albion, Mich.

Protectors for Iron Tent Stakes

Iron stakes have been generally adopted by auto campers. The form made from light channel iron is widely used, but it has one disadvantage: The top soon becomes battered, making the edges so sharp that they are dangerous. During a camping trip last summer, one of the children who was barefoot, stepped on a stake and was injured. A short time later one of the grown folks had a rubber torn off by coming in contact with a stake. As a result of these experiences, we determined to provide some sort of protectors. After some search for the proper

thing, the idea of using short pieces of ¾-in. garden hose was suggested and tried. Each one was 2¾ in. long and a ½ by 1¼-in. hole was cut in the side. This rubber guard is slipped over the top of the stake after it has been driven in.—H. D. Edwards, Huntington, W. Va.

Lowering Auto Mirror

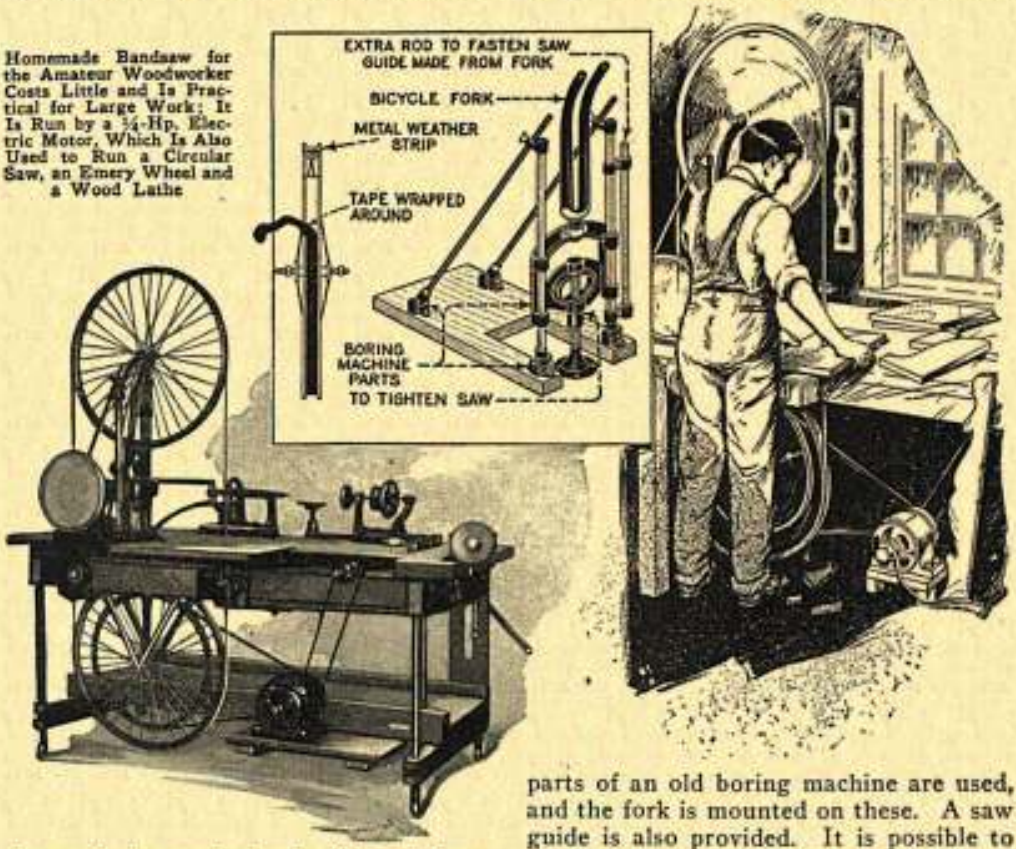
Older Ford cars of the closed type were not equipped with rear-view mirrors, which are very useful under modern driving conditions. The standard mirrors for the late closed cars are quite cheap, and have good, adjustable brackets. However, the wooden strip above the windshield is much higher on the older models than it is on the new ones, and the mirror is so high that it is difficult to use it. A 5 by 6-in. board of 1-in. thickness can be screwed to the wooden headpiece and the mirror bracket attached to this with wood-screws. This will lower the mirror about 2 in. and make it much easier to see. If the edges of the board are beveled, it can be painted or varnished.—E. T. Gunderson, Humboldt, Iowa.

Vermin-Proof Icebox Drain

Cockroaches and other vermin will not get into the icebox through the drain, if it is arranged as shown in the drawing. Punch the bottom out of a glass jar. Do not attempt to knock it off, but, resting the jar bottom on soft earth, punch out the bottom with an iron rod. Enlarge the drain hole in the floor to receive the jar, as shown, using wire, nailed to the floor, to hold it in place. Seal all openings around the neck with plaster of paris. A funnel may be used to catch the drippings from the icebox or, if desired, a pipe leading to a drain in the cellar may be used as long as it does not extend up through the floor. The insects will then be unable to climb up the glass.—W. F. Saunders, St. Louis, Mo.

Homemade Bandsaw

If the amateur woodworker does not feel justified in purchasing a manufactured bandsaw, he will find a homemade one, of the type shown in the photo and illustration, entirely practical and sufficiently large for all the work he may wish to do. It consists of two bicycle wheels, mounted above and below the bench as indicated. The wheels are held by means of bicycle forks. A ¼-hp. electric motor, belted to the lower wheel, runs the device. Each wheel is wound with a layer of friction tape to prevent the saw blade from slipping. To loosen and tighten the top wheel, parts of an old boring machine are used, and the fork is mounted on these. A saw guide is also provided. It is possible to use the same motor for running a circular saw, emery wheel and small wood lathe, all mounted on the same bench.—C. F. Wilhelm, Kitchener, Can.



Homemade Bandsaw for the Amateur Woodworker Costs Little and Is Practical for Large Work: It Is Run by a ¼-Hp. Electric Motor, Which Is Also Used to Run a Circular Saw, an Emery Wheel and a Wood Lathe

Air Leaks in the Water-Pressure Tank

The pressure in a tank belonging to a house-pumping system is maintained by air pressure applied to the water. If the air escapes, the water will not flow through the pipes, and if the water pressure goes down while no water is being drawn off it means that the air leaks out at some joint. Leaks usually occur above the water line and between two riveted plates. To locate them, apply a strong solution of soap and water to the different joints and connections of the tank with a brush. Any leak will show in the form of bubbles. If it is a small leak at a seam or rivet head, take a cold chisel and hammer and tap the plate edge or the edge of the rivet head directly above the leak until the two metal sections are forced together. If this method fails, it will be necessary to call in a boiler worker or competent plumber. If the leak occurs at a fitting, a slight turning up with a wrench may remedy the trouble. —L. B. Robbins, Harwich, Mass.

Workbench Vise Made from Auto Jack

A good vise for the workbench can be made from a spare auto jack at practically no expense. Bolt a heavy piece of steel

Improvised Vise Consists of a Discarded Auto Jack of Heavy Plate Clamped to Workbench

plate to the front of the bench to project above the top several inches. Clamp the jack to the bench top, as indicated, so that the top end of the jack will be opposite the top of the steel plate. This is accomplished by spiking or bolting a block of wood to the bench to support the jack properly. If necessary, cut a slot in the bench top for the end of the foot of the jack to rest in. Fasten the jack to the bench by means of two flat-iron clamps. These should be just the right length to hold the jack to the bench securely, when the bolts are driven down. By pumping on the handle, the head of the jack can be moved backward or forward. A screw-motion jack will be found most satisfactory for this purpose.

Easy Way to Empty the Range Boiler

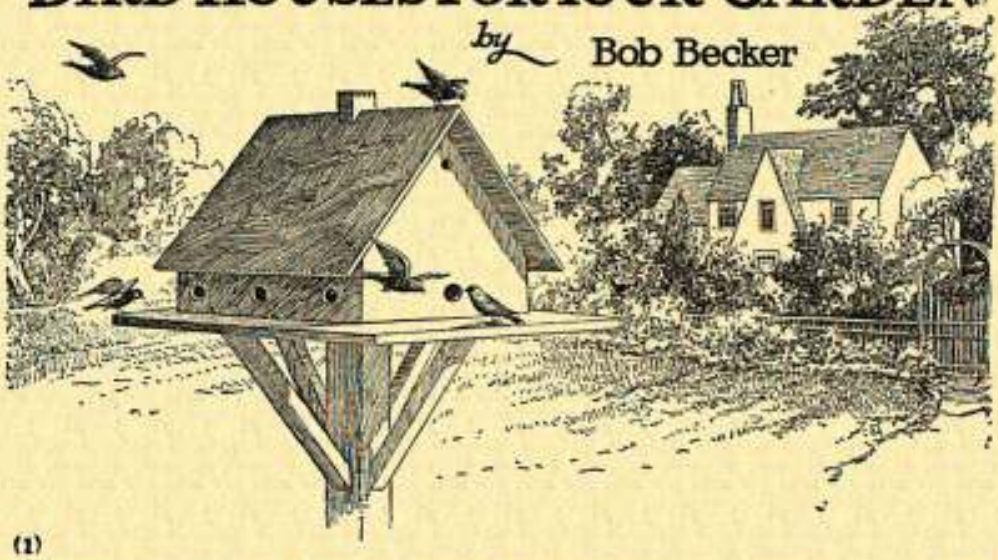
Emptying the range boiler is usually a difficult task for the amateur plumber. The hot-water pipe unions must often be broken to let air into the top of the tank. This is itself hard to do and the joint usually "weeps" when it is made up again. My tank had a standard compression cock with a smooth nose. In the washing-machine equipment, there was a short piece of hose with a clamp and a male hose-coupling thread. This was slipped on the cock and the hose clamp tightened. A length of garden hose was screwed into this and the other end was connected to the ejector used for emptying the washing machine. The cold-water inlet valve on the boiler was then closed, and the drain cock and a hot-water cock at the kitchen sink were opened. Then I started the ejector in the laundry. Some air began to enter the valve at the kitchen sink and the suction of the ejector was strong enough to drain the water out of the pipe between the sink and the tank. The water held in the section of pipe below the kitchen floor ordinarily prevents air from entering the top of the tank. When this pocketed water had been sucked over into the tank, the water at the ejector was turned off. The water then ran freely from the tank until it reached the level of the discharge of the ejector. Then I started the ejector again and soon had the tank empty.—L. B. Robbins, Harwich, Mass.

Flytrap Made from a Flowerpot

An excellent flytrap may be made from an old flowerpot, a glass and an ordinary saucer. The pot is inverted and raised on three small blocks of wood. The glass is placed over the hole in the bottom of the pot, and a saucer, with a little sugar in it to attract the flies, is set underneath. The flies enter the space at the bottom of the pot to reach the sweet bait, and when satisfied, they fly to the top through the hole in the pot and into the inverted glass. The flies may be removed by placing a card between the two receptacles and then immersing the glass in water.

BIRD HOUSES FOR YOUR GARDEN

by Bob Becker



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PRACTICALLY every home owner likes to have song birds nest around his house, as the peppery little wrens, robins, bluebirds, woodpeckers and other common species not only appeal strongly to one's interest and affection, but are a distinct economic asset, since they feed on noxious insects and on the seeds of plants that are anything but welcome in the garden.

If you want to attract these feathered friends to your home it is easy to do so by providing nesting boxes for them, and you can make these at home for almost nothing. With no more than a saw, hammer, nails, some scrap lumber and a can of paint, any home mechanic can make a wide variety of bird boxes of pleasing design that will not only look good to the songsters, but will also add a delightful touch to the garden.

The first question that comes up is: What size shall we make the bird homes? Different varieties have different tastes in nests, and the boxes must be suited to the birds for which they are intended, or else the invited guests will not use them. For example, a martin house, as shown in Fig. 1, should have over-all dimensions, on the floor space, of 18 by 18 in., divided into 6 by 6-in. compartments, as shown in Fig. 11. The compartments should be 6 in. deep also, and the entrance holes 2½ in. in diameter and placed about 1 in. above the floor.

For the average bird box, wood is by far the best material; metal is not good, because it conducts heat easily, and the nests become too hot. Use an easily worked wood, like pine or cypress, the latter being the better because it resists decay so well. However, successful bird houses can be constructed from almost anything in the shape of wood: Rough slabs of sawmill waste, such as is sold for kindling, thin lumber from a packing box; in fact, any kind of wood that will make a rainproof shelter and not be so thin as to go to pieces easily, or make the nest too warm.

Of all the birds we have secured as tenants of our garden apartments we like the house wrens best. They are regular little alarm clocks, always full of life, and they "sing their heads off" from morning till night. Wrens are the least fastidious of nesting birds; anything from an old shoe to a tin can suits them, but they do appreciate a house built especially for them. The ideal wren house has a floor space 4 by 4 in., 6 to 8 in. deep, with the entrance from 1 to 5 in. above the floor. Up to a few years ago, the standard specifications for a wren-house entrance called for a round hole the size of a quarter (15/16 in.), and this seemed to suit the birds

(2)

very well. Now, however, the bird lover has taken into consideration the wren's habit of carrying into its box short sticks for the nest, and he specifies that the entrance shall be a horizontal slot, 3 in. long and as wide as a quarter. This enables the nest builder to get its sticks into the box without much trouble. This type of entrance is shown in the house in Fig. 4. In Figs. 2 and 3 are shown two other types of wren houses that can be adapted to other birds by simply changing the dimensions. The log-cabin type, in Fig. 2, is most easily built by using dowel sticks, ¾ in. in diameter, notching the corners as in regular log-cabin construction and either chinking the joints between the logs or lining the inside of the house with thin wallboard for warmth. The "logs" should be stained a dark brown. The dimensions for this house are: ends 5 in. wide and 8 in. high, sides 8 to 10 in. long, and roof and floor to fit. Be sure to allow the roof to project in front and rear to keep the rain out, and waterproof the joint of the roof boards with a strip of roofing paper, tacked over it.

The type shown in Fig. 3 is a very attractive one, and is made very simply, using a piece of pine for the back and sawmill-waste slabs for the front, sides and roof. Proportion the box as specified before. The house in Fig. 4 is also very simple to make, either from plain boards or from rough slabs. Make the floor 10 in. long and 4 or 5 in. wide. The sloping sides of the box are 10 in. long.

All our wren houses are fastened about 7 ft. above ground, on the garage, the house and on trees. Under no circumstances

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should a wren house be placed more than 9 or 10 ft. above the ground.

Attractive wren houses can be made from gourds, and all you have to do with them is to bore a ⅞-in. hole through the side, tie a string around them, and hang them up. Although metal nesting boxes are not recommended, a tomato can will make a wren nest in the absence of anything better. Cut off the top and, with the pliers, bend in the rough edge so that it will not injure the bird. Punch a couple of holes through the lower side at the "entrance" so that a twig for the birds to perch on can be wired to the can, two more in the "roof" so the can may be hung to a tree and two in the bottom for good drainage. Then give the can a coat of green paint and hang it up in a shady spot.

The bluebird, a handsome, gentle-voiced songster, is easily attracted to a bird house, so, if you

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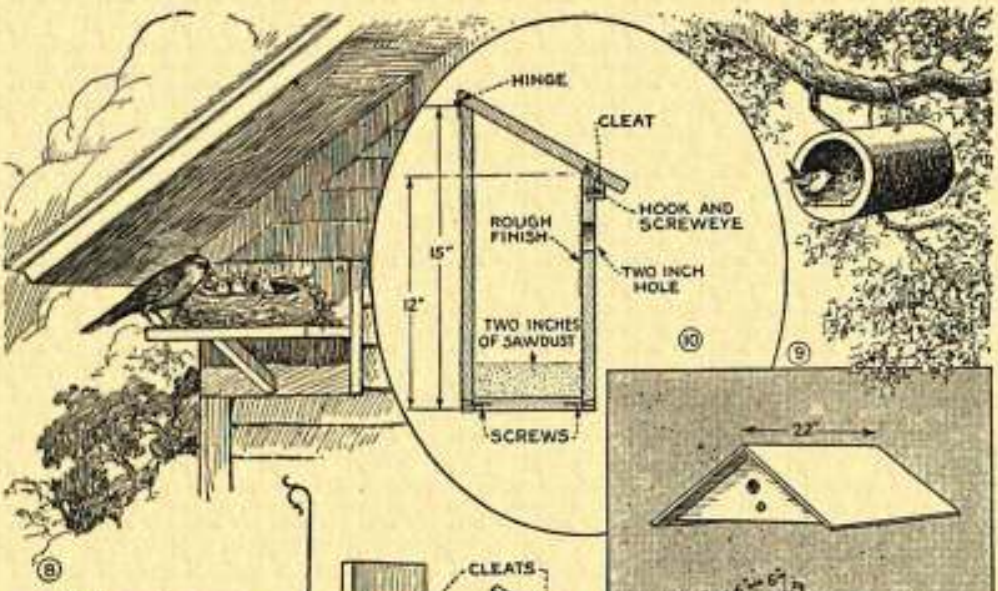
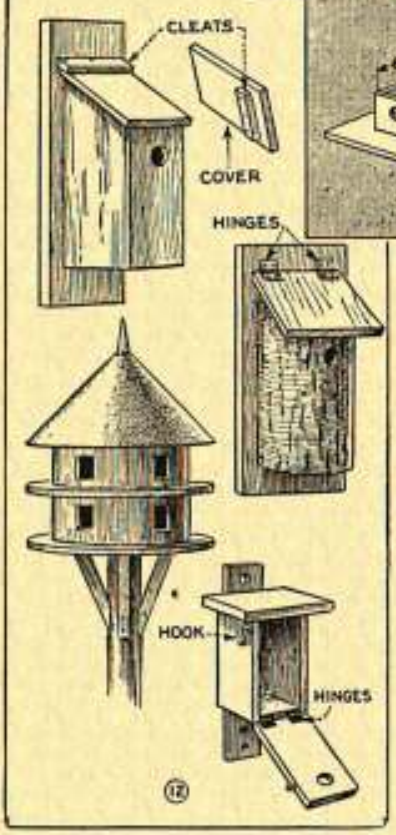
live where these birds are found, you will be well repaid for the trouble of making homes for them. This bird is partial to orchards, and the houses may be placed on the trees, from 5 to 10 ft. above the ground. Be sure to make the boxes with removable tops, so that you can peep into the nests during the mating season and see how the young ones are getting along. Boys and girls find this kind of natural-history lesson great fun.

I have made three kinds of bluebird houses, all of which have pleased the birds. One was made from ordinary packing-box material, with a hinged top, as shown in Fig. 5, the second from ½-in. white pine, with a hinged front, as in Fig. 6, so that the young birds could be examined. Both of these were painted green. The third was made from rough slabs with the bark left on, exactly like the wren house in Fig. 2, except that the dimensions were larger. The floor of a bluebird dwelling should be 5 by 5 in., the depth of the cavity 6 in., the height of the entrance from the floor 6 in., and the entrance should be 1½ in. in diameter. I recommend the rustic type because it looks





so well in garden or orchard.

The flicker or yellow-winged woodpecker is another good-looking bird neighbor to have around the yard. If you want to hang up a "for rent" sign for this fellow, make a box as follows: Floor 7 by 7 in., 17 or 18 in. high, and with an entrance hole 2 in. in diameter, about 15 in. above the floor. Better make the top removable, or hinge it, so you can get into the box without any trouble. There must be at least 2 in. of sawdust in the bottom of the box so the birds will have nesting material, and the inside of the front piece of the box should be roughened so that the birds can climb to the entrance. In one flicker house that I constructed, I used for the front board a slab of maple with the bark left on, turning the bark side to the inside. When the house is finished, paint it green (unless it is of the rustic type) and place it with the long axis vertical in a sunny place, from 9 to 15 ft. above the ground. Details of the construction of a house of this type are given in Fig. 10.

Usually it is unnecessary to make any overtures to the robins, so long as natural nesting places are provided by shrubs and trees. But when these are lacking you can entice the redbreasts by putting out nesting platforms for them. These should be of weathered lumber or of wood with the bark on. I have one of the latter type at the corner of an open porch under the eaves. A pair of birds grabbed it immediately, so that we had a continual "robin show" through the nesting season, until the young birds graduated and left

the yard. For the shelf, use one backboard, 11 in. wide and 6 or 7 in. high. Then nail on a flat shelf of the same dimensions; nail it to the backboard and brace it as shown in Fig 8. Two heavy nails or screws will fasten it to the house, shed or garage. The same type of shelf will often attract phoebes, as these birds (who are death on insects) like to build a nest on a veranda or under the eaves.

Barn swallows also like shelves, and they are beautiful birds to have around. They have no bad habits, and narrow cleats or small shelves nailed to rafters in a barn or shed is all they require. Sometimes they will occupy a narrow shelf under a porch corner.

Details of construction for the martin house are given in Fig. 11. This should be ready early in the spring so as to attract migrating birds. Once started, colonies of martins usually return season after season, but don't forget to oust the English sparrows, who will want to take possession of the house.

Details of the houses with hinged and removable tops and fronts are shown in Fig. 12, as well as an alternative design for a martin house.

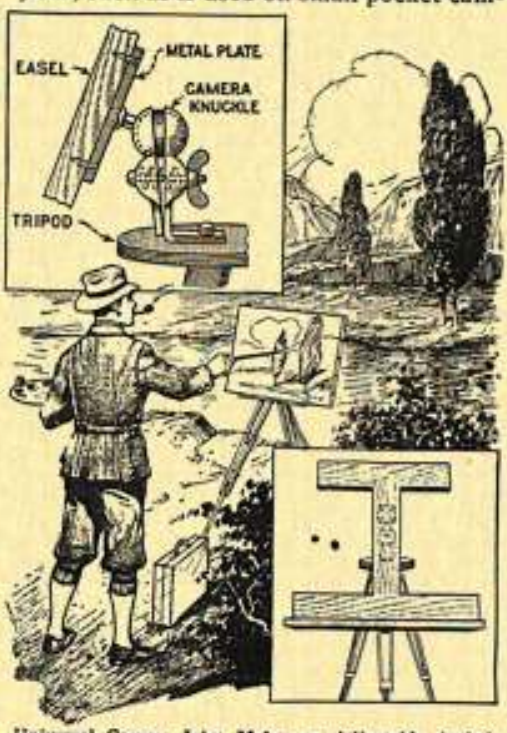
When the houses are finished, there is one general rule to bear in mind in erecting them: Wherever possible let them face the south, thus keeping the entrances away from prevailing winds and storms. Also, fasten them rigidly and securely, as birds prefer houses that do not shake. Hang up some string and some colored yarn in proximity to the houses, and you should have no difficulty in inducing the birds to take possession of their quarters.

Quick Method of Labeling Bottles

An easy and timesaving method of labeling bottles is to use quick-drying, transparent lacquer, obtainable at almost any hardware store. The side of the bottle is given a coat of lacquer with brush or spray gun, the label is firmly pressed on and the face of the label is then lacquered. In a few minutes the lacquer is dry and the bottle ready for use. The labels are not affected by water or other liquids, except alcohols. The method is especially suitable for the photographer because the labels do not wash off.

Adjustable Easel on Camera Tripod

Artists who frequently make outdoor sketches, will find the adjustable easel shown in the drawing of considerable use. A small easel is mounted on a universal joint, such as is used on small pocket cameras, and the joint is attached to a tripod as indicated, making the whole assembly portable. A metal plate is screwed to the back of the easel and a hole is drilled and tapped to accommodate the screw end of the joint, to permit easy disassembling. This easel can be adjusted to any desired height or angle, and being light, is especially useful for field work.—Guy E. Clark, Everett, Wash.



Universal Camera Joint Makes an Adjustable Artist's Easel for Field Work

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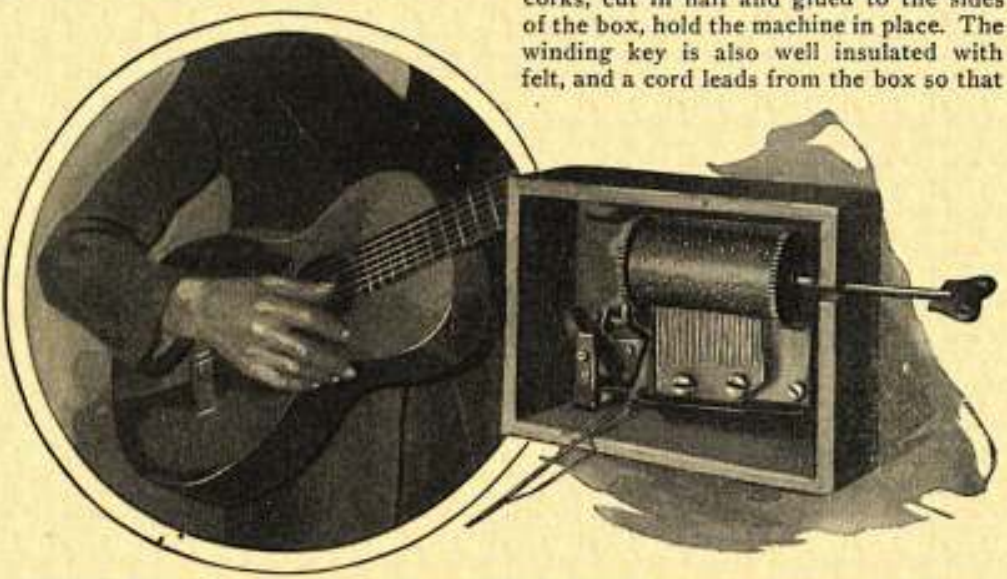
Cement for Metal and Glass

A cement that will hold brass to glass consists of the following ingredients: red ocher, 2 oz.; rosin, 15 oz.; beeswax, 3 oz., and plaster of paris, 1½ oz. I used this cement for holding brass stripping to the glass in an aquarium and found it entirely satisfactory.—Philip C. Shera, Columbus, Ohio.

Mysterious Music Box

By using the device shown in the photo anyone can play a guitar, violin, ukulele or similar instrument by merely holding it in his arms. The music really comes from the instrument but the performer does not have to play it. The secret lies in a small music box kept in the performer's right-hand coat pocket. Such a music box can be purchased for about $1. It is carefully fastened inside of a small cigar box so that the winding key projects. A needle, also projecting outside of the box, is soldered to the frame of the machine. Heavy felt is used to line the box wherever the machine is likely to touch the wood, and corks, cut in half and glued to the sides of the box, hold the machine in place. The winding key is also well insulated with felt, and a cord leads from the box so that a pull will release the trip, which starts the mechanism. When the box is placed in the performer's pocket, the needle projects outside so that an instrument held against it acts as a resonator.



Anyone Can Provide Mysterious Music on a Guitar, Violin or Similar Instrument by Means of a Small Music Box Concealed in the Pocket; a Projecting Needle Makes Contact with the Instrument

How to Cut Mica Washers

Did you ever try to cut a mica washer with a knife or a pair of shears? A good method of doing this is as follows: Measure the diameter of the intended washers and select a gouge of which the blade curvature conforms to the circumference of the washers. Lay the sheet of mica on the butt end of a block of hardwood and mark off the circle with a compass. Then use the gouge as a vertical cold chisel, placing the cutting edge over the pencil line and striking the handle a sharp blow with the hammer. Move the chisel around the circle in this manner until the disk is cut out. The inside opening can be cut out in a similar manner with a smaller gouge or, if such a tool is handy, with a belt punch of a suitable size.—L. B. Robbins, Harwich, Mass.

Coconut Ash Receiver

A novel ash receiver can be made from a coconut shell. It is mounted on a small ornamental wooden stand cut out to support it. The long fibers may be allowed to remain on the shell and the rough edge filed down until it is smooth. By applying a coat of varnish and adding a match-box holder, the tray will be quite attractive.

Building a Monorail Coaster

By L. B. ROBBINS

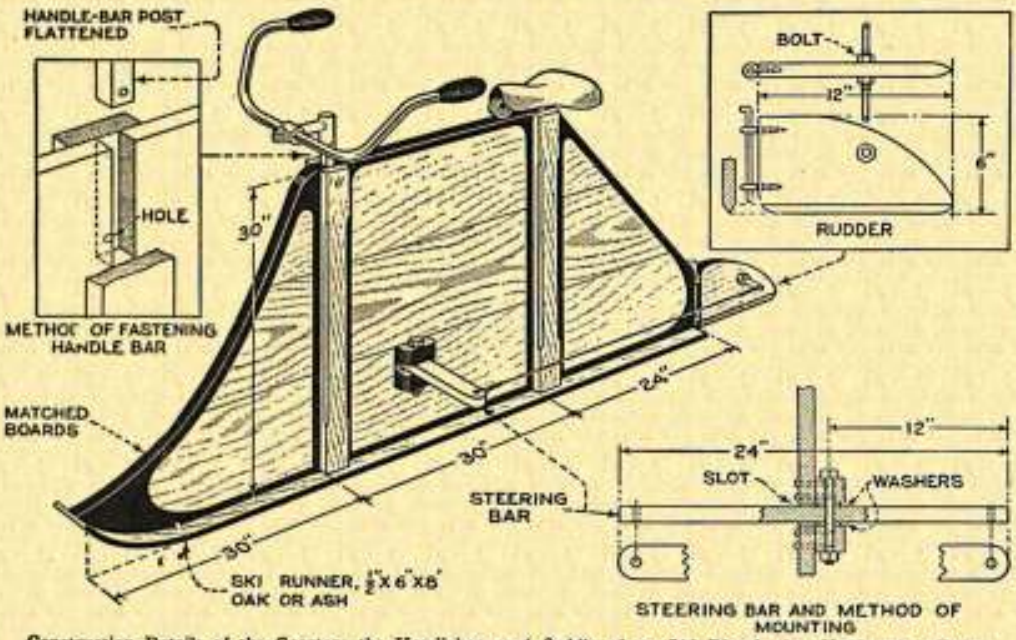
HERE is a winter coasting device that is a sort of combination ski and bicycle. It is used for running down long, smooth snow-covered hills and will afford much fun for the lover of speed.

The body of the coaster is made by cleating together several smooth, matched spruce boards, 7 ft. long. Their width is immaterial but the total width should be about 30 in. First put on the two back cleats, one on each side, with screws. Place these at right angles to the edges and 24 in. from one end. Let these two cleats project beyond the top edge about 3 in.

Now, 30 in. ahead of these cleats, saw a vertical notch down through the top board, for a depth of about 6 in., and make it 1 in. wide. This is for the handlebar post. Then screw two cleats over the boards at this point so as to completely cover the notch. Be sure to draw the boards well together before cleating and to countersink the screw heads. Then saw the rear ends of the boards off at an angle, as shown, so the last 8 in. of the rear will be vertical. Also cut out the front in a sweeping curve, as shown, commencing just in front of the forward cleats and ending it 8 in. from the bottom. The bottom should then be curved down in a sweep to its long straight edge.

The ski runner had best be made from a piece of oak or ash, 8 ft. long, 6 in. wide

and ½ in. thick. Fasten it to the bottom edge of the body with brass screws, countersinking the heads only slightly. The back end should be flush with rear of the body, but the front end should project up and beyond the point. This curve is



Construction Details of the Coaster; the Handlebars and Saddle of an Old Bicycle Are Used and a Foot-Steering Arrangement Is Provided

easily obtained if the wood is steamed or soaked in boiling water before attempting to fasten in place. Sandpaper the runner smooth and oil with linseed oil.

The handlebars can be taken from an old bicycle. Flatten the post so it will fit down in the notch in the body and drill a hole through it and corresponding holes through the cleats for a retaining bolt, to hold it steady. The seat may also be an old bicycle saddle and can be bolted to the top between the two rear cleats, as shown. The saddle type used will determine how this should be done.

Then comes the steering arrangement. This consists of an iron bar 24 in. long, 2 in. wide and stiff enough to stand your weight. Have a pivot hole drilled 11 in. from one end and a small hole in each end for the steering cables. Cut a horizontal slot in the body, 10 in. from the bottom, and at a point between the cleats convenient to the feet when sitting in the saddle. Bolt two hardwood blocks above and below this slot and drill a hole down through them. This is a pivot hole for a long bolt, which should be driven down through the blocks and through the pivot hole in the steering bar. Be sure to have the 11-in. end of the bar on the blocked side of the body.

The rudder is cut out of a piece of hardwood, 12 in. long and 6 in. wide, to the shape shown in the detail. Sharpen the bottom edge and fasten a long bolt through the middle, near the top edge. Drive a pair of heavy screweyes into the vertical edge of the rudder to fit close to another pair in the end of the body. A steel pin, run through the screweyes, allows the rudder to swing from side to side. Drill a hole in each end of the bolt and connect them to the ends of the steering bar, as shown. Use small steel wire and line the rudder up so it will be exactly in line with the runner when the bar is at right angles to the body.

Give the entire body two or three coats of bright-colored paint, to protect it from moisture and give a sporty appearance.

Starting from the crest of a long hill, this monorail coaster is ridden exactly like a bicycle except that the steering is done with the feet on the steering bar. A slight movement either way moves the rudder and changes the course of the coaster. Be careful of attempting to take too sharp curves however. The best speed can be realized by wearing a hard-packed path down the slope by several descents and following this track as closely as possible in all later trips.

Nickelplating by Friction

In nickelplating iron, a thin coating of copper can first be produced on it by rubbing on a solution of 20 parts of sulphate of copper, 5 parts of sulphuric acid and 100 parts of water. After the copper plate has been formed rub over it, with a rag, a solution of 3 parts tin, 6 parts nickel and 1 part iron in 100 parts of hydrochloric acid and 3 parts of sulphuric acid. If finally the object is rubbed with a rag that has been dipped in finely pulverized zinc, a nickel deposit will be made on the copper. The thickness of the nickel deposit can be increased by repeating the two last operations. A silver coating can be produced by dissolving freshly precipitated chloride of silver in a solution of hyposulphite of soda, 1.1 parts to 10 parts of water, and adding to this solution 180 parts spirits of sal ammoniac and then stirring in 800 parts of finely washed chalk. This mixture is applied and rubbed until it dries on the object being silvered, and the result is a brilliant deposit of pure silver.

Holder for Washing Photographic Films

Photographic films can be effectively washed in the sink by means of the simple device shown in the illustration. A short length of ⅜-in. pipe, threaded at one end, a ⅜-in. pipe flange and a section of rubber hose are the only materials needed. With the hacksaw, cut a slot, lengthwise through the pipe, about 1 in. greater than the width of the largest film to be washed, as shown in the detail. Screw the pipe into the flange and fasten this to a wooden standard which should be high enough to permit the film to hang down into the sink without touching the bottom. The film is held with a clip. A length of rubber tubing is slipped onto the water faucet and over the end of the pipe and the water is then allowed to run slowly. It will flow down both sides of the film and clean it thoroughly.—Harold Nowell Whitmore, Cleveland, Ohio.

Folding Stepladder Extension

A stepladder that can be opened up so that it becomes almost twice as long, is a convenient part of the household equipment. As shown in the drawing, half of the ladder is part of an ordinary stepladder, and the second half is simply a short ladder of the usual type. The two sections are joined by means of two metal straps with a rung between them on which the top ladder slides in slots cut in the rails. A hook attached to the lower half is swung out to slip over the bottom rung of the upper half to hold it rigid when extended.—A. C. Cole, Chicago, Ill.

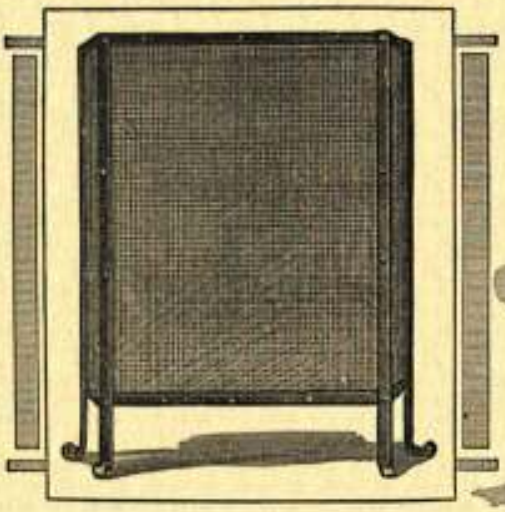
Dual - Purpose Ladder Can Be Used Outdoors as Well as Indoors

Cleaning Center-Guide Float in Carburetor

Many carburetors are fitted with hollow metal floats having a tube through the center. The inlet needle works in this tube and any roughness or dirt here will cause trouble by too high or too low a fuel level. A good method of cleaning out the inside of the tube is to remove the float and draw a rag soaked in metal polish through it. Repeat this several times and then draw a dry rag through the tube. If the opening is still rough, roll up a piece of very fine sandpaper or emery cloth, insert it in the tube and pull this back and forth until the surface is smooth. Finish by using metal polish on a rag. The inlet needle should also be treated with metal polish. Care should be taken when using sandpaper in the tube through the float, as any holes made here would allow the float to fill with gasoline.—E. T. Gunderson, Jr., Humboldt, Iowa.

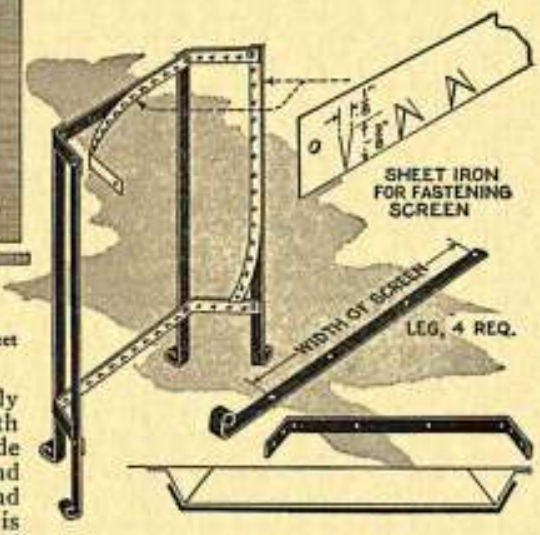
Making a Fireplace Screen

Sparks from fireplaces sometimes set houses afire and frequently cause other



Fireplace Screen Made from Strips of Flat Metal, Sheet Metal and Copper Screen

accidents. This danger could be greatly reduced if fireplaces were protected with screens. These can be purchased or made at home; the one shown in the photo and illustration is simple in construction and can readily be made by anyone who is handy with tools. The frame is made of 5/16 by ¾-in. bar iron, which can be obtained from a blacksmith or a hardware dealer. With a hacksaw, cut off four lengths for legs, making each leg 4 in. longer than the height required for the frame. Form a foot on one end of each, as shown. This can be done by heating the iron, then clamping it in a vise and bending and hammering it into shape. The legs must, of course, be uniform in shape and dimensions. Drill ¼-in. holes in each to receive stove bolts with which crosspieces are attached, the length of which is determined by the width of the fireplace. If there is a projecting hood above the opening the screen should be bent to conform to its shape as shown in the lower right-hand detail. In any case it should be bent approximately to the form shown, making the front legs project forward at least 4 in. beyond the rear ones so that the screen will stand securely. Cut strips of 24 or 26-gauge sheet iron about ¾ in. wide. With tin snips one edge of these strips is cut to form points, as shown. Bend these points up at right angles and attach the strips to the crosspieces and to the end legs as indicated. It is then an easy matter to attach some copper screen by slipping it over these points and then bending the points over. Be sure that the screen is drawn up straight and true. It is held stretched and smooth by ½ by ⅛-in. iron bars, cut to fit over the strips of sheet metal holding the screen, holes being drilled through the bars to fit over the stove bolts. The projecting edges of the screen are carefully trimmed off and the rough edges and corners of the metal



FIREPLACE HOOD

strips filed down.—Howard E. Good, Waterville, Ohio.

Copper Stencil for Marking Laundry

A stencil suitable for marking laundry may be easily made as follows: Obtain a small sheet of very thin sheet copper, about 1 in. wide, and 4 in. long. Dip this in a vessel containing some melted beeswax so that both sides will be evenly covered with a thin coat when it cools. The design, name, monogram or figure that is wanted in the stencil should now be drawn upon a piece of thin white paper, the reverse side of the paper blackened with graphite, and then laid on the stencil plate with the design in the center of the plate, whereupon the design is lightly traced with a blunt point on the thin wax coating. After the paper is removed, trace the design on the wax surface with a pointed instrument, but not completely, the lines being broken at more or less regular intervals, to form holders so that, after etching, the design cannot fall out.

Next lay the stencil in a shallow dish and pour a small quantity of fresh nitric acid over it. Keep the air bubbles removed from the surface of the sheet by means of a piece of soft feather or brush. The design will be eaten out in a very short time where the wax has been removed, and this may be readily observed by holding the stencil plate up to the light. The acid should then be rinsed off with water, and the wax removed by heating and wiping it off with a cloth. The stencil may be given a final cleaning in a dish of benzine or gasoline, which will remove any remaining wax.

Novelty Lampshade Revolves on Stand

A lampshade turned by the heat from the bulb can readily be made for the type of electric lamp in which the bulb is mounted upright at the top of a supporting base. Remove the regular shade and replace it with a special shade made of fairly transparent parchment or colored bond paper. This shade may be made either cylindrical or square. The top of the shade is of cardboard, and is cut so that it has small blades or fans like those of a windmill wheel. The center has a dent punched in it to rest upon the small tip of the bulb. Thus mounted, there is almost no friction and the rising heat from the lamp through the fan blades of the top causes the shade to revolve slowly. Figures can be cut from black paper and pasted to the shade or

Novel Parchment Lampshade Which Is Rotated by Rising Heat from the Lamp

other light ornamentation of the kind shown may be added and will make it quite attractive.

Old Ford Crankcase Used for Feeding and Watering Hogs

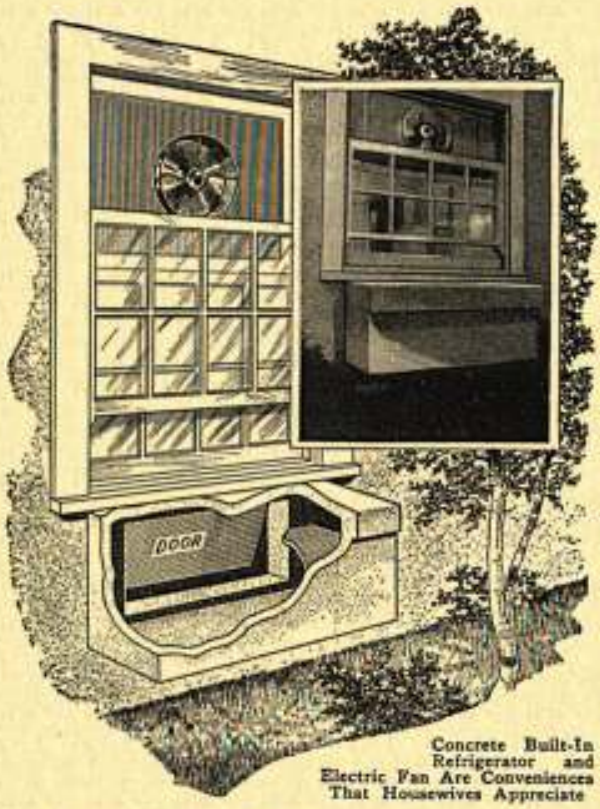
Crankcase Makes Hog Trough

Instead of throwing away an old discarded Ford crankcase, one farmer made use of it as a trough for watering and feeding his hogs. A small hole is dug in the ground under the fence to receive the crankcase, the narrow end of which projects outside of the hog yard. This arrangement enables the farmer to pour the slops into the crankcase without spattering it on his clothes or having the pigs rub their snouts against his shoes.

Locating Breaks in Tire Casing

Breaks on the inside of tire casing that are large enough to wear the inner tube, are sometimes difficult to find when the tire is removed from the wheel. It is a good plan to roll the casing by hand on the floor, bearing down on it heavily. This gives the effect of a tire about half down, and causes breaks on the interior to show up plainly inside of the flattened portion. This is a good method to use with small tires, but larger tires are usually too stiff to be flattened in this way.—E. T. Gunderson, Jr., Humboldt, Ia.

¶When you have a hole in your pocket turn the pocket inside out and cover the hole with adhesive tape.



Concrete Built-In Refrigerator and Electric Fan Are Conveniences That Housewives Appreciate

Concrete Window Refrigerator

Made of concrete, the refrigerator shown in the drawing is a considerable improvement upon the wooden window box, which is quite common. It is built as part of the wall of the house and opens into the kitchen. There is a drop door, the inside of which is heavily padded with heat-resistant material to prevent the heat from the kitchen from getting through to the food. Inside of the box there is the usual shelving. Built as thick as it is, this window box not only serves to keep things cool without freezing during the winter but also helps keep out the heat in summer. If desired, ice can be used.—Felix J. Koch, Cincinnati, Ohio.

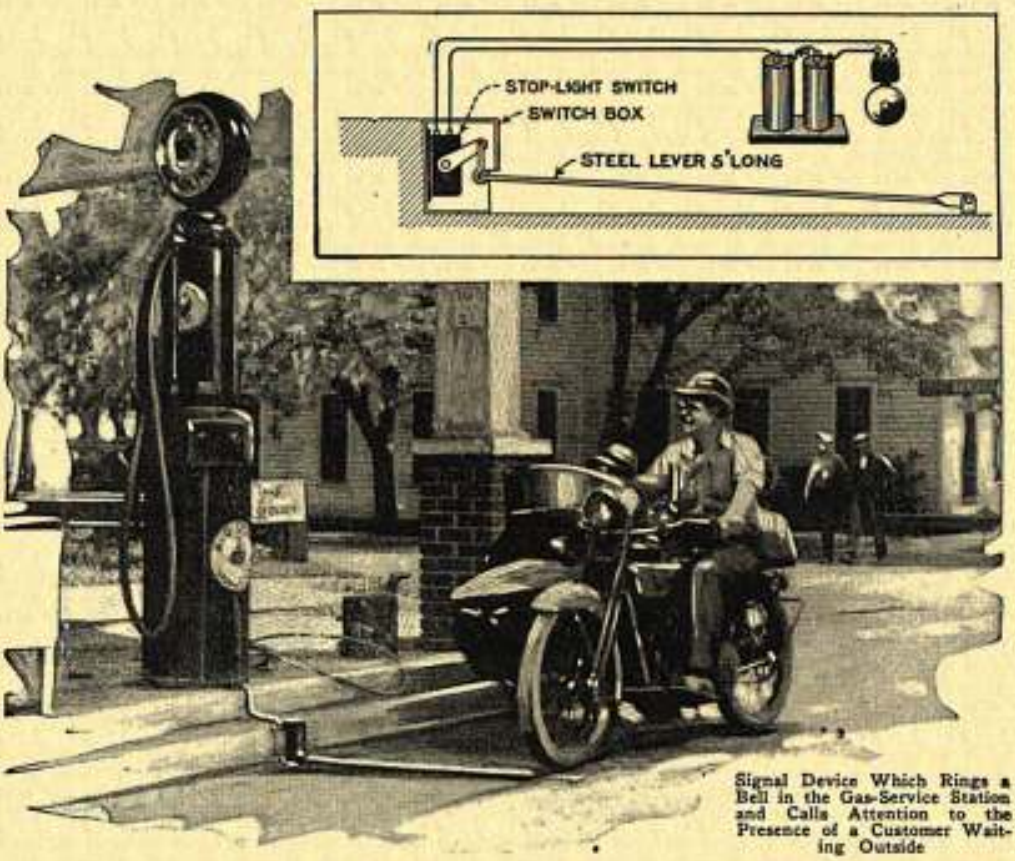
How to Make a Humidity Indicator

A simple weather indicator that may be used in determining the condition of the atmosphere is made as follows: Dress a small figure, in the form of a doll, with a piece of cloth, previously dipped in the following solution: Chloride of cobalt, 30 parts by weight; sodium chloride, 15 parts; gum arabic, 7½ parts; calcium chloride, 4½ parts and water, 400 parts. This cloth will change color as the amount of moisture in the atmosphere changes, the change being due to the cobalt salt, which, in dry air is lavender blue. As the moisture in the atmosphere increases, the color changes first to bluish red, then light red and finally pink, according to the amount of moisture. With a decrease in moisture, the colors change in the reverse order, and the blue color returns when the air becomes dry.

Sheet-Iron Foot Scraper

If one wishes to depart from the conventional style of foot scraper, here is an idea that may be of value. The scraper can be cut out of sheet iron with a cold chisel, the pattern resembling an animal or bird. In the drawing, one scraper is made in the shape of a dog, the other resembling an owl or parrot. In making them, be sure to use heavy sheet iron, especially if the pattern calls for some of the metal to be cut away at the base. The outline can be drawn on the metal with chalk and then cut out with the chisel. It does not matter if the outline is ragged or a bit irregular, as it can be filed smooth later. As the scrapers are set in concrete blocks, part of the sheet metal underneath the design is allowed to remain so that it can be anchored in the concrete.

Ornamental Foot Scrapers Resembling Animals and Birds Improve the Appearance of the Doorstep



Signal Device Which Rings a Bell in the Gas-Service Station and Calls Attention to the Presence of a Customer Waiting Outside

Bell Signal for Service Station

As a signal to call his attention to the presence of a customer, the owner of a gas-service station installed the bell-ringing device shown in the photo. The insert shows the arrangement and wiring diagram. A steel lever about 5 ft. long is laid in the auto track so that the car must ride over it. When this takes place, a switch is closed for an instant and causes a bell to ring, which may be located at any convenient place in the station.—C. O. Cole, Wichita, Kans.

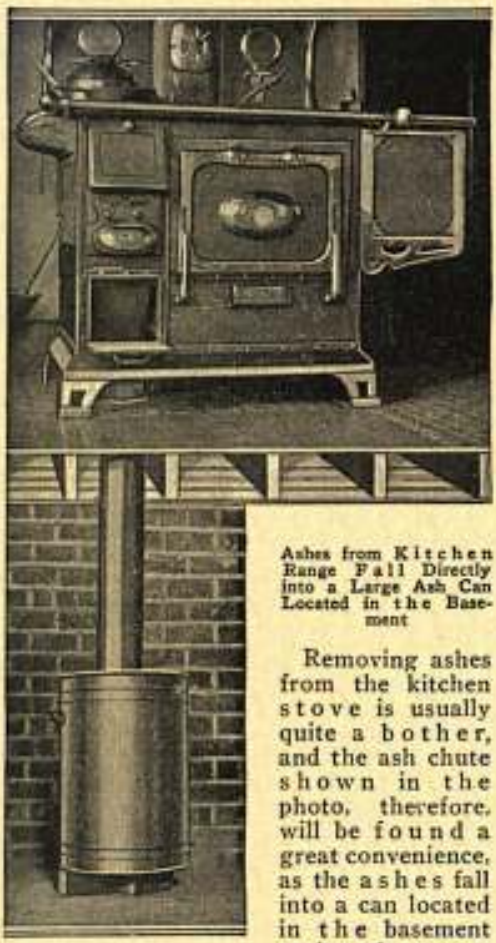
Treating New Paintbrushes

Failure of good paintbrushes to render service usually is due to improper treatment before dipping them into the paint. They should be thoroughly cleaned before they are used. Work them against the hand or a board until all dust and loose hairs are worked out. Then place the brush in clean water and let it remain there until the hairs are well saturated. Finally, shake out all the water and allow the brush to dry. When so treated, new brushes will last longer and will work better.—L. H. Georger, Buffalo, N. Y

Wash-Basin Base for Lamp Prevents Fire

Dangerous fires have been caused by ordinary lanterns accidentally knocked over. To eliminate this hazard, one farmer mounted his lanterns on ordinary tin wash pans. These provide such a wide base that there is practically no danger of the lantern upsetting. The edges of the lantern base are soldered to the bottom of the wash pan. When soldering, the oil should, of course, be removed.—L. M. Jordan, Vredenburgh, Ala.

Removing Ashes from Kitchen Stove



Ashes from Kitchen Range Fall Directly into a Large Ash Can Located in the Basement

Removing ashes from the kitchen stove is usually quite a bother, and the ash chute shown in the photo, therefore, will be found a great convenience, as the ashes fall into a can located in the basement under the stove. The ordinary ash pan is removed, and a stovepipe brought up from the basement, as indicated. A galvanized-iron hopper with sloping sides and a short circular pipe at the bottom takes its place. The short pipe fits in the top of the stovepipe leading to the ash can.

Making Glass Transparencies

A great number of the amateur photographers have made glass transparencies by contact printing, using regular photo plates instead of paper. Few have gone farther than this, either framing or just binding the transparency so that it can be hung up in some location where the light shows through it. A better way is to make the transparency in the usual way and use a clear glass for a backing, placing a sheet of thin, colored tissue paper between the two glasses and then binding the glasses with gummed tape. In this way different effects can be obtained by using the same view with colored tissue papers, or by placing bright-colored tin foil between the two glasses. When using the tinfoil plan, there will be no transparency from side to side of the photo but from the front only and the picture can be placed in any location where there is light on its surface. The bright foil underneath will bring out the picture clearly.

Saw Vise from Old Bed Rails

An old bed rail, picked up in the junk yard, can be made into a serviceable saw vise by the home mechanic. The horizontal bars, which form the jaws of the vise, are cut 14 in. long, and notched in the center to admit the vertical members. The two sets of bars are drilled and tapped, the holes being countersunk on the inside of the jaws. Draw up the screws tightly, saw off the parts projecting outside of the jaws, and rivet over to prevent loosening. The vertical bars should not exceed 16 in. in length. The fulcrum bar, bolted to both vertical bars, should keep them ½ in. apart. Drill a 15/32-in. hole in the lower end of the outer vertical bar and tap for a ½ by 2-in. capscrew. This, when forced against the opposite bar, brings the jaws together firmly. The fulcrum bar should not be over 10 in. below the jaws. Attach the vise to the workbench with one or preferably two short pieces fixed to the inner vertical bar, as shown.

Useful Saw Vise for the Home Mechanic Made from Old Bed Rails

Writing Cabinet for the Library Table

By GEO. H. CAPPEL

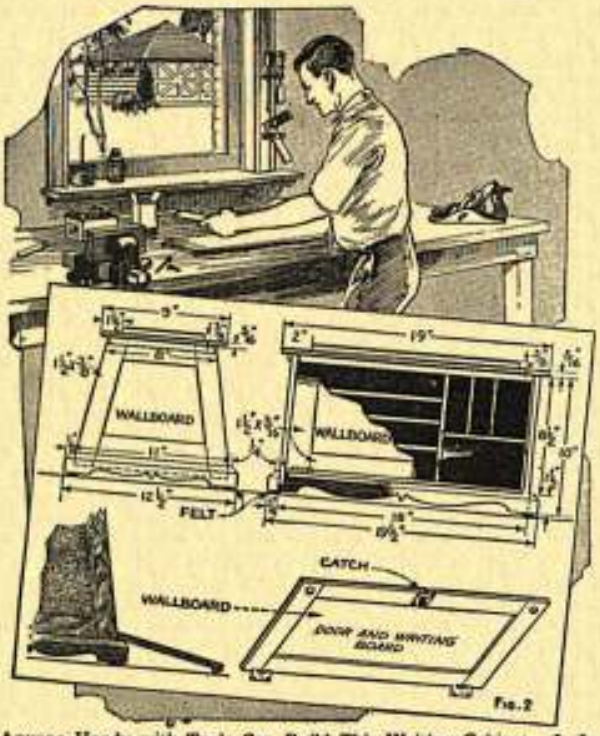
AN attractive and roomy writing cabinet, which is set on the library table and will easily hold all writing materials, paste, etc., can be made by anyone handy with tools and careful to follow instructions. Ordinary wallboard may be used for the back, front or writing door, and for the end panels, while cypress is used for the top, base and edges.

The cabinet is 19½ in. long, 12½ in. wide at the base and 9 in. at the top, and is 10¾ in. high. This is about the most convenient size for the ordinary library table. The sides, back and front are made first. The wood is glued to the wallboard and then tacked on the inside so that no nails will be exposed. The base is then put on. The curved lines are first penciled off carefully and then cut out with a scrollsaw. The bottom, which also may be of wallboard, is next put in place; it is held by wooden cleats, nailed inside of the sides, back and front. The top is a nicely grained piece of cypress, nailed to the back and end with headless nails, which are sunk with a nail set and the holes filled with putty or wood filler. The door is then fitted in place; it is hinged to the base with two or three small nickel hinges and a catch, which can be obtained at any hardware store. If desired, a lock may be used. The inside is partitioned off to suit the user. Thin stock is used for this purpose. Pieces of felt or rubber-head tacks are used on the bottom of the cabinet and on the door, where it rests on the table when open.

All the woodwork is stained with asphalt thinned with gasoline, rubbed off with a cloth, followed up with two applications of shellac, applying the second coat after the first has dried thoroughly. It is finished with wax, which will give a neat appearance. The panels or exposed parts of the wallboard are papered with wall paper, to match that of the room. This will make quite a novel and unusual type of writing cabinet.

Paneled Writing Cabinet Is Designed to Stand on the Library Table and Has Plenty of Space for All the Writing Materials

The method of staining previously mentioned gives a golden-oak finish, of a depth depending on how much the asphaltum is thinned. For a fumed or mission-oak finish, use wood dye or a similar penetrating stain, smoothing the rough surface, after staining, with fine sandpaper and finishing with wax as before. Varying shades of oak, walnut and mahogany can be obtained in the wood dyes, so that the cabinet can be finished to suit the furniture in the room.



Anyone Handy with Tools Can Build This Writing Cabinet. It Is Made of Cypress and Wallboard

Where prepared dyes and stains cannot easily be obtained, the amateur can make his own. Mahogany stain may be made by dissolving Bismarck brown in alcohol. Mission-oak finish may be obtained by exposing the wood for a day or two to the fumes of strong ammonia (28 per cent) in a tightly closed box. If the wood is moistened with water just before exposure, the resulting stain will be darker than if fumed dry. The surface must be sandpapered after fuming and before waxing or oiling.

If a varnished finish is desired, the surface should be filled, using a good paste filler, applied, after staining, in the manner specified by the maker. The filler must be well rubbed off, when dry, with fine shavings or cotton waste, rubbing across the grain. After sandpapering, the wood is ready for the varnish.

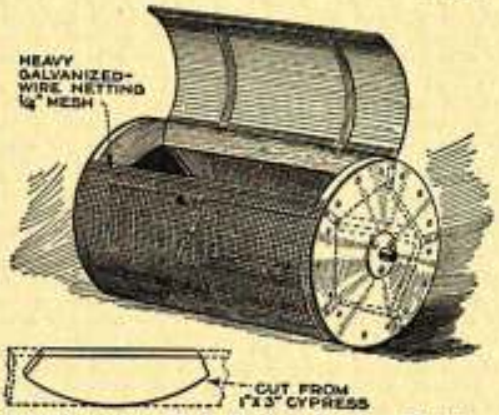
Improving Roofing Paint

Tar or asphalt roofing paint makes a lasting and very cheap covering for a tin roof even though it is badly pitted with rust. A great objection to many of these preparations, however, is the fact that they are black and absorb so much heat as to make the house perceptibly warmer.

In recent tests of black and white paints as applied to oil tanks, it was found that the latter rose in temperature only 19 to 22° and lost only 9 per cent of their naphtha content as compared to a temperature increase of 54° in tanks covered with black paint. Obviously similar conditions hold true where the roof of a house is coated white or black. A cheap and effective method of overcoming the objection to the use of asphalt paint is to dust its surface with beach sand or finely powdered stone of some light color. The paint will soften when the sun shines on it so that the stone or sand will stick.

Rebuilding Washing-Machine Cylinder

The revolving cylinder in our electric washing machine began to wear out The perforated metal covering around the cylinder was breaking from hole to hole, which let the clothes work through and tear. However, the two ends, the wooden crosspieces and the lid were still in good condition, as was the rest of the machine. A new cylinder would cost $28, so I decided to rebuild the old one myself. After carefully removing the worn-out coverings from the ends where they were rimmed together, I sawed ten pieces of 1 by 3-in. cypress to the shape shown in the detail. These pieces were placed from one crosspiece to another entirely around the ends as shown by the dotted lines, and were fastened to the metal ends with cop-



Galvanized Wire Mesh Used to Repair a Washing-Machine Cylinder

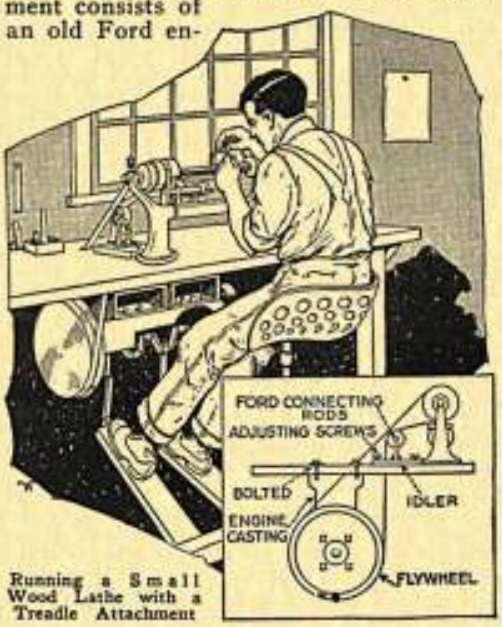
per screws. This braced the crosspieces and also served as a base to fasten the edges of ¼-in. galvanized-iron mesh. I used the 24-in. width and as the cylinder was 22 in. long, this permitted overlapping the mesh about an inch to fit inside of the edge of the cylinder. Starting at the crosspieces where the lid is hinged, I fastened the mesh by using 5/16-in. round-head bolts, 3¾ in. long, placing the heads inside of the cylinder so that they would be drawn slightly into the wood when tightened up and would leave no sharp edges to tear the clothes. I lapped the ends of the mesh about an inch to get a better hold. A strip of sheet brass was placed between the wood and the mesh. The bolts were then tightened after placing a washer under the nut. The sheet brass was turned over the nuts, after cutting off the ends of the bolts, and screwed down to cover the rough edge of the mesh. The mesh was then drawn around the cylinder, putting in a few temporary screws to hold it in place. It was fastened to the other side of the lid opening on the crosspiece in the same way as before. Putting this netting on was a rather tedious task but it has proved entirely satisfactory.—S. E. Schofield, Indianapolis, Ind.

Burnt Match Receiver

During fire-prevention week, the children in our schools were required to contrive some novelty that would aid the purpose. Our eight-year-old lad noticed how a dangerous fire had once started in our kitchen by dropping a still blazing match into a receptacle near the stove. So he decided to prevent a recurrence. Taking an empty tin can, he pierced the bottom with a large nail, pressed the oval lid in place at the top and then placed the can in an inverted position near the stove. The burnt matches are dropped into the container through the holes, and when full, the can is emptied. The matches seldom continue to burn after they are dropped into the can and if they do, the flame soon goes out.—Rev. Lewis F. Freyberg, Zanesville, Ohio.

Driving Small Wood Lathe by Foot

The treadle attachment on a wood lathe shown in the illustration has been used successfully for two years. The attachment consists of an old Ford engine block with the crankshaft, two connecting rods and a Chevrolet flywheel. The flywheel was turned down and holes drilled in it so that it would fit on the end of the crankshaft, and the face crowned to keep the belt on. An idler pulley is fastened to the bench top to permit adjustment of the belt. Two connecting rods are used to support the idler pulley and these are fastened to a block of 1-in. wood, which has slots cut in it and is held to the bench top with screws and wingnuts. The pedals are hinged to a crosspiece under the bench and are connected to the crankshaft.—J. P. Kincaid, Durant, Okla.



Running a Small Wood Lathe with a Treadle Attachment

Starting Furnace Fire with Gas

For starting a furnace fire quickly, one man bent a 2-ft. length of ¼-in. gas pipe to a 45° angle and attached to it a length of rubber hose, which he connected to the nearest gas fixture. When the furnace fire is desired no kindling is used, but this improvised gas burner is held under the grate and in a few minutes the coals will glow. This method is perfectly safe and eliminates chopping of kindling, which is more or less difficult to get in large cities.—Mrs. V. S. Martin, Detroit, Michigan.

Lighting the Fish Bowl

An illuminated fish bowl, which is attractive in the den or parlor, can easily be constructed in the home workshop. The

Electrically Illuminated Fish Bowl Adds to the Appearance of the Parlor

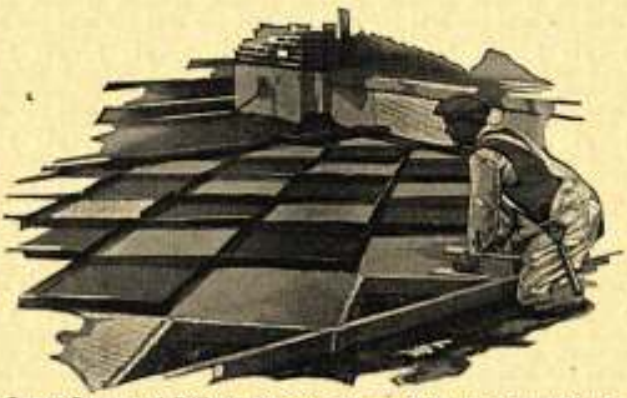
stand shown is 12 in. square by 4 in. high, but the size will, of course, have to be varied according to the size of the bowl, which in this case is a cylindrical jar. If a wood-turning lathe is available, the stand may be turned round, although a square stand is the easiest to make. A square of cardboard with a circle cut out equal to the diameter of the bottom of the bowl is inserted under the ground glass, to prevent the light from escaping around the sides of the bowl. Illumination is provided by a 6-volt lamp which can be run on a bell circuit obtained by the use of a bell-ringing transformer. The stand may be stained or varnished to harmonize with the furniture, and be made as elaborate as desired. Two small holes should be drilled in the rear to permit heated air to escape.—R. B. Clifton, Denver, Colo.

Avoiding Battery Trouble

Regular use of a good hydrometer is the only way to know whether or not a storage battery is getting a proper charge. The heaviness of the acid is the only true indicator of the condition of the battery and the hydrometer measures this. Never leave a battery in a discharged condition and, whether in use or not, don't leave it without attention for a long period of time. When not in use, a fully charged battery will become one-third discharged in a month or so. Neither should a battery be overcharged. The gassing produced if this is done disintegrates the active material in the plates. Keep the battery well charged in winter. This may necessitate increasing the charging rate over the summer normal. A fully charged battery cannot freeze. Keep the hold-down bolts tight, or the box will be damaged and the terminals are likely to be loosened, due to shaking of the battery which allows acid to creep up around them. Also, sediment will settle between the plates and cause an internal short circuit. Never add anything but distilled water to the electrolyte; boiled water won't do. And never fill the battery with "trick" solutions.—A. C. Cole, Chicago, Ill.

Sidewalks of Colored Squares

Quite a novel departure in the construction of cement sidewalks is shown in the photo. The pavement is made up of large colored squares. The colors are mixed in the cement in separate batches, which should be worked up carefully. Wooden frames of 2 by 4-in. lumber are used as forms, and tar paper is placed between adjacent squares to keep the colors from running together. It is not necessary to use colored cement for the entire thickness of each block; the base can be made of ordinary concrete and a ¼-in. thickness of cement applied on top. Ground colors for cement work can be purchased at any paint store.—M. A. Ayers, San Francisco, Calif.



Large Squares of Different-Colored Cement Make an Unusually Attractive Sidewalk

How to Make Your Boat Watertight

Simple Method Makes Old and Leaky Boats and Canoes as Good as New at Small Cost

THERE is nothing more annoying, upon reaching the summer camp on the lake or river, than to find the canoe or boat, after its long storage during the winter, gaping at the seams and ready to go to the bottom as soon as it is launched. Or to embark on a fishing trip, after looking the boat over and deciding that it will do all right, and then spend the better part of the day in laborious bailing instead of fishing. The usual remedy is to sink the craft in shallow water and wait until the wood swells and closes the seams, but, while this will work in a majority of the cases, the owner is deprived of the use of the boat for a period of several precious days.

The hull, of course, can be calked, but, after this is done, the owner is very likely to have the whole job to do over again next season, thus wasting more time. There is a way, however, to get rid of the annual overhaul, or wetting of the boat, or the continuous bailing, a way that will insure a dry boat not only this season but next also, and the season after that, with no more work to be done after

Scraping the Boat in Preparation for Waterproofing, Melting the Glue and Applying It to the Hull with a Wire Sink Brush

the first job. Boats treated in this manner have been known to stand up for twenty years without further attention, and without necessitating the bailing of a single drop of water other than that deposited in them by the rain. The hull is also considerably stiffened, a factor of decided importance when an outboard motor is used, and the useful life of the boat increased by years.

Method of Covering Seams Where Entire Boat Is Not to Be Covered

This method of waterproofing a boat demands no expert knowledge, and is not expensive. The only things necessary are a supply of marine glue sufficient to cover the boat properly, some cotton cloth, a kerosene stove to heat the glue, a brush, some tacks and a hammer, and some old flatirons. The marine glue used should be Jeffery's No. 7 black, soft marine glue, or special marine canoe glue, according to the type of the craft. One pound of the glue will waterproof 3 sq. ft. of surface, so it is necessary to figure the area of the hull in order to get the correct amount to order. The cloth used should be heavy unbleached cotton cloth, of firm, close weave, which can be obtained at any dry-goods store. It must be purchased in one length, wide enough to cover one side of the boat completely, allowing for all curves, and a yard or two more than twice as long as the boat. It is cut in two, and each length used to cover one side of the boat. If the boat is clinker-built (lap-straked), it is well to cover the whole side, carrying the cloth to the gunwale. If carvel-built (smooth-sided), it will only be necessary to carry the cloth a few inches above the waterline.

The first thing to do is to scrape all the loose paint from the hull and remove all dirt and oil. Then remove the stem band at the bow, and, starting from the stern, stretch the cloth over one side of the boat, tacking it to the transom and the bow. Do the same with the other side, using ½-in. copper tacks, and allow the cloth to remain on the hull for about 24 hours. This stretches the cloth and makes it conform somewhat to the shape of the hull. When stretching, see that there are no slack places in the cloth. After the time specified, remove the cloth pieces and mark them for their respective sides.

Now melt the marine glue in any kind of suitable container over the stove, using a moderate flame and stirring it frequently. If a kerosene stove is not at hand, the glue can be melted over a small fire, but care must be taken that the flame is not too hot, as the glue must not be allowed to boil. The glue should be cut into small pieces before melting, and it should be carefully watched until it will drip from the stirring paddle like oil, when it is ready for use. It must be used as promptly as possible, and it must be liquid when used or it will not fill the seams properly. Apply it with a wire sink brush, or failing this, with the stub of a small whiskbroom, which, however, must be stiff and well bound. Apply a heavy coat to the entire surface to be covered. Now tack the end of one piece of canvas to the stern of the boat and start drawing it tightly toward the other end. Draw it as tight as possible and tack at the bow. Next tack along the gunwale, stretch, and tack along the keel. If the cloth is wetted before applying, it can be stretched more easily, and, when it shrinks, it will hug the hull more closely. However, if it is wet, care must be taken that it is thoroughly dry before the next operation.

The next step is to iron the cloth down into close contact. This can be done with either a flatiron or a gasoline or electric iron, which can be cleaned afterward with gasoline. The application of the hot iron causes the glue to sweat through the cloth. The iron must not be used as in ironing clothes, but rather with a wobbling motion, on its own axis, and it must be passed in this manner over the entire surface of the cloth, until the latter is black. The operations on the other side of the boat, are, of course, exactly similar to this. The iron must not be too hot, as this will prevent the cloth

from sticking to the hull; a little experiment will enable the user to determine the proper heat. No excess of glue should be allowed to remain on the surface of the cloth, as this will later "bleed" through the paint. The cloth from both sides must lap over the entire width of the keel, and be perfectly ironed down; similarly at the bow. The cloth must lap over the sternpiece or transom about 1 in. and be well ironed down also. Trim off all rough edges and overhanging lengths of cloth.

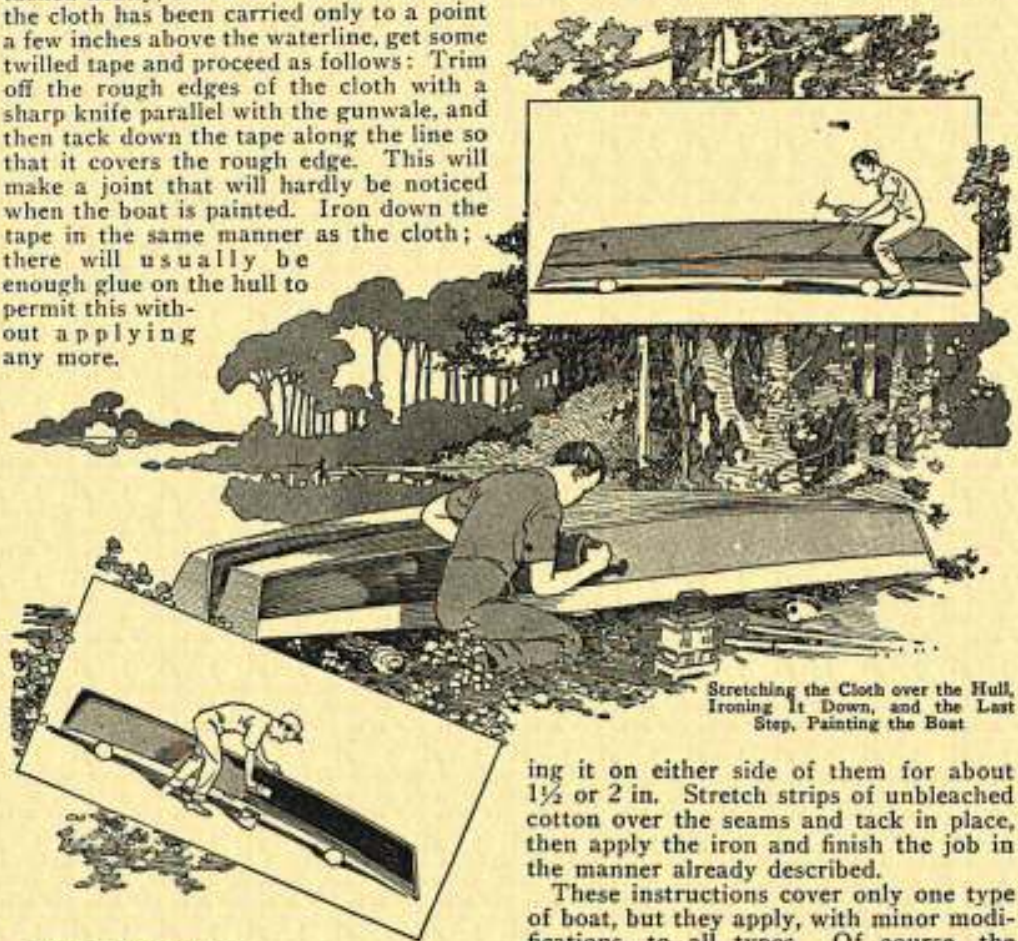
Now cut two pieces of the cloth about 2 in. wide, and long enough to reach from the keel to the gunwale along the joint between the side boards and the transom, and tack along the joint, allowing 1 in. on each side, then iron down into place. Feel all over the bottom of the boat for lumps caused by a little too much glue, and iron these down smooth.

If the boat is clinker-built, the cloth need only be trimmed at the gunwale and tacked neatly, but if it is carvel-built, and the cloth has been carried only to a point a few inches above the waterline, get some twilled tape and proceed as follows: Trim off the rough edges of the cloth with a sharp knife parallel with the gunwale, and then tack down the tape along the line so that it covers the rough edge. This will make a joint that will hardly be noticed when the boat is painted. Iron down the tape in the same manner as the cloth; there will usually be enough glue on the hull to permit this without applying any more.

After ironing, apply one or two coats of orange shellac to the entire hull, to prevent the glue from discoloring the paint, and, when the shellac is dry, paint the boat. Any good paint can be used for the purpose, and if a good finish is desired, the last coat should be well rubbed down with pumice and linseed oil, and two coats of good spar varnish applied. This last operation should be done in a warm room, free from dust.

When an old boat is being waterproofed, the keel and stem pieces should be removed, if possible, until the process is complete. When replacing them, they should be set in marine glue, to avoid leaks at the screw holes.

When it is desired to cover only the seams of a boat, proceed as shown in the small drawing. Melt the glue as before, and only as much as is required for immediate use. As it is used from the melting pot more can be added from the can. Apply a heavy coat to the seams, spreading it on either side of them for about 1½ or 2 in. Stretch strips of unbleached cotton over the seams and tack in place, then apply the iron and finish the job in the manner already described.



Stretching the Cloth over the Hull, Ironing It Down, and the Last Step, Painting the Boat

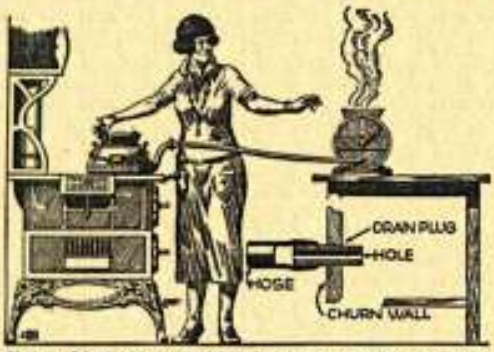
Courtesy L. W. Ferdinand Co.

These instructions cover only one type of boat, but they apply, with minor modifications, to all types. Of course, the

owner may vary them to suit his own boat; for example, on a flat-bottom boat with no keel it is feasible to apply the cloth in one piece, although it may be found more difficult to get a smooth job. If the job is done with care, a boat waterproofed in this manner will last a lifetime, and any small holes that it may acquire later in service can be patched in a half hour by the same methods.

Steam Churn Sterilizer

There are times when the churn is not scalded out immediately after it has been used, and this neglect makes it necessary



Simple Method of Sterilizing Churns and Other Utensils with Steam

to resort to more effective methods of cleansing. A simple method of sterilizing and deodorizing a musty churn is shown in the illustration. A hole is drilled in the drain plug of the churn, and the plug is connected to the spout of a water kettle by means of a length of rubber hose. In order to prevent steam from escaping, flatirons or other weights are placed on the lid. As is apparent, steam under considerable pressure can be forced into the churn, so that every corner is reached and thoroughly sterilized. A cork is used to plug up the hole in the drain plug when the hose is removed.

Preventing Ladders from Slipping

Anyone who has used a long ladder against a frame building knows its tendency to move sideways when one is working on one side. This danger can be eliminated in the following way: Tack or glue some strips of coarse emery cloth or sandpaper to the top ends of the stringers. Pieces of old inner tubing may also be used for this purpose. With the tips of the stringers so provided, many accidents will be eliminated.

Damp-Proofing Cement-Block Houses

Cement-block houses make attractive, durable and economical dwellings. They need no periodical painting and are comparatively easy to construct. However, there is sometimes a serious drawback to this kind of building, for unless properly treated, the walls often absorb considerable moisture from the air, and become too damp inside for comfort. To overcome this dampness it is necessary to coat the outside walls thoroughly with a thin mixture of pure cement, 1 part, and water 16 parts. This mixture is best applied with a whitewash brush and should be well worked into the pores of the cement blocks as well as into the cracks between them. It is advisable to wait one week before applying the second coat. In a rather dry climate one coat is sufficient. One sack of cement should be ample for double-coating an ordinary residence.

Novel Napkin Rings

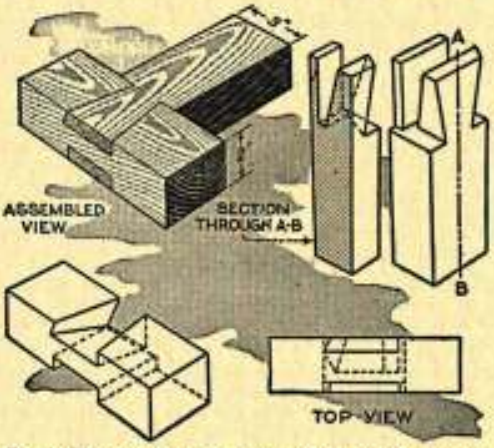
On arriving at our summer cottage in April we found that we had failed to take along napkin rings, and as we did not like to use paper napkins and did not have the equipment to wash linen ones, the use of rings or some other method of identification was necessary. For a few days we used pins with different-colored heads as a makeshift, until I went to Portland where I hoped to buy some cheap rings, but as I could find none, I had to return without them. My wife declared something must be done as the pins were ruining the napkins. On looking over my negatives I found an overexposed film and the idea came to me that neat rings could be made from them. I soaked the film in a solution of hot water and baking soda and soon the emulsion was thoroughly stripped and the clear celluloid base was left. I cut the piece into strips, 1¾ by 5¼ in. in dimensions, and punched holes through each end ½ in. apart and about ⅛ in. from the edge. A piece of baby ribbon of a different color for each person completed the ring. These rings were so neat that everyone who saw them commented on their tastefulness.—Charles A. Blake, Peak's Isle, Maine.

Keeping the Garage Warm

I have a neighbor whose garage is built as an addition to his home. When he put in his furnace, he cut a hole through the cellar wall and brought a pipe through it to a register in the floor of the garage directly under the engine. Now, no matter how cold the weather is, his car can always be started in a few moments; in fact, the whole car is kept warm, so that occupants are less likely to contract colds by sitting on chilly seats. There is, of course, a door opening from the house into the garage, and, therefore, it might be thought that exhaust gases would be present to a dangerous degree. However, as the car never needs warming up, the only fumes are those made while running in and out.—W. Mehanna, Bussey, Iowa.

Joint Puzzles Woodworkers

The interesting puzzle joint shown in the illustration, is within the scope of the average amateur and will perplex many an experienced woodworker. It is a combined bridle and dovetail joint. Any kind of wood can be used, but hardwood, although a little more difficult to work, gives a better finish and appearance, the 1½-in. stock being preferred. The dovetail joint is left much thicker near the shoulder than at the top, to permit the dovetail to slide in place easily. The joint must be



Puzzle Woodworking Joint That Will Perplex Experienced Workers

well glued so that it cannot be pulled apart.—C. Illingworth, Vancouver, Can.

When sewing heavy socks or canvas, powdered rosin on the fingers will aid in pulling the needle through.

Printing with Acetylene Light

In the rural districts and at summer resorts, where electricity is often not available and the amateur photographer has no

Printer Rigged Up with Box and Auto Headlamp

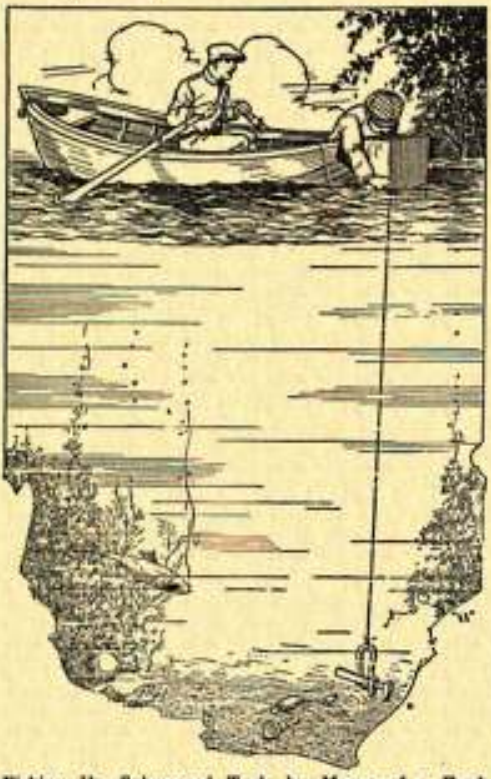
city gas at his disposal, he must give up printing photos unless he decides to do it with a kerosene lamp, which is a very slow process. However, he need not despair, for here is a method of rigging up an efficient printer in a short time. It consists of a shallow, wooden box, about 20 in. long, an old auto or motorcycle headlamp of the gas type, having a good reflector, and a tank of acetylene gas. The lamp is clamped to the end of the box and the tank is connected to the lamp with a length of rubber tubing. A smaller box is placed inside of the larger one, upside down, to serve as a support for the printing frame. With this arrangement printing can be done in one-third of the time required with a kerosene lamp.—C. M. Wilcox, Torrington, Conn.

Repairing Cracked Rubber Battery Jars

It is not necessary to discard a cracked battery jar, for it can be repaired in the following way: Widen the crack to a V-shape with a three-cornered file, so that the widened part of the crack is on the outside. Then get a broken phonograph record and cut off a piece. Place the jar on its side and, with a hot soldering iron, run the piece of record into the crack. When the jar has cooled, a neat, smooth job will be the result.—Frank N. Coakley, Buffalo, N. Y.

Salvaging Submerged Tools

When working over water it sometimes happens that tools fall overboard and are then given up as lost. However, I saved



Fishing Up Submerged Tools by Means of a Ford Ignition Magnet

over $50 worth of tools that had been accidentally dropped overboard, by the method shown in the illustration. All that is needed is a Ford magneto magnet and a length of strong cord. The magnet is securely tied to the end of the string and is lowered to the bottom to make contact with the metal tools; it has sufficient strength to hold them while they are pulled up to the surface.—Elmer M. Creighton, Avalon, Calif.

Pasteurizing Milk at Home

If you cannot obtain pasteurized milk and are doubtful about the purity of raw milk, you can pasteurize it easily at home on the gas range. Take a pail deep enough to allow water placed in it to reach the neck of a quart milk bottle. Place an inverted saucer in the bottom of the pail and set the bottle of milk on the saucer. Pour water into the pail up to the top level of the milk in the bottle. Put the pail containing the bottle and the water on the range and leave it there until the water boils. Then turn off the gas, remove the pail and let it stand, covered, for half an hour. Remove the bottle of milk and cool it quickly by letting cold water run over it. As soon as the milk is cool, place the bottle close to the ice in the refrigerator and keep it there until it is to be used. Boiling milk for three minutes will also make it safe for the feeding of infants.

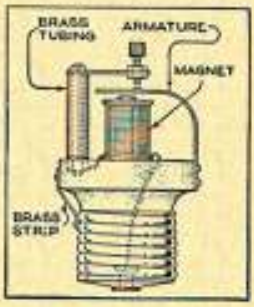
Removing Rusted Auto Wheel

After having failed by all ordinary means to remove a rear auto wheel that had rusted on, I hit on the following plan. I replaced the axle nut and turned it up tight, then backed it off one full turn and replaced the cotter pin. The car was allowed to run for a couple of days in this condition. At the end of that time the nut was removed and the wheel came off easily.—George Lukenbill, Gibbon, Nebr.

A High-Tone Buzzer Easily Made

The high-tone buzzer shown in the illustration, is made to fit into a lamp socket or fuse block, and gives excellent results when used for radio work or for test purposes.

The cap and fuse wire are removed from an ordinary fuse plug. Two small holes are drilled through the mica of the cap, one in the center and the other near the edge. The center hole is used in attaching the electromagnet and the outside hole in attaching the standard. A semicircle must be cut out of the brass edge of the cap around the standard, so that there will be no possibility of a short circuit at this point. The standard is made from a short piece of brass tubing fastened to the mica by means of a small bolt and nut. A portion of the porcelain should be chipped out to admit the nut, so that the cap will fit as tightly as before. The electromagnet is made by winding No. 24 enameled copper wire around a small flat-head bolt between two fiber washers. One end of the magnet wire is soldered to



the contact inside of the bottom of the plug, as shown by the dotted lines; the other end is soldered to the nut holding the standard. After this has been done, the cap can be replaced over the porcelain. A brass strip is soldered to the edge of the cap and to the screw shell of the plug. The armature of the buzzer is made of clock spring. A fillister-head screw is used as an adjustable contact, and small nuts are soldered to the extending arm of the standard to hold the screw in place.—A. D. Keogh, Springfield, Ohio.

Stopping Leak in Wooden Water Tank

A leaky wooden tank can be made water-tight in the following manner: Find the approximate location of the leak, then take some dry cement and sprinkle it inside of the tank close to the staves on the bottom over and around the leak. When the tank is again filled with water, which is necessary to provide sufficient pressure, the cement will be forced into the crevices and will soon set. This repair method applies particularly to attic tanks, where the leak might destroy the plaster of the ceiling below.—W. C. Fink, Springdale, Pa.

Making Perspective Sketches

Sketching buildings and other objects in true perspective is usually difficult for the beginner, but can easily be done with the aid of a piece of clear glass. It is held against a tree or post or in any other way, and the outlines of the building are traced on the glass with a grease pencil. Of course, the glass must not be moved after the work has been started, and the worker must also keep his position exactly behind it while the sketch is being made. After the outline has been completed it is an

Easy Method of Making Perspective Sketches

easy matter to fill in the details.—J. G. Pratt, Washington, D. C.

Corn-Cutting Block

Corn ears can be cut up conveniently on the chopping block shown in the drawing. It consists of a small stump, the top of which is sawed to a V-shape slanting toward one side. This side of the block is cut away so that a pail to receive the cut ears

A Small Tree Stump Can Be Made into a Handy Chopping Block for Corn Ears

that drop will fit closely against it. A looped leather strap is nailed on the opposite side of the block to permit pulling it around or lifting it.

Staining and Painting Laths

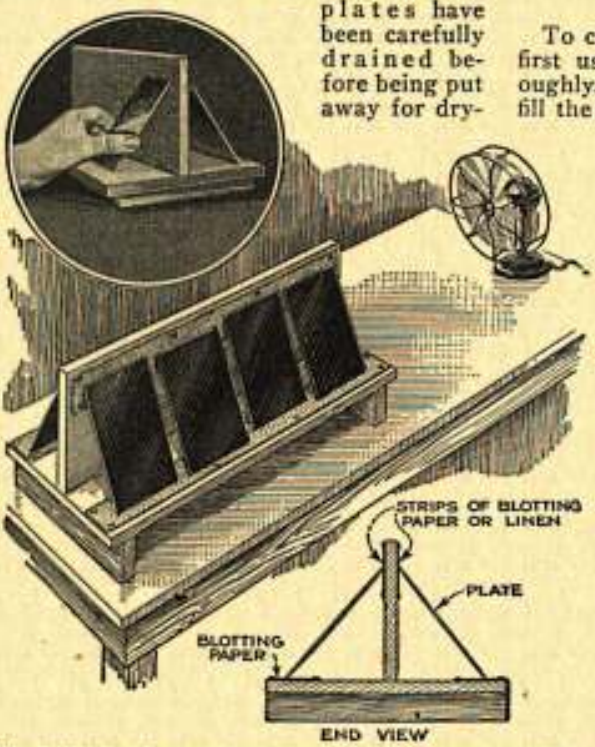
A home builder, making some trellis work of laths, wanted to stain and paint them quickly. He plugged one end of a length of 2-in. pipe, and forced the lower end into the ground so that it would not tip over. Then he filled it with the stain or paint and dipped the laths. This method saved considerable paint and stain.—Mrs. V. S. Martin, Detroit, Mich.

Eliminating Linoleum Troubles

The failure or short life of linoleum is due in many cases to springy, worn-out and decayed boards, loose joints between the boards and large knots. These defects must first be removed to make the linoleum last longer. All the floor felt used will be of no avail unless the foundation is right.

Frame for Drying Plates

Plates and films dry very slowly as the water draining from the sensitive coating collects at the bottom edges. Even if the plates have been carefully drained before being put away for drying, a great deal of moisture accumulates again in a short time and delays the process. In the new drying device shown in the illustration, this accumulation of moisture is prevented by resting the plate edges on strips of blotting paper. These absorb the moisture and spread it over a large surface so that it can evaporate in a few minutes. The framework of the device is made from two boards; a horizontal base and an upright, fixed at the center of the base. Where the plates touch the boards, strips of blotting paper or linen, about 2 in. wide, are tacked on. The friction between the plate edge and the blotting paper suffices to hold the plates in position; if flat films held in metal frames are to be dried with the aid of this device a narrow strip of wood may be nailed to the outside edges of the base, to prevent the frame from sliding off. The film side of the plates should face the base to prevent dust or grit settling on the sensitive side. An electric fan can be set up at one end of the frame, as shown, so that the current of air will hasten the drying.—C. A. Oldroyd, Barrow-in-Furness, Eng.



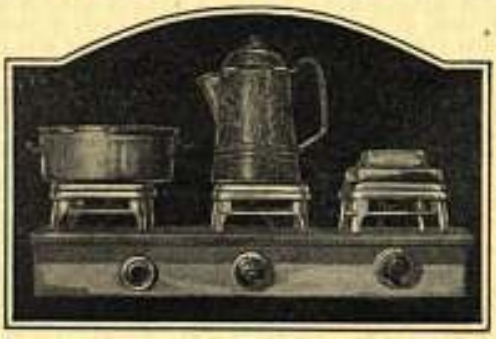
Simple Wooden Frame, with Strips of Blotting Paper Tacked On, Makes a Good Plate Drier

Restoring a Rusted Rifle

To clean the bore of a rifle or shotgun first use soap and water, and dry thoroughly. Cork the chamber tightly and fill the bore with the following anti-fouling solution, which must be freshly mixed at the drug store and kept tightly closed until used: Ammonia, containing 28 per cent gas, 3 oz.; water, 2 oz.; ammonium persulphate, ½ oz.; ammonia carbonate, 100 grains. Allow the solution to remain in the barrel half an hour but no longer, pour it out and immediately dry the bore thoroughly. Scrub it well with a new close-fitting brass-bristle brush. Then repeat the operation with the anti-fouling solution, drying thoroughly immediately after pouring it out, as before. Scrub the bore well for some minutes with patches heavily greased with rust remover, clean out the rust remover and oil the bore.—Earle W. Gage, Ashville, N. Y.

Improvised Electric Stove

Three electric toasters, which can be obtained for a small sum, make a good stove for preparing light meals and lunches. They are mounted on a ¾-in. board, about 6 in. wide and 2 ft. long, which is nailed to 3-in. side and endpieces. The toasters are wired in parallel and each one is provided with a separate single-pole switch, so that it can be turned on or off as desired. The wiring is all done underneath the top.—Milton A. Ayers, San Francisco, Calif.



Improvised Three-Burner Electric Stove for Preparing Light Meals and Lunches

Celluloid Craft for the Home Worker

By HERBERT C. McKAY

FOR those who enjoy home-craft work, there is nothing which will be found to be a more versatile medium than celluloid. This material is now supplied in various colors and various weights. The weights vary from the thin sheets about like heavy wrapping paper to any desired thickness. The heaviest weight ever required will be 3/8 in., and the 1/16-in. stock will be fine for imitation carving. The physical nature of celluloid is such that it may be carved, sawed, cut, turned or manipulated in any desired manner with the utmost ease. It does not split or crack readily, yet its texture is such that it is easily worked, and it is not expensive.

For the first experiments, the thin sheets will probably prove most satisfactory. Provide yourself with a half dozen sheets of celluloid in various colors. You will also want the following equipment: One set of air-drying china colors or a set of enamel colors; three small brushes; one stencil knife; assorted bronzes and celluloid cement. The last is made by mixing 2 parts of acetone and 1 part of amyl acetate. This is the cement used in patching motion-picture film. It is not truly a cement, but softens the celluloid and under slight pressure the softened surfaces of the material unite, making a joint of the nature of a weld.

In these days when the check book is so rapidly taking the place of the purse, the signature blotter has come to be recognized as a necessity. The small blotters furnished for this purpose soon become broken and soiled in use, but if provided with an "ivory" backing they will give long service and be ornamental. To make such a blotter, cut a piece of celluloid 3 in. long and ½ in. wide, Fig. 1. Cut the ends round and glue a strip of blotting paper to this celluloid. Then, in bronze, or enamel place some decorative design upon the back of the blotter.

If you wish to make a somewhat more elaborate blotter, it may be done this way. Cut three pieces of celluloid 1½ by 3½ in. In one piece cut a diagonal slit in each corner as shown in Fig. 2. To this cement a second piece by the edges only. You can now insert 1 by 3-in. strips of blotter in this holder by pushing the corners of the blotter into the slits. Cut an opening in the third piece of celluloid, large enough to serve as a frame for a photograph of vest-pocket size. Decorate the front of this piece and then glue the photograph to the back in such a manner that it shows through the opening. In this step ordinary glue must be used as the celluloid cement will not do. If you wish to make a completely finished blotter you will need in addition a sheet of the thinnest transparent celluloid and a fourth sheet of colored stock, Fig. 3. Cut the transparent celluloid the same size as the first sheet and cement this to the back of front sheet before inserting the photograph. Then glue the photograph in place and finally cement the colored stock to the back of the sheet covering the photograph. You will now have an opening in the front sheet and in this opening will appear the photograph protected by transparent celluloid, and the back is covered to conceal the mounting. Now with an eyelet paper fastener hinge the two completed sheets together, but do not crimp the fastener too tightly. The two sheets may then be swung apart, the fastener

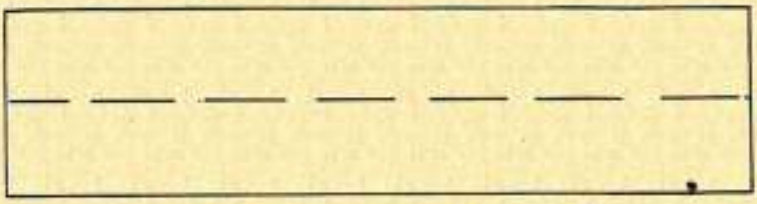
Steps in Making Nail Files and Check-Book Blotters; Carving and Fret-Sawing Heavy Celluloid for Paper Knife

acting as a pivot. This will expose the blotter. When not in use the whole is closed and the blotting surface protected.

By immersing the celluloid in water at about 110° to 125° F. and leaving it there a few moments, it may be bent in any desired shape and, after cooling, will retain this shape. This is of advantage in making such implements as a nail file. To make this article secure a blade from a discarded file or purchase a small file without a handle. If the tang is hard, it may be annealed by heating in an alcohol flame. Then drill a hole a little larger than the paper eyelet, and prepare the handle as follows: Cut a strip of celluloid ⅛ in. wider than the widest part of the blade, and 1 in. longer than twice the length of the blade from the point to the center of the hole, Fig. 4. Bend this strip in the middle by immersing in hot water. Then punch a hole through the two free ends at the same time. Insert the blade and set an eyelet through both thicknesses of celluloid and through the blade. The blade will now fold into the celluloid, jackknife fashion, Fig. 5. Finish the file by trimming the celluloid around the eyelet and decorating.

When you have made these smaller articles, you will be ready to attempt more ambitious forms of celluloid craft. A most beautiful desk set can be easily made. Cut the shapes for the four corners as shown in Fig. 6, and score them with a knife along the dotted lines. Immerse them in hot water, and, when soft, bend along the knife scores which will help to make the bends straight. Lay these under slight pressure until dry. Then cut two strips, about 8 in. long and 2 in. wide, Fig. 7. Score these down the center and bend to form two channels 1 by 8 in. Place under pressure to dry and cool. These strips are for decorative edges for the blotter. When cool, the channels and corners are set with edges together. There is enough spring in the celluloid to allow the blotter to be inserted, and this spring will cause the corners and channels to grip the blotter firmly. These pieces are now ready for decoration.

The rocker blotter is made by cutting a strip of heavy celluloid 3 by 6 in., Fig. 8. This is scored across each end and ½ in. turned back until it forms an angle of about 45° with the back. Now cut a piece of rather heavy tin plate, 3 by 6 in. Insert one end of this under each turned end of the back. This will form a curved spring plate. Cut a strip of blotter, 3 by 7 in., and after removing the spring, place the blotter over the spring and replace it in the back. This completes the blotter which is now ready for decoration. The treatment of the heavy stock is the same as with the thin, but in shaping a longer immersion in hot water is necessary and for cutting, a coping or fret-saw is to be used instead of the stencil knife or scissors.



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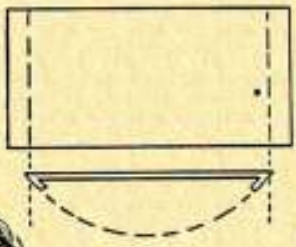

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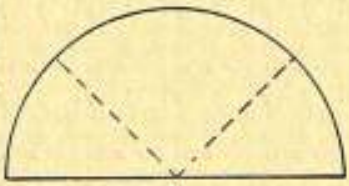

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Outlines of Corners and Edges for Desk Blotter and Celluloid Back for Rocker Blotter; Below, Finished Desk Set

Details of Letter File, Ruler and Paper Knife for Desk Set, Also Shape of Lemon Fork and Design for Pendant

The next piece to be constructed is the letter file. This is made of a piece of heavy celluloid, 4 by 12 in. in size. This is so bent that a channel is formed with sides 5½ in. high and bottom 3 in. wide, Fig. 9. The design is now traced upon these pieces and the sides sawed to shape. This is then ready for decoration. Cut a 1 by 6-in. piece of heavy celluloid and bevel one edge carefully. This is marked in inches, divided into quarters, as in Fig. 10, and a decoration placed along the back. This provides a ruler.

The paper knife, Fig. 11, completes the set. This is sawed to shape and the cutting edge beveled and decoration applied. When complete the set will form a most beautiful gift and one which will be appreciated by the recipient.

Attractive photograph frames may be made by cutting the frame from a sheet of heavy celluloid and decorating. The strut may be of celluloid or of heavy pasteboard. If you wish to make napkin rings, cut strips of heavy celluloid from ½ to 1 in wide and 7 in. long. Cut one end to a decorative shape and immerse in hot water until soft. Then form into proper shape, tie with cord and place to cool. When cool, the rings will retain their shape and may then be decorated.

Heavy celluloid may be shaped by filing and scraping in such a manner that the pieces will closely imitate carved ivory. For this purpose ivory-grained celluloid should be used. Lemon forks are easily made by first sawing the celluloid to shape, then filing the decorations into the handles. If desired, the finishing may be given by the use of the finest grade of sandpaper. Carved paper knives are very beautiful and closely resemble expensive ivory ones. The principal shape is first cut out, then the decoration is fret-sawed. This

will leave the article in rough shape. Then, with a sharp knife and fine files, round each piece until all roughness disappears. Finish by sanding with fine sandpaper wrapped about a match. If carefully done, the work will be most attractive. Earrings may be made which will surpass any that can be purchased in the stores, yet can be completed in a day. These are made in a manner similar to that employed in making the paper knife, except that the material is rounded on both front and back, as both sides are visible when the pendants are worn.

Various Celluloid-Craft Articles Easily Made by the Home Worker

Decorative chains may be made by fret-sawing the individual links and splitting them. When the chain is assembled, the links are cemented, and the chain will be to all intents solid. This may be combined with sawed and carved ornaments to make attractive girdles and neck pieces.

The suggestions given in this article together with the drawings will enable anyone, with a little practice, to make many other most attractive gifts from this material; and as this form of art-craft work is, as yet, more or less uncommon, such gifts in addition possess the charm of novelty and therefore should prove most acceptable.

Reviving Inking Pads

When inking pads reach the point where they do not ink the stamps sufficiently to make a good impression, merely turn them upside down for several hours or leave them turned upside down overnight, and the next day they will be in good shape again. Constant use absorbs and forces the ink from the top of the pad to the bottom, and turning the pad upside down allows the ink from the bottom to seep toward the top where it is needed.—H. A. Courtney, Atlanta, Ga.

¶A cover for the spare tire will pay for itself in a short time. It is estimated that an unprotected tire may lose as high as one-third of its normal mileage.

Guard for the Sprinkler

It is quite difficult to water a lawn along a sidewalk with a sprinkler without annoyance to pedestrians. This trouble was satisfactorily overcome by use of the guard shown in the drawing. A piece of galvanized sheet iron was cut in an ornamental form, painted with a suitable design, and then soldered to two heavy-wire legs. By setting the guard into the ground at the proper distance from the sprinkler, the water can be kept away from the sidewalk. The size of the guard is dependent, of course, on the type and size of the sprinkler used.—Harold E. Benson, Boulder, Colo.

Sheet-Metal Guard Prevents the Sprinkler from Wetting Passing Pedestrians

Eradicating Insect Pests

Of the many domestic pests common in warm weather, the ordinary red ant is one of the most difficult to get rid of. It is particularly hard to poison, requiring a specially prepared, attractive bait, and it is not susceptible to the various "contact poisons," as are roaches and many of the agricultural pests. Ants, as well as all other insect pests, are usually attracted by food, such as starchy material, sugar, etc. Very often a complete and thorough house cleaning will do much to eliminate them. Where this is not effective, one of the best eradicators for these insects, ants included, is common cresol or cresylic acid, which can be obtained at any drug store or chemical-supply house. It may be applied in the concentrated form to the floor or other woodwork where the insects travel, or it may be diluted with an equal volume of kerosene before application. In the case of buildings supported on posts, it is usually sufficient to saturate these supports thoroughly with the cresol so that the pests cannot reach the building. When handling it, care must be taken that it does not come in contact with the skin or any part of the body as it will cause a severe burn. If it should come in contact with the body, it should be removed immediately by first washing the part with denatured grain alcohol (not wood alcohol) and then with plenty of soap and warm water. When diluted with kerosene, care must be taken to avoid danger from lights and fire. The cresol has a strong odor and can therefore only be used in places where this odor is not objectionable. The odor generally disappears in a few days or a week, but the effect lasts a month or more. Where the anthills can be found, cresol may be poured into the entrance and will cause considerable destruction to the inhabitants. This chemical also has a very high disinfecting or antiseptic value.—Chas. E. Mullin, Camden, N. J.

Basketball Scoreboard Made by School Class

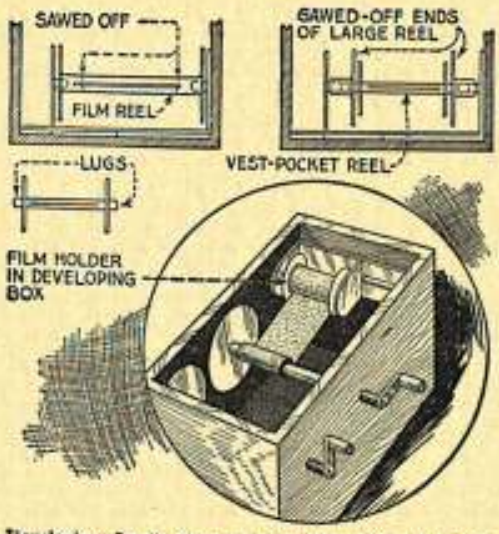
The photo shows a basketball scoreboard somewhat out of the ordinary. The face is made of wallboard, with a covering of black slate and with figures and letters painted on it with white enamel. The name of the home team is put on with paint while that of the opposing team is chalked in each time. A set of number cards are also made of wallboard; these are painted black and the numbers are painted on in white. The cards are fitted with screweyes at the top and are hung on hooks screwed into the scoreboard. A clock with a large hand, indicates the time in minutes for each quarter, which is eight minutes. To indicate which quarter is being played, a hole is cut in the board and a round dial containing the numbers 1 to 4 is pivoted on the back. The photo shows how the quarter dial is turned.

Cleaning Oil from Chassis

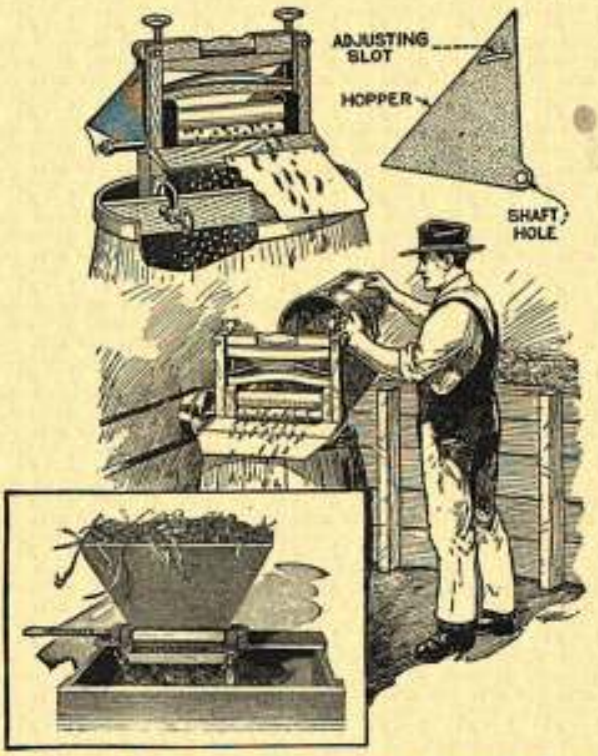
When you wash your car, the grease found on the chassis is quite difficult to remove. A good method of doing this is as follows: Into a tin can holding 2 qt. or more, pour 1 qt. of hot water; cut up one-fourth of a cake of yellow laundry soap into thin shavings and dissolve in the hot water, then add two or three tablespoons of gasoline to this solution. Use a stiff, medium-sized paintbrush, either flat or round, to apply the mixture to all the greasy places on the car. You will find that this will clean off the oil like magic.—J. H. Downie, San Antonio, Texas.

Film-Developing Tank Adapter

I wanted to use my 2½-in. film-developing tank for developing a small film used in a vest-pocket camera. As the smaller reel did not fit in the holder for the larger film, I made an adapter. A large-size reel was sawed off near the flanges, as indicated in the upper left-hand detail, and these flanges were pushed over the ends of the smaller reel, which permitted the flanges of the larger reel to fit in the sockets of the developing tank. This arrangement will hold the reel securely and permit the film to be unwound correctly.—Milton Robertson, Alameda, Calif.



Developing Small Film in Large-Size Film Tank by Means of an Adapter



Dry Peas and Beans Can Be Quickly Hulled with an Old Wash Wringer Equipped with Hopper

Shelling Peas and Beans

Shelling peas and beans can be accomplished quickly with the aid of an old wash wringer. Two kinds of hoppers are shown in the illustration. The one above is made of sheet metal, the sides being cut to the shape shown, and is attached to the wringer so that its bottom is level with the top of the lower roller. It is supported on the shaft, and is attached to the wringer uprights with wood screws, an adjusting slot being provided so that the hopper can be tilted to make the feed more or less automatic. The wringer legs are clamped to a length of 2 by 4-in. wood, which is nailed across the opening of a barrel.

The hopper shown in the photo is slightly different in construction. In this case the hopper is made of wood, and is mounted above the rollers of the wringer, which are arranged horizontally. After the peas and beans are thoroughly dry, they can be run through this improvised huller, the rollers being adjusted so that the peas and beans will not be cracked. The wringer may be driven by a small engine or motor or turned by hand.—A. C. Brundage, Rochester, Minn.

Novel Flower Bed with a Sprinkler Above Makes a Picturesque Addition to the Garden

Unusual Flower Bed Built Like Bird Bath

Resembling a bird bath, the flower bed shown in the illustration is quite unusual. It has three "decks" ranging in size from 16 to 30 in. in diameter. These are octagonal in shape and each is about 3 in. deep. The center post is 60 in. high. The frame is built first of wood, well seasoned and creosoted. This is covered with metal lath tp which stucco is applied. The bed is securely fastened on a concrete base in the garden or on the lawn. A pipe is run up through the center post and is equipped with a small sprinkler at the end so that the flowers can be watered.—Dale R. Van Horn, Walton, Nebr.

Garage Drives of Crushed Stone

Crushed stone makes an excellent driveway from the garage to the street, if the owner cannot enter from the alley, and one that is not only attractive in itself, but is also cheaper than concrete.

The stone should be spread evenly over the drive to a depth of 4 or 5 in. and tamped down well, using a mixture of sizes. Over this, a top dressing of screenings should be placed, to form a sort of bond for the coarser material; this dressing should be 1 in. thick. A barrel of the screenings should be kept about the house so that ruts can be repaired while the drive is new, and before it has been rolled down solidly by the passage of the car. After six months' use, the drive will require little or no attention, and it will be found to last practically as long as a concrete drive.

Clean Chimneys Save Trouble

To function properly, a chimney must be clean, and many home owners will find that the only reason the furnace does not heat the house as well as it formerly did, is that the chimney has not been cleaned for five or six years. This is usually the most neglected part of the heating installation, in spite of the fact that it is just as important as any other part. Whenever the heating capacity of the furnace falls off and there is no sign of anything wrong in the furnace itself, try having the chimney cleaned.

Cheap and Novel Hall Seat

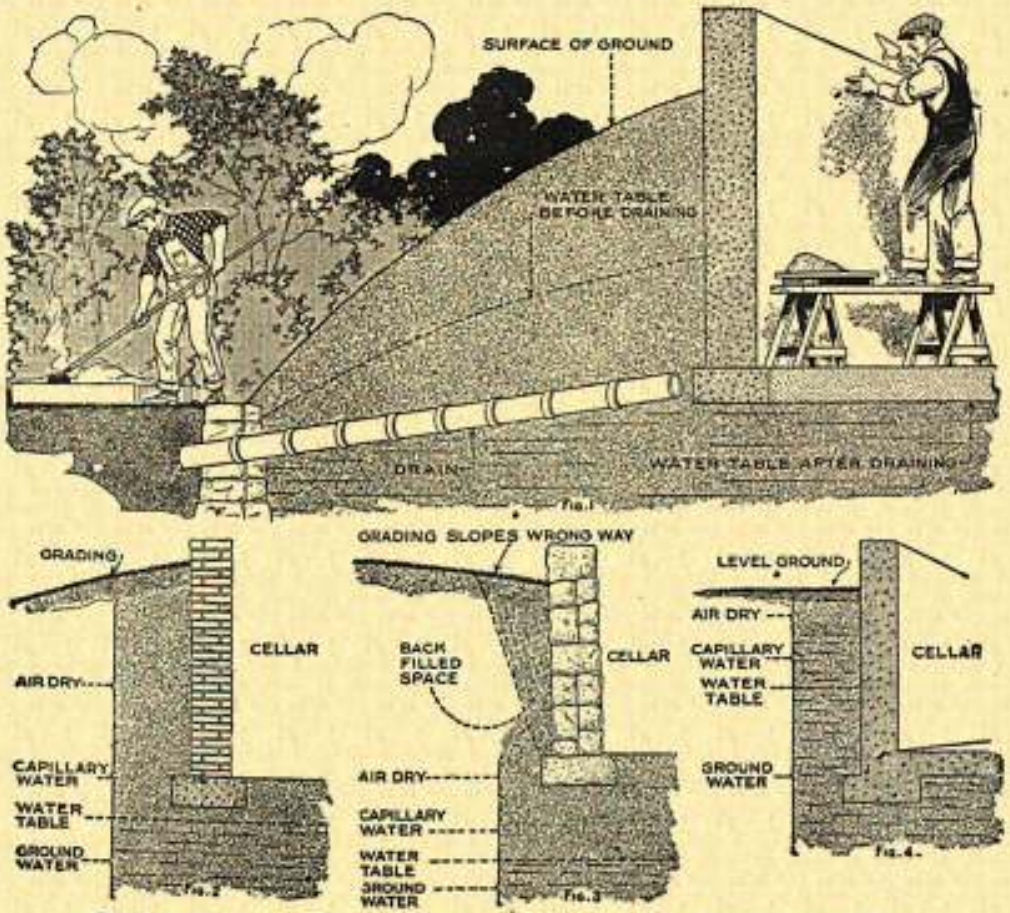
A child's crib, long out of use, was brought down from the attic and transformed into a neat, cheap hall seat, which served its purpose just as well as a purchased one. The crib was made of oak and was strong and sturdy. The rockers were removed and casters were fitted on the legs. The rail and spindles were removed from one long side, and a new heavy mattress obtained. This was covered with cretonne to match the drapery of the hall. Wooden slats were, of course, provided under the spring to give support. The crib was carefully scraped, sandpapered and then finished like the other furniture. Now it stands under the hall window and makes a comfortable seat.—Mary S. Hitchcock, Hannawa Falls, N. Y.

To Keep Your Cellar Dry

Easily Applied Ways to Add to Value, Comfort and Convenience of the Home

REAL-ESTATE dealers say that a good cellar adds $500 to the selling price of an average dwelling, and, while this may not be universally true, there is no doubt that the comfort, convenience and health of those who dwell in a house are considerably enhanced by a dry, clean cellar. Dry air is a poor conductor of heat, and it promotes evaporation, which is a cooling process. Moisture invites decay, corrosion and the growth of many forms of life that are injurious to man. For these reasons a dry cellar is better insulated and less subject to outside temperature changes than a damp one. The latter is a poor place for the storage of vegetables, fruits and other foods, and is bad for pipes, floors, tools and other utilities, as well as being unsanitary.

As it is better to avoid mistakes than to correct the consequences, the choice of a site is of the utmost importance. The essential points for the prospective builder to observe are the following: The site should be moderately elevated so that a fall in at least one direction from the building is obtained; the ground should be open and porous, so that air and water are admitted readily, like sands, gravels and soils capable of good cultivation. The vegetation should not be too plentiful, and the soil and subsoil should be clean; the site should be well and deeply drained. During the wet season of the year the ground water should be at least 10 ft. below the surface of the ground and preferably 15 ft. The distance between the ground water and the bottom

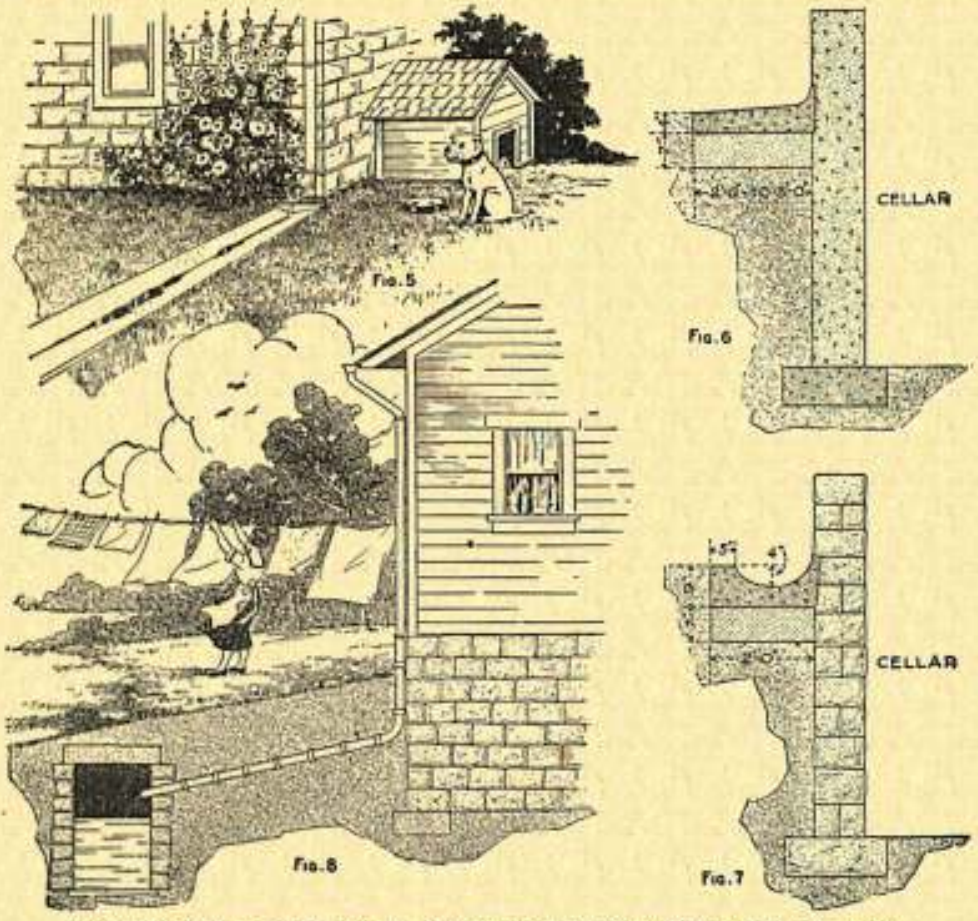


Conditions That Lead to Damp and Water-Logged Cellars, and One Method of Curing Them

of the cellar depends to a great extent on the character of the soil and the type of floor to be used. In exactly the same manner as oil rises in a lamp wick, water will pass through the minute spaces existing in soil. This capillary rise in coarse sands and gravels may be no more than 2 or 3 ft., but in very fine sands, silts and clays it may reach as much as 8 ft. No site should be chosen before the source of the domestic water supply has been determined, its purity and abundance, and before fixing on the location of a suitable plot of ground in which to waste sewage and other drainage.

The causes of wet and damp cellars are diagrammatically represented in Figs. 1 to 4. In Fig. 1, the cellar bottom is below the natural water table, but in this case the ground slopes so that the table may be lowered by proper drainage. In Fig. 2 the grading slopes the right way and the water table is below the bottom of the cellar, but the cellar will be damp because the capillary water rises to the floor. Fig. 3 shows the condition when the water table is well below the floor, and the capillary water does not rise enough to do any harm; this has been nullified, however, because of poor back-filling and a faulty grade, so that surface water from the eaves, from rain or melting snow, can pass into the cellar. In Fig. 4, the cellar bottom is below the water table and drainage cannot be obtained.

Where a cellar, due to poor construction and grading, becomes a sump for the collection of water from downspouts, snow banks or other surface sources, a very effective method, and one that adds to the appearance of every low-set dwelling, is to place additional filling against the cellar wall, and grade it down to a smooth sharp slope that extends at least 8 or 10 ft. from the wall (see Fig. 1). It should be seeded with a good lawn grass



Two Methods of Curing Surface Seepage, and Two Ways of Leading Off Water from Downspouts

and rolled well or otherwise firmed. To shed the water properly, it is essential that the grade be as steep as practicable. If necessary to grade as high as the cellar windows a curved or rectangular well or hatchway of brick or concrete should be

Left, Plaster Coat Applied over Coat of Damp-Proof Paint; Right, Use of Roofing Brush to Apply Damp-Proofing to Outside Wall

built around them, and hinged covers for closing these during a heavy rain or snowfall should be provided. Another method is to lay a sloping pavement or gutter, 2 or 3 ft. wide and composed of Portland cement, as in Figs. 6 and 7. The foundation for the walk or gutter should be of well-tamped cinders (not ashes), slag, coarse sand gravel or stone, and it should be wetted thoroughly just before placing the concrete. The wall surface adjacent to the concrete should be cleaned, brushed with a wire brush and roughened with a stone hammer, then thoroughly wetted and plastered with neat-cement mortar just before placing the concrete. For one-course work the concrete should be made in the proportions 1:2:4, laid 4 to 4½ in. thick and troweled, to a firm, non-absorbent surface with steel trowels. For two-course work the base course should be mixed in the proportions 1:2½:5, or 1:3:5, and laid 4 to 4½ in. thick, followed within 15 minutes with a ½ to ¾-in. course of 1:2 cement mortar worked to a smooth, hard finish with steel trowels. Only so much water should be used in the concrete that, under moderate tamping, it will just flush to the surface.

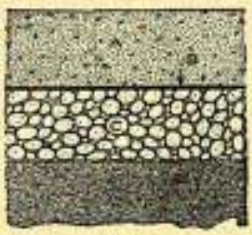


Fig. 9

Where no use is made of the rain water, it is always desirable to conduct it away from the cellar walls. In one house where the grading was excellent, water worked into the cellar after a heavy rain. The trouble was traced to a downspout, and it was remedied in the simple manner shown in Fig. 5. A small, half-round concrete gutter, with the top just level with the surface of the ground, and about 6 ft. long, was laid under the offending spout, and carried the water far enough from the wall to overcome the trouble. The same result may be attained by using a regular eave gutter, a U-shaped wooden trough, or a length or two of vitrified channel pipe on the ground. The water from the downspouts can also be led to a dry well located 15 or more feet from the building, as shown in Fig. 8, or piped to a suitable surface outlet.

Where the bottom or the walls of the cellar are within the reach of capillary water only, dampness, not standing water,

is the consequence. This trouble may be eliminated by damp-proofing the floor and walls. Fig. 9 shows one method in common use for keeping capillary water away from cellar floors. The essential principle is that of an abundance of air-filled space C, secured, in this case, by a 5-in. layer of clean, coarse broken stone or screened gravel, between the ground and the concrete floor A. The concrete is mixed in the proportions 1:3:5, and is laid 4 in. thick. On top of the stone is laid a layer of cheap roofing paper B, to keep the fine materials in the concrete from settling between the stones until the concrete has set. The top of the concrete should be troweled to a smooth, hard surface.

Where it is desired to prevent or reduce dampness in existing stone, brick or concrete walls or floors, or to shed water down the walls, the simplest method is to apply two coats of specially prepared damp-proofing paint. The surface to be treated should be thoroughly clean, and the paint must be brushed into all pores, hair cracks and inequalities, leaving a smooth continuous coat. Where a painted floor is subject to heavy or constant wear it should be protected. A thick plastering of Portland cement, rich and smoothly troweled, is frequently used for this purpose. Similar treatment of the outside of walls, both above and below the ground surface, is a great aid in protecting the damp-proofing and preventing flaking and peeling. A large brush should be used in applying the bituminous paints to the outside of cellar walls. A roofing brush makes a good tool for this job. Where the use of damp-proofing paints and coatings is contemplated, one should always get full directions from the manufacturer.

When the cellar bottom is below the water table and a drainage outlet can be obtained within a reasonable distance, a drain should always be constructed for lowering the ground water at least as far as the bottom of the foundation walls and the underside of the cellar floor. Fig. 10 shows a 4-in. tile drain laid 6 in. below and outside of a cellar wall. The pipe should be sound hard-burned or vitrified drain tile, or ordinary sewer pipe with socket joints. Nothing smaller than 4-in. pipe should be used. The grade or fall should be smooth and regular and, to guard against settlement of the soil within the pipe, it should be made as great as possible. If it is certain that only clear water will enter the pipe, the fall may be as small as 3 in. in the foot. Each pipe should be carefully bedded its full length so as to avoid uneven loading and liability of breakage. The joints must be kept open about the thickness of a knife blade and, to prevent entrance of loose earth, should be wrapped with strips of burlap or similar material about 6 in. wide and 15 in. long, tied on with wire or stout string on each side of the joint. The pipe should be surrounded with fine screened gravel or broken stone, after which similar, but coarser material, say about ½ to 1-in. size, is used to cover the pipe to a depth of 1 ft. On top of the broken stone it is well

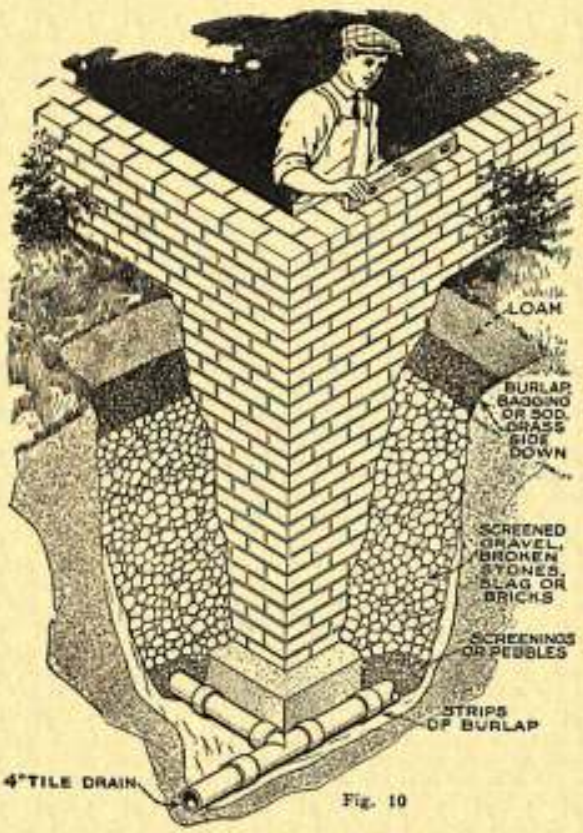


Fig. 10

Method of Laying Drain Tile outside and below Cellar Wall to Control Ground Water

to spread burlap or bagging. Sods, grass side down, hay, straw or brush may also be used with fair success. Where the building is situated on a hillside, and the soil against the cellar wall is likely to be saturated, the coarse-stone filling should be brought up to the surface of the ground, and the top soil placed, graded and seeded in the usual way. A belt that not only collects ground water but effectively intercepts seepage and capillary water is thus placed around the cellar, or on the sides where the flow comes. If the site of the cellar is very soft or springy, two or three branch drains should be laid under the cellar floor.

Attractive Wren House

Of all the wren houses I have made during the last 20 years, I have never found one that will attract the birds as the one shown here does. It can readily be built by any boy with material taken from orange or lemon crates. The house is about 8 in. high and the gable can be cut to any design. The fence can be made of wood or metal; a strip of sheet metal from which punchings have been cut is useful for this purpose. After the house has been completed it should be given a coat of paint; a gray and white combination makes an attractive job. The house, which should be screwed together, to permit easy cleaning, is mounted on a standard or fastened to the limb of a tree.—Addison Bain, Marion, Ohio.

Attractive Wren House That Any Boy Can Make of Odds and Ends

Preventing Loss of Outboard Motor

After hearing several motorboat enthusiasts tell how they had lost their small outboard motor while attempting to transfer it from one boat to another or from boat to dock, and also coming very near losing my own in this way, I devised a simple safeguard against such a mischance. A 12-ft. length of ½-in. rope was fitted at both ends with snap fasteners, one to be attached to an eyebolt on the gunwale of the boat, and the other to the motor through a bolt hole. The rope is left attached to the motor at all times.—J. E. Hoag, Los Angeles, Calif.

Preventing Loss of Outboard Motor by Means of Safety Rope Attached to Gunwale and Motor

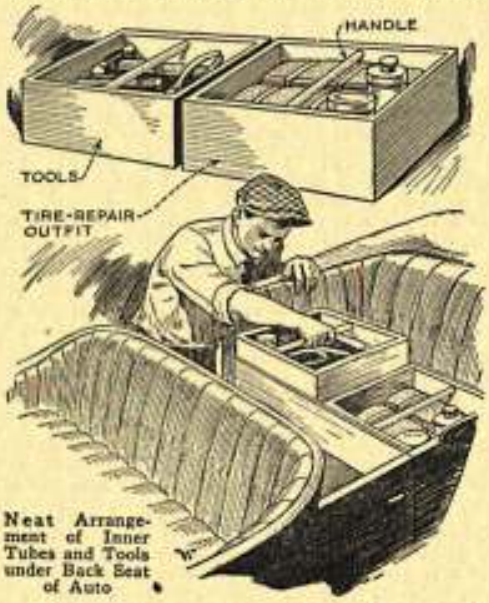
Clean the Gutters

Home builders are often disappointed because the roof gutters rust away in what seems a comparatively short time, but the fault is usually their own. At least once a year the gutters should be thoroughly cleaned out and painted, especially on the inside. When this is done, the "drain" of the gutters should also be noted; that is, every length of gutter should have a uniform drop toward the downspout so that there will be no pockets in which water can collect and rust the gutter through. This means also that there should be a sufficient number of hangers or supports to each length of gutter to prevent any sag.

¶Always carry spare bulbs when motoring. They will prove very useful some dark night when a bulb burns out.

Neat Back-Seat Tool Box for the Automobile

Extra inner tubes, patching kits, tools, chains and a few rags are usually found in



Neat Arrangement of Inner Tubes and Tools under Back Seat of Auto

much confusion under the back seat of an auto. A method of keeping these articles in an orderly arrangement will save the tubes from being injured by the tools, and when anything is needed, it can be picked up instantly without rummaging through the whole space. Two wooden boxes are made to fit closely under the seats, one is used to hold inner tubes and patching kits, while the other is for the tools. The latter may be subdivided into as many smaller compartments as desired. A simple handle should be provided on each box, as shown.

Printing Masks Made of Cut Film

Discarded photographic cut film has proved to be suitable for making masks producing the white margins on photographic prints. It makes little difference whether or not the film is cleared of the gelatin coating, unless the silver deposit upon it renders it very black. It is removed by placing the film in running hot water. After the film has been thoroughly dried, it is immersed in a waterproof aniline-red dye, which can be obtained from any good hardware dealer. After the piece of celluloid has been dipped and dried, with the aid of a sharp knife or razor blade and a steel-edged ruler, the center portion is cut out to whatever size and shape are desired. The advantage of using these masks is that in placing the negative and the mask in position, one can readily see just how much of the picture overlaps the edges of the mask and better judgment can be used in masking when taking advantage of arrangement, composition, etc., of the picture. Due to the fact that the film has been dyed a true red, no light rays can pass through it that will affect the photographic paper and the portion under the mask remains white.

How to Clean Floors before Refinishing

Removing the finish from hardwood floors by means of the scraper or knife before refinishing is usually a job dreaded by the amateur mechanic. Most of the work, however, can be done as well by means of paint or varnish remover, a scrubbing brush and a package of ordinary kitchen cleaning powder. After applying the varnish remover to a small section of the floor, and allowing it time to soften the finish thoroughly, wet the brush moderately, dip it in the powder and scrub the floor vigorously. This will remove all the old varnish and leave a clean job. The section cleaned should then be wiped off with clean water, and a new part of the floor attacked.

Locating Lost Rifle Pin with Compass Needle

While out hunting sometime ago, I found I had lost the small pivot pin on which the trigger turns. I knew I must have dropped the pin within a space a few inches square, but could not locate it. Finally I removed the needle from my pocket compass and, tying it to a small stick with a short string, dragged the needle over the ground. In a very short time the small pin was found clinging to the needle of the compass. —Clyde E. Volkers, Terre Haute, Ind.

A Homemade Refuse Burner

By A. J. R. CURTIS

IN thickly built-up residential districts and in localities where alleys are not available, refuse burners prove a great convenience in disposing of rubbish and trash. The design for the concrete burner shown in the accompanying illustration is one which may be depended on for the disposal also of a considerable amount of garbage, provided there is always an excess of paper and other odorless free-burning material. An excessive proportion of pure garbage will create unpleasant odors and therefore should be avoided.

The burner consists of a concrete box, 3 ft. 8 in. square and 4 ft. 1 in. high (above ground) in outside measurements. The walls are 6 in. thick, and extend 1 ft. below the ground. The roof slab is slightly arched, varying from 7 to 9 in. thick. Plain wooden box forms may be used inside and outside. In putting these forms together, the nails should be left protruding slightly to permit easy withdrawal in disassembling. The inside form, particularly, should be well oiled or soaked to prevent swelling caused by the absorption of moisture. The various rectangular openings are made by fastening small box forms between inner and outer main forms as the concrete is placed to the lower level of each opening. See Fig. 1. Similarly, the flue openings may be made circular, if preferred, by inserting short sections of stovepipe between forms. The openings through which the grate-shaker arms protrude are formed by inserting short sections of 1-in. iron pipe. Concrete made of 1 part cement to 2½ parts of sand and 3 parts of pebbles or crushed stone is recommended. The footing is placed in a shallow trench, and vertical reinforcing rods are then placed in position. The reinforcing is done entirely with ½-in. round rods, the verticals and horizontals both being located 12 in. apart, as shown.

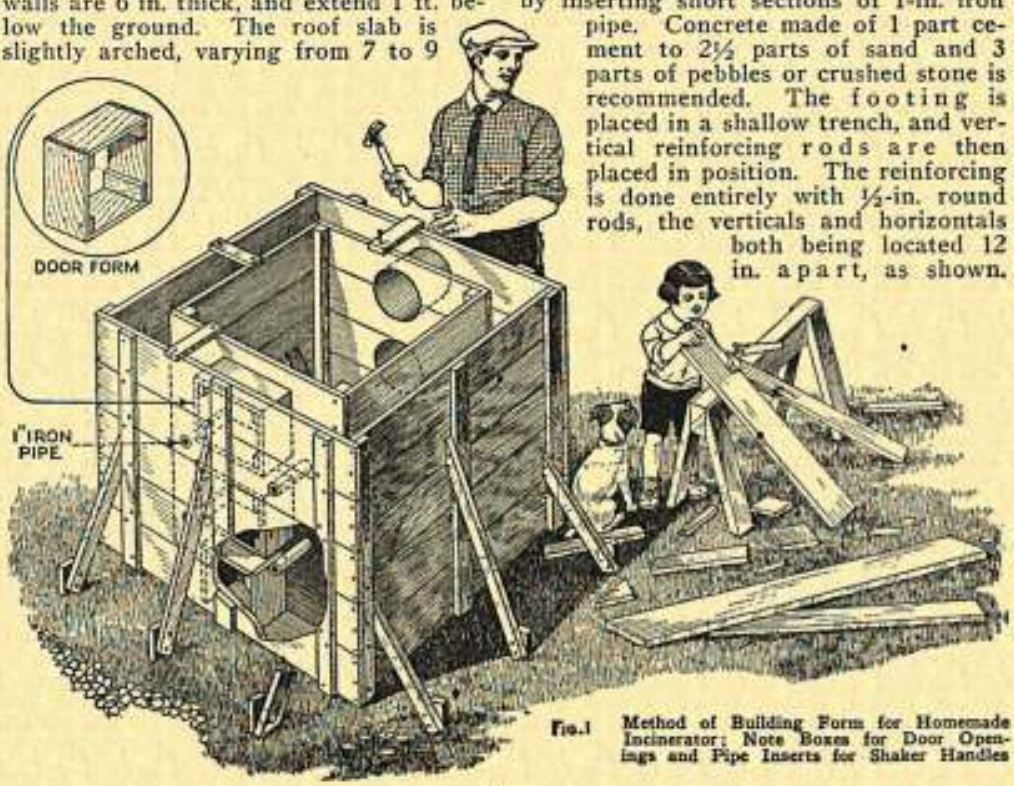
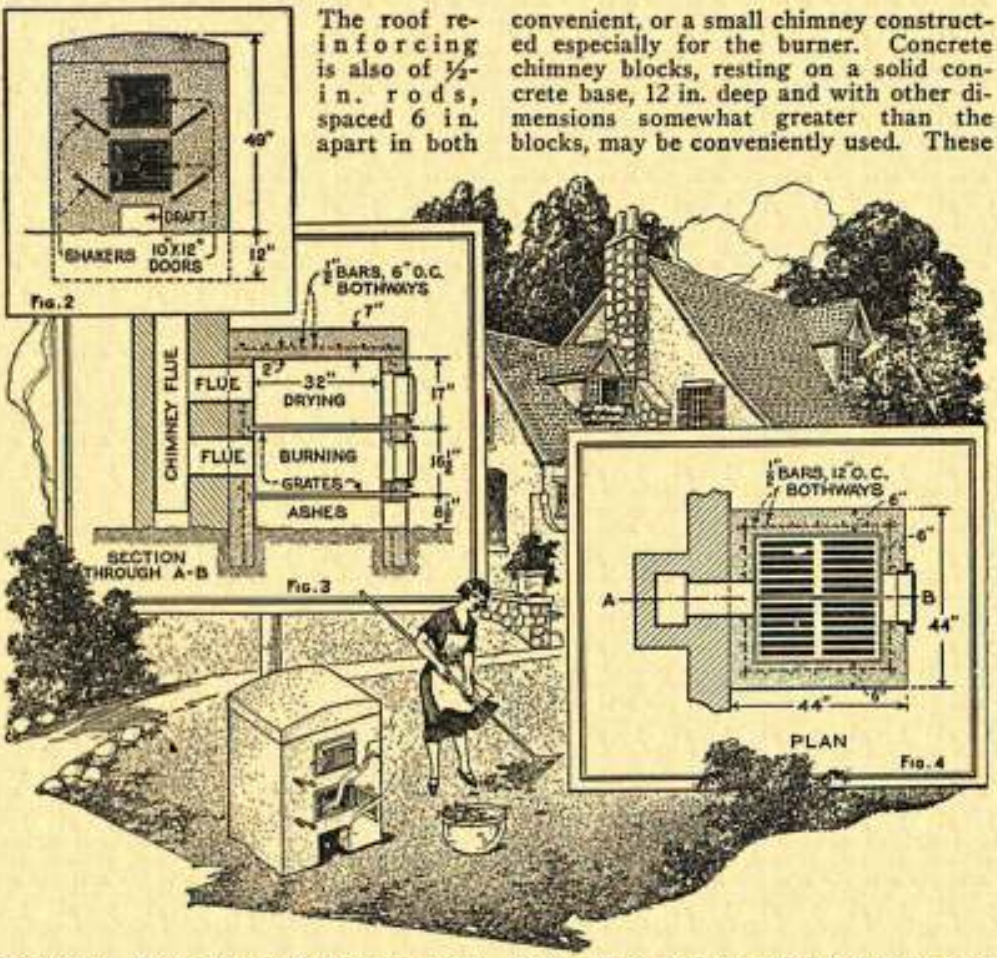


Fig. 1 Method of Building Form for Homemade Incinerator; Note Boxes for Door Openings and Pipe Inserts for Shaker Handles



The roof reinforcing is also of ½-in. rods, spaced 6 in. apart in both directions. After the vertical rods are in place, the horizontals may be wired in position as convenient.

The concrete should be just wet enough to flow nicely into all parts of the mold under light tamping. The forms are removed as soon as possible, any blemishes are immediately touched up with a similar mixture, and the entire surface scrubbed or painted with a creamy mixture of cement and water. The outer forms may generally be removed the day following the placing of the concrete, to permit surface finish. Inner forms may remain longer. Should any portion of the inner form become tightly wedged in, beware of straining the green concrete to remove it; it is far better to let it remain until burned out.

The doors and grates required for the refuse burner may be obtained by ordering (specifying dimensions) from any local hardware dealer. The flues may be attached to a house or other chimney if convenient, or a small chimney constructed especially for the burner. Concrete chimney blocks, resting on a solid concrete base, 12 in. deep and with other dimensions somewhat greater than the blocks, may be conveniently used. These blocks have tongue-and-grooved mortar joints, and are easily laid in cement.

If a monolithic (cast in place) chimney is preferred, it may be made of 1:2½:3 concrete and lined with chimney-flue lining or cull sewer-pipe sections, which are conveniently used as an inner form.

Replacing Watch Ribbons

In renewing wrist-watch ribbons, it is sometimes difficult to pass the ribbon, especially if heavy and readily frayed, through the narrow slots in the hook and clasp. It can be done easily in the following way, however: Fold a narrow strip of pa-

per, about 2 in. long, and the width of the slot, in the middle. Tuck the ribbon end inside of the paper, and pass the folded end of the paper through the slot. The ribbon will readily follow the paper, if pushed slightly.—Richard C. Tarr, Gloucester, Mass.

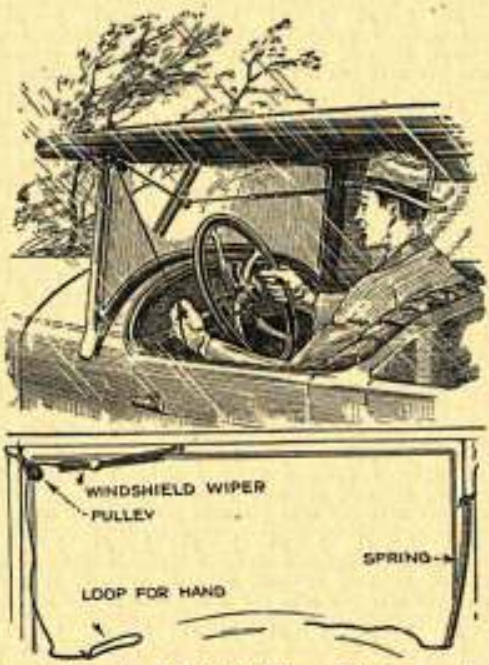
Case for Tail-Light Lamp

A strong casing for a spare tail-light lamp can be made of an empty 10-gauge shotgun shell. The lamp is wrapped in a rag and is placed in the shell, bulb first, the ends of the rag hanging out at the open end. When it is desired to remove the lamp for use, it is pulled out by the ends of the rag. The shell is stiff enough to stand ordinary handling and the lamp, thus protected, can be carried in the tool box without much risk of breakage, unless, of course, a jack, or some other heavy tool, is placed above it.—E. T. Gunderson, Humboldt, Iowa.

Hand Grips Make Teeter Safe

In order that smaller children might enjoy a big seesaw as well as the older ones, the athletic director of a western school provided each board with the handgrips shown. Lengths of ½-in. iron rods were bent to the shape shown and the ends flattened and drilled for ¼-in. bolts. With these grips, two children can safely sit on each end, facing each other. To prevent rusting, the rods should be tinned or painted.—Dale R. Van Horn, Walton, Nebraska.

Small Children Can Use Playground Teeter Provided with Safety Grips



Semi-Automatic Windshield Wiper Which Does the Work Satisfactorily and Cost Only a Few Cents

Semi-Automatic Windsifield Wiper

My Ford had only the ordinary windshield wiper operated by hand. This was rather inconvenient and tiresome, so I rigged up a semi-automatic attachment which proved entirely satisfactory. I took about 6 in. of spring from an old shade roller and fastened it to the right side of the windshield. Then I fastened the other end to the knob of the wiper, regulating the tension so that the wiper would be pulled over quickly. A pulley in the upper left-hand corner, through which is run a stout cord fastened to the knob, completes the device. When it rains, I loop one end of the string around my hand and when the windshield needs wiping, a downward sweep of my hand pulls the wiper over and when I let go the spring pulls it back again. The cost was only 10 cents for the pulley.—Dr. E. W. Henke, Newark, N. J.

Protecting Small Articles against Rust

Screws, nails and other small iron articles will resist moisture and consequently rust if they are tumbled about when new and dry, in a pan of powdered rosin. If slightly warmed before shaking, a fine coating of rosin dust will adhere to the surface of the metal.

Handy Typewriter Shelf Which Hangs on Bureau Drawer Is Useful in the Home

Convenient Typewriter Shelf

A bureau drawer can be used to support a typewriter shelf by means of two flat-iron hangers, as shown in the illustration. The shelf is a 1-in. board, about 12 in. wide and of such length that it may be put in the drawer when not in use. A blacksmith or hardware dealer can bend the flat-iron hooks to the shape required. Two holes are drilled in them for woodscrews to hold the shelf. Strips of felt are glued on the underside of the hooks to prevent scratching or marring the front of the drawer. It is not advisable to put a heavy standard-size typewriter on such a shelf, but for portable machines up to 20 lb. in weight, it is entirely practical, and such a typewriter can also be put away in the drawer.—Mary E. Hopkins, New York City.

Blueprint-Toning Solutions

Some drafting rooms use hydrogen peroxide in water as a blueprint toner. When this is added to water, it makes a solution that brings out deep blues and clear whites on prints that have been overexposed. Another equally good toning solution can be made by dissolving two teaspoonfuls of potassium-bromide crystals in a gallon of water; after toning, wash the print in clear water.

How to Smoke Fish Properly

Usually, in smoking fish, the smudge or fire is built inside the smokehouse, which makes it necessary to open the door every time a fresh supply of fuel is added. A far better method is to locate the smokehouse so that it will be a little higher than the surface, on which a sheet-iron stove is placed, so that the pipe from the latter will enter through the bottom of the house.

The usual method of smoking fish is generally unsatisfactory, so much so that it should be condemned. By merely smoking the fish, as is usually the case, it is not cooked through, but is half raw. After two days of smoking, as directed, through the sheet-iron stove, next build a fire inside the smokehouse, the fuel being hardwood or ash that is thoroughly dry, so that the most heat and least smoke will be given off. The result of a day or two of this firing will be a thoroughly cooked product that is perfectly palatable. The fish should be arranged at least six feet above the fire.—Robert Page Lincoln, Minneapolis, Minn.

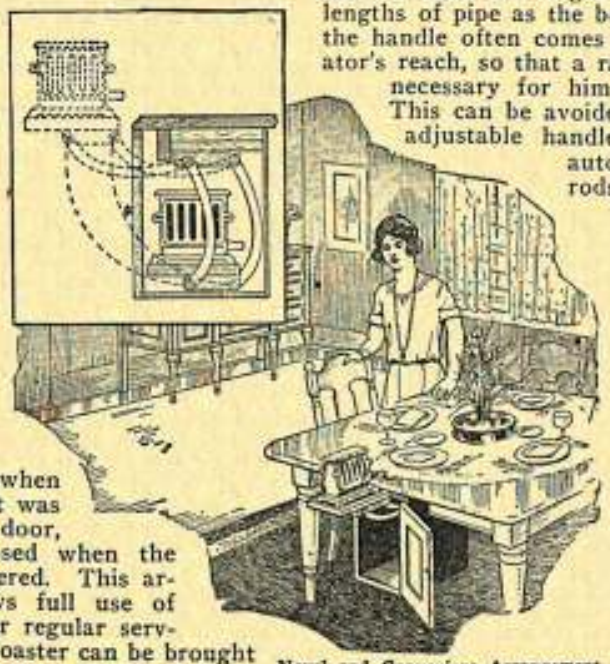
Reclaiming Oil in Small Quantities

Old crankcase oil contains a large percentage of gasoline and dirt. If the gas is evaporated from the oil, and the dirt and fine particles, which accumulate from the constant wearing of the parts of the engine, are removed, the oil is as good as new. Oil companies are now saving the oil which they take out of automobile engines and reclaiming it in a wholesale manner. Although most automobile owners are not especially interested in reclaiming oil, there is a method of doing it in a small way which is simple and practical. The work should be done in a place protected from dust and dirt, such as a garage or basement. After removing the oil from the engine, pour it into a container and let it stand until the dirt has settled at the

bottom. A flat vessel, 3 or 4 in. high and large in proportion to its height, should be used for this purpose, to give the greatest possible surface for evaporation of the gasoline that is mixed with the oil. Place a felt wick in the oil, clipping it to the edge of the pan so it cannot slip out; wind it with wire at the lower end, and hook a strip of ordinary wrapping paper, 5 or 6 ft. long and 7 or 8 in. wide, on the end, as shown in the drawing. Underneath the strip of paper place a jar to catch the oil as it seeps over the paper. From a pint to a quart of oil may flow over the paper in 24 hours. For rapid evaporation of the gasoline, a temperature of about 80° F. should be maintained.—Ruth Wilson, Manhattan, Kans.

Handy Cabinet for Toaster

A convenient compartment for the electric toaster, that is attached to the underside of the dining-table top, is shown in the illustration. A small wooden cabinet was made, and a piece of fairly heavy wood used to fasten it to the brace underneath the table top, and also to carry a flat-iron bracket from which the toaster support was suspended. A similar bracket was attached to the underside of a small board on which the toaster frame was fastened, and curved links, two on either side, were made of the necessary shape and length to clear the table edge and elevate the toaster to the table level when it was used, as shown by the dotted lines. The top and sides of the cabinet were cut out to clear the table brace. A latch, not shown in the illustration, was used to lock the toaster support when up. The cabinet was provided with a door, which was closed when the toaster was lowered. This arrangement allows full use of the table top for regular service, and yet the toaster can be brought into play at any moment.



Novel and Convenient Arrangement for Toaster underneath Table Top

Adjustable Handle Facilitates Work of Boring Shallow Wells by Hand

Adjustable Well-Auger Handle

In farm wells whose depth does not exceed 30 to 50 ft., the pipe is usually set into a hole bored with a hand auger to the first gravel stratum. These augers are connected to the end of a ¼-in. pipe and a handle is screwed onto the top end to turn the auger. When adding lengths of pipe as the boring progresses, the handle often comes above the operator's reach, so that a raised platform is necessary for him to stand on. This can be avoided by making an adjustable handle from two old auto connecting rods as shown. The crank-bearing caps are removed and the two rods are bolted together so as to grip the pipe as indicated. Handholds can be made from pieces of an old hay-fork handle, bolted to the ends of the rods. As boring progresses, the handle is shifted to be within easy reach.

Removing Ink Stains

MOST ink stains on household materials and clothes can be removed in the home, but it should be clearly realized, at the start, that differences in the materials have a good deal to do with the fastness of the stains, and therefore with the ease with which they may be removed. For example, an ink stain on cotton cloth might be removed by using soap or a little soap and water, while a spot of the same ink on a light-colored wool could be removed only by the use of acids, with a great risk of permanent damage to the cloth itself. The different kinds of ink would also necessarily take different methods for the removal; thus an iron-tannin ink would be treated differently from a red ink, and both would be treated differently from an ink made from a soluble Prussian blue, such as is used in most safety and anti-fraud inks. The most that can be done, therefore, is to give a few general directions.

The first thing to do is to remove the stained fabric from the action of strong light. Sunlight, contrary to popular belief, will not fade ordinary black writing inks, but will set the stain so as to make its removal very difficult. Stains made by red, violet and green inks, on the other hand, may be removed almost entirely by rinsing with water and exposing the fabric to the action of bright sunlight.

If the stained piece is large, or cannot be treated as a whole because of its size or because of the possibility of changing the color of surrounding parts, separate the stained part from the rest of the piece by clamping it in an embroidery frame. If this is not at hand, a satisfactory substitute may be made by clamping the stained part over the top of a mason jar by means of rubber bands or several turns of string.

Fastening the Stained Portion of the Cloth over a Mason Jar

First remove as much of the stain as possible by treating it with tepid water. Then pour warm or fairly hot water through the cloth. Next try the action of warm soap solution, working the fabric gently with the tips of the fingers or with a soft-bristle brush. In many cases stains can be removed by means of these simple methods. If the stain does not come

out there are a number of things that may be tried, those least likely to injure the fabric being named first.

For white goods, soak the stain in warm milk. Sour milk, or milk soured by the action of vinegar, will usually work better on most stains.

Treat the stain with lemon juice, preferably warm, by pouring the juice through the cloth held in the embroidery frame or over the mason jar, as previously described. Make a paste of lemon juice and salt and apply it to both sides of the fabric, allowing it to stand for some time. Remove the layer of salt and rinse the fabric. Sometimes, after this treatment, a faint stain may still be seen, which can be further reduced by the action of bleaching-powder solution.

Above, Pouring Tepid Water through Stain; Left, Souring Milk for Obstinate Stains

Lemon Juice Alone, Preferably Warm, Will Often Remove Stubborn Stains and a Mixture of Salt and Lemon Juice Is Also Effective; Working Soap Solution with a Soft-Bristle Brush

Soak the spot in a cup of milk to which has been added several tablespoonfuls of kerosene. For articles that can be put through a regular washing process, this will be found one of the most effective methods. Goods that cannot be washed, or that will hold the kerosene and show a grease stain, should, preferably, be treated by one of the other methods, or, if the milk-and-kerosene treatment has been used, they should be given a washing in clean gasoline or benzine. The latter must be used with extreme care because of their inflammability. Professional cleaners make use of various strong acids and other chemicals, such as oxalic acid and hydrochloric acid, and when these are applied by persons experienced in their use they do good work. They are poisonous, however, and should be handled with great care in the home, and they are very injurious to the fabric unless they are removed completely after the treatment. Goods treated with these acids should be rinsed in several changes of clean water and finally in water to which has been added a small amount of soda or

ammonia to neutralize the effect of the acid. For blue-black inks, use ammonia and oxalic acid alternately. For purple,

Ink Stains on Varnished Surfaces Are Removed by Rubbing with Fine Polishing Powder

blue, red, etc., use potassium permanganate and oxalic acid. For printing and India inks, sponge with a cloth dipped in carbon tetrachloride.

Stains on varnished woodwork can often be removed with very little damage to the finish by first moistening the spot with water and then rubbing the stain with a piece of cloth dipped in one of the fine-grained commercial polishing powders capable of polishing silverware and glass without scratching. The rubbing should be done with care, and the soapy layer containing the ink be removed with clean water before it has had time to dry. A second application may be found necessary, but the two will usually be enough. Fine pumice or rottenstone (powdered), which may be obtained from the local paint dealer, may also be used, and will not injure the finest surface

Choked Mufflers Cause Trouble

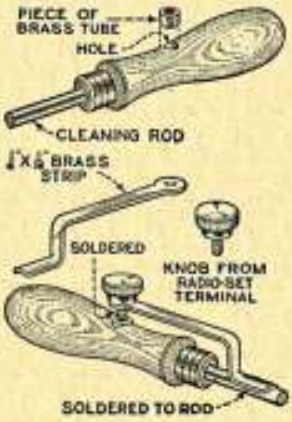
A rather unusual car trouble was found to be caused by a choked muffler. The engine seemed to run properly when the speed was slow, but if the speed was increased the engine would stop in a short time. After the carburetor had been taken apart and cleaned, the valves ground and reseated and several gaskets replaced, without noting any improvement, the trouble was finally found to be in the muffler, which had only small openings for the exit of the exhaust gas. These were partly closed by an accumulation of carbon, which caused back pressure. At low speeds the gas had sufficient time to pass through these small openings, but at high speeds the gas was forced into the muffler from the engine quicker than it could get out. As soon as the muffler was cleaned, the trouble was over. —Mrs. F. G. Coleman, Kansas City, Mo.

Screen for Magic Lantern

Magic lanterns showing slides and projectors for opaque pictures are quite common. To get the best results from these they must be used with the proper screen. The best is made from large-size blotting paper; this is dead-white and makes a perfect projection surface; in fact, it is used as a standard in judging the quality of screens used in large theaters.—Guy E. McAllan, Millicent, Can.

Improved Cleaning Rod for Guns

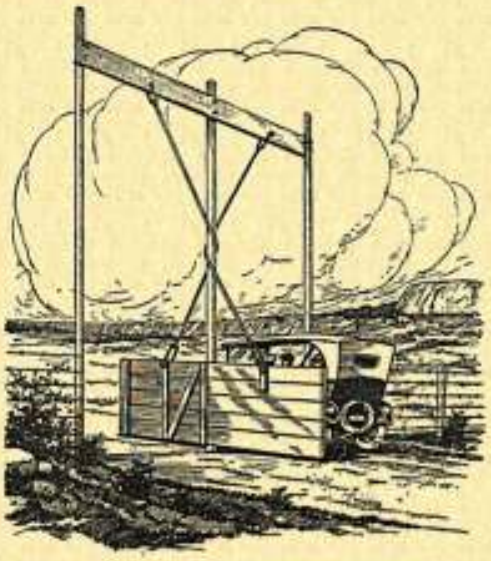
As I do a lot of shooting I use a cleaning rod frequently. The one I have has a loose handle, that is, the rod turns freely in the handle. It is very annoying, when the rod has to be turned with any degree of force, to have to grip the rod with the fingers, but the turning feature has its advantages also. To do away with the former and keep the latter, I designed the following improvement. A piece of spring brass, about 1/16 in. thick, was bent as shown. A hole was drilled in the handle of the rod and a small piece of brass tubing was fitted in it to keep the wood from being chewed up on the edges of the hole. A small knob and screw, or any little piece of brass rod to fit the hole in the brass tube, is soldered on the end of the spring-brass strip. The little knob



and screw can be obtained from radio-set scraps. The spring-brass strip is now soldered to the cleaning rod and the tool is complete. By pressing down on the knob, the handle and rod will turn together.—Joseph G. Heyck, Houston, Tex.

Automatic Gate for Closed Highways

Through many miles of range country in Arizona, New Mexico, and Texas, the highways cross huge ranches and gates are located in many places. Where cattle guards are not satisfactory, some other method is necessary. Gates are more or less objectionable as the driver has to get out to open and close them, but this is not necessary with the gate shown in the drawing. Two pipes, 4 in. in diameter and extending 16 ft. above the ground, are set at the ends of the opening in line with the fence. A third pipe, usually 6 in. in diameter, is also set vertically midway between them. These three pipes are connected by a length of 2 by 8-in. timber from which chains are attached with links, crossing at the center post, then down to each side of the gate, as shown. When the front bumper of the car strikes one side of the gate, it is swung open. The chains wrap about the center pipe, causing the gate to lift. But when the car has passed, the gate swings back into place. The gate is attached to the center post with U-bolts so that it will turn freely. The larger the center pipe is the harder the gate will be to open and the quicker it will close.



Novel Gates on Western Ranches Are Pushed Open by Passing Cars and Close by Gravity

Mooring the Motorboat

After trying several methods of mooring a motorboat in a boathouse that is exposed to rather heavy waves, the following

Method of Mooring a Motorboat in Rough Waters

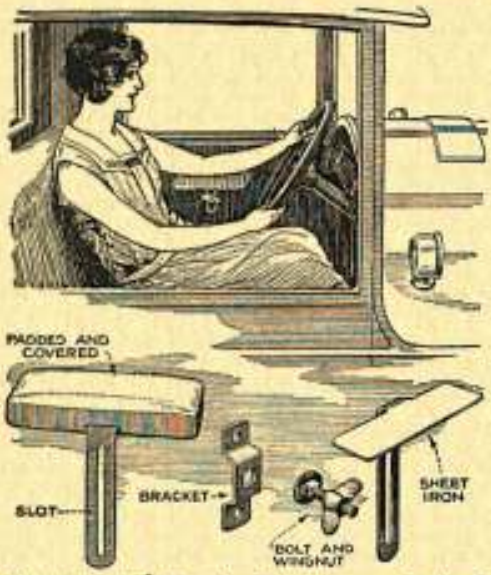
method was adopted and found satisfactory. Two staples, with rings attached, were driven into the floor opposite the seat brackets and a rope with snap-hooks at both ends was used on each side, one snaphook being attached to the stapled ring and the other to the bracket and then snapped to the ring. This leaves the boat free to move laterally about 6 in. The front end of the boat is fastened by two lengths of chain to two stapled rings, as shown, and discarded auto tires are nailed to the dock sides to serve as bumpers. It takes only a few moments to make these arrangements, and when thus moored, the boat will be secure in the roughest seas and its sides and bow cannot be damaged. —Arthur G. Roach, Sudbury, Ont.

Picking Up Phonograph Needles

When playing the phonograph, the needles sometimes are dropped or spilled in the machine. If they are not recovered, they may get into the motor and cause serious trouble. I have found that a small horseshoe magnet picks up the needles much more quickly than the fingers, especially in the corners. The magnet can be left on the machine next to the needle box, where it will always be handy. —Henry B. O'Connell, New Haven, Connecticut.

Adjustable Arm Support Rests Driver on Long Trips

Most drivers of closed-model cars rest the left elbow on the sash sill to lessen



Adjustable Arm Rest for Driver Lessens Strain of Long-Distance Driving

the fatigue incidental to long-distance driving. However, the sill is usually located just a little too high, and is too hard for comfort, and the adjustable padded arm rest shown in the drawing will be found much better. It is made of a piece of sheet metal, bent as shown, with a pad on top and a slot in the support. A sheet-metal bracket attached to the side of the body holds a bolt, which keeps the arm rest in position by turning down the wing-nut on the slotted part of the rest. This arrangement allows the rest to be raised or lowered to suit the driver.—G. A. Luers, Washington, D. C.

Durable Whiting Paint

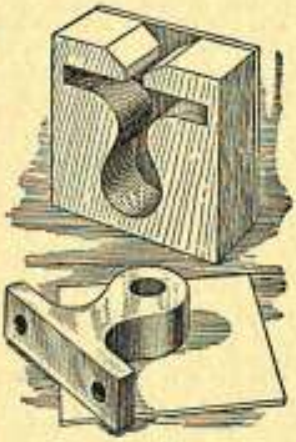
Whiting paint, which is used to paint announcements and similar information on display windows, can be improved considerably so that it will not rub off so easily. To impart to whiting paint some of the permanent characteristics of ordinary paint, and yet have it retain its highly desirable quality of solubility, add a small amount of ordinary mucilage. The mucilage will help to make a better-flowing mixture of the whiting, and will cause it to harden after it has been applied to the glass surface, so that it cannot be rubbed off. Such paint will even withstand a certain amount of wetting before it is dissolved.—J. S. Hagans, Chicago, Ill.

Knotting Thread When Sewing

To knot thread when sewing, first thread the needle, single or double, holding the needle and the end of the thread in the left hand between the thumb and forefinger. Then, take the thread with the right hand, wind it three or four times around the end of the needle and pull the winding down with the left hand to the end of the thread. A quick knot is made which shows neat on the work.

Casting Small Pillow Blocks

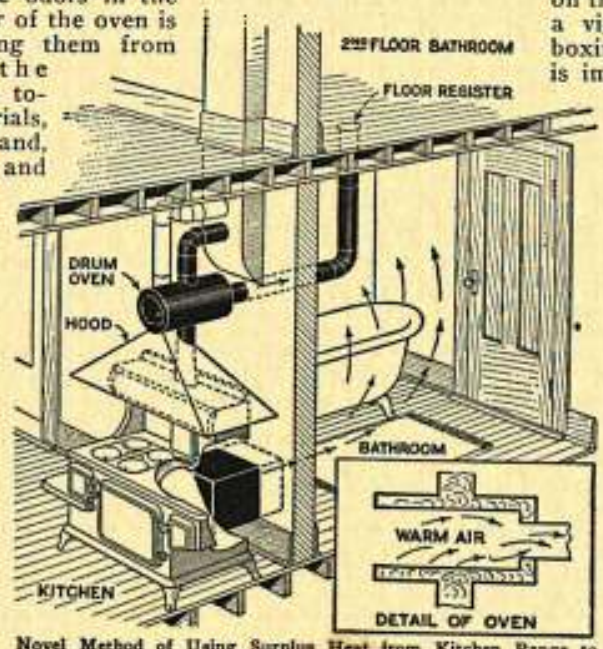
Recently I needed a number of small pillow blocks and shaft hangers for a ¼-in. shaft. It struck me that I could make these of babbitt in a wooden form, so I made a pattern or mold as shown in the drawing, put a piece of heavy cardboard on either side, clamped the assembly in a vise and proceeded to cast the blocks. The only precaution observed was to keep the babbitt as cool as possible so as not to char the wood. Some small pulleys that I needed later on were cast in the same manner, making the mold for the rim of the pulley from a piece of ½ by 4-in. stuff, 4 in. long. A block of the same size was clamped on each side of the rim mold. As the pulleys were to be attached on the ends of the shaft, I bored a ¼-in. hole in one of the sidepieces, inserted the shaft through the hole into the mold, and cast the pulleys right on the shaft. This saved much time in drilling and tapping holes in the pulleys, and, as the work was light, served the purpose quite well. If it is desired to give the pulleys a more finished appearance the side blocks can be turned so as to give the sides of the pulleys the regular shape, hub and all.—A. L. Talsbury, Cherokee, Iowa.



Heating Rooms with the Kitchen Range

In one residence the bathroom was located next to the kitchen and it seemed that some of the heat of the kitchen range might be used to heat it. This was done by removing a section of the wall directly behind the range, and replacing it with a square of sheet iron, which was fitted flush with the bathroom wall, as shown, and painted a suitable color. An inclosed box of galvanized iron connected the range with the wall. Despite the fact that the heat is transmitted only through the air and metal, it has not been necessary to use a stove in the bathroom except on very cold mornings, and so the original idea of filling the metal box with sand or some better conductor of heat was not carried out.

To heat the upstairs bathroom, which was directly over the lower one, a slightly different method was used. A drum oven, which fits on the stovepipe replacing one joint, was obtained and by cutting a circular hole in the back, it was possible to connect a few sections of new stovepipe to the oven, and run the pipe up to the bathroom, where it was attached to a floor register made from a discarded oil-stove lid. In this case the warm air from the kitchen enters the oven through the door and is further heated in the oven, from which it passes directly into the bathroom. When there are objectionable odors in the kitchen, the door of the oven is closed, preventing them from passing up to the bathroom. The total cost of materials, partly secondhand, was only $5.85, and the work was done in leisure hours. The results have been highly satisfactory for more than two years. Such a method of heating is not, of course, limited to a bathroom; a sewing room or hall could be heated in the same way. —Harold E. Benson, Boulder, Colo.



Novel Method of Using Surplus Heat from Kitchen Range to Warm Bathroom

Homemade Toy Gives the Boy an Enjoyable Imitation of a Boxing Bout

Novel Toy Pleases Children

Simple to make, the toy shown in the drawing is quite novel and will prove popular with the youngsters. When it is pushed along, the two figures pivoted on the handle perform a vigorous round at boxing. This motion is imparted by means of a length of heavy wire, pivoted eccentrically to the wheel, and to the foot of the first figure, and a shorter length of wire connecting both figures, as shown. The figures are cut out of pieces of fairly heavy tin and are pivoted to the handle, the detail giving a clear idea of the construction.—E. W. Wehry, Cedar Rapids, Iowa.

Nail Puller for Shingles

In making repairs on a shingled roof, one of the difficulties encountered in

Handy Tool for Pulling Nails from under Shingles When Repairing Roof

patching in new shingles arises from the old nails, which are left in position under the rows above after the defective shingles have been pulled out. The usual method of getting these out is to push a thin bar up against the nail, and by hitting the other end of the bar with a hammer knock out or bend the nails. However, a better tool for the purpose is shown in the drawing. A piece of tool steel, 3/16 by 1 by 22 in., is formed into a handle at one end and the other end is ground off to a point, which is then notched on each edge as shown. The notches are staggered a little so as not to weaken the cross section. Then the upper edges are beveled for easier working. In use, the point is pushed up under the shingles and, on drawing it back, a nail is caught by one or the other of the barbs. Then, a twist of the tool is usually sufficient to pull the nail out.—William Knowles, North Vancouver, Can.

A Hint to Home Dry Cleaners

Many housewives doing dry cleaning at home wash delicate garments in gasoline and are at a loss to know why they soil again so quickly and seem to catch dust and grime much more readily than before. In most instances this is due to the poor quality of gasoline employed. Low-test gasoline contains a high percentage of grease and oil, and when garments are cleaned in this, they naturally retain the impurities after the gas itself has evaporated. The remaining grease is not sufficient to be easily perceived, but it is present nevertheless, and dust or dirt falling upon the garment adheres so that it presents a soiled appearance in a very short time. To overcome this, one should use only the highest grade of gasoline obtainable. The garment will be more thoroughly cleaned and will remain clean longer. It will also air out quicker, so that the pressing can be done without leaving an objectionable odor in the fabric. Care should always be observed to keep all cleaning and drying operations away from flames of any kind.

Protecting Clothes on the Line

Some dogs have the habit of getting hold of and tearing clothes hanging on the clothesline to dry. To prevent this, a Kansas farmer elevated his revolving clothesline so that even the longest sheets would be above the dog's reach, and then provided a small concrete platform, as shown in the illustration, to permit one to hang up the clothes conveniently. Four lengths of old pipe were used to form the corner supports of the concrete slab, which is 4 in. thick, 2 ft. wide and 3 ft.

Preventing the Dog from Getting at the Clothes on the Line

long, and is elevated about 16 in. above the ground.

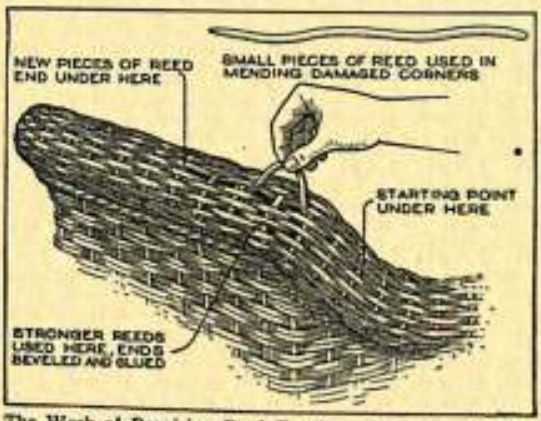
¶A useful coat hanger may be made from a newspaper, rolled up and suspended by a cord around its center.

Repairing Woven-Reed Furniture

One of the disadvantages of genuine woven-reed furniture is the brittleness of the reed after it has become thoroughly dried out. This brittleness often results in unsightly breaks.

The drawing shows a simple method of repairing such breaks without being deprived of the use of the article, as would be necessary if the article was sent to a shop. Break off the broken ends of the reed so that all ends are underneath and concealed by the crosspieces. Using the broken pieces as a sample, the necessary quantity of new reed can be obtained from almost any upholstering or furniture-repair shop. The new reed is soaked in water to make it pliable, and while in this condition, it is inserted under and over the crosspieces in such a manner that the ends will always be concealed underneath the crosspieces. If the work is carefully done, it will be almost impossible to detect where the repair was made. When the reed dries out, it will naturally retain its bent position, locking itself into the old weave, and will last as long as other parts of the body. When thoroughly dry, the patched spot is given a coat of varnish or stain, to correspond to the rest of the article.

In repairing the heavier crosspieces, the ends are beveled off with a sharp knife, and new pieces, of the proper length and with correspondingly beveled ends, are glued into position. The glued joints should be tied together with twine until the glue has hardened, before proceeding to complete the repair by the insertion of short lengths of reed as described above.—Frank E. Leitch, Brooklyn, N. Y.



The Work of Repairing Reed Furniture Is So Simple That There Is No Excuse for Allowing the Damage to Spread

Brush Holder Assists Home Painter

In painting the eaves of houses, and similar places that are rather difficult to get at, a brush holder of the kind shown in the illustration increases the painter's reach, eliminates frequent moving of the ladder and makes the work safer. A wooden stick, ⅞ by 1 by 36 in. in dimensions, is drilled with a ¼-in. hole through the center, about 2½ in. from one end. A similar hole is drilled through the thickest part of the brush handle, and a 1¾ by 5/16-in. round-head carriage bolt with a thumbnut is used to fasten the brush to the stick, the other end of which can be rounded off and smoothed to form a handle. A screw-eye is then driven through the stick and brush handle to prevent wiggling if the thumbnut should come loose. The knack of handling the brush comes readily.

Holder for Paint Brush Assists Painter When Working on Eaves

Drying Squeegee Prints Quickly

It takes several hours to dry squeegee prints in the usual way. The drying process can be hastened considerably by placing the ferrotype plates about 6 or 8 ft. from an electric fan. By doing this, the prints will dry quickly and one will be kept busy picking the dry prints from the floor.

Handy Stencil Disk Saves Time

Facilities for cutting individual stencils are seldom justified in a small concern, and therefore the disk stencil shown in

Convenient Disk Stencil for the Small Shop or Store

the drawing will prove to be of exceptional merit. It is made from a thin brass disk through which letters are cut as indicated. A small round handle is fixed at the center, permitting the disk to turn, and a plate of the same stock as that of the disk is pivoted on the handle. This plate has a square opening cut to fit over the letters to facilitate stenciling. The parallel edges of the plate are also used as a guide for obtaining alinement. Such a stencil is a great convenience for the small shop or store and neat work can be turned out with it.

Glazed Tile as Good as Porous for Drainage Lines

An erroneous idea exists regarding the kind of tile that should be used for drainage. Some contend that drain tile should be porous enough to allow water to pass through the walls, and that glazed tile will not permit this action, and therefore should never be used. However, only 1/25 gal. of water will pass through the wall of a very soft 4-in. clay tile in 24 hours. To put it another way, it would take 2,000,000 running feet of such tile to make a 4-in. tile line run full at the outlet, provided all the water were to pass through the wall of the tile and the slope of the tile were 5 in. per 100 ft. There is therefore no difference in the value of the tile made from clay, shale or concrete, as the drainage water enters the tile at the joints. For this purpose, a space of 1/8 to 1/4 in. should be left between the joints, the exact amount of space depending upon the nature of the soil. In the case of an extremely soft sand or quicksand, the joints should be covered with broken pieces of tile or a short piece of roofing paper.—C. M. Baker, Wooster, Ohio.

Cleaning Auto Shackle Pins

In a large auto-service station, specializing in lubrication and tightening up of cars, the head mechanic places considerable stress on the necessity of keeping spring shackle pins in good condition. Due to the clogged condition of the oil channels in these pins, they are frequently removed because of the impossibility of forcing grease through the clogged holes. Greasing is necessary to prevent the pins from squeaking and wearing, which results in a pronounced clicking or rattling. Any shackle pin can readily be removed by the method shown in the illustration. The head or round part of the pin is held securely with a file, while the nut is removed from the other end. After the pin has been removed the grease hole is opened with a stiff wire and cleaned with a pipe cleaner. Due to the accumulation of solid dirt and grease, it is often impossible to clear the channel with a grease gun, though after it is once cleaned, continuous attention to lubrication will keep it clean.—G. A. Luers, Washington, D. C.

When fruit juice is spilled on table linen, sprinkle at once with salt to prevent a permanent stain.

Making an Egyptian Ash Tray

By HERBERT C. McKAY

ASIDE from its utility and novelty, the ash tray or smoking stand shown in the illustration is interesting and easy to make. The stand proper is a silhouette of an Egyptian dancing girl. The more difficult lines are painted instead of being sawed, and the ash container is in the form of a lotus flower.

The right-hand view, Fig. 1, gives the outlines of the figure. The scrollwork at the feet of the figure adds considerably to its strength. These scrolls should be enameled in contrasting colors; for example, if the base and scrolls are black, the flesh and gold of the feet and skirt border will stand out in good relief. The breast and skirt bands were enameled crimson in the original with ornaments in gold. The winged pheasant on the head was of gold relieved with black. The features were black outlines, as illustrated, upon a ground of flesh color. The base was an oval piece of wood, ½ in. thick, 4 in. wide and 9 in. long.

The ash receiver is made from a piece of metal, which may be brass or copper, about 1/32 in. in thickness and cut as shown in Fig. 2. This is laid upon a block of medium soft wood and the petals peened with a ball-peen hammer. (See Fig. 5.) They will curl up just as crepe paper does when used for making artificial flowers. This piece is peened until the petals curl inward a little. Then a piece is cut as shown in Fig. 3. This is treated in the same manner, but the peening is stopped when the petals have turned straight upward. Then each petal is reversed and peened upon the back at the outer points. This recurves the points of the petals and makes them flare outward. Finally a piece is cut as shown in Fig. 4. Slits are cut from the junction of the petals toward the center to allow each leaf to curl. This is peened until each petal is concaved; then the petals are straightened until they project from the center in a plane. The center of each plate is drilled out large enough to admit the passage of a No. 14 gauge wire, and both sides of each plate are cleaned for soldering. The last plate is put in place first and soldered about ½ in. below the top of the wire, then the six-pointed plate is soldered just above this and finally the

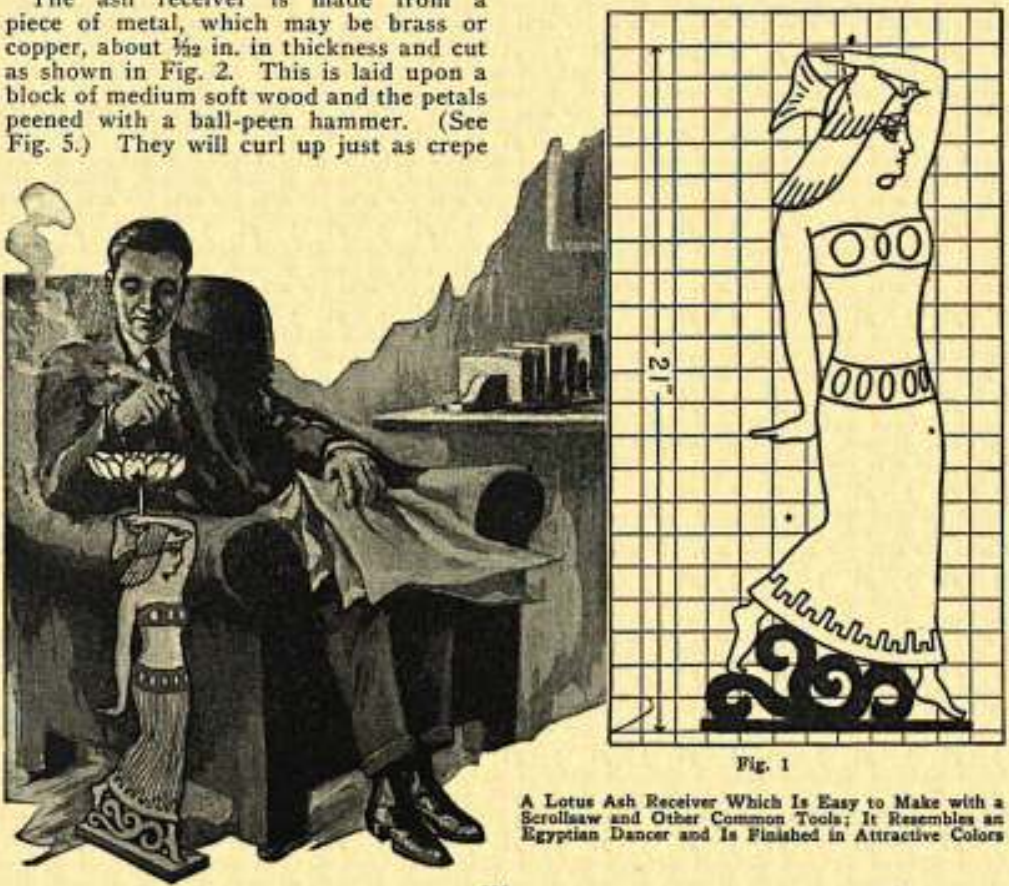


Fig. 1

A Lotus Ash Receiver Which Is Easy to Make with a Scrollsaw and Other Common Tools; It Resembles an Egyptian Dancer and Is Finished in Attractive Colors

twelve-petaled plate is soldered on top. The projecting wire is cut off with a pair of end-cutting pliers and solder smoothed above the projecting stump. The bottom of the four-petaled plate is enameled

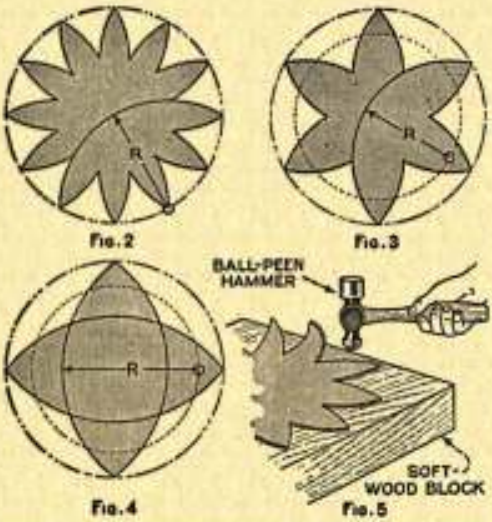


Fig. 2 Fig. 3 Fig. 4 Fig. 5

Pattern and Method of Peening Thin Sheet-Copper Tray of Ash Receiver

green, while the rest of the petals are enameled ivory. When the enamel is dry, the inside of the cup is delicately veined in pale green and the tops of the four petals at the bottom are treated likewise. A hole is drilled through the upraised hand of the figure and down into the head. The wire stem of the lotus is inserted in this, and the stand is complete.

Burning Soft Coal, Coke or Small Anthracite Sizes

When burning soft coal, make a very careful deep bed of paper and wood to the height of the fire door. Light as usual and do not add coal until the wood becomes like charcoal embers. Add fuel gradually, opening the base door, feed-door draft and smoke-pipe dampers. Then let the coal slide off the shovel just inside of the door so that it forms a bank against the front of the heating section. Break up the crust which forms after the coal is ignited and spread it out evenly. Always bank fresh fuel on the front of the fire so that the live fire in the rear will burn the gases. When the fire is about 10 in. deep and thoroughly ignited, close the base door but leave the fire-door slide, the base-door flap and all smoke-pipe dampers open, to guard against possible explosions. These explosions are caused by the sudden ignition of gases when the fire is smothered. For this reason live flame ought to be burning through the top of the fire or a red spot should be seen at all times. See that all fresh fuel ignites promptly. Break up the larger lumps or crust on top of the fire. Keep the feed door closed to prevent the escape of the gases, but leave the slide in that door open to complete combustion of gases. When the fire is burning briskly and the gases ignited, open the feed door slightly to increase combustion. The nature of this fuel requires more frequent firing, but it has high heat value.

Coke burns quickly and with an intense heat. It should fill the fire bed to the bottom of the feed-door opening, and can be banked higher in the rear of the firepot. It will require longer to ignite the first fuel and subsequent feedings should be ignited before the ashes are shaken or the drafts checked. The lower draft opening should be closed except for the first lighting. The smoke-pipe damper should be regulated according to the strength of the chimney so that the fire will not burn out too quickly. The draft in the feed door must be manipulated to assist in checking the fire.

Pea and buckwheat coal, or small-size anthracite, need little extra care or attention except that fresh fuel should be thoroughly ignited before the ashes are shaken out. The grates should also be shaken gently to avoid breaking down the fire bed. When a mixture of coke and buckwheat coal is burned, kindle with coke and add subsequent layers of buckwheat and coke. When the surface is covered with buckwheat, leave a small red spot for proper ignition of gases. Bank at night with buckwheat. Shake the grates gently also in this case.

Oil Filter from Old Felt Hat

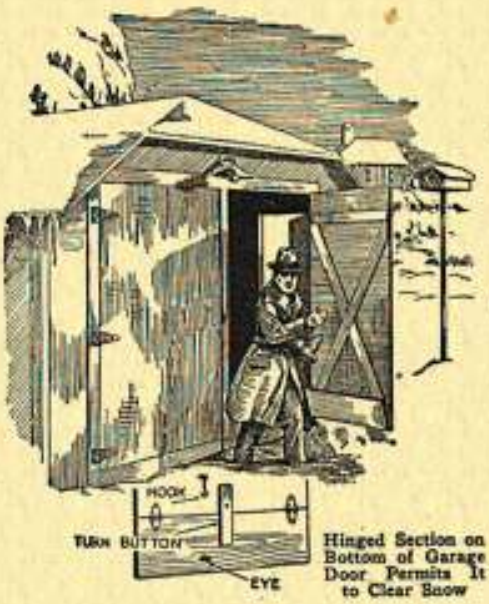
Oil can be filtered satisfactorily by straining it through an old felt hat, as shown in the illustration. The hat is set in the top of a pail and the oil poured in. It may be necessary to provide additional support for the hat brim if the pail is large. The oil will seep through slowly and will be free from all dirt after it has been strained in this way.

Luminous House Numbers

When calling for the first time on a new acquaintance, I always found it difficult to read the house numbers, and to find the right one, I was often obliged to light several matches. Thus, in most cases, I was late for my appointment. Considering the fact that new friends would have the same difficulty in locating my house, I finally hit upon the following idea and gave it a tryout to my satisfaction. I bought some luminous paint and painted my house numbers with it, causing them to shine at night and making them easily readable.—Henry B. O'Connell, New Haven, Conn.

Snow Clearance on Garage Doors

Swinging double doors used on such buildings as barns and garages are often difficult to open during winter because of the snow in front of them. A remedy is to attach a hinged board to the bottom of each door which can be raised and held up with hooks when desired. The doors are short enough to allow them to open over an ordinary fall of snow. The boards are attached to the bottom of the door with hinges and are held in place when down by large wooden turn buttons, fastened to the inside of the door at the bottom. Before opening the doors the

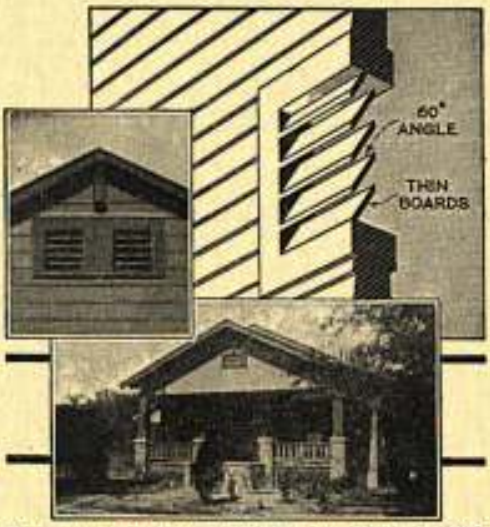


Hinged Section on Bottom of Garage Door Permits It to Clear Snow

boards are lifted up and hooked as shown in the drawing.—E. T. Gunderson, Jr., Humboldt, Iowa.

Gable Ventilators for Homes

Many southern homes are now built with ventilators in one or both ends, just under the gables. This is an idea that can



Ornamental Ventilators in Gables, Just below the Roof, Help Reduce Temperature in the House

be used to advantage during the summer months in other parts of the country, if ordinary precautions are used during the winter to keep out the cold. Practically all ventilators of this type are framed like a window. The thin boards in the ventilators are spaced 1½ in. apart and set at a 60° angle, sloping outward, so that even driving rain cannot get in. Hot air, which otherwise is confined under the roof, escapes readily and the temperature inside of the house becomes much lower. In winter a pad of black building or roofing paper can be tacked over the opening on the inside, so that it will not be noticeable from the street. Where driving rains and snowstorms are more frequent, it may be better to make the blades of the ventilators from strips of sheet iron, the strips being curved or bent to form smaller openings and set closer together.

Remedy for Leaky Fountain Pens

Many fountain pens soon begin to leak in the cap, and this is quite annoying. A good method of overcoming this trouble is to press a small piece of sponge into the end of the cap. All the ink which leaks out can then be removed by squeezing the sponge with a pencil or small piece of wood every few days.—R. Harry, New York, N. Y.

Oil Drum Makes Water-Tank Heater

Preventing the water in tanks and troughs from freezing is one of the farmer's winter problems. Water heaters are on the market but one can also be made without much trouble. An old oil drum

Old Oil Drum Makes Excellent Heater for the Farmer's Water Tank

is usually available. The top of this is cut out and a removable sheet-iron cover substituted, which has two holes cut in it for flues, one of which is the air intake, extending clear down to the bottom of the drum, and the other the smoke flue. A chunk of wood has been found to burn an entire day, and a coat of ice 2 in. thick over the whole tank was melted in about two hours. Cobs are used when a quick, hot fire is wanted, and wood chunks to keep a slow heat through the day and the following night. The tank is anchored securely by means of rocks, which are fastened to vertical rods hooked over the top of the drum.—Dale R. Van Horn, Walton, Nebr.

¶Do not apply furniture polish to soiled furniture, or it will never look bright; wring a cloth out of warm soapy water, and wipe the furniture carefully, then polish as usual, when quite dry.

Novel Photographic Collection

Those who are fond of collecting photographs, as well as the amateur photographer who likes to dabble in novelties, can obtain interesting photos in a simple way. The process involved is more or less well known, but the material used affords a pleasant departure from conventional methods. Go to your local movie theater and ask for a few pieces of waste film. These scraps will probably be portions of scenes from well-known photoplays, and it is with these pictures that you can start the collection. After looking over the films, pick out those scenes which appeal to you the most and clean the film thoroughly as it has collected a great deal of grease and dirt while being run through the projector. A few pieces of commercial cut film, and a printing frame are also needed. Open your printing frame and lay a strip of the film on the glass, emulsion side up. Now place a piece of the commercial film on top of that and close the frame. This film will be printed as a piece of prepared paper, but the exposure must be very short. A match burnt in front of the frame will prove sufficient.—L. C. Ferguson, Ontario, Calif.

Successful Mud Attachment for Cars

After years of experiment by newspapers throughout the country to find some means of transportation whereby afternoon-delivery service could be maintained the year around on muddy rural routes, a Springfield paper devised an attachment for an automobile wheel, which takes the machine through the mud successfully. It is made by welding together two rims, to which, at intervals of 12 in., mud hooks are welded. This is bolted to the rim already on the wheel with long rim bolts. In order to solidify the entire wheel, an old brake drum is bolted, inside out, to the outside of the third rim. When these rods are drawn up, the wheel is capable of withstanding all jolts it will receive on its trips.

Effective Guard, Made of Two Extra Rims, Prevents Miring of Car on Muddy Roads

Making a Workbench for the Home Shop

A BENCH for the woodworker should combine three qualities—true working surface, rigidity and efficient clamping devices. According to purpose, designs may vary widely as in the two described, if the above essentials are embodied in them.

The simple manual-training bench illustrated in Figs. 1 to 13 is built of hard maple, with the upper rails joined to the top by means of lag screws and the stretchers to the legs with drawbolts, facilitating "knocking down" for crating. Stock sizes of material are used, ¼ in. reduction in thickness and width being figured for waste in the mill dressing, so that a 2 by 4-in. piece is dimensioned as 1¾ by 3¾-in. in the drawings; but if stock material comes thicker or thinner it need not be sized to the exact dimensions given, as other dimensions may be slightly altered to fit.

For the top, glue up, edge to edge, three pieces of 2 by 4-in. stock, 3½ ft. long, and one piece of 2 by 3-inch. The joined edges must be jointed straight, and, if machine jointed, should be smoothed by hand, as well, to remove the ribs. Fit two pieces together, one with the heart side, and the other with the sap side, up, as shown in the top section illustrated for the second bench, Fig. 14, to prevent warping. They should meet at the ends and part very slightly at the center, so that when clamped up the edges will come tightly together, forming snug joints, and the ends, being brought slightly under compression, will be less likely to open up under shrinkage. Since maple is very close-grained, glue can be absorbed only to a limited extent, so if possible the surfaces of the joint should be scratched with a scratch plane; in the absence of this tool, use a toothed scraper. Warm the wood and have the glue well cooked, to the consistency of cream. The use of ½-in. dowels will increase the strength of this joint.

The front piece, acting as the front band, is illustrated as having a tenon worked on each end 1¾ in. long, 2 in. wide, and ¾ in. thick, which is similar to that detailed for the front band of the second bench (Fig. 16). A saw kerf is made ¼ in. from the shouldered edge, into which an expanding wedge is driven when the band is assembled with the end bands, thus forming a dovetail. If preferred, this tenon may be left off, and a mortise cut in its place, into which a slip-tenon can be glued. By this means the ends of the top are left free to plane, making easy the correction of irregularities from sawing. The truing up of the top is a matter of considerable labor. If there is much irregularity, reduce first with a scrub plane by planing diagonally from corner to corner, afterwards using a jointer. Finish with the grain. To be sure that the top is not in wind (twisted), lay on edge at each end a narrow straightedge and sight over the tops. Lower the high corners and bring smooth to a straightedge in all directions. Scrape off all plane marks. Make the top as thick as the stock will allow, since it is a waste of time and energy to

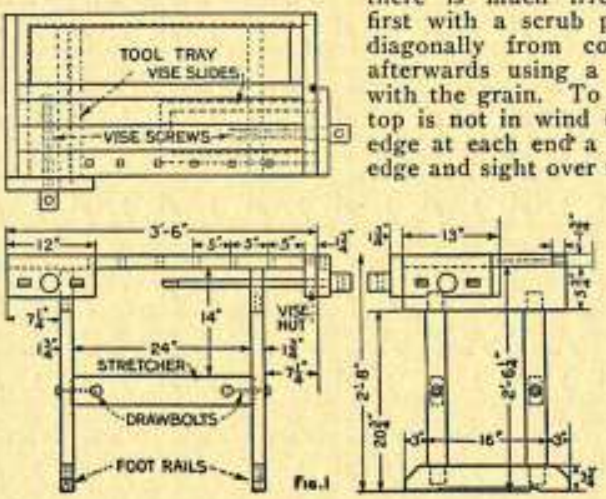
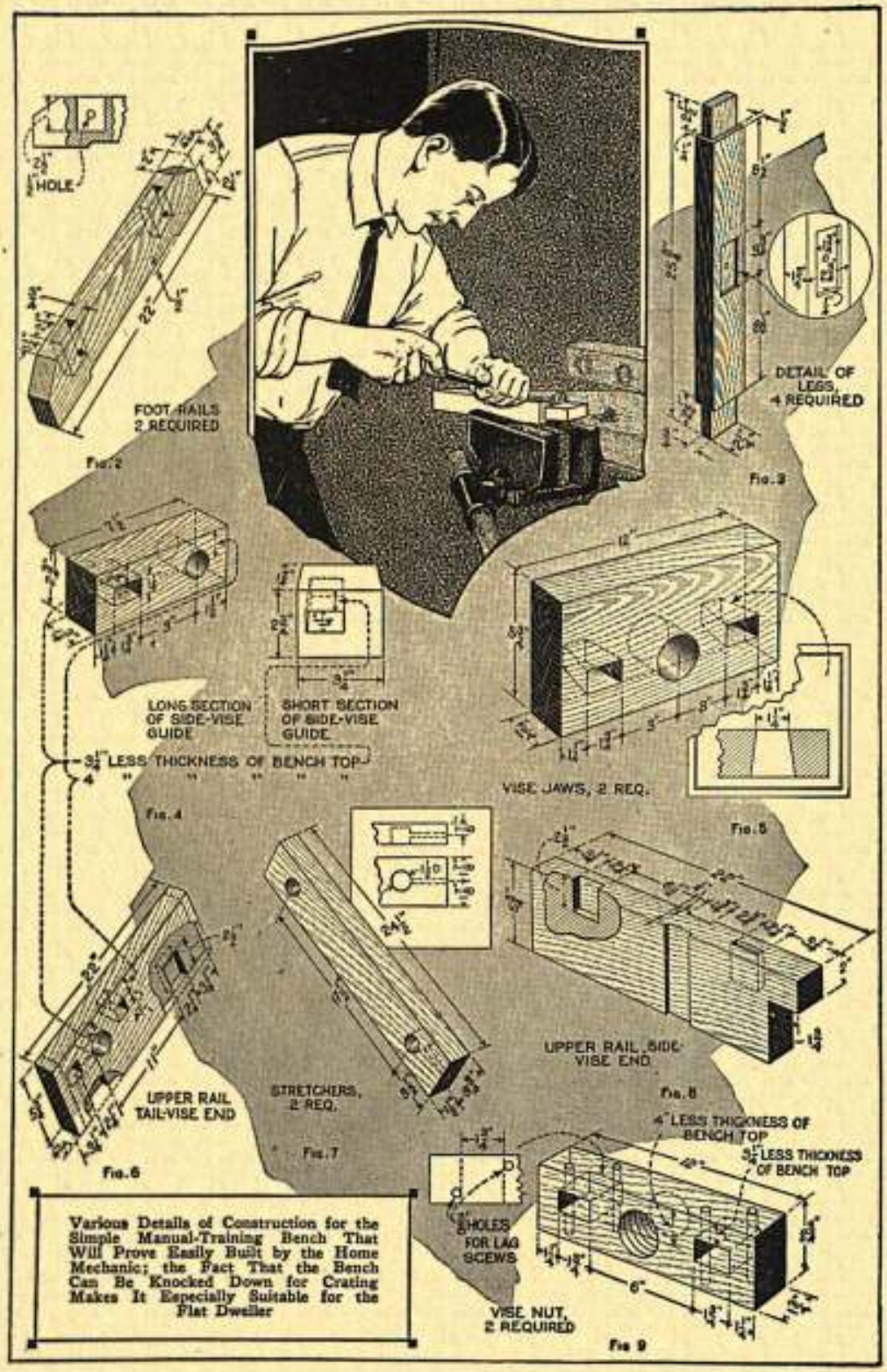
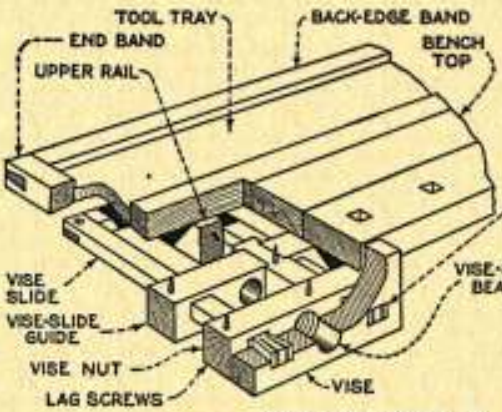


Fig. 1



Various Details of Construction for the Simple Manual-Training Bench That Will Prove Easily Built by the Home Mechanic; the Fact That the Bench Can Be Knocked Down for Crating Makes It Especially Suitable for the Flat Dweller



SLIDE VISE ASSEMBLED

Fig. 10

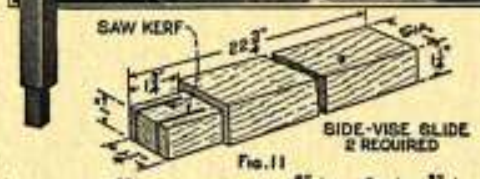
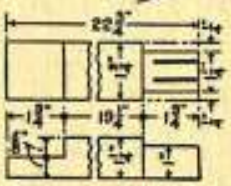
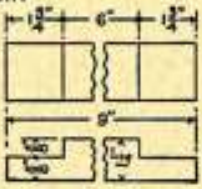


Fig. 11



TAIL-VISE SLIDE, 2 REQUIRED

Fig. 12



CROSS BRACE

Fig. 13

remove more wood than is absolutely necessary. Straighten and parallel the edges. Square the ends and cut a ¾ by ¾-in. groove full width in the center of each. Rabbet the underside of the rear edge ½ in. wide and ¾ in. deep to fit over the edge of the tool-tray board.

The back and end bands are of 2 by 2-in. stock squared up, a dovetail mortise being worked in the ends of the end pieces as detailed in Figs. 16 and 17. A ¾ by ¾-in. groove to mate with that in the ends of the top is plowed in each, and before assembly a slip-tongue, ¾ by 1½ in., is inserted. The back band is rabbeted ¼ in. wide to fit over the tray board. Glue the corner joints of the band but leave the slip-tongues dry. They aline the top with the bands, but allow it to shrink or swell without buckling or checking. The tray board is 1 by 8 in. by 3 ft. 2½ in. laid in the rabbeted recess and secured by three 2-in. flat-head wood screws at each leg rail. The two stretchers are 2 by 4 in. by 2 ft. ½ in., with a 1½ in. hole bored nearly through the thickness, centered 3½ in. from each end. Bore ⅜ in. holes in from the ends to meet them.

Each leg is of 2 by 3-in. stock, 2 ft. 1¾ in. long, with a tenon ¾ by 2¼ by 2½ in. centered on each end and a mortise ¼ in. deep 8½ in. from the upper shoulder, drilled, to receive a stretcher end. Both upper rails are 2 by 4 in. by 1 ft. 10 in., with mortises 3¼ in. from each end in the lower edges for the leg tenons. Fit the joints close, and apply glue to both tenon and mortise. The side-vise rail is notched around the vise nut, as detailed, while a dado ¼ in. deep is cut in each side

upper rails, and if necessary, counterbore so that the screw heads may be sunk in. When the glue is dry, assemble the legs with the stretchers and top.

The detail shows clearly the vise construction. The two slide bars, 1¼ by 1¾ in. by 1 ft. 10¾ in., have tenons on one end 1 by 1¼ in., saw-kerfed for expansion in the dovetail mortises in the vise jaw.

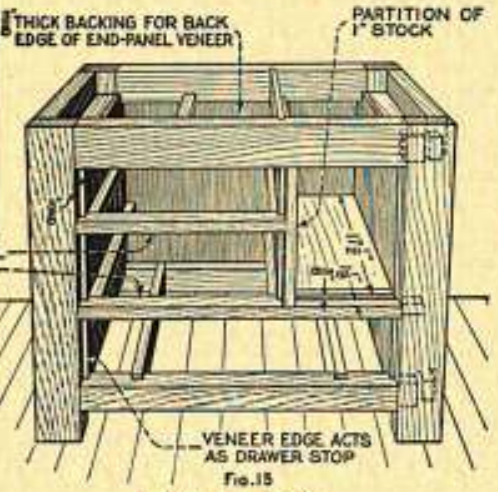
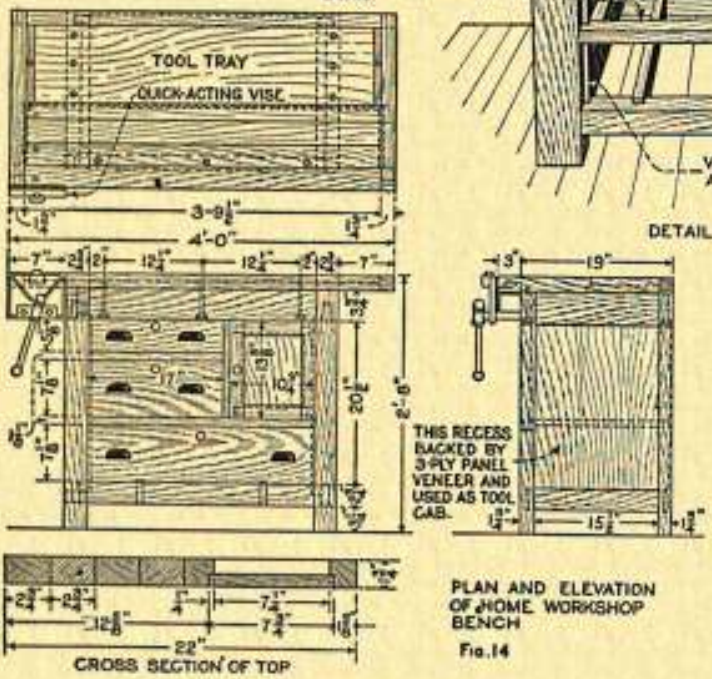


Fig. 15

DETAIL OF FRAME



CROSS SECTION OF TOP

PLAN AND ELEVATION OF HOME WORKSHOP BENCH

Fig. 14

Notice the shoulders on the lower sides of the slide tenons, designed to resist clamping strains. On the side vise these slides pass through holes cut in the nut block, which is screwed to the under edge of the front band, and through the two-piece guide block fitting into the dados in the upper rail. In the tail vise the bar slides pass through the upper rail, eliminating the guide block, and a cross-brace is half-lapped across the ends, secured with screws only, so that the vise can be removed. A 1½-in. wooden bench screw 14 in. long, or better, a 1¼ in. steel screw, should be used in each vise. At each end of the tool tray secure a triangular block with one screw, to facilitate the sweeping out of shavings. Cut stop holes as illustrated, and make a hardwood stop 6 in. long to fit snugly.

Build the top of the cabinet bench of 2 by 3-in. stock in the same manner as that of the other, but making it 4 ft. long.

8½ in. from the notched end, into which the two sections of the vise guide fit. The other upper rail acts as guide for the tail vise slides, so that 1¼ by 1¾-in. holes are cut as dimensioned in the detail, the distance from the upper edge being 3¼ in. less the thickness of the bench top. The screw-guide hole is just large enough to admit the screw without binding, and its center is 4 in., less the thickness of the bench top, below the upper edge.

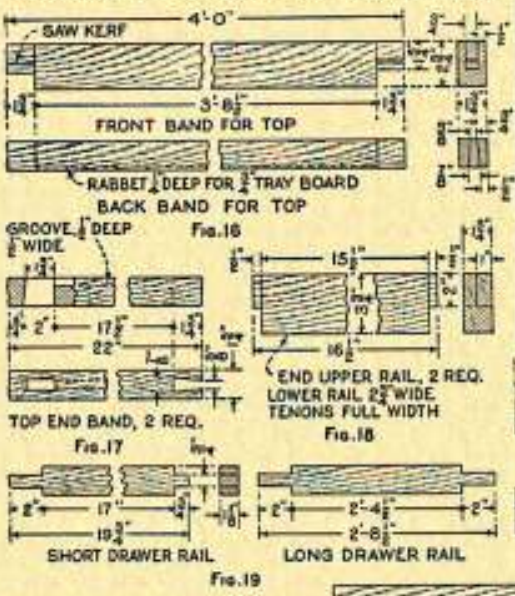
Before assembling the legs and rails, bore ⅜-in. lag-screw holes through the

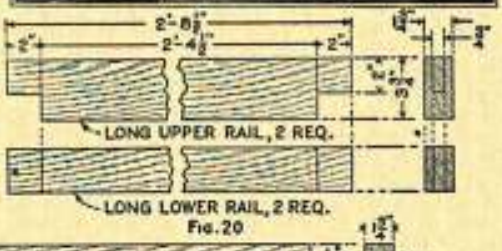
Since a patent quick-acting vise is used, all wooden vise apparatus is eliminated. Cut the legs ½ in. long and lay out for the mortises from the lower ends. Select the best side and edge of each for faces and mark them, laying out on the other faces according to figures in the details. Notice that the top of the upper mortise is 1¾ in. from the upper end, allowing stock enough to prevent the upper rail tenon stripping out.

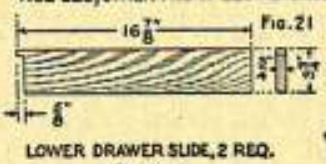
The upper rails are of 2 by 4-in. stock. The end tenons are flush with the lower edges, and 2 in. wide, those of the long front and rear rails being 2 in. long, while those of the end rails are only ½ in. The lower rails are 2 by 3 in., with full-width tenons. Cut dados ⅜ in. deep for slide cleats as shown. Assemble the end rails and legs, glue and screw cleats flush with the inside edges of the rails and inside surfaces of the legs, and cover over the inside with ⅜-in. 3-ply panel veneer, notched to fit around the rails. On the drawer end the edge of the veneer is ⅜ in. back from the front of the leg, forming drawer stops; while on the other end, that portion lining the cupboard is 1⅛ in. back from the front of the legs. The rear edges are ⅜ in. from the outer faces of the rear legs, making backing for the veneer back. Use ¾-in. flat-head screws, countersunk, for the veneer.

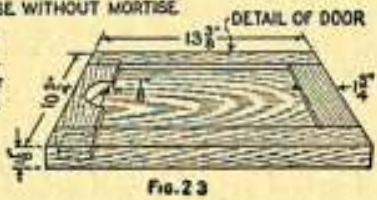
The drawer rails are 1⅛ in. net by 2 in. The tenons on both ends of the long rail and on the left end of the short drawer rail are 2 in. long and ¾ in. thick, centered on the width, and as wide as the thickness. That of the right end of the short rail is ¾ in. long, engaging with the partition.

Assemble the frame, and, while the glue is setting, glue up the partition and shelf from 1 by 10-in. stock. Cover the back of the frame with panel veneer, screwing stops on the rail edges where needed. From the inside of the right leg lay off a distance of 10¾ in. along the long rail and

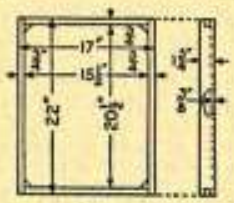




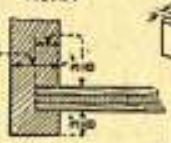




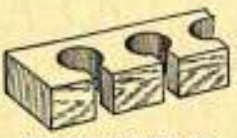
glue and screw to the back a cleat ¾ in. square. Put a like cleat along the end and back to support the shelf. Cut the shelf 10¾ in. long and screw in place on the cleats. The front edge, rising ⅜ in. above the rail, forms a door stop. The partition is cut long enough to admit a cleat on the lower end under the shelf and the upper end bearing against the cleat between the two upper rails, but must not project below the drawer rail, lest it interfere with the long drawer. The short rail must be put in at the same time as the partition, its short tenon fitting in a mortise cut in the partition, the front edge of which must come flush with the front of the rails, forming a stile. Make the cleat slides for the long drawer of 1 by 4-in. maple, as shown in the detail. The projecting upper edges (rising 5/16 in. above the rail) form stops for the drawer. The slides for the small drawers are ¾ in. net by 1⅛ in., and are glued and screwed along the end between rails and back. They must be parallel to each other and square with the front. Attach the top by means of lag screws through the long upper rails. If drawer front material in maple is not obtainable from regular stocks, it is cheaper to make it by hand than to have it specially milled. Use 1 by 8-in stock for the two larger drawers, jointing the bottom and top edges straight and plowing a ⅜ by ⅜-in. groove ⅜ in. from the lower edge inside. Cut the front pieces ¼ in. longer than the opening, and rabbet the ends 15/16 in. back to a thickness of ⅜ in. Plow and size the sides, cut them ½ in. shorter than the distance from the front of the rail to the back of the cabinet, rabbet the back ends ¾ in., and assemble with the front and back, using screws. If an especially durable job is desired, dovetail the sides into the front.



DETAIL OF DOOR FOR END CABNETS
Fig. 24



DRAWER CONSTRUCTION
Fig. 25



FOR CHISELS, FILES, ETC.

FOR BRACE, SPOKESHAVE, ETC.

TOOL HOLDERS
Fig. 26

Cut a piece of panel veneer for the bottom, making a snug fit, and slide into the groove past the back. A screw or two through it into the back will prevent it from working out. Insert the long drawer and scribe along each side of the slides with a pencil, and guiding by these lines screw strips of wood ⅜ in. thick to the bottom as guides. Replace the drawer and mark the front ends for cutting to fit. By beveling the ends and top slightly the front can be made to show very little joint. The other drawer is fitted in the same way. The upper drawer is made of 1 by 6-in. stock.

Build the cupboard door of 1¼ by 2-in. stock for stiles and rails, plowing the insides edges ⅜ by ⅜ in. to receive the panel veneer, and cutting tenons on the rails ⅜ by ⅜ by 1¼ in., as dimensioned in the detail. Do not glue the panel. When the glue is set, surface the joints and smooth up. Fit to the opening with a clearance of less than 1/16 in. all around, and hang with 2 by 2-in. fast-joint butts. The end recesses are tool cabinets. Each door is built to close against the bench end, using 1 by 2-in. stock for stiles and rails, rabbeted instead of plowed for the panel, the corners being joined as shown in the detail and re-enforced by corner blocks glued and screwed inside. Cut the panel veneer to exact size, beveling the edges slightly, so that when tapped to a seat in the rabbet the joint around will be very tight. Secure with small screws, and hang with 3 by 3-in. fast-joint butts. Mortise in the drawer locks and screw on the vise.

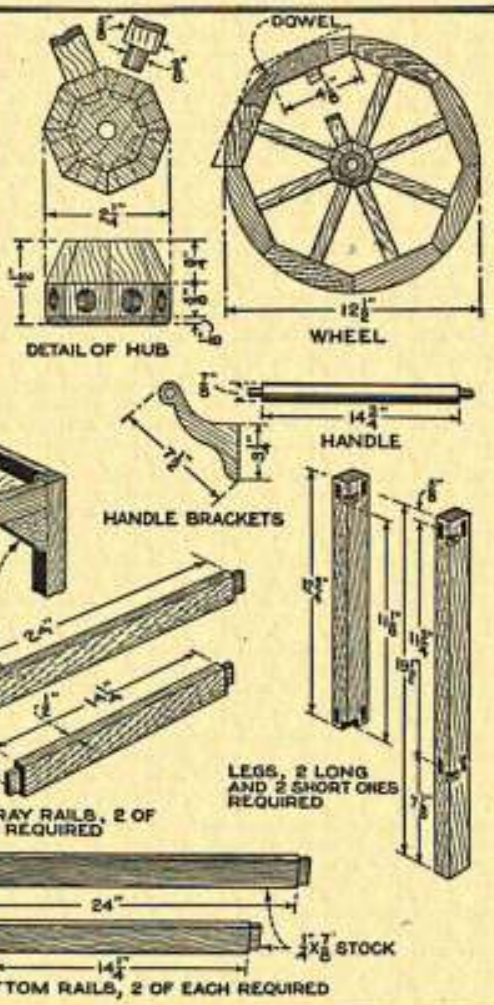
Since individual equipment varies considerably, no arrangement of tools is shown. On the whole, as shown in Fig. 26, simple clips, small screw hooks, turnbuttons and wooden racks are best for the tools.

A Homemade Tea Wagon

By E. E. SCOTT

THE tea wagon is a true boon for the busy housewife, as it saves many of the innumerable steps between dining room and kitchen, necessary in carrying in meals, and removing dishes.

The material for all parts of the tea wagon shown, except the wide boards for the trays, is mahogany, obtained from the scrap pile of a chair shop, and costing only 50 cents. The trays are made of



Full Details and Dimensions of a Tea Wagon That can be Made Very Cheaply at Home: Most of the Parts can be Made of Scrap Stock, and the Construction Is Simple. The Photograph Shows the Completed Wagon

½-in. pine boards, doweled and glued together as shown in the detail.

The making of the wheels is the only operation that is at all difficult and demands explanation, but, with a little care in mitering the separate sections, the work is comparatively easy. The wheels should first be laid out, full size, on a sheet of cardboard, and one rim section cut out to the shape indicated by the dotted lines, to serve as a template. The stock should be marked by means of the template, but cut in a miter box set to a 22½° angle. The ends of each section must then be carefully "sliced" with a keen plane, to make as perfect a fit as possible, then doweled and glued as shown, notches being cut in the corners, and the rough segments bound together with wire until dry. The octagonal hub and square spokes are then made and glued together, and the assembly, when dry, carefully centered within the rim. The spokes are marked, cut to the proper length, and nailed to the rim with 1-in. brads, one on each side of a spoke.

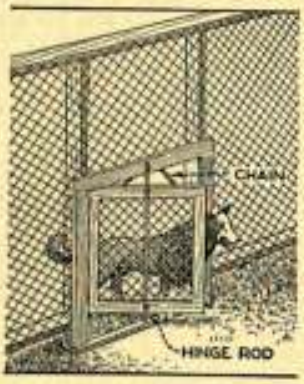
With one leg of a pair of compasses at the center of the hub, a 12½-in. circle is described on the rim, and it is trimmed to shape with knife, file, and sandpaper. If desired, a groove can be cut in the rim and rubber tires fitted.

The remainder of the work is mainly a case of "cut and fit," all the details and parts being shown in the drawing. The axle brackets are fastened to the lower tray by three long, screws, the wheels being attached to the brackets by square-head brass bolts, 2½ in. long. A pair of ordinary casters are fitted to the rear legs. Screws are used to fasten the angle braces on the trays, and also for the handle brackets. The remaining parts are carefully mortised, glued, and nailed with small brads. Prepared liquid glue should not be used; use the hard, flaky patternmakers' glue obtainable at most hardware stores, and melt it in a regular gluepot.

The finish will, of course, depend upon the material used and the maker's taste, but the woodwork should be as finely finished as possible before any stain is applied, and, if the wood is open-grained, a good paste filler should be used after staining. Do not use a varnish stain, but obtain a good stain or wood dye, and follow the maker's directions closely.

Gate for Dog Built in Fence

It is generally desirable to give watch dogs free entry and exit to the house yard of a farm, especially at night, and for this reason one of the gates is usually left open; this, however, does not exclude poultry or cattle from the yard. This objection can be easily overcome by providing a self-closing gate that can be opened with little effort by the dog.



The gate can be built in any fence, can be made of any suitable size, and can be adjusted so that more or less effort is required to open it. It is held in a suspended position by two short chains as shown, and swings on a vertical rod that passes through screweyes driven into the frame, as indicated. It must be balanced as perfectly as possible so that the chains will close it again after it has been opened. The force required to open the gate depends on the distance that the chains are spaced from the hinge rod; the farther they are spaced from it, the more force is required, and vice versa.

The edges of both gate and opening are, of course, perfectly smooth, to eliminate possible danger of injury, and sufficient clearance must be left between the top and bottom of the gate to insure easy operation.

Hints for the Home Typist

To facilitate handling the paper and carbon sheets when making several copies on a typewriter, the following expedient has been found very helpful: Select a sheet of light but tough paper, the same width as the carbon sheets, but about 1½ in. longer. Place the carbon sheets, face downward, on this paper and fold the projecting end over the top of them. Then sew the carbon sheets in this fold securely on a sewing machine, about ½ in. from the fold, using a rather long stitch. In using this carbon arrangement, each sheet of paper is pushed up under the flap as far as it will go, and the platen release is used when inserting the sheets into the machine.

Replacing Gaskets

Shellac is very often used when putting in a new gasket. This is, however, bad practice, as a new gasket will compress enough to make a good joint, it being necessary only to rub a little grease on both sides, and the use of shellac means that the gasket will be torn when removed. When replacing an old hard gasket, shellac must be used, but it is better not to use old gaskets at all.

Track Aids in Pulling Buggy over Steps

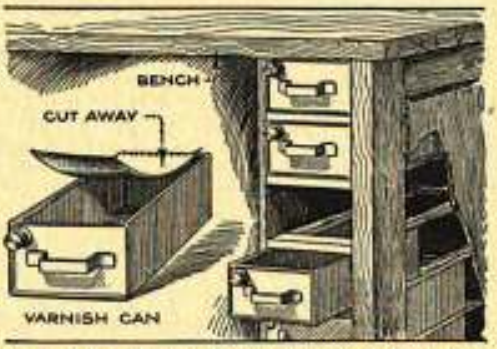
A detachable track has been found to be a great aid in pushing a baby cab or invalid chair over a flight of steps. Two lengths of channel iron, wide enough to accommodate the tire of the vehicle between the flanges, are used for the tracks. At one end, both flanges are trimmed off for about 2 in., and the web is bent down to form a hook. Light flat-iron brackets, bent U-shape, are screwed to the riser of the top step to accommodate the hooks, so that the web of the channel will come flush with the tread of the step. The tracks are spaced to suit the wheels of the cab or chair. When not in use the tracks can be laid aside. If the steps are of concrete, expansion bolts can be used to fasten the brackets, holes being first drilled in the step with a common star drill.

Replacing Fan Belts

Trouble is often experienced when replacing fan belts on small cars having a crank that is not detachable, because there is very often too little space between the crank and the lower fan pulley. This trouble can be eliminated by cutting off, with a hacksaw, part of the four teeth of the crank that engage with the pin on the end of the shaft. Of course, care must be taken not to cut off too much, or the crank will be ruined.

Drawers Made from Varnish Cans

Ordinary varnish cans of 1 or 1½-gal. size can be turned into very serviceable and durable drawers for holding small tools, nails, screws, putty, and, if desired, liquids. One side of the can is cut away as indicated. The sharp edges remaining are bent or hammered down so that there will be no danger of cutting the hands. A number of slides on which the cans may run easily can be arranged underneath the workbench, as shown in the illustration, or if desired, a special frame can be built to contain them, making a neat storage cabinet. — Harry W. Poor, Boston, Mass.

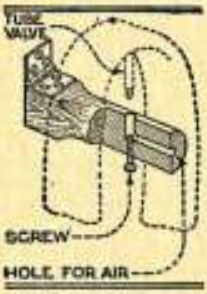


Serviceable and Durable Drawers, Made from Varnish Cans, Provide Excellent Storage Space in Any Workshop. They may be Arranged under the Bench, or a Frame can be Built to Contain Them

Simple Tube Deflater

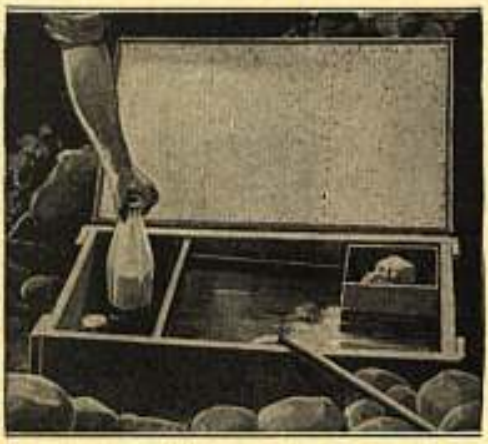
A device for deflating inner tubes is shown in the illustration. It can be constructed in a few minutes and is very useful in any garage, as it eliminates the necessity of removing the valve, or of searching for a piece of wire to push it down.

Two small holes are drilled in one end of a piece of wood in the manner shown. The hole in the side is large enough to allow a valve stem to be inserted, while the hole in the end permits the air from the tube to escape. A machine screw is driven into a smaller hole in line with the first hole, and extends about ⅜ in. into it. The end of the screw fits inside of the valve stem, and holds the valve open.—J. J. Ginsberg, Brooklyn, N. Y.



Refrigerator for the Camp

An excellent refrigerator for the camp or summer cottage can readily be made by lining a wooden dry-goods box with



A Wooden Dry-Goods Box, Lined with Galvanized Iron and Divided into Several Compartments, Makes an Excellent Refrigerator for the Camp

galvanized iron, soldering all seams, so as to make it water-tight. This refrigerator also serves as a drinking tank.

The refrigerator has three compartments; the large one is used for the drinking water, the one at the left in the photograph for cream and milk bottles, and the smallest one for meats and vegetables. The two larger compartments are made by making a partition across the box, but the smaller one is simply a removable galvanized iron box. The compartments can be made any size.

Water from a spring is led into the box by means of a length of pipe, and flows from the main compartment into the smaller one through a hole drilled in the partition. A drain hole is drilled in the outer side of the second compartment so that the surplus water will flow out. This hole is drilled at about two-thirds the height of quart-size milk bottles. The hole in the partition may be higher than this, so that the level of the water in the largest compartment will reach nearly to the top of the small meat box.

It has been found that a refrigerator of this type, about 3 ft. by 18 in. by 12 in. in dimensions, will keep milk and cream sweet for three days during the hottest weather.—Harry F. Blanchard, South Glenn Falls, N. Y.

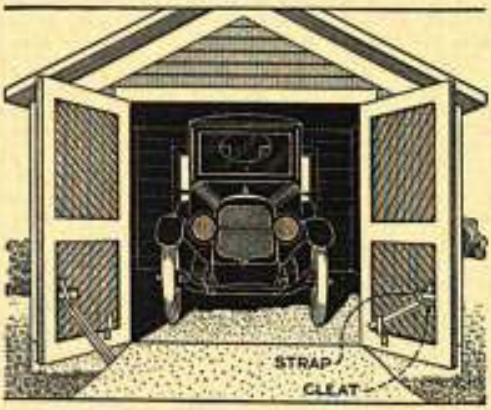
¶Steam for small toys may be obtained by connecting a rubber tube to the valve of a steam radiator.

Winding Electrical Coils Tightly

Most experimenters, working with electrical coils, find great difficulty in winding the wire so tightly that the coil, when finished, will have the neat appearance of machine-wound coils. It is well known that copper possesses a high heat-expansion rate, and this fact can be applied in coil winding, to make a neat job. By placing the wire over the stove, or other source of heat, until it is thoroughly warmed, and keeping the temperature as high as possible during the winding operation, surprisingly good results will be obtained. In following this method care must be taken to see that the ends of the wire are securely fastened, to prevent them from loosening when the wire contracts upon cooling. When it is understood that 100 ft. of copper wire expands nearly ½ in. when raised in temperature about 30° F., it is easily seen that, when the wire contracts upon cooling, it will produce a tightly wound coil.

Holding the Garage Door Open

Open garage doors are likely to be slammed shut by a slight breeze. This is very annoying, especially when one person, unaided, is attempting to drive into the garage. The simple stops shown in the drawing will prevent this occurrence. Each consists of a stout wooden prop, of 1 by 2-in. material, a leather strap, nailed to the door, and a cleat nailed below the strap. In use, the prop is set under the cleat so that pressure applied to the other side of the door cannot close it. When the doors are closed the ends of the props



Method of Keeping Garage Doors from Closing, Which Proves of Considerable Assistance When Driving into the Garage Unaided

are set behind brackets provided for this purpose; or simply rested on the frame.

Lubricating Windows

When windows fit tightly so that it is difficult to open and close them, the guide strips are usually planed down. This method of overcoming the difficulty is effective but has the disadvantage of allowing the window to rattle during windy weather, and is therefore not entirely satisfactory. A better method is to use a suitable lubricant on the guides. Not every kind of oil can be used for this purpose, however, as some kinds become thick and sticky, and this tends to increase the difficulty instead of lessening it. An excellent solution for the purpose is a mixture of paraffin and turpentine.

Dissolve as much paraffin in turpentine as possible, by shaving the paraffin and allowing the mixture to stand for a few days. Apply the solution liberally to the window guides with a brush, going over them two or three times. The turpentine will evaporate and leave a colorless film of paraffin on the guides. After this treatment the windows will slide freely, regardless of weather conditions.

For metal-frame windows in industrial and office buildings, the following method gives satisfaction: The paraffin is melted and powdered graphite is stirred into it while hot. Upon cooling, the mixture solidifies, and the cake thus formed is used to rub the guides.

Obtaining Clear Image in Finder

When exposures are made under the open sky, the finders on many cameras show not only the image of the object to be photographed, but also reflect a transparent image of the photographer's head and a section of the sky above, both of which disturb the sharp outlines of the image. Pulling down the hood of the finder low enough to cut out these reflections usually hides from view the top of the image.

A simple means of correcting this fault, and, at the same time, leaving the whole image visible, is to place a small paper cone over the finder; a piece of heavy paper rolled into conical shape, and pinned together, will serve excellently. A convenient size of cone is about 6 in. long, with the top opening ¾ in. in diameter, and the bottom opening just large enough to fit over the finder.

Garden Hedges from Sod

It usually takes considerable time and care to grow a neat-looking border hedge, and this deters many gardeners from planting them. The gardeners of Exposition Park, Los Angeles, however, have found a quick method of making them, by using sod.

Left: A Garden Well Surrounded by a Hedge Made of Sod.
Right: A Bridge of Sod Built over a Miniature Lagoon

The illustrations show the pleasing effect of sod hedges surrounding a rustic well curb, and also forming a bridge over a miniature lagoon. Strips of sod are piled, one upon another, to the height and shape desired, and kept thoroughly soaked until a compact structure is formed. Sod with the grass side out is used on the edges, as well as in the topmost layer. In making structures like the bridge, it is, of course, necessary to provide reinforcement of some kind, usually heavy-wire mesh.—C. C. Wagner, Los Angeles, Calif.

Simple Blow-Out Shoe

A strip of canvas, properly applied, makes an ideal blow-out shoe that will add many miles of service to an old casing. The canvas strip must, of course, be wider than the length of the hole in the casing. The canvas is wrapped around the tube several times, so that it will fit exactly inside of the casing. A liberal application of soapstone will eliminate most of the danger of chafing. Care must be taken when replacing the tube to get it in the casing so that the bandage fits inside of the blow-out. It will be found that the casing will not bulge as with an ordinary blow-out shoe, and that the strip will last a long time.

Bamboo Bow and Arrow

Almost every boy, at some time or other, would like to try his skill with a bow and arrow, but it is rather difficult

Strong, Durable Bows and Arrows Can Be Made from Bamboo Fishing Poles

to obtain a satisfactory piece of wood for the bow. Seasoned hickory is usually recommended, but an excellent substitute is the bamboo from a cheap fishpole. With reasonable care, a 5-ft. length of bamboo may be split into pieces of small dimensions; twelve or fifteen being obtained from a pole 1½ in. in diameter. After splitting it, the pieces of heart, or hardened pith, at the joints should be removed with a knife or plane so that the strips can be bound together in a compact bundle. The binding is a very particular part of the work, if the bow is to be made serviceable for any considerable length of time, and waxed cord should be used for this purpose. To begin, bind the middle section of the bundle to a distance of 6 in. on either side of the exact center. After fastening the string ends, cut away one-fourth of the number of sticks in the bundle just beyond the wrapping, and bind those remaining at points about 16 in. from the center of the bow. Cut away as many sticks as before and bind again, proceeding in this way until one-fourth of the sticks of the bundle remain. These are bound at the tip ends, and the bow is ready to receive the string. If the work has been done carefully, the result will be a well balanced bow that will last for years, especially if the bowstring is loosened after using it, so that the bamboo may straighten again and retain its elasticity. Serviceable arrows may also be made of similar material by binding four of the narrow strips together and inserting balancing feathers.

Making Direct Photographic Positives

A little known process which can be used for making lantern slides and transparencies from ordinary plates or cut films, consists in subjecting the negative to the light when only partly developed. Exposing the plate to the light causes a reversal of the image, that is, the negative image is printed onto the remaining silver, which naturally assumes the form of a positive. A mere flashing on and off of a 50-watt lamp will often do the work. After printing, it is sometimes necessary to return the plate to the developer to produce a strong image. A thorough fixing and washing completes the process. —L. C. Ferguson, Ontario, Calif.

Paper Strip Indicates Bottom Margin

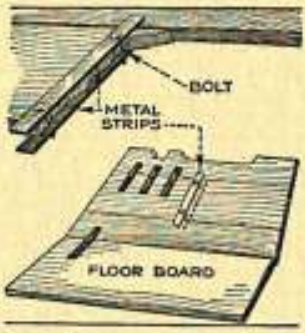
Typewritten letters appear neater if the margin at the bottom of the page is kept uniform. The spacing device on the typewriter takes care of the side margins, and the upper margin is in full view at all times, but one cannot see the lower edge of the sheet and therefore it is difficult to make a uniform margin. To inspect that width, the sheet must be turned out of the machine, and this often causes the paper to slip, resulting in irregular spacing, especially when carbon copies are used. The trouble can be eliminated and much time saved by feeding a strip of paper into the machine as shown in the illustration. The strip should lie about ½ in. over the right-hand edge of the sheet, and its top edge should coincide with the top of the sheet, the length of the strip being, of course, equal to that of the sheet. When the stop mark on the strip appears, a new sheet is inserted in the machine and in this way the bottom margin on all the sheets will be uniform.

Emergency Gaskets for Automobile

When it is necessary to use a gasket for an oil leak in the transmission cover, and a regular gasket is not at hand, a good one may be made from a piece of heavy wrapping paper. The sheet is laid over the cover and cut to fit by tapping around the edges with a hammer. The bolt holes are cut with the ball end of the hammer. The same kind of gasket will serve in many other places.

Keeping Floor Boards in Place

After a light car has been in use for some time, it frequently happens that the foot boards do not fit as snugly as at first, and hence are apt to slip out of place. This might cause a serious mishap, if it should occur while driving, as the pedals would be locked. One way of eliminating this danger is to bolt two metal strips to opposite sides of the middle floor board, as shown in the illustration. The ends are allowed to project ¼ or ½ in. beyond the edge of the floor board. It has been found that the boards will never slip out of place with this arrangement, but can still be removed and replaced easily.—W. J. Fraser, Toronto, Canada.

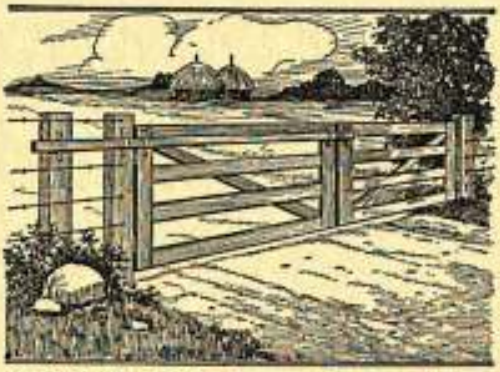


Double Gate for Farmyard

A gate of double width is a special convenience in the farmyard to permit the easy passage of wide hayracks, loaders, harrows, and other large implements. Such a gate is shown in the illustration, and it has the additional advantage of being made without the usual center post, to which both parts of a double gate are latched, and which is objectionable because it partly defeats the purpose of such a gate.

The gate illustrated is strong and rigid. The fence on one side of it is provided with two posts upon which are mounted U-brackets made of flat iron or steel. These are in line with similar brackets on the gate, as shown, and together accommodate a 2 by 4-in. beam. A hole, drilled near the end of the beam, permits the insertion of a peg or bolt to be used for a handle.

Generally, it is only necessary to open one section of the gate to provide sufficient space for the passage of an auto-

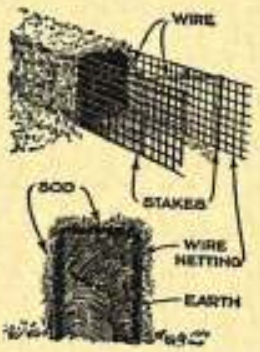


A Double Gate for the Farmyard, Constructed So as to Eliminate the Objectionable Center Post of the Usual Double Gates

mobile or carriage. The side of the gate shown at the right is opened by simply pushing the 2 by 4-in. beam back a few inches to clear the bracket. The beam remains in the four brackets of the other section and posts, and holds the rest of the gate rigidly in place. When necessary to open both sections, the right one is released first, and then the beam is pulled out of the two post brackets, which allows the left section to swing freely on its hinges.

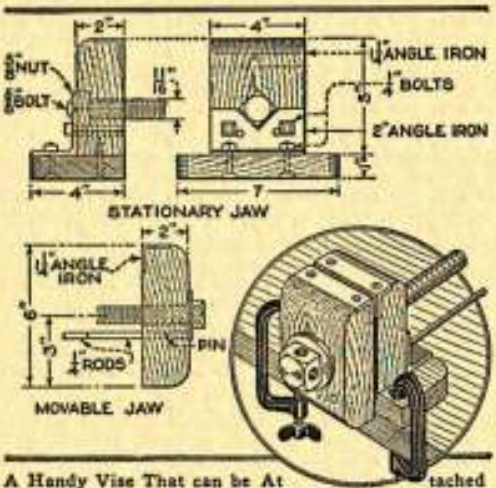
A Neat and Simple Hedge

A very neat hedge can be made without the trouble and expense of setting out separate shrubs and then having to keep them trimmed. A frame of wire screen or netting is set up in the manner indicated by the drawing. Sod is placed inside the wires, with the grass side out, and the space between is filled with earth. In a short while the grass will grow through the mesh of the screen and completely conceal it. The same idea can be followed out by planting some rapid-growing climbing vines over the netting.—Robt. Page Lincoln, Minneapolis, Minn.



A Homemade Vise

A homemade vise that can be clamped to any table or bench proves of considerable assistance where space does not permit the use of a stationary vise, or where a vise is used so seldom that it is hardly advisable to purchase one.



A Handy Vise That can be Attached to Any Table or Bench with Ordinary C-Clamps: It is Made of Hardwood and the Jaws are Protected with Angle Iron

The base and jaws are made of hardwood, to the dimensions shown. A piece of 2-in. angle iron holds the stationary jaw to the base, and is attached to both with ¼-in. bolts. To face the jaws, 1¼-in. angle iron is used. A hole is drilled through the center of both jaws for the ⅝-in. bolt, used as a screw, and a ⅝-in. nut is recessed into the back of the stationary jaw. If desired, small holes can be drilled through the head of the bolt to accommodate a "tommy," so that it will not be necessary to use a wrench for tightening or loosening the vise; or a permanent lever may be attached to the bolt head as in an ordinary vise. C-clamps are used to fasten the vise to the table or bench.

Disinfecting Cellars

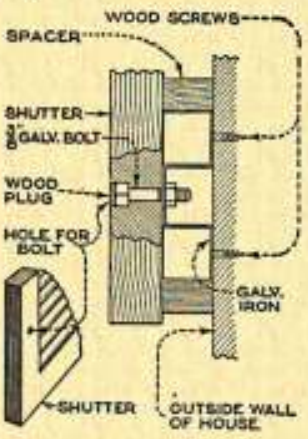
It is very disagreeable to have the basement or cellar acquire a musty odor after being closed up all winter. To prevent this, clean the basement thoroughly, taking care that there is no decaying vegetable matter in it. Then sprinkle dry chloride of lime, pulverized copperas, or even common lime on the floor, and close the basement up. After a few days, open the windows until the smell of the lime disappears. If the musty smell still persists, whitewash the walls and sprinkle powdered charcoal around freely.

It is a good plan to whitewash the cellar walls twice every year, in the spring and in the fall. This will not only improve the appearance but will also help to keep the air from becoming foul. As everyone does not know how to make a good whitewash that will not rub off on the clothes, the following recipes and information will be of value. Procure some hydrated lime, which can usually be purchased at a builder's-supply yard. Add enough of it to half a pailful of water until the mixture, which is, of course, stirred continuously, acquires a creamy consistency. Take ¼ lb. of flour and mix it in a separate dish, using enough water to barely wet it. Rub all lumps out with a tablespoon. Then pour boiling water on it to thicken it, and pour it into the whitewash, stirring well.

Another method of making a good whitewash consists in adding 2 lb. of salt to every 10 gal. of water, stirring well until the salt is dissolved; and then adding hydrated lime until the mixture has the consistency of paint.

Fasteners for Colonial-Window Shutters

The window shutters on present-day houses of the colonial type are fitted more for ornament than for use, and since they are not opened or closed, the type of fixture shown should be used for fastening the shutter to the side of the house.



This fixture has several advantages. It is nearly invisible, holds the shutter securely, and can be detached in a few moments, when it is necessary to clean or paint behind the shutter. A small U-shaped, galvanized-iron bracket is attached to the siding with wood screws, in line with the edge of the shutter. The latter is attached to the bracket by means of a machine bolt, as shown, and the head of the bolt is countersunk and covered with a wooden plug.—L. H. Georger, Buffalo New York.

Removing and Replacing Valve Springs

Although the grinding of valves on automobile engines is a simple operation, according to most instruction books, the amateur mechanic faces several difficulties, especially in case of an L or a T-type of cylinder head. Very often the whole side of the cylinder block is inaccessible; the valve spring cannot be lifted without the aid of a compressing lever, and the pin under the spring is difficult to get at, and often falls down into the oil pan while one is attempting to get hold of it. The use of a few simple tools, however, makes the job comparatively easy.

A satisfactory compressing lever that can easily be made is shown in Figs. 1 and 2. The lifter consists of two short lengths of flat steel, connected with a short bolt so that the tool can be folded, to save space in the tool compartment. An iron or hardwood block is used as a fulcrum. By resting the fulcrum on the crankcase, near the row of valve tappets, and inserting the forked end of the lever under the valve spring, the latter can be pried up far enough to expose the pin.

After raising the valve spring, the pin must be removed. This is usually done by means of a pair of tapered-nose pliers, as shown in Fig. 4. However, an electromagnet, made as shown in Fig. 3, has been found to give great satisfaction. The core of this magnet, which is made of soft iron, extends 1½ in. beyond the bobbin; it is bent and tapered at the end as shown. The bobbin is wound with several layers of No. 14 single cotton-covered magnet wire. The ends of the coil are soldered to flexible cord that can be led to the terminals of a storage battery, or provided with a plug to fit into the dash lamp or other socket. Such a magnet will remove and replace pins with very little danger of dropping them.

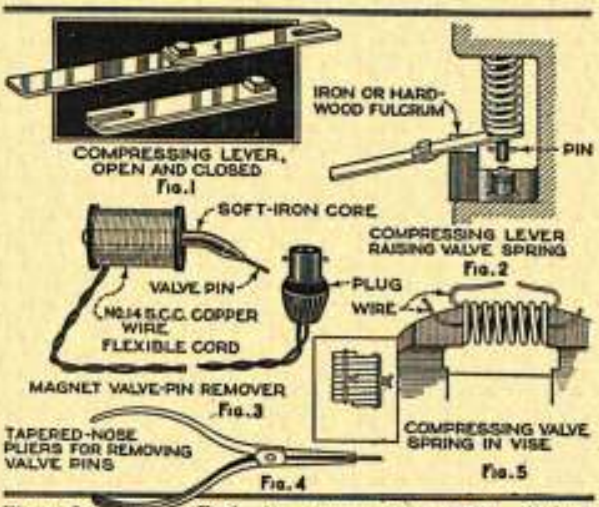


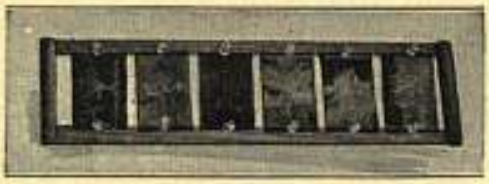
Figure 1: Tool for Compressing Valve Springs. Figure 2: Method of Using. Figure 3: Homemade Electromagnet Used to Extract Pins. Figure 4: Tapered-Nose Pliers for Extracting Pins. Figure 5: Method of Holding Springs Compressed

It is usually an easy matter to remove the valve springs, but very difficult to compress them and to put them into place again. A simple method is shown in Fig. 5. The spring is compressed in a vise, and some No. 20 wire tied around it, as indicated, to hold it together after the vise has been released. While held in this way, the spring is set in position around the valve stem, and the washer and the pin are replaced. The tie wires are then cut.—H. H. Parker, Oakland, Calif.

Film-Developing Rack

A convenient and inexpensive frame to facilitate the handling of film-pack films, while developing, is shown in the photo.

The frame is made of wooden strips, the length and width of which are determined by the size of the films and the number to be developed at the same time. The films are fastened to the sides of the frame with glass-headed push pins, as indicated, and the frame, with the films attached, is then immersed in the developer bath and fixing solution in turn. The use of such a frame permits each negative to be watched separately, and overexposed negatives can be removed before the others. After the films have been thoroughly fixed and washed, the frame is placed in a suitable place to allow the films to dry, and thus the separate films need only be handled once or twice at any time.



A Frame for Facilitating the Development of Film-Pack Films: The Negatives can be Watched Separately and Any One can be Removed before the Rest

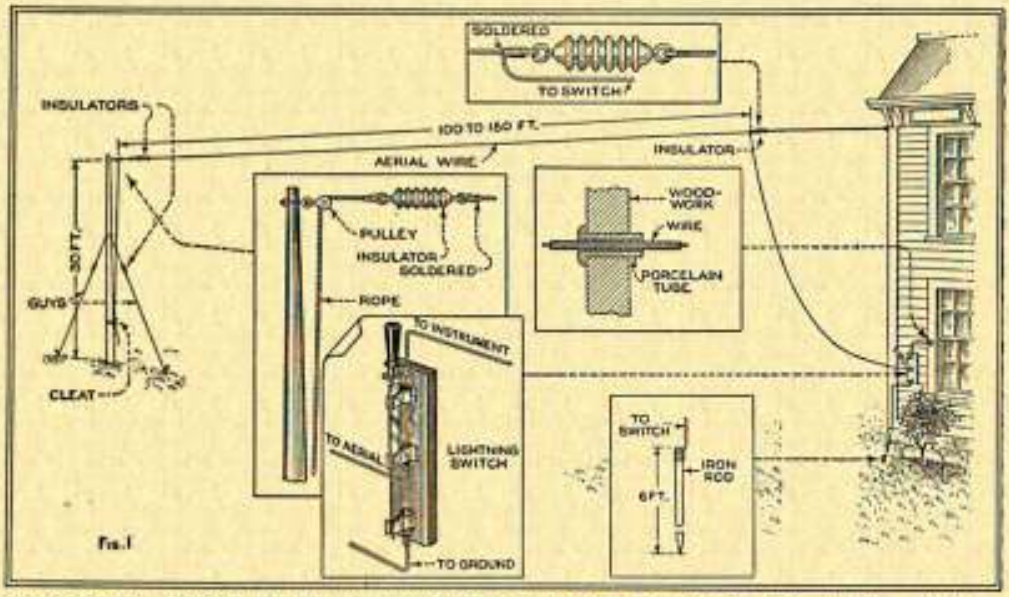
Installing Radio Apparatus on the Farm

By E. R. HAAN

THE large number of stations now broadcasting weather and market reports make the installation of a radio-receiving instrument on the farm no longer a luxury, but a necessity.

The operation of a receiving set is very simple; no technical knowledge is necessary, and any farmer may, in a very short time, become expert in "tuning in" the various stations within the range of his set.

A receiving set can be either built at home or purchased ready-made. There are today thousands of boys on the farm who have built and are building radio-receiving sets. For those who contemplate building their own sets, complete information on the construction of a successful receiving set that has a distance range of approximately 1,000 miles, and a wave-length range of 150 to 400 meters, is contained in the February and March, 1923, issues of this magazine. The February issue describes the construction of a detector unit with one stage of amplification; the March issue, the construction of two and three-step sets. With this set it is possible to receive the popular entertainments and lectures broadcast at wave-lengths up to 400 meters, but not the official weather forecasts, and crop-and-market reports that are broadcast at a 485-meter wave length. However, the reception of the latter is made possible by using 21 turns of wire instead of the 16 indicated in the circuit diagram of the outer coil, making a total of 45 turns instead of 40. No. 28 single silk-covered wire should be used instead of the No. 26 double cotton-covered wire specified, to enable the extra turns to be wound on the form. This is the only change necessary, and will readily be understood upon referring to the articles mentioned. The set can be used successfully to operate a regular loud-speaking horn or can be hooked up with a phonograph horn to amplify the sound. Under especially favorable atmospheric conditions the distance range is often much greater than 1,000 miles.



The Single-Wire Aerial Is the Most Commonly Used, and has been Found to Be Universally Successful. Its Length Is from 100 to 150 Feet, and It is Suspended at a Height of 30 to 60 Feet above the Ground. The Illustration Shows All the Details of Installation and the Necessary Connections

If a ready-made receiving set is to be purchased, a few considerations must be borne in mind: It is highly advisable for a farmer to have a two-stage set with which he can receive the 485-meter reports. Never purchase a set on the assumption, or on the verbal assurance that it is suitable for receiving market reports; insist that the dealer demonstrate this capacity of the set by actually "bringing in" these reports.

Anyone can install a receiving set. Procure a 100-ft. or 150-ft. length of No. 12 or 14 stranded copper wire, which is best for strength and conductivity. If this

cannot be obtained, any bare copper wire, No. 12 or 14, but not smaller, will do. Also procure two aerial insulators; some No. 14 insulated weatherproof wire for a "lead-in," the length of which depends on the height of the aerial; a lightning switch, for which a single-pole double-throw knife-switch of 600-volt, 100-amp. capacity is suitable; a number of porcelain knobs, and two porcelain tubes. With this material proceed to erect the aerial, as shown in Fig. 1. In selecting a suitable place to suspend the aerial, the following precautions must be taken, the neglect of which will result in inefficiency of the set. Suspend the aerial 30 to 60 ft. above the ground, so that there will be a considerable space between it and any trees, structures, or outbuildings. In case electric-power, light, or telephone lines run near or through the farmyard, take care to suspend the aerial at right angles to and not parallel to these lines. If possible suspend the aerial from masts mounted on the house and barn or other building. The lead-in wire must always be fastened to the house end. Full details of the method of attaching the wire to the mast are shown in the illustration.

The lead-in wire is attached to one end of the aerial and is brought down to the lightning switch; it is either allowed to hang from the aerial to the switch as indicated, or if desired, may be attached to the side of the house at different points with porcelain knobs. Care must be taken to solder all the connections, in order to make them mechanically and electrically secure. The insulation of the lead-in wire must be kept intact at all points to prevent any possible ground. The lightning switch is attached on the outside of the house near the window where the wire to the instrument is brought in; the latter is insulated by means of a porcelain tube where it passes through the window casing or frame. The lead-in wire from the aerial is soldered to the center terminal of the switch; the wire to the instrument to the upper-clip terminal, and the ground wire to the lower-clip terminal.

There are numerous other types of aerials that give good results. Frequently two or four-wire aerials are used. There are cage, umbrella, fan, and loop aerials, the latter for inside use. There are also several methods of connecting the lead-in to the aerial. But it is not the purpose of this article to give the construction of various types, their merits and demerits; the single-wire aerial described above has been found universally successful, and, being simple to make, is particularly recommended. However, if it is desired to have a two or four-wire aerial, the aerial wires and guy wires are attached to a wooden spreader, as shown in Fig. 8; the aerial wires are 100 ft. long, and are spaced 2 ft. apart.

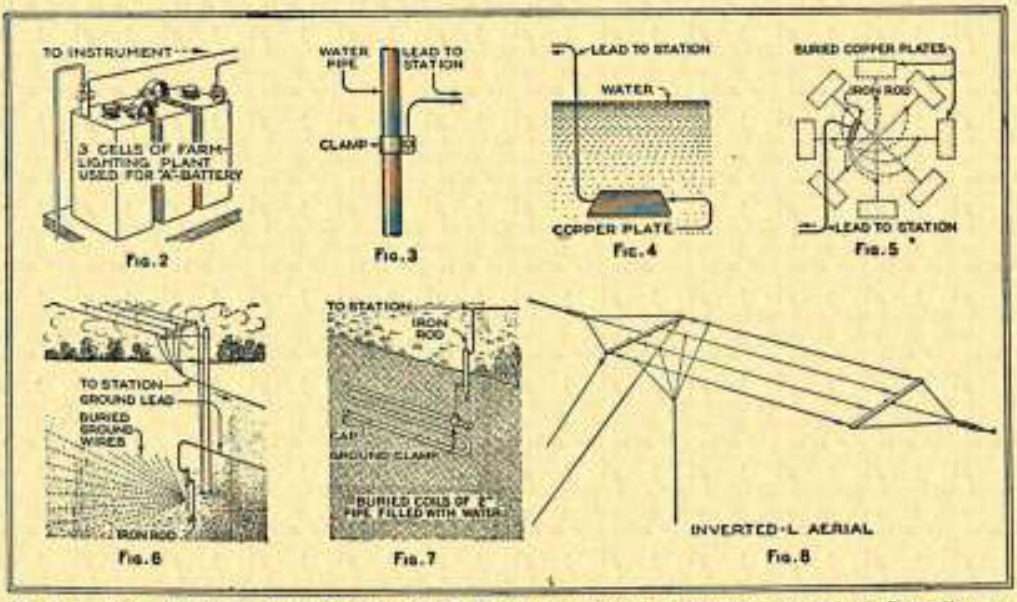


Figure 1, Three Cells of a Farm-Lighting Outfit Used for A-Battery; Figure 2, Method of Grounding on Water Pipe; Figure 3, Grounding in a Well; Figures 4, 5, and 6, Other Methods of Grounding; Figure 7, a Four-Wire Aerial That is Used Quite Often. The Wires are Spaced About Two Feet Apart, on Wooden Spreaders, Which are Braced by Insulated Wires or Ropes

The ground connection must now be made. This is another important part of the installation. The object is to make a good connection between the ground terminal of the switch and the earth. Drive a long steel or iron rod into the ground, to a depth of about 5 or 6 ft., and solder the ground wire to it securely. Another excellent method of grounding is to solder the ground wire to a copper plate and to drop this plate into a well, as shown in Fig. 4. Other methods of grounding are shown in Figs. 5, 6, and 7. The ground wire need not be insulated, but it must be well separated from the lead-in wire so that there can be no possible connection between the two. The connection shown in Fig. 2 is quite suitable for the ground connection from the instrument—not the switch—and is simply made. Run a length of lamp cord, or similar heavy wire, to the nearest water pipe. Scrape the pipe bright and attach the bared end of the wire to it by means of a clamp, or by soldering directly to the pipe. Be sure to make a good connection between wire and pipe.

In maintaining the set, the following hints should be kept in mind: Never allow the storage battery to run low before it is recharged, as this lowers the efficiency of the set, and is bad for the storage battery itself; on a farm having an electric-lighting outfit, it is not at all necessary to have a separate storage battery for the radio set, because three cells of the lighting battery, connected as in Fig. 2, will do just as well. In fact, using three cells of the lighting battery is even better than having a separate A-battery, because the lighting battery is always kept charged, and hence does not involve so much trouble as a separate storage battery.

The B-battery should be tested occasionally for voltage. This can easily be done by means of an 18 to 24-volt automobile-headlight lamp; its two terminals are touched, for a moment only, to the two leads connected to opposite poles of each 22-volt unit. If it burns very dimly, the battery is weak, and should be replaced with a new one. It usually takes quite a while before the B-battery is exhausted, and one is therefore apt to forget about it and wonder why the set does not work as well as it did at first.

There are several kinds of detector and amplifier tubes at various prices on the market. In selecting these, it is best to get a good tube manufactured by a reputable concern. However, the difference in the results obtained from two tubes having the same rating, and made by the same concern, is sometimes surprising. Before purchasing any tube one should always insist upon having it tested, as it frequently occurs that tubes do not work properly, due to causes and conditions in their manufacture beyond control.

By carefully following the method of installing the aerial and ground, and observing the suggestions for maintenance contained in this article, any farmer can successfully "listen in" to lectures and entertainments, to weather forecasts, and crop and market reports, that are broadcast daily from scores of stations all over the country.

In receiving market reports, it is, of course, necessary to note them down carefully so that the reports from various stations can be compared. It will be found that it is very convenient to have a blackboard mounted on the wall near the set, so that the items and figures can be jotted down as they are received. The board should be arranged so that the reports of several successive days can be noted, as this helps to show the trend of the market. No particular arrangement of this bulletin board is shown, as the subjects listed will depend upon the particular interest of the farmer, and will vary in nearly every case.

Irrigating the Garden

It is common during the summer dry spell to see amateur gardeners spending an hour every evening in sprinkling their gardens. While this undoubtedly refreshes the plants, it does not saturate the ground to a sufficient depth to benefit the plant roots.

A much better method, and one that does not require as much time and labor, is to remove the nozzle from the hose and allow the full stream to flow into the garden. The stream should be directed into the rows by means of small ditches, in the same manner as irrigation is practiced in dry climates. By saturating the soil to a depth of 4 or 5 in., sufficient moisture is provided to last for several days or a week. The soil should, of course, be cultivated as usual.

One should never sprinkle a garden during the day when the sun is shining, as this practice is very injurious to the plants and flowers.—G. E. Hendrickson, Argyle, Wis.

A Fireproof Cement

An excellent fireproof cement for furnace and stove work can be made by mixing powdered fire clay with sodium silicate (water glass) to the consistency of a stiff dough. Powdered magnesia or asbestos can also be used instead of fire clay, but the latter is usually the easiest to obtain. A small quantity of asbestos fiber added to the mixture will serve, like hair in plaster, to hold the cement together.

The cement thus made is not expensive and will stand considerable heat. It is very useful for plugging up smoke-pipe openings and also for lining stoves.

A Birch-Bark Berrying Basket

A simple berrying basket can easily be improvised in the woods, when a regular basket or bag is not available. Tear a strip of bark from a birch tree, and fold it over, as shown in the photo, folding in the edges at the side and bottom, and "sewing" them together with a slender flexible green twig. Attach another piece of twig to the top of the basket, to serve as a handle. This basket is quite strong, considering its rough construction, and serves very well for the purpose of carrying berries, fruits, and nuts. It can, of course, be made any size desired.

Lawn Table and Parasol

The novelty of the lawn table shown in the photograph consists in the use of a three-branched tree crotch for the legs, and also in the attachment of a large parasol to the table. To one who is fond of reading or studying in the open, this shaded table is a great convenience.

When the branches of the crotch are sawed off evenly, they provide a strong and stable support. The bark can be left on or peeled as desired. A circular table top is preferable to any other shape, and it should be a little smaller in diameter than the parasol used. The table top is mounted on a framework of 2 by 4-in. pieces, nailed to the crotch, and is preferably made of cypress, to withstand the

A Novel Lawn Table Equipped with a Large Parasol Is of Great Convenience for Those Fond of Reading or Studying Outdoors

effects of the weather. The parasol is one of extra-large size, such as used on delivery wagons, and the handle is set into a hole drilled in a wooden block screwed to the table.

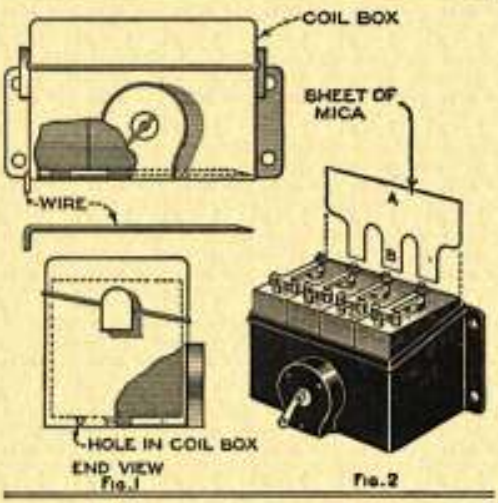
Pumping Tires Quickly

The attachment shown in the drawing permits the use of two pumps to inflate an automobile tire, and is therefore quite a timesaving addition to the motorist's tool kit, especially when the car is equipped with fairly large tires.

The device is made from a short piece of $\frac{5}{8}$-in. metal tubing, in the ends of which valve-stem tips, about $\frac{3}{4}$ in. long, are soldered. A hole is drilled in the center of the tube, another stem soldered in, and a length of pump hose clamped to it. A regular pump-hose stem, equipped with a screw-cap, is clamped in the other end of the rubber tube.—R. L. Friess, Bowling Green, Ohio.

Foiling Automobile Thieves

Automobile thieves usually do not care to spend much time in attempting to steal a light car; they take one that can be started instantly, and let the others alone. For this reason, simple methods of preventing the engine from starting are often just as good as expensive locks.



Two Methods for Foiling Automobile Thieves: Figure 1, Wire That Lifts the Coils to Separate the Bottom Contacts; Figure 2, Sheet of Mica That Separates Back Contacts

Figure 1 shows a piece of pointed wire, about ¼ in. thick, pushed through a hole drilled in the side of the coil box, and under the coils, so that the lower contact on each box is raised and the circuit broken. It is, of course, advisable to drill the hole on the left side, so that the wire cannot be seen when the car is entered.

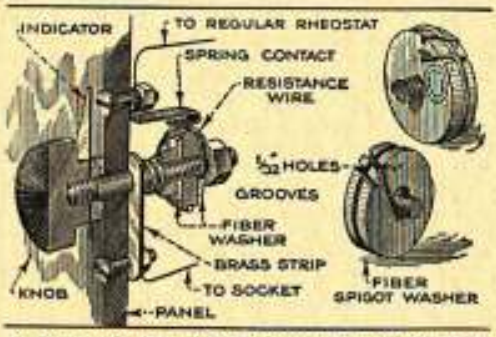
Another method of breaking the circuit is to cut a piece of mica, or any thin insulating material, to the shape shown in Fig. 2. When this is inserted behind the coils, with the end A down, the circuit is broken. With end B down, however, the circuit is complete, and the car can be started as usual, as the back terminals make contact through the cut-out portions of the mica sheet. The discovery of this device is also very improbable.

Cleaning Tarnished Silver

Tarnished silverware can be cleaned by dipping it in a solution of water, soda, and salt, contained in an aluminum pan. The pan must be clean and free from all grease, and filled with enough boiling water to cover the silverware. One teaspoonful of baking soda and another of table salt is added to each quart of water. The silverware is immersed until the tarnish has disappeared. The pieces are rinsed in clean warm water, and rubbed until dry with a soft cloth. If not tarnished very much, it is only necessary to dip the silverware in the solution, but it must come in contact with the aluminum. —Charles A. Smith, New Haven, Conn.

Easily Made "Vernier" Rheostat

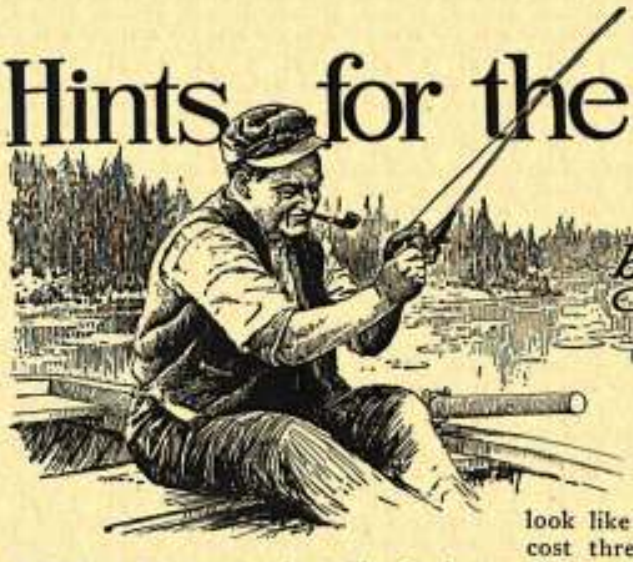
A "vernier" rheostat, connected in series with the regular one, will be found of advantage when regulating the filament current in the radio detector. For receiving sets not equipped with a vernier rheostat, one can readily be improvised as illustrated. The rheostat consists of a short length of resistance wire, wound once around the circumference of a fiber spigot washer, about ⅝ in. in diameter. Grooves are cut across the washer, as shown, so that one end of the resistance wire can be wound around the threaded spindle, and locked with a nut and washer; the other end is fastened by threading it through two 1/32-in. holes, drilled about ⅛ in. apart. A spring-brass contact, bolted to the panel, bears on the wire when the assembly is mounted on the panel, and connection to the spindle is made by means of a spring-brass strip, also bolted to the panel as shown. A spring is used on the spindle, between this strip and the inner binding nut on the fiber washer. A knob and indicator are mounted on the front of the panel in the usual way. This rheostat provides a variable range of resistance, the maximum value of which is equal to that of a single turn of wire on the regular rheostat.—E. J. Bachman, Fullerton, Pa.



A Homemade "Vernier" Rheostat That can be Made by Any Amateur: Its Maximum Resistance Equals That of a Single Turn of Wire of the Regular Rheostat

Hints for the Fisherman

by Bob Becker



JUST as the hunter who sallies forth to the game fields must have his gun and outfit in order if he wishes to get the best results, and just as the automobilist must prepare for a tour and carry spare tires and a few tools for repairs, so the fisherman, with designs upon the big ones of his favorite lake or stream, should have his tackle in the best condition if he wants the most fun out of his sport. A loose ferrule that may bring trouble when a fish is played, a poorly wrapped rod tip or a reel that is dirty and not working properly, may spell the ruin of a day's sport with bass, pike, muskellunge or trout and the wise fisherman puts the taboo on these annoyances by a few hours of work before the "battle" with the big fish begins.

If you are planning on fixing up "Old Faithful," your pet fishing rod that has served you on many a trip, here are a few tips on how to make your wooden weapon look like new irrespective of whether it cost three, five, or seventy-five dollars. First, remove the guides by cutting through the windings. An old razor blade or a keen knife will do this trick. Take off the tip and the ferrules. If they do not come off easily application of a little heat to the metal (by means of a match, if nothing else is handy) will easily solve the problem.

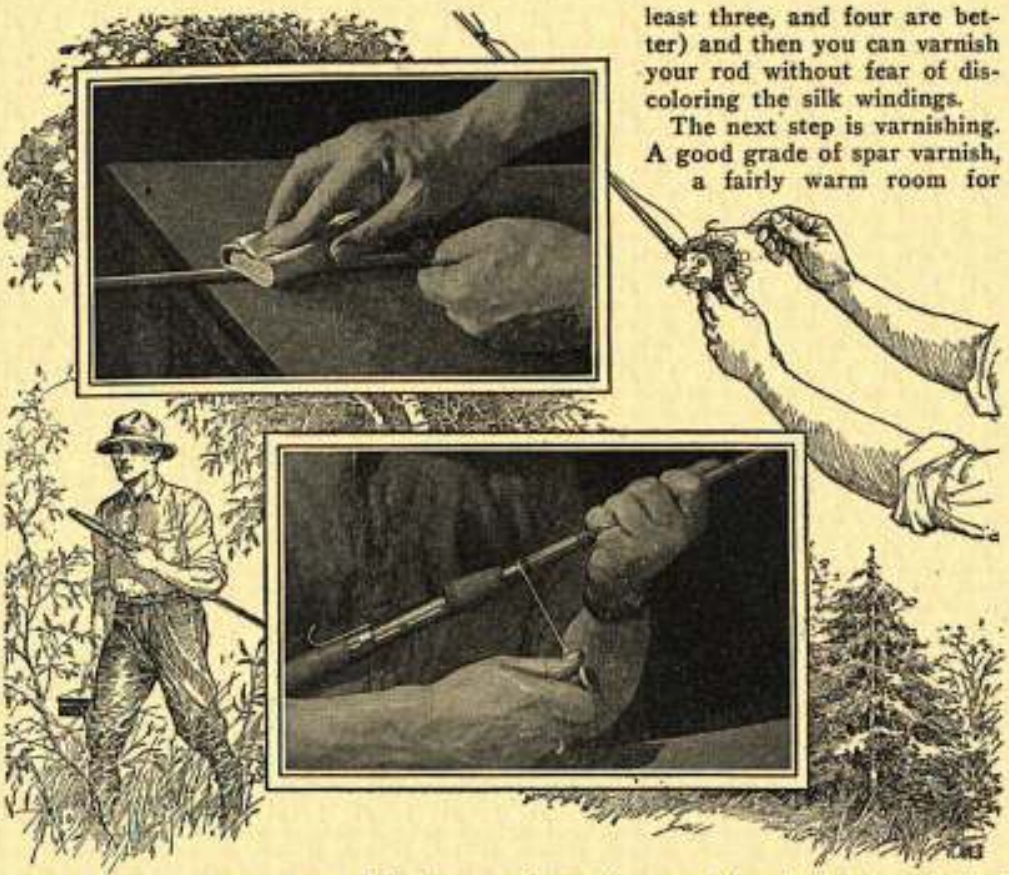
In fixing up a rod for a fishing season it is well to remove all the silk windings and all the varnish. By scraping the stick with a sharp steel edge (I use part of the blade of an old hunting knife taped in two places so that it may be gripped by the hands) the old varnish can be removed easily but one should be careful not to scrape too hard as you must preserve the enamel on the bamboo, especially where the various parts of the rod are joined. If your rod is solid wood like hickory

or bethabara this "manicuring" operation does not need to be done so carefully, as there is no danger of injury to any enamel.

The next operation is sandpapering. Buy the finest sandpaper that you can obtain, find a small flat block of wood, 4 or 5 in. long and about 2 in. wide, spread a piece of sandpaper over this block and then use plenty of elbow grease as you rub down the rod. But don't bear down too hard if you're working on a bamboo rod, as the slogan is, "remember the thin enamel coat on the bamboo must be preserved." After giving the rod a thorough rubbing down, wipe it clean so that it will be shipshape for the next operation. This next step is where many fishermen make a fatal error, as far as the appearance of their rods is concerned. They put on a coat of varnish instead of shellac, which results in a messy job because the color preservative that will be used later on the silk wrappings turns varnish white, and presto!—the job is ruined. So the trick is, apply a light coat of good shellac first and you have a solid foundation to work on.

In cementing the tip and ferrules to the rod, fishermen can use a wide variety of materials. Marine glue, sealing wax or ferrule cement are a few of the ingredients available. We prefer the regular ferrule cement which can be purchased in any sporting goods store. It comes to you a hard, brittle (when cold) stick of wax-like substance wrapped something like a big stick of candy. When you're ready to use it on the rod scrape the wood free of any of the old cement, then heat both the wood and metal, melt a little of the cement, smear it on and then shove the parts on firmly. As soon as they have cooled sufficiently you're ready to proceed with your job.

Winding the rod and fitting the guides are the next items to be tackled. Guides should be placed in position and held there either by thread or small rubber bands. With your gay-colored silk thread wind tightly and evenly toward the agate



which will assure a neat even job. Practically every home rod worker uses the following method in winding a guide. In starting the thread he turns in one end of it so that three or four turns are passed over it (Fig. 1). When nearly finished with the winding the next trick is to throw a loop of thread on the side of the rod (Fig. 2) so that three or four turns can be made over this loop. Then at the finish put the end of the thread through this loop (Fig. 3), pull the end through and cut it.

Every fisherman who owns a fishing rod of wood which is gayly yet tastefully decorated with colored silk wants the windings to look well. To achieve this end note the following suggestions, designed to keep the colors of the silk bright and clear after the varnish is applied. Any drug store can furnish the combination; banana oil and collodion in equal parts. Use a good camel's-hair brush and put on several coats of this color preservative (at least three, and four are better) and then you can varnish your rod without fear of discoloring the silk windings.

The next step is varnishing. A good grade of spar varnish, a fairly warm room for the work, a good brush that doesn't shed hairs and plenty of patience are the big factors in the success of this operation. Put on three or four thin coats, always allowing the rod to dry for several days between each application. If you can keep the rod in a room free of dust it will come out looking like a million dollars and quite ready for some tussles with big fish.

Thousands of fishermen prefer steel rods for their "weapons" while on fishing trips, as these sturdy tools require little or no "petting," and can be abused more than a bamboo, hickory or bethabara rod. As a rule there are no colored silk windings to worry about and hence home work on these steel "whips" is a negligible item. If agate guides are used on your rod the main thing is to examine them closely after the winter storing period to see if they are intact. A cracked agate means a cut line and poor casting.

The reel is an important item in the fisherman's kit so don't slight it when polish-

ing things up for a trip. Take it apart carefully for cleaning. Put a drop or two of the finest lubricating oil on the vital parts and it is ready for use. Tissue paper is much better for cleaning the delicate parts of a reel than rags as the lint from the latter can be injurious to the finely attuned parts of any bait-casting reel, whether cheap or expensive.

After the outfit is cleaned, revamped, polished and all ready for strenuous combat with the finny tribes the fishing clan, which numbers many millions, finds it worth while to keep in mind a few don'ts if the outfit is to stand the gaff, and last for one or more vacations. We might call these "don'ts" the ten commandments for successful Waltonians. They apply to the fisherman with a modest outfit as well as to the angler with hundreds of dollars invested in expensive tackle:

If you're fishing along a river, or on the bank of a lake don't lay your rod on the ground, unless you're sure you are the only fisherman in the territory. Stand the rod against a tree or in some brush so that no one can come along and step on it. Sand (or foreign particles of any kind) in a reel will ruin it. So don't carry your reel loose in your pocket, in the bait box or in a suit case where it may pick up some dirt. We use a small leather case for our pet reel. A small pouch with draw strings is also good and can be made at home at practically no cost. After fishing in the rain dry your rod, reel and line. The reel should be wiped with a dry cloth and a few drops of oil applied. See that all moisture is removed from the rod. Unwind all the line on your reel and let it dry out thoroughly before you start out again. Don't use a knife blade in trying to unsnarl a "backlash" on your casting reel. Backlashes (better known as "bird's nests"!) should be treated with a button hook or better yet a hairpin, neither of which has cutting edges. Don't let anybody step on your line when you're in a boat, on the shore or anywhere else. The plunk of a big outdoor boot on a fish-line is almost as bad as using a knife on it. A step doesn't break the line at the time but it is apt to part a little later when you have a whopping big fish on it. Don't leave your lines, rods or reels out over night. The soaking they will get from the dew is almost as injurious as that received in a rain. Another point is this, if the joints of your fishing rod fit rather tight don't twist the joints when you take them apart. Separate them by a straight pull and begin with the tip. Tight-fitting ferrules can be "eased up" by rubbing with a piece of emery paper. Don't take your rod apart and toss the pieces on the ground, as sand in the ferrules means trouble. When walking through the brush with your rod don't carry it tip first. Grasp it just above the butt so that the point trails behind you waist high. Many a steel rod has been ruined and many a wooden rod broken by ramming the tip into trees. Never stand a rod or any of your tackle (reel, hip boots, lures, lines, etc.) near a hot stove or a radiator. Keep these things away from heat, if you want them to last.

No matter how careful one is when on a fishing trip there may be an accident. Hence, the wise fisherman takes around a little emergency repair outfit so that he can make a quick repair in the field. One day last summer, just two hours before taking a train for home, we were on a small lake trying to get a mess of black bass to take back with us. A light rain had started to fall and the bass were hitting. With our time limited we were casting for all we were worth as fish were wanted badly and in a hurry. And then trouble stepped into the picture. We were using an inexpensive wooden rod. It cracked just above the ferrule, a decided fracture that would not permit us to even land a minnow unless repairs were made right away.

But our emergency kit was there for our rescue. Out came the tape, ordinary rubber tire tape. We wrapped the tip with this and in five minutes we were ready to take on any bass. With this repaired rod we hooked and landed eight good sized black bass and called it a day.

The fisherman can't foresee accidents but he can be ready for them with a pocket repair kit. On a long canoe and fishing trip which will take one far away from a base of supplies or tackle shop it is a wise idea to tuck in the duffel bag some or all of the following items: Lest the rubber boots fail take a small amount of rubber cement and rubber cloth; to repair a snag in your boot apply just a small amount of cement, put on the patch and then lay a stone, your tackle box or other heavy weight over it. This trick insures a repair job that will hold for a long time.

Practically every fisherman using wooden fishing rods carries along tire tape and ferrule cement. Both cost little, take up practically no space and are invaluable in repair jobs. We are still using an old bamboo rod that cost but six dollars four years ago although twice on trips to secluded lakes, reached by long hikes, we have broken the tip of this rod and had to make emergency repairs. Each time the break did not spoil our fishing, as the lateral splice which can be made with tire tape saved the day. The stunt is simple. When the tip breaks place the broken

ends side by side for 1½ or 2 in., and then bind them with tire tape. Such a repair will hold although it is temporary and you will have to eventually replace the tip. With the tire tape take along the ferrule cement. If your rod should develop a loose ferrule, heat it with a match, remove it from the wood, clean both the wood and the metal and then apply the melted cement. Take time out while it cools and you're then ready for more fishing.

In our little pocket repair kit we have the following articles which are "standing by" for trouble: A small flat file, a pair of wire-cutting forceps, a pair of baby pliers, a roll of tire tape for hastily repairing a long break, some rubber cement and cloth for repairing rubber boots or rubber pacs, a couple of feet of light copper wire so that in case one of the guides on a steel or bamboo rod is broken we can make a new one out of wire, and ferrule cement.

After an experience with a leaky canoe last summer we are considering the addition of a piece of ordinary laundry soap to this kit, as in a pinch it will do for repairing leaks. After traveling fifteen miles to a muskellunge lake with an Indian guide we secured a canoe and started out upon the lake for a wonderful day's sport. But the canoe leaked like a sieve. In the rickety old tumbledown boathouse where the canoe had been stored we found, after quite a search, a chunk of laundry soap. With it we filled the cracks in this manner: first moistening the places we rubbed the cake of soap over them until a thin layer was deposited. Through this the water could not flow and after ten or fifteen minutes of work with the laundry bar we went after the muskies. Moreover we kept our feet dry while doing it, as the holes in the canoe were plugged quite thoroughly by our repair work.

There are tricks in every trade and fishing is no exception. Checking up on your outfit before you start on a trip, packing along a simple little repair kit so as to be ready for accidents, and observance of a few common-sense rules in the care of tackle not only mean the saving of money for the angler but success when a big one grabs the lure and starts a fight, as faulty, neglected tackle can't cope with the big fighters of lake and stream that are now waiting for the disciples of Izaak Walton.

Coil Spring Protects Lawn Hose

When the sill cock for the attachment of the lawn hose is in such position that the hose, when in use, must lie across the driveway, it occasions much annoyance. Either the hose must be moved each time a car passes in or out, or it must sooner or later become damaged by driving over it.

Heavy Coil Spring over Hose Protects It from Damage by Auto

To eliminate this difficulty, a Wisconsin home owner employs a stout coil spring, 10 ft. long, which slips over the rubber hose at the portion crossing the driveway. Wrappings of rubber tape at each end of the spring hold it in place. With the hose thus protected, a heavily laden auto or truck may pass over it repeatedly without causing the slightest damage.

Curing Elusive Knock in a Ford

A knock in a Ford car was heard only when the car was going uphill. After considerable investigation the cause was found to be a weak crank spring. This permitted the crank to fall back against the crankshaft, and every time the motor made a revolution there was a knock, which seemed to be in the engine. A new crank spring remedied the trouble.—Chas. Latour, Jr., Plattsburg, N. Y.

An Improved Lawn Canopy

By C. W. MORGAN

THE lawn canopy shown in the illustration is rather unusual in design, and is very easy to construct. It may be used to shade the outdoor dining table or lawn furniture, and a hammock may be swung between its supports. The construction eliminates the faults of the common types, such as the sagging of the canvas and slacking of the ropes that are caused by changes in the weather.

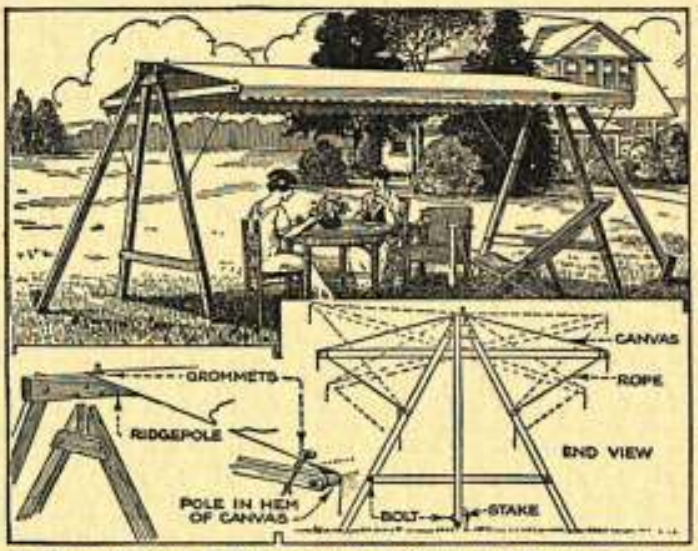
The end supports are made of 2 by 4-in. stuff, the two sides of the triangular frame being 8 ft. 6 in. long, and braced, near the bottom, by a piece of 1 by 3-in. stock, 7 ft. 6 in. long. Bolts are used to fasten the frame together, and a space for the ridgepole is left between the upper ends of the sidepieces.

The ridgepole is a 12-ft. length of 2 by 4-in. stock, notched at each end, to fit over the upper edges of the top crosspieces on the end frames, drilled, at the ends, for the bolts that fasten the end braces to it, and bolted to the sidepieces of the frame.

The end brace is 8 ft. 6 in. long, also of 2 by 4-in. lumber; it is bolted to the ridgepole at the top, and to a stake, driven into the ground, at the bottom. This, in the writer's opinion, is the best way to fasten the braces, although, of course, they can be fastened to the frames by struts, thus eliminating the stakes.

The canvas, which is 11 ft. long by about 11 ft. wide, is kept taut by a frame made of 1 by 3-in. stock and 2-in. poles or pipes. The frame is 11 ft. by 9 ft. 6 in. in dimensions, and the poles are fitted in hems, 4 in. wide, sewed in the canvas as shown in the detail. If pipes are used, the ends must be plugged for the screws or pins that fasten the 1 by 3-in. crosspieces to them.

Brass grommets are fastened in the canvas, at the points indicated, and tie ropes pass through them. The center grommets may be slipped over pegs in the ridgepole, or ropes passed through them and round the pole. The end tie ropes are fastened around the sidepieces of the canvas frame, and then led down to the legs of the main frame and tied within easy reach of the hand.

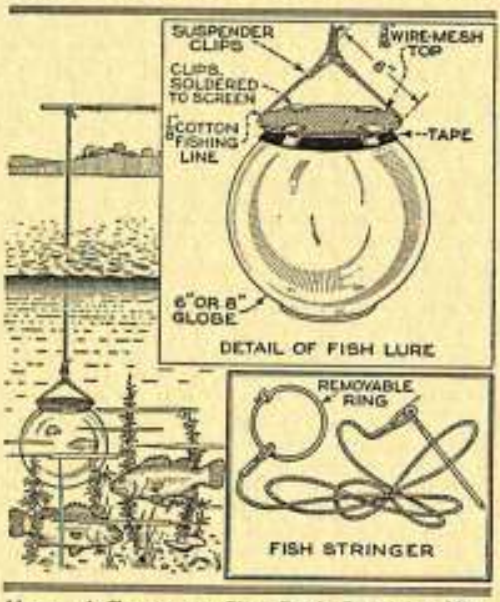


An Improved Type of Lawn Canopy, of Substantial Construction: The Canvas is Always Kept Taut, and, as the Top can be Tilted to Either Side, It Provides Plenty of Shade at Any Part of the Day

With this design, the canopy is always taut, and may be tilted to either side, as indicated by the dotted lines, thus making it serviceable for use any part of the day. If bolts are used to fasten the frame together, the whole canopy can be dismantled and folded up into a comparatively small space. The ridgepole and braces fold up together, and the end frames may be collapsed also, by removing only two bolts.

Two Kinks for the Fisherman

The drawing shows a fish lure that seldom fails in its purpose, providing, of course, that there are fish in the vicinity.



Above: A Transparent Glass Bowl, Containing Minnows, That Forms an Excellent Fish Lure. Below: The Fish Stringer Provided with Detachable Ring

The lure consists of a transparent glass bowl, preferably a goldfish bowl, about 6 or 8 in. in diameter, containing some minnows. It is suspended in the water a foot or two away from the point where the user is fishing.

To make the lure, cut a circular piece of galvanized, or copper, screen wire, about $\frac{3}{16}$-in. mesh, to fit over the opening of the bowl. Solder four brass clips, shaped to fit under the edges of the bowl, to the screen, as shown. These keep the screen firmly in place while the bowl is immersed. Wind two layers of friction tape around the neck of the bowl, coat well with a good varnish, and allow it to dry. Then take a line of $\frac{1}{8}$-in. cotton, of sufficient length to go around the neck, and allow two suspension leads about 6 in. long; form loops on the ends of the leads, and fasten the loops with common suspender clips. Then fasten the cord around the neck, apply another coat of varnish over the cord, allow it to dry, and the lure is ready for use. Fill the bowl with water, and place in it some live minnows, put on the cover, and lower into the water. I have found from experience that it is best to use from six to twelve minnows.

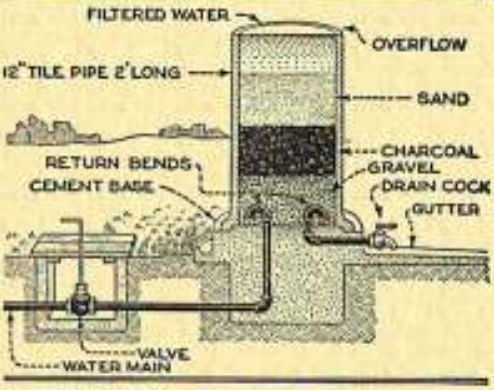
I have employed this lure for catching herring and perch, with a minnow on my hook about 3 ft. away from the lure. When the water is clear, the fish can plainly be seen to dart at the minnows in the bowl, but, upon coming in contact with the glass, they seem to realize that something is wrong, and immediately turn and snap at the minnow on the hook.

When removing fish from a stringer, it is usually necessary to force them back over the stringing needle, and this is not a very easy or pleasant task. To overcome this difficulty, I use a detachable ring on the lower end of the stringer, as shown in the illustration. The ring is made of No. 8 galvanized wire and has the ends hooked to engage with each other, as indicated. By squeezing the ring, it is loosened and can be removed from the stringer. With one jerk of the stringer, the entire catch will slip off.

The stringing needle is made of the same size of wire as the ring. The stringer is made of braided cotton line of the desired length, the ends being looped and fastened with suspender clips.—Frank L. Howe, Milwaukee, Wis.

Simple Filter and Water Cooler

The drawing shows a simple filter and water cooler that can be made from a tile pipe, filled with gravel, charcoal, and



An Efficient Water Filter and Cooler Made from a Two-Foot Length of Tile Pipe, Filled with Gravel, Charcoal, and Sand

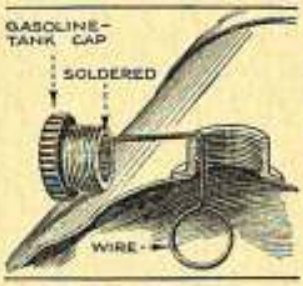
sand; the water enters the filter from below, flows over the top of the pipe, and is caught and led off by a gutter in the cement base.

The tile pipe is 12 in. in diameter and about 2 ft. long, and is set in a cement base, formed as shown. The water main enters from below, through the cement base, the end of the main projecting into

the tile pipe being fitted with a return bend, to prevent the gravel from choking the pipe. The water is regulated so as to rise slowly through the filter and overflow down the wall of the pipe, the partial evaporation of the water keeping the wall cool, and consequently the water inside. A drain cock should be provided, as indicated, so that the filter can be drained when it is to be cleaned, and new gravel, etc., substituted for the old.

Retainer for Gasoline-Tank Cap

The loss of gasoline-tank caps is a frequent occurrence, which, however, can easily be prevented by means of the simple attachment illustrated. One end of a length of wire is soldered to the cap; the other end is bent into a loop, and a right-angle bend is made in the center of the wire. The loop at the end of the wire must be a little larger than the opening in the gasoline tank, and is sprung a trifle in order to force it through the opening.

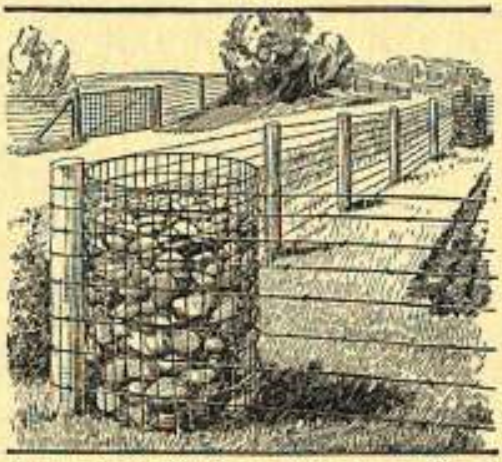


Neat Method of Piling Stones on Cleared Land

A neat way for a farmer living in a rocky region to pile the stones gathered from his fields is to dispose of them in woven-wire containers located in the corners of the fields.

The containers are made from 12-ft. lengths of woven-wire fencing, rolled into the form of cylinders, the two meeting edges of each being stapled to a corner post. In filling the containers, the heavy stones are, of course, thrown in first. As the pile grows higher, it is built as evenly as possible to prevent it from sagging to one side. It may be necessary to drive a long stake on the side of the container opposite the corner post, and staple the mesh to the stake also. It is desirable that the mesh of the fencing be smaller at the top of the cylinder, so that the smaller stones will not fall through.

The piles of stone so arranged have a neat and roughly ornamental appearance, and add materially to the strength of the fence, by bracing the corner posts. When the containers have been filled, a cement

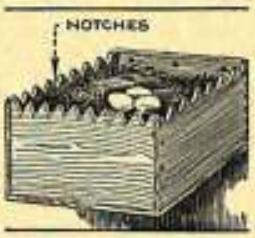


Neat Method of Piling Stones Picked Up from Cleared Land: The Stone Piles Also Add to the Strength of the Fence

composed of 1 part portland cement to 1 of sand can be poured over the pile, and tamped into all the crevices, making a solid, almost everlasting corner post, which will take the place of the wooden one when the latter is no longer serviceable. A solid foundation can be provided by digging under the pile, one side at a time, allowing some of the stones to drop into the excavation, and filling in with cement, or the hole can be dug before the stones are piled in the corner, the larger stones placed in the hole, and the cement poured in before building higher.—Ward L. Schrantz, Carthage, Missouri.

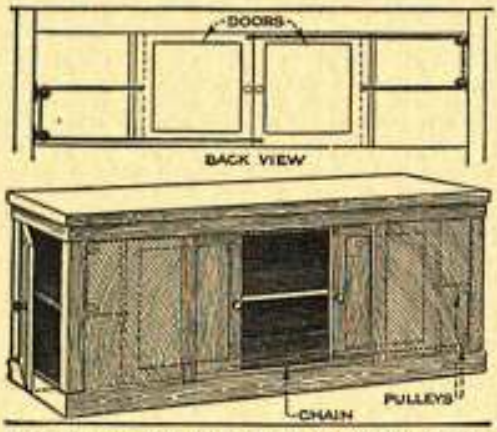
Preventing Poultry from Roosting on Nests

Finding that chickens had a preference for roosting upon the nests, rather than upon the roosts provided for them, the writer hit upon the simple idea illustrated to prevent this, and found that it worked effectively from the start. All that is necessary is to saw notches in the edges of the nest boxes, as indicated. The notches are cut about 2 in. deep, and need not be of uniform size, although this makes a neater job.—Edward L. Clark, Scranton, Pa.



Novel Sliding Doors for the Buffet

The novelty of the sliding-door arrangement for a buffet or cabinet, shown in the drawing, lies in the fact that both



A Novel Arrangement of Buffet or Cabinet Doors: Both Doors Slide Open at the Same Time, and All the Interior Space can be Utilized

doors open at the same time, although only one of them need actually be pushed.

Four small grooved pulleys and two lengths of light chain are used; sash cord or rope may also be used, but chain is preferable, as it will not stretch. The method of arranging the pulleys and chains is clearly shown in the upper detail. An additional feature of merit is the provision of end doors and shelves, so that all the space in the cabinet can be utilized.—C. F. Wilhelm, Kitchener, Canada.

Transplanted Onions Grow to Double Size

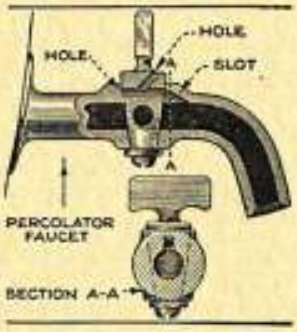
Last year I planted a large patch of onions in my garden, and as soon as they were large enough for table use, I pulled about half of them out to allow room for the others to develop into bulbs. After the tops were trimmed and the fiber roots cut back, to prepare them for market, I found more garden space available and decided to replant them.

The soil of the two onion beds was practically the same, and there was no difference in the method of cultivating, but nevertheless the replanted onions developed bulbs that were double the size of the others.

This was quite a mystery to me, until an elderly market gardener explained that I had accidentally discovered one of the secrets of successful onion culture. According to him, the removal and trimming of the onions when they were little larger than a lead pencil, caused the fiber roots to branch forth with thousands of minute roots, and limited the development to the bulb, which consequently grew to abnormal size.—G. E. Hendrickson, Argyle, Wis.

Improving Percolator Faucet

The illustration shows how a faucet for use on coffee percolators, etc., can be improved to prevent the drip that occurs a few seconds after the faucet is shut off. Two $\frac{3}{32}$-in. holes are drilled in the plug, and a $\frac{1}{8}$-in. slot is filed in the body of the faucet, as indicated. The holes, in connection with the slot, provide an air vent that opens the instant the faucet is shut off, and prevents the retention of any liquid in the nose of the faucet.—G. B. Olson, Bridgeport, Connecticut.



Spool Holder for the Sewing Room

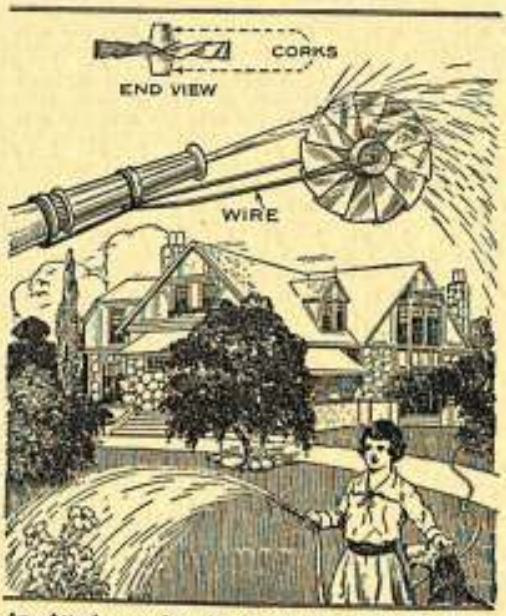
A piece of $\frac{3}{4}$-in. wood, cut to the shape shown, hinged to the window casing so that it can be swung out, and provided on the upper edge with a number of pins or dowels, makes an excellent spool holder for the sewing room. The holder can be made as long as desired, and smoothed down, stained, and varnished to match the window casing. Holes, slightly smaller than the pins to be used, are drilled in the top of the holder, to an even depth, and about $1\frac{1}{4}$ in. apart. Large nails, about $4\frac{1}{2}$ in. long, clipped to even lengths, and with the upper ends rounded, make good pins.—E. W. Hall, Catskill, N. Y.

Bag Used as Dust Container

A cobbler who had installed an electric finishing machine found himself confronted with the problem of disposing of the dust. It was impossible to discharge the dust outside of the building, on account of the adjoining buildings. The difficulty was overcome by simply taking a grain bag and fastening it over the exhaust pipe, in the same way as the dust container is fastened to a vacuum cleaner. All the dust was retained in the bag, which was easily emptied.

Spraying Attachment for Garden Hose

The chief objection to the use of an ordinary garden-hose nozzle for spraying shrubbery or plants is that the flow of water must be reduced to a fine spray before any considerable area can be covered. To eliminate this objection, an attachment was made for the hose nozzle as shown in the drawing. A disk was cut from a tin can, and radial slits cut in it as indicated; after bending the sections, to form a "fan," the disk was mounted on a piece of heavy wire, bent and attached to the hose nozzle. Two

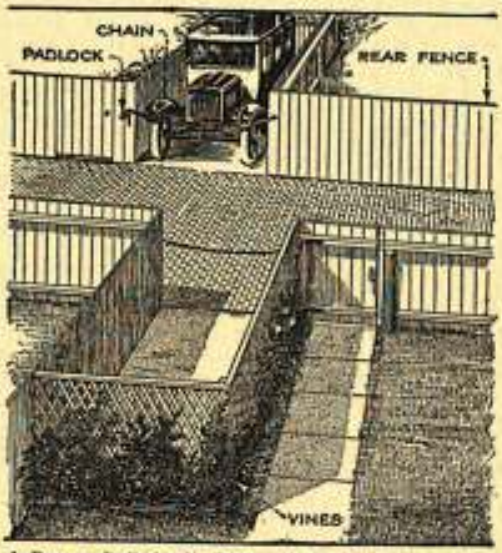


An Attachment for the Garden-Hose Nozzle That Enables the Spray to Cover a Wide Area and Prevents Injury to Plants and Flowers

corks were drilled and fitted on the wire, one on each side of the disk, to hold it in a vertical position. With this attachment, it is possible to use the full stream of water without damaging the plants.

Recess in Fence for Car

The illustration shows an arrangement used by a resident of Washington, D. C.,



A Recess, Built in the Backyard Fence, and Equipped with a Chain and Lock, has been Found Convenient for Storing a Car Temporarily

for the temporary storage of an automobile until a garage could be built. A 7-ft. section of the backyard fence is removed and a recess, 14 ft. long, built in; it may be built of the same material as the fence, which is, perhaps, most advisable because the section of the fence cut out can then be used; or it may be built of latticework, as shown in the foreground, and vines planted around it, which would be the more decorative method. A strong chain is fastened securely around a corner post on one side of the entrance, and equipped with a heavy padlock, that can be snapped on an eyebolt fastened to the opposite corner post. If the recess is used during winter, it should be provided with a light roof to keep off the snow.—G. A. Luers, Washington, D. C.

Improvised Sash Weights

While repairing an old country building, sash weights improvised from old bottles filled with sand, were found to be entirely satisfactory. Although these weights were used only on one sash, they can be used equally well on both, but a lath, or other strip of wood, should be fastened vertically between the two adjacent bottles to prevent them from hitting each other and breaking.—P. F. Noyes, Wulfert, Fla.

Trousers Made to Fit in High Boots

A camper who found it rather uncomfortable to have the bulgy bottoms of his trousers "stuffed" into his high boots,

Alterations That Enable the Camper to Wrap the Trousers Snugly around the Leg, Eliminating the Discomforts Experienced While Wearing High Boots

soon remedied the trouble by cutting off the bottom hem of the trousers, a practice called "stagging" by woodsmen, then ripping open the inner seam of each leg nearly up to the knee, and resewing the seams down to the calf, fitting the cloth loosely to the leg. Small snaps were used to hold the part of the trousers below the calf snugly around the leg. For additional security, a small tape was sewed on at the bottom, so that it could be tied around the leg just above the ankle. The alteration thus effected eliminated all the difficulty previously experienced when pulling the high boots and socks on or off, and was much more comfortable than the previous method.—Leroy W. Hutchins, Bronxville, N. Y.

Shock-Absorbing Radius Rods

The radius rods on a light car often cause considerable trouble, owing to the rapid wearing of the ball-and-socket joint

Flat-Spring Radius Rods Substituted for the Usual Rods on a Light Car: They are Bolted to the Frame Instead of the Crankcase

under the crankcase. To prevent this trouble, a California man substituted for the regular rods, spring radius rods of the design shown in the photograph. They are made of flat spring steel, ⅜ in. thick and 1½ in. wide. One end of each is bent to a semicircle of about 3½-in. radius, and bolted to the frame, as indicated, and the other end to the underside of the front axle at the point where the ordinary radius rod is fastened. The curve in the spring allows vertical motion of the axle and also a slight "cushion" to the thrust of the rear wheels, thus materially lessening the shocks on the body and engine.—E. B. Winter, Alhambra, Calif.

Towing a Canoe

When towing a canoe behind a motorboat, great difficulty is usually experienced in keeping the light craft from yawing from side to side and upsetting, unless some expert is in the canoe to keep it in the track of the leader. However, this is a "ticklish" position for one to be in, as it means constant vigilance and considerable muscular effort to avoid a bath.

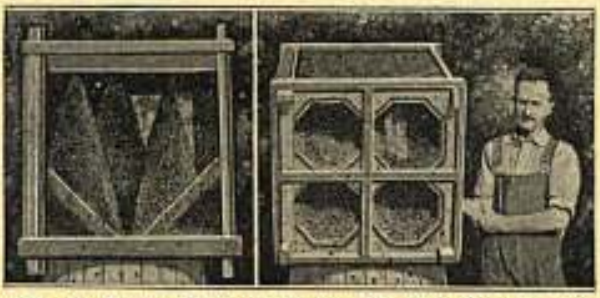
The difficulty can easily be eliminated by attaching the tow rope to the bow of the canoe in the manner shown in the illustration; the canoe can then be towed unoccupied, and will be found right side up and dry at the end of the trip. Tie the tow rope in a bowline, or any other secure knot, around the bow of the canoe as tightly as possible, pulling the knot under the middle of the canoe so that the rope will tend to pull the bow upward. Force one of the paddles under the forward seat or thwart, then over the loop of rope, and force it under the little triangular piece set in the bow of the canoe. This keeps the towline from slipping off the front of the canoe, and any speed can be made, with the assurance that the canoe will follow without any trouble.—R. Melrose, St. John, N. B.

¶To remove dust and lint from dark-colored clothing, rub lightly with a piece of damp chamois skin.

Fly Trap for Dairy Barns

Milking fly-tormented cows in "fly time" has always been one of the farmer's special trials. One farmer, however, by an ingenious application of the wire-cone fly trap to his special needs, has been able to keep his cow stable almost free of flies. Not only has this made milking easy, but the milk flow has been noticeably greater.

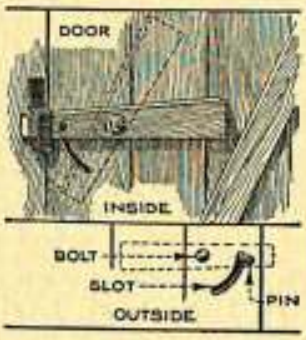
A barrel of separated milk, which is used for feed, stands just outside the barn door on this farm. This barrel is, of course, a great attraction for the flies, and they swarm around it in large numbers. This milk is used as a bait, the fly trap illustrated being placed over the container. The trap consists of a wooden framework, about 2 ft. square, which is covered with wire-screen cloth on all but the bottom side. In the open side four screen-wire cones are fastened to suitable strips; the small open ends of the cones extend inside the trap to within a few inches of the top, and the spaces between the large ends and the trap sides are filled in with pieces of wood, to prevent the flies from escaping. In use, the trap is placed over the top of the milk barrel, so that a part of the bottom opening of each cone extends beyond the edge of the barrel. Flies, in trying to get into the barrel, enter these cones, go up through them, and out at the top inside the trap, from which there is no escape. The top cover of the trap is hinged so that the dead insects can be removed as required. Boiling water can be used to kill the flies before the trap is opened. With such a trap unbelievably large numbers of flies are caught; as much as 5 lb. of dead flies have been removed at one time from it.—Florence E. Clark, McGregor, Ia.



Side and Bottom Views of Effective Fly Trap, Showing How Cones are Placed and How the Bottom is Arranged

Self-Acting Door Latch

A door latch for barns and granaries should be certain in action, so that the door cannot open accidentally after being shut. A spring door latch frequently gets out of order, and is therefore not very satisfactory, but a simple wooden self-acting latch of the kind shown in the illustration has been found entirely suitable for the purpose.



The latch consists of a single piece of wood, tapering from 4 in. to about 2 in. in width, so that one end will be much heavier than the other. It is bolted to the door loosely and slightly off center, so that the heavy end always tends to swing down. A curved slot is cut in the door, and a wooden pin, fastened in the latch, passes through the slot so that the door can be opened from the outside. When the door is closed and the latch is released, it swings to the closed position, owing to the greater weight of the wide end.—H. F. Grinstead, Columbus, Mo.

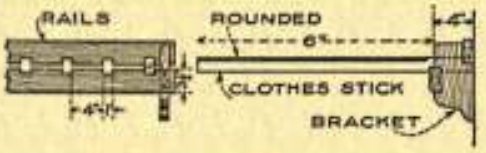
Edging Lawns with a Blowtorch

Where the surface of a walk is on the same level as the lawn, it is a common practice to trim the overhanging grass by means of a spade or other sharp implement, leaving a small V-shaped trench. This may be practicable on some lawns, but if there is much of a slope to the walk, the rains often wash away the soil thus exposed, and make refilling necessary at intervals.

Under such conditions it is better to refrain from further trimming, and allow the grass to grow. As soon as the roots have gained a firm foothold, to prevent erosion of the soil, further growth can be checked for the remainder of the growing season by running the flame of a gasoline blowtorch along a narrow strip. It takes only a few minutes to scorch several rods of grass along the margin of the walk.

Simple Clothes-Drying Rack

The simple wooden clothes rack illustrated consists of two 1 by 3½-in. rails, held together at their ends by small



Clothes Rack for Drying Clothes Indoors That will be Found of Great Convenience to the Housewife: The Sticks may be Removed in a Moment

brackets. The rails are notched to receive the clothes sticks, and may be made any length desirable; they are fastened to any convenient wall or partition, about 5 ft. above the floor. The clothes sticks are made of 1 by 1¼-in. poplar, and are 6 ft. long, the part extending beyond the rails being rounded on top. When removing the clothes, all that is necessary is to draw the stick out of the bracket and allow the clothes to slide off into a basket.—M. E. Duggan, Kenosha, Wis.

Repairing a Fountain Pen

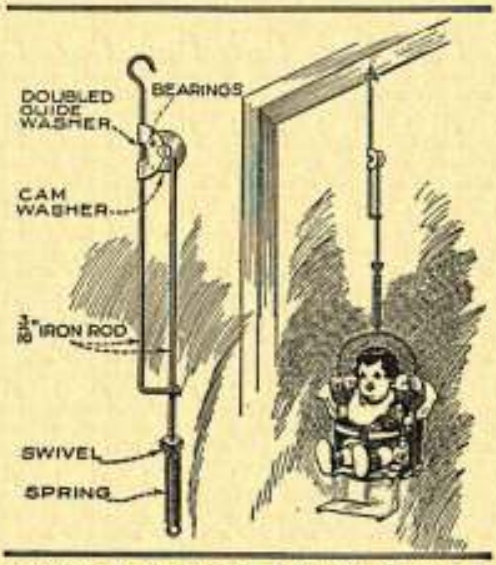
To repair a split fountain-pen barrel or cap, coat the section to be repaired with shellac, covering the barrel or cap all the way around. Then, before the shellac sets, wrap this section with silk thread as uniformly as possible, and with all the tension that the thread will stand, making no provision for the ends of the thread except to smooth them down well in the setting shellac. After the shellac is dry, which only takes a few minutes, the job is finished by covering the section with another light coat of shellac, using the fingers in both cases to apply it. The section thus repaired will be the strongest part of the pen, and, if it should be the barrel, it will be absolutely leak-proof. If the shellac used is too heavy, it will not make a neat job, and if it is too light, it will set before it can be wrapped; it should have the consistency of flowing varnish.—E. H. Taylor, Howell, Tenn.

Adjustable Hanger for Baby's Swing

The adjustable hanger shown in the drawing is adapted for the common baby swing of canvas, and is well worth making for mother's convenience as well as baby's safety.

It is made of two lengths of ⅜-in. iron rod, bent to the shape indicated. One of the rods is fitted with a swivel, to which a coil spring is attached. The clamp consists of two washers: a guide washer that is doubled to slide over one rod, and a cam washer that is riveted loosely between the sides of the guide washer, as shown. The rod that has the coil spring attached to it is bent at the upper end and riveted loosely in a hole drilled in the cam washer, so that the weight of the swing, with its occupant, will force the washer tightly against the other rod.

The hanger must be made accurately, so that the guide will slide freely, and it may be made any desirable length, although one measuring 18 in., when closed,



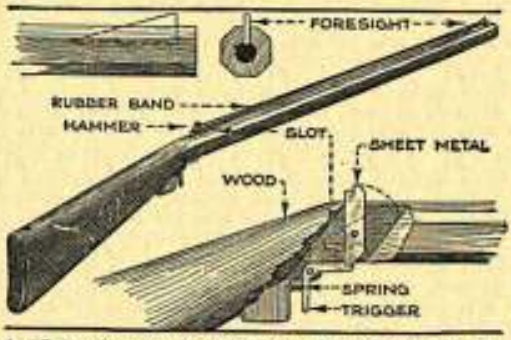
Adjustable Hanger for the Baby's Swing That Is Entirely Safe and Proves a Great Convenience for the Mother: It Locks Itself Tightly

has been found most convenient.—A. L. Long, Springfield, Ill.

A "Safety-First" Toy Gun

There is probably nothing that appeals to the average boy quite so much as a gun. However, a real gun is a dangerous thing to put into the hands of a small boy, and it is not by any means safe even for a larger one. Even the toy air gun is not safe, as the small bullets shot with it may easily destroy the eyesight. A very inexpensive and serviceable toy gun, and one that is quite safe, is shown in the drawing; it can readily be made from a length of 1-in. pine board and a few pieces of sheet metal.

The board is shaped to the form of the gunstock and barrel, and a slot cut through it, as shown. The foresight, trigger, and hammer are made of metal. Any kind of soft metal that can be cut easily with a hacksaw or cold chisel is used; brass, from 1/16 to 1/8 in. in thickness, is perhaps preferable. A groove to hold the foresight, is cut in the point of the barrel, and the hammer and trigger are pivoted on pins driven through the stock. A small coil spring, set in a hole drilled in the butt, forces the trigger forward, so that the gun can be cocked like any other gun. A rubber band is hooked over the foresight and stretched back over the cocked hammer, and the gun is then loaded. When the trigger is pulled,



A "Safety-First" Toy Gun That Uses Rubber Bands as Ammunition: It Is Easy to Make, Shoots Quite Accurately, and Is Not Dangerous

the rubber band pulls the hammer forward, and slips off, and the sudden release of the tension propels the band forward with considerable force. The length of the barrel and the strength of the rubber band determine the distance that the band is thrown. The gun can be used for target practice, and will shoot quite accurately. Fly shooting with a gun of this type has been found to be an alluring pastime for the youngsters, and one that develops real skill.—H. H. Siegele, Emporia, Kan.

Weed-Pulling Fork for Hoe

Long-rooted weeds often grow so close to potato and tomato vines in the garden

Simple Fork Attachment for a Garden Hoe, That Enables Weeds to be Uprooted without the Danger of Cutting Near-By Plants

that they escape notice until they have attained considerable height. As such weeds are often in a position where they cannot easily be reached with an ordinary hoe without endangering the plants, the attachment illustrated for uprooting them was devised, and found to be a practical and back-saving tool.

A piece of 3/8-in. round iron rod is bent to the shape shown, to form a two-pronged fork. This fork is flattened and drilled at the points indicated. Corresponding holes are drilled in the blade of the hoe, and the fork riveted to the blade.

In use, the weed is gripped between the prongs of the fork, and the handle of the hoe pulled down, the edge of the hoe blade acting as a fulcrum. In this way the most stubborn weeds are uprooted. It takes only a short time to make the attachment.

Converting a Kerosene into a Gas Heater

A kerosene heater of the common type can readily be converted into a serviceable gas heater. Remove the oil receptacle and wick, and fasten a circular stove gas burner in position with wire. The gas burner can be purchased at small cost, and furnishes considerable heat.

Convenient Cupboard Stepladder

The stepladder for the kitchen cupboard shown in the drawing proves very handy for the housewife, as it fits in the

Figure 1, Ladder Ready for Use; Figure 2, Outside of Lower Section of Cupboard Containing Ladder; Figure 3, Ladder Folded to Slide into Recess

lower part of the cupboard when not in use, and can be drawn out and opened in a moment when needed.

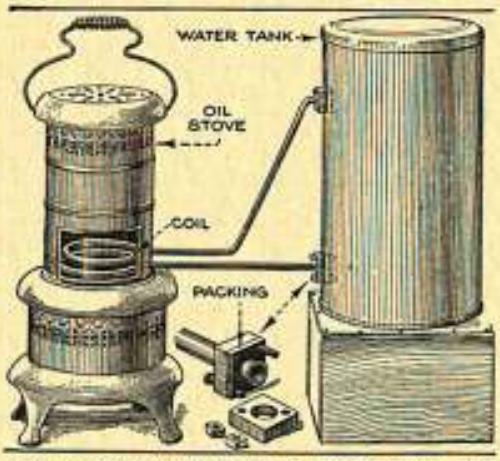
A space, about 6 in. wide, is partitioned off in the lower cupboard, to hold the ladder when folded. A small stepladder that will fit in this space is made, or one can be purchased and fitted in. To the inside leg is bolted a wooden block, shaped as shown; this block slides on two strips of wood nailed to the sides of the compartment. The leg and block are bolted together loosely to permit the former to move freely. Part of the baseboard is then cut out and bolted loosely to the other leg. It is a good idea to reinforce this piece of baseboard, as it is otherwise likely to break. When the ladder is put in the cupboard, as shown in Fig. 2, the cut-out piece is in line with the rest of the baseboard, as in Fig. 2. When the ladder is pulled out and unfolded, as shown in Fig. 1, the steps are situated conveniently under the shelves above.

Shipping Berries by Mail

The usual plan for sending any variety of berries through the mail, by parcel post, is to put up the berries in small paper bags, and fit the bags into shallow, square cartons. The arrangement works well, but considerable time is required for proper packing. The following method saves a great deal of time and is entirely satisfactory: Fill the berries into divided pasteboard egg cartons, which are made to hold a dozen eggs each. The berries ship well in this manner,' if they are shaken down gently.

Heating Water with Oil Stove

A simple homemade water-heating attachment for an ordinary oil stove can be made up at little expense. The attachment consists of a water tank and a length of ¼ or ⅜-in. copper tubing, arranged as illustrated. Two coils are formed near the center of the tubing. The diameter of the lower coil should be a little greater than the diameter of the wick of the stove, and that of the upper coil a little smaller. The ends of the tubing are attached to a can of several gallons' capacity, or to a small watertight barrel. The connections can be made with the parts of a discarded gas headlight of an automobile, or if these are not available, with similar plates made of flat iron, drilled as shown. One plate is soldered on each pipe near the end, and the other plate bolted to it on the inside of the tank, after the end of the



A Water-Heating Attachment for the Oil Stove, with Which Several Gallons of Water can be Heated to the Boiling Point in a Very Short Time

tubing is passed through the tank side. Packing is, of course, used to prevent leakage.

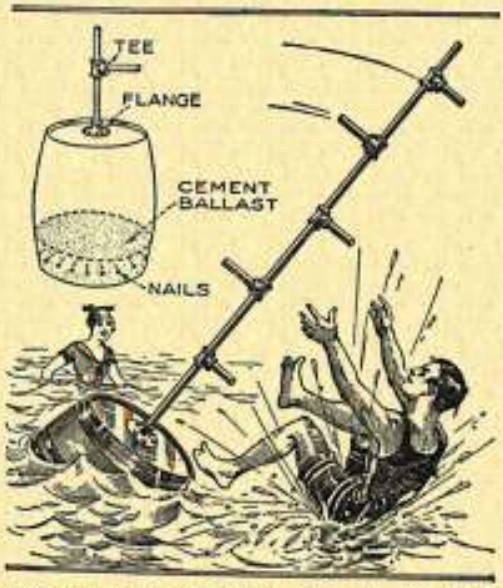
A slot, just large enough to admit the tubing, is cut in the side of the stove, upward from the lower edge, to allow the upper part to swing back freely, which is necessary when lighting it. The water

tank is placed on a wooden box or low stool to bring it to the correct level. The lower part of the tubing must be perfectly horizontal and enter the tank near the bottom. With this arrangement, water can be heated to the boiling point in a short time.

"Tumbling Barrel" Provides Sport for Bathers

A novel device that is popular at a Wisconsin bathing beach is shown in the illustration. An empty vinegar barrel, of about 50-gal. capacity, is filled with cement, to the level indicated, after nails have been driven through the sides to keep the cement in place when set. The bunghole is tightly plugged, and a 1-in. pipe flange is screwed to the center of the upper end. Into this flange a 10-ft. "ladder," made of tees and long nipples, is screwed, which completes the device.

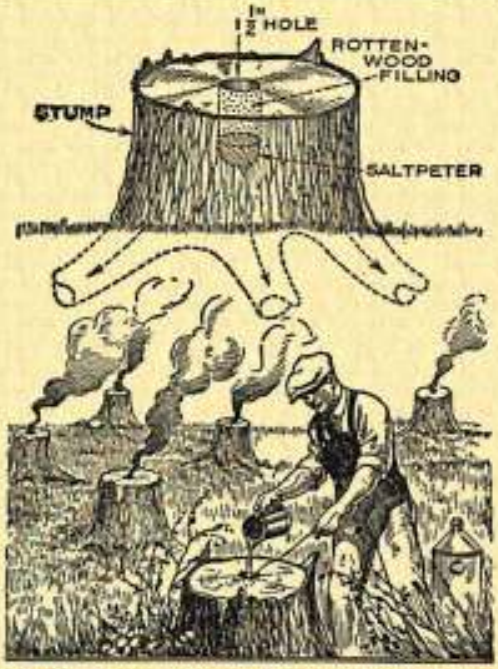
When placed in the water the "tumbling barrel," as it is called, floats with the upper end about 1 ft. above the surface of the water. The trick that affords so much amusement to the bathers is to mount the barrel and climb as far up the mast as possible before the barrel tips. The cement ballast of the barrel maintains the equilibrium of the "tumbler" as long as the bather stands upon its top, but any attempt to climb the mast results in some amazing gymnastics—and an eventual ducking.



A Novel Device Called the "Tumbling Barrel" That Is Popular at a Wisconsin Bathing Beach: The Trick Is to Preserve the Balance While Climbing the Mast

Burning Out Stumps Effectively

When clearing land of stumps for farming purposes, it is desirable to have the soil free from all roots as well as the stumps. When the stumps are pulled,



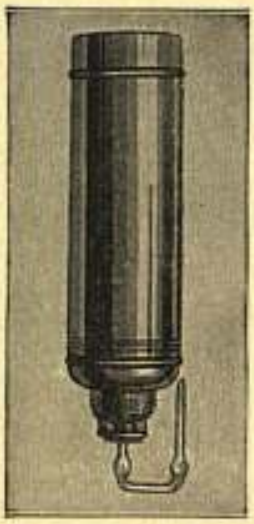
Effective Method of Burning Stumps: An Injection of Saltpeter Enables the Fire to Creep to the Ends of the Roots, Until They are All Consumed

the roots often break off. Some of these are overlooked and remain in the ground, and this, of course, is highly objectionable, as they will catch on the plowshare.

A good method of clearing land of stumps is to burn them out with the aid of saltpeter. Saltpeter, if so applied as to penetrate into the heart of a stump properly, will in a year's time reach down to the very ends of the roots. During the summer, when the stumps are thoroughly dry, drill a 1½-in. hole, about 3 or 4 in. deep, in the center of the stump, as indicated. Into this hole put 3 tablespoonfuls of saltpeter; then close the hole with decayed wood and dirt. During the following summer, dig out the dirt, fill the hole with kerosene, and set the stump on fire. It will burn slowly but surely, and will keep on burning under the ground until every piece of root is consumed. The action of the saltpeter makes a slow-burning match of the fibers of the roots, and carries the fire wherever it has penetrated.—J. V. Romig, Allentown, Pa.

A Homemade Statoscope

The statoscope is a simple form of aneroid barometer that is very sensitive to small changes of air pressure. It will readily detect the difference in barometric pressures of two levels 5 ft. apart, and will demonstrate that the air pressure is greater at the feet of a standing person than at his head.



A homemade statoscope may be constructed as follows: Take a length of glass tubing having a small bore, open at both ends, and, by means of a gas flame, bend it to a U-shape, as shown in the photograph. Suck a few drops of water or oil into the tubing, just enough to fill a part of the length between the bends. Now insert one end of the tubing into the interior of an empty vacuum bottle of 1-qt. capacity, by forcing the tubing through a tight-fitting hole in the cork. Vaseline should be used on the tube to insure an air-tight connection. The bottle should be suspended, by cords, upside down and absolutely plumb, so that no motion of the water may occur due to the instrument being tipped.

The air in the bottle is separated from the outer air by the water "plug" in the tubing. Any change of volume of the air in the bottle will therefore be registered by a motion of the water plug. Only two factors will change the volume of the air in the bottle: change of temperature and change of pressure. By using a vacuum bottle as a container, temperature changes will not affect the statoscope appreciably, except over long intervals of time. There remains only the influence of a change in pressure of the atmosphere, transmitted to the air in the bottle by means of the water plug or piston.

For small changes of atmospheric pressure, the relative change of volume of the air in the statoscope is equal to the relative change of pressure in the external air. If the barometric pressure changes by 1 part in 40,000, the volume of the entrapped air will change 1 part in 40,000 also, and, as 1 qt. of air approximates 69 cu. in. in volume, the water plug in the tubing will move a little more than ½ in., if the diameter of the bore in the tubing is ⅛ in. This corresponds roughly to the change of pressure accompanying a change of elevation of 6 ft., for elevations less than 1,000 ft. above sea level.

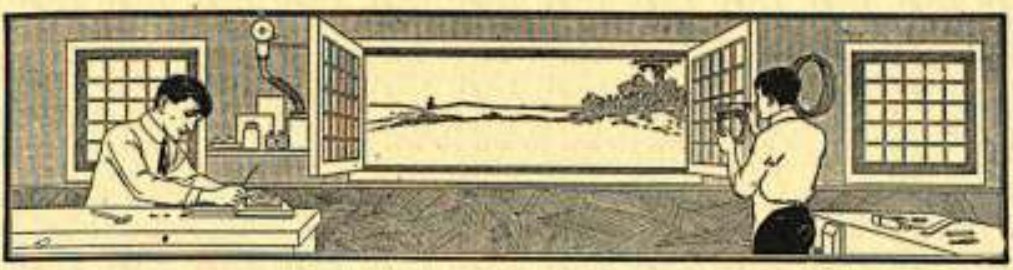
If two enlargements, or bulbs, are blown in the tubing, as shown in the photograph, the water will not be driven entirely out of the tubing by great changes of pressure; air will simply bubble into or out of the flask for continuously increasing and decreasing pressures, respectively. As used in ballooning, if the bubble "breaks inward" the balloon is falling; if it "breaks outward" the balloon is rising. The rate at which the bubbles break is a measure of the rate at which the balloon ascends or descends. If the statoscope, with the enlargements in the tubing, is carried in an elevator, the number of feet change of level between successive breakings of a bubble serves to calibrate the device to read differences of level in actual feet. The device can be carried in an automobile winding its way up into the hills, and, from the counted number of times the bubble breaks, the rise in feet above the starting point may be ascertained. Of course, the number of feet elevation required to "break a bubble" varies with the actual elevation, so that the device should be calibrated in the region where it is to be used.

To take double precaution against temperature changes in the air within the statoscope, it is well to wrap the bottle in layers of felt. It is, of course, preferable to use a drop of oil in the glass tubing instead of water, as the oil does not evaporate.

Holding the Automobile Hood

The usual practice of raising one-half of an automobile hood and resting it on the edge of the dash is none too safe, as the vibration of a running engine, or any slight jar, will dislodge it.

To prevent this, cut a number of notches, about ¼ in. deep, along the edge of the dash, near the socket into which the hinge rod of the hood fits. These notches must be as close to the edge of the dash as possible, so that, when the hood is closed, the notches cannot be seen. When the hood is raised, its lower edge is set in one of the notches, to prevent it from slipping down.—L. B. Robbins, Harwich, Mass.



How to Build Attic Aerials

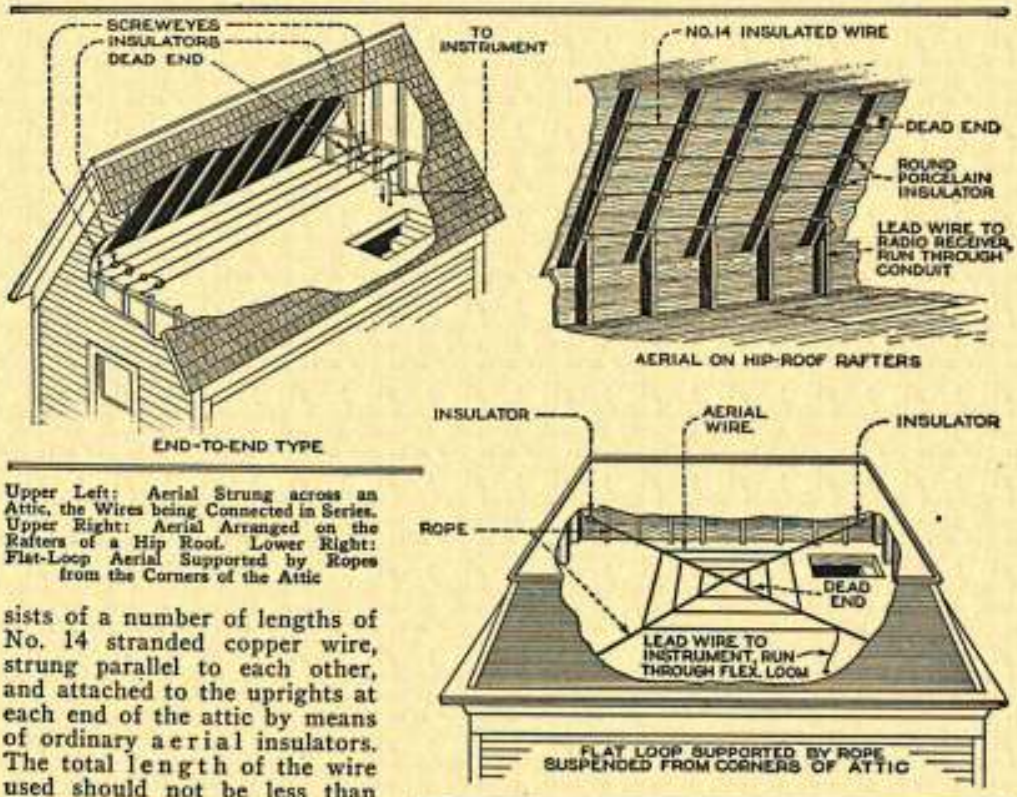
BY F. L. BRITTIN

ATTIC aerials are easy to construct, and when properly made, the results obtained with them are nearly as good as those obtained with outdoor aerials. Attic aerials should not be confused with loop aerials, as they have no directional effects. They also have an advantage over outdoor aerials in that they do not need a lightning switch.

The end-to-end type of this aerial consists of a number of lengths of No. 14 stranded copper wire, strung parallel to each other, and attached to the uprights at each end of the attic by means of ordinary aerial insulators. The total length of the wire used should not be less than 150, nor more than 200 ft., and the wires should be spaced about 1½ ft. apart. One end is left dead; the wires are then connected in series, as shown, and the other end is soldered to the lead-in wire, which is brought down to the instrument through a length of flexible loom.

In attics where less space is available, such as those with hip roofs, the aerial can be strung along the rafters, as shown in the upper right-hand drawing. One length of No. 14 wire, 150 to 200 ft. long, is strung in four parallel rows as indicated, the wire being attached to the rafters by means of round porcelain insulators, which can be purchased at any electrical-supply store. One end is left dead, and the other is connected to the lead-in wire, as before.

The flat-loop aerial, shown in the lower



Upper Left: Aerial Strung across an Attic, the Wires being Connected in Series. Upper Right: Aerial Arranged on the Rafters of a Hip Roof. Lower Right: Flat-Loop Aerial Supported by Ropes from the Corners of the Attic

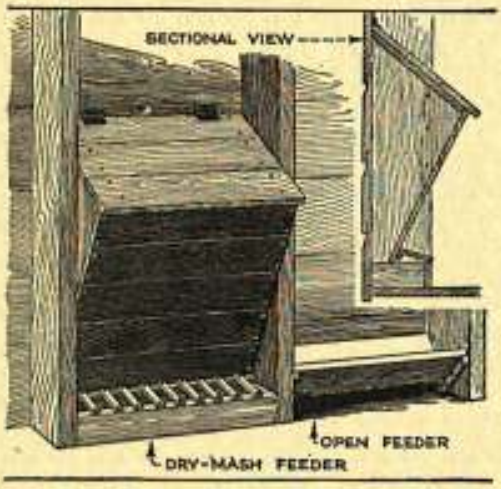
drawing, is designed for small attics. Two lengths of rope are strung across the attic from corner to corner, and are tied together at the point where they cross. The aerial wire is attached to the ropes, as shown in the drawing, being tied firmly at every point where it touches the ropes. The inner end is the dead one, and the outer end is connected to the lead-in wire. The turns should be spaced about 1 ft. apart.

In apartments where there are no attics, an inside aerial that gives good results with a tube set can readily be made by running several turns of annunciator wire behind the picture molding, leaving one end of the wire dead, and bringing the other down to the receiving set. With such an aerial the writer has received stations 1,000 miles distant, using a two-step spider-coil receiving set, made as described in the February issue of this magazine.

To obtain the best results with any receiving set, just as much pains must be taken to secure a good ground as to construct the aerial. Number 14 wire should be used, and one end soldered to a water or radiator pipe. A clamp can also be used, the pipe, of course, being scraped where the clamp is attached. Gas pipes are not so good for grounding purposes, as they are often insulated from the ground by the meter. However, this can be remedied by shunting a wire around the latter.

Built-In Poultry Feeders

Poultry feeders of the type shown in the illustration, built against the wall between two frame uprights, have been found very convenient, and save considerable floor space. A dry-mash feeder is illustrated on the left, and shown in section at the right. The front side is slanted, to allow the feed to slide down freely, and the top is also built at an angle, to prevent the fowls from perching on it. Small strips of wood are nailed over the lower end, or mouth, of the feeder, as indicated, so that the feed cannot be scratched out. Open feeders, of the V-shaped type shown at the right, are also used. These are fastened to cleats nailed to the uprights.—Harry R. Shiffer, Brownstown, Pa.



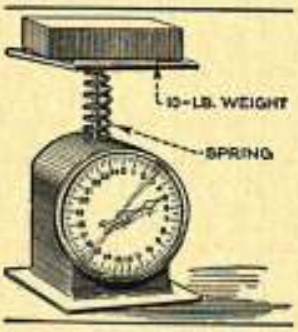
Feed Boxes Built against the Wall between the Uprights in a Poultry House Save Floor Space

Using Stale Photograph Paper

Stale developing paper will give foggy, gray images in ordinary developing solutions. By exposing three times longer in printing, and using about four times as much bromide of potassium in the developer, the prints may be made clear and "contrasty." The exact amount of bromide to be used is easily ascertained by experiment.

Increasing Capacity of Scales

The standard family scale usually has a weighing capacity of 25 lb., but it often happens that heavier articles must be weighed. To increase the capacity of such a scale, a coil spring may be placed on the stem of the platform, as indicated in the drawing. The coil spring should be made of No. 12 or 14 steel or brass spring wire, and can be wound so as to increase the capacity of the scale several times.



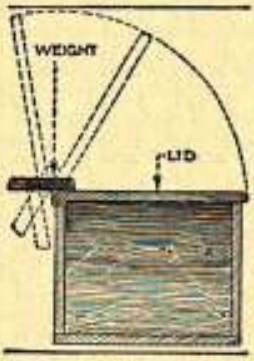
When the spring is in place, a body of known weight is placed on the platform, and the scale indication noted. The actual weight, divided by that indicated, gives a factor that is used to multiply the scale readings shown when weighing other articles. For example: if, as shown in the drawing, a 10-lb. weight is placed on the platform,

and the scale reading is 5, for all articles weighed subsequently the scale reading is multiplied by 2, to obtain the correct weight.

The results obtained with this method, while not absolutely correct, are close enough for practical purposes.—E. W. Kemp, Lexington, Ky.

Counterweight Holds Lid Open

A counterweight, attached to the lid of a chest or bin, as shown, holds the lid either open or closed, and eliminates the need of a catch.



Any heavy piece of metal can be used; it is screwed or bolted to the back edge of the lid so it will not overbalance the lid when closed, but exert sufficient force to draw the lid straight up when the latter is raised halfway. If desired, the weight may also be adjusted to hold the lid in an intermediate position.—H. F. Grinstead, Columbus, Mo.

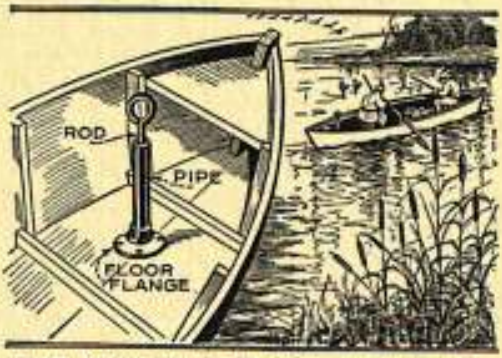
Why Aster Seedlings Die

Florists are sometimes perplexed concerning the cause of asters wilting and turning black at the stem, near the ground, which usually happens just at the time when the flower is beginning to bud. As a general rule, more trouble of this kind is experienced with plants grown in a greenhouse than with those grown outdoors.

The grower usually attributes the loss to some kind of stalk borer, aphis, or fungus. The real cause is, however, excessive rainfall or heavy watering, which causes much trouble, especially among asters planted in rich soil. Low land, on which water has a tendency to remain long after heavy rains, is a very poor place for seedlings, although it is ideal in dry weather. The same indications of stem rot are found among asters allowed to remain too long in the greenhouse, and also among those that have slender stems, because they have been planted too thickly, and therefore have to be partly buried in soil to steady them.—A. C. Cole, Chicago, Ill.

Shallow-Water Rod Anchor

The hunter, fisherman, or trapper who uses a light, flat-bottomed boat can improve his craft considerably by fitting it with an anchor of the type illustrated. It consists of a cast-iron floor flange and a short length of 1-in. pipe to fit, the flange being screwed securely over a 1-in. hole cut in the floor. The top end of the pipe must be above the water line of the boat. The remainder of the equipment consists of a ⅝-in. iron rod with a ring formed at one end. This rod is dropped into the pipe and pushed into the bottom of the stream or lake. If desired, an anchor of this kind may be installed in each end of the boat, to insure stability.



Handy Anchor for the Flat-Bottomed Fishing Boat: The Rod is Pushed into the River Bottom

Gasoline Flatiron Used as Camp Stove

A convenient camp stove can readily be made from a gasoline flatiron. The handle is removed and two flat-iron legs are substituted for it, so that the flatiron may be inverted, the bottom serving as the top of the stove. The fuel tank is turned to the position shown, care being taken that the feed pipe is not twisted off while turning. A support of flat iron is provided to brace the fuel tank, and is attached to the iron by the screws that hold the nearest leg The fuel is lighted in the usual way.

Bottle Window for Log Henhouse

A northern farmer who did not have much time to spare or cash to spend, when erecting a log henhouse, used empty bottles instead of regular windows. Ordinary round bottles were used, as they are stronger than flat ones. Notches were cut in adjacent logs with an adz, and the bottles fitted and cemented in place, care being taken to keep the glass clean. Owing to the small diameter of the bottle in comparison with that of the logs, it was necessary to bevel the notches deeply on the inside, to admit as much light as possible. Any number of these bottles can be arranged in a log wall without weakening it. The bottles admit as much light as ordinary windows, and prevent drafts. They have the additional advantage of keeping the henhouse warmer than ordinary windows during cold weather, as the dead-air space in each bottle prevents, to a great extent, the dissipation of the heat inside.—H. Webster, Spear Hill, Man.

Oiling Washing-Machine Motors

Many small electric motors, used on washing machines, are made with dustproof bearings, the oil hole in the top of each bearing being fitted with a hollow screw cover that is set with a screwdriver. In cramped quarters this cap is very unhandy, as a very short screwdriver must be used to turn it, and for this reason refilling is often neglected. The simple improvement illustrated will help considerably to remove this trouble. A small piece of sheet brass is soldered in the slot of the screw cap, as shown, thus making a thumbnut out of the screw cap. A hole, just large enough to receive the end of the oilcan spout, is drilled through the threaded side of the cap. With this improvement no screwdriver is needed, nor need the cap be removed entirely to oil the bearing.

Keeping Out the Rain

The drawing shows a good method of keeping rain out of the open window of a sleeping room, where it is essential to have fresh air at all times, even during rainy weather. A wooden box is made to fit between the window jambs and rest on the sill. It is held in place by means of thumbscrews on the sides, and also by the weight of the window on top. The opening is made on the underside of the box, so that rain cannot enter.—H. A. Palmer, Toledo, Ohio.

Lazy-Tongs Row Marker

The garden-row marker shown in the illustration is of special convenience as it can be adjusted to any desired spacing. The center "diamond" of the tongs is pivoted to the end of the handle, and a bolt on the opposite corner of the diamond fits in a slot cut in the handle, as indicated; a wingnut being fitted on the bolt to clamp it at any point in the slot. Heavy nails, driven through the lower strips, at the points of the diamonds, are used as markers; ⅜ by 1-in. strips are used for the lazy tongs, and are fastened together by snug-fitting rivets and washers.

BUILDING A CAMP CAR

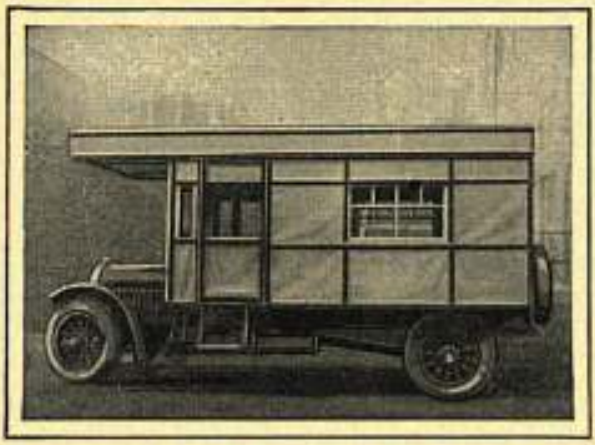
By Ray F. Kuns
PRINCIPAL, AUTOMOTIVE TRADE SCHOOL, CINCINNATI, OHIO

Part I
Chassis and Body Construction

THE Camp Car, or land cruiser, described in this article was evolved after a number of years' experience in summer touring, and is the fruit of much thought and preliminary investigation.

Many plans were made, designs drawn up, checked over thoroughly, and then discarded, and much experimenting was done before the car was finally built; the car has, since being constructed, been driven over 5,000 miles, and has given every satisfaction.

Some of the considerations involved in the construction of a car of this type are the following: It must be of lightweight construction; everything must be contained under one roof—that is, there must be no sections extending beyond the protection of the roof, whether traveling or in camp; it must allow the driver good vision in every direction; it must afford comfort to all passengers when riding, and good beds when camping; it must have provision for carrying a supply of safe drinking water, and for the preparation of meals; it should have an ice box, and as many cupboards and lockers as possible. These provisions are only necessaries, and were not at all hard to embody in the final design.



Side View of the Camp Car Ready for the Road: This Car has Given Excellent Service in Touring

In designing the car, the body width was determined by the space necessary for the berths and seats, as it was desired, when carrying four passengers, that the seats should afford each a good view. The seats were accordingly to be individual, and were located in the car as shown in the floor plan; they are held in this position by cleats, but may be removed and used in any part of the car, as desired.

The length was the next consideration. After some figuring, it was decided to allow the body to overhang the rear axle by 5 ft., and the body was so built; after one season's use, however, the wheelbase was lengthened, and the overhang reduced to 3 ft. It was found possible to make the floor 12 ft. long. The headroom was determined by the writer's height, and this left only one main dimension to be determined—the length of the "snout," or overhanging part of the roof, needed to house the berth that is swung over the hood in front of the steering wheel. The bed or berth was made 4 ft. wide, so as to take a regular mattress, and this, then, fixed the amount of overhang.

The first tour taught much about chassis design and construction. The 5-ft. overhang was found to impose too much weight on the rear axle, and while this was all right as far as steering and traction for hard pulls were concerned, it did not make for a steady-riding car or tire economy. The original wheelbase was 123 in.; by moving the rear axle back

24 in., a much better balance was obtained, and the body design was unaltered, except as to floor arrangement. The present wheelbase is 147 in., and the weight on each wheel, with full load, is about 1,500 pounds.

The first touring-car frame being too light, it was discarded, and two lengths of 4-in. channel iron were used instead. A short connecting length of the same-size channel was welded across the front, to form a bumper and brace the frame, and another length across the frame, to carry the front end of the torque arm. The remaining cross members are either 1½-in. pipe or sections cut from the old frame. The frame was made narrow enough to allow the springs to be mounted on the outside.

The front springs are 40 in. long, and are mounted under the frame in the usual manner; each has nine leaves, 2 in. wide. The rear springs are 56 in. long, and have fourteen 2-in. leaves each; the rear ends of the springs are fitted with sliding contacts instead of shackles.

The first season, the rear springs were underslung, with long shackles at the rear; this, however, allowed the springs to twist and the car to sway badly. With the present construction there is no sidesway, and riding comfort is all that can be desired. Four heavy snubbers are used to check rebound.

Front View, Showing the Clear-Vision Windshield That Allows Each Passenger an Unobstructed View

The rear axle was taken from a heavy touring car. It is of the full-floating type, having adjustable taper-roller bearings throughout. The gear ratio is 4½ to 1, but 5 to 1 would be better. The front axle is of the usual I-beam type, designed for touring-car service.

The 6-cylinder engine is of the standard L-head type, 3½-in. bore by 5-in. stroke, with a rating of 29½ hp. It is an engine designed for service in a passenger car weighing about 2,700 lb. The transmission is standard. The engine is powerful enough to keep the car moving even in very bad going, although, in hard pulls, the 5-to-1 gear ratio in the rear axle would help considerably.

The speed in high gear ranges from about 5 to over 45 miles per hour, although, of course, the average touring speed is around 30 miles.

The tires and rims are worthy of more consideration than they usually receive. Nothing less than a 4½-in. truck cord, or a 5-in. passenger-car cord tire, should be used for a car of this weight. The rims should be one of the several types that make contact with the felloe all the way around.

The foregoing information is given, not so much with the idea that others will assemble a special chassis, as the writer did, but rather that the main points of this design may be remembered when selecting a chassis. There are a number of fast, light trucks on the market, among which a suitable chassis may be found. If a touring-car chassis is used, it should be one with a very rigid frame, an engine of the specifications outlined above, and good springs. A suitable chassis will be more commonly found among the higher-priced cars than among the low and medium-priced ones.

The chassis being ready, the framing of the body may proceed. The job will probably have to be modified to fit the chassis, but the dimensions given will be of material help, and, in many cases, can be followed without change. When assembling, the road clearance must be watched; this should not be less than 10 or 12 in. If the body is to be framed on the chassis, it is well to set the latter in such a position that it will not be disturbed while work is in progress, and to block it level. If this is not done, every deflection of the springs, or change in tire pressure, will throw the job out of level, and result in delay.

The sills used for the frame are 2 by 4-in. oak, although any good hardwood will answer. The manner of attaching the sills to the frame will vary; in a touring-car chassis with a hump in it to run over the rear axle, the sills may be set on edge, in such a manner that the front ends rest on the top of the side members

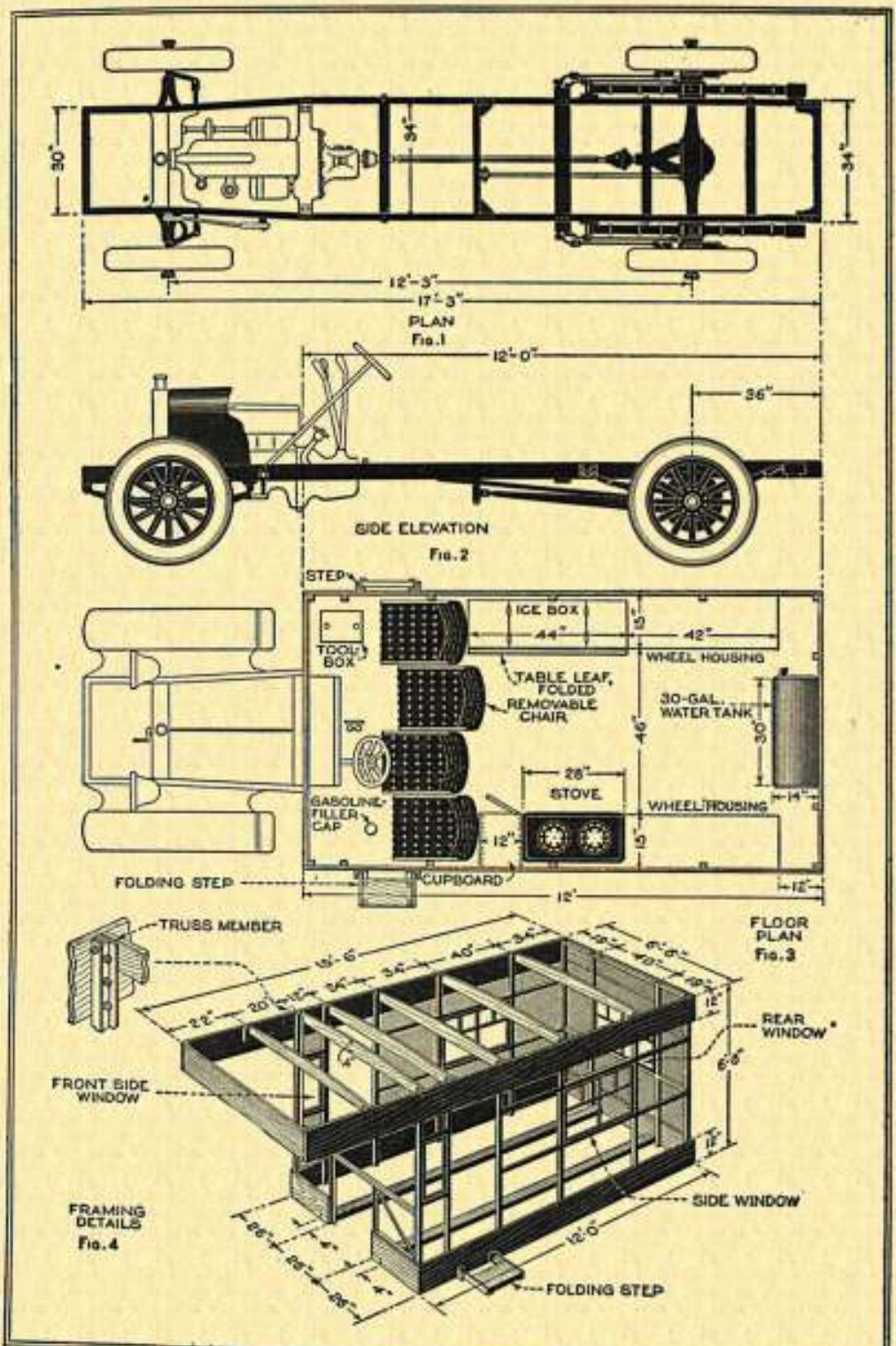


Figure 1, Plan, and Figure 2, Side Elevation of Assembled Chassis for Camp Car; Figure 3, Floor Plan, Showing Location of Chairs While Driving, Stove, Ice Box, and Other Equipment; Figure 4, Details of the Body Frame, Showing Window Frames in Place, and Connection of Front Posts and Rafter to Truss Member

of the frame. If the frame is straight on top, the sills may be laid flat, as shown in Fig. 4. Another method is to bolt the sills to the side of the frame. A point to keep in mind is that every inch that the sills project above the frame means an inch added to the height of the body, and this means much, not only in looks, but in sidesway, and in clearance under bridges, etc. In laying the sills, also, care must be taken to see that they will clear other parts of the car as they move up and down with the spring action.

Having bolted the sills to the frame as seems best, the floor, of No. 1 common pine, is laid. Two boards are cut to the necessary length, one being fastened to the front end of the sills, the other to the rear, at right angles, determining the four corners of the lower part of the body. The rear board may have the groove sides planed down, and the edge laid even with the ends of the sills, and must be squared carefully with the front board and sills before being nailed down. The flooring comes next.

Wherever possible, the floorboards are laid full length; that is, clear across the width of the body. There are no cross sills, for two reasons: They raise the floor from 2 to 4 in., and they tend to make the frame more rigid, and more subject to racking on rough roads.

The position of the engine, transmission, and wheels will determine the location of the parts that must be cut out of the floor. The old floorboards may be used, but it will usually be found necessary to use new lumber.

As cross sills are eliminated, other members must be used to take their place. The floor helps, but cannot be depended on to do the work alone. At the front, any wood sill or truss would prove too bulky and insecure. Accordingly, the truss member, Fig. 5, was evolved. This is made from 1¼-in. angle and T-iron. All joints are welded, and the rabbets formed are set to the front, in order that the windshield may have a proper seat when closed. The two short center posts are bolted to the front ends of the sills, and rest on a steel plate, fitted onto the top edges of the car frame. Two pieces of ¼ by 1-in. steel are welded into the outer panels, as shown, for braces; these prevent sagging of the outer edges of the body. The space between the long posts is filled by the windshield, while traveling, and by the forward berth, while camping.

The side sills are pine or poplar, 2 by 2 in. in size, nailed under the edges of the floorboards, when the latter are cut to length. Pieces of the same material are used to bind the edges of the floor cut-outs. The rear edge of the floor is strengthened with a 2 by 2, or 1 by 4-in. sill, depending on the method of attaching the main sills to the car frame.

Having the truss member erected and all edges of the floor bound and strengthened, the next step is to lay out the studs or posts.

The approximate position of the posts may be gathered from Figs. 3 and 4; good, sound oak or ash, 1½ in. square, is used for these. The posts are half-lapped, at the bottom, to the floor and 2-in. sills, and the joints fastened with screws, after coating the surfaces with white lead or paint, to prevent penetration of moisture. As the posts are set, they are plumbed, laths being used to brace them in position. The front posts are fastened to the truss angles with screws.

It will be noted, in Fig. 4, that there is a 12-in. board bolted to the bottom and top of the posts on each side. These are poplar, known as panel stock by lumber dealers; the bottom boards are ¾ in. thick, and the top ones ½ in. thick. These boards take the place of heavy cross and longitudinal sills, and are fastened to the posts with 5/16-in. bolts. This construction insures sufficient rigidity to prevent racking of the body, while permitting considerable twisting without damage; no corner or diagonal braces are used.

The rafters are of 1⅜-in. oak or ash; they are 2 in. wide at the ends, and 4 in. at the center. If additional headroom is desired, they may be cut out to a curve on the underside, starting the curve at a point 16 in. from each end, and making the height of the chord 1½ in.; that is, the width at the center would be 2½ in. A rafter is set at each post, which results in uneven spacing, but is best for strength. One 5/16-in. bolt is used to fasten the rafter, at each end, to the posts, which are notched ⅜ in. to take the ends of the rafters. In the overhanging end of the top, short posts are fastened, to support the rafters.

Short pieces of the post material are used in the corners of the top as bolting pieces for the panel boards, and similar pieces along the edges as nailing cleats for the roof sheathing.

The two rear side windows, and the rear window, are arranged to slide up, for ventilation. When traveling at touring speed, however, there is a great amount

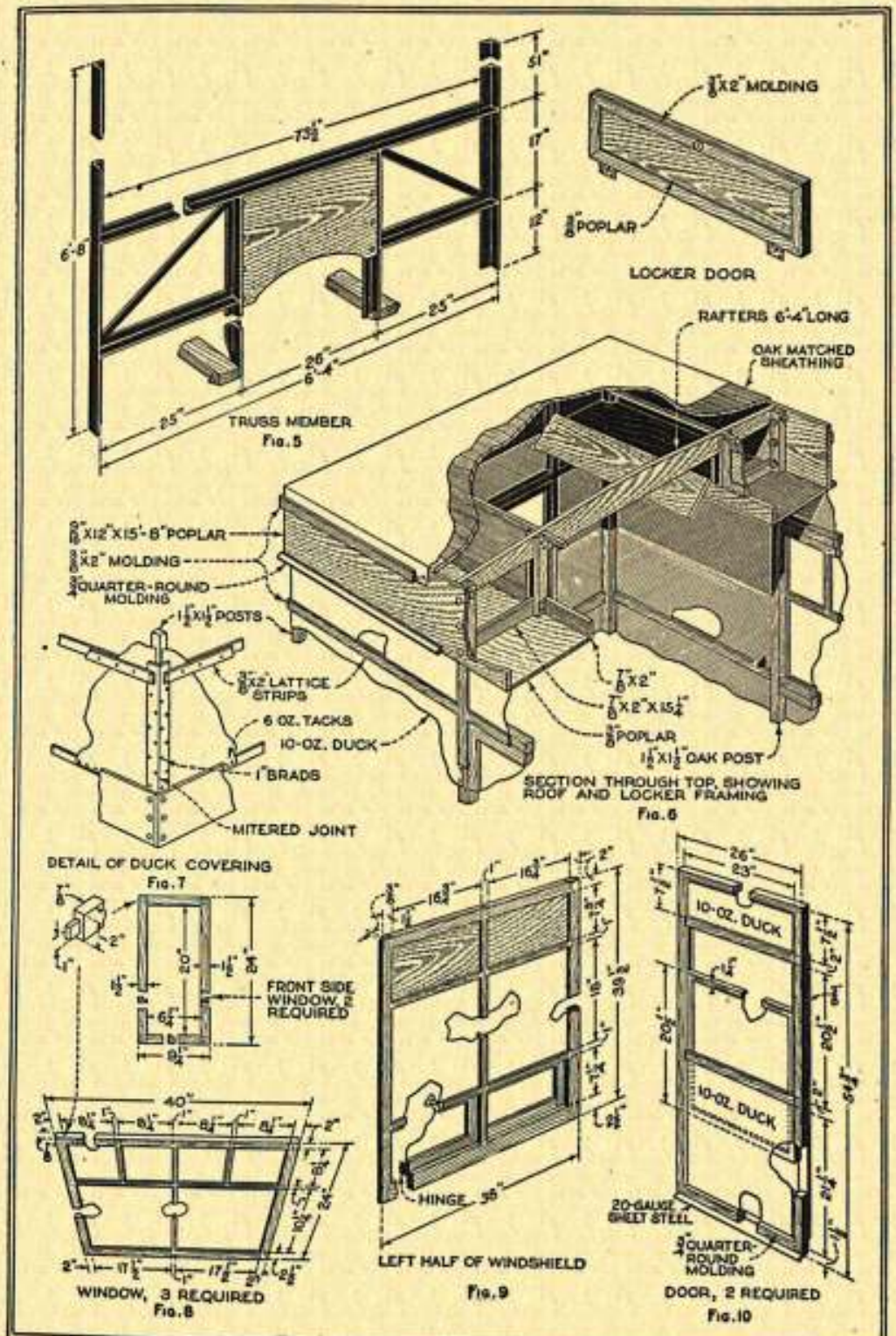


Figure 5, Truss for Front of Body; Figure 6, Details of Roof Covering and Locker Framing; Figure 7, Method of Applying Duck Covering to Sides and Rear; Figure 8, Details of Windows; Figure 9, One-Half of Windshield, Showing Ventilating Frame; and Figure 10, Door Construction, Showing Sliding Window

of suction at the rear of the car, and the dust whipped up sifts in at every crevice. As it is hard to make a sliding joint snug enough to exclude this dust, it may be best to make only the side windows slide. The posts are used as the side frames. The window sills are ½-in. stuff, set at a slight angle to insure drainage. The window cap is merely a piece of quarter-round molding, nailed over the lattice strip that holds on the duck covering. The window frames cannot be finished until the body has been covered.

The roof may be covered with the regular roof sheathing used by body makers, or, as in the present case, with ⅜-in. oak flooring.

The smooth side is laid to the rafters, as this forms the ceiling, and is stained and varnished. The sheathing is fastened with 1-in. flat-head nails, well punched down. With the framing finished, as in Fig. 4, and the roof sheathing on, the duck roof covering is applied.

This may be obtained from a body-trimmer's supply house, in a width sufficient to cover the roof without a seam. The corners of the sheathing should be rounded, to prevent cutting the covering. Each edge of the covering is drawn down to a line on the panel board 3 in. from the top of the sheathing, and tacked fast. The edges are then trimmed, if necessary, and covered with a ⅜ by 2-in. lattice strip. These details are clearly shown in Fig. 6.

Before covering the sides, the posts are braced, on the inside, by means of lattice strips tacked to the centers, to prevent them from being pulled out of line as the material is stretched. One edge of the side covering is tacked to the rear door post, and the duck run back to the rear edge, making no allowance for the window opening. It is best to cut the material at the rear corner, putting on only one side at a time, and not to attempt to run around the rear and up the other side without cutting. Note, in Fig. 7, that the duck is fastened between panel board and posts, at top and bottom, the nuts being slacked, the material tucked in, and the bolts drawn tight again; this avoids cutting the material. With the top and bottom tacked in place, the lattice strips are applied. These are ⅜ by 2-in. molding strips. A strip is nailed, on the outside of the duck, so that it will just touch the bottom of the window sills when these are in place. A second strip is nailed 23 in. above this, to form part of the window cap. These strips run from the rear door post to the rear corner post, on each side, and across the rear, in like manner. The strips do not meet at the corners, but are cut short to allow room for the vertical strips that cover the tacks fastening the duck to the corner posts. When fastening the vertical lattice strips at the window posts, they are allowed to project over the posts about ⅜ in., to form shoulders against which the windows rest and slide.

The temporary lattice strips tacked on the inside are now removed, and strips, long enough to reach between the posts, fastened on the inside of the duck by nailing to the outside strips. A helper, holding a heavy sledge or dolly against the strips, is necessary for this part of the job. Flat-head nails, ¾ in. long, are used for this, heads inside, where they do not spoil the appearance of the job. No inside strips are placed above the windows, as they would interfere with raising the latter.

After the sides are finished, the window openings are cut out, and the body forward of the doors covered and paneled to conform to the rear. The front side-window frames are fastened to the posts, and the duck tacked to them.

The windows, shown in Fig. 8, have frames of poplar or pine, rabbeted ¼ in. wide and ½ in. deep, to receive the glass. The glass is retained in the rabbets by ¼-in. square molding. All joints are mortise-and-tenon, and the panes may be arranged in any manner desired.

The windshield, the left half of which is shown in Fig. 9, is set in the upper part of the truss member. Each side is framed to fill half of the opening in the truss, the full width being 6 ft. 4 in. The halves are joined at the center by a ⅜-in. rabbet. Aside from filling the opening properly, when used as a windshield, these parts also form the sides of the housing for the upper berth, when lowered, and carry part of the weight of the bed when raised. Therefore, the frame is made of hardwood.

When opened, the top edges overlap the panel boards 1 in., which prevents them from opening too far, and makes them weatherproof. Mortise-and-tenon joints are used throughout, and the glass panes are fastened in the same manner as in the side windows. The lower panels are filled in with light oak frames, carrying two panes of glass each; the frames are hinged at the bottom, and may be dropped for ventilation. When up, they are held in position by metal thumb buttons.

The halves are hinged to the truss

posts, and clear the web of the T-iron top rail by 5/16 in. Three hinges are used on each side. In framing, it must be borne in mind that the frames are right and left-hand, or they will not mate when hung.

The door frames, Fig. 10, are made of hardwood. Each door is provided with a sliding window that drops into a pocket—much like a sedan window. Double-strength glass is used, in a light wood frame. Duck is used to cover the top and bottom of the door; this is tacked, on the inside, in the rabbet provided for the window frame, and, where this does not run, strips of quarter-round molding are used. Edges where molding is not used are rounded with a rasp, so that all exposed edges are round. Corner joints are half-lapped and screwed, and cross rails tenoned into mortises in the sidepieces. The window frame is held in by means of a 20-gauge sheet-metal pocket, and by lattice strips screwed to the frame.

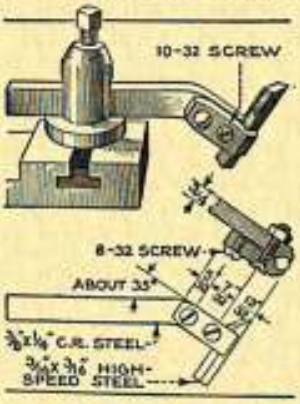
Three carriage hinges are used on each door, and deck locks, with a permanent handle, fitted. The sheet metal forming the pocket should be painted body steel or galvanized. It is so formed that any water blowing in at the window joint will run out over the flange at the bottom of the door. The edges of the doors are made snug by trimming them with aluminum T-molding, purchased from a body-builder's supply house. The windows are raised or lowered by straps attached to the frame, and are held closed by small "triggers" which swing under the frame.

Full details of the interior fittings, etc., will be given in the August issue.

Tool Holder for Small Model-Making Lathes

The difficulty of forging tools for small lathes, and of keeping such tools in proper condition, is obviated by the use of the tool holder shown in the illustration.

The holder is made of cold-rolled steel, and the shank is easily bent in a vise by means of a large wrench. The square hole for the bit is made by drilling a 1/8-in. hole through the end of the two parts of the holder, as shown, while the parts are clamped together, and then filing each half with a small square file. A length of 5/16 by 5/16-in. high-speed steel is used for a bit, this size being the smallest that is usually carried by dealers. It is furnished annealed, and can be cut to length with a cold chisel or hacksaw, then ground and hardened. The hacksaw must be used with light strokes, or the steel, being air-hardening, will harden under the saw and ruin the blade.



The advantages of this type of lathe tool for the amateur are the ease of hardening the high-speed steel, of grinding the bits for a new edge, and the elimination of reforging.

Increasing Volume of Tone of Phonograph

The vibrations of the diaphragm of an ordinary phonograph reproducer are conducted to the amplifying chamber from one side only, although it is obvious that both sides of the diaphragm vibrate equally. Advantage can be taken of this fact by providing an additional horn to amplify the volume of the tone. The horn can be made of fiber board, and the small end must be just large enough to fit over the outside of the reproducer, a notch being cut in it to fit over the needle arm. The horn is held in place on the reproducer by means of a rubber band. The sound is given out from both sides of the diaphragm, which not only results in increased volume, but also in a slightly different quality of tone.—Charles I. Reid, New York City.

¶Porch boxes for flowers and plants should be wider at the bottom than at the top, to afford additional growing space for the roots.

BUILDING A CAMP CAR

By Ray F. Kuns
PRINCIPAL, AUTOMOTIVE TRADE SCHOOL, CINCINNATI, OHIO

Part II
Interior Fittings

HAVING built and covered the frame, as detailed in the July issue, the construction of the berths and other interior fittings may be taken up.

At the front of the car, in Fig. 11, will be seen a duck-covered frame; this serves several purposes. When the car is closed up, ready for traveling, the back end of the frame rests on the top of the windshield, as shown in Fig. 13, protecting the berth from dust and dirt. When the berth is down, the frame forms the front wall of the sleeping recess. The frame is made of 1 by 4-in. poplar, and is hinged to a stout cleat in the "nose" of the car. The hinges are firmly bolted to both frame and cleat, as they carry part of the weight of the berth and its occupants. The immediate point that receives the weight of the berth is a cleat running across the frame, as shown in section in Fig. 13; and to keep the berth from slipping from this cleat, two iron brackets, shown dotted, are screwed to it, and fit behind the berth frame. Most of the weight of the berth is carried by the cross member of the truss, shown, in Fig. 13, just below the windshield.

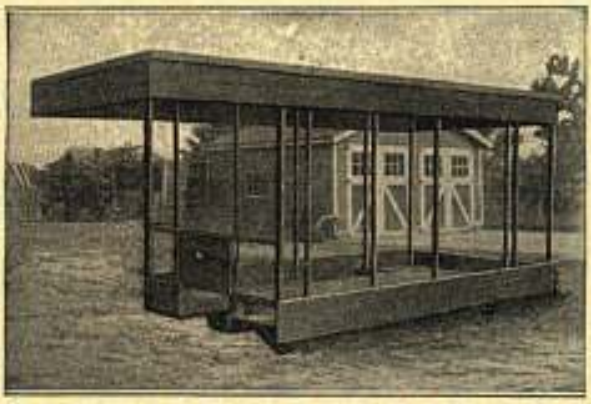


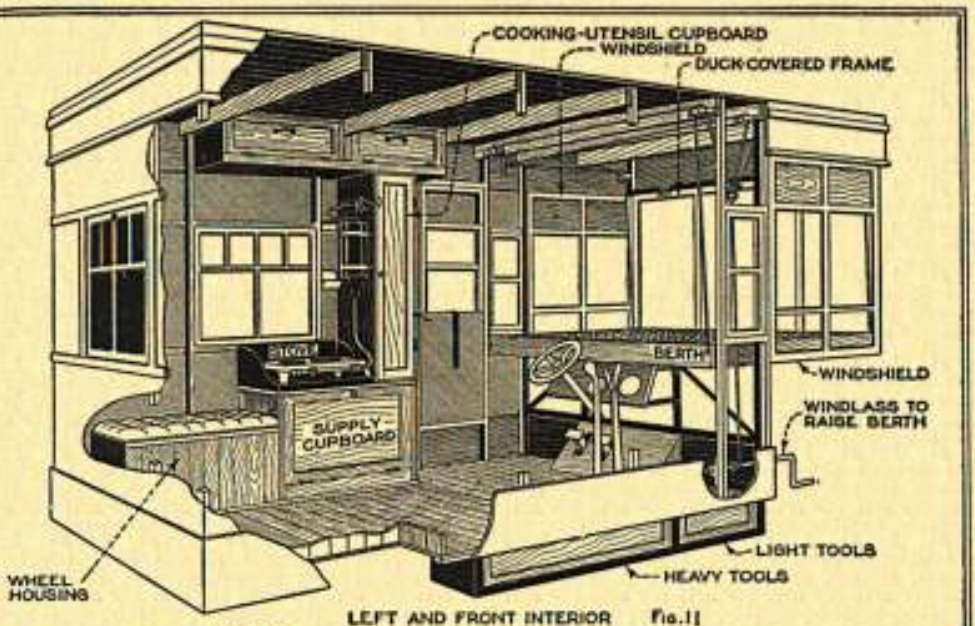
Photo Showing Body Framed, Ready for the Application of the Duck Covering

The duck used to cover the frame need not run below the cleat just mentioned. The side rails project below this, and form convenient handles for lifting the frame. A grooved rail on the front of the frame fits over the top of the windshield when the car is closed.

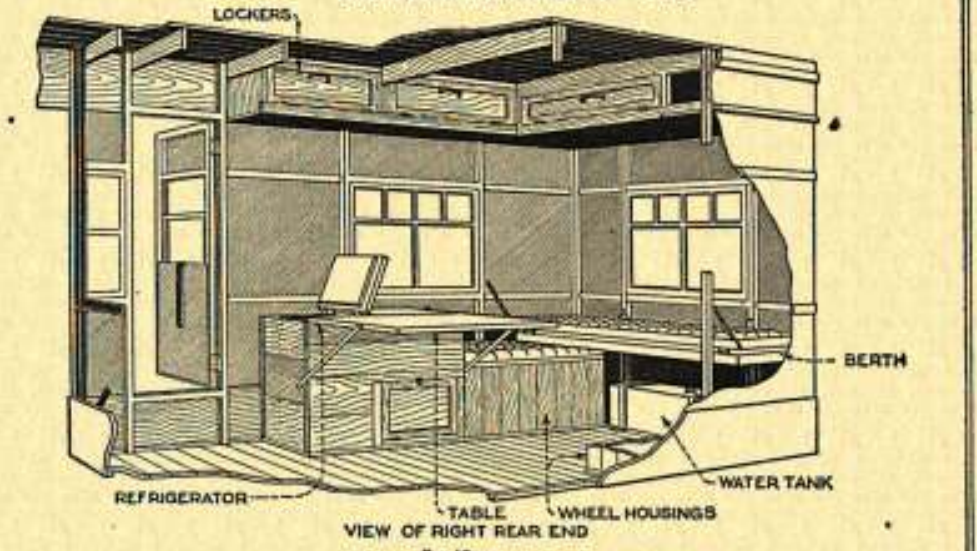
The front berth, shown in Fig. 14, is made from a discarded bedspring, the end angle irons of the bed being screwed or bolted to the endpieces of a 48 by 72-in. wooden frame. The endpieces of the frame cover the ends of the sidepieces, to prevent trouble due to the pull of the springs. The bottom of the berth is covered with duck, which may be paneled with lattice strips if desired.

The windlass-and-pulley arrangement for raising the berth is shown in Figs. 11 and 13. The pulleys are so placed that the small ropes running to the corners of the berth may be attached to a larger rope, which is run to the windlass. The latter is a length of ½-in. pipe, mounted in wooden blocks on the frame, and provided with a gear and dog for a ratchet. The pipe projects through the front panel board, and a crank, fitted with a pin that engages slots cut in the pipe, is used to turn it. The crank is stored in the car when not in use. The gear is pinned to the pipe just inside the front post, and the pawl fastened to the post so that it will prevent the gear from turning backward, except when the pawl is raised. The ropes used at the four corners are medium-weight sash cord; the windlass rope is of the same type, but heavier.

The rear berth, shown installed in Fig. 12 and in detail in Fig. 15, is made from



LEFT AND FRONT INTERIOR Fig. 11



VIEW OF RIGHT REAR END

Fig. 12

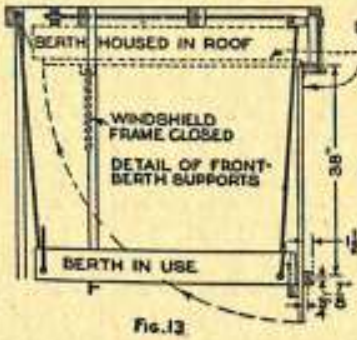
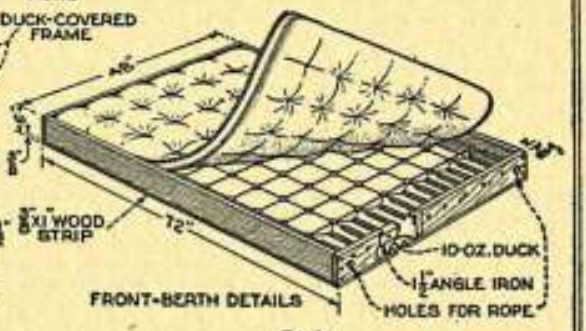


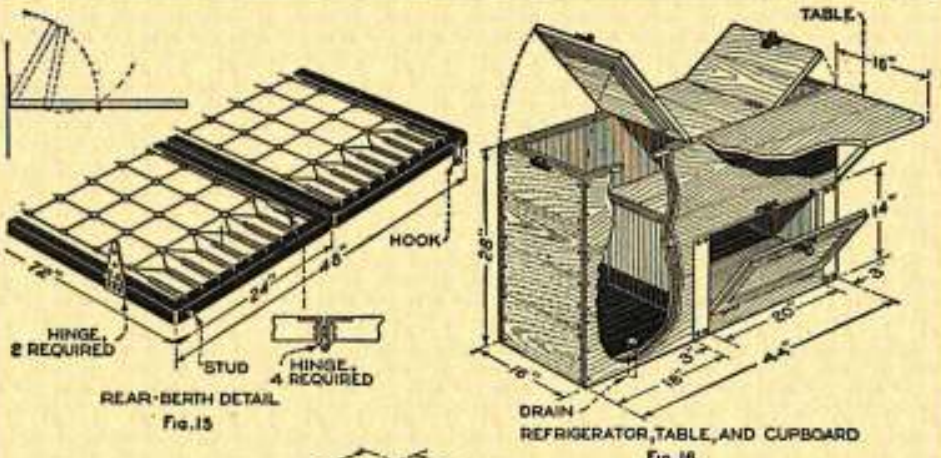
Fig. 13



FRONT-BERTH DETAILS

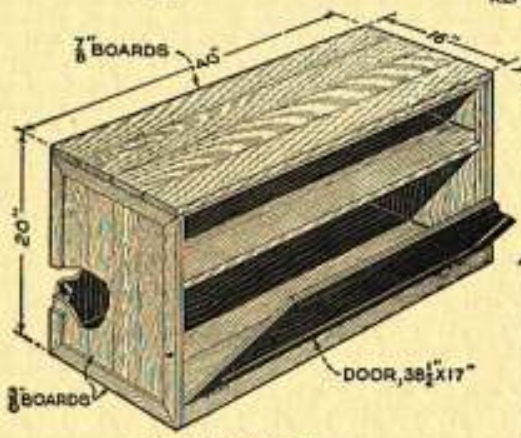
Fig. 14

Figure 11, View of Left and Front Interior, Showing Location of Utensil and Supply Cupboards, Gasoline Stove, and Front Berth; Figure 12, View of Right Rear End, Showing Lockers, Rear Berth, and Refrigerator; Figure 13, Details of Front-Berth Arrangement; Figure 14, Working Drawing of Front Berth



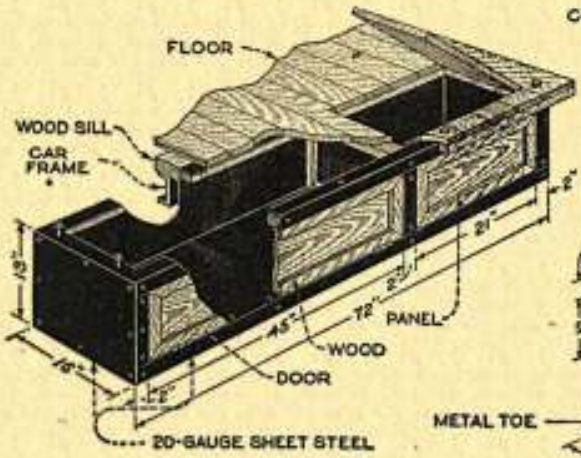
REAR-BERTH DETAIL
Fig. 15

REFRIGERATOR, TABLE, AND CUPBOARD
Fig. 16

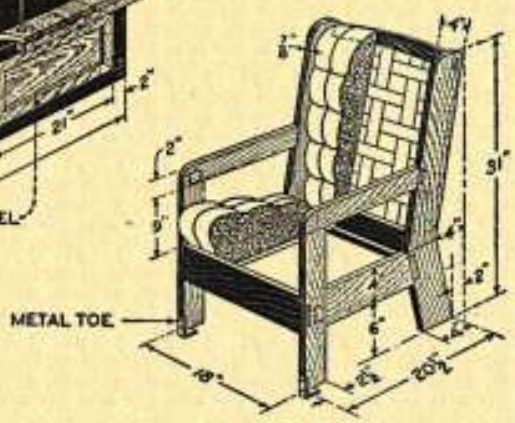


SUPPLY CUPBOARD
Fig. 17

COOKING-UTENSIL CUPBOARD
Fig. 18



DETAIL OF TOOL BOX
Fig. 19

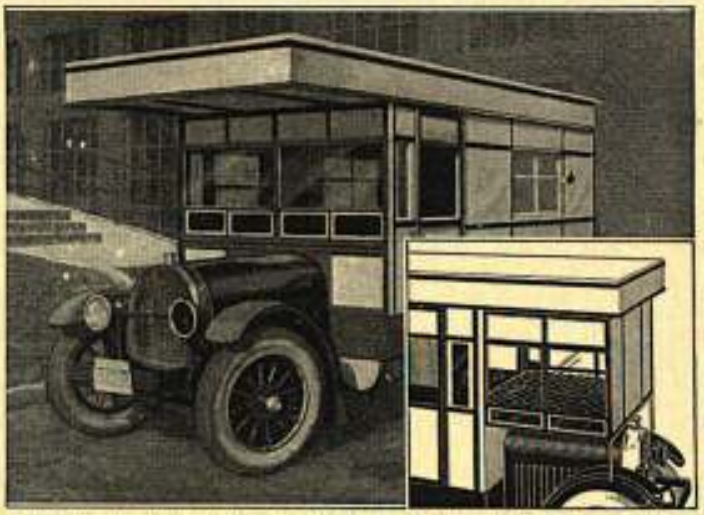


CHAIR, 4 REQUIRED
Fig. 20

Figure 15, Details of Rear Berth; Figure 16, Construction of Refrigerator and Table; Figures 17 and 18, Supply and Cooking-Utensil Cupboard Details; Figure 19, Method of Making Tool Box; Figure 20, Framing and Upholstering of Chair, Showing Method of Fastening Chair to Floor

a so-called sanitary couch. All parts are discarded except those that can be used to make up the two light 2 by 6-ft. frames. After the frame pieces were cut to size they were welded together, although riveting will serve just as well. The springs were then fitted into each section, and the frames fastened together by means of four hinges, as shown in the detail. Two other heavy strap hinges were fastened to the berth and to the rear posts, as indicated, and hooks and studs fitted to secure the two parts together when folded against the wall, or when used at half width. The method of folding is shown in the upper detail. The half mattresses used are fastened to the frames by means of heavy cord. Two heavy chains, attached to the side posts, support the front of the berth, while allowing it to be doubled up when traveling.

The ceiling lockers are shown in Figs. 11 and 12. There are five of these, two at each side and one across the rear. The rear one is 12 in. wide, 3 ft. deep, and 6 ft. long, and easily contains all the spare bedding. The side lockers are not so large, and are used for clothing, and other articles in constant use. The method of framing the lockers is clearly shown in Fig. 6, Part 1; each door is cut from a single piece of ⅜-in. lumber, and the edges bound with lattice strips. This makes a neat but light door. Thumb buttons or catches are used on the ends of each door to prevent rattling.



Left, Car Complete, Ready for the Road, with Berth Housed, and Windshield in Place; Right, Windshield Open, Berth Down, and Duck-Covered Frame in Position for Sleeping

The combined refrigerator and table, Fig. 16, is made throughout of ⅜-in. soft wood. Wide boards were used so as to minimize the number of joints necessary. The entire box, with the exception of the small cupboard, is made with a double skin, ⅜-in. strips being used to separate the boards. The lids are of the same type of construction; this insures fairly good insulation. The ice is set in through the large top door, and rests on a slatted frame at the bottom, just over the drain. The ice compartment is lined with galvanized iron, and the drain pipe is run through the floor. A sliding shelf or rack (not shown) is also fitted in this compartment. The small cupboard is built with but a single thickness of lumber, and has no connection with the main compartment.

A table leaf is hinged to the front of the box, supported by two ⅛ by 1-in. steel braces. The leaf itself is made from a single piece of ⅜-in. poplar, 16 in. wide, and is strengthened by three cleats.

The supply cupboard, shown in Fig. 17, is also made of ⅜-in. stock, except the top and shelves, which are made from flooring boards, to insure strength. The construction is clearly shown in the drawing.

The cooking-utensil cupboard is built to fit the space between the supply cupboard and one of the overhead lockers. Its position is shown in Fig. 11, and its construction in Fig. 18.

The gasoline stove is mounted on the supply cupboard, as shown in Fig. 11. This is the standard type used for home cooking, but several inches are cut from the bottom, and all joints carefully riveted. A vacuum tank is used instead of the reservoir originally furnished. Connection from this tank to the stove is made with 5/16-in. copper tubing; the supply line is connected to the rear gasoline tank, which is filled with high-test gasoline. A small vacuum pump is connected to the vacuum line at the top of the tank, and a few strokes of this will fill the tank with gasoline, so that no fuel is ever handled in open vessels to supply the stove.

The water tank, Fig. 12, is of 30-gal. capacity, and is set on the floor at the

rear of the car. A ¾-in. pipe is run, under the floor, to the rear of the car, where it is fitted with a tee. The side outlet is fitted with a 16-in. length of pipe, the upper end being capped; this is the filler pipe. The other opening in the tee is fitted with a regular faucet; both filling the tank and drawing water are done outside the car. This tank may be made by anyone handy at sheet-metal work; it is made of 20-gauge galvanized iron, and is fitted with a center baffle plate, to prevent splashing. A pressure system, tried at first, proved to be too troublesome.

The tool box, Fig. 19, is made of 20-gauge auto-body steel, over a wood frame. The rear compartment, carrying spades, chains, rope, jack, etc., is reached from the outside. The front compartment, carrying small tools, is reached through a trapdoor in the car floor. In framing this box, the builder should remember that it is to be swung under the floor, and make the frame accordingly.

Four chairs are provided, one of which is shown in Fig. 20. They may be moved to any position desired, but to keep the driver's seat in position while traveling, as shown in the floor plan, Part I, it is furnished with metal toes on the front legs. These slip under staples or metal cleats on the floor, and make the seat quite secure. When the parts are framed and glued together, the webbing is nailed to the back; a small spring is then sewed on at each point where the webs cross. The springs are then tied in the usual manner, covered with burlap, the back padded with cotton batting or hair, and covered with material taken from an old touring-car seat. This can be secured at any car-wrecking house. It is also possible to cut sections of padding complete from old car-seat backs, and tack them in place. While this demands care, it is easier than building up the upholstery from the bottom.

The seat cushions may be made, in a similar manner, from old touring-car seat cushions, the upholstering material being first removed from the springs. A frame is then prepared that will fit loosely into the chair frame, and the old springs are fitted into this, wired, and tied in place, and the upholstering replaced.

The wheel housings must be made very tight, and mounted snugly to the frame, to exclude dirt. They are made of 20-gauge metal, wood-covered if desired, and all joints should be seamed, crimped, and riveted. Felt strips are used in the floor and side joints, coated with gasket cement, and screws used to draw the housings tight. The metal housings are quite strong enough to serve as seats, and cushions can be fitted to them. Dimensions cannot be given that will suit all cars, but the housings shown are 13 by 15 by 42 inches.

Two gasoline tanks are carried, both mounted under the floor, outside the chassis frame at the left front corner. The forward tank is used almost exclusively for the engine, although both are connected so that either may be used if desired. The rear tank carries enough high-test gasoline for a month's cooking, and is connected to the stove as previously described. Both tanks are of 15-gal. capacity.

The construction of the remaining few fittings, such as the instrument board, folding steps, etc., can be gathered easily from the drawings. Many other fittings could be described, but as the necessity for these varies with the builder, they will be omitted. The painting and finishing, which is also a matter of individual taste, need not be entered into here.

To those who contemplate building such a car, however, the following figures will be of benefit. The cost will vary, of course, and some small items, not purchased, are omitted; the main items of cost are included, so that the prospective builder will have a good estimate of his probable expenditure. The tires purchased in this list were put on last season, and are apparently good for at least another season. It will be noted that—as is to be expected—the item of cost is greatest in the case of the chassis. As this item may vary greatly, it is hard to estimate costs. The reader will understand that no labor charges are figured.

BODY AND CHASSIS COSTS

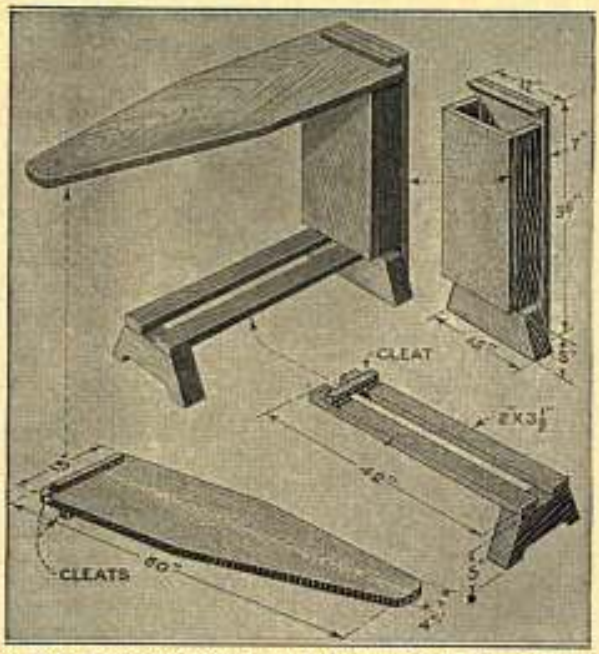
Lumber	$ 59.12	Used touring car	$150.00
Duck	50.10	New wheels and rims	47.00
Glass	5.50	New tires and tubes	160.00
Paint	10.65	Steel	7.00
Steel	9.30	Materials for overhaul	28.05
Hardware	7.60	Shock absorbers	33.00
Shades	12.00		
Linoleum	14.00		
Stove and vacuum tank	11.00	Total	$604.92

Rigid Homemade Ironing Board

A laundress in a northern Michigan resort town, who employs a number of helpers, has found ironing boards of the type shown in the illustration exceptionally rigid and convenient, and, as they may be taken apart in a few minutes, they do not take up much space when not in use.

The fixture consists of three main parts: the ironing board proper, made of 1 or 1¼-in. stock, the upright, and the base. The base is made by nailing two pieces of 2 by 3½-in. stuff, 42 in. long, to a heavy block, 5 in. high, as shown. The upright is made by nailing another 5-in. block to the bottom of a ¾ by 12 by 36-in. board, and then nailing a three-sided box, as shown, to the plank. A space of 2¼ in. is left between the bottom of the box and the block, and the ends of the baseboards are put in position, and marked for the cleat, which should fit snugly against the inner side of the box.

A cleat, with a beveled face, is then nailed on the top of the upright, leaving enough space between box and cleat for the ironing board. Two cleats are nailed to the latter, the top one is beveled to fit under the cleat on the upright, and the bottom one fits against the inside of the box. As there is no support at the middle of the board, skirts and dresses are not wrinkled when slipped over it. The unusually narrow smaller end is an additional advantage.—Herma N. Clark, Chicago, Ill.



A Three-Piece Collapsible Ironing Board That Is Exceptionally Rigid, and Possesses Several Other Advantages over the Usual Type

Preventing Vibration of License Plates

The attachment of the auto-license plate to the front of the radiator by means of a bracket clamped around the filling tube makes it conspicuous, but the vibration of the engine soon causes the plate to loosen and rattle.

To overcome this, and at the same time prevent the vibrating bracket from breaking the seam of the filler tube, one motorist has fastened the lower part of the plate to the radiator, as shown. The bolts pass through the lower holes in the license plate and between the tubes to the inner side of the radiator. A cork, drilled through the center, is slipped on each bolt, between plate and radiator, to absorb the vibration, and tin washers are used between nut and radiator, to prevent damage to the latter.

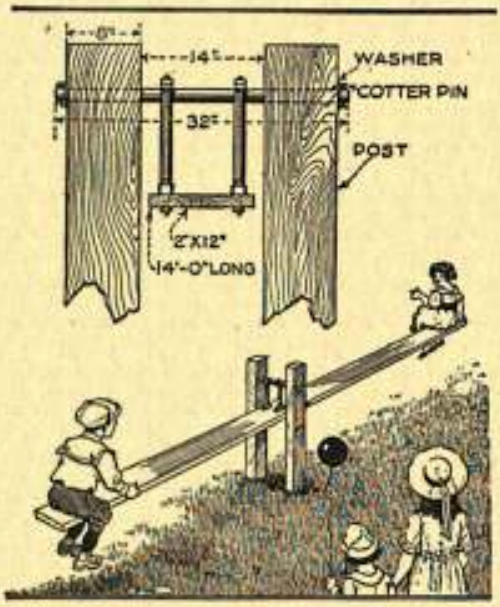
If desired, the corks may be painted black to correspond with the radiator, and they will then be scarcely noticeable.

Using Cut Films in Plate Holder

The cut films that have been placed on the market will probably supersede the glass plate entirely, owing to their freedom from "halation" and their unbreakable qualities. They can be loaded into an ordinary plate holder by the use of a stiff paper card, cut to the exact size of the film, and placed behind each film when loading the holders. The cards should be painted a dead-black color to prevent halation.

A Novel Seesaw

The seesaw shown in the illustration is novel in that it combines a swinging mo-



A Novel Seesaw That Provides Both a Swinging and a Tilting Motion

tion with the usual tilting one, providing the sensations of both a swing and a seesaw.

It is supported on two upright posts, spaced approximately 14 in. apart. Posts, 8 in. in diameter or 8 in. square, are large enough. The pivot on which the plank swings is a length of pipe or steel rod, running in holes bored in the posts, as indicated, about 3½ ft. above the ground. Both ends of the pivot are fitted with washers and cotter pins. The plank is underslung on the pivot by means of two old automobile connecting rods. The plank should be a strong one, of 2 by 12-in. stock, and about 14 ft. long. The "big-end" caps of the connecting rods are removed, and holes are drilled through the plank for the connecting-rod bolts; the plank is then bolted to the rods, and the rods to the pivot. The plank must, of course, be perfectly balanced when suspended from the pivot.—Lowell R. Butcher, Des Moines, Ia.

¶By holding the printing frame containing a negative that is thinner at one end than the other in such a way that the thin end is farther away from the light than the dense part, it is possible to obtain evenly exposed prints.

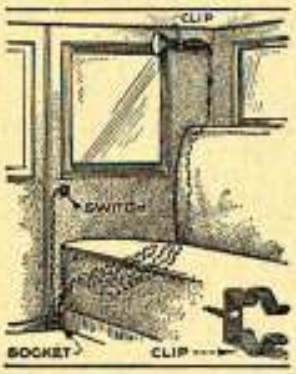
Yardstick for Fishing Boat

Fish laws are becoming more stringent every year, and the fisherman is kept busy with his ruler to avoid arrest for keeping fish that are under legal length. To simplify matters, some fishermen mark off the lengths of various kinds of fish on their rods. However, a simpler method of measuring the fish is to tack a yardstick along the inside of the boat, near the bottom, marking the length limit of each variety of fish on it. When a fish is caught, it is placed against the measure and it can be seen at a glance whether or not the fish may be kept.—Robert Page Lincoln, Minneapolis, Minn.

Combined Trouble and Tonneau Light

The owner of a light sedan car that was not equipped with a tonneau light, found the arrangement illustrated a most convenient one, as it provided a lamp for interior illumination, and one that could be used outside the car as a trouble lamp.

An ordinary portable hand lamp, such as may be purchased at any auto-supply house, and about 10 or 12 ft. of flexible cord, of a color to match the upholstery of the car, are obtained, and connected to a plug and socket fastened on the side wall, near the floor, and close to the rear seat of the car. The surplus cord is tucked away between the seat end and the side of the car, so that it is concealed, except for a short length running from the top of the back cushion to the clip that holds the lamp, near the ceiling. The clip is made from a piece of spring brass, bent as shown, so that the handle of the lamp may be pushed between its ends, and is secured to the wall with a round-head screw. Wires, concealed under the upholstery braid, may be run to a switch placed near the door. The wiring is, of course, connected to the storage battery. In case of trouble, the lamp is easily accessible, and the cord is long enough to reach any part of the car.—George R. Brown, Bridgeport, Connecticut.

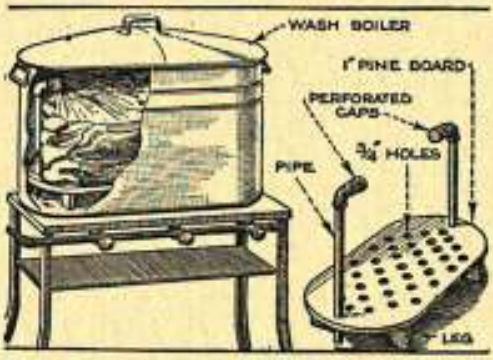


Simple Clothes Washer

A simple but efficient clothes washer of the type shown in the drawing has been used successfully for a number of years for cleaning clothes that will stand boiling.

It consists of a wash boiler, fitted with a 1-in. pine board that is perforated with ¾-in. holes and mounted on wooden legs. A larger hole at each end permits the insertion of two lengths of 1-in. pipe, 14 in. long, which are fitted at the upper end with an elbow, nipple, and cap, the cap being perforated with numerous small holes. The pipe should fit snugly in the holes in the board, and the lower ends, which are open, must be only a slight distance above the bottom of the boiler.

In use, the arrangement is fitted in the boiler as indicated, the clothes are packed in, and water is poured in to a depth not quite sufficient to cover the clothes. As soon as the water boils, the steam confined beneath the clothes forces the water up through the pipes and over the clothes. The water will then seep through the clothes, and in this way there is a continuous circulation, which cleans the clothes in a short time.—G. E. Hendrickson, Argyle, Wis.



A Simple Arrangement for an Ordinary Wash Boiler That Converts It into an Efficient Washer

An Improvised Smokehouse

When it is necessary to smoke small quantities of meat, and no smokehouse is available, one can readily be improvised from a laundry stove, a barrel, and a support such as a sawhorse or wooden box.

One head of the barrel is removed, and a hole, 8 in. in diameter, is cut in the other head near the side, as shown. This hole is fitted over the short length of pipe projecting above the stove, the barrel being supported by the sawhorse and by a brick placed on the stove. The meat is hung, by means of small wire hooks, from an iron rod placed across the top of the barrel. The whole arrangement is placed outdoors in a place sheltered from the wind. Wood or corncobs is used for fuel.—Harold Jackson, Kankakee, Ill.

An Improvised Smokehouse, Consisting of a Laundry Stove, a Barrel, and a Support Such as a Sawhorse or Wooden Box

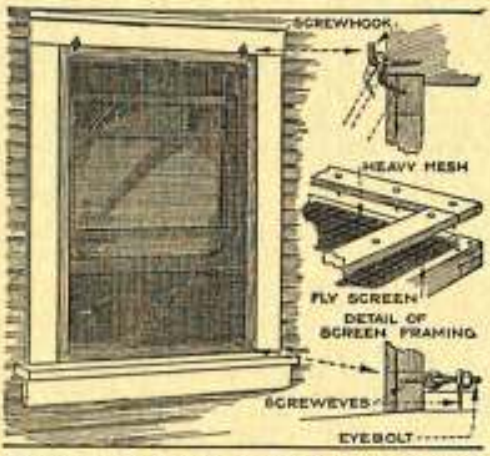
Repairing a Fishing Rod

Many a broken fishing rod is laid aside because the owner does not know how to repair it properly. The ordinary method of repair is to cut the two ends at an angle, and, after applying glue to the surfaces, to join them and wind silk around the joint.

This method can be greatly improved upon by reinforcing the splice with a medium-size darning needle. The sharp end is driven into one piece and the other end is then ground to a point and pushed into the other piece. It may be necessary to drill a small hole in the second piece with a fine drill, in order to force the ground point into it without pushing the needle down farther in the first one. The joint, of course, is glued and wound with silk in the usual way. A splice thus made will be the strongest part of the whole rod.

Fastening Full-Length Window Screens

The drawing shows an excellent method of mounting full-length window screens. The frames are made of oak and must

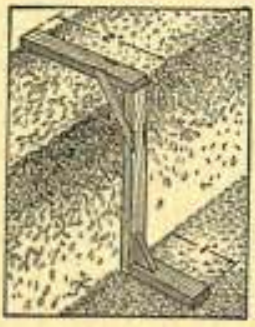


Full-Length Window Screens That can be Attached, Detached, or Swung Open Easily

fit exactly in the window opening. The screen is tacked to the frame in the usual way, light wooden strips being nailed over the edges. If additional strength is necessary, for protection against entrance, a double-screen construction is used: the fly screen and a heavy galvanized-wire screen. The frames are fastened at the top by means of screwhooks on the window casing and screweyes in the screen frame, and at the bottom by means of screweyes and eyebolts, the frames being drawn tight against the casing by means of the eyebolts.

A Gauge for Clipping Hedges

A little time spent in making the hedge-clipping gauge shown in the drawing will go far to improve the appearance of hedge fences by making it possible to clip the hedge uniformly, and without giving it the appearance of careless work.

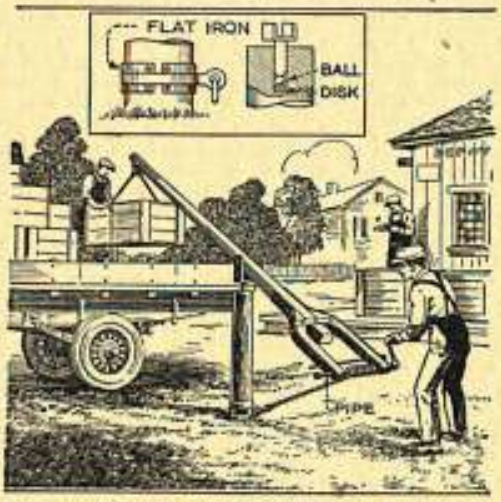


The perpendicular member of the gauge is made from a piece of 2 by 4-in. material, but the horizontal parts may be of lighter stuff, the dimensions to which such a gauge is made depending upon individual requirements. In use, the trimming is begun at one end of the hedge, the gauge being held in an upright position by standing upon the bottom member. Clip as much of the hedge as projects above the top of the gauge, moving it along as the work proceeds.

Simple Farm Derrick

A handy and efficient derrick can be built in a short time from material found on nearly every farm. It consists of a discarded wagon tongue, pivoted on a fence post so as to revolve freely, and fitted with a simple winch for raising the load.

An iron pivot yoke is forged to the shape shown, or one may be built up of flat and round iron. A hole is drilled in the post top to accommodate the shank, an iron disk and a steel ball, taken from an old ball bearing, being set in the hole as shown, to make an easy-running bearing. The yoke straddles the tongue at its balancing point, a bolt being passed through a hole drilled in each. The winch consists of ¾-in. pipe and fittings, and



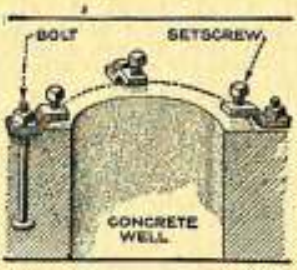
A Simple but Efficient Derrick Consisting of a Discarded Wagon Tongue, Pivoted on a Fence Post and Fitted with a Simple Winch

is arranged as indicated, the winch shaft passing through holes drilled through the ends of the "hounds." One end of a stout cable is securely fastened to the winch shaft, and the other end to an iron collar that is an easy fit around the bottom of the post. This collar is held in position by half collars above and below it, screwed to the post. Hooks or clamps to suit the load are suspended from the

outer end of the tongue. A rod, sliding through the ends of the hounds, near the winch shaft, as indicated, is pulled out to keep the crank from revolving when it is desired to swing the load. With this arrangement it is possible for one man to operate the derrick unassisted.

Clamp Bolts for Pump

The clamp bolts shown in the illustration have been found very useful for bolting pumps to concrete foundations, as the pump can be easily attached or detached without damage to the bolt threads. In setting the bolts in the concrete, they are placed outside of the area covered by the pump base, but close to the holes through which they would ordinarily have been inserted. When the concrete has set, the pump is placed in position, and small steel clamps, bent as indicated, are fastened down by the nuts, so that the ends of the clamps project over the pump base. Setscrews in the ends of the clamps are screwed down against the pump base to hold it in place. To remove the pump, the nuts and setscrews are loosened, and the clamps are turned out of the way.

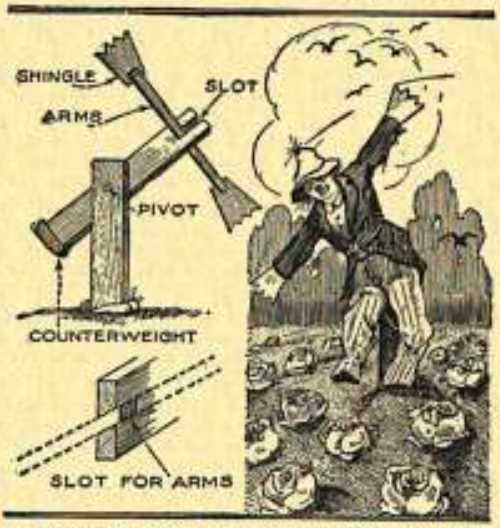


Attachment on Spade Saves Shoes

The illustration shows a simple attachment for a spade, to save the shoes while digging. The attachment consists of a short length of ¾ or ⅝-in. pipe, about 4 in. long, with a hacksaw slot cut through it lengthwise as shown, to permit it to be pushed onto the spade. The slot should, of course, be of such a width that the spade will be gripped firmly. The use of this attachment not only saves the shoes of the workman, but since it is much wider than the narrow edge of the spade, it is not so tiring on the foot.—R. A. Danby, Dannevirke, New Zealand.

A "Live" Scarecrow

Most scarecrows are inefficient because they show no signs of "life." The scarecrow shown in the drawing, however, which is made to swing on a post, and is actuated by the wind, has been found very effective.



A "Live" Scarecrow, Actuated by Gusts of Wind, That Is a Sure Fright for Most Feathered Pests

It is constructed as follows: Sink a flat piece of timber into the ground, allowing it to project about 3 ft. Then pivot a similar piece to it with a loose-fitting bolt, as shown. Saw a slot across the top end of the second piece, at an angle, as shown in the detail, fasten to it a horizontal piece for the arms, and nail shingles, cut to represent hands, in slots on the ends of the arms. Nail a piece of lead or other metal to the bottom end of the pivoted piece, for a counterweight. After the frame is finished, dress the scarecrow up in the desired manner, allowing plenty of play at the pivot.

If the arms are at a considerable angle from the direction of swing, and the gusts of wind strong enough, the upper half of the scarecrow will move backward and forward, causing a bobbing motion that is a sure fright for most feathered garden pests. The intermittent gusts of wind keep the figure in constant motion. The counterweight must be heavy enough to bring the figure upright when the breeze abates, but must not, of course, be heavy enough to prevent the figure from swinging.—L. B. Robbins, Harwich, Mass.

Making Mortise and

by

Squaring around the Rail for the Shoulders of the Tenon

Above, Gauging the Thickness, and at Left, the Width of the Tenon

THE old adage, "well begun is half done," applies particularly to the making of woodworking joints, and since no work can be perfect, errors and irregularities must constantly be reckoned with. It is, therefore, very important that laying out be carefully done, and that the processes follow one another in the correct order.

A simple form of the mortise-and-tenon joint is one in which the sides of the two members come flush, as in the meeting of the stile and rail in a door, and the method of setting out and making this joint is as follows: Surface the best side of the rail stock and mark it lightly with an "X" for an easy identification as the face side. Joint a good edge with the plane, testing for squareness with the try-square, holding the handle of the square against the face side. Mark this edge also with an "X." Next square the other edge and lastly the other side. The natural impulse is to take the four sides in rotation, but this is almost sure to bring poor results. Very accurate indeed is the surfacing of a piece of stock to within 1/64 in. of squareness or parallelism, so that, in squaring in rotation, the errors are continued in the same direction, instead of tending to neutralize one another. Square up the stile stock in the same manner, locate the position of the mortise and mark its length. Measure the length of the rail to its shoulder, and with the point of a knife score a light line around the stock, squaring from face side and face edge. Here again, if the sides are taken in rotation, error is certain to result, and the lines will not meet at the last corner, especially if the square happens to be a little out of true.

Set a marking gauge for one-third the thickness of the stock, and guiding on the face side, gauge a line on both edges and end to the shoulder marks. With the same setting, mark one side of the mortise. Then set the gauge for two-thirds the thickness of the material, and repeat. The thickness of the tenon and width

Tenon, and Dado Joints

Edwin M. Love

Cutting the Thickness of the Tenon with the Ripsaw

Above, Ripping the Tenon to Width, and at the Right, Sawing Off the Cheeks

of the mortise are now determined.

The wisdom of gauging both pieces from the face sides is apparent, since, if one is thicker than the other, the good sides will come flush in the joining, and excess stock can be removed from the back. Moreover, the width of the tenon and the mortise would be dependent on the thickness of the material if gauged from both sides. Knowing the width of the tenon and its position on the rail, gauge both edges from the face edge. This completes the laying out.

Clamp the rail vertically in a vise and, with a backsaw or ripsaw, cut the cheeks or sides of the tenon, "splitting the line," that is, leaving half the line on the tenon, the kerf being in the waste wood. If there is any tendency for the saw to "run," or cut to one side, due to having longer or sharper teeth on one side than on the other, cut alternately from one edge and then the other. If the mechanic is right-handed, the tenon is preferably to the left of the saw, so that the line is kept freely in sight; though, of course, when sawing alternately from one edge to the other, the tenon must sometimes be at the right. Rip the edges before cutting the shoulders, thereby retaining the guide lines. Crosscut the side shoulders and then the edges. The broad side faces are much more conspicuous than the edges, so that, if any undercutting occurs, it should be on the edge rather than the face, where it might be were the edges cut first. It is easy to cut the thin edge stock away without marring the faces.

Narrow mortises are best hollowed out with a chisel. Use a full-width chisel, and start cutting a short distance inside of the end mark, since the wood crushes back behind the flat side of the chisel, and if the edge is placed on the line, the mortise will be too long. This is an important point where the end of one board is being housed into another, as there is then no projecting shoulder to hide the mortise edge. Make cuts across the grain every ¼ in., striking the chisel handle with a

mallet, or if this is lacking, with the side of the hammer head, the carpenter's usual method. Having chipped to the end of the mortise, rake out the chips and repeat until the proper depth is reached. Avoid prying against the mortise end, as this bruises the corner.

The tenon should always be a little shorter than the mortise depth, not only to make sure that it will not interfere with the closing of the joint in assembly, but to provide room for excess glue, which, if unable to escape, would split the piece.

Wide mortises may be bored out with brace and bit and smoothed with a chisel, the work being supported on the bench or in the vise.

Before assembling the joint, coat both the cheeks of the tenon and the sides of the mortise with glue, for in no other way is it possible to be certain that the full gluing surface is utilized. The ends of the mortise and the tenon absorb glue so rapidly that, unless they are previously sized, they cannot be relied upon to contribute to the strength of the joint.

The common gained or dado joint is especially useful in drawer construction, or for supporting shelves in cabinets. This is really a form of the housed joint, with the mortise lying across the grain, receiving the full thickness of the other piece.

In the common form, the groove is cut the full width of the material. Surface the stock and mark the face edge and side

Cutting the Edges of the Tenon with the Backsaw

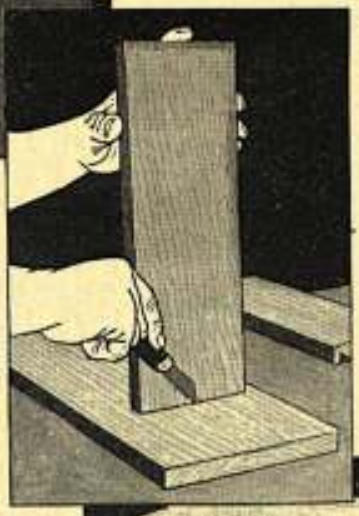
Above, Chiseling Out the Mortise; Left, Making the Mortise by Boring

as before. Having located one side of the groove, use the end of the mating piece as a pattern for marking the width, or, if this is not practical, simply measure it. Gauge the depth, which should not exceed one-half the thickness of the stock, and cut both sides with a backsaw or fine-toothed finishing saw, keeping the kerf in the waste wood. If one is skillful with the saw, no guide other than the thumb of the left hand is necessary; but the average amateur will find it convenient to tack a straight strip of wood along the line against which to hold the saw.

If the dado is wide, chisel a slope on each side in the waste wood before chipping out; otherwise, holding the chisel flat, cut out nearly to finished depth, and smooth the bottom to the line. Use the hand to force the chisel, or, if the wood is tough, use a mallet or the side of the hammer head.

In assembling, if careful work has been done, the mating board should slide snugly in without looseness or crushing The use of a "dutchman," or wedge, is to be frowned at, and is permissible only for painted work. Since all parts of the joint present end grain on one side, this wood must be sized if the joint is to be glued.

Sometimes the piece dadoed in does not come flush with the other. In this case make a blind dado, which is the type shown in the illustrations, chiseling



Above, Trimming the Mortise after Boring; Right, Marking the Width of a Dado

out a mortise at the blind end, so that a stroke can be made with a saw in cutting the sides. The blind dado can also be used with good effect with a flush shelf by notching the front edge of the latter to fill the space beyond the blind end.

The commonest fault of the amateur is that of trying to trim a tenon with a chisel. This is very bad practice. The tenon should always be cut to exact size with the saw, by "splitting the line," and experience seems to prove that if a man is so inexpert that he cannot do this he will only make matters worse by resorting to the chisel, which, in this case, is a more difficult tool to handle. Moreover, the guide lines are gone when the cheeks are cut away. It is true that some books recommend cutting a little distance from the line and planing and chiseling to size, but most authorities frown on the practice, and a mechanic would never think of doing such a thing. Occasionally, of course, any man will run off a trifle, and might touch up the tenon with the rabbet plane, but the tenon should never be started with the intention of finishing it in this way. Sometimes one finds an amateur who trims a rabbet shoulder across the grain with the chisel, and this is worse still. If the saw kerf is made inside the line, the tenon will be made too thin, and will be a loose fit. If it is made on the line, the tenon will again be a trifle on the thin side, but if made as directed before, by splitting the line and keeping the kerf in the waste wood, the tenon thickness will be correct.

In sawing across the grain, it is more than ever necessary that the saw cuts be made in the waste, as the recess formed between the saw cuts in making a halved joint will receive a piece of wood that is already the full width of the stuff being used. In other words, the piece of wood that will go into the recess cannot be made wider to make up for any inaccuracy caused by careless sawing, whereas, should the tenon be cut a trifle narrower than intended, the mortise can be cut accordingly.

Left, Guiding Saw with Strip in Cutting a Dado; Below, Chiseling the Waste Wood from Dado

Removing Rust Stains

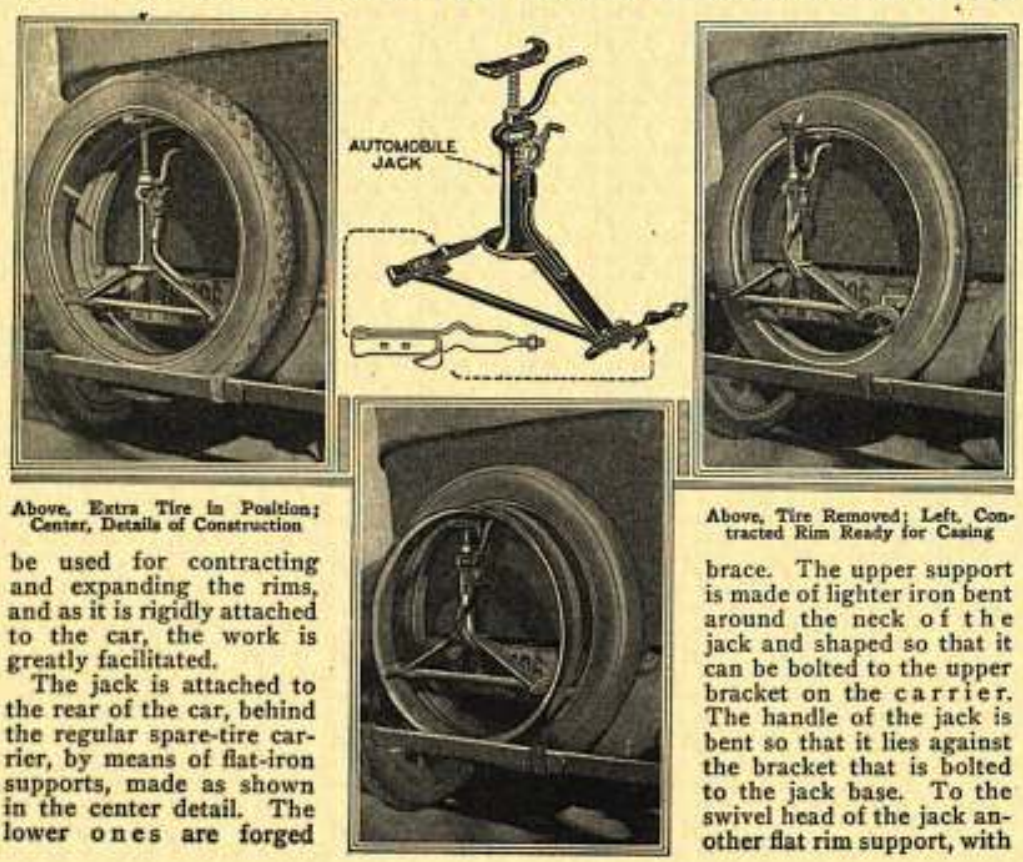
Rust stains on the family wash are a frequent source of irritation to the busy housewife, while in many textile plants they also cause a loss by producing "seconds," etc. The stains may be the result of a number of sometimes entirely unsuspected causes. Some water contains enough iron in solution to produce a rust mark on white materials when it is used with a soap having an excessive amount of alkali. Other water is normally free of iron, but fungus growths containing iron may develop in the water mains, become dislodged with any increased flow of water, and thus carried into the consumer's premises. Again, the bluing used after washing may contain iron. This type of

bluing is entirely satisfactory provided the clothes are thoroughly rinsed, but if just a little too much soap or washing compound remains on them, the blue will develop a red iron mark. Frequently one may neglect wiping off a wire clothes line before hanging out the wash. There are many other causes of rust marks in the home, as, for instance, the various iron parts of washers, wringers, etc., but those given are probably the most common. In the ordinary household there is not usually enough difficulty of this kind to lead to much experiment on methods of removal, but in some factories it becomes an item of more interest.

Recently the British cotton-industry research association conducted extensive investigations along this line and found a method which they considered good enough to recommend. They suggest sponging the mark with a cloth pad saturated with a cold solution containing 1 oz. of oxalic acid and 1 oz. of acid potassium fluoride in 1 qt. of water, until the mark disappears. The excess of sblution should then be washed out of the fabric with plenty of clean water, and finally the entire wet space should be dipped into dilute ammonia water to neutralize all traces of the chemicals used. When this treatment is used with care, the rust mark can be removed successfully and, according to the association's report, the most delicate white fabrics will not be injured.—Chas. E. Mullin, Camden, N. J.

Jack Makes Tire Carrier, Contractor and Expander

The accompanying photos show how an ordinary screw jack may be adapted to form a carrier for an extra tire on the car, making it possible to carry two tires instead of one. In addition, the jack may be used for contracting and expanding the rims, and as it is rigidly attached to the car, the work is greatly facilitated.



Above, Extra Tire in Position; Center, Details of Construction

Above, Tire Removed; Left, Contracted Rim Ready for Casing

The jack is attached to the rear of the car, behind the regular spare-tire carrier, by means of flat-iron supports, made as shown in the center detail. The lower ones are forged round at one end and threaded to take nuts that bind them to the frame of the regular carrier. At the other end they are bent to form seats for the rim and the ends bent back to make pointed hooks. The supports are bolted to another flat-iron bracket which is riveted to the base of the jack, and strengthened by means of a pipe brace. The upper support is made of lighter iron bent around the neck of the jack and shaped so that it can be bolted to the upper bracket on the carrier. The handle of the jack is bent so that it lies against the bracket that is bolted to the jack base. To the swivel head of the jack another flat rim support, with

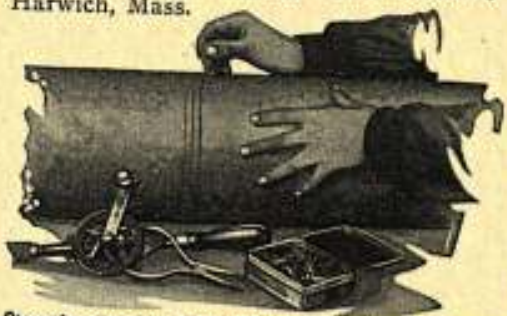
a hook similar to the lower ones, is riveted. When it is necessary to remove a casing from the rim, the hooks are engaged with the edge of the latter, and the screw of the jack is run down, causing the rim to contract. When a casing is to be put on a contracted rim, the latter is placed on the jack, the casing put in position, and the screw run up, thus expanding the rim and pressing it out against the casing. A few more turns of the screw then locks the rim firmly in place on the carrier. The ratchet wheel of the jack may easily be locked to prevent the theft of either tire. —Mrs. Hassie Terrell Hixon, Auburn, Alabama.

Treating Stucco before Painting

Paint usually peels off stucco very soon, especially if the latter is new. To prevent this, the stucco should be coated with a solution consisting of 20 parts of sulphate of zinc and 80 parts of water. This will cut the caustic effect of the lime in the stucco. After this coat has dried, the paint is applied and it will then stick permanently.—L. H. Georger, Buffalo, N. Y.

Holding Furnace-Pipe Sections

Those who are unfortunate enough to have a long run of smoke pipe from the furnace to the chimney, probably have experienced trouble by sections pulling apart when assembling the pipe. The writer solved this difficulty with a few cotter pins. Two sections were put together at a time. Two small holes were drilled opposite each other at the joint through both pipes. A cotter pin was spread wide apart and the ends then squeezed together with the fingers and inserted into the hole. Sections thus assembled will not part except by lifting out the cotters. By numbering each section and drawing a line across each joint with stovepipe enamel the sections can always be reassembled in exactly the same relation.—L. B. Robbins, Harwich, Mass.



Stovepipe Sections Held Together Securely by Means of Small Cotter Pins

Saving the Grindstone

Grindstones become soft if left standing in water. To prevent this trouble, a small felt-covered wheel can be arranged to be partly submerged in the water, and

Small Felt-Covered Wooden Wheel Partly Immersed in Water Keeps the Grindstone Moist

at the same time the portion above the surface of the water should be kept in tight contact with the edge of the grindstone by means of a coil spring as shown.

Cleaning Rolled Seams on Tubs before Soldering

When galvanized-iron tubs and pails with a rolled seam at the bottom develop a leak at this point and the joint is heated for soldering, any moisture, soap or grease in the joint will run out and prevent the solder from sticking. To overcome this apply the flame from the outside and below, and heat the seam until it appears dry and stops smoking; then clean the surfaces about the seam on the inside. When the soldering now is done in the usual way, there will be no trouble. If the soldering torch is held on the outside of a thin sheet of galvanized iron, the inside surface will be burned black, but by applying the flame to the thick seam, this is less likely to occur.

¶ To prevent the absorption of moisture by the salt in salt-shakers during damp weather, place a glass over each shaker, when not in use.

Railroad Lantern Used as Stove

An ordinary railroad lantern can be used as a small stove on which the trainman can make his coffee. In converting the lantern to a stove, a 1-gal. tin pail, or similar can of suitable diameter, is substituted for the regular glass globe, nail holes being punched in the side near the bottom and the top as shown, and a hole cut in the bottom. The can is then placed, upside down, over the wick, and the stove is complete. If a pail is used for a coffee can, as shown in the drawing, small holes are punched in the cover or top to permit the steam to escape.—A. kaMont Burst, Washington, District of Columbia.

Strong Turnbuckle Made of Pipe and Fittings

The illustration shows a homemade turnbuckle consisting of pipe and fittings. A piece of ½-in. pipe, about 6 in., or so, long, is drilled through the center for a "tommy." One end of the pipe is threaded for a cap, and the other end is tapped for a plug. A 5/16-in. hole is drilled through the center of the cap, and a swivel, made of 5/16-in. iron rod and bent to the shape shown, is pushed through this hole, the end being spread over on the inside of the cap. After screwing the cap into place tightly, both cap and pipe are pinned together to prevent unscrewing. A plug, screwed in the other end of the pipe, is drilled and tapped for a ⅜-in. threaded rod, which is also bent at the end to form a ring.

A Darning Kink

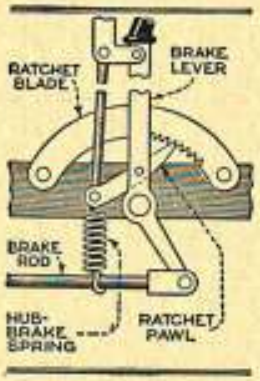
By enameling one half of a darning "egg" black and the other half white, it will be found that the strain on the eyes incident to darning will be relieved considerably. When dark-colored stockings are mended the white part of the egg is turned upward, contrasting with the material, and in the case of light-colored stockings, the black part is used. The fatigue of the work is thus decidedly lessened.—C. L. Meller, Fargo, S. D.

Grooving File for Golf Clubs

It does not take long for the face of a golf driver or brassie to wear down, but it can be quickly restored to its former condition by the use of the tool illustrated. This tool consists of eight hacksaw blades, bolted together at both ends with stove bolts, the cutting edge of every other blade being reversed as shown in the end view. The method of use is obvious.—F. S. Roots, Fall River, Mass.

Spring for Hand-Brake Pawl

The pawl spring used on the hand brake of a light car frequently breaks, and this should be remedied immediately, as, otherwise, the car may run forward when the engine is cranked. A good repair can be effected in a few moments in the manner shown. Instead of replacing the usual spring, which consumes considerable time, one of the coil springs used in a rear brake shoe is hooked over the brake rod and the ratchet-pawl pin, as indicated. It is not necessary to drill any holes.

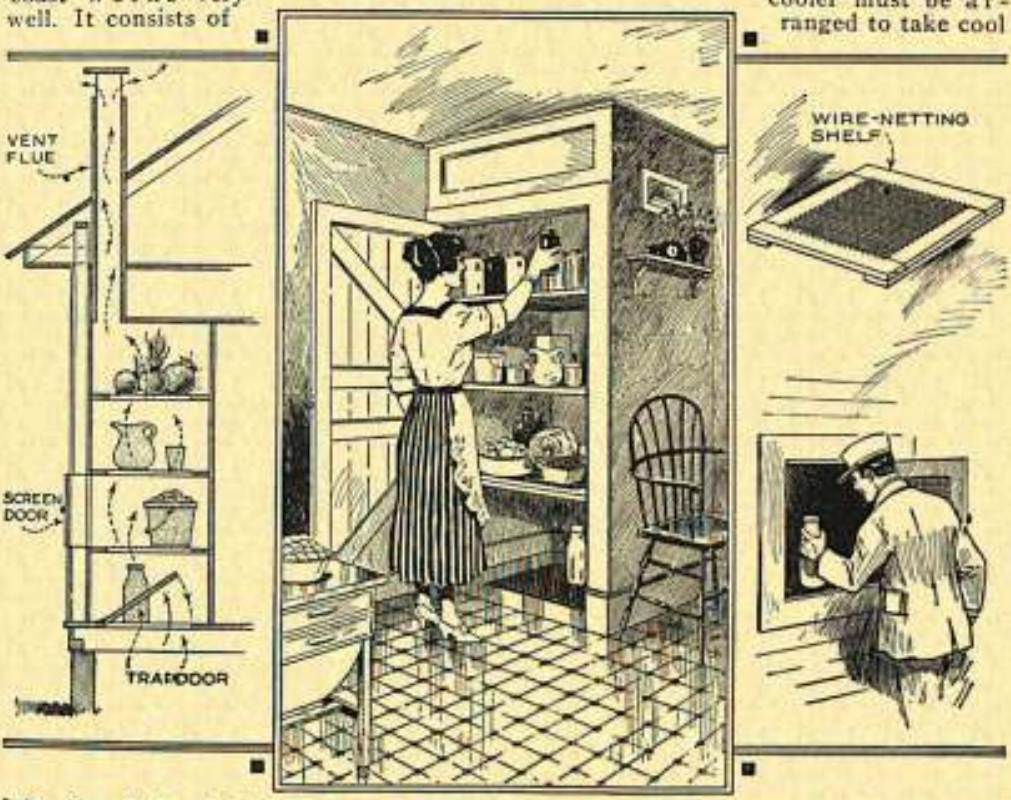


The "California Cooler"

BY W. DRAPER BRINCKLOE

THE "California cooler" is well known on the Pacific coast, and should be better known elsewhere in the country. It is used to keep vegetables and other perishable foodstuffs fresh and sweet, and in the cool climate along the sea coast works very well. It consists of nothing more than a simple closet, fitted with screen-wire shelves, with a small screened opening in the house wall, near the bottom, and another at the top. Fresh air enters the closet through the lower opening, and passes out of the upper one; the constant current of air is supposed to keep the food fresh, and, as a matter of fact, does so quite successfully.

For use farther east, however, this simple construction must be modified; as the outside air is often very hot, the cooler must be arranged to take cool air from the cellar, and to make it pass through fairly rapidly.



Left: Cross Section of California Cooler, Showing Arrangement of Trap and Screen Doors, Shelves, and Vent. Right: Detail of Shelf, and Appearance of Screen Door and Casing

A closet, of matched boards and of any size convenient, is built in one corner of the kitchen, on an outside wall. From the top, a sheet-metal or wooden flue is run above the roof, as shown in the left-

hand drawing. This is better than merely cutting a hole in the side wall, as, when the flue is heated by the sun, the air within it rises more rapidly, drawing the cool air in at the bottom. The vent is usually made 4 in. in diameter or 4 in. square; in the drawing, it is shown passing through a low attic, but in my own bungalow it runs up through a second-story room, behind a wallboard partition.

Near the bottom of the closet, an opening, about 8 in. wide and 12 in. high, or any other convenient size, is cut through the wall. This is cased in, and a small screen door fitted in place with spring hinges. In the bottom of the closet, an opening is cut through the floor, and fitted with a small trapdoor, about 12 in. square. The trapdoor opening, as well as the opening in the vent, should be covered with fly-screen wire.

The shelves are made of heavy galvanized cellar-window wire netting, tacked to 1 by 2-in. wooden frames, and resting on cleats screwed to the inside of the closet.

In cool weather, the trapdoor is kept closed, and the air taken from the outside. When the outside air becomes too hot, the trapdoor is opened, and the screen-door frame filled with a piece of wallboard or thin wood, cut to fit nicely and held in place by turn buttons.

The cold closet will not do away with the refrigerator by any means, but I have found that for a large part of the year it enables one to get along without ice very well. If milk bottles are wrapped in a wet cloth and set in the cooler, the current of air causes rapid evaporation and keeps them quite cold. Fresh meats are put in closed kettles, and the kettles wrapped in wet cloths; fruits and vegetables do not require this, as the cellar air keeps them cool enough.

Milk and grocery deliveries can be made through the outer door, and for the milk especially this is a decided advantage, as it is placed in a cool place at once, not left in the hot sun as usual. All told, the constructor of a California cooler will not regret it.

Emergency Lens Shade

All motion-picture cameras are provided with lens shades, which is the reason that the operators can obtain such effective scenes "shot" against the sun. Amateur photographers will profit by using such a shade. One can easily be made from a card or piece of paper of a dark color, preferably black. Cut a piece to suitable size and make a slit in the end equal to exactly half of the circumference of the lens tube. Open the slit and slide the shade over the lens as shown. To cover the entire lens, use two cards.

Bucket Used as Heater

During cool weather in spring and fall, when it is not necessary to use a furnace, but some heat is necessary to take the "chill" from the room, oil and gas cookstoves are frequently used. Although these provide considerable heat, it does not radiate properly, but rises to the top of the room. This difficulty can be avoided by placing an ordinary metal bucket, with holes punched in the bottom to permit air circulation, in an inverted position over the burner. The heat given off by the stove will then radiate from the sides as well as the top, causing a more even distribution of the warmth.—Joe H. Hudner, Bautista, Calif.

Fly Exit on Screen Door

Despite care in keeping screen doors shut, flies will gain entrance, and will collect on the inside of the screen where they have no means of escaping until the door is opened and they are driven out.

If a slot is cut or planed along a short length of the top edge of the screen-door frame, as shown in the illustration, the flies, which constantly crawl from the bottom to the top of the door, will be attracted by the strip of light and will crawl through the slot to the outside, but as the inside of the slot is not so well lighted, they will not return. It is still better, if possible, to cut a few slots where the screen joins the frame, which can be accomplished with a little more trouble. The planed surface is then painted a dark color.—Harold E. Benson, Boulder, Colo.

Soldering with Alcohol Lamp

A very convenient method of soldering the wire connections on radio sets, or on any other delicate work, is to use a piece of copper wire heated by the flame of a small alcohol lamp. The lamp can be purchased for about 40 cents at any physicians' or dentists' supply house.

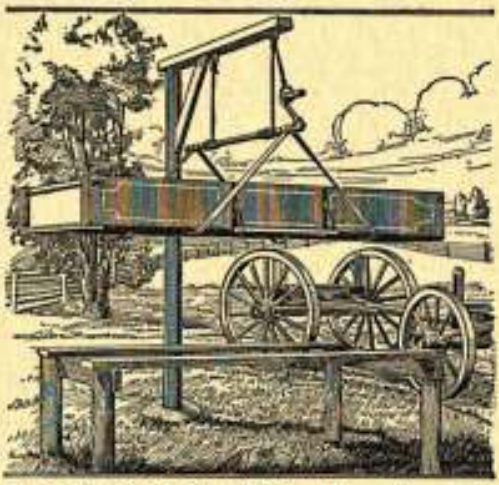
The length of copper wire, which should be No. 14 gauge, is thoroughly cleaned, twisted around the neck of the lamp with a pair of pliers, and bent to pass through the upper part of the flame, leaving about ¾-in. of the end projecting beyond the flame. This end is tinned in the usual way, and used as the soldering bit. Experiments will determine how far the tip must extend from the flame to obtain the best results. The device insures a hot point of constant temperature, and because of its size, it is much more efficient than a soldering iron for small work.

Saving the Gatepost

Careless drivers often neglect to allow sufficient clearance between the wagon and the gatepost when driving in a large load, and as a result the post is often struck and loosened, or it may even be broken. To prevent this, a farmer mounted an old wagon wheel on a 2 by 4-in. timber and spiked it on the top of the fence post, so that the tire projected about 3 in. beyond the post, as shown. The wheel was bolted to the timber, a thimble from an old wagon axle being used for the wheel to turn on, and a large washer and nut on the upper end prevented the wheel from being lifted up. When a load passes through the gate too close to the post, it strikes the wheel, and the wheel keeps it clear of the post.

Easily Made Wagon-Box Derrick

On the average farm it is seldom that more than one set of wagon trucks is kept for the different boxes and racks, and this naturally necessitates frequent changes to meet the seasonal requirements. The task of lifting the boxes is usually beyond the strength of one man without some mechanical assistance. For this reason the revolving derrick shown in the illustration was designed. With it one man or boy can easily remove a box or rack from the truck and place another in position.



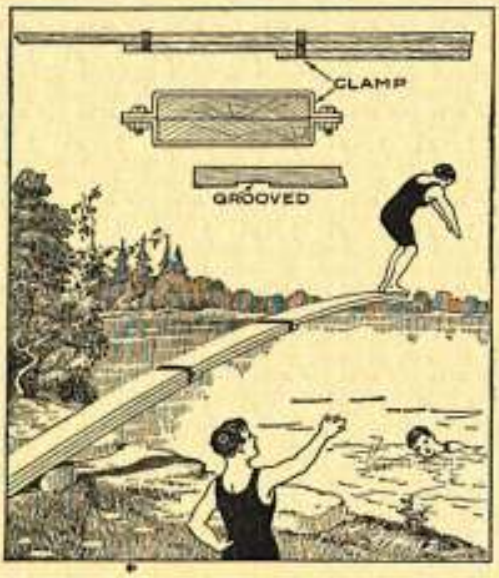
Simple Derrick Used for Hoisting Wagon Boxes and Racks: It can Easily be Operated by One Man

The standard of the derrick is a 6-ft. oak post, set in a cement base; the post fits loosely in the base so that it can be easily turned, the socket being filled with hard grease to facilitate swinging. A 6-ft. arm projects at the top and is supported by a stout brace. Two strong ropes are attached to the arm with eyebolts, as shown, and a windlass, made of 1¼-in. pipe, is suspended from the ropes, the ends of the ropes being securely attached to holes drilled in the windlass. The hooks are made of heavy tire iron, bent and sharpened at the lower ends to hook under the box, and with eyes forged in the upper ends to hang on the pipe. A short length of rope with an iron ring is tied to one of the eyebolts, and is used to hold the pipe crank, to prevent it from unwinding.

¶A waterproof glue is made by dissolving gelatin in hot water, to the consistency of thick cream, and adding a tablespoonful of acetic acid to each pint.

Making a Diving Springboard

A springboard for the swimming pool or the "old swimming hole" that actually has "spring" to it, is made by connecting



A Highly Satisfactory Diving Springboard Made by Bolting Three Planks Together

three boards somewhat after the manner in which the leaves of an automobile spring are assembled. In this way the spring obtained is much greater than that produced by any single board.

The top board is the longest, the next is about 3 ft. shorter, and the lowest one is about 4 ft. shorter than the second. The inner ends of the boards are set flush, and all three are fastened together throughout with screws, and at the points illustrated with iron clamps, which should be as unyielding as possible and made with sufficient space between the ends so that the boards can be clamped together tightly. The clamps are fitted into grooves cut on the underside of the bottom and middle boards, but the upper surface is not countersunk.—Robt. P. Lincoln, Minneapolis, Minn.

Turf-Cutting Tool

A single-bladed chopping knife can be made into a turf cutter for edging lawns around walks and flower beds. It is only necessary to remove the wooden handle with which the chopper is provided, and to drive the tang into a longer handle, which may be the handle from an old spade, or similar implement.

Using Badly Worn Phonograph Records

Some of the older phonograph records in every collection have become concave, and, from constant use, much of their original quality has been lost. One of these can be used to improve the playing of other records, however. To the convex side of the record, four felt or leather washers, just thick enough to keep the record out of contact with the turntable, are glued at equal distances. The record, so fitted, is then placed on the turntable, and the record to be played placed on top of it. This arrangement will slightly increase the volume of sound and also bring out the low tones more distinctly.—James E. Noble, Portsmouth, Ontario.

Plug-Type Aerial-Ground Switch

In order to use a radio set without running a permanent wire into the house from the aerial, an arrangement similar to the one shown in the drawing can be used. The lightning switch, which is of the single-pole, single-throw type, is opened or grounded as the plug is attached or removed. The switch is arranged on the outside of the building.

A hole is drilled through the window casing or wall, in line with the switch blade; this hole should be $^{13}/_{16}$ in. in diameter and a $^{3}/_{4}$-in. porcelain insulating tube inserted into it. A second tube, $^{3}/_{8}$ in. in diameter and 2 in. longer than the first, is fitted with a strong spring switch clip small enough to pass through the larger tube. The wire running from the clip through the smaller tube should be regular high-tension automobile-ignition cable, and a flexible cord, which reaches to the instruments, is soldered to this. It

will be seen that when the inner tube is pushed through the outer one from the inside, the clip will make contact with the switch blade and at the same time push it out, breaking the ground connection. Upon pulling the plug in, the aerial is automatically grounded, but there is no metallic circuit into the house. A stop is provided to prevent the switch blade from being pushed out too far.—Edwin J. Bachman, Fullerton, Pa.

How to Make a Bed of Boughs

Thousands of men who camp in the woods sleep on twig beds, but it is safe to say that comparatively few know the proper way of making such a bed, so that it can be slept on comfortably. The mere cutting of a mass of branches and covering it with a blanket does not make for that enviable comfort so much talked of by old campers. A single thick branch will cause a sleepless night, not to mention what an armful unevenly distributed will do. There is only one way of making a twig bed that is worth while. The twigs selected should have stems not thicker than ¼ in., while smaller ones would be still better. Take a canvas or blanket, go to a tree, cut off a supply, and bring it in. Two men working at the job will soon have the bed ready for the night. The head of the bed should be higher than the foot, and the drawing shows how the twigs should be arranged at an angle, with the butts of the stems resting on the ground. In this manner the thick matting of the twig tops will keep the body from coming into contact with the sticks. When completed, stretch the covering blanket over the boughs. It should be mentioned that it is a good idea to fasten straps or cords at the four corners of the covering canvas or blanket; these can be tied to the tent pegs and drawn tight. Balsam-fir and cedar twigs are the best materials to use for the purpose; branches from most other trees are practically useless.

Basket on Pole Hives Bees Safely

A Wisconsin beekeeper, whose general farm work allows very little time for capturing the swarms that escape his

An Effective and Timesaving Device for Hiving a Swarm of Bees That have Escaped

apiary, has found the method illustrated both easy and quick. The device used for the work, he claims, has saved him many hours of labor as well as numerous painful stings.

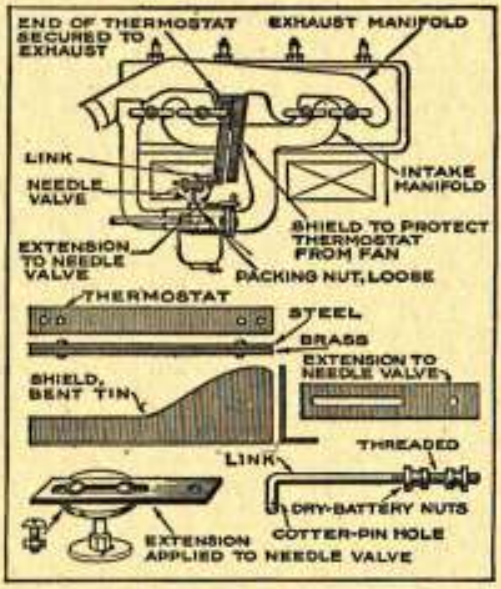
The device is simple to make. It consists of a circular rim and a supporting fork made of ¼-in. iron rod, and a cone-shaped screen-wire basket attached to the rim as shown. A stout cane fishpole is used for a handle, making the device light and easy to handle.

When the bees swarm, they usually alight in one of the trees of the orchard, and often at such a height that it is almost impossible to capture them. As soon as the swarm is located and fairly settled, the basket is raised under the swarm and shaken so that most of the bees will drop into it. Of course, many bees escape but they will return to the swarm and cluster on the outside of the basket. When all is quiet again, the basket is lowered in front of an empty hive and the bees are induced to enter their new home without much trouble. —G. E. Hendrickson, Argyle, Wis.

¶A wastebasket, fastened to the side of the desk chair, keeps the basket in one place and prevents upsetting.

Thermostat Control for Carburetor Needle Valve

By adding a simple thermostat the needle valve of an automobile carburetor may be regulated automatically without



An Automatically Controlled Carburetor Needle Valve That Opens and Closes as the Engine Heats or Cools

attention on the part of the operator. The thermostat operates an extension on the needle valve, opening it slightly when the engine is cold and closing it when the engine warms up. The thermostat is made by riveting two pieces of dissimilar metals together, in this case strips of brass and steel. Metal, about ⅛ in. thick by ½ in. wide, is suggested. Owing to the fact that one of these metals expands considerably more than the other when heated, the thermostat will form the arc of a circle. By fastening one end of the thermostat securely in the manner shown, the opposite end is made to operate the carburetor.

On a common type of light car the upper end of the thermostat can be fastened underneath one of the manifold clips, and the lower end connected to the needle valve by an extension rod, fitting into an adjustable extension fastened to the top of the needle-valve wheel. By making the connecting link adjustable, various settings can be tried until the best effect is obtained. With the light-car engine, the needle valve should be opened a quarter turn for starting, and then turned back as the engine becomes warm; and approximately the same rule will apply to similar types of carburetors. With a heat-controlled regulator of this type, the thermostat must be shielded from the direct blast of the fan by means of a shield, cut from a piece of tin and fastened under the thermostat.

Breaking Force of Water from Hose

A great disadvantage in irrigating a garden with an ordinary hose is the washing away of the ditch or furrow banks owing to the force of the water as it issues from the hose. This trouble can easily be overcome by taking two cans, one somewhat smaller than the other, and arranging them as shown in the illustration. A hole is made in the bottom of the larger one, to receive the end of the hose, and the small can is placed inside the larger, with its open end toward the hose. Both cans are fastened together by means of a wire, run through them as shown. In use, the arrangement is placed in a ditch, the hose is fastened in place, and the water is turned on. The water strikes the end of the small can, is deflected back, and issues in a slow, broad stream from the opening between the cans.

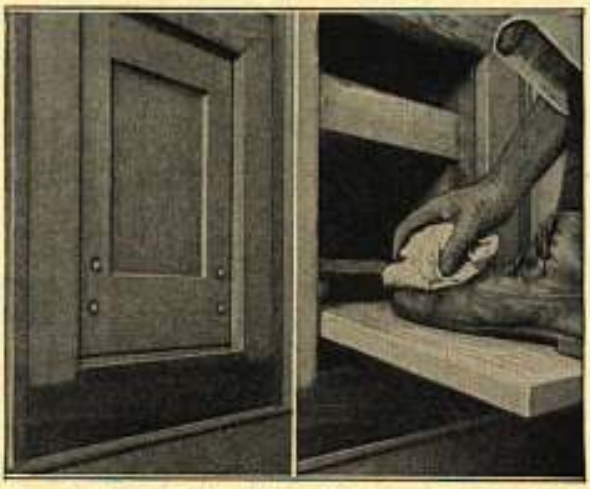
Nonslip Feet for the Tripod

Those who do much photographing in the home experience considerable trouble in keeping the tripod from slipping on linoleum or hardwood floors. By pushing an ordinary fuller ball from a faucet over the point on each leg of the tripod, no further trouble will be experienced, as the rubber balls will hold the tripod securely on any surface.—K. H. Hamilton, Chicago, Ill.

Handy "Built-In" Shoe-Polish Box

Convenience and usefulness are combined in the "built-in" shoe-polish box shown in the photograph. It provides space for keeping the polishes and brushes, and when opened, serves as a footrest as well. Being small in size, it can be installed in any suitable place in a wall, as it slips between the studs, which are usually spaced 16 in. apart.

Build the box of 1-in. stock, 12 by 18 in. inside measurements, gaining the top and bottom pieces into the jambs. The depth should be such that after the back, which is made of panel veneer or other suitable thin stock, is nailed on, the front of the frame will be flush with the plaster when the box is set in place. The shelves and partitions indicated in the photograph should be set back from the front edge of the frame ⅜ in. so as to form stops for the door, which measures 1⅛ by 12 by 18 in.



Convenient Box for Shoe Polish and Brushes: The Door Opens to Serve as a Footrest While Polishing

The door pivots on a piece of ½-in. gas pipe, 13¾ in. long. The ends are carried in holes bored in the side jambs, 2½ in. from the bottom and 1½ in. from the front. Ordinary pipe straps screwed to the inside of the door act as hinges. A stop must be so placed inside the frame that the door, when open, slopes forward at a convenient angle for the foot.

Case the box to match the trim of the room, bringing the inner edges of the casing flush with the inside of the box. It has been found that the most convenient height for the box is about 1 ft. from the floor, measuring from the bottom of the box. The edge of the lower casing will then bear against the top of the baseboard.

If the box is to be installed in a house already built, cut out the plaster and laths between two studs until the height of the opening is 20 in. Cut two lengths of 2 by 4-in. wood and nail these between the studs, above and below the opening, so that the casing nails may be driven into them.

Homemade Ink-Bottle Holder

A serviceable ink-bottle holder that can easily be made from a block of wood and some ordinary pencil erasers, is shown in the illustration. A block of ¾-in. wood, about 4 in. square, is obtained, and a circle, a trifle larger than the bottom of the ink bottle, is scribed on one side of the block, in the center. Then another circle, with a radius ⅛ in. larger and concentric with the first, is scribed on the block. The circles are divided into four equal parts by scribing diagonal lines from corner to corner of the block. At the points where the lines intersect the outer circle, punch marks are made, and holes, a trifle smaller in diameter than the rubber tips of pencils, are drilled with the punch marks as centers. The large hole for the ink bottle is then drilled to the desired depth.

Pencil erasers are forced into the four holes drilled for them. As is apparent, they serve to hold bottles of slightly varying diameters snugly. Pieces of pencil erasers are attached to the underside of the holder with small brads to serve as feet and prevent marring of the finish of the desk or table. Two coats of black shellac give the holder a good finish.

¶To test turpentine, place a drop or two on a piece of white paper. If pure, no trace or stain will be left.

"Propping" Pear Trees with Twine

A successful California fruit grower has found ordinary binder twine a good substitute for the wooden props ordi-

Binder Twine as a Substitute for Wooden Props Ordinarily Used to Support Fruit-Tree Limbs

narily used to support heavily loaded branches of pear trees. The twine is wound around the tree as if it were a huge bundle of grain. This is done after the fruit is well set on the trees, but before it is large enough to bend the limbs. The work of tying up the trees is conveniently done by two persons. One carries a ball of twine and a forked stick to hold the twine at any desired height while moving around the tree, and the other, mounted on a stepladder, ties up the branches. It is frequently necessary to wind the twine around the tree several times at different heights.—W. L. Salvage, Beaumont, Calif.

Saving Radio Tubes

After completing a radio set and hooking up the batteries, it is highly advisable to apply a voltmeter to the filament terminals of the sockets before inserting the tubes, with the rheostats first off and then turned to operating position. If the voltmeter indicates more than the filament voltage of the tube, look over the wiring and see if the B-battery lines are connected across the filament lines, and make the proper changes. Under no conditions should the tubes be subjected to a higher voltage than that for which they are designed, as the filaments will be burned out very quickly.

Stop for Garage Doors

The usual method of "propping" the garage doors to hold them open may be dispensed with by providing an automatic stop of the kind shown in the illustration. A short post is sharpened at one end and is driven into the ground near the open position of the door, and two short strips of wood, about 1 by 3 by 8 in. in dimensions, are hinged together at one end as shown. A coil spring is fastened between the strips to raise the free end of the upper strip, the ends of the spring being stapled down. The lower strip is nailed to the post so that the hinged end points toward the door when the latter is opening. When the door is swung open, the bottom strikes the inclined plane of the upper strip and, after depressing it, slips over the end; the spring then lifts the strip and prevents the door from closing. A stake should be placed beyond the stop to keep the door from swinging open too far. When driving the post into the ground, care should be taken that the post is sunk deeply enough into the ground so that the door will be sure to slip over the strips.

Convenient Drying Rack for Negatives

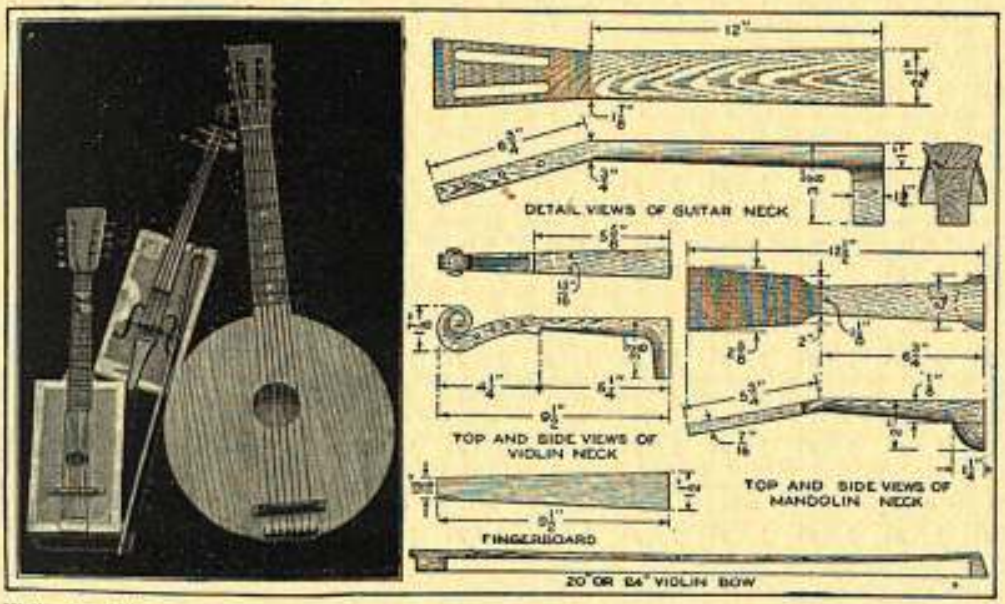
The drawing shows a convenient rack for drying negatives. It is made of sheet zinc or brass, and can be hung on the wall, or placed on the bench or table. It is made of sheet metal, cut to shape, with the wide end formed to make a shallow tray, while the long strip is bent at right angles to the tray. Cuts are made in the strip as indicated and the parts so formed bent out to an angle of about 45°. A small hole is drilled at the top of the rack so that it can be hung on the wall. Plates must be placed in the rack with the emulsion side up, or the film surface will be scratched, ruining the negative, and all sharp edges must be rounded off smooth.

Musical Instruments from Cigar Boxes

BY W. F. CORD

CIGAR boxes, which may generally be obtained for the asking from any tobacconist—who will be glad to get rid of them—can be used to make very passable violins and mandolins. Of course, it is not expected that a "fiddle" of this variety would possess the tone of a Cremona or Stradivarius, but, in the hands of one knowing how to play such an instrument, very creditable results may be attained.

The drawing shows the dimensions and appearances of the various necks in case it is desired to make them at home. However, if the best results are desired, it is recommended that these, as well as the bridges, tailpieces, strings, and similar fittings, be purchased from a music-supply house. If made at home, poplar should be used.



Violin, Mandolin, and Guitar That are Made from Cigar and Cheese Boxes by the Addition of Suitable Necks and Fittings: Anyone Who can Play a Standard Instrument of Either Kind can Produce Music from These

The cigar-box violin should be made from a box about 3 in. deep, 5 in. wide, and from 9½ to 13 in. long, according to the person for whom it is made. Let the lid form the back of the instrument, but do not nail it down until the work has been completed. Glue a block, ⅜ in. wide by 2½ in. long and the same depth as the box, in the end to which the neck is to be fastened, and a smaller block at the opposite end. Cut the F-shaped sound holes in the top and then drive in a few more nails around the edges of the box, to make it stronger. When the neck has been completed, drill two or three holes through the block and box into the neck for screws; then glue the neck in place, and screw it on tight. Next fasten the fingerboard in place, drill a hole in the rear end and rear block, and glue into it a small peg to hold the tailpiece. The bow is also made of poplar, and the hairs can be obtained from a long-tailed horse or bought from a music store; ordinary thread can even be used, where it is not possible to obtain horsehair, or to purchase a bow.

For the mandolin, a box about 5½ or 6 in. wide, 2¾ to 3¾ in. deep, and 9½ in. long, will be best. The lid, as in the violin, forms the back and is not fastened down until the remainder of the work is done. The sound hole, which is about at the center of the box, is 1¼ by 1¾ in. in size. Glue a piece of wood, ¼ by ⅝ in. in dimensions, across the box, midway between the sound hole and the end of the box, to keep the bridge and fingerboard from pressing in the top. A block, ⅜ in. wide by 3 in. long, and the same height as the box, is glued inside at the neck end. The neck is made as indicated in the drawing, and is attached to the box as described for the violin.

The guitar is made from part of a cheese box instead of a cigar box. A box

made from a single piece of wood, instead of one made up from three-ply veneer, should be selected. Cut the rim down to 3¼ in. in width, and attach the neck at the point where the ends meet, after fastening a ¾ by 3¼ by 3¼-in. block on the inside. The neck, when in place, must stand above the rim a sufficient distance so that, when the top is applied, the neck will be flush with the top. After the neck has been fitted, as described above, the top and bottom can be put on; these pieces may be sawed from pine, poplar, or almost any kind of lumber, about ⅛ in. thick. The sound hole is a little above the center and is 2¾ in. in diameter. The top is glued and nailed to the rim and is reinforced by three ¼ by ⅝-in. strips that are glued edgewise across the underside of the top to prevent it from being pressed in. It is also advisable to glue two or three such strips on the bottom before it is attached. A lug, 1¼ in. long by 1½ in. wide, is left on the bottom cover, and fastened to the underside of the neck.

Homemade Hog Oiler

An easily constructed hog oiler, made from a wheel taken from an old wheelbarrow, is shown in the photo. The

Effective Hog Oiler, Made from an Old Wheel Covered with Burlap Sacking

wheel, covered with burlap, is mounted in its original bearings on the wooden base that contains the oil trough. The wheel turns as the hogs rub against it, thus continually taking up a fresh supply of oil. This treatment keeps the hogs free from lice and other vermin.

Making Sparrows Useful

If a small quantity of cracked corn is thrown on the heads and under the stalks of cabbage plants, the sparrows will gather up the corn, and, while getting down through the leaves after the small grains, will also eat the cabbage worms.

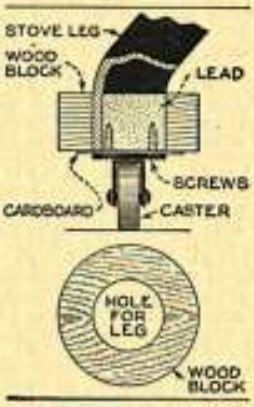
Some corn is first scattered near the patch to attract the birds, and the grain is then thrown in and around the head of the cabbage plants about every two days; if the patch is a large one, every three or four days will do. The sparrows will not eat the cabbage, but will get the green worms.—Joe Dunn, Meyerdale, Pa.

Vacuum Cleaner "Blows" Organ

In a church where an ordinary reed organ with pedal-operated bellows was used, it was desired to install an electric blower. As the reeds of such an organ are sounded by suction, the air being exhausted from the wind chest by the bellows, it was found that a common vacuum sweeper could easily be made to do the work. A small hole was cut in the wind chest, and the end of the vacuum-cleaner hose inserted, the connection being made air-tight. The cleaner itself was set in the basement where it could not be heard while running. The result was entirely satisfactory, the cleaner doing the work just as well as an expensive electric blower.—Phil H. Brehmer, Rutland, Vt.

Attaching Caster to Oil Stove

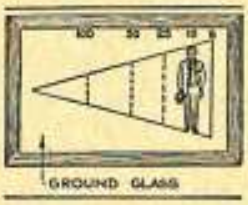
The addition of casters to an oil stove, which is ordinarily not fitted with them, increases its convenience considerably, as it can then be moved about more easily.



A piece of 1-in. hardwood is cut to a circular shape and a hole is drilled through it as shown, so that the leg of the oil stove fits in the hole snugly. The bottom of the hole is closed with a cardboard disk, a flat-top caster is placed in position underneath it, and the caster screws pushed up through the cardboard. Melted lead is poured into the hole in the block from above, and this, when cool, will hold the screws securely.

Using Camera Finder as Range Finder

Any small camera finder, having a ground glass, can be used as a range finder by marking two horizontally converging lines on the ground glass as shown in the illustration. Distances of 6, 10, 25, and 50 feet from the camera are marked off on the ground, and, with a person of average height standing at these points successively, his position is marked on the ground glass at the points where the images of head and feet touch the upper and lower lines. Vertical lines are drawn between the points thus located and the distances marked on. If the finder is too small for many figures, the lines marked can be the same as those on the focusing scale, and the numbers dispensed with. Thereafter, when making a snapshot, it is only necessary to find the line corresponding in height to the person to be photographed in order to know the correct distance to set the scale.



Package Fasteners

When it is necessary to send a package at unsealed-mail rates, and a supply of regular parcel-post package seals is not on hand, perfectly satisfactory ones can readily be made from two 4-in. strips of 1-in. gummed paper, such as is used for sealing packages. Fold over about ¾ in. at one end of each strip and insert a flat-headed brass paper fastener, as shown, in one of the strips, and a small piece of cardboard in the other. Then stick the ends down to hold the fastener and cardboard in position. Punch a hole or cut a slit through the piece of cardboard for the fastener to pass through, and then fasten the strips to the package as shown, so that it can be opened for inspection by the postal authorities.—Leighton Powell, San Francisco, Calif.

Temporary Wire Fences

The photograph shows the construction of a temporary fence for "hogging down" corn or other forage crops on a farm. Each stake is made from a length of pipe, which is flattened at one end so that it can be easily driven into the ground. A number of holes are drilled in the pipe, in pairs, at equal distances apart, and a small loop made of wire is inserted into each. The wire fence is then stretched in the usual way, and a long straight piece of heavy wire is slipped down through the small loops to hold the fence in place. With this arrangement the fence may be put up or taken down in a very short time.

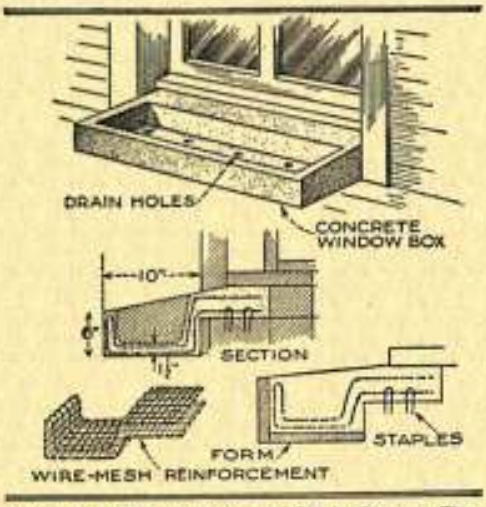
Temporary Wire Fence That can be Set Up or Taken Down in a Very Short Time

When Felloe Bolts Become Loose

Bolts that are used to hold demountable rims in place on the felloe have a tendency to loosen, partly from screwing them up tightly, and partly from running stresses. A simple repair is as follows: Remove the bolts, and plug the holes with wooden dowels, then drill new holes halfway between the old ones. The size of these holes should be such that the bolts must be driven in.

Combination Window Boxes and Sills in Concrete

When remodeling his building, an owner included the concrete combination window boxes and sills shown in the illustration, adding considerably to the appearance of the house, and insuring permanent sills. The construction is simple and durable, the concrete being reinforced with wire mesh, doubled as shown, and stapled to the plate under the sill. A wooden form was made, 6 in. deep at the front, 10 in. wide and as long as the window frame, lightly nailed in position, and the concrete, a mixture of 1 part cement to 2 parts sand, poured. The interior was cut out and troweled smooth while the concrete was still plastic, and ½-in. drain holes made through the bottom. The form was not removed until the concrete had set, and the sill was kept wet for a week, before any weight was placed on it.



Combination Window Boxes and Sill in Concrete That Is More Durable than the Wooden Sill

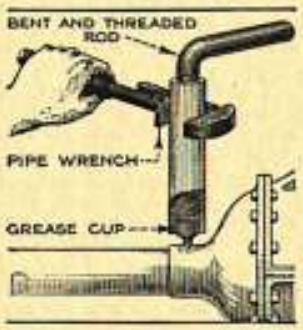
When the Crankcase Oil Runs Low

Owners of automobiles provided with the splash system of oiling will appreciate the kink given below, when a low supply of oil in the crankcase threatens to "freeze" the pistons and burn out the connecting-rod bearings.

Pour a quart or two of water into the crankcase. As oil is lighter than water, it will rise to the top, and will be splashed up by the crankshaft and connecting rods as usual. By doing this the car can be run to the nearest supply station, where the crankcase can be drained and refilled.

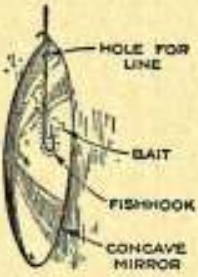
Special Wrench for Removing Grease Cups

The wrench illustrated was devised to remove grease cups of the screw-cap type, such as used on automobile axles, the threads on the outside of the cup preventing the use of a pipe wrench because of the damage to the thread, and the hexagons on the lower parts being usually so much worn or so placed, as not to allow a wrench to be used. The tool consists of two parts: a short length of pipe, tapped through its entire length with the same thread as the grease cup, and a rod, threaded to fit in the pipe, and bent as shown, to facilitate turning it. In use, the pipe is first screwed onto the grease cup, after which the rod is screwed down tightly against the cup, thus locking it securely in the pipe. A pipe wrench is then used in the manner indicated to unscrew the cup.



Mirror an Effective Lure for Fish

While the bait shown in the illustration makes use of a mirror, it is the greed of a fish that leads to its capture rather than its vanity, for, seeing the bait attractively reflected in the mirror as well as the image of what seems to be another fish, it becomes a question of which one gets the worm first. While glass mirrors can be used they are open to the objection that applies to all glassware—they break. Consequently a concave mirror made of polished metal, such as the bowl of a silver tablespoon or large measuring spoon, is better, and the results equally satisfactory, the convex side being blackened. The hook is fastened on a line passed through a hole in the edge of the mirror and drops to the center, where it can be baited in the usual way.—J. W. Matley, New York City.



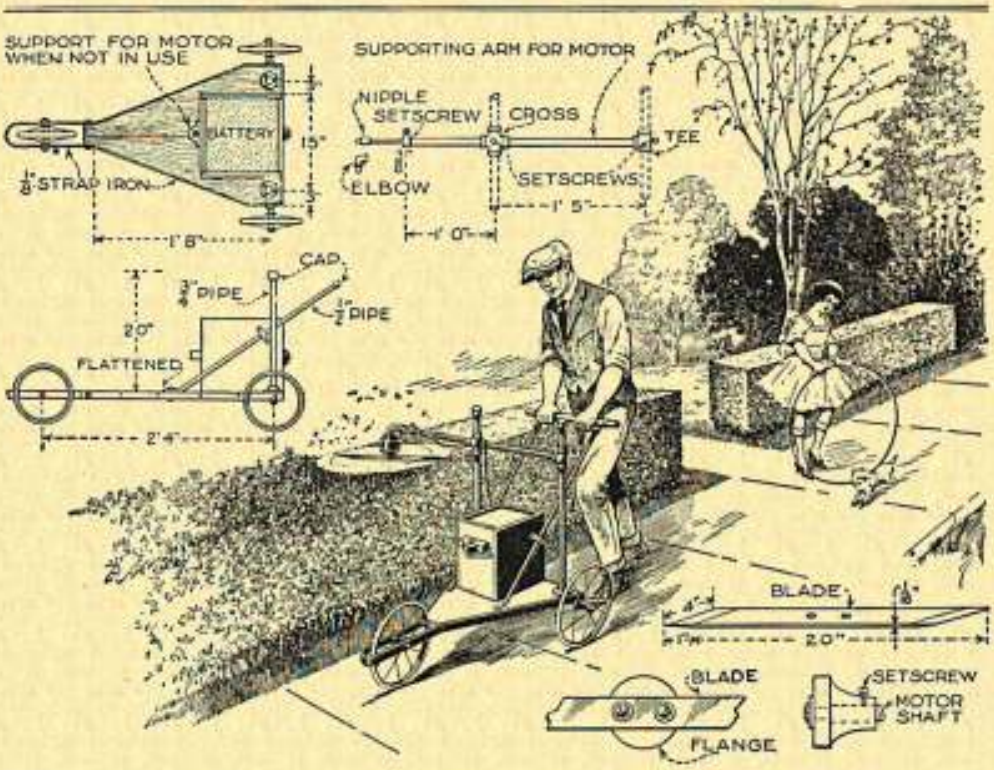
An Electrically Driven Hedge Trimmer

BY A. E. SHAW

A MACHINE that will interest the man who prides himself on his well-kept grounds is the electric hedge trimmer shown in the illustration. There is no great amount of skill required to build the machine beyond that possessed by the average amateur mechanic, and, besides trimming the hedge very accurately and uniformly, the machine does the work in a much shorter time than it can be done by hand.

The base of the machine is made of 1-in. lumber, which is faced on the edges with ⅛ by 1-in. flat iron. The iron is extended at the front as shown, to form a bearing for the front wheel. The rear-wheel axle is strapped to the underside of the base; the wheels are 12 in. in diameter, rubber-tired.

The supporting frame for the motor is made up from ¾-in. pipe and fittings, the vertical arms being attached to the base by means of floor flanges. The cross arm is fitted with a cross and a tee, from which the threads have been filed so that they will slide easily on the vertical pipes, and they are fitted with setscrews so that the arm can be locked in position.



This Electrically Driven Hedge-Trimming Machine will Delight the Amateur Mechanic Who Prides Himself on the Appearance of His Grounds. It is Easily Made, and Quite Efficient

A coupling, tapped for a setscrew, is screwed on the outer end of the arm, and a smaller pipe is telescoped within it. This pipe is threaded at the outer end, or fitted with a reducing coupling and nipple, to screw into the base of the motor. The size of this pipe and the thread used will depend on the motor available. For trimming the top of the hedge, the motor is mounted at right angles to the cross arm, the elbow shown being used for this purpose.

The motor is a small battery motor, which develops about 1/15 hp. at 1,800 r. p. m., on 6 volts, and it is fitted with a tool-steel blade, ground to the shape and dimensions given in the drawings, and carried on the motor shaft by means of a machine-steel flange, drilled and tapped for two round-head screws and a setscrew.

It has been found convenient to drive the outfit by a storage battery mounted on the base, but it is perfectly feasible to use a 110-volt motor, provided a connection can conveniently be made. When the motor is not in use it is removed, with its supporting pipe, and carried in the bracket screwed to the front of the battery box.

The handle of the machine is made of 3/4-in. pipe and fittings, the lower end of each leg being flattened and screwed to the base, and each leg is attached also to the side of the battery box with pipe straps.

Improvements for a Fishing Boat

A tackle box fitted in the seat of a rowboat has many advantages over an ordinary tackle box, as it has not only much more room and cannot be knocked

Left, Making a Slat Floor for the Fishing Boat; Right, Tackle Box Built under Seat

around, but is kept completely out of the way. As shown in the drawing, the tackle box is made in the form of a drawer under the center seat, the one that is usually used the most. The drawer is about 30 in. long, 6½ in. deep, and 12 in. wide, which gives plenty of room for two or three rods, and compartments for hooks and lures, so that these will not become mixed, as is generally the case in the ordinary tackle box. The box is protected from rain by the seat, and as it does not touch the bottom it is also free from water in the boat. A hasp and padlock should be provided on the box.

Another improvement for the boat is a slat flooring to prevent getting the feet wet. For convenience the flooring can be arranged in three sections. The construction is simple, all that is necessary being a quantity of slats and a few cross members. The best wood to use is fir, and the flooring should never be painted, but should be given a liberal application of linseed oil. The slats, so protected, will last a long time. In addition to keeping the feet dry, the slat flooring protects the bottom boards of the boat.

Simple Homemade Leaf Spreader

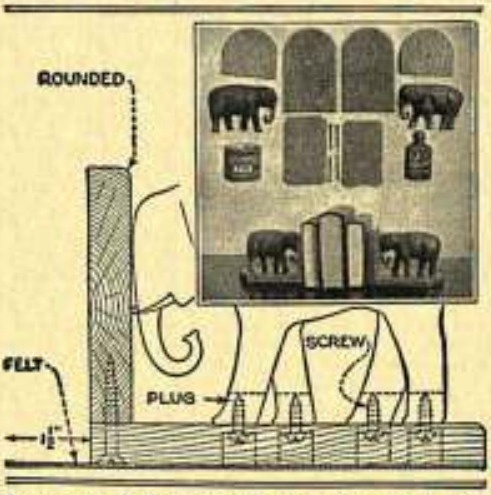
To lubricate the springs of an automobile properly it is necessary to loosen the clips and spread the leaves apart for the insertion of the lubricant. There are many methods of doing this, but the tool shown in the sketch will do the work with a minimum of effort. It is made from two pieces of a broken spring, bent as shown. The ends are ground to a knife-edge for wedging between the leaves; by tightening up the nut in the bolt the knife-edges are drawn together, separating the spring leaves. The bolt holes must be elongated to prevent the bolt from binding.

¶By fixing an 18 or 20-in. extension to his cane, a blind man has greatly increased its usefulness. Because of the increased length he is able to notice obstacles within a much greater radius

Inexpensive Book Ends

A neat pair of ornamental book ends, which are just as presentable in appearance as many of the expensive ones on the market, can easily be made at home for a fraction of the cost of the manufactured article.

The wooden base and vertical part of each end are cut from 1 by 5-in. finished lumber, to the shape shown in the details of the photograph. The two parts are joined with 2-in. wood screws, small holes being drilled to prevent the screws from splitting the wood. Two small celluloid statuettes, such as elephants, which cost only 10 or 25 cents each, are obtained. The statuettes are attached by cutting off the bottom of the feet and gluing wooden plugs inside. Screws are driven up through the base into the plugs to hold the statuettes in place, the screw-holes in the base being counterbored to receive the screw heads. The underside of the base is covered with a piece of felt, which is glued on. The felt should project about 1½ in. beyond the vertical part of the book end; the outer book rests on this, and prevents the book end from moving. The wooden part of the book end is enameled to match the statuette, or both base and statuette may be finished in any other desirable way.—Glen McWilliams, Detroit, Mich.



Ornamental Book Ends, Made at Home, but Just as Good as Expensive Purchased Ones

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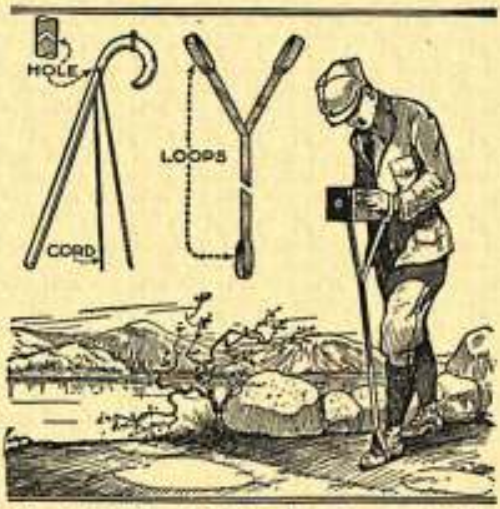
¶The Bureau of Information will tell readers where materials mentioned in the Shop Notes and Amateur Mechanics departments may be obtained.

Time Exposure with Hand Camera

Tripods are more or less of an annoyance to the camera enthusiast, and few use them. However, it is sometimes necessary to make a time exposure to get the desired picture, but the camera cannot be held steadily enough with the hands to avoid doubling the image. It is, however, a simple matter to hold the camera steady if a cane is carried along. Just below the crook of the cane two holes are drilled from opposite sides to meet in the center, both slanting down from the point of junction. Another hole is drilled through the crook to take a tripod screw, on which the camera is mounted. A cord is run through the angular hole, the ends of the cord are stepped on, and pulled taut by pulling back on the cane, which has the end planted on the ground in the position indicated, thereby holding the cane firmly in position. The arrangement thus improvised is steady enough for long-time exposures.

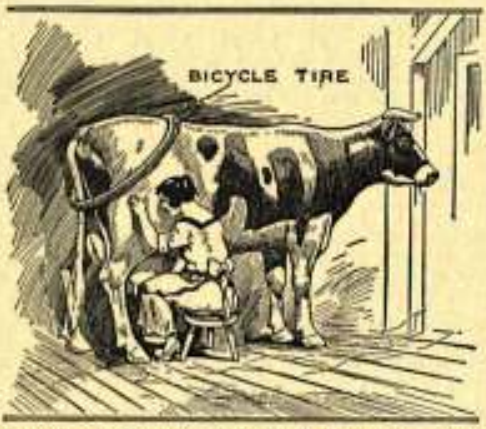


Simple Methods of Making Time Exposures without Using a Tripod

Another method of steadying the camera is to cut a length of tape into three pieces, and to tie or sew these pieces together at the central point as shown, making a form of the letter Y. Loops are made at the ends so that the foot can be placed in one loop, and each wrist in another. Then, with the camera clasped between both hands, an upward pull will enable the user to hold the camera steadily enough for a time exposure of four or five minutes.—George Parke, Chicago, Ill.

"Anchoring" the Cow's Tail

Anyone who has milked cows has suffered from the annoyance caused by the animal switching its tail around to chase

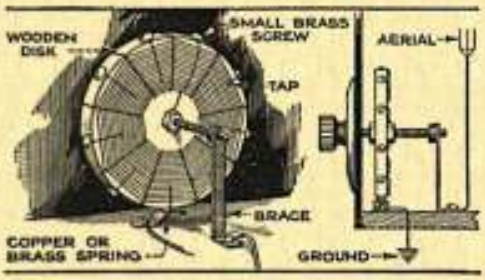


Simple and Effective Method of Preventing Cows from Switching Their Tails

away the flies. This trouble can be prevented very easily if there is an old bicycle tire lying around the yard. The tire is simply thrown over the cow's back as shown. This idea has been tried and found very effective.—F. H. Chick & Co., Strong, Me.

Novel Mounting for Spider-Web Coil

A simple and effective method of tapping a spider-web coil is shown in the drawing. The coil is wound on a wooden or fiber disk, ¼ in. thick. Each section is tapped as usual, and the taps are connected to small round-head brass screws, driven into holes, drilled and tapped in the edge of the disk. The coil is then



Rotating Spider-Web Coil That Permits the Use of a Greater Number of Taps than Usual

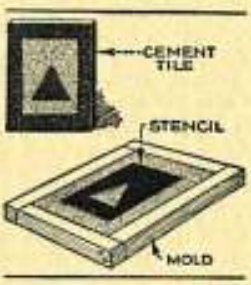
mounted on a long screw, to which is attached the knob and dial used for revolving the coil. A nut is run onto the screw, on each side of the disk, to hold it securely in place, and the end is filed down to fit a bearing made of sheet brass. The aerial end of the coil is fastened under one of the nuts, and the lead-in wire from the aerial is connected to the bearing. A flat copper or brass spring, connected to the ground, is fastened underneath the disk, so that the brass screws all come in contact with it in turn as the coil is revolved. This arrangement permits the use of a greater number of switch points than with the usual spider-web coil.—C. Wright Richell, Columbus, Ohio.

"The Kettle's Boiling"

A warning signal for a water kettle, indicating that the water is boiling, can be made from an ordinary flat tin whistle, soldered into a hole cut in the kettle lid. A little steam or vapor passing through the whistle will not cause it to sound, but when the boiling point is reached, so much steam is generated that the whistle is blown loudly. The housewife can put the kettle on and go about her work, confident that she will not forget it.—Wm. E. King, Monessen, Pa.

Ornamenting Cement Tile

Designs on the face of cement tiles, or other cement work, such as panels, can easily be made without the necessity of making wooden forms. Frequently, when wooden forms are used, and the cavities later filled with colored cement, the design appears very awkward, owing to the difficulty of forming the design in wood smoothly. The idea illustrated involves the use of a piece of a heavy waterproof-paper or sheet-metal stencil. In use the stencil is placed on the soft cement and the colored aggregate is pressed through it. A similar effect can also be obtained by dusting on dry cement color, but this is not so satisfactory, as it is not permanent. If the stencil is built up of several thicknesses of paper, a colored cement mixture can be used that will stand out in slight relief beyond the surface of the work when the stencil has been removed.



Saving Theater-Sign Lamps

Many theaters are closed for the summer months, and during this time the electric signs are not used. The lamps left on the signs accumulate dust and dirt, and some are usually broken, which gives the sign a very dilapidated appearance. To prevent this, it is advisable to remove the lamps as soon as the season is over. Removing the lamps leaves the receptacles open to catch dirt, but this can be overcome by screwing corks of the proper size into the receptacles in place of the lamps. The appearance of the corks is improved by painting them with a contrasting color.

Using a Gas Heater as a Stove

The oooking arrangement shown in the illustration has been found of considerable convenience in a room where a regular stove cannot be used, but only a gas heater is available. The device consists of a piece of russia iron, nearly as wide as the opening of the heater, with the edges bent upward as shown. Two shelf brackets are attached to the bottom to serve as legs on one side. The other side is supported by the lower part of the heater. When the gas is turned on, sufficient heat is radiated to heat water and food quickly.

Poultry Feeder and Rat Trap

A combination rat trap and dry-mash feeder is a rather novel addition to the poultry house. The feeder is a long box, 1 ft. high and 1 ft. wide, with a sloped and slatted top, through which the hens put their heads to eat during the day. To convert this into a rat trap, a 4-in. hole was bored in the end of the hopper, a short length of 4-in. stovepipe fastened in the hole, and a bag tied over the other end of the pipe and spread out on the ground. A heavy board cover was hinged to the feed box; this was kept open by means of a hook during the day, but the hook was released, and a small prop with a string attached to it used at night. The string led away to a distant window

Combination Poultry Feeder and Rat Trap That Is Simple to Make and Very Effective

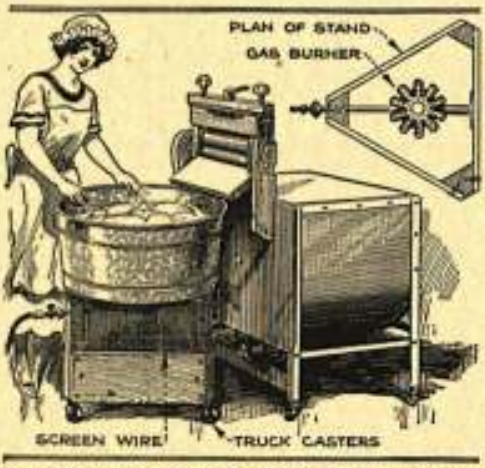
so that the poultryman could pull it without entering the poultry house and disturbing the rats. A yank at the string let the cover drop and trapped the rats inside. Then, by beating on the cover with a stick, the rats were made to run through the hole, down the pipe, and into the bag, where a few blows killed them. As long as the hens ate from the feeder the rats never seemed suspicious. —L. Harris Hiscock, Skaneateles, N. Y.

Jack Used as Rim Tool

Automobile owners and drivers generally have trouble in bringing the ends of a split rim together when replacing a tire. Various tools are made for this work, but unfortunately they are not usually carried in the car. The drawing shows a simple method of using a jack and a block of wood for spreading the rim. The pressure is exerted equally on the rim at the three points of contact, thus spreading the rim evenly and without the danger of bending it out of shape.

Handy Washtub Stand

The illustration shows a convenient washtub stand that has been found to save much heavy lifting on wash days.



Movable Tub Stand and Burner Combined That Saves Much Lifting on Wash Days

The stand is triangular in shape and has a leg at each corner, casters being provided on the legs so that the stand can easily be moved about. The legs are joined by 1 by 3-in. pieces of wood at the top, and 1 by 10-in. pieces at the bottom. The stand may be equipped with a gas burner, as shown in the upper detail. If a gas burner is provided, it should, of course, be of large size, suitable for heating a considerable quantity of water. Protection for the clothes of the user should be provided by tacking heavy screen or similar material to the sides.—Ward H. Snook, Columbus, Ohio.

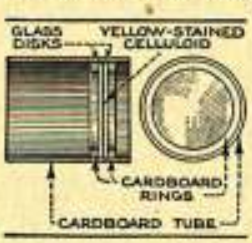
Inexpensive Emergency Gas-Tank Cap

The cap of the gasoline tank is one detachable part of the car that will loosen and become lost unless care is used to screw it tight after each filling with gasoline. One motorist discovered that the tank cap had been lost at a place where no service station could provide a replacement part. A hardware store, however, provided a good substitute cap, and one that is worth noting, in case the reader should be caught in the same predicament.

A close pipe nipple and a pipe cap, of the same pipe-thread size as the opening in the tank, which was of a standard size, provided a substitute equal, except in point of appearance, to a regular cap. A small vent hole was drilled into the cap. The cost of the two fittings approximated that of a single gallon of gasoline, and, as much gasoline waste was prevented, the improvised cap saved its cost several times over.

Color Screen for the Camera

The illustration shows an easily made color screen for the camera. It consists of a short length of cardboard tube that fits the lens; a cardboard ring is glued in the end of the tube at the point indicated and two circular glass disks are cut to fit the inside of the tube. These disks must be free from scratches and bubbles. Disks cut from old glass negatives are ideal for this purpose. A piece of celluloid, stained yellow, and cut to the same size as the glass disks, is placed between them. The assembly is then placed in the tube against the cardboard ring, and a second ring is glued in the tube against the other side of the assembly, to hold it in place. —Wm. J. Edmonds, Rutland, Vt.



Rubber Remover

The device illustrated has been found useful for removing tight rubbers, which are not easy or agreeable to remove with the hands when muddy. It is made of sheet metal, cut and bent to the shape indicated and screwed to the floor or the edge of a step. In using the device, the heel of the rubber is first pulled off by inserting it in the U-shaped slot and pulling the foot. The foot is then pulled back so that the tongue comes between the rubber and the sole of the shoe, after which a slight jerk of the foot will release the rubber.

TIRE REPAIRS IN THE HOME GARAGE

by

Lowell R. Butcher

Part I—Tire Damages and Their Prevention

THERE are but two kinds of tire damage: that caused by carelessness or inattention, and that resulting from unavoidable accidents or wear. The car owner is particularly interested in the first variety, the kind that can be prevented with proper knowledge of the causes. In addition, he will want to know what kind of tire damages can be repaired with economy, and what injuries are so severe that it is best to discard the tire in favor of a new casing.

To understand the common abuses and damages, something must be known about the parts of the tire. Each individual part of the tire has a duty to perform, and that duty cannot be done if the part is damaged or destroyed. Principal among the tire parts is the carcass. This is the framework of fabric, fabric cords, or cable cords that gives the tire its strength and serves to hold the air pressure. It is not designed to stand road wear; that function is left to the tread of the tire.

Above, Car-Track Wear; Left, Fabric Break from Stone Bruise; Right, Fabric Break Due to Running in Car Tracks

The tread of the tire is made of a compounded gum that resists wear. The rubber of this has little strength as far as retaining air pressure is concerned, but it is designed to combat wear and to protect the carcass from dirt, moisture, and direct contact with the road. The sidewall of the tire has much the same duties as the tread. It is not nearly as thick as the tread, for there should be little wear on the sidewall unless the tire is abused.

A strip of loosely woven fabric is placed between the tread and the carcass; this is known as the breaker strip, and serves to distribute the road shocks more evenly over the carcass. A cushion of rubber, known as the cushion of the tire, is placed between the breaker strip and the carcass. In some cases there is a layer of the cushion stock between the breaker and the tread as well. This cushion serves to soften the road blows so that the carcass does not take the shocks directly.

The bead of the tire simply serves to hold the tire in place on the rim. Its shape will vary with the type of rim used. The types used are two in number: the straight side and the regular clincher.

Most of the larger tires have beads to suit straight-side rims while a great many of the 30-in. tires still use the regular clincher type.

Without question, the greatest and most common abuse of tires is underinflation. With all the warnings that have been given, car owners still persist in running tires without sufficient air pressure. A multitude of damages is possible from underinflation. The carcass of the tire is constantly bent and "hinged," the gum that binds the layers of fabric or cords together is destroyed, and the plies rub together. Friction soon develops and the tire wears itself out.

It can be seen that the cushion of the tire will be put under great strain in an underinflated tire. The constant bending wears the cushion, which soon breaks down and rolls into tiny balls of rubber. Then the road shocks are taken more directly on the carcass, giving it punishing abuse. The binding gum between the tread and carcass gives way causing a condition known as a "separated" tread.

Rim cuts, as shown in Fig. 1, are a common ailment on tires that have been run soft or flat. The tire bends over the rim, which cuts the rubber of the sidewall and breaks the carcass of the tire. A blowout, which may be so severe that repair is impossible, soon follows. Other injuries of this character are due to bent or battered rims. Rusty rims will also help in making rim cuts. The rims should be straight, kept free from rust, and given frequent coats of rim paint.

The tread of the tire is often worn down through careless driving. Spinning the wheels to make a start, or in an effort to climb out of a mud hole, may grind several hundred miles from the life of the tire. Bad skids on rough pavement will wear the treads excessively, and sliding the wheels by locking the brakes will grind off the tread in patches, as shown in Fig. 2. A wobbly wheel or a bent axle will also wear the tread down unevenly, and if the front wheels are out of alinement the tread will wear off on one side. Nearly all these causes of premature tread wear can be avoided by a little care in driving.

It is often necessary to use tire chains when driving in the mud or on slippery pavements, but chains should be used no longer than absolutely necessary. A good chain, if applied correctly, will cause little wear, but an old chain or one applied incorrectly will grind the tread of the tire badly. Cheap chains should be avoided, as they are apt to be soft, and will wear rapidly, presenting innumerable sharp cutting edges to the tire; old chains also are undesirable, for the same reason. Whenever used, tire chains should be applied with enough slack to allow them to creep slightly, thus distributing the wear more evenly around the tire. Chains should always be applied with the same side next the tire, as the road side of the chains wears, and, if placed next to the tire, will cause rapid destruction. A typical example of chain damage is shown in Fig. 3.

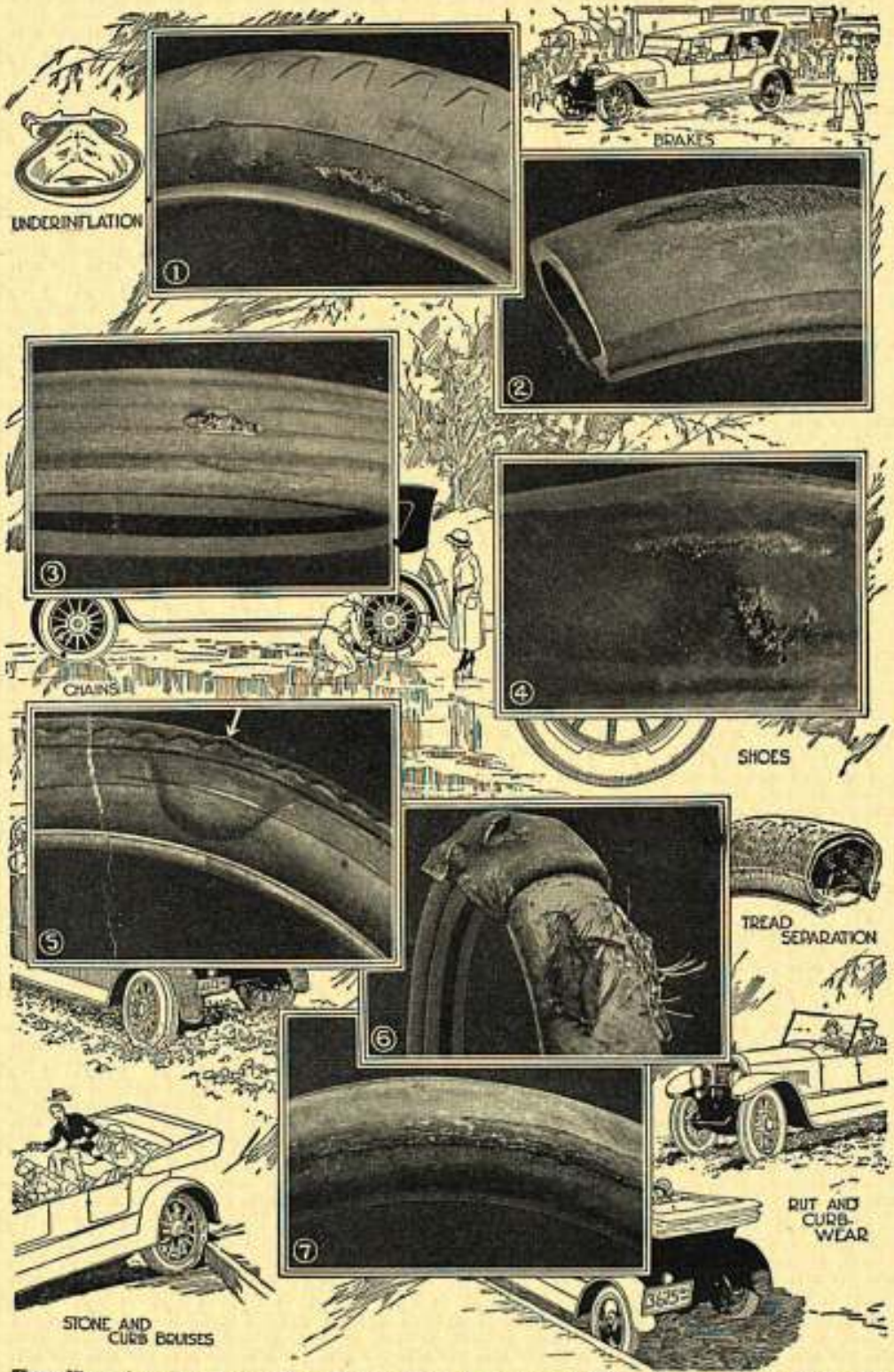
Most motorists know that grease and oil are not good for rubber, but a peep into their garages would not make one credit them with such knowledge. Tires should never be allowed to stand in grease or oil, and if a smear gets on the tire, it should be washed off with a little warm water. The rubber will rot quickly if the grease is allowed to remain.

The neglect of the tires frequently extends to the spare tire. Nearly every car nowadays is equipped with a spare tire at the rear, yet fully 50 per cent of these spares are unprotected. A tire cover is cheap insurance against the effects of heat, sun, and moisture. Most of the life of a tire may be destroyed by carrying it as a spare without any protection.

Loose inside shoes are another cause of tire damage, often unsuspected. Shoes must be used in emergencies, of course, but they should not be kept in the casing any longer than necessary, and, if they must be used, they should be cemented in place. A loose shoe will shift slightly, and will rub or chafe the fabric as it shifts, until the inside of the casing presents the appearance shown in Fig. 4. Aside from the liability of chafing, the shifting shoe may pinch or injure the inner tube.

To get the most out of his tires, every car owner should inspect them at frequent intervals. Many small damages, if found in time, may be repaired at a small cost, but their neglect may mean a more costly repair, or a damage that makes the tire worthless. Many of the small repairs may be made at home if the motorist finds the injury in time.

In going over the tires for damages, some systematic method should be followed. Hit-and-miss methods will not do, as one may pass up several injuries that a more methodical examination will disclose. Possibly the inspection is best started at the inside of the tire. Open the tire and prop the beads apart with short sticks, so that the inside of the tire is brought into plain view. Go over the



These Illustrations Show Some Other Common Types of Damages to Tires, and What Causes Them. The Best and Costliest Tires will Not Give the Service Expected of Them If Neglected

inside of the tire carefully, feeling for fabric breaks or chafed spots. Bend the outside of the tire just above the bead channel, opening any rim cuts or sidewall damages. Flex the tread surface by pressing the tire together and opening any tread cuts. Place one thumb at the center of the tread and the other at the union of the sidewall with the tread and press the thumbs together. This will usually detect any tread separation.

The inspection of the inside of the tire will disclose any fabric breaks or chafes. A good light is essential in making the inside examination, as the inside of a tire is covered with a light layer of gum and a coat of tire paint, and small cracks in the fabric may escape detection if the inspection is not carefully made.

A good sense of touch is necessary in finding any separated plies of the fabric. If the plies are separated, the friction—the light layer of gum between them—will be rolled up into tiny balls. These can be felt between the layers of the carcass by running the fingers over the inside of the tire. Neglect of this injury usually results in a blowout, as the plies of the carcass rub together and wear themselves out. Separated plies of the carcass are usually the result of running a tire soft or flat.

The bending of the sidewall near the bead will open up any rim cuts. The rim cuts in a clincher tire will be lose to the bead channel and may pass unnoticed if the examination is not carefully made. Those on straight-side tires will be farther up on the sidewall. While looking for rim cuts, it is a good plan to check over the condition of the bead. A broken bead core or a chafed bead cover are the two most common bead damages.

Cuts on the tread can be found by bending, although they may not be noticed when the tire is mounted and inflated. Any tread cut, however small, should be repaired at once. In themselves, tread cuts may not be serious damages, but their neglect invites dirt and moisture to enter the tire and rot the carcass. Severe cuts and damages will often extend through the tread and open one or more plies of the carcass.

Tread separations are most often found at the hinge point of the tire. This is the point at which the sidewall and the tread meet. As explained, this damage can be detected by pressing together the hinge section with the thumbs. In aggravated cases, where sand and dirt have been allowed to enter through a small cut or hole, the separation may bulge out and take the form of a sand blister, such as shown in Fig. 5. Sometimes the tread separation is caused directly by a small cut or hole. The dirt and moisture destroy the friction between the carcass and the tread, causing the separation to appear. Most often, however, tread separation is caused by underinflation.

Stone bruises, caused by bumping against curbs, or striking heavy stones in the road at high speed, are often hard to find. Usually they can be found at points in the carcass that seem to have lost their "life." More serious cases manifest themselves in a break in the fabric, which is plainly seen when the inside of the tire is inspected. A stone bruise is the direct forerunner of a blowout. The blowout may not occur at the time the tire is bruised, for the fabric break does not always extend through all plies, but pinched tubes often result from bruises that break inside plies of the tire.

The frequent inspection of the tires will help to get the most from them. This inspection or examination may be of the nature of looking over the tire for tread cuts or may be an elaborate examination of both the inside and the outside of the tire. The inspection should be made once every two months or oftener.

Many of the minor tire damages can be repaired at home, but the more serious ones are best taken to a competent tire repairman. If there is any doubt as to whether a tire can be repaired with economy, take the doubtful casing to the tire man. Sometimes a few dollars spent in making a small repair will add thousands of miles to the life of the tire.

In general, a tire with a badly separated tread cannot be repaired with economy. This tire ailment usually results from underinflation, and there are apt to be many other things besides the tread at fault. Sometimes a badly separated tread is repaired by retreading the tire. This repair is rather costly and should never be made unless the carcass of the tire is worth another tread.

Blowouts from stone bruises are usually repaired. Sometimes this damage happens to tires that are almost new. However, the permanent repair should not be postponed by using an emergency inside boot. If this is done for any length of time, the casing may be damaged to such an extent that its repair is doubtful economy. There have been many tires ruined by using blowout boots for some time after the blowout has happened. One such tire is shown in Fig. 6; the carcass was rotted by the dirt and

moisture which had easy access to the inside of the tire.

Rim cuts are hard to repair. In many cases this damage extends around the entire tire, and, when such is the case, no attempt should be made to repair it. To repair it properly would mean considerable expense, and after the job was done it is doubtful if the repair would hold. A short rim cut, however, can be repaired effectively.

Nail holes and small cuts are easily repaired at home, and they should not be neglected, as ignoring them may mean a serious damage later on.

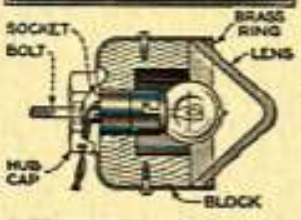
The sidewalls of the tire are not as frequently injured as some other parts, but they can be almost destroyed by careless driving. Running in deep ruts or in street-car tracks will impose a great deal of wear on this part of the tire, which is not built for it. Very often the tire sidewalls are scuffed and bruised, as in Fig. 7, by attempting to place the car too close to the curb when parking. The remedy for these troubles is obvious—keep out of ruts and street-car tracks, and don't allow the tires to scrape against the curb.

Careful inspection of tires followed by the necessary repairs means dollars saved for the car owner. Many of the minor injuries can be repaired at home; in fact, if the tires are cared for as they should be, trips to the tire man will be few and far between. It is the neglect of tires that causes the more important and serious damages. Much of the dissatisfaction toward the service the car owner gets from his tires will be done away with if he will take care of his tires as he should. Repair the little damages before they become big ones and the tire mileage will correspondingly increase.

The next article will describe the repair of tire casings.

Homemade Side and Tail Lamps

Electric side and tail lamps for use on a light car can be constructed from nickeled hub caps, and will look just as neat as the manufactured ones. A block of wood, cut to fit inside of the hub cap, is drilled to take a standard automobile-lamp socket, then counterbored for the lamp. The block is inserted into the hub cap in the position shown, and fastened in place by means of small wood screws, driven in from the outside. The lens is held between the block and a brass ring, which is soldered at two points to the inside of the hub cap. Another method of holding the lens in place is to insert a single coil of spring wire inside the hub cap, so that it will spring outward against the cap when released, in the same manner as a common tail-lamp lens is locked, the threads keeping the wire from slipping out. A small hole is punched in the end of the cap to receive a bolt for fastening the lamp.



Appropriate Camp Ash Tray

In harmony with the atmosphere of the camp and forests is the ash tray shown in the photograph, which is made to represent a black bear, standing erect with its paw in the crotch of a small maple branch that supports the ash tray at a convenient height. The bear figure is cut from a very thin hemlock board with a jig saw, and appropriately finished in glossy black paint, with a bit of buff on the muzzle.

Segregating Nonproductive Hens

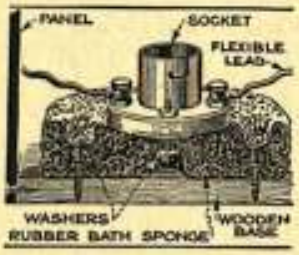
In order to pick out nonproductive hens, we placed a piece of woolen cloth, saturated with glycerin and colored with a dye, above the entrance of each nest, so that the hens would strike against it when entering the nest. The result was that the laying hens bore marks on their heads, backs, or tails, while the nonproductive ones remained unmarked. After a second and third test the latter were segregated.—Abe Sair, Brandon, Can.

Making the Medicine Cabinet More Convenient

Medicine cabinets are usually found too small to permit an orderly arrangement of the numerous bottles, vials, and other containers, kept in them and therefore additional space is necessary. This can easily be provided by building a few narrow shelves on the inside of the door as shown in the illustration, most cabinets of this type having the shelves set back far enough to permit this. It may be necessary, in some cases, to provide a heavier door as well as heavier hinges to take care of the additional weight. One end of the shelves on the door must be cut off at an angle as shown in the plan view so that the door can be closed. A rail around the edge of each shelf is also necessary as opening and closing the door moves the bottles.

Cushions for Vacuum Tubes

It is an excellent idea to mount a vacuum tube on a shock-absorbing base in order to prevent interference from vibration, which is especially noticeable in the 1½-volt dry-cell tubes. Talking close to the set causes the grids to vibrate, which gives a ringing sound in the phones or loud speaker. To prevent this springs and rubber-band supports have been tried out in factory-built sets, but neither has been found as successful as a rubber-sponge cushion.



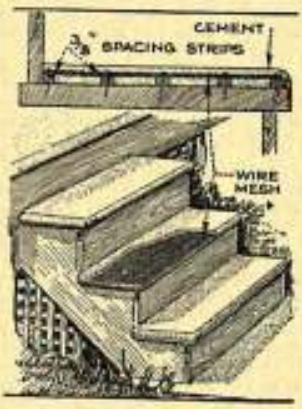
The socket is attached to the sponge and the sponge to the wooden base by means of screws, which are fitted with large washers to prevent the heads from tearing through the rubber. Heavy wire should not be used to connect to the socket terminals, as this will transmit vibrations to the tube; it is preferable to use common lampcord. When inserting or removing a tube, the socket should be held with one hand to prevent tearing the sponge.

Improvement on Gas-Tank Kink

The scheme of soldering a tire valve into the gas-tank cap, on an auto with a gravity-feed system, so that a tire pump may be used to provide pressure to get the car up a hill, is well known. Of course, the vent hole in the cap must be plugged when using pressure, and taken out again for gravity feed. An improvement on this scheme is to solder two valve stems in the cap, one containing a valve core and fitted with a dust cap, the other to serve as the vent. When necessary to use pressure, the cap of the stem containing the valve core is removed so that the pump can be attached, and the cap screwed on the other valve stem, to seal the vent.

Retreading Steps with Concrete

Wooden steps that are used continuously wear down soon and must then be replaced. A good method of renewing the steps is to retread them with concrete, which involves little work, as the old steps need not be torn off, providing they are sound. Thin wooden strips are first nailed on the steps and a double layer of wire mesh is stapled over this to reinforce the cement. Almost any kind of meshed wire will do except fly screen or similar screen, which is too light. The layer of cement should be about ¾-in. thick and the mixture should consist of half sand and half cement. It is, of course, necessary to provide forms along the edges of the steps.—G. A. Luers, Washington, D. C.



TIRE REPAIRS IN THE HOME GARAGE

by

Lowell R. Butcher

Part II—Casing Repairs

WHILE some of the more serious tire damages must be taken to the tire shop for repair, there are many simple repairs that the car owner can make. Most of the bad blowouts are caused by neglecting some simple injury that could have been repaired in the home garage. Trips to the tire shop and the purchase of new tires will be less frequent if the owner will learn to make a few simple repairs—and will make these when needed.

The most simple repair to make, and the one most often required is the tread patch. This repair is the same whether the carcass of the tire is of ordinary fabric, cord-fabric, or cable cords. The repair is used on tires the treads of which have been damaged by bruises or cuts. These minor injuries may not seem serious, but their neglect will cause other and more serious troubles. The patch is used to fill in the broken place on the tread and seal up the carcass against dirt and moisture.

Such damages usually extend only to the carcass of the tire. If many plies of the tire are damaged, it is best to take the tire to a competent repairman and have a section repair made. Broken plies make a hinge section at the point of the damage, and internal rubbing and friction take place, no matter how well the tread is sealed up.

All broken or injured gum must be removed from the injury before any attempt is made to build up the tread patch. Remove all separated or broken tread down to the breaker strip. A sharp knife or an old razor blade will be needed for cutting out the damaged gum, as shown in Fig. 1. The instrument must be kept sharp and will cut much better if it is dipped in water from time to time. The cut-down portion of the tread will be circular in shape, and the sides of the hole should be beveled off at an angle. Wash the injured spot with high-test gasoline to remove all dirt and grease, use a coarse file or a rasp to buff and roughen the injury, and finish the work with some coarse sandpaper. Roughing the tread allows the tread patch to get a better grip on the tire.

Regular vulcanizing cement is used in making the tread patch. Apply this in three coats, allowing each coat to dry before the next is applied. As this cement consists for the most part of raw rubber it is almost impossible to apply too much. After the last coat has dried until it is "tacky" to the touch, the injury is ready to be rebuilt up with new gum.

Cushion stock and tread gum will be needed to build up the patch. The cushion stock is applied first in a thin layer that completely covers the injured spot, and laps at least ½ in. all around the cut-down portion, as in Fig. 2. Use a sharp prod or screwdriver to work down the gum evenly over the injury, and roll the gum well with a tire roller before applying the tread stock. This prodding and rolling drives out any air bubbles that might be lurking under the gum, and is quite necessary, as the repair may fail if good contact is not secured at all points.

Wash off the repair with high-test gasoline to remove any dirt or grease that may have been rubbed on while working down the gum, then use the tread stock to build up the hole until the center of the repair is slightly higher than the surrounding tire. This operation is shown in Fig. 3. This will allow the gum to flow down evenly during the vulcanizing. Work down the tread gum with a prod, and roll before curing.

An electric or gasoline-heated patch vulcanizer may be used to cure the repair, but fully as good results can be obtained by using the electric iron. Shape a block to fit the inside of the tire by rounding the corners of a chunk of wood. The top of the block must be flat as the tire will have to be flattened out for the cure. Spread a piece of holland—the protective wrapping for repair materials—over the patched spot, and clamp down

the electric iron. A large C-clamp will serve to hold the iron tightly against the patch, as shown in Fig. 4. It is important that the iron be held tightly during the cure; if it is not, the gum may bulge at the point of contact, and make an unsightly repair.

The length of time required for cure will depend somewhat on the kind of gum used, and the depth of the repair. If the patch is shallow, enough heat may be retained in the hot iron without using current when the iron is clamped in place. More often, the repair will require more heat than can be supplied in this way, and the current will need to be turned on for a little while. The exact length of time for the cure is best determined by experiment. A piece of new gum may be used as a test piece and the exact heat and the length of time required to complete the cure found by making several tests. Properly cured gums will be full of life and elasticity.

If the fabric of the tire is bruised or partly broken, the tire should be reinforced from the inside. An inside shoe, firmly cemented into place, is used for this purpose. Prepared shoes may be purchased, but the car owner can easily make serviceable shoes from the carcasses of old tires. A tire slightly larger than the one for which the shoe is intended should be chosen. The shoe should extend from toe to toe of the bead and consequently cannot be made from a tire of the same size.

An inside shoe is usually made of three plies, cut down to the shape shown in Fig. 5. Its length will depend upon the length of the injury it is to cover but the ends of the shoe will be cut down or "stepped down" as shown in the illustration, regardless of the length of the boot. Two plies of the shoe reach from toe to toe of the tire, but the third ply—the one that goes next to the inside of the tire—ends ¾ in. from each toe. In other words, this third ply lacks 1½ in. of being as wide as the other two plies. The second ply is stepped down so that it is 1 in. shorter at each end than the first ply, the third ply is ¾ in. shorter at each end than the second ply. The large ply of the tire is always placed so that it is on the outside and the stepped-down layers of the shoe fit against the inside surface of the casing.

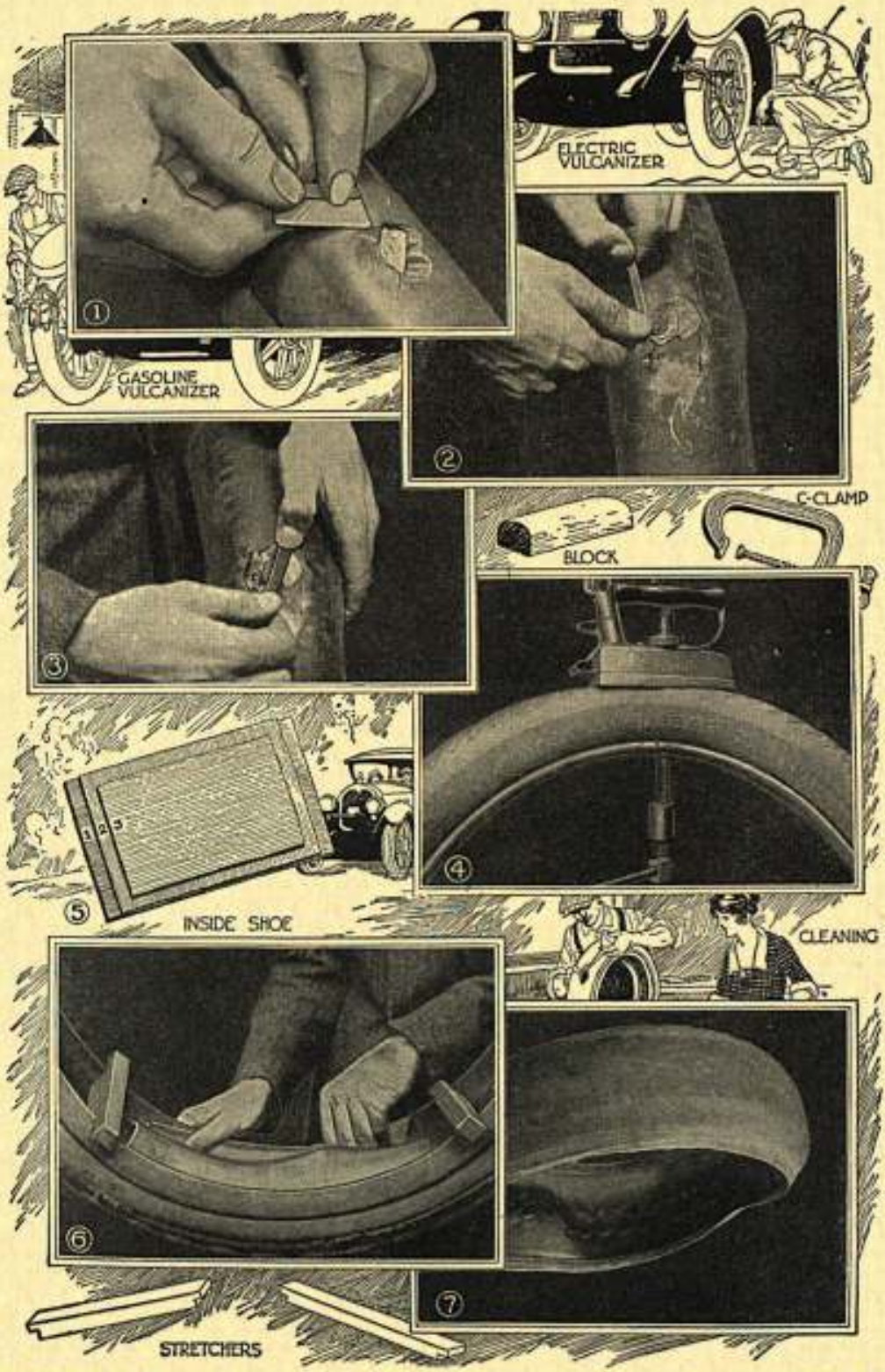
If all the plies of the shoe were ended at one point, there would be some danger of a hinge point at the ends of the shoe, and the sharp bumps which would be formed might injure the inner tube. The gradual ending, or the stepping-down, prevents these sharp edges at the ends.

Ordinary vulcanizing cement is best to fasten the shoe into place. In spite of the fact that there is no equipment in the home garage to apply heat for vulcanizing the shoe into place, the heat from the tire in operation on the road will gradually cure the shoe to the carcass of the tire. In applying the shoe to the inside of the tire, start at the toe of one bead and fasten one edge of the shoe. Work across the tire, pressing down the center of the shoe first and working out from the center to each end. Placing the shoe in this way will do much to eliminate the chance of wrinkles and will insure good contact at all points. With a little practice, one can tell by touch whether the shoe is fitted snugly. A couple of wooden stretchers, used as shown in Fig. 6, should be made to keep the tire spread during the operations described.

If the tread patch is to be used in connection with an inside repair, apply the shoe before curing the patch. Some of the heat from the vulcanization of the tread patch will help to cure the shoe into place. Three coats of vulcanizing cement are used on both the inside of the tire and on the shoe. The tire and shoe must be thoroughly cleaned and washed before the cementing is done; a block of sandpaper and a wire brush are best for doing this. The application of the cement should be extremely liberal, as fabric will soak up a much larger amount of the cement than will the tread of the tire.

The inside shoe is often used without the tread patch, when the injury is confined to the inside of the tire. Sometimes stone bruises will break one or two plies on the inside of the tire and yet not break the tread or sidewall. Chafed spots on the inside of the tire may also be covered with an inside boot. These damages may not seem serious, but are apt to cause much tube trouble until they are repaired.

Reliners are really large inside shoes that extend all the way around on the inside of the tire. They give protection to the tube and are a welcome reinforcement to a weakened casing. Some tire men hold that the reliner does not add to the life of the tire, and such is certainly the case if the reliner is applied improperly. There are many times when the use of a reliner is justified, however, and will add many additional miles of service to the tire. A fairly good tire,



Various Steps in Repairing the Minor Injuries in Tire Casings That may Easily be Repaired If Attended to in Time, But Often Ruin a Tire Beyond Hope of Repair When Neglected

whose carcass has been broken or cracked by abuse, justifies the use of a reliner. The reliner will protect the tube and give strength to the carcass of the tire, but, whenever used, the reliner should be cemented firmly into place.

This type of inside reinforcement may be purchased ready for use, or be made from an old casing. If it is to be made from an old tire, the casing selected for that purpose should have a fairly sound carcass, as broken plies in the reliner will cause much trouble. Like the tire selected for making inside boots, the tire for making the reliner will be somewhat larger than the tire in which the reinforcement is to be used. Reliners are usually made from three plies, with the under ply stepped down so that it fails to reach the bead by ¾ in. on each side. The ends of the plies should also be stepped down so that no two end at the same point.

Both the inside of the tire and the reliner are well cleaned and liberally cemented before the reliner is applied. If the casing is light, it may be turned inside out, as in Fig. 7, while the reliner is applied. Heavier tires must have the reliners applied without turning. Prop the tire open with short stretchers, and work in the reliner in a manner similar to the way the boot was applied. The narrow ply of the reliner should go next to the inner surface of the casing.

Before the cement has had time to dry, mount the tire on a rim and inflate to the proper pressure. The pressure of the tube on the reliner will help to smooth out any wrinkles and make good contact at all points. It is a good plan to powder the inside of the tire with soapstone before the tube is placed. This will prevent the tube from sticking to any cement which may have overrun the reliner.

In cutting down an old tire for a reliner, the tread and sidewalls are removed first. Cut along the junction of the tread and sidewall with a sharp knife. The cut should be deep enough to extend down to the carcass of the tire yet not deep enough to injure it. An old razor blade makes an excellent instrument for cutting down the tire. After making the cuts around the tire, cut across the tread and sidewall to make a starting place for removing the rubber. Pry up one end of the tread and sidewall with a sharp screwdriver and remove the rubber in three strips. The screwdriver may be needed to loosen the rubber as it is stripped back. If the rubber sticks so tightly that it cannot be removed by this method, it can be cut from the tire in small strips.

After the rubber has been removed, the bead cover is taken off. If the end of this cannot be found, a starting place is made by cutting across the cover. The cover is pried loose with a screwdriver and stripped from the tire. Following the bead channel closely, cut the beads from the carcass. If the carcass is to be used for inside boots, cut it into sections of the proper length and step down the plies as explained before. When the material is wanted for a reliner, all plies but three are removed, and the inside ply cut down to the proper width. It is best not to cut the reliner to length until it has been measured and fitted to the tire in which it is to be used.

These simple repairs will handle the most common tire injuries. One should not hesitate to consult a tire man if the repair is beyond the equipment of the home garage, as a few dollars spent at the tire shop may save the price of a new casing. These more serious injuries will be much less frequent, however, if the minor damages are repaired as soon as discovered.

Oiling Motorcycle Transmission

As no appreciable amount of oil is consumed in the gear box of a motorcycle it has to be refilled so seldom that one is liable to forget all about it. On motorcycles equipped with a hand pump this danger can easily be overcome by providing an oil pipe from the pump to the gear box so that the oil can be pumped into the latter in the same way that it is pumped into the crankcase, the same oil being used for both purposes. The additional pipe, which is a length of copper tubing of the kind commonly used for this purpose, is attached by soldering a T or Y-fitting in the pipe leading to the crankcase. A shut-off valve must, of course, be provided in both lines so that when oil is wanted in either crankcase or gear box, the flow of oil in the opposite pipe can be shut off. The tubing leading to the gear box should be bent to an S-shape so that it will not be affected by a slight change in the position of the gear box, which must be moved forward or backward occasionally to adjust the driving chain of the motorcycle.—George Wallace, Dallas Center, Ia.

TIRE REPAIRS IN THE HOME GARAGE

by

Lowell R. Butcher

Part III—Inner Tube Repairs

THERE are few car owners who have not made repairs on inner tubes and it is equally true that there are but few drivers who have not had a tube repair fail on some particularly hot day. Many of the tube-repair failures can be avoided, for it is usually the workmanship that is at fault. A correctly applied patch will make the repaired section of the tube fully as strong as any other part.

Two methods of making tube repairs are in common use: the cold-patch repair, which needs no heat, and is often used for emergency repairs, and the repair by vulcanization, which requires heat to cure the patch. Many car owners prefer the vulcanized repair, holding that there is less chance of failure with this method.

The tire-repair shop makes use of heat from steam to vulcanize repairs, or, in some cases, the heat from an electric tube plate. While the car owner will have neither of these pieces of equipment, he can make vulcanized repairs fully as good as those turned out by any repair shop. A common type of vulcanizer, designed for the car owner's use, is shown in Fig. 1. This vulcanizer is especially convenient when making roadside repairs. The fuel is solid and is contained in a tiny pan the size of the patch. The patch is on the bottom of the pan. To make a tube repair with this vulcanizer, the pan is clamped over the damaged spot, the fuel lighted and in a few moments the repair is neatly vulcanized. This equipment does very well for the smaller tube repairs.

A small gasoline vulcanizer may be secured to make the larger repairs, although such equipment is not absolutely necessary. Almost every home affords an electric iron that can be used to cure the repair. With a little experience, a neat job of tube repairing can be turned out with the iron.

First, and the simplest of all repairs, is the puncture. Either the cold-patch method or the small tube vulcanizer may be used to make the repair. In either case the tube must be well cleaned before any repair is attempted. Sandpaper the portion of the tube around the injury until all grease and dirt are removed and a "roughed" place is provided for the patch. If some high-test gasoline can be obtained, use a little of this to clean the injury. Clean water is better than the commercial grades of gasoline, which usually contain more or less kerosene and low-grade fuel.

If the small vulcanizer is to be used to make the repair, strip the protective linen covering from the patch and clamp the pan and patch over the injury. Prick up a corner of the fuel with a nail or penknife and light. Allow the vulcanizer to remain in place for at least five minutes after the fire has died out. After that, the tube can be dusted with mica or talc, replaced in the casing and inflated. No cement is required when making a repair with this equipment.

The cold patch will require cement for holding the patch into place. Apply two or three coats of this to both the patch and the tube, and allow each coat to dry partly before the succeeding one is applied. Cut a patch from the repair stock, allowing a liberal lap all around the injury; a round or oval patch is best as there are no corners to loosen. When the final coat of cement has dried until "tacky," press the patch into place and use a small C-clamp and block, as shown in Fig. 2, for applying pressure while the cement dries. Allow the patch to dry fifteen or twenty minutes before using the tube. Many failures of cold patches are due to using the tube before the cement has dried.

The tube damage will often be in the nature of several tiny holes in a group, or a puncture which is in the center of a chafed spot. In such cases, it is better to use one large patch to cover the group of holes or the entire chafed surface. A chafed spot in a tube indicates a weakened place and it will be only a matter of time until more repairing is needed

unless the entire surface is covered. Sometimes a portion of the tube is blown out or the tube is badly torn when a tire "blows." If the hole or tear is over ½ in. long, it is best to reinforce the injury from the inside, as, if only an outside patch is used, there is apt to be a weak spot at the point of repair.

First of all, the hole should be trimmed so that the edges are smooth. Ragged edges on a hole are simply an encouragement for tears. Use sandpaper or emery cloth to clean and buff the inside and outside of the tube around the hole. Wash the injury with some high-test gasoline or some clean water. If the repair is to be vulcanized, the inside patch should be made from a material known as combination backing. This is a regular vulcanizing gum and has one side semi-cured to prevent the patch from sticking to the opposite side of the tube. Cut a patch from this large enough to lap the hole at least ½ in. all around.

Regular vulcanizing cement must be used to make the repair. Apply three liberal coats to the inside of the tire and to the raw side of the patch. When the final coat of cement is almost dry, the patch should be inserted. Moisten the inside of the tube with high-test gasoline to prevent the patch from sticking until it can be centered. Place the patch over the hole, cemented side up, and force it in with a blunt stick as indicated in Fig. 3. Lifting up on the tube while the patch is pressed in will help to get it through. Center the patch carefully before the gasoline dries and inflate the tube slightly to smooth the patch into place.

Before the outside patch is applied, the hole must be plugged with a little gum. This plug should be cut from tube-repair stock to a shape that exactly fills the hole. Now cut the outside patch, making the corners round, and the lap around the edges of the hole slightly greater than that of the inside patch. Regular tube-repair stock is used for the outside patch. Cement as for the inside patch and press firmly into place, and the repair is ready for vulcanizing.

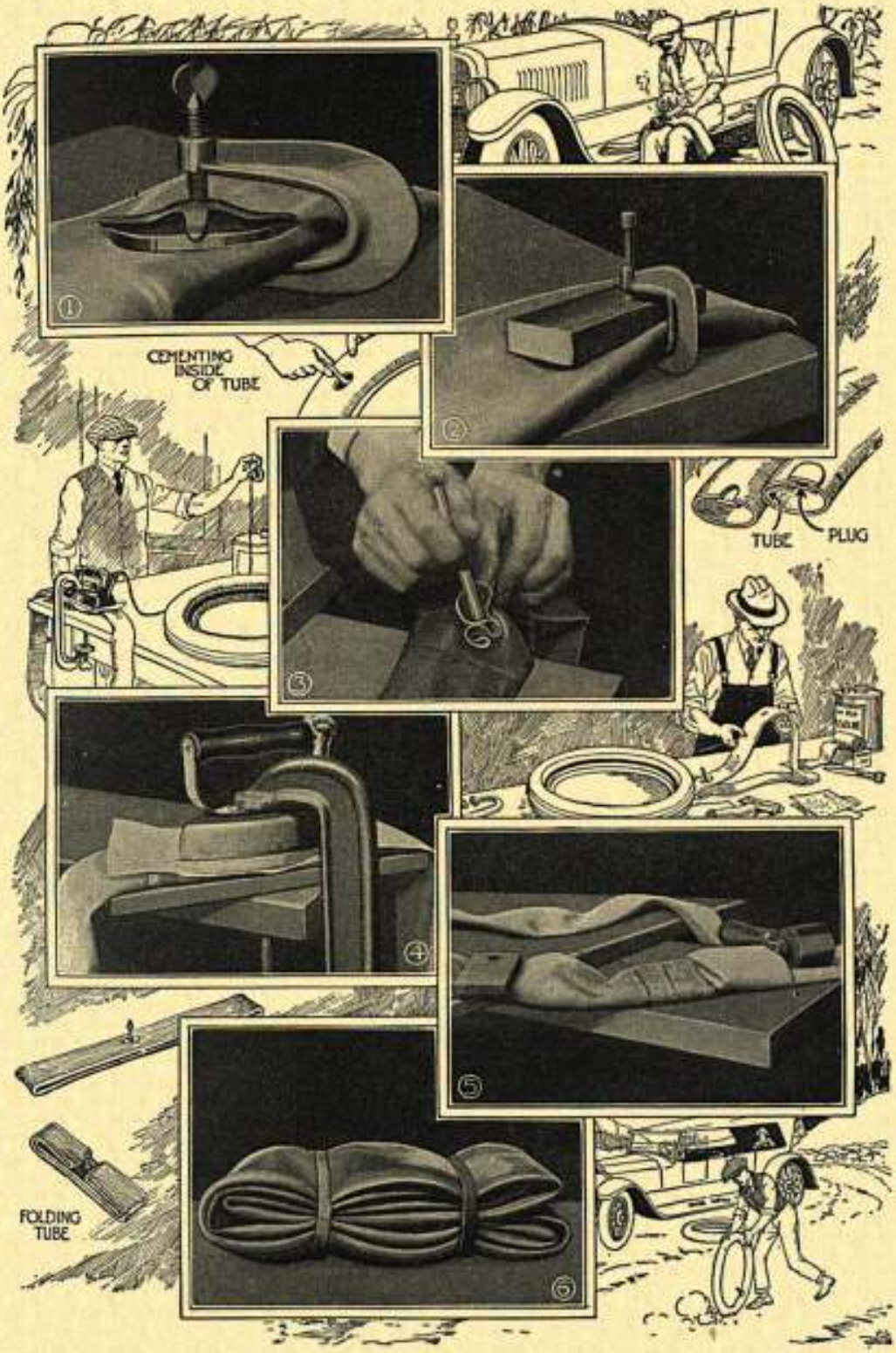
A piece of cloth or paper should be placed between the electric iron and the patch; "holland"—the protective cloth found around new repair materials—is excellent for this purpose. Place a smooth board under the tube, and clamp the electric iron down on the repair with a large C-clamp, as in Fig. 4. Some little experience in regulating the heat is necessary to get the best results. If the iron is heated to a sizzling heat and the current turned off before the iron is clamped into place, there is usually enough heat retained in the iron to cure the repair. An undercured repair will be soft and retain the impression made when a pencil is pushed into the gum. Properly cured gum will spring back into shape after the pencil is removed. Overcured material will be hard, brittle, and lack the life of properly cured rubber.

The repair just outlined can be made by using the cold-patch method, but it is doubtful if the finished job will be as satisfactory. Regular cold-patch material is used instead of the vulcanizing gums and cold-patch cement instead of the vulcanizing cement.

It is a little difficult to repair an injury very close to the valve stem. This kind of a damage, or a torn valve-stem hole, is best repaired by shifting the valve to a new position, and patching the old hole. In shifting the valve stem, one should always push the valve stem inside the tube. Any effort to pull the bottom of the stem through the hole it is to occupy may result in tearing the tube.

The valve pad for the new position may be cemented into place with cold-patch cement or vulcanized, but the latter is to be preferred as the repair is more likely to be permanent. Select the new position for the valve and cut a small hole for the stem. Buff the tube around the hole with sandpaper and wash carefully. Cut an old valve pad from a worn-out tube and buff the bottom of this thoroughly. Cement both the tube and the bottom of the pad with three liberal coats of vulcanizing cement.

Cushion stock, a yellow vulcanizing gum, is used to bind the pad to the tube. Mark out the space to be occupied by the pad and cover this portion of the tube with cushion stock, 1/32 in. thick. This is best applied in narrow strips. Continue to apply these until the entire space to be occupied by the pad is evenly covered, then press the pad into place and roll to press out any air bubbles. Fill the valve-stem hole with a chunk of inner tubing to prevent the hole from filling from the overflow of the gum during the cure. Slightly more heat may be required in this case, due to the fact that the raw gum is sandwiched between the pad and the tube. The electric iron is clamped down as before and the repair cured. After the vulcanizing is done, the valve stem may be pushed up through the hole and the valve assembly tightened into place. The hole formerly occupied by the stem is repaired in the usual manner.



Methods of Repairing Injuries in Inner Tubes, from the Smallest Puncture to the Blowout Requiring the Splicing In of a New Section: This Work May All Be Done by the Car Owner

Bad blowouts or tears which extend part way across the tube may be so serious that they cannot be repaired by the usual methods. Sometimes what may seem to be an impossible repair may be made by cutting out the damaged section and splicing in another section of tubing the same length. This kind of repair necessitates two end splices, by far the hardest tube repair there is to make, and much care must be taken to keep the tube from being either shortened or lengthened during the splicing. The section cut out should be measured to give the dimensions for the replacement section. This section can be cut from another old tube of the same size as the damaged one. Cut the replacement section about 3 in. longer than the part cut out; this will allow for a lap of 1½ in. at either end.

By trial, it will be found that the section to be spliced in is slightly larger or smaller in diameter than the tube. Make the splice so that the smaller diameter fits inside. Clean the splice ends by buffing them with sandpaper and wash with some high-test gasoline. If the part that is to fit outside is turned back, the buffing and cementing can be done more easily. Cement both the inside and the outside section of the lap with three coats of vulcanizing cement. Cut three strips of ½₂-in. thick cushion stock and arrange them around the inside end of the splice as shown in Fig. 5. Turn back the other section over this and roll the joint to press out any air bubbles or wrinkles.

Three "hitches" will be needed to cure the joint. Clamp down the heated electric iron on the splice and allow it to cure the splice from one side. Turn the tube one-third of the way around, and repeat the operation, and finally flatten the remaining third down and cure again. After the last cure is made the tube should be plunged into water to prevent the tube from sticking together on the inside. The second end splice is made exactly the same as the first, after checking the tube for length.

These ordinary repairs will take care of all common tube injuries.

No matter which method of repair is used, the success of the repair will depend upon the cleanliness with which the work is handled and the care taken in doing the work. Grease, oil, and dirt are fatal to repairs, and the first duty of the repairman should be to see that the injury is thoroughly cleaned.

The larger tube injuries are easy to find but tiny pin-hole punctures may be difficult to locate, especially if no water is available in which to test the tube. If the repair is being made by the roadside, roll the partly inflated tube in the dust of the road, and a spurt of dust will be kicked up by the air from the puncture. The hole can sometimes be found by passing a moistened finger along the suspected part of the tube, when the air current from the hole will feel cool to the moistened finger. A particularly elusive puncture can be found by mounting the tube in a casing and inflating. Test the entire tire in a tank of water and mark the position of the leak on the casing. When the tube is removed, notice what portion of it was adjacent to the marked place on the casing.

Inner tubes become worthless if allowed to hang in the light and air for any length of time. If an extra tube is not carried in the car, it is best to fold it up and put it away in a dry and cool place. If an inner tube becomes dead and lifeless it can be restored, to some extent, by soaking in warm water.

The tube which is carried in the car should be folded and packed in a bag or wrapped in burlap. Boxes should be avoided, as they are apt to rub holes in the tube. A section from a large inner tube makes a very satisfactory bag for carrying the tube. The smaller tube can be folded and slipped inside the section from the large tube. The proper method of folding the tube is shown in the lower left-hand sketch, and the folded tube in Fig. 6. Needless to say, the inner tube should not be thrown in among the tools, where holes will be punched in it. Pack it carefully and put it where there will be no danger from shifting equipment.

All the tube repairs mentioned are so simple that they can be made without the aid of an expert tire man. The materials for the vulcanized repairs can be purchased at any tire shop, and only a small quantity of any should be purchased at a time. The age of the materials has nothing to do with their quality, but dirty materials will not make good repairs and a little stock will last the ordinary man a long time. If the materials get soiled or seem to lack life, freshen them up by washing with high-test gasoline.

A gasoline vulcanizer may be purchased if desired, to make the larger repairs but there is no need of going to this expense when such excellent results can be obtained with the electric iron. If the motorist wishes to make his emergency tube repairs by vulcanizing, the small solid-fuel vulcanizer makes a very compact repair outfit.

Auto-Trailer Rowboat Truck

During the dry days of summer, many rivers are reduced to shallows and pools, and to reach a good fishing or bathing location, without having to push or pull the boat over the shallows is impossible. Having this in mind, the rowboat truck illustrated was made from the front axle of an old automobile, to which two boards were bolted; the outer ends of the boards were bolted together, as shown. Crosspieces were nailed to the boards to serve as a cradle for the boat and prevent it from working out of position. The boat is placed on the truck so that most of the weight is supported by the axle instead of the planks. This truck is easily fastened to the rear of an automobile and hauled at fair speed over average roads to a place where the water is deep enough for the engine.—A. E. Granville, Barbourville, Ky.

When Summer's Heat Dries Up the Streams So That Deep Water must be Sought Elsewhere, the Boat can be Loaded onto This Truck, Hitched behind an Auto, and Hauled to the Nearest Deep Water

Lamp Shade for the Photographer

The photograph shows an improvised lamp shade for use in a photographer's dark room when developing prints. The shade is made from an amber-colored bottle, with a neck large enough to admit the end of a lamp socket. On some bottles the flange on the neck fits nicely in a common shade holder. The bottom of the bottle is removed and the rough edges are ground down, to prevent injury. The bottle may be cut in several ways: A carborundum disk having a thin edge, if kept wet and rotated at a high speed, will cut heavy glass, but the bottle must be fed against the wheel very gently. A better way is to make a file mark—clean but not very deep—around the bottle and heat it with a long slender flame while slowly rotating the bottle. It is very important that the gas flame should not spread over the surface of the glass, for it is only the file mark that should be heated. A mere glancing touch is sufficient, and the glass will usually crack off in a very clean cut. Sometimes a fine platinum wire is wound around in the file mark and heated by an electric current. Less common is the trick of wrapping a strand of cord, soaked in kerosene, around the mark and igniting it. The principle is the same in each case. The unequal heating of the glass causes it to break, and, of course, it breaks at the weakest point—the file mark.—Paul J. Garvey, Chicago, Ill.

Preventing Damage from Storage-Battery Acid

Storage batteries, used for radio purposes, are often set on the carpet or on the varnished and polished floor, and, while this may be unavoidable, it is not advisable to take chances of having the rug or the floor finish ruined by any acid that may accidentally be splashed out, or that, in case of old batteries, may seep through the bottom. This danger is eliminated by the use of a shallow wooden box filled with sand, in which the battery is set, as shown in the drawing. A pair of handles, made of stout wire, are attached to the box to facilitate lifting and carrying the battery. Any acid that seeps through the battery case will be absorbed by the sand.

Skirt Used as Grass Bag

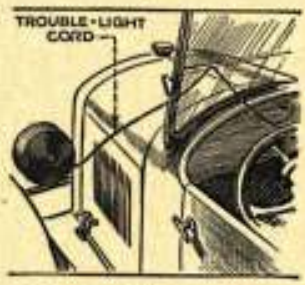
An old wide dress skirt, with the belt cut off, and the bottom stitched across, makes an excellent bag for carrying lawn

Large Bag Made from an Old Dress Skirt, and Used for Carrying Grass and Leaves Raked from the Lawn

rakings. Several bushels of mown grass can be carried in it conveniently, as it is short and wide, and does not weigh as much as a basket.

Emergency Headlights

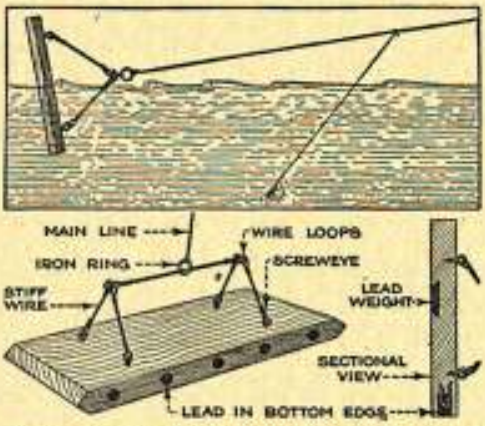
When the headlights of an automobile are "out of commission," owing to a ground or a short, one or both of them can still be used, providing there is a trouble lamp in the car. The trouble-cord lamp socket is removed, and the wires attached to the headlight plug, replacing the usual wires. The cord is then run from the dash-lamp socket to one of the headlights, as shown, or better still, by means of an extra length of cord, it can be connected to both headlamps, in parallel. It is a good idea to be prepared to meet emergencies of this nature by carrying an extra trouble cord, fitted with a plug at each end.



Fishing in Center of Swift River

How to fish a rushing river in midstream successfully has been a mystery to many who have wanted to try their luck in the far-out pools, which are difficult, if not impossible, to reach from shore. For such fishing, the board or trolling guide shown serves excellently.

The device is made from light pine and is 1½ ft. long, 6 in. wide, and ¾ in. thick. Both ends are pointed, as shown, the better to cut the water. Four screw-eyes are driven into one side of the board, and wires that are stiff enough to prevent bending easily are attached to the eyes, as shown, by making a ring or eye at the ends. A horizontal wire with an eye at each end is run between the end wires and is attached to eyes made in the outer ends of the first wires. The line that runs to the boat or fisherman's rod has a ring fastened to it that slides freely along the crosswire. The line with the lure on it is connected to the main line, and with it one can reach the deep spots that cannot otherwise be successfully fished. To make the block ride the water properly the bottom edge must be ballasted with lead.



Fishing Block or Trolling Guide for Fishing in the Middle of a Swift Channel

Holes are drilled into the edge of the board with an auger bit, a staple or nail driven into the center of each hole, and melted lead is poured in. Enough holes are made and filled in this manner so that the block will be pulled down in the water to a depth of 3 inches. Also, as there is a pull on the line side this must be balanced by weighing down the opposite side, which can be done by cutting a dovetailed groove along the back of the board, and filling it with melted

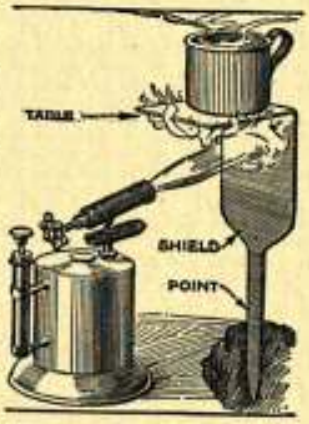
lead, or by fastening a weight to the board, above the center. This will make the device swim at the proper angle, so that when there is a pull on the line, the device will not turn over toward the line side.—Robt. Page Lincoln, Minneapolis, Minn.

Upholstery Nails Improve Steering Wheel

The steering wheel of a light car, which has straight pinion gearing from the wheel to the steering knuckle, is deflected very easily by stones and ruts on the road, so that it is necessary to grip the wheel firmly on rough roads. To prevent the wheel from slipping in the hand, due to its smooth surface, ordinary round-head upholstery nails should be driven into the steering wheel on the inside The nails used for this purpose have a large fiber head, about ½ in. in diameter.

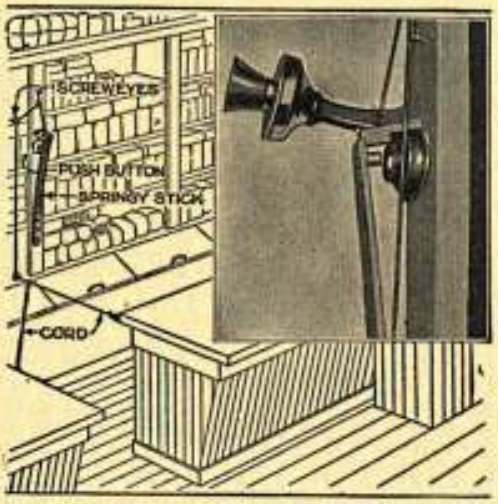
Cooking Lunch with a Blowtorch

The writer once worked at steam fitting and learned, among other things, a handy way to heat a lunch with a blowtorch. A piece of flat steel is cut to form a portion, 4 in. wide and 7 in. long, which narrows down to a section, about ¼ in. wide and 5 in. long, tapering to a sharp point, The wide portion is bent at right angles 4 in. from the end, and forms a table 4 in. square. The narrow part is stuck into the ground or floor when used, and a blowtorch is placed in the position indicated, with the flame directed under the table. A lunch can be heated in a surprisingly short time in this manner.—L. B. Robbins Harwich, Massachusetts.



Simple and Effective Burglar Alarm

A village storekeeper, who did not wish to become a victim of robbery of which a number had occurred in his vicinity,



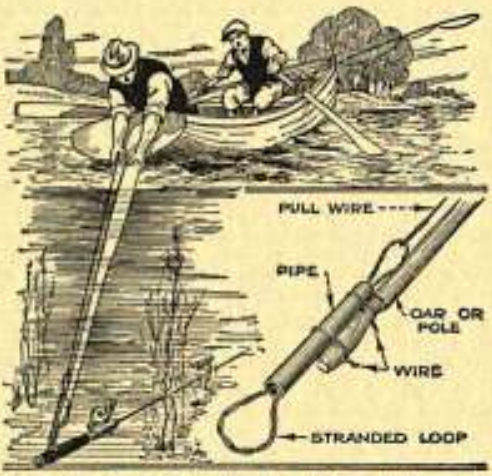
Simple Burglar Alarm Improvised by a Country Storekeeper: It Actually Aided in Catching a Burglar

improvised the simple burglar alarm shown in the photograph, and, with its use, succeeded in capturing one of the night marauders.

The alarm consists of a trip arrangement, which, when released, presses the telephone push-button switch, thereby ringing the call bell at the telephone exchange. The operator then notifies the sheriff, the owner of the store, and other interested parties. The trip is merely a springy stick, with the lower end securely screwed to the wall below the button, the upper end being loose and fitted with a short peg. The push-button switch is located directly under the peg, as shown, so that the button will be pushed down when the stick is released. A short piece of wood is set between the edge of the stick and the wall, and is connected to a long stout cord, passed through a few screweyes, and stretched in the position most likely to be passed by one attempting burglary. When this cord is pulled the piece of wood is dislodged and the peg presses the push button, which rings the bell at the telephone office continuously until a switch is released by the operator. As no alarm is sounded within the store, the intruder is unaware that he has "given himself away"—until the arrival of the officers. This idea can only be used, of course, where a push-button ringer is used on the telephone.

Salvaging Submerged Objects

While idling along close to shore in a rowboat one day the writer happened to "spot" an object lying in the mud about



A Handy Device for Salvaging Objects Submerged in Shallow Water

7 ft. under water. After ascertaining that this was a steel fishing rod, preparations were made to salvage it. Several attempts to hook it with a large fishhook proved futile, so in the end the writer had to don a bathing suit and go after it. This little incident suggested a better method of salvaging submerged objects, which was later tried out and found successful.

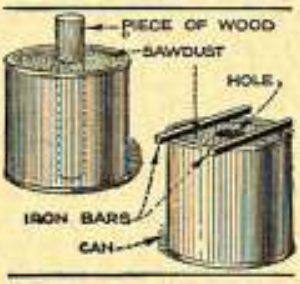
A piece of pipe about a foot long, and a length of hay-baling wire, were picked up around the barn. The wire was doubled and twisted to make it stiffer, then formed into a loop and inserted in the pipe so that it projected out of both ends, as shown. These parts, and a coil of the baling wire, were kept in the bottom of the boat, to be assembled as shown in the sketch when an object worth salvaging was located.

When using the device, the length of pipe is wired to the handle of an oar, with the wire loop inside, and the lower end of the loop projecting enough so that it can be passed over the object to be salvaged. A wire attached to the upper end of the loop and running up to the user is then pulled, so that the loop holds the object securely. By lifting the oar the object is easily brought to the surface.

When trying to ascertain the nature of a submerged object, a powerful flashlight is of aid.—C. M. Wilcox, Torrington, Conn.

A Cheap Glue-Pot Heater

A small tin can filled with sawdust makes a glue-pot heater that will keep the glue hot all day; a ½-gal. can is large enough. Set a round piece of wood vertically in the center of the can and fill the space around it with sawdust. Then remove the piece of wood and drop a lighted match into the hole; this will cause the sawdust to start burning, giving heat enough to keep the glue soft. Two short iron bars are placed on top of the heater to provide an air space between it and the glue pot.



Back-Yard "Hen Pastures"

Green feed is necessary to the health and productivity of hens, and the farmyard has no end of green things, bugs, worms, seeds, and grit, which may be had for a little desultory hunting. The commercial poultryman also takes special pains to supply free range if possible, or provides some kind of green feed in sufficient quantities to keep the birds flourishing, but the back-yard hen frequently has a hard time of it, and the owner often decides that there is something wrong with the breed or with the grain combination, when there is nothing more the matter than lack of green feed.

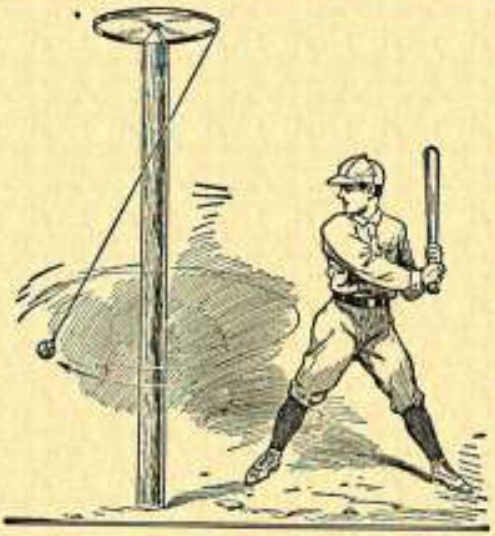
One of the principal things this back-yard hen needs is a "magic green carpet." That carpet, says the U. S. Department of Agriculture, can be made of oats grown in a small part of the yard. Instead of putting a fence around this tiny field to keep the fowl from destroying it before it has a chance to develop, some fine-mesh fencing wire is placed over it, the wire being tacked to a frame made from pieces of 2 by 4-in. wood. The oats will grow up through the mesh where the hens can pick them off, but they will be unable to reach in far enough to do any

serious damage to the plants. Such a patch of oats, if watered regularly, will last for a long time. The hens will walk over the wire and graze off the tops, but if the wire has been stretched tightly it will not sag down far enough to permit the hens to reach the ground.

"Solo" Batting Practice

The young baseball enthusiast often finds himself handicapped in batting practice because there is no one to pitch the ball. The device shown, while hardly taking the place of a pitcher, nevertheless affords the batter considerable practice.

On the top of a post, 12 ft. high, a bicycle wheel is mounted. A stout cord or light rope, about 10 ft. long, is tied to the rim, and a baseball is attached to the lower end by means of a screweye. The batter gives the ball a swing and the momentum carries it around the post, causing the bicycle wheel to rotate in the same direction. When the ball crosses

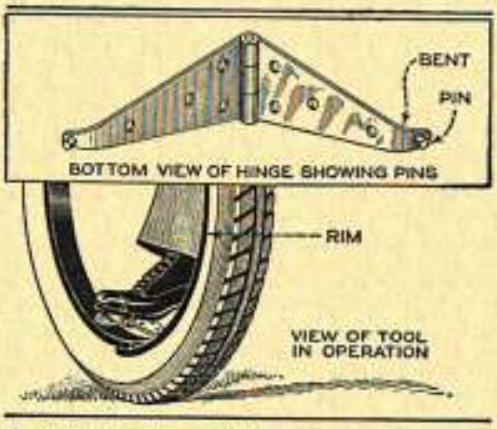


Mechanical Baseball Pitcher That Provides Continual Batting Practice When No Pitcher Is Present

the imaginary plate, the batter strikes it, sending it in the opposite direction. If the hit has been square, the ball will make several revolutions before it has dropped far enough to enable the batter to strike it again. The batter strikes first in one direction and then in the other, which, with practice, will enable the player to use either hand.—Dale R. Van Horn, Walton, Neb.

Rim Spreader for Changing Tires

A common 8-in. barn-door hinge can be used to good advantage for spreading automobile rims when changing tires. If



An Effective Automobile-Rim Spreader Made from a Barn-Door Hinge

the rims are perfectly plain at the split it will be necessary to drill two 5/16-in. holes about 4 in. from the ends. Two pins are riveted or welded to the end of the hinge and each end is then bent as shown. The pins are inserted into the holes drilled in the rim and the hinge is pushed down with the foot, thus spreading the rim. If there are studs on the rim, the hinge can be used without pins, by simply butting the ends against the studs, notching the ends if necessary to prevent the hinge from slipping.—Frank N. Coakley, Buffalo, N. Y.

Hanger for Oars

Boats are usually not provided with means for keeping the oars outside of the boat and above the water when they are not in use, and this necessitates lifting the oars into the boat, with the result that the seats are bespattered with water from the wet blades. To overcome this, simple hangers of the kind shown in the illustration can easily be made from short lengths of strap iron, bent as indicated and fastened firmly to the gunwales by long screws.

Seat on Cripple's Crutch

A cripple, one of whose legs is amputated above the knee, uses a crutch to which a support of the type illustrated is

Convenient Crutch Seat or Support That Lessens the Pressure of the Crutch under the Arm

attached. The seat is located at the point most convenient for the user, and takes part of his weight, thus relieving the pressure of the crutch under the arm. It may also be used as shown in the drawing. The support is made of ¾ or 1-in. wood, comfortably padded on top, and braced by means of ¼-in. iron rods, flattened at each end, drilled, and bolted to support and crutch.—A. C. Cole, Chicago, Illinois.

Making a Lock Jimmy-Proof

An ordinary door lock can be made jimmy-proof by drilling a 5/16 or ¼-in. hole through the lock casing, the end of

the bolt, and the door casing, as shown in the drawing, so that a nail or a pin can be pushed in. When the door is locked and the pin pushed into place, it will be a hard matter for anyone to jimmy the door from the outside. This idea has been tried and found thoroughly practical.—L. E. Fetter, Portsmouth, N. H.

Homemade Radio Dials

Substantial radio dials of neat appearance can be cut from old rubber storage-battery jars. To facilitate cutting, the rubber is softened by heat. After the dial, cut roughly to shape, has hardened, which can be hastened by immersing it in cold water, it is trimmed down and beveled upon a lathe. If a lathe is not available, one can easily be improvised by mounting the dial concentrically on any wheel that can be revolved at a speed sufficient for cutting. A sharp chisel is then used in the ordinary way.

To graduate the dial, it is again heated, to enable neat impressions to be stamped upon it. The lines are pressed in with a knife edge, and the numbers with type obtained from a printing shop. After the impressions have been made, and the dial has cooled off, white paint is dabbed over the impressions. The dial is then carefully rubbed with a dry cloth, so that all the paint but that in the graduations and numbers is removed.

Simple Holder Makes Inner-Tube Repairing Easy

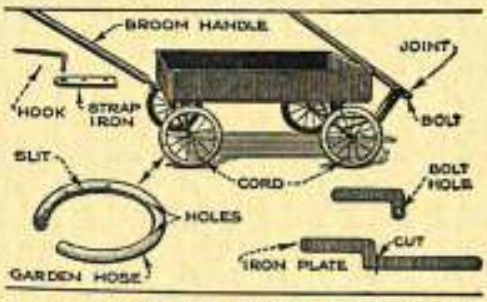
The fixture shown in the illustration is very convenient for holding inner tubes securely while making repairs. It consists of a length of ¾-in. pipe, bent and flattened as shown, and drilled at each end to receive the wood screws with which it is pivoted to one end of a 9-in. length of 1 by 4-in. wood. The base is screwed down to the bench securely, so that it projects about 6 in. over the edge, as indicated. In use, the tube to be repaired is placed in the position shown, and the pipe is pulled down, flattening the tube and holding it securely while the surface is cleaned and the patch applied. A space is left between the sides of the pipe and the base, so that the tube will not be chafed.

Reconstructing a Small Wagon

An ordinary coaster wagon with flat steel-rimmed wheels was rubber-tired with lengths of ordinary garden hose, split open on the inside with a knife and stretched around the wheels as shown. A few holes were punched along the edges of the slit to permit the hose to be laced to the rim with shoestrings. The lengths of hose were made to fit together snugly at the ends.

The handle of the wagon was also changed to make it easier for the rider to steer. The tongue was cut near the end attached to the axle, and two iron plates, which, in this case, were taken from the legs of an old army cot, were attached so that the upper end of the tongue could be swung back over the cart. It is not essential to have the plates of the shape shown; straight pieces will do just as well if a little space is left between the cut ends of the tongue.

To make it an easy task for an older person to push the small cart, a short piece of strap iron, with a hole drilled in the end, was attached to the rear end of the cart as shown. A screwhook, screwed into the end of a broom handle, was hooked into the hole of the strip of strap iron, and the handle used to push the cart; this allows the rider to steer,



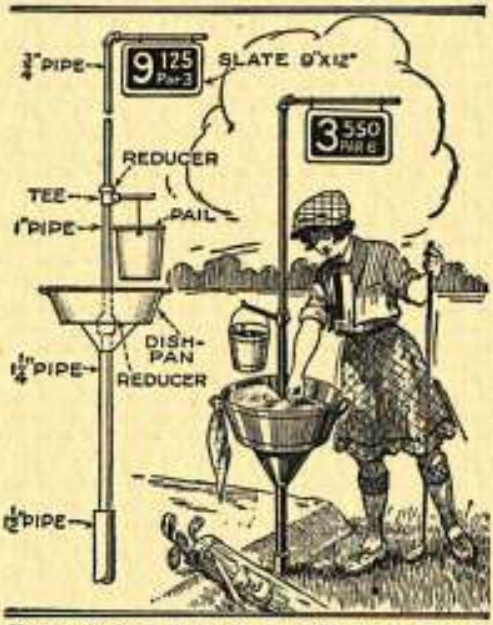
In Reconstructing a Small Cart, the Wheels were Rubber-Tired with Lengths of Ordinary Garden Hose

while giving the "motive power" complete control of the wagon at street crossings.—Mrs. Ruth D. Shultis, Albion, Michigan.

Portable Sand Stand for Golf Course

The drawing shows a portable homemade sand stand for the golf course. It can be made for a small sum in comparison with that asked for similar manufactured stands, and it gives just as much satisfaction.

The sand box is made from a 16-in. dishpan, and the upright parts from lengths of ordinary galvanized-iron pipe and fittings. The base is a 2-ft. length



Homemade Sand Stand for the Golf Course That Is Just as Satisfactory as a Manufactured One

of 1½-in. pipe, driven into the ground. The stand is simply set into the base. The lower length of pipe, which is 1¼ in. in size, is 4 ft. long, and a reducer is screwed onto the upper end. On the shoulder of the reducer the dishpan is placed, a hole being, of course, cut in the bottom of the dishpan, and part of a funnel is soldered to it, as shown; the funnel prevents the pan from tipping, but allows it to be rotated if desired. The 1-in. pipe above the reducing nipple is about 18 in. long. A reducing tee is fitted on this, a 1-ft. length of ¾-in. pipe, notched to hold the water pail, is screwed into the tee horizontally, and a 3-ft. length vertically. An elbow is screwed onto the top, and a 1-ft. length of pipe is extended as a support for a sign, giving the number of the hole on one side, and ground rules relative to the individual hole on the other side. Ordinary school slates, with screweyes driven into the edge, have proved satisfactory as signs.

During the winter these stands are taken from the golf course, painted, and stored away. A seamless dishpan is used, the handles being left on to provide places to attach a towel.—Dr. Frank B. Swartzlander, Doylestown, Pa.

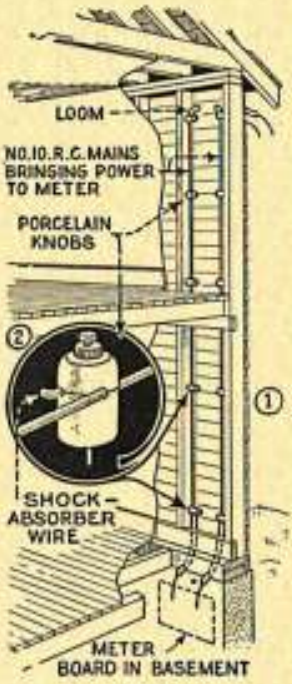
Wiring Your Home

By E. R. Haan

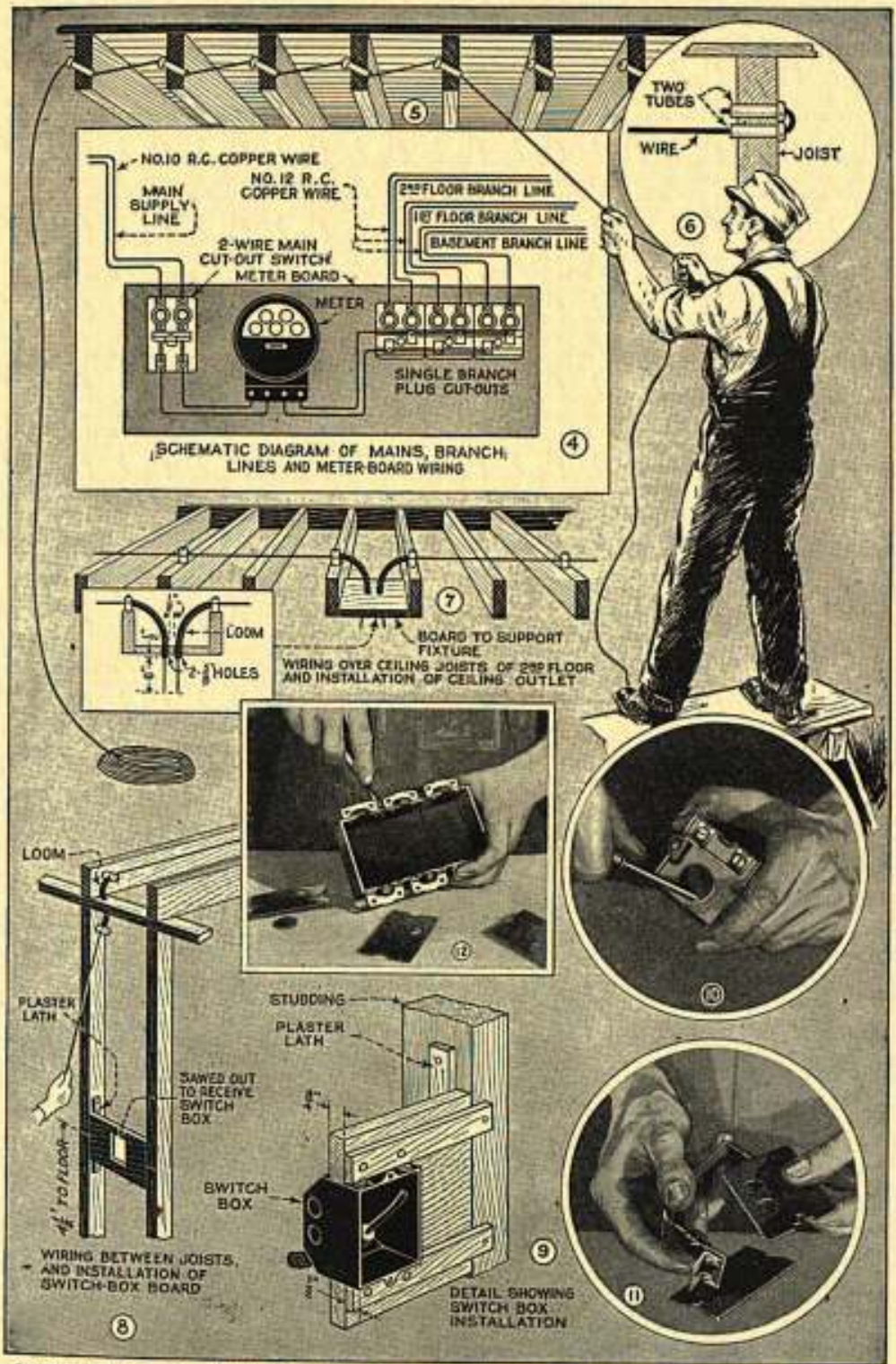
WIRING a house is usually considered the task of an expert electrician, but anyone who is able to grasp just a little theory and follow simple instructions as to the method of doing the work can easily wire his own home. The work of wiring a house is not advised, however, for home owners in the larger cities, where it is necessary that the work be done by a licensed electrician, but is especially recommended for the small-town home owner, and for the farmer. These may make a worthwhile saving by employing their spare time for this purpose. In this article the method of wiring houses under construction will be described, while sequent articles will contain information on wiring old houses, flexible metal-conduit work, fixture hanging, etc.

The first thing to do is to select the necessary tools. Those mostly employed by an electrician are a pair of wire cutters, a hammer and an auger. A pair of 6-in. side-cutting pliers will be found most convenient. A straight-claw hammer is highly preferable to an ordinary carpenters' hammer, as it is frequently necessary to remove porcelain knobs, boards, etc., for which the straight claw is particularly adapted. The handle should be cut short to make it handy for nailing between studdings, joists and rafters, which are usually spaced 16 in. center to center. A 5/8-in. auger is the most useful size on a wiring job. Get two or three of these, as they soon get dull and no time should be wasted on the job with a dull drill or in sharpening it. A ratchet brace or a corner brace is absolutely necessary. An ordinary brace cannot be used owing to the cramped quarters in which one must occasionally work. Next, get a couple of screwdrivers, one having a 2 or 3-in. shank and the other a 5-in. shank. A soldering iron and a blowtorch are also requisites for a wiring job, as every connection must be soldered as a precaution against fire and other troubles. The need for a small can of non-acid soldering flux, a pound or two of solid-wire solder, a roll of rubber tape and a roll of friction tape is obvious. A small keyhole saw is necessary for sawing out holes for flush-switch boxes, and a wood chisel will greatly facilitate this work. For sawing boards a small crosscut or panel saw is used.

Now the materials for the work have to be purchased. Perhaps you can make arrangements with the town

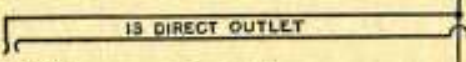


Installation of Main Supply Lines Running to Meter Board



Various Details of a Good Wiring Job Which Can Be Done by an Amateur, No Special Skill Being Required to Do This Work

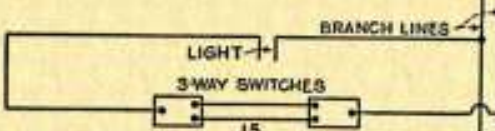
electric shop to return whatever wire, loom, knobs and tubes you may have left, as it is difficult to estimate the exact amount required. For an ordinary seven or eight-room house you should have a 500-ft. roll of No. 14 rubber-covered copper wire; about 200 ft. of No. 12 rubber-covered wire; 100 ft. of No. 10 rubber-covered wire; 50 ft. of "circular loom"; 200 porcelain knobs;



20 2½-in. porcelain tubes; as many flush-switch boxes as necessary; three double-pole, single-branch, plug cut-outs, and one two-wire main-panel cut-out with switch.

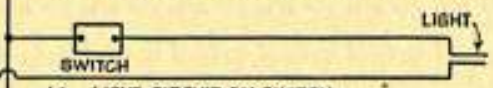
The proper time to wire a new house is just before lathing. Then the partitions will all be up, or should be, the preliminary plumbing work will be finished, the subfloors will be laid, and all the door and window jambs will be in place. The wiring has to be done at this time, and done as quickly as possible, or the lathers will be waiting. Under ordinary circumstances and if nothing untoward happens to interrupt the work, it will take the amateur electrician about two or three days to wire a one-family house of average size.

The "mains" are to be put in first.



15
3-WAY CIRCUIT FOR CONTROLLING ONE LIGHT FROM TWO SWITCHES

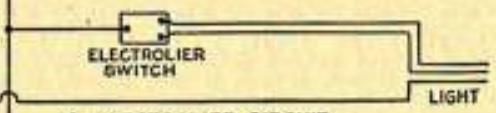
Their position is determined by the location of the nearest power-line pole in the street or alley. The mains should be brought out of the side of the house, preferably a few feet below the roof and at a point which is nearest to the city power lines. Drill two holes, about 12 in. apart, near studs as shown in Fig. 1. Now tie a weight to the end of the No. 10 rubber-covered wire, taking the end on the inside of the coil. Always follow this practice in unwinding a coil, as it will prevent getting the wire tangled. Drop the wire down the inside of the wall until the weight hits the first-floor sill. Then drill a hole through the sill and pull the wire into the basement where the meter board is to be installed. Do the same thing with the other main wire. In some cases it is desired to have the meter on the porch. A similar procedure is then followed, taking care never to cross a joist, sill or studding, but to go through it, pushing a porcelain tube or a length of loom through the hole before threading the wire through. A porcelain knob is nailed to the studding near the hole through the siding, and a length of loom, long enough to reach from the knob to about 4 in. outside of the wall, is slipped over the wire before it is pushed through the hole. Knobs should be located every 4 or 6 ft. apart, and the wire should be drawn taut before the



14 LIGHT CIRCUIT ON SWITCH

knobs are driven tight. A short length of wire in the empty groove on the knob, as shown in Fig. 2, will permit one to drive the nail down tight without danger of breaking the knob. Grasp the wire with one hand and pull it taut while driving the knob down as shown in Fig. 3. A good method of straightening wire before knobbing is shown in the headpiece.

After the two mains have been strung, two pairs of branch lines are installed. No. 12 wire is used for this purpose. These lines extend from the meter board up through the partitions and along the center of the ceilings of the first and second floors, from one side of the house to the opposite side, as shown diagrammatically in Fig. 4.

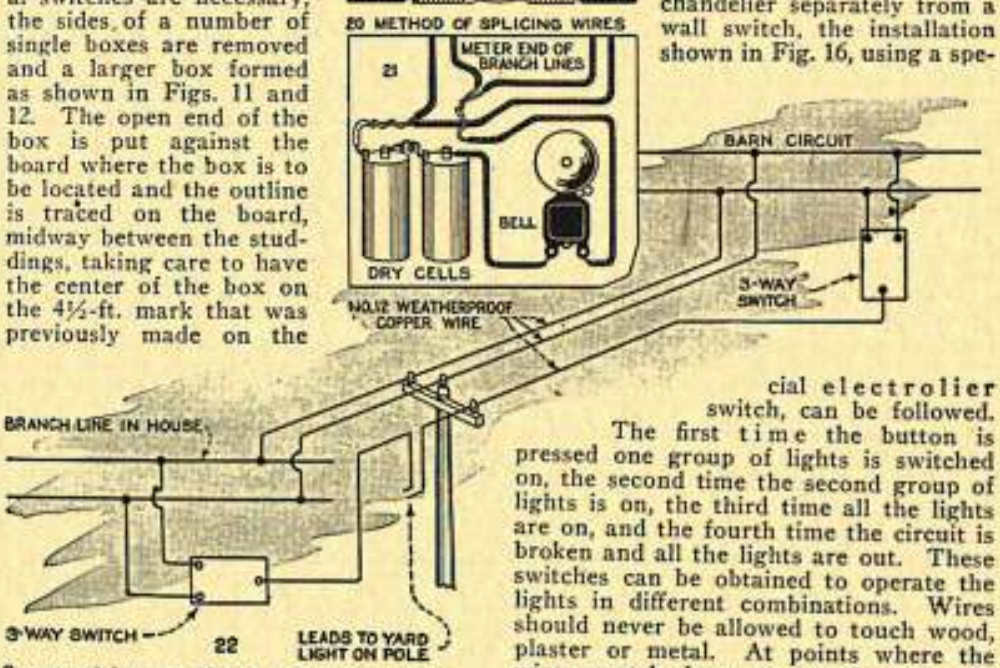


16 ELECTROLIER CIRCUIT

No switches are cut directly in the branch lines, but the wiring to the various rooms is tapped off at points most convenient. It will be found best practice to run the second-floor branch line first. Usually the wires can be strung right over the joists of the ceiling of the second floor, on knobs, instead of passing through them, which saves considerable time and expense.

Wherever outlets are to be located, a piece of ¾-in. board should be nailed between the joists, as shown in Fig. 7,

to support the fixture. The ceiling outlets are usually located in the center of the rooms. Wall lights should be about 6 ft. above the floor, switches about 4½ ft. from the floor, and the wall outlets, such as flush receptacles for cords, are located just above the baseboard. To be sure that all switch boxes are exactly the same height, take a stick, 4½ ft. long, set it up vertically and mark the joists, as shown in Fig. 8. This should be done before the board is nailed between them. Flush-switch boxes of the kind shown in Fig. 9 are used. Where several switches are necessary, the sides of a number of single boxes are removed and a larger box formed as shown in Figs. 11 and 12. The open end of the box is put against the board where the box is to be located and the outline is traced on the board, midway between the studdings, taking care to have the center of the box on the 4½-ft. mark that was previously made on the



Correct and Incorrect Method of Making Connections; Method of Testing the Circuits, and the Wiring of a Farm-Yard Light

studdings. Drill holes at the corners and use the keyhole saw to cut out the hole. The clamps on the boxes are adjusted so that the boxes will project ½ in. beyond the face of the board, as shown in Fig. 9, which makes the edge of the box flush with the surface of the plaster. Before the box is fastened, the necessary holes are made for the wires by pushing out the perforated portions. Use the claw of the hammer to knock the perforated section inward and then bend it with a screwdriver until the piece breaks off as shown in Fig. 10. Lathing nails and lath are used to fasten the box to the supporting board, as shown in Fig. 9. This practice will prevent lathers from dislodging the box, which is otherwise easily done.

The coil of No. 14 wire is then untied and the circuits of the various rooms wired. Figs. 13, 14, 15 and 16 show the most common wiring diagrams. For hallways and large rooms, it is often desired to have two switches to control one light. The wiring is then done as shown in Fig. 15 and is called a "three-way" installation. Where it is desired to operate two or three lights on a chandelier separately from a wall switch, the installation shown in Fig. 16, using a special electrolier switch, can be followed. The first time the button is pressed one group of lights is switched on, the second time the second group of lights is on, the third time all the lights are on, and the fourth time the circuit is broken and all the lights are out. These switches can be obtained to operate the lights in different combinations. Wires should never be allowed to touch wood, plaster or metal. At points where the wires must be loose or pass through sills, studdings, ceiling-outlet supports, or switch boxes, a length of loom should be used, fitting snugly between two knobs, as shown in Fig. 8, or from one knob to ½ in. outside of an outlet support or switch box, as shown in the detail of Figs. 7 and 9. Draw the ends of the wires to extend about 6 in. outside of an outlet and then twist the ends together to prevent them from being pushed back into the partition. Wires between knobs should always be pulled tight.

After the wiring of the second floor has been finished, proceed to string the branch wires for the first floor. In this

case all the overhead wiring has to pass between joists or through them. Get a masons' chalkline and mark the underside of the joists to facilitate drilling holes through them in a straight line for the branch wires, which should run parallel to each other and about 6 in. apart. Get a 2 by 10-in. board and improvise a scaffold directly under the position where the branch lines are to be strung. The height of the scaffold is adjusted to suit the worker. The holes are drilled about 2 in. from the lower edge of the joists and at an angle, as shown in Fig. 5, and porcelain tubes are pushed through from the highest ends of the holes, which will prevent them from slipping out; the wire is then pulled through. In doing this, the coil of wire should always be placed on the floor at one end of the line, so that the wire can be pulled up vertically from the coil. The inside end of the coil is used to prevent tangling, as mentioned before. The other end of the wire is anchored as shown in Fig. 6.

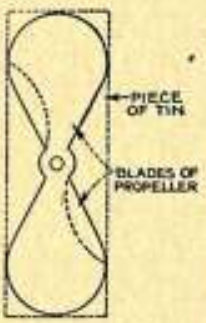
Instead of baring the wire and making the connections and splices as you go along, you will find it much more convenient and quicker to allow the ends of the wires to hang loose at these points, and do the splicing and soldering after the wiring has been completed. Peel off all the rubber insulation from the ends and portions to be connected and then scrape the surface of the copper clean with a knife to remove corrosion. Always support the wires with knobs near a splice, to take the strain off the wire, and make a neat open coil or twist, as shown in Fig. 17. This detail also shows the proper method of making connections. Never twist the bare end to form a close coil around another wire, as shown in Fig. 18, as this will prevent the solder from flowing between the turns. The correct method of splicing the ends of two wires together, with a few open turns, is shown in Figs. 19 and 20. After the soldering iron is heated, taking care not to get it too hot, tin it properly and proceed to apply solder to every connection. Apply flux to every connection first to make the solder stick. After soldering, apply the rubber tape and the friction tape to insulate the soldered portions.

The wiring of the basement can be done, on knobs, at any time later, provided the ceiling is not to be plastered. Otherwise the procedure already described for the first floor is followed. To test the wiring to be sure that it is correct, take two dry cells and connect them in series with a doorbell and to the branch wires, as shown in Fig. 21. Bring the ends of both wires of every direct outlet together, which should cause the bell to ring if the wiring is correct. If the bell does not ring, there is a break in the wiring at some connection, and this has to be found at once. On outlets operated by a switch, the ends of the wire at the switch have to be touching at the same time the wires of the lamp are touching, in order to close the circuit and ring the bell. On three-way circuits the ends of the wires in each switch box, and also the wires of the lamp outlet are connected in the same way to make the bell ring. After the wiring has been found to be correct, or made so, the preliminary work is completed and the lathing and plastering can be done.

Wiring in barns is very easy to do, as it is all open. On every farm equipped with electricity a yard light is necessary. The wiring to this light is done as shown in Fig. 22, so that it can be turned on or off at both the house and the barn.

Making Small Propellers

Propellers, used for a variety of model and experimental purposes, can be formed from light sheet metal with the aid of a pair of tinsnips or ordinary shears. A strip of material of the desired width and length is obtained and a circle is scribed at each end as shown. The points where these circles touch the long sides of the strip are connected by diagonal lines, the crossing point marking the center of the propeller. Two smaller circles are scribed around this center, representing the hub and mounting hole. The diagonal lines are now curved somewhat where they join the circles and one edge of each blade may be cut out as indicated by the dotted lines, which are arcs of a circle of a radius not too large in proportion to the length of the blade. Finally the blades are given a slight twist in opposite directions to make the propeller revolve in the wind.—J. S. Hagans, Chicago, Ill.



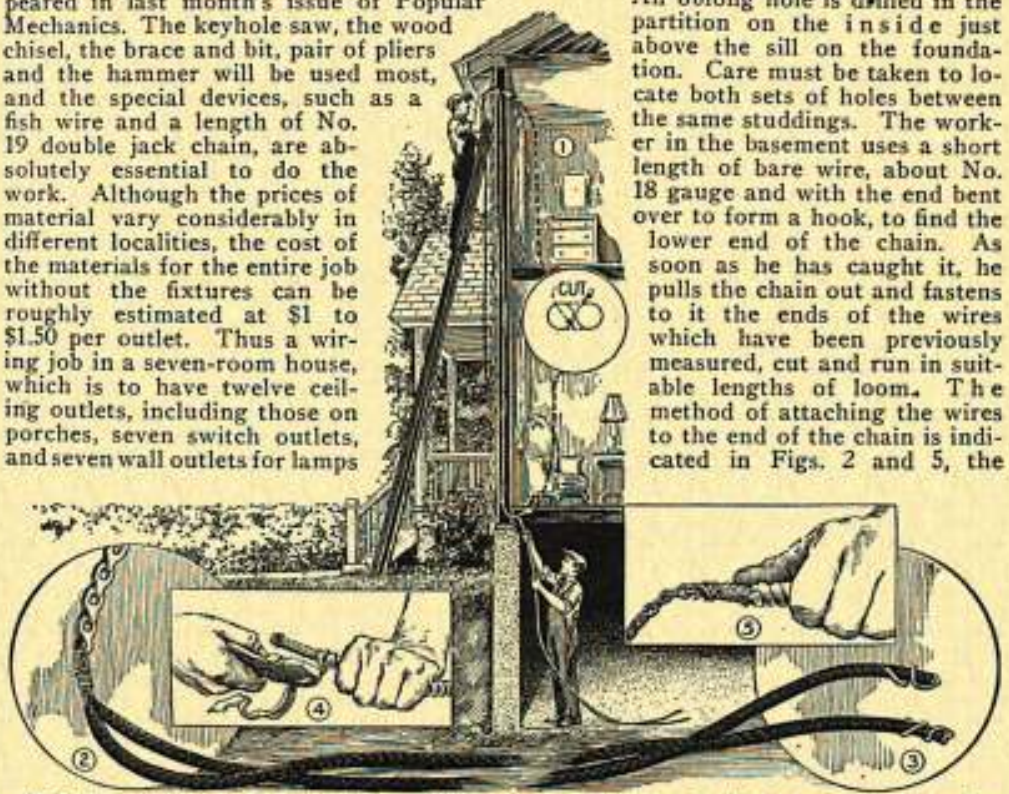
¶Small screws can be started easily in difficult places by putting a piece of gum on the end of a match and sticking the screw head to it.

Wiring Your Home

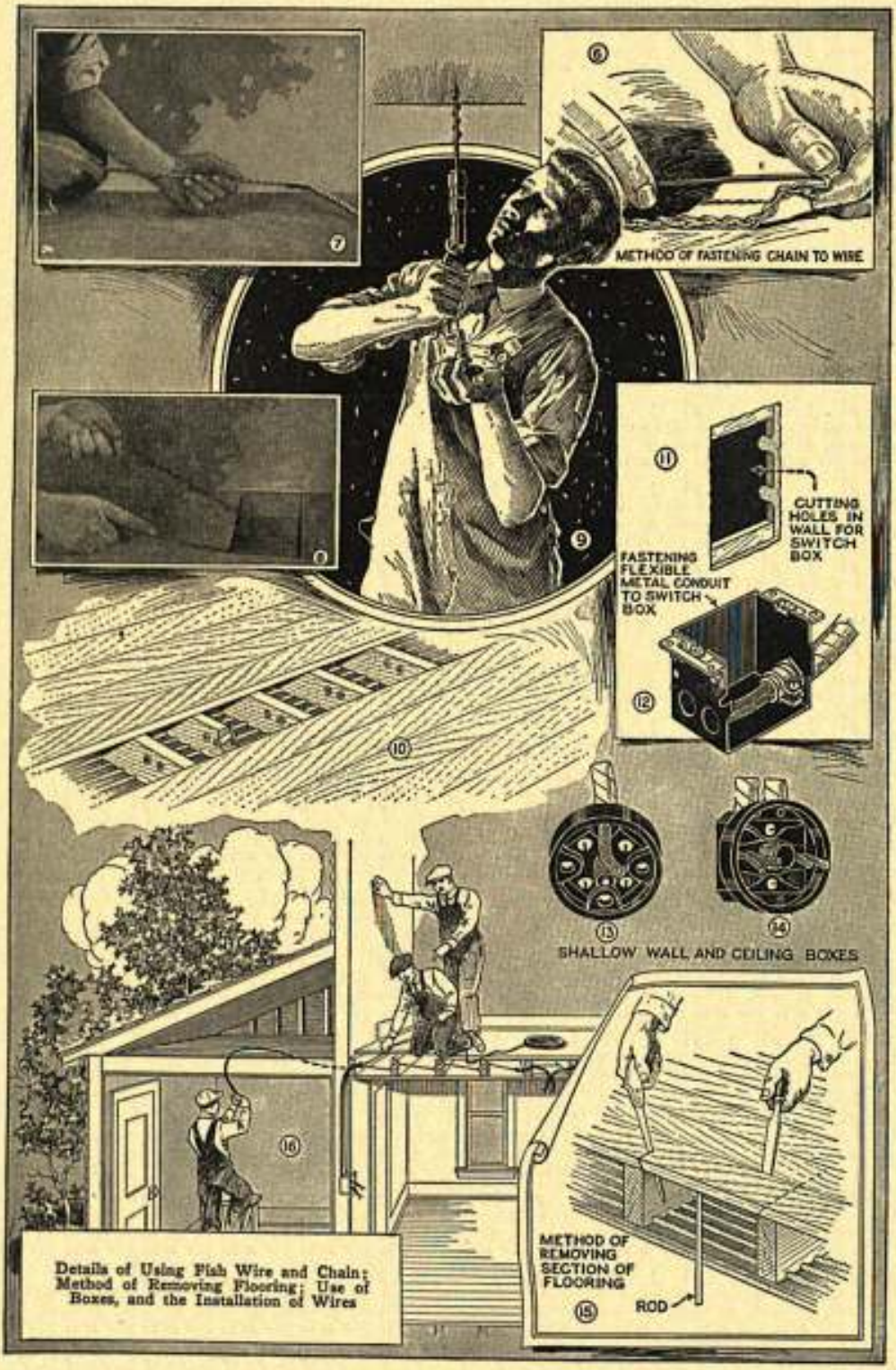
By E. R. Haan

THERE are hundreds of houses that were not wired for electricity when built, as it was not in general use at the time. To wire these houses is an easy task and can readily be done by anyone in his spare time. After the job is completed, there will scarcely be any evidence to show that it was done, provided the method described in this article is followed, and care is taken in doing the work. The tools ordinarily used by electricians for this kind of work have been described in the previous article, which appeared in last month's issue of Popular Mechanics. The keyhole saw, the wood chisel, the brace and bit, pair of pliers and the hammer will be used most, and the special devices, such as a fish wire and a length of No. 19 double jack chain, are absolutely essential to do the work. Although the prices of material vary considerably in different localities, the cost of the materials for the entire job without the fixtures can be roughly estimated at $1 to $1.50 per outlet. Thus a wiring job in a seven-room house, which is to have twelve ceiling outlets, including those on porches, seven switch outlets, and seven wall outlets for lamps and electric appliances, will cost from $26 to $39 for material.

It will be found that two-wire, flexible metal conduit, such as BX, is most convenient to use for this kind of work. However, if it is not readily obtainable, you can use ordinary rubber-covered wire and loom. The first thing to do is to determine the most convenient location for the city supply or service lines, as shown in Fig. 1. A few feet below the eaves, two 5/8-in. holes are drilled close together, and the portion between them is chipped or sawed out to form an oblong hole as shown in the insert. A length of furnace chain, long enough to reach into the basement is dropped down into the partition. An oblong hole is drilled in the partition on the inside just above the sill on the foundation. Care must be taken to locate both sets of holes between the same studdings. The worker in the basement uses a short length of bare wire, about No. 18 gauge and with the end bent over to form a hook, to find the lower end of the chain. As soon as he has caught it, he pulls the chain out and fastens to it the ends of the wires which have been previously measured, cut and run in suitable lengths of loom. The method of attaching the wires to the end of the chain is indicated in Figs. 2 and 5, the



Beginning a Wiring Job on Finished House, Which Necessitates Wires to Be Fished through Partitions and under Floors; a Few Tricks Make the Task an Easy One



Details of Using Fish Wire and Chain; Method of Removing Flooring; Use of Boxes, and the Installation of Wires

former showing the use of separate loom-covered wires and the latter showing the use of flexible metal conduit. You will notice that in both cases the wires are bared for an inch or two, and, after being threaded through the last link of the chain, the ends are twisted arouhd so that they cannot come loose easily. In case BX is used, it will be necessary to untwist the metal covering a few inches, which can be done conveniently with a pair of pliers, as shown in Fig. 4. If two separate lengths of wire and loom are used, it will be necessary to bend over the free ends of the projecting wires and twist them around the loom as indicated in Fig. 3. This prevents the wire from being pulled out of the loom, if the latter meets some obstruction or binds in the partition in any way while the worker on the ladder is pulling the wires up. It will be found necessary to have a helper in doing most of this work, as someone must feed the wire into the partition from below while it is being pulled up with the chain from above. Use No. 10 or No. 12 rubber-covered wire for the service lines. In general, the method just described is followed when installing other wires in partitions. They are measured and cut below and are then pulled up with the chain, as shown in Fig. 7, connections to other wires being made later.

It may seem a trifle more difficult to the amateur to fish wires in horizontal runs between ceiling and floors but with the aid of a suitable length of No. 10 galvanized-iron wire, with the en l bent as shown in Fig. 6, the task is an easy one. The installation of horizontal wires is illustrated in Fig. 16. An oblong hole is first drilled in the ceiling where the outlet is to be located, and a similar hole is drilled through the wall so that the wire and chain can be pushed through as shown in Fig. 8, until the chain is located above the outlet hole and the helper in the room below can fish for it as previously described. He then attaches the wires, and the worker on the second floor pulls them up. For concealed work, no wires are to be visible after the work is completed.

All the wires are strung between joists and studdings, under floors and in partitions. In some cases where it is necessary to run wires through a number of joists from one side of a room to the other, as shown in Fig. 10, a strip of flooring should be removed, if this is not too difficult to do. The keyhole saw is used as shown in the headpiece to loosen the strip of flooring so that it can be removed more easily, which is done by means of a broad chisel. Obviously, care must be taken to

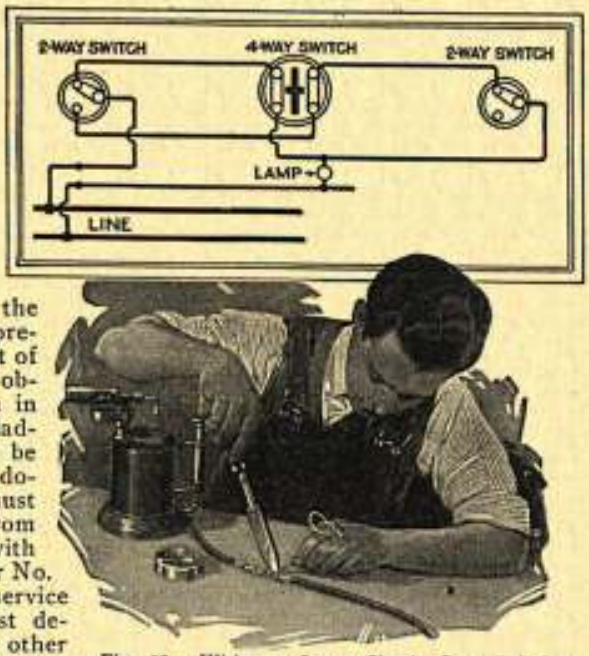


Fig. 17. Wiring a Lamp Circuit Controlled from Three Points

prevent splitting the edges of this strip and marring the floor. Most newer houses have double flooring, which complicates matters, and in such cases it is often advisable to drop the lines down the wall partitions, into the basement, and bring them up again on the other side of the series of joists that had to be crossed. In lightly built frame houses, it is often easier to take off the molding above the baseboard and run the wire under it. In such cases care should be taken to break off old nails, as any attempt to drive them out would cause a split in the board. In closets and around chimneys the installation of wires is easy. Holes are drilled through joists and tubes are pushed through, as explained in the previous article. In case wires can be run between the joists, only a small section of flooring has to be removed, as shown in Fig. 15, and when the board is replaced later a couple of short strips of 1-in. material are nailed to the joists as supports. A good method of locating the exact piece of flooring to be removed above the ceiling outlet, if it is necessary to get at the wires at this point, is to insert a rod in the ceiling outlet hole from below and tap it against the

floor above, where the worker can readily determine just what floor board it is striking against.

If flush switches are to be used, a hole is cut in the wall as shown in Fig. 11. A switch box is outlined on the wall. This is done so that the brackets on the edge of the box are directly over the lath and not over the spaces between the laths. The middle lath is sawed out and also part of the laths on each side, after the plaster has been removed, which requires great care. The best method of doing this is to cut into the plaster with a knife and then remove the plaster inside of the cut. Flexible metal conduit is fastened to the switch boxes with small clamps, as shown in Fig. 12, and if this conduit is used, shallow wall and ceiling boxes of the type shown in Figs. 13 and 14 should be installed. When wire and loom are used, it is only necessary to make an oblong hole between two plaster laths to permit the loom to be pulled through. There is very little knob work to be done on a job of this kind, and all wires which are not rigidly supported must be protected by loom. Flexible metal conduit is recommended because it is easier to work with and is also cheaper than wire and loom. It possesses great strength and comes in lengths from 50 to 200 feet.

In some cases it may be desired to control a light from three points and the wiring diagram shown in Fig. 17 is then followed. The importance of soldering all connections well after finishing the job cannot be overemphasized. Apply flux to wires after they have been well scraped with a knife, and then the solder. This treatment is necessary to insure a positive electrical connection, but in splicing it also serves to add mechanical strength. Unsoldered wires are dangerous, as they corrode from dampness, which increases the resistance at a joint, and this, in turn, allows the wires to become heated. All soldered joints should be covered with rubber tape while it is hot. When the rubber is hot it will adhere to the joint securely. Friction tape is then wound over the rubber.

Eliminating Steering-Gear Rattle

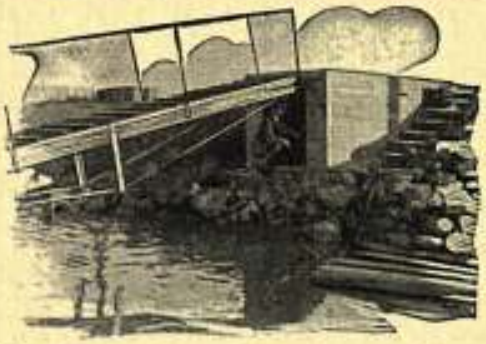
Finding that the straight split bushing at the lower end of the steering gear of my automobile (a model-91 Overland) did not remain tightly against the gear, so that end play, accompanied by a disagreeable metallic rattle, occurred, I remedied the trouble in the following manner: A strong coil spring was slipped over the steering rod and kept in compression against the lower bushing by means of a washer and cotter pin, as shown. The spring load should be approximately 25 lb. A washer, having a shoulder cut around it as shown in the upper left-hand detail, is inserted between the bushing and spring.—Carl N. Furay, Dayton, Ohio.

Softening Celluloid

Celluloid sheets, rods and tubes can be bent to any desired shape by first immersing them in hot water until the material is soft. After the article is bent to shape, it can be hardened immediately by dipping in cold water. A convenient and strong celluloid cement is made by dissolving small pieces of it in equal parts of acetone. If a flexible celluloid paint is wanted, add a few drops of castor oil to the cement and color with alcohol-soluble aniline colors.

Locker under Motorboat Gangway

When a San Francisco motorboat owner was building a concrete landing for the gangway leading to the motorboat floats at the yacht harbor, he conceived the idea of making the landing hollow, to provide a storeroom for buckets, hose, oil,



Convenient Locker under Concrete Landing for Motorboat Gangway

etc. In addition, the room was equipped with electric outlets so that wires could be extended to the motorboat for charging batteries and for use in electric heaters to keep the boat dry during the winter season, when it is not used very much. A connection with the local water supply was also installed.—C. W. Geiger, San Francisco, Calif.

Shelf for the Porch Swing

A shelf suspended under the seat of the porch swing is a handy addition to this useful piece of porch furniture, as it offers a convenient place to keep books, magazines and papers. The shelf should extend the entire length and width of the swing but it is suggested that it be not over 3 in. deep, as this will accommodate practically all the current reading matter one may have.

Erecting a Cheap Garage

A cheap and satisfactory garage can be built in the following way: The uprights or studdings are spaced 36 in. apart from outside to outside and a strip of heavy blue-card lining paper, 36 in. wide, is tacked on. Then some 36-in. fine-mesh poultry netting is stapled on, and finally a strip of slate-coated roofing paper of the same width. The poultry netting serves to add strength and rigidity to the walls and to protect the paper from being easily broken. The rafters should first be covered with a layer of sheathing, and then slate-coated or asphalt shingles are applied in the usual way. This construction is, of course, not as solid and durable as a wooden garage but it will last for many years.—H. T. Demarest, Warwick, N. Y.

¶When shoestrings lose their metal ends, making lacing difficult, dip the tips in liquid celluloid, twist them hard and allow them to dry; this remedies the trouble.

Laterals for the Garden Hose

A home owner in San Antonio has run laterals from his hose and thereby doubles

Laterals on the Hose Permit Watering the Lawn Quickly and Evenly

the area that can be watered at one time. The pressure is reduced somewhat, of course, but the results are more satisfactory as it is possible to adjust the distance between the sprinkler heads. The splice was made from a tee coupling, and three 5-in. pieces of pipe small enough to be forced into the hose. The laterals were cut from a hose which had begun to leak in places and are 12 ft. long. White lead should be placed on the pipe joints and rubber cement spread on the portions of the pipe which are inserted into the hose. It is good practice to make the joints tight with wire, even though the hose is stretched to fit over the pipe.—Dale R. Van Horn, Walton, Nebr.

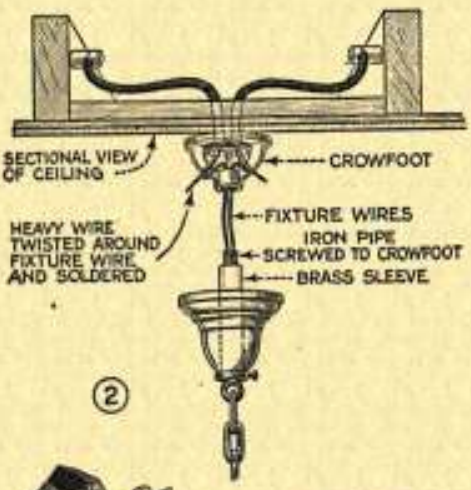
Holding Suitcase in Tonneau

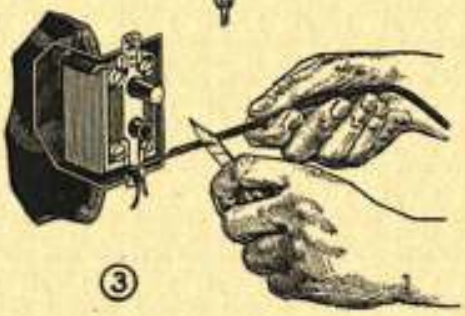
It is a good plan to attach a strap loop to the backside of the front seat in a touring car or a sedan, as this can be used conveniently to hold a suitcase or similar package against the seat back and keep it out of the passengers' way. Such a loop is also useful if a spare tire is to be carried in the tonneau.—E. T. Gunderson, Humboldt, Iowa.

Hanging Electric Fixtures

By E. R. Hoan

FIXTURE hanging is the task that remains for the home electrician after he has completed the wiring, as described in the May and June, 1926, issues of Popular Mechanics Magazine. For the living and dining rooms, library, halls, etc., more or less elaborate fixtures will add much to the appearance of the home, while ordinary drop cords with keyless sockets are sufficient in bedrooms, and key or pull-chain sockets in closets. Most fixtures consisting of more than a rosette, cord and socket, have an iron crowfoot, which is first screwed to the ceiling, the screws projecting into the fixture-support board previously nailed between the joists, as shown in Fig. 2. The ends of the fixture cords are bared and are pushed through the tapped hole of the crowfoot so that connection can be made with the outlet leads. The latter are twisted around the fixture cords, which makes the connection strong mechanically. Then the connections are soldered and taped. A good wrapping of tape is essential, as the sharp ends of the wire might puncture a layer of tape, and in case the wires of both connections should touch the metal bell of the fixture, a short circuit would result. The short length of pipe is then screwed into the crowfoot, and the bell is pushed up against the ceiling and fastened there by tightening the setscrew, as shown in Fig. 1. In some cases it is necessary to reduce the length of the chain on fixtures so that they will hang at the right height. This is done by taking two pairs of pliers and opening the links which are to be removed, as shown in Fig. 13. By doing it as indicated in the insert, the links can be opened without marring them.

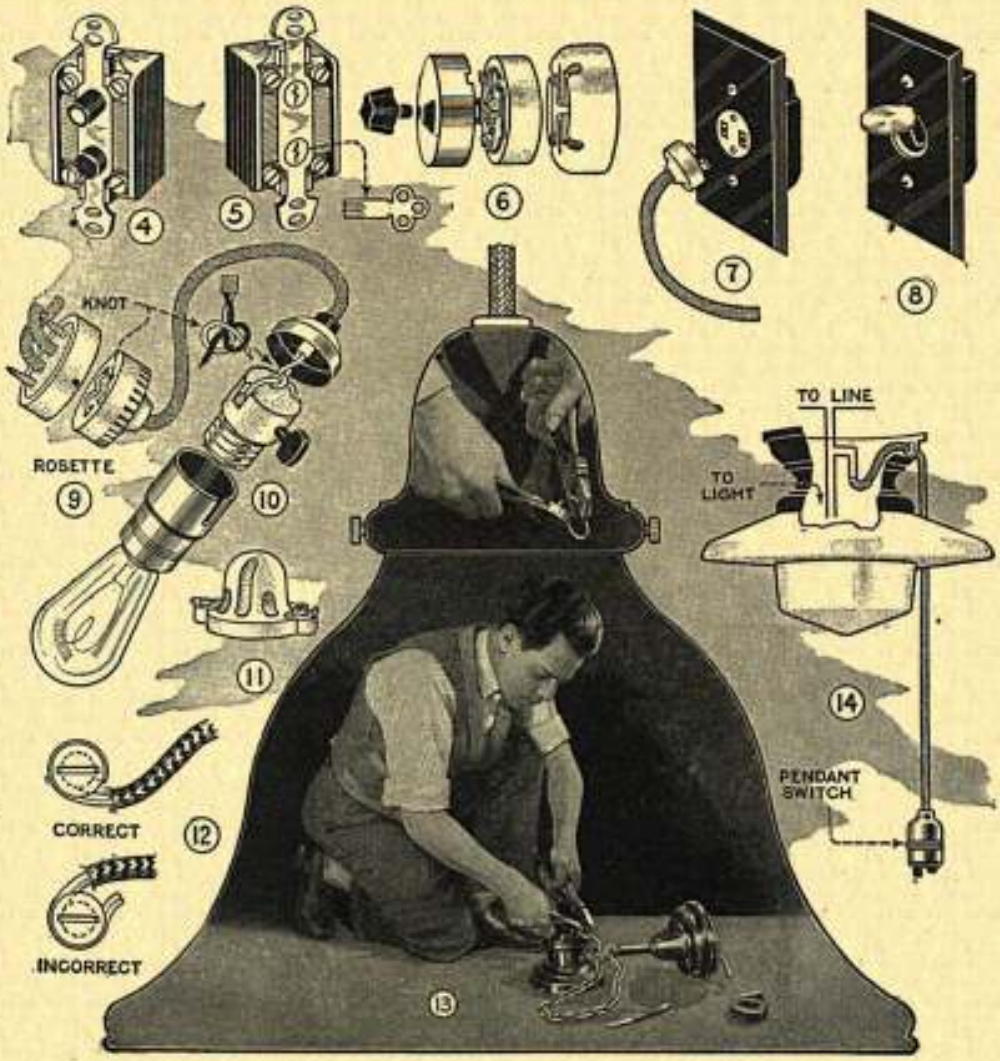




The installation of flush switches is shown in Fig. 3. The rubber-covered leads are pulled out of the box and the switch is fastened in place. The wires are then bared, up to the screw to which they are to be attached, and are twisted around it under the head, which is then driven down tight. There is a correct and incorrect method of twisting wire under screw-heads, as shown in Fig. 12. The wire should always be wound around the screw in the same direction as the threads. If it

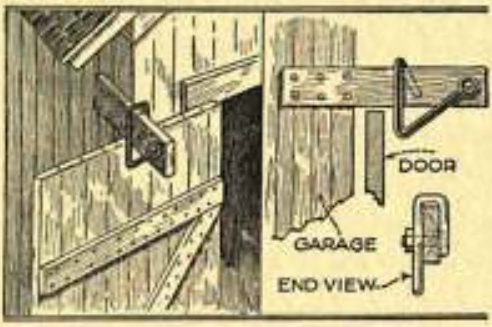
is wound around the screw in the opposite direction it will tend to loosen. Two types of flush switches are shown in Figs. 4 and 5, the latter being of the key type, which makes it impossible for anyone to meddle with it. A snap switch with an extra porcelain base is shown in Fig. 6, the base being used only in exposed wiring, such as in basements and barns. As direct outlets for lamps, washing machines, electric irons, etc., the flush plugs shown in Figs. 7 and 8 are used. When wiring these, be sure that the wires do not touch the metal switch box, or there will be a short circuit. After the plug has been connected, the plate is screwed on.

When making drop cords, use a porcelain ceiling receptacle of the separable type shown in Fig. 9. The base is first screwed to the ceiling and connected. A length of lampcord is connected to the other part of the rosette and a socket is attached to the other end of the lampcord. Knots of the kind shown in the detail prevent strain on the screws to which the bared ends of the lampcord are connected, so that short circuits will not occur, and generally make the cord more durable. For exposed wiring, the ceiling receptacle shown in Fig. 11 will be found convenient. If you have a direct outlet with a key socket and wish to change it to a ceiling fixture, a pendant switch on a length of lampcord, as shown in Fig. 14, should be used unless a wall switch is desired, in which case some additional wiring has to be done, as explained thoroughly in preceding articles.



Garage-Door Catch

The garage-door catch shown in the drawing is used on garage doors to prevent the doors from swinging back

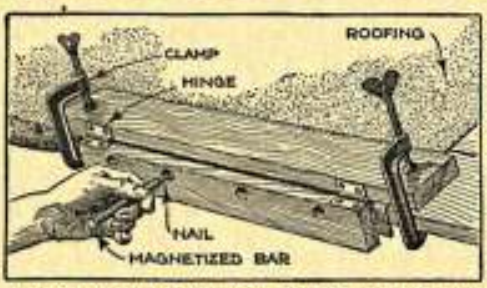


Garage-Door Catch to Prevent the Door from Swinging against the Car While Driving In

against the car while driving it into or out of the garage. The arrangement is unusually simple in that only one piece of iron rod, bent to the shape shown, and pivoted to a wooden bracket, forms the complete catch. The wooden bracket is screwed to the side of the garage and a bolt on the end of the bracket is used as a pivot for the catch.

Fastening Edges on Roll Roofing

When laying heavy roofing paper over the edge of a roof, it is usually found to be difficult to turn the material over and fasten it neatly without tearing. By hinging two hardwood strips together, a fixture is obtained that will prove of great assistance. The upper strip is made a little longer than the lower, to allow room for the two clamps required to hold it to the roof. One or both ends of the



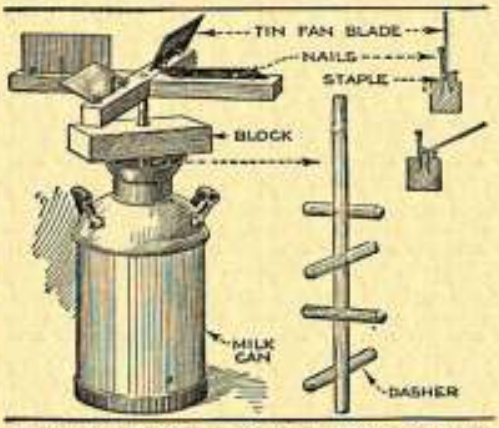
A Good Method of Fastening the Edges of Prepared Roofing

other piece are curved to prevent tearing the roofing by making a sharp crease in it when the edge is folded over.

The longer strip being clamped in place at one end of the roof, the hinged piece is bent down, assisted by the hammer where necessary. It is well to get a few roofing nails in place before removing the fixture; this is accomplished by having a few holes drilled through the short piece, large enough for the big-headed nails to go through. A round, magnetized bar of hard steel will set the nails in place through the hole, and a few taps of the hammer will send them home. The rest of the nails can be driven after the fixture has been removed.

Simple Wind-Power Milk Stirrer

To keep milk sweet, especially during warm weather, it is necessary to remove the animal heat as soon as possible, and this can be accomplished only by thorough stirring. When done by hand this simple chore becomes rather tiresome, and therefore a wind-driven stirring device, of the kind illustrated, which will



A Simple Milk Stirrer Driven by Wind Power for Removing Animal Heat from Milk

serve the purpose equally well, will be found useful.

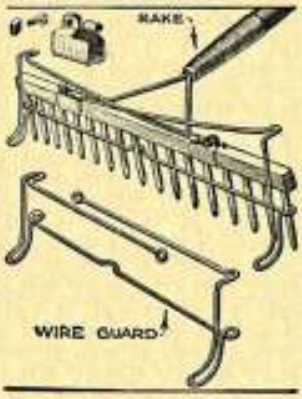
The device consists of a vertical wooden shaft, fitted with two short crosspieces, on which blades are mounted to catch the wind. The crosspieces holding the blades are made of 2 by 2-in. material and the blades themselves are merely pieces of tin, obtained by removing the ends of tin cans and flattening the cylindrical portions. Staples are used as hinges for the blades to swing on; nails are driven into the crosspieces on both sides of each blade; a nail on one side is partly driven in to hold the blade in the vertical position when the wind catches it, and two nails, on the other side, driven in almost entirely, hold the

blades at an angle to permit the wind to catch it. The short crosspieces forming the dasher or stirring element are made of round wood, nailed or screwed to the shaft. A 4 by 4-in. block, with a hole drilled through it to serve as a bearing for the shaft, is placed on the milk can as indicated, to hold the stirring device in position.

In the slightest wind each blade of the wheel, as it catches the breeze, swings upward to an erect position, where it is held by the nail. Here it remains until it has revolved a quarter turn, when the reverse side is presented, causing it to fall back until a similar action of the other blades brings it into the wind again. —G. E. Hendrickson, Argyle, Wis.

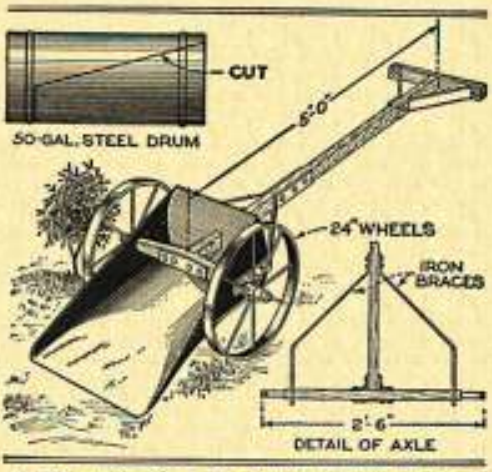
Attachment for Leaf Rake

When using leaf rakes constant difficulty is experienced, as the leaves and grass quickly accumulate between the teeth and must then be pulled out by hand. An attachment that eliminates this trouble is shown in the illustration. It consists of a length of heavy galvanized wire, bent to the shape shown in the lower detail and attached to the top of the rake with thin sheet-metal clamps. Of course, there are so many different types of rakes that the exact method of attaching this guard will vary, but the principle is the same in all cases. In its normal position the guard runs across the teeth near their ends, and is bent to form an eye at each end to fit the outer teeth. While using the rake, the guard moves up. This gives the leaves a chance to get on the teeth, but as soon as the rake is lifted from the ground, the guard pushes the leaves off. The guard does not add much to the weight of the rake and there is no necessity for removing it. The use of the guard also eliminates the "digging in" and tearing of grass roots experienced in raking, as the rake rides smoothly on the "feet" of the guard, and the rake teeth barely touch the ground.



Yard Scoop Saves Labor

A scoop of the kind shown in the drawing has been found useful for leveling small plots of ground and also as a substitute for a wheelbarrow. It consists of part of a 50-gal. steel drum, cut as indicated in the upper detail, and with the lower edge flared out to present an even digging edge. This part is then mounted on a wooden or iron axle; two wheels, about 24 in. in diameter, taken from an old farm implement, are mounted on the axle. A 5-ft. handle is also attached to the axle at right angles to it, the handle passing through the end of the scoop and being supported by two iron braces, bent to the shape indicated, and bolted to the side of the scoop. A crosspiece is provided on the end of the handle so that one or two persons can push it. The edge of the scoop should be sharpened to lessen the pressure required in scraping hard ground. As the edge of the scoop is only a few inches above the ground, the handle does not need to be tilted very high to make the scoop dig.



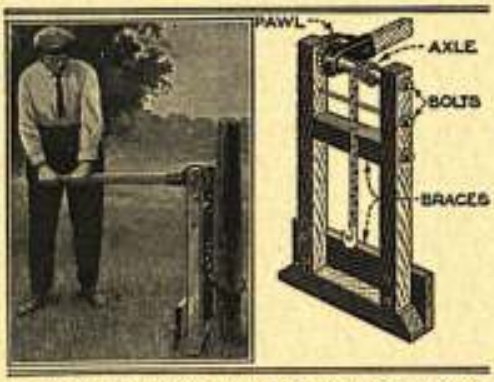
A Homemade Scoop for Leveling Uneven Plots of Ground and Carrying Heavy Loads

Removing Bloodstains

Many methods of removing bloodstains from linen and other cloth leave a dark spot on the material, especially if the stain is large. A method that will not do this is to soak the cloth in cold water for 24 hours and then wash it for 30 minutes in soap and suds, to which a small amount of soda has been added. Then the cloth is washed a few minutes in warm, but not hot, water.

A Ratchet Post Puller

The ratchet post puller illustrated is operated by means of an ordinary pump



A Ratchet Post Puller will Pull Almost Any Post, Due to the Leverage Obtained

handle. The ratchet wheel is shrunk on an axle which is mounted in the vertical members of a strong wooden frame as shown. The pawl that engages with the ratchet wheel is attached to the handle, which pivots on the axle as indicated, and a strong chain, with a hook on one end, is securely pinned to the shaft. In use, the chain is hooked around the post to be pulled, and the handle is operated like a pump.

Simple Droplight Shade Adjuster

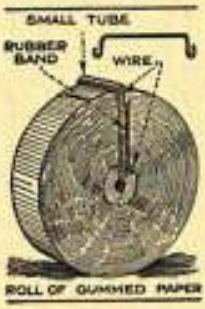
An ordinary droplight, fitted with a shade, is often used above desks and drawing boards, but when the light is adjusted high enough to enable one to work under it, it is impossible to keep it from shining directly in the eyes without using an eyeshade, which some people dislike to wear. The trouble can, however, be prevented by adjusting the lamp so that the light is not thrown directly downward. This is done by means of a string, tied around the lamp cord above the shade, and looped over the point of the lamp as shown in the drawing. Obviously, the shade can be set at any angle to suit the user, so that the direct light is cut off from the eyes.—C. L. Hendrickson, Milwaukee, Wis.

Replacing an Auto Engine

In replacing an engine of a light car it is sometimes difficult to slip the rear end of the engine into position without displacing the gasket on the front half of the universal case. If a jack is set against the rear end of one running board and against a block on the rear hub, the torque tube can be shoved back, and the universal case and gasket can be pushed or tapped far enough back to slip in easily.—A. O. Bosshard, East Moline, Illinois.

Preventing Gummed Tape from Unrolling

To prevent a large roll of gummed tape from unrolling, a simple attachment of the kind shown has been found effective.



A small aluminum tube, used for holding extra leads for a metal pencil, was used, and two wire paper clips, straightened to form hooks of the kind illustrated. One of these was run through the center of the roll of tape and the other through the tube. Two short rubber bands were then used to connect the hooks on each side of the roll. When the tape is pulled, the tube rolls back, but the tension of the rubbers prevents the roll from loosening.

Extension for Wrench

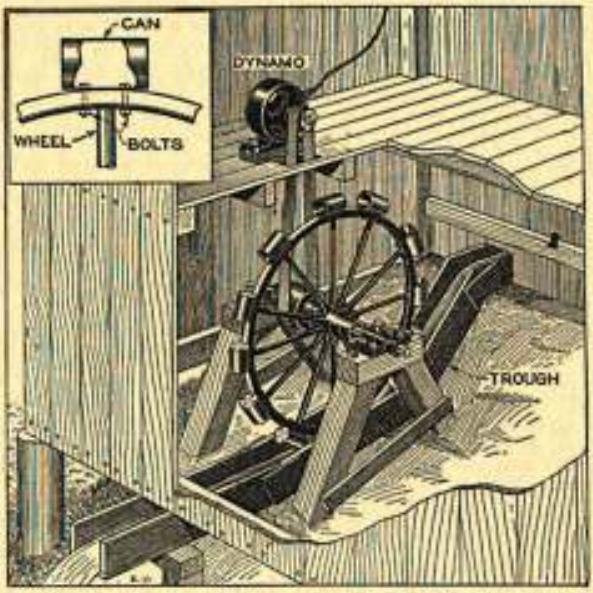
Every tractor or other piece of farm machinery has some nuts in locations that are difficult to reach; this necessitates the use of some extension on the wrench when these nuts must be loosened or tightened. A good extension for this purpose is shown in the drawing. It consists of a steel bar, with a slot at one end to fit the wrench head, and having a rivet or pin driven through the slot. With this extension wrench it is possible to grip a nut from the top or side as indicated, in whatever way is most convenient.—G. G. McVicker, North Bend, Neb.

Waterwheel for Running Small Dynamo

By using a light waterwheel of the type illustrated, where sufficient water current is available for turning it, the energy of the flowing water can be transformed and used for practical purposes.

The waterwheel can be made by attaching a number of tin cans, of suitable size, on the felloe of a discarded buggy wheel, and fastening the wheel, together with a pulley, on a shaft, that is supported by a wooden frame. The pulleys on the waterwheel and dynamo must be so proportioned in size that it will be possible to revolve the armature at its rated r. p. m., in order to obtain the voltage and amperage that the dynamo is capable of producing.

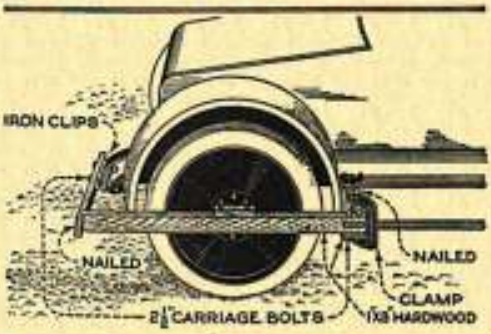
By concentrating the water current in a narrow channel, as shown, a greater force will be exerted on the waterwheel.



A Simple Waterwheel That can be Easily Made for the Purpose of Driving a Small Dynamo

Emergency Repair for Full-Floating Axle

The drawing shows a method used in an emergency to hold the wheel and axle of an auto in position, when the retaining nut on the full-floating axle came off. The weight of the car, resting on the outdrawn axle, forced the end of the housing out of round, which prevented the replacement of the nut, and therefore the arrangement shown was assembled from parts picked up at the nearest farm,



Emergency Repair for Full-Floating Axle That Permits the Car to be Driven to the Repair Shop

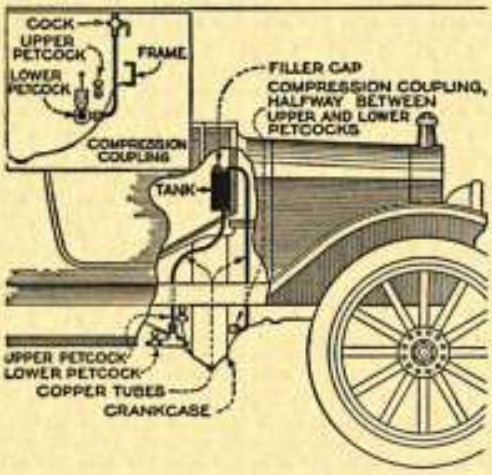
and in the toolbox. It consisted of a length of 1 by 3-in. hardwood, bolted to a strip nailed and clamped to the running board, and attached to a second strip, which was bolted to the rear spring as indicated. This arrangement kept the shaft in place, and allowed the car to be driven for 40 miles, until permanent repairs could be effected.—J. F. Ware, Dayton, Ohio.

Painting Boat Hulls

The hulls of small boats are usually painted white but do not remain white very long owing to the dirt in the water, which coats the paint. This can, however, be prevented by using a paint consisting of white lead and turpentine instead of white lead and oil. White lead, which contains about 10 per cent of oil, is thoroughly mixed up with turpentine and is allowed to stand overnight to permit the lead to settle; the turpentine absorbs about half of the oil contained in the white lead. It is then poured off, the residue mixed with fresh turpentine, and the boat painted with it. As this paint dries quickly, several coats can be applied in a short time, thus building up a thick coat. As this paint lacks the necessary binding material, it washes off slowly, exposing a fresh surface of paint, and as it has no affinity for water, it does not become watersoaked. It does not blister or chip off, but gradually wastes away.

Automatic Oil Feed for Auto

This automatic oil feed, while illustrated and described as applied to a light car, may be used on any engine where



A Simple and Efficient Automatic Oiling System for the Light Car

the oil level must be kept at a predetermined height.

A hole is drilled into the crankcase at about ¼ in. below the point at which the oil level is to be held; this is tapped ⅛ in. pipe size, and a compression coupling for 3/16-in. outside-diameter copper tubing screwed in firmly. The lower petcock is removed, and screwed into a ⅛-in. tee, which is connected to the crankcase with a nipple; a compression coupling is then screwed into the side outlet of the tee.

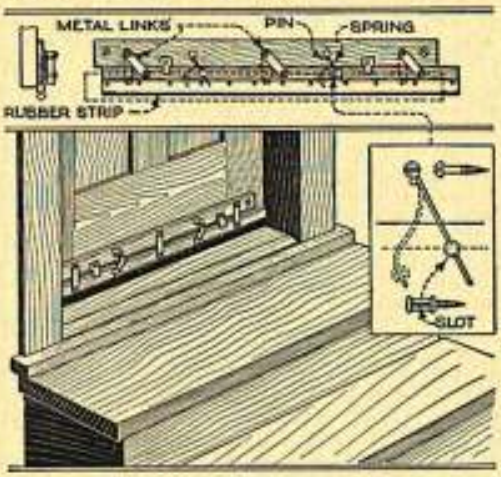
A tank of about 1 gal. capacity, made of sheet iron, and with all joints brazed, is then strapped to the dash; this tank may be a gallon oil can, but the constant vibration will chafe holes in it after about six months use, so it is better to use a specially made tank; in any event, the tank must be provided with a screw cap, fitted with a gasket, so that it will be airtight. The tubes are then soldered or brazed to the tank as shown in the drawing, and the tank filled with oil.

The oil will flow out of the tank, into the crankcase, until the oil level reaches the upper tube opening. When it covers the tube no more air can get up to the tank, and the oil ceases to flow. As soon as sufficient oil has been used to uncover the end of the upper tube again, a bubble of air passes up the tube, and a corresponding quantity of oil comes down the other tube. This continues automatically until the oil in the tank is used up. The system may be improved by the addition of a float gauge, which may be purchased anywhere; when the gauge shows the least drop in height, it indicates that the tank is empty. A shutoff cock, of the compression-coupling type, can also be fitted in the oil line.

This system has been in use for over a year, and I would not be without it, as it eliminates much of the time spent in "oiling up."—John A. Blaker, West Auburn, Mass.

Ingenious Weather Strip

The drawing shows an effective weather strip that prevents cold air from entering under the door. It consists of two wooden slats, one screwed to the bottom of the door and the other loosely connected to the first with metal links and flat springs as indicated. A rubber strip is tacked to the lower slat. When the door is opened the springs force the lower slat to the position shown in the upper detail, the action of the spring being shown in the insert. Closing the door brings the one end of the lower slat against the door jamb, on the hinge side,



A Weather Strip That Effectively Prevents the Entrance of Cold Air under the Door

and this forces the lower slat tightly against the floor, effectively preventing all drafts.—D. M. Halliday, Chesley, Can.

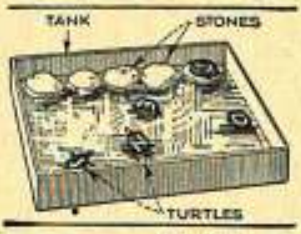
¶It is a difficult matter to catch a moth with the hands as it flies through the air. However, if the hands are moistened, the moth can easily be caught, as the nearness of a wet surface seems to have a paralyzing effect on its wings.

Radio-Panel Bushings from Valve Stems

It has been found that excellent bushings for use on radio panels can be easily made from the valve stems of discarded inner tubes. Any length bushing, up to 1 in., may be made by cutting off the large end of the stem and drilling out the small hole to the desired size.—H. M. Flint, Strathmore, Calif.

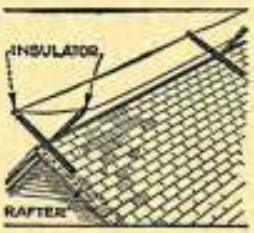
Novel Window Display

A clever window display, which attracted considerable notice, and caused much comment, was used by a Chicago furniture dealer to advertise a line of refrigerators. The display consisted of a tank containing water, some flat stones with the tops level with the surface of the water, and an equal number of turtles with letters painted on their upper shells as shown in the drawing. A prize was offered for the person who discovered the turtles all on the stones at the same time in the proper position to spell the name of the refrigerator. In the drawing, the letters constitute the word "Jones."



Erecting Aerials

A simple method of erecting supports for aerials, when height is not a great consideration, is to nail lengths of 2 by 2-in. wood to the roof as shown in the drawing. The supports are fastened on opposite sides of the roof, and are located over rafters, so that the spikes can be driven into these. The distance between the upper ends of the supports should be about 16 to 24 in. Ordinary porcelain insulators, which can be procured from any electrical store, are screwed to the ends of the supports and the aerial is attached to these. Care must, of course, be taken to have the aerial wires stretched as rigidly as possible so that they will not touch the roof.



Handy Hog Hanger

Farmers and others who butcher hogs outdoors will appreciate the usefulness of the hog hanger shown in the drawing; with this hanger it is an easy task for one man to hoist a hog without any assistance. The post stands about 6 ft. above the ground and must be at least 6 in. in diameter; it should be set about 2 ft. in the ground as it must support heavy loads. A 2 by 4-in. crossbar is pivoted on the top so that it can readily be swung around to different positions, the pivot being a ½-in. bolt, driven into the top of the post. Two other 2 by 4-in. crosspieces are attached to the post about a foot below the top, and are arranged at right angles to each other. They are fitted into slots sawed into the side of the post and are securely fastened in place with large spikes. A 1-in. iron or steel crank is made to fit in either of two holes, drilled through the post at right angles to each other as shown. In use, the upper crossbar is brought directly above one of the lower crosspieces, and a rope loop is passed over the ends to support the upper one when a hog is pulled up. This is accomplished by means of the crank, a pulley attached to the upper bar, and a length of stout rope. The rope is provided with a hook which engages with the sharp pin that is pushed through the hog's "heels." Turning the crank lifts the hog up to the position where the pin can be slipped over the lower crosspiece, on which the hog is hung.—Robert H. Neill, Ottawa, Ohio.

A Hog Hanger That can Easily be Operated by One Man without Any Assistance

Anchors for Small Boat Landing

The drawing shows a novel method of using cement blocks to anchor a small boat landing. The blocks are made in

Cement Blocks Used to Anchor Small Boat Landing: They are Located between the Piles

a rectangular shape and of a size depending on the width of the landing. A block 8 by 8 by 20 in. in dimensions was found to be a convenient size. Lengths of ½-in. flat iron are set into the ends of the blocks, while the cement is soft, the exposed portion of each piece being rounded to form a ring that fits the pile loosely.

In setting up the framework of the landing, the piles on one side are first driven in. The rings at one end of the blocks are placed over the piles and the blocks are lowered down to the bottom. The blocks are then shifted to the correct position and the other piles located in the rings and driven down about 2 ft. Crosspieces, nailed to the piles at their upper ends, and two long 2 by 12-in. timbers, nailed along them as shown, form the framework upon which 2-in. lumber is nailed to form a walk.—M. E. Duggan, Kenosha, Wis.

¶ When the paste pot or mucilage bottle is empty and some adhesive is needed for pasting papers, photos, and similar items, condensed milk can be used as a substitute. Spread it thinly over the surface to be pasted and it will hold well.

Preparing Concrete Floors for Dancing

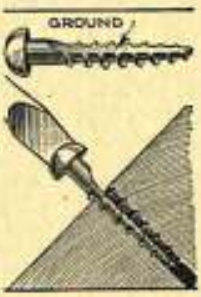
The simplest and cheapest way to prepare a concrete floor for dancing is to treat it with liquid soap. The soap should be worked up into a lather and rubbed into the floor by means of a scrubbing brush. After this an occasional application of powdered soap will keep it in good condition. It will be necessary to apply several coats of liquid soap if the floor is rough and porous. Liquid soap is prepared by boiling a large quantity of soap in a small proportion of water.

A mixture of paraffin and turpentine can also be used. The paraffin is mixed in turpentine, just as much paraffin being used as can be absorbed by the turpentine. Only enough of the mixture should be applied to the floor to thoroughly fill the pores of the concrete, as an excessive amount will leave a sticky film on the surface. After the mixture has been allowed to dry, the surface should be treated with paraffin, applied in the same manner as to any wooden floor.

A third method is to treat the floor with heated wax, driven into the pores of the floor by means of a device similar to a blowtorch. The permanence of this treatment depends on the penetration of the wax, and this in turn depends on the temperature of the concrete. If possible the concrete should be heated just before the wax is applied. The surface is maintained by the application of powdered wax in the usual manner.

Setting Screws into Hardwood

It is frequently necessary to drive screws into hardwood or composition panels, and unless proper precautions are taken, the panels are easily cracked. Of course, it is common practice to drill a hole before driving the screw in, but this does not always prevent cracking, and it is therefore much better to tap the hole by means of a screw ground down for this purpose as shown. Such an improvised tap cuts a good thread that allows the following screw to be driven in easily, and provides a good "grip" from which the screw will not pull out.

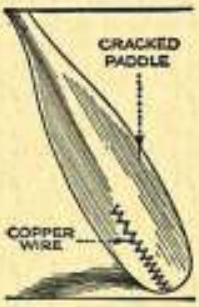


Soldering a Broken File

A thin round file that had been broken in two was repaired satisfactorily by soldering, much to my surprise, ordinary solder, chloride-of-zinc flux, and an alcohol lamp being used in the process. I first tinned the broken ends and then heated them just enough to melt the solder. The ends were dipped in solder and were then held together until the solder had set. During the entire process I took great care not to heat the parts more than necessary to melt the solder, and as a result, found that the temper of the file was not injured except at the joint. The repaired file was found to be almost as strong as it was originally.—Wm. J. Edmonds, Rutland, Vt.

Sewing a Split Paddle

A split blade of a paddle or oar can be satisfactorily repaired by the simple process of sewing up the split with copper or brass wire. As a rule such a crack does not extend into the thick part of the blade and therefore the main consideration is to hold the edges of the crack securely together. To do this, punch or drill a series of small holes all along the crack, on both sides, about ¼ in. from the crack and ½ in. apart. The holes should be staggered, those on one side coming halfway between those on the other side. Clamp or bind the blade so that the crack will be tightly closed, and then sew it together by passing the wire through the holes, beginning at the point farthest from the tip of the blade. When the tip has been reached, work back again, using the same holes. Finish off by twisting the two ends and fastening them down with a copper tack or a small brass screw. Use about No. 20 wire, and pull it tight at every stitch, taking care, however, not to break it at the sharp bends. As for the durability of such a repair, an oar repaired in this way has been used for an entire season without having any trouble at the seam. There are, of course, cases where this plan will not work, but in the majority of cases, where the edges are not broken apart on a long taper or bevel, the repair will be effective and permanent.



Simple Pump Filter

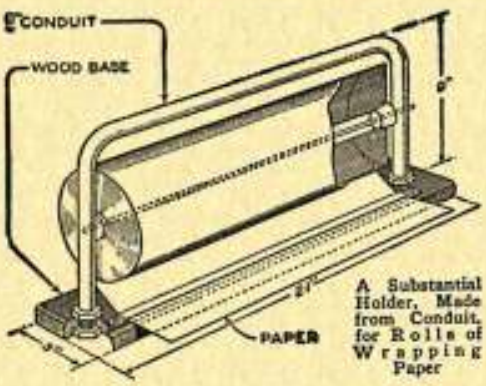
The old custom of tying a small cloth sack around the pump spout to filter the water is not recommended, as it is insanitary and unhandy. A much better filter and one that can readily be made is shown in the drawing; it consists of a tin-can lid, two rubber washers, a piece of copper screen, and a length of spring wire. The inside of the lid is cut out equal to the diameter of the inside of the spout. The washers and screen are cut to fit inside of the lid. Ears are formed opposite each other in the side of the lid, and holes are punched in the ears to receive the ends of the spring wire, which is twisted to form a coil spring. A short section of the spring in the center and at each end is pulled open and straightened, and the ends are turned over to form hooks, which are brought through the holes in the lid.—J. V. Romig, Allentown, Pa.

Convenient Mounting for Electric Fan

By mounting an electric fan on a camera tripod as shown in the photograph, the fan can be placed wherever desired, and can be adjusted to any desirable height. A circular wooden top is made for the tripod and is bolted to it by means of the screw on the tripod head. On small fans that have only one speed, a lamp connected in series will cause the fan to run slower if desired.—K. H. Hamilton, Chicago, Ill.

Holder for Paper Rolls

An inexpensive and substantial holder for rolls of wrapping paper may be made from a short length of conduit, as shown in the drawing. Each end of the conduit

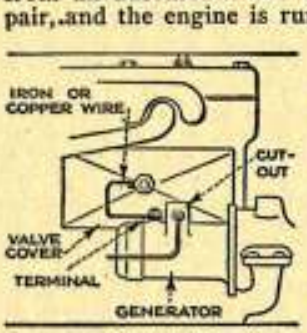


A Substantial Holder, Made from Conduit, for Rolls of Wrapping Paper

is bent at right angles at the proper points, and the ends are threaded for the nuts that hold it securely to the wooden base. A ¼-in. or ⅜-in. hole is drilled in the center of each leg to accommodate a rod for supporting the roll. The rod is a trifle longer than the outside width of the holder, and is provided with a head on one end, and a thread and wing-nut on the other. The paper cutter that is attached to the base is made of light flat iron bent to the shape indicated, and fastened at the ends of the base with wood screws.—J. C. Bush, Duluth, Minn.

Grounding Generator When Battery Is Removed

When a storage battery is removed from an automobile for charging or repair, and the engine is run on the auxiliary magneto, the generator should be grounded to prevent it from being damaged. To make a ground for the generator is an easy matter, as any piece of wire, insulated or not, can be used, this wire being connected to the terminal of the generator and to one of the nuts holding the valve covers in place, as shown in the illustration.



Stabilizing a Portable Typewriter

The main feature of several portable typewriters consists of an arrangement for folding the platen over the keyboard. When these typewriters are operated at high speed the platen is not very stable and consequently the letters are not printed evenly. This objectionable feature can be overcome by placing heavy rubber bands around the side arms so as to keep them together solidly. They can readily be removed when the machine is folded.—Charles I. Reid, New York City.

Leveling the Incubator

When an incubator is located in the cellar or basement it is usually necessary to lay small blocks under the legs to make it stand level, but it often happens that these blocks are accidentally dislodged, causing the incubator to tilt, and this not only shuts off the circulation of the water, but sometimes jars the eggs, which is very harmful for the setting. To overcome this trouble it is a good idea to place short lengths of tubing or pipe over the legs as shown, these pieces being free to slide up or down. Circular disks of wood and cardboard, cut to fit inside the pipe, are placed under the legs. When the proper height is secured for each leg, the pieces of pipe are slipped down over the disks and this eliminates all danger of dislodging them, even though the incubator is moved over the floor.

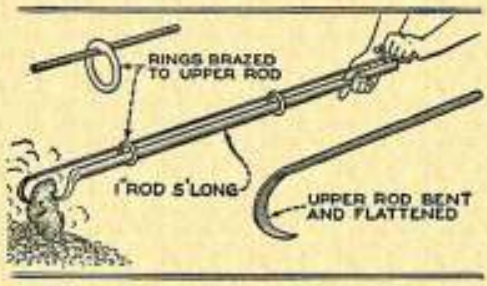
Repairing a Damaged Gun

While on a hunting trip I had the misfortune to strike my gun on a rock, which made a deep dent in one barrel and also bent both barrels slightly. The dent was easily taken out by driving a hardwood rod, which was rasped down to the inside diameter of the barrel through the barrel several times. This nearly pressed out the dent. Then I forced a brass rod, fitting the barrel close-

ly, through in the same way, which completely took out the dent. To straighten the barrels I calipered both ends and center and drilled a hole in each of three blocks to correspond to the measurements taken. Then I sawed these blocks in half and placed the barrels in a carpenter's vise, placing the two blocks that fitted the ends between the barrels and the bench, and the other block between the barrels and the movable jaw of the vise. The end blocks were, of course, planed down so that the distance between the bottom of the groove and the side was equal to the thickness of the stationary jaw of the vise. By carefully screwing the vise down, I straightened the barrels out successfully.—Lewis B. Rogers, Downers Grove, Ill.

A Clinker Remover

The usual method of removing clinkers from a fire is a tedious job, but it is greatly facilitated by using the tool illustrated, made especially for this purpose. It consists of two iron rods, one 1 in. and one ¼ in. in diameter, both about 5 ft. long. On the end of each rod a hook is shaped to the form shown, so that the clinker can easily be grasped between them. Two or three rings are welded to the ¼-in. rod so that it can slide on



A Handy Tool, Made from Two Iron Rods, Facilitates the Removal of Clinkers from Fires

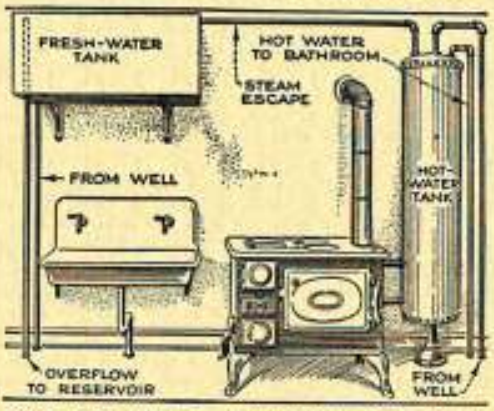
the larger rod. A handle is formed at one end of the smaller rod for convenience.

Fireproofing Paper

Paper can be made fireproof by immersing it in a strong solution of alum and water until the paper is saturated, and then permitting it to dry. Paper money can be fireproofed in this way. The paper is tested by holding it over the flame of a candle or match; if it ignites, the alum solution is not strong enough.

Fresh Water for the Farm Kitchen

Usually the fresh water pumped by the windmill goes to a reservoir outdoors, and from there to the kitchen, and there-

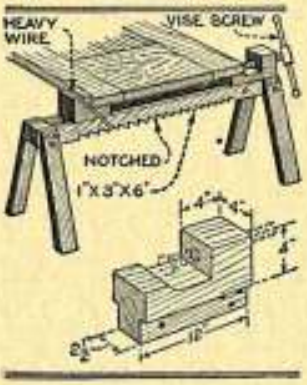


Fresh Well Water is Pumped into Tank in the Kitchen and from There to the Reservoir

fore the fresh water is not directly available in the kitchen. The drawing shows a system that first brings the freshly pumped well water into a tank located in the kitchen and from this tank, through an overflow, to the reservoir in the yard.

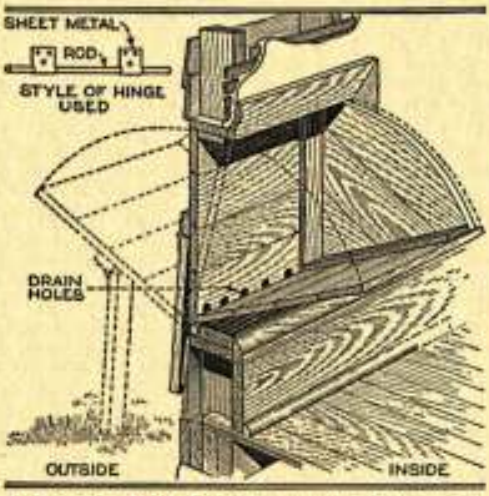
Improvised Gluing Clamp

A gluing clamp that is similar to a sawhorse in appearance and combines the advantages of both, has been found very useful for woodworkers. It consists of two rails of 1 by 3-in. material, about 6 ft. long, notched on the underside, and supported by two legs at each end. A vise screw is securely fastened at one end and a heavy block of wood, which serves as a movable jaw, fits the rails as shown. A groove is cut across the top and a heavy rod, bent to a rectangular shape, and with the ends securely twisted or welded together, is used to lock the block on the rails at any desired point. Woodwork of almost any size can be accommodated by such a clamp.



A Swinging Wood Box

When building a small hunting lodge, a Missouri man who remembered his youthful antipathy toward carrying wood,



A Swinging Wood Box That can be Filled on the Outside of the House and Emptied Inside

installed in the wall a swinging wood box, which could be swung outward to be filled and then swung back inside again to its position next to the fireplace. It is built to resemble a feed trough, and, when viewed from one end, has the appearance of a 55° sector of a circle. It is pivoted on the bottom on a bar hinge, made as shown in the left-hand detail, and can be swung inward or outward freely. When it is in its normal position inside the house, the outer side of the box forms part of the exterior wall, and when swung outward for filling, the other side closes the opening in the wall and prevents cold air from entering. When swung outward the box is supported by a 2 by 4-in. leg, hinging on a cleat nailed on the outside. The top edge of the inner side comes against a cleat that is nailed on the top side of the opening. The box is naturally held in its inward position by gravity, but if desired, it can be fastened securely by an ordinary lock, attached to the wall above, and sliding into a keeper on the side of the box.—Ward L. Schrantz, Carthage, Mo.

An excellent holder for the back saw, when it is not in use, can be made from two clothespins, the heads of which are sharpened and set into holes drilled in the workbench. The saw fits between the upturned prongs.

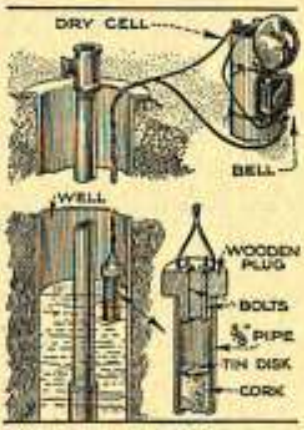
Starter Troubles

Before blaming the starting motor or switch when the starter refuses to operate and the battery is known to be in good shape and fully charged, or nearly so, examine all terminals carefully, taking them off, cleaning thoroughly with a file or sandpaper, and scraping the battery-post clamps inside and out. Very often there is nothing wrong except dirty or corroded terminals, and cleaning will remove the trouble at once. Keep the battery posts and clamps clean and covered with vaseline to prevent corrosion, and be especially careful about the ground connections, which in many cars collect dirt, and rust or corrode.

It is also good practice to examine the starting-motor cables occasionally, and to renew them if the insulation is badly frayed or there are broken strands.

Locating Surface of Water in Well

A simple and accurate method of locating the surface of water in a well is shown in the illustration. A length of ordinary lampcord is connected at one end to a bell and dry cell, two or more dry cells being necessary if the lampcord is quite long. At the other end of the lampcord is connected an automatic switch, which operates upon striking water. The switch consists of a short length of ⅝-in. pipe with a wooden plug screwed into one end, and a cork, with a tin disk tacked on top, inserted at the other end, the lower edge of the pipe being hammered over to keep the cork from falling out. Two small-diameter brass bolts are passed through the wooden plug and the ends of the lampcord connected to them. The bolts are connected with each other electrically as soon as the cork rises in the pipe and pushes the tin disk against their heads, which closes the circuit and rings the bell, indicating that the surface of the water has been reached.



A "Snow Box" for the Amateur Stage

BY L. B. ROBBINS

DEVICES intended to imitate the falling of snow upon the amateur stage are many and varied, but few are completely satisfactory. Either the fall of "snow" is limited by the small supply of the pieces of paper used to create the illusion, or the spread of the snowfall is far too small for the scenery required.

There is one device, however, that can be made by anyone handy with tools, and that has been in successful use on many professional stages for years, especially abroad. For the amateur's use this "snow box" has been simplified, and, as shown in the illustration, will serve to spread a snowfall over the visible portion of a small stage. Moreover, it holds a supply of material large enough to last, with judicious use, for many minutes, so that a long scene can be staged without the snowfall abating in the least.

A Simple and Effective Attachment for the Amateur Stage for Giving the Effect of a Heavy Fall of Snow: The Box Holds a Large Supply of Paper, and Is Easy to Operate

The necessary length of this snow box will, of course, depend upon the size of the stage, but for general use a 12-ft. box will be ample to cover any space not hidden by scenery, and should do for any small school, lodge, or society stage. The sides can be made of 12-ft. boards, 18 in.

wide, or several boards cleated together to make a side this width. The ends should be shaped to the segment of a circle, 18 in. along the sides, curved across the top edge, which measures 15 in. wide, and the point at the bottom cut off so that it measures about 2 in. wide. Nail the sides to these ends so that a box is formed as shown in the drawing.

Nail a 12-ft. length of 3-in. furring along the bottom, over the opening left by the bottom edges of the sides. Fit two or three barrel hoops in the top opening, curving them to correspond to the curve of the tops of the ends. These act as spreaders and serve to keep the screening which covers the top at the proper curve. This screening should be preferably 1-in. mesh chicken wire, tacked over the entire top opening of the box.

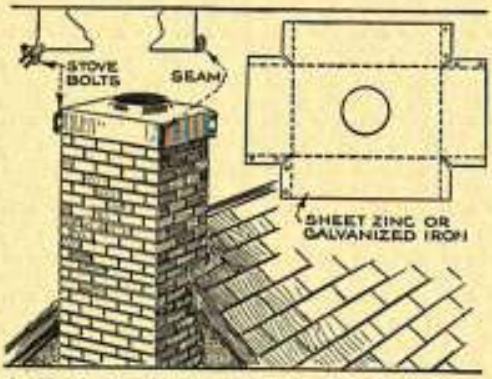
The box is then swung at each end by bolts run through the ends as shown. The ends of the bolts are run through holes in the ends of timbers placed over the stage well up and out of the way. Suspend the box horizontally in this manner over the open part of the stage where the snow is to fall.

The box is operated by means of a tipping lever—a stick nailed across the top of one end. Cords fastened to each end of this lever pass up through pulleys attached to the ceiling and then down to the stage behind the wings, where they are fastened to a rocking lever made as shown in the drawing. Nothing elaborate is necessary for this lever, but it should be supplied with some sort of a handle so that it can be operated by a stage hand from a good vantage point.

When the box is filled with paper bits and then rocked from side to side some of these bits fall out and to the stage in imitation of real snow. An electric fan behind the wings at one end of the stage will blow the falling snow as though driven by a strong wind. If desired, a link from a large flywheel driven by an electric motor can be arranged to rock the snow box by power, so that the stage hands can attend to other duties during the "storm."

Zinc Makes Durable Chimney Caps

Brick chimneys are apt to break and become loose at the top, due to weathering, and the loose bricks are very dangerous, especially during high winds.

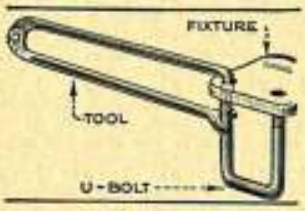


A Metal Cap for the Chimney Top Prevents the Bricks from Becoming Loose

This danger can easily be prevented by providing a cap made of sheet zinc, cut to the shape shown in the illustration and fitted on the chimney, brass bolts being used to tighten it. The edge of the circular hole is bent upward to shed water. The cap can be put on by anyone who can use tools such as tin snips and hammer. Heavy galvanized iron can be used for the cap, but zinc is more durable.

A U-Bolt Replacing Tool

When replacing U-bolts on the springs of an automobile, considerable difficulty is often experienced in getting the bolts in line with the holes in the bracket or fixture, because of the tendency of the bolt to spread apart. A great help in lining up these bolts is the simple tool illustrated. It consists of two lengths of iron rod, hinged together at one end; the other end of one rod is bent to fit in the bracket hole, and a fork is forged on the end of the other. The forked rod is held against one side of the U-bolt, while the bent end is inserted in the hole of the bracket as shown. With one leg of the U-bolt already located in position, it is an easy matter to force the other leg into place with a few light blows of a hammer on the hinged end of the tool.—Glen F. Stillwell, Collinsville, Ill.



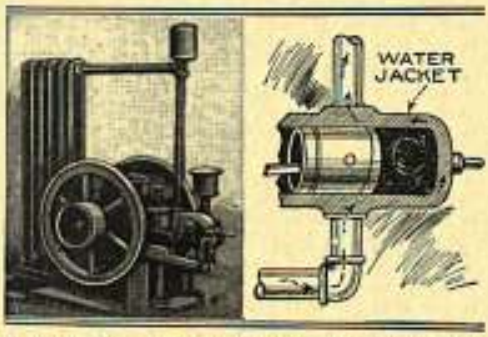
¶A radiator hose usually begins to leak on the underside. By loosening the clamps and turning the hose around, so that the underside will be on top, it will serve twice as long.

Horseshoe Wrench for Oil Barrels

When one is in a hurry to fill an auto or tractor fuel tank, it is quite annoying to wait for the liquid to gurgle out of the faucet gradually, as is usually the case. Of course, if the upper cap is unscrewed so that air can enter, the flow is increased considerably, but unfortunately the caps of standard 50-gal. barrels are made round, with a square recess in the center, so that an ordinary wrench cannot be used to unscrew them. A pipe wrench can be used on the outside, but a pipe wrench is not always at hand. A horseshoe has been found to be a very convenient tool for unscrewing the cap. One calk is inserted in the slot, as shown in the illustration, and the cap can then be loosened with a single twist.—G. E. Hendrickson, Argyle, Wis.

Heating Radiator Cools Engine

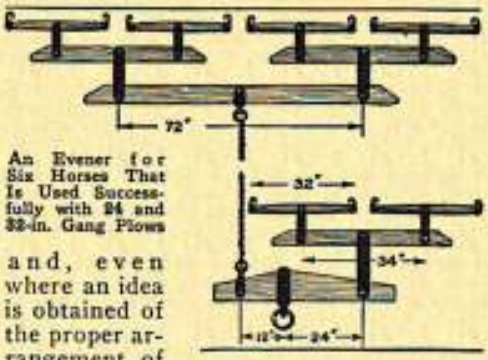
A farm gasoline engine, on which the water hopper had been broken by freezing, was not put out of service by this mishap, but was cooled by means of an ordinary heating radiator; this hookup, although novel, proved very efficient. The method of connecting the radiator to the water jacket is plainly shown in the photo and detail. A high radiator is best to use for this purpose, as there is a greater distance between the top and the bottom than there is in a small window radiator, and this induces a constant and steady circulation of water.—Dale R. Van Horn, Walton, Neb.



A Novel Cooling System for a Gasoline Engine Making Use of an Ordinary Heating Radiator

Six-Horse Evener for Plow

Farmers are often puzzled as to the proper method of making an evener to be used for six horses when plowing, and, even where an idea is obtained of the proper arrangement of the horses, the dimensions of the arms are still puzzling.



An Evener for Six Horses That Is Used Successfully with 24 and 32-in. Gang Plows

The illustration shows, in plan, an evener that has been used for years with success, on 24 and 32-in. gang plows. The four and two-horse eveners used are standard size, and the main-evener member is the same length as the standard three-horse evener. The right-hand lead and wheel horses walk in the furrow and guide the plow.

Kettle Holder on Faucet

The illustration shows a length of heavy galvanized wire, bent to form a holder that is attached to the kitchen faucet, so that steaming kettles may be hung on it to avoid burning the hands. The wire is bent to the shape shown in the detail and to a size determined by the faucet on which it is to be used. After it is fitted on the faucet a stovebolt is passed through the eyes formed in the wire, and is screwed up tightly.—Harold E. Benson, Boulder, Colo.

¶Never neglect attending to auto rear-axle noises; the rear axle is a very hard-worked piece of mechanism, and should therefore have the best of care. Have any noise investigated immediately.

Ice-Block Fence for Hockey Field

The photograph shows a hockey field inclosed with blocks of ice, which cost only one-third as much as a wooden fence

An Ice-Block Fence for a Hockey Field Is Just as Good as a Wooden Fence and Is Much Cheaper

for the same purpose. The blocks were about 20 in. thick, 40 in. long, and 22 in. wide. They were set on end, as shown, with the 22-in. sides lengthwise of the fence. Wet snow was packed between the blocks and the whole fence then sprinkled with water, which froze the blocks together. The section inclosed was then flooded, and this, upon freezing, also held the blocks together more securely. Slight thawing spells had little effect on the fence.—C. L. Meller, South Fargo, N. D.

Cleaning the Sink

There are numerous methods of cleaning sinks, but many of them are not effective. A simple method of doing the work effectively is shown in the illustration. The sink is half-filled with water, and a wide 1-in. plank about 1 or 2 ft. long is laid on the water. Standing aside to avoid being splashed, the operator strikes the board a few hard taps with the hammer, with the result that the pipe is cleared by the transmission of the blow through the water, which dislodges the obstruction. This method will always be found effective, provided the obstruction is not too large to be forced through the pipe.

Repairing Marble Clocks

Marble clocks are built up of a number of pieces of marble cemented together, and these are liable to fall apart when the clock is old. A simple and durable repair is to scrape off as much as possible of the old cement and use plaster of Paris, mixed with water to join the pieces together again. It may be necessary in some cases to drill a number of ⅛-in. holes in the edges of the pieces to anchor the cement securely, or to drill smaller holes, and bind the pieces with wire hooks in addition to the cement.

A Strong and Simple Bridge

The photograph shows a strong and simple footbridge used over a gully on a western golf course. It is made of two strong planks, one a little shorter than the other. A cleat, 10 in. wide, is nailed between them in the center, and a 6-in. cleat near each end. The ends of the short plank are securely nailed to the

A Strong and Simple Bridge Made from Two Planks, Used across a Gully on a Western Golf Course

underside of the larger one. The bridge, so constructed, will support a dead weight of 1,000 pounds.

Test for Sodium Carbonate

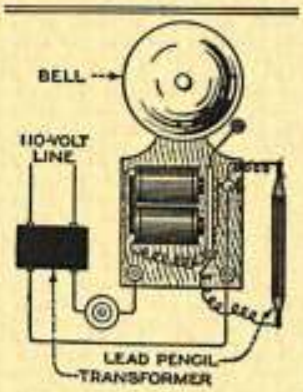
Many photographers make up their stock solution of sodium carbonate and sodium sulphite in similar bottles, and as the labels of these bottles become dirty or are torn off very easily, it is sometimes impossible to tell which solution a particular bottle contains. A good method of finding out is to pour a small quantity of either liquid into a measuring glass and add a small crystal of citric acid. If a constant stream of bubbles issues from the crystal until it is dissolved, the solution is sodium carbonate, but if there is no action, the solution is sodium sulphite.

Drying Rack for Stove

The photo shows a simple drying rack, made of heavy galvanized wire, that can be attached to the stove in an instant, and removed as quickly. Each end of the wire is bent to a 4-in. loop and then bent at right angles to the front length. The ends are then bent sharply upward for a length of 1 in., to slip between the door and the frame of the warming oven. Such a rack is of considerable usefulness when a few clothes must be dried in a short time.

Preventing Bell Contacts from Sparking

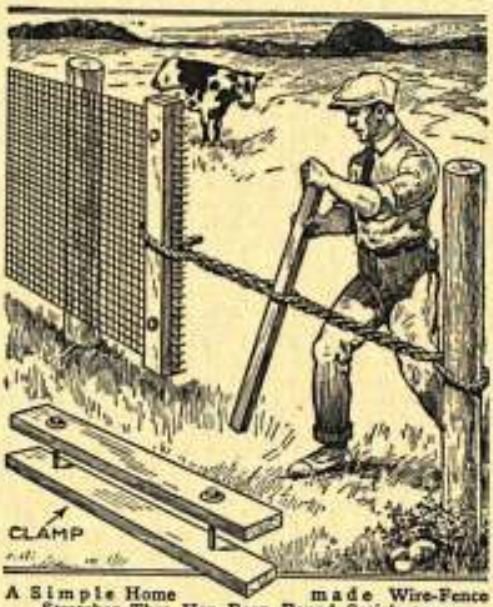
Where doorbells are operated from transformers, or directly from a d. c. house circuit through a resistance, there is usually heavy sparking at the contacts, and this rapidly burns away the points, making frequent renewals necessary. To eliminate this trouble, and make the bell operate more steadily, a resistance should be connected across the contacts as shown in the illustration. A simple and effective resistance for this purpose is an ordinary lead pencil. The wood is cut off both ends of the pencil, and the wires twisted tightly around the bared ends of the lead. The wires are connected with the vibrating member and with the fixed contact. This resistance will pass the high-voltage current formed at the break, but will not shunt out the contacts and prevent the bell from ringing.



¶ Moths will rarely touch anything wrapped in newspapers, and winter clothes thus stored will be almost sure to escape damage.

Stretching Wire Fencing

A simple and efficient wire-fence stretcher is shown in the drawing. It consists of two lengths of 2 by 6-in. wood

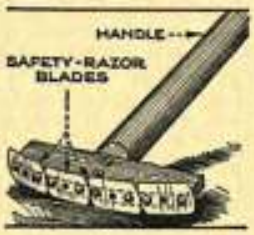


A Simple Home made Wire-Fence Stretcher That Has Been Found Satisfactory

with two or three bolts passing through them so that they can be securely clamped to the end of the fencing as shown. A heavy rope is passed around both pieces, around a fence post, and tied. A stout stick is used to twist the rope, thus pulling the fence as tight as desired. The device can be made in a short time from material that can be found on every farm. —Geo. A. Luers, Washington, D. C.

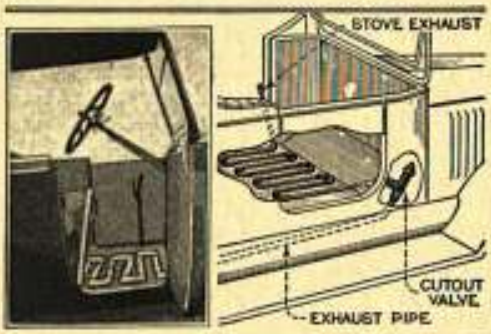
Shaving the Lawn

Shaving the lawn with a safety razor seems ridiculous, but it has been done. Passing over the lawn with a lawnmower did not exterminate the numerous dandelions, so another method was necessary. Four razor blades were screwed to the narrow edge of a short length of lath, and a handle was attached as shown in the drawing. Using this simple tool the dandelions, including the buds, fell at the slightest touch.—Francis W. Lane, Villa Park, Ill.



Exhaust-Gas Cook Stove for the Tourist

When equipped with a stove of the kind shown, the tourist does not have to worry about fuel for his stove, as his gasoline is also his fuel supply. The



Camp Cooking Is Simplified by the Exhaust-Gas Cook Stove on the Floor of the Automobile

whole apparatus consists of pipe and fittings arranged so that it can be connected to the exhaust pipe of an automobile. The stove is made of several short lengths of pipe connected together by return elbows to form a hot plate. A cutout valve is inserted in the exhaust pipe at the point shown so that the stove can readily be attached and detached. It is, of course, necessary to provide a thick sheet of asbestos between the hot plate and the floorboards to prevent burning the latter. When the plate is not in use it is removed.—Curtis Clark, Waldo, Ark.

Tool Removes Milk-Can Covers

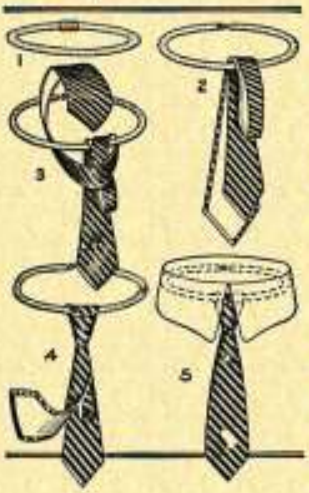
When the lid of a filled milk can is pressed down to prevent spilling the contents in transportation, a partial vacuum is created, which makes it extremely difficult to remove the cover again. To overcome this difficulty a Wisconsin farmer made the simple tool shown in the illustration. It consists of an iron bar with two holes drilled as shown to receive bolts, which have their heads cut off and the shanks bent to form hooks. In use the tool is grasped at the two ends and lowered so that the hooks engage with the handle of the cover. A quick twist and pull serves to loosen the most stubborn lids. This eliminates the use of mallets or hammers for removing the covers, a practice that damages thousands of covers every year.

Tightening Loose Watch Crystal

Watch crystals frequently become loose and cause a great deal of annoyance by constantly falling out. A simple and effective method of making them remain in place is to put a minute drop of glue at six or eight points in the groove. This can best be done with a toothpick or match stick. When the crystal is snapped back into place it will remain there indefinitely. Any glue that squeezes out on the glass can be removed very easily after it has dried.

Saving the Ties

The necktie kink shown in the illustration prevents neckties from stretching out of shape and from raveling, and eliminates the necessity of tying them every time they are worn. A permanent knot is tied on a flexible armband as shown in Figs. 2, 3, and 4, the band being cut in two at the point indicated, and the ends fitted with a hook and eye. The method of arranging the band under the collar is shown in Fig. 5.—Robert C. Knox, San Luis, Calif.



Repairing Narrow Curtain Lights

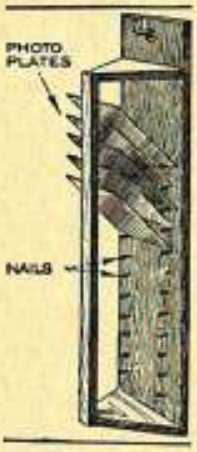
Broken celluloid curtain lights on a car can be readily and inexpensively replaced with ordinary kodak film, developed without being exposed. Cut the strip of film to the proper length and fasten it in place. As this film is thinner and more flexible than the celluloid used in curtains, it will not break so easily.

Storing Robe in Roadster

How to prevent the robe in my roadster from becoming soiled, was a problem that troubled me for a long time; it could not be kept clean on the rear deck, or on the floor of the compartment behind the seat, and it was impossible to keep it on the seat. I found, however, the use of a towel rail, screwed inside the compartment behind the seat, to be very satisfactory. It was large enough to accommodate the robe and also a sweater or coat, and prevented these from becoming soiled.—M. C. Johnstone, Madison, Wis.

Simple Negative Rack

The illustration shows a simple negative rack that can be made by anyone in a few minutes, from 4 pieces of wood and a number of nails. The back or base is about 4 in. wide and about 1 or 2 ft. long, and a hole is drilled at one end so that it can be hung on the wall. Two triangular-shaped blocks, about 4 in. high, are nailed on the baseboard and a length of 1-in. wood is nailed to these, as indicated. Small brass nails are driven into the base from the back, and are spaced about ¾ in. apart; the plates are set on the nails and rest against the front strip at an angle, as shown.—John H. Curtis, Philadelphia, Pa.



A Barbed-Wire Winder

The barbed-wire winder shown in the photograph can readily be made from material found on every farm, and it winds the wire on a spool just as neatly as is done in the factory. It consists of a frame made from pieces of wood of the dimensions shown in the illustration. Two V-shaped end supports are made of 2 by 4-in. lumber, the ends being spiked and bolted together. The supports are inverted and crosspieces are nailed on, the crosspieces being about 30 in. long. A strap-iron bearing is screwed on each support near the top as indicated in the end view, or if preferred, a ¾-in. hole can be drilled through the ends of the V supports to serve as bearings instead of the strap-iron pieces. A ¾-in. pipe or rod is bent to the shape of a crank and a ¼-in. hole is drilled through the crank, about 6 in. from the straight end, so that the spool can be securely attached. The

A Simple Homemade Barbed-Wire Winder Made from Material Available on Every Farm

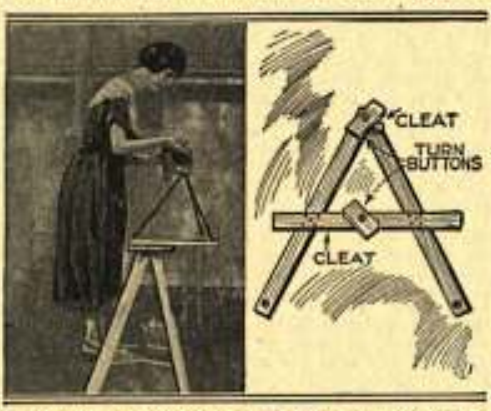
spool consists of two pieces of 1 by 5 by 16-in. wood with a ¾-in. hole drilled through the center, and two pieces of 1 by 5 by 20-in. wood, nailed across the first. The winding crank is pushed through the bearings of the frame and holes in the spool and a 6-in. spike or round piece of iron, held by ordinary fence staples, driven through one board of the spool, keeps the spool securely on the crank.

Keeping Wedges from Rebounding

Log-splitting wedges become smooth and polished after being used awhile, and this condition allows them to rebound very easily when driven in. The trouble can be eliminated by cutting a number of nicks in the sides of the wedge with a cold chisel, the nicks being driven in toward the point of the wedge. The edges of the nicks are slightly burred and this prevents the wedge from rebounding.

Stepladder Extension for Camera Tripod

In order to take pictures of objects too high for the reach of the ordinary tripod, an amateur photographer devised the combination stand shown in the photo.



A Convenient Extension on the Top of a Stepladder Provides a Stable Base for the Camera Tripod

It consists of a wooden frame that can be attached to the top step of a stepladder so that the camera tripod can be conveniently mounted on it, enabling the photographer to look into the finder and locate his subject almost as easily as on the ground.

The frame is made by cutting two hardwood legs as shown in the detail, and nailing them together at one end, at an angle of 60°. Nail a small cleat over this joint, and parallel to it, at a distance equal to the width of the upper step of the stepladder, nail another cleat. Screw a heavy turn button to the center of each cleat so that the frame can be clamped securely to the stepladder. Bore small holes in the ends of the legs and at the joint to receive the points of the tripod legs, to prevent the tripod from slipping.

Two-Tone Photographs

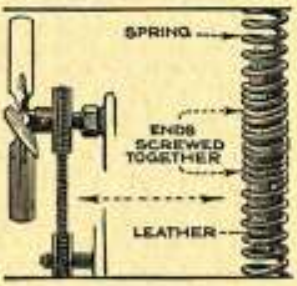
Most amateur photographers are familiar with the sepia-toning process; the print is first immersed in the bleaching bath until the image is almost invisible and it is then transferred to the sulphiding solution, which restores the picture in sepia tone. However, few photographers have much use for the sepia-toning process, as it can be used only for a limited class of subjects.

A new process of toning photographs in two colors, sepia and black, produces an artistic effect and greatly increases the field of sepia-toning. The portions of the photo that are to be toned sepia are painted with a double-strength bleaching solution, applied with a small camel's-hair water-color brush. The bleaching is accomplished much more easily by soaking the print in water and blotting it so as to leave it moist before applying the bleaching solution. Care must, of course, be taken to avoid getting any of the bleaching solution on the portion of the print that is to remain black. After bleaching, the print is immersed in the sulphiding solution. The portions of the print that have been bleached will be sepia and the rest of the photo remains black, giving a pleasing combination.

Objectionable backgrounds should be sepia-toned to make them less conspicuous, allowing the subject to remain black, but in cases where the subject is of a brownish color, it should be toned sepia to make it appear more natural, as black and white photos cannot do justice to a brownish subject.

Coupling for Spring Fan Belt

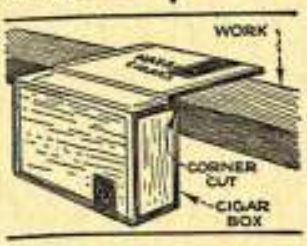
The illustration shows how a screen-door spring was used in an emergency as a fan belt on an automobile. The spring was stretched until the pitch of the coils was about ⅛ in., in order to give it the necessary stiffness. The two ends were coupled by means of a 1½-in. length of round leather, with the ends slightly tapered to make an easy entry into the ends of the spring. This piece was screwed halfway into each end of the spring and the spring was twisted until the ends screwed into each other far enough to tighten the spring on the pulleys. The spring belt thus made was only intended as an emergency repair but was found to give better service than the regular V-belt.



When an ink bottle was accidentally upset on a carpet, a quantity of ordinary table salt was instantly applied to the spot; the ink was quickly absorbed by the salt, and when the latter was removed by means of the vacuum cleaner, the spot was scarcely visible.

Cigar Box Used as Square

While building a gate I mislaid my square, which made it necessary to make use of some substitute. Finding a cigar box I tried to use it in the manner illustrated and found that it did the work quite as well as a square, and was also just as handy. To test its accuracy, I used it to mark a continuous line around a piece of 2 by 4-in. wood, and found that the last line was perfectly in line with the first. The corner was cut as indicated so that the first line marked could plainly be seen when drawing the second.—Ben Frantzreb, Indianapolis, Ind.



Conveyor for Lifting Water up Incline

The drawing and photograph show a convenient method of conveying water up a steep incline, in order to eliminate hard climbing, which was otherwise necessary to obtain water from a point below the camp. The conveyor consists of a pail suspended a few feet below an inverted pulley, which runs on a wire suspended rigidly between a tree at the camp and a post driven into the ground near the water supply as shown. A long rope is connected to the pulley and is wound

A Handy Conveyor for Lifting Water up Steep Inclines, That Saves Hard Climbing

on a large wooden drum, which is revolved to raise or lower the pail. When the pail is lowered it strikes the water and tips over, filling up immediately.

Concealed Counterweight for Cellar Door

The old-style trap doors covering the outside cellar stairs are rather unhandy to open, and for this reason counterweights, arranged as indicated in the

Counterweights Concealed in Ornamental Posts Aid in Opening Heavy Cellar Doors

drawing, have been found to be of considerable assistance. A hollow post made of ¾-in. lumber, and set securely in the ground, is located on each side of the door. A pulley is fastened in one side for a chain to run over, one end of the chain being attached to the door, and the other end to a counterweight such as an old sash weight.

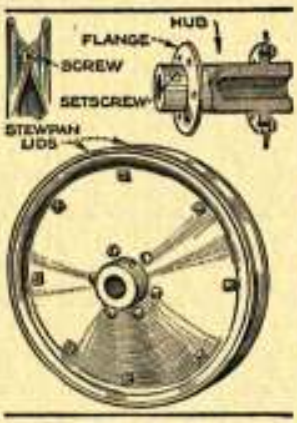
The appearance of the posts is greatly improved by mounting wooden flower boxes on top of them. The post and flower box are painted the same color as the house.—M. E. Duggan, Kenosha, Wisconsin.

Draft Shield for Carburetor

On many automobiles the carburetor is situated rather low on the side of the motor, right in the path of the air draft, which, during cold weather, cools the carburetor and prevents it from working properly. This trouble can be eliminated by providing a sheet-metal shield, large enough to close the space between the engine and the hood, and extending at least to the top of the motor. It is fastened under a manifold clamp, and its edges are rolled or bent over to prevent cutting the hands. Galvanized iron or brass is the best material to use for the shield.

Pulley Made of Pan Lids

A round-belt or V-pulley is often used in model and experimental work. As pulleys of the right diameters cannot always be purchased, the builder is often forced to make his own. A neat and strong pulley of large diameter can be made out of two stewpan lids, bolted together as shown in the drawing. The knobs are removed and the rivet hole is enlarged to slip over a brass or steel hub, which can be keyed or screwed to the shaft. The center hole must, of course, be in the exact center of the lids. Six small screws are used to hold each lid to a hub flange, the flange being drilled and tapped to receive the screws. Stovebolts, as many as are necessary, are used to clamp the two lids firmly along the edge. Pulleys of this type are light and strong, besides being neat in appearance.

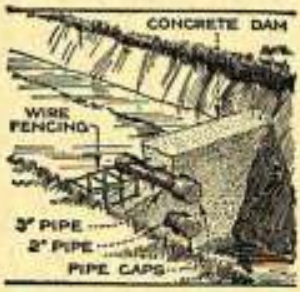


Simple Hanger for Portable Lamp

A convenient device for holding an extension cord at any point above the workbench or lathe is shown in the illustration. It consists of a length of heavy wire, stretched tightly over the bench, and a wire hook, fitted with a short chain and a spring clothespin as shown. The socket end of the extension cord is held by the clothespin, allowing the lamp to be hung at any desired height, and the hanger can be slid along the wire to the most convenient position for the worker. The wire on which the hanger slides is suspended between two walls and is kept taut by means of a turnbuckle at one end. The clothespin is fitted with a wire hook, run through the center of the spring.

Spillways for Miniature Dams

On small concrete dams short lengths of pipe, with a cap on each end, make excellent spillways. They are, of course, inserted through the form, and the concrete poured over them and the wire fencing used as reinforcement. The pipes should be of different sizes, to allow variation in the rate of discharge, and they should be located one above the other as indicated, to make possible complete control of the height of the water behind the dam.



How to Make an Arrow Pistol

The arrow pistol shown in the photograph is a simple and entertaining device that can easily be made by anyone. A 14-in. length of pipe, or tubing, cut from the head of an old brass bedstead, forms the barrel. This is attached, with strips of tin, to a stock or grip, cut from a piece of wood, the top edge of which is grooved for the barrel. A strip of rubber, ½ in. wide and 10 in. long, is cut from a discarded inner tube, and this is fastened to each side of the grip, by placing a square piece of tin over the ends, doubling the rubber twice, and fastening it with wood screws. The arrow can be made from any light wood, either tipped with feathers or not, as desired. The head should be pointed with a small nail, set into a hole drilled lengthwise in the wood. The mature stems of cat-tails, when cut to the proper length and tipped with shingle nails, form excellent arrows. Guns of the kind described have been found to shoot nearly 1,000 ft., with greater accuracy than a bow and arrow in the hands of a novice.

A Novel Pistol for Shooting Arrows That Will Shoot Nearly 1,000 Feet with Considerable Accuracy

Making a Gear Tight

Considerable trouble was experienced with a large crank gear on a deep-well pump, as it came loose repeatedly, although it was retained in position by a setscrew clamping down a heavy key. To overcome the difficulty I mixed finely sifted cast-iron filings and common table salt with water into a creamlike mixture, poured it into the setscrew hole, then forced the setscrew down to the key. After pouring in so much of the mixture that it began to come out of every crevice, I put the setscrew down to stay and allowed the pump to stand idle for a few days. After being repaired in this way it has been in use continuously for over a year, and the gear is still tight.—E. B. Johnston, Canton, Ohio.

Baby Crib Made from Barrel

The latest contribution to a baby's ward in a hospital in Oakland, Calif., is a "barrel crib," which was devised to meet the shortage of baby cribs. The barrel was sawed out as shown and was mounted on a simple wooden frame made of 1 by 4-in. material. The barrel was padded on the inside with a heavy comforter, which was tacked on. The outside was rubbed down smooth with sandpaper, and given a liberal coat of white enamel, and a neat brass drawer handle was screwed to each end, so that the crib could be carried around conveniently. A number of these cribs have been made, and have given every satisfaction.—Miss Seline Hess, Oakland, Calif.

Straightening Gut Leaders

A gut fly or bait leader that has been coiled for any length of time is very hard to handle, as it kinks and jams easily, and is liable to crack when it is straightened out. To overcome this, take a piece of rubber about 3 in. square, from an old inner tube, and rub it briskly over the leader a few times; this will straighten it perfectly.—M. W. Meier, Seattle, Wash.

Portable Handrail for Porch Steps

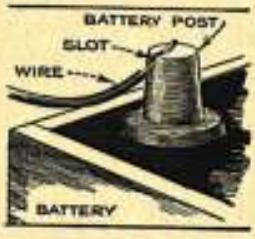
Accidents on slippery porch steps, due to the formation of ice, can be avoided by the use of the portable steps and rails shown in the photo. The device is made

A Portable Step and Rail for the Porch Prevents Accidents Due to Slippery Steps

of wood and fits over the steps as indicated. The tread is cut from 1-in. boards, about 4 ft. long, so that two persons can pass side by side. The sidepieces are cut from 2-in. material, notched to fit the steps. The vertical pieces, supporting the rail, are made of 2 by 2-in. stuff, and are braced by triangular blocks cut from the sidepiece material. The particular advantage of this device is that it can be put away when the winter is over.

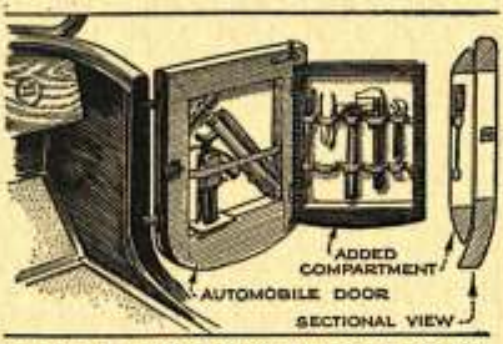
Making Tight Battery Connections

Storage batteries used on automobiles often have plain tapering terminals and this makes it unhandy to use them for radio purposes, as it is so difficult to attach wires to the terminals securely, in the absence of heavy test clamps. A tight connection can, however, be made by cutting a small slot in the top of the terminal with a hacksaw as shown in the illustration, inserting the bared end of the wire in the slot, and tamping the slot closed with a blunt-nosed tool. The small slot can hardly be noticed and will do no harm to the battery. This method of connecting is used in a battery station in preference to using clips, as these are soon ruined with battery acid and then make a poor contact, which has repeatedly caused the burning out of the rectifier bulb.



Tools Carried in Auto Door

Vacating the rear seat of an automobile so that tools can be obtained from under it, is very inconvenient to the passengers, especially during cold or rainy



A Handy Automobile Tool Kit Incorporated with One of the Front Doors to Save Space

weather. A solution of this problem is to keep the tool kit elsewhere in the car, as for instance on the front door. The inside covering of the door is first removed and a frame, 2½ in. deep, covered with galvanized iron, is hinged to the door as indicated. The combined width of the door and of the additional compartment furnishes sufficient space for the jack, tire pump, and other tools. The tools are held in place by means of leather straps, arranged as shown, and a small catch is used to keep the compartment closed.

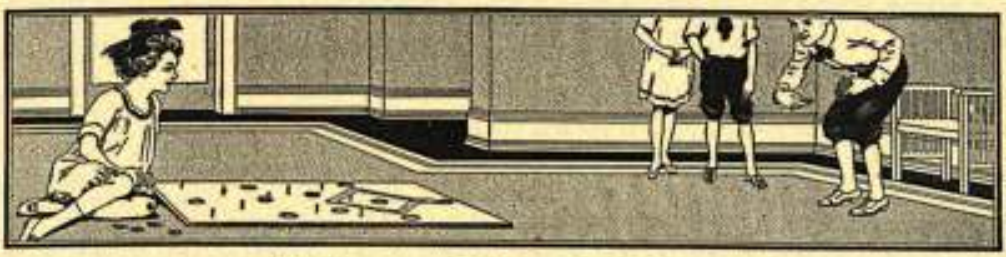
Testing Steel on Emery Wheels

Arguments often arise in the shops as to what particular type a certain piece of steel belongs. It is generally known that each kind produces a spark peculiarly its own, when touched on an emery wheel; but what these sparks are like, and to which kind of steel each belongs, is not so easily remembered by everyone. The three most commonly used steels—machine, tool, and high-speed—can usually be recognized if the material is new, but if it is old, or has been used previously on other work, it is hard to judge just what it is without testing in some way. A good practice, to avoid mistakes, is to keep samples of each at hand. The illustration shows a simple method of doing this, which possesses the all-important feature of keeping the pieces together. Two old drill shanks, one of high speed, the other of tool steel, and a scrap piece of machine steel, have a ⅛-in. hole drilled through one end, and are stamped HS, TS, and MS respectively. The pieces are forced onto a ⅛-in. wire, which is then bent to a triangular shape to keep the pieces well apart, and twisted together, leaving a loop at the top. A length of soft wire is attached to this loop, the other end of the wire carrying a weight, and the whole thing fastened under the bench where the grinder stands, by two staples. In this manner it is kept out of the way when not in use. When it is desired to test a piece of steel the test pieces are pulled forward and touched on the wheel, while the piece to be tested is touched on the other side. In this way it is obvious to the most unskilled, by comparing the sparks, what kind of steel is being tested.

A Simple Lawn-Mower Repair

One of the signs of old age in a lawn mower is the failure of the knives to rotate when taking a heavy cut. Perhaps more lawn mowers are consigned to the scrap heap for this reason than for any other; yet the difficulty can be remedied very easily by a few minutes' work. Remove the wheels of the mower by unscrewing the center bolts, and lift off the spur gears that drive the knives. A 3-pawl ratchet, cast within the hub of the gear, acts on a sliding key running through the end of the knife shaft. As long as the faces of these pawls are nearly radial, they fit flat against the key when driving the knives; but when worn, as indicated in the upper detail of the drawing, they wedge the key down so that it ratchets in both directions, thus failing to rotate the knives.

The remedy is to dress the faces of the pawls. This can be done best by cutting straight through the front edges of the pawls, hub and all, with a hacksaw as shown, then chipping off the worn portion. The resulting cuts in the hub do not weaken it to any extent, as actual repairs made in this way have worked perfectly without any consequent breakage.



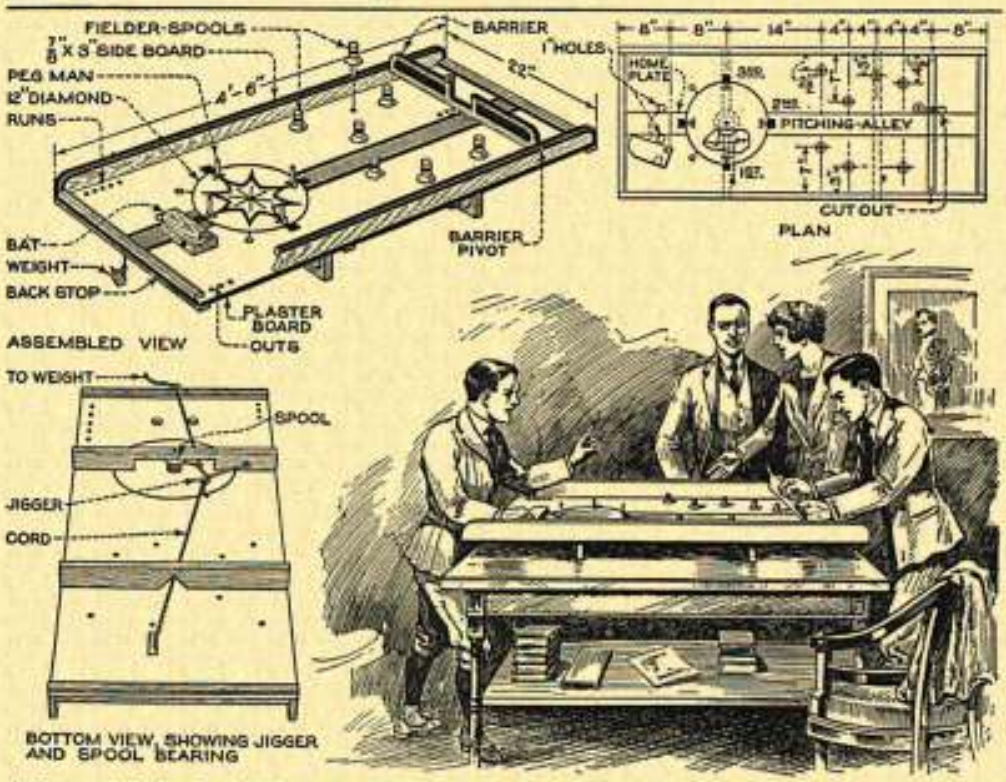
A Homemade Baseball Game

By ROLAND B. CUTLER

PARLOR baseball games are usually quite complicated and "pepless" affairs, but all the skill and chance of a real baseball game are embodied in the homemade baseball board shown in the drawing.

The board is very easy to make and nearly all the material required can be found around the house or workshop, except possibly the piece of wallboard used for the "floor." This piece measures 22 in. by 4 ft. 6 in. in dimensions, and the smoothest side should be up. Two ⅜ by 3-in. side boards are nailed along the top edges, and two supporting cleats, ⅜ by 3½ by 22 in., and two end cleats, ½ by 2 by 22 in., are nailed across the bottom. A back stop, ⅜ by 1 by 20 in., is nailed to the end of the board, on top, and the inner edge is beveled to a thickness equal to half the diameter of the balls, which are ordinary marbles. The barrier piece near the other end measures ½ by 3 by 20 in.; it is loosely pivoted at each end with a wood screw, and its lower edge clears the top of the wallboard by about ⅛ inch.

A disk, accurately cut out of the wallboard, serves as the diamond. It is 12 in. in diameter and its center is located equidistant from the sides and directly over the supporting cleat nearest the back stop.



A Homemade Parlor Baseball Game that Will Provide the Young "Fan" with All the Thrills of the Actual Game: The Details of Construction Are Simple, and the Materials Easily Obtained

A wooden spool, about 2 in. in diameter and about 2 in. long, nailed to the underside of the disk in the center, serves as a bearing on which the diamond rotates. A recess, 2 in. deep and 8 in. long is cut in the cleat to provide clearance for the spool and for the "jigger"—the wire device used to turn the diamond. A wooden pin, driven in a hole drilled in the center of the cleat, serves as a spindle on which the spool and disk revolve.

The jigger is made of No. 10 galvanized wire, or from a pail bail of the same thickness, bent to the shape shown. One end is stapled to the support cleat; a cord is tied to the eye that is formed at the bend, and it is run along the underside of the board, through a V-slot cut in the other support cleat, through a slot cut in the field, and the end is tied to a screweye on the barrier piece. In the upper left-hand figure the barrier piece is shown raised but in its normal position it is dropped, the slot in the board allowing plenty of clearance for the head of the screweye. One end of a 4-ft. length of cord is stapled to the spool under the diamond, and, after it is passed around a hook bent in the short arm of the jigger, runs underneath the board and through a screweye under the back stop; the other end is fitted with a wire hook on which is hung a weight consisting of several iron washers.

The diamond is rotated by winding up the 4-ft. cord on the spool and adjusting the weight so that the diamond will rotate about a quarter turn when the barrier is jerked up quickly. As soon as the barrier is dropped to its normal position the weight will take up the slack in the 4-ft. cord, without causing the diamond to move back again.

The face of the diamond is neatly laid out as shown, a small 1-in. triangle being drawn at four equidistant points around the edge, and a ⅛-in. hole is drilled in the center of each triangle to take a short wooden peg, which represents the man batting or running. About a dozen or more of these "peg men" should be provided. Four jerks of the barrier will rotate the diamond a complete revolution, giving each man a run.

The pitching alley is laid out about 3 in. wide, and the positions of the three bases and home plate neatly marked with black ink; the bases should each be made about 1 in. square and the home plate about 2 in. square. Halfway between the home plate and first base, and also between the home plate and third base, a small O-mark is made, which figures in scoring.

A wooden bat is arranged behind the home plate. It is made of 1-in. stock, 3 in. wide, and 6 in. long, with a screw hole drilled at one corner so that it can be pivoted loosely on a screw. On the opposite side, about 1½ in. from the end, a finger hole is drilled. In use the bat is set in the position shown in the upper right-hand figure and when the ball is pitched the bat is swung around with the index finger to strike the ball, and it will then occupy the position indicated by the dotted lines.

A small ball hole, about 1 in. in diameter, is drilled on each side of the pitching alley, and about 1 in. behind the home plate, in order to make the pitcher "put 'em over;" all balls running into or outside of these holes allow the batter to "take his base."

A number of ⅛-in. holes are drilled in the field at the points indicated in the upper right-hand figure, and the small spools used as fielders are fitted with pins to fit in the holes; the upper rims of the spools are cut off for the sake of appearance. A fielder must be situated directly in front of the slot cut under the barrier to prevent the balls from rolling into it. A row of ⅛-in. holes is drilled on one side of the board in which to set pegs for runs, and three similar holes on the other side for outs. When completed the board can be neatly painted and varnished, if desired, in order to make its appearance presentable for parlor use.

The game, if played correctly, is very interesting and has all the thrills of a real baseball game. The 4-ft. cord is first wound on the spool by turning the disk to the left, and the diamond is brought around so that one triangle is located exactly in front of the home plate. The pitcher then rolls the ball through the slot in the barrier, down the pitching alley, and the batter tries to strike it as it passes over the home plate. If a ball is pitched into or outside of the two ball holes the triangle is advanced to the O-mark, and a peg man is inserted in the hole. But if the batter hits the ball into the field without striking a fielder, it is a fair ball. The barrier is then jerked up and the batter advanced to first base, this move also advancing all the peg men on the diamond. If the ball, upon being hit strikes a fielder, it is supposed to be caught by that fielder, which places the man in an out hole. The same also applies to the batter hitting one of the base runners. On a strike the man on first base is brought back to the O-mark, and consequently this brings every man on the diamond back a short distance. The first two foul balls made by a batter count for strikes as in real baseball. A run is

home plate and he is then placed in a run hole. If the pitcher hits a base runner with the ball, the peg men are all advanced a base, or half that distance, or such an offense may be counted as a run for the batting team. If a pitched ball jumps the back stop, the batter is advanced to the O-mark, and a batted ball that jumps the back stop is a foul.

Of course, the rules for the game can be made to suit the players, and they may vary from those given above. However, the more closely the rules comply with actual baseball playing, the more realistic and interesting the game will be.

Cover for Egg Crock

The illustration shows a two-piece wooden cover for a large earthenware crock used for storing eggs. It has been found to be much more convenient than a one-piece cover, besides being air-tight, which the one-piece cover is not. The cover is made of a circular piece of wood, a little larger than the top of the crock, cut in two and hinged as shown. One of the pieces is securely clamped to the crock by means of wood screws driven into the underside, with the heads projecting over the lip ring. A ¼-in. bolt, with the head cut off and the end bent over to fit the lip ring, is provided on the other half, and is fitted with a washer and wingnut. This makes a clamp that can be tightened or loosened instantly with the fingers.—M. E. Duggan, Kenosha, Wis.

Making Plateholders Fit

Sometimes slides in photographic plateholders become swollen on account of dampness or other causes, with the result that they are hard to push in and out of the plateholder. This trouble can easily be overcome by filing down the swollen parts with a small file. It will be found that it takes but a few moments to make the slide fit perfectly.—Edward H. Flaharty, Denver, Colo.

Illuminating the Christmas Wreath

When a wreath is used in the window at Christmas time a very pretty effect can be obtained by illuminating it in the manner shown in the drawing. A small tin can about 4 in. in diameter and 3 in. high is obtained; a can in which hand soap is sold was used by the writer for the purpose. A five-pointed star is laid out on the bottom of the can, and it is cut out with small tin snips or heavy scissors. A slot 1 in. wide is then cut around the side, leaving only about 1 in. uncut. At this point, a small porcelain socket is mounted on the inside as shown; the socket can be purchased in any 5 and 10 cent store. A piece of yellow or red tissue paper is pasted inside of the box over the star, and a small 4-volt lamp is screwed into the socket. A length of flexible lampcord is led through a hole punched in the tin and connected to the socket. The outside of the can is painted with aluminum or gilt paint, and the lamp is mounted inside the wreath at the top.—Thomas W. Benson, Philadelphia, Pa.

"Fenders" for Auto Hood

The enamel on the auto radiator and cowl is frequently scratched by raising and lowering the hood carelessly. This can be prevented by providing small leather "fenders" on the corners of the hood as shown. They are made from pieces of leather about 2 in. square, folded over as indicated, and riveted to the corners of the hood. Besides preventing scratches when the hood is raised or lowered these fenders also lessen hood rattle, when the hood clips are loose.

Brush for Washing Cars

Washing the running board, wheels, and underside of the fenders of an automobile is usually a tedious and laborious

A Combination Brush and Water Nozzle for Washing the Underside of Auto Fenders and Running Boards

task, as the use of a hose alone is not sufficient to remove the caked mud quickly and thoroughly. The work is greatly facilitated by means of a special washing brush of the kind shown in the drawing. This fixture is attached directly to the water hose and causes a constant stream of water to flow on the surface where the brush is being used.

The brush used for this purpose is an ordinary calcimine or whitewash brush, about 6 in. wide, and having fairly stiff bristles. It is drilled through the wooden part as indicated to fit tightly on the threaded end of a 3-ft. length of ¾-in. pipe. A small slot is cut in the pipe at an angle, so that the water will be directed against the bristles. A cap, of course, is fitted on the end of the pipe, and the water hose is connected to the other end. If the brush tends to work loose on the pipe, the pipe can be threaded further, and provided with a locknut and tapered washer on each side of the brush.

¶The sleeves of old raincoats can be used to make bags for carrying rubbers.

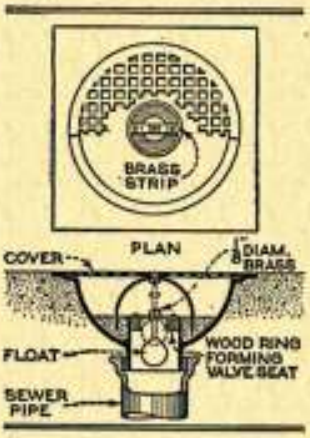
Catch for Sliding Screen

Convenience and simplicity are embodied in an easily made catch for the sliding screen. A piece of wire, about 12 or 14 gauge, is bent to the shape shown in the drawing, to form a catch about 1 in. long. The part above the loop is a little longer than that below, and the catch is screwed loosely to the window sash, about ⅛ in. from the screen. Two nails are also driven into the sash to keep the catch in the position indicated. When the screen is raised, the weight of the upper end causes the catch to drop under the lower part of the screen and hold it up. To lower the screen, it is raised slightly, and the top of the catch pulled back. The only necessary manipulation of the catch is when the screen is lowered, as it works automatically when pushed up, the heavier end falling in place itself.—George L. Michel, Jersey City, N. J.

Cellar Drain Converted into Trap

In some localities where the sewer system is too small to carry away the water of an exceptionally hard rain immediately, the water will temporarily back up through the basement floor drain.

In cases of this kind, the ordinary bell-trap floor drain can also be made to act as a back-water trap, as shown in the drawing. A wooden ring is cut from a piece of white pine, to form a valve seat, fitting snugly in the outlet. A brass strip is screwed across the top of the ring to guide the stem of a float; a wooden ball from a small-size croquet set, or a similar ball, makes a good float. The stem is a short



length of ⅛-in. brass rod, screwed into the float and fitted with a nut at the other end to keep the float from dropping through the guide strip. The opening through the valve seat allows the water to flow into the drain, but prevents it from coming out, as the ball rises and closes the opening until the water recedes. —Fred G. Koper, Charleston, W. Va.

Turned Posts for Homemade Furniture

The appearance of homemade tables and other furniture can be improved considerably if round legs are used instead of square ones, which immediately give the job away, no matter how well done. It is not necessary, in most cases, to go to the trouble of having legs made especially for this purpose, or to ransack the market for them, as ordinary stair balusters, which are available in a variety of sizes and forms, can be procured from any dealer in lumber and millwork. These balusters make as neat table, pedestal, and chair legs as can be desired and cost very little.

Mooring Small Motor Boats

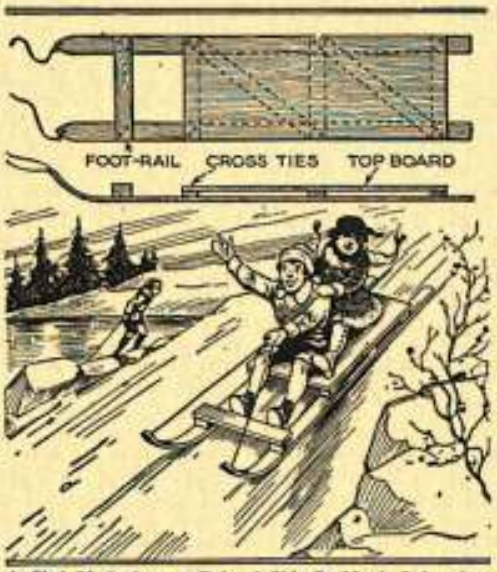
An unusual method of mooring a small motor boat was used at a summer resort on the Canadian shore of Lake Erie. A framework of 2-in. pipe and fittings, made large enough for the boat to be floated under it, was constructed as shown in the photograph. A windlass, also made of pipe and fittings, was provided at each end of the frame so that the boat could be

Motor Boat Completely Protected from Storms by Novel Mooring

hoisted clear above the surface of the water whenever necessary, as in stormy weather. Strong chains were provided on each windlass, and these were looped under the boat at the bow and stern as shown. The handle of each windlass can be pushed toward the inside, so that it bears against the frame upright, in order to prevent it from unwinding.—John E. Mason, Hamilton, Can.

A Ski Toboggan

The exhilarating sport of sliding downhill on the snow crust has much to commend it. It also has its dangers, as the crust softens toward spring, and a heavy



A Sled Made from a Pair of Skis Is Much Safer than the Ordinary Kind on Crusted Snow

sled is liable to break through, catapulting its passengers headlong into the frozen snow, which breaks up and presents jagged cutting edges capable of inflicting considerable injury. A sled that is so built as to practically eliminate this danger is shown in the drawing.

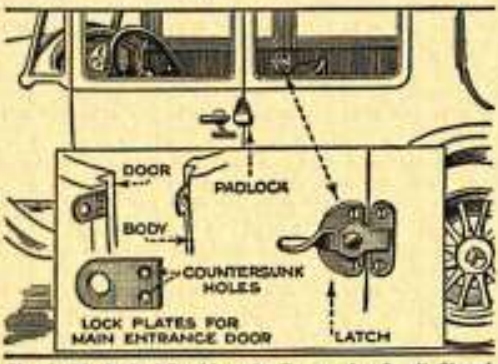
It is made from a pair of old skis, securely fastened together by means of three crosspieces and two diagonal braces, as shown in the upper details. The top board and foot rail are attached, to this framework by means of wood screws, and a hole is drilled through the end of each ski to take a ¼-in. rope. This sled will slide just as easily and just as far as any other sled, and will not break through the snow crust, or turn over, due to the width of the runners. It is also light in weight and can be easily managed by small children.—C. M. Wilcox, Torrington, Conn.

Putty for Floor Cracks

Cracks in a floor that is stained and varnished may be filled with a putty consisting of 2 parts of glue, 14 parts of water, 4 parts of plaster of paris, and 2 parts of litharge. This putty will take the stain and varnish well.

Locking the Closed Car

Many small closed cars are not provided with door locks, and the owners do not always want to pay the price demanded for



Simple Method of Locking the Doors of a Small Closed Car Using Only One Lock

handles of the locking type, or regular pillar locks.

A car of this type may very easily be locked by means of a padlock, however, thus making it a safe place to leave clothing and packages, as well as affording additional protection against car theft. As indicated, the left front door is provided with two flat-iron lock plates, one being screwed in a recess cut in the door edge, the other in the casing, so that the screws are covered when the door is closed. The remaining doors are fitted with simple latches, or sliding bolts, which are fastened before leaving the car.

These fittings are inexpensive, and, with a neat padlock of good make, do not detract from the appearance of the car, while adding to its security against theft.

Regulating Fireplace Dampers

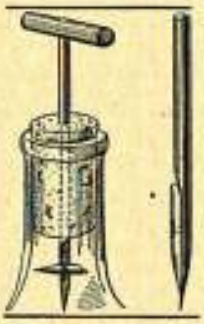
The old-fashioned fireplace is becoming more and more popular with home builders every year; not only for ornamental purposes but for the appearance of cosiness and comfort presented by the open fire. The addition of an open fireplace, however, may cause the main heating plant to waste large quantities of fuel if the damper is not regulated properly, according to weather conditions, when the fireplace is not in use.

In cold and windy weather a strong suction is caused in the fireplace chimney, and consequently much of the warm air escapes, allowing the cold air to leak in through the cracks of the doors and windows. For this reason the fireplace draft should be closed in such weather.

In damp and sluggish weather, however, when it seems impossible to start a circulation of warm air within the house, and very little heat comes from the registers, it is advisable to open the damper of the fireplace. The draft of air moving upward through the chimney will be too slow to draw much cold air into the house from the outside, but will be sufficient to stimulate a stronger circulation through the furnace.

A Cork Extractor

An effective cork extractor, which pulls the corks without breaking them, can easily be made from a large tin-opener key. A small piece of metal, the same thickness as the key, is riveted loosely to the lower end of the key so that it can be turned easily, and both are ground down to a point as shown. In use the small piece is set in line with the key as shown on the right, and the key is pushed down through the cork. By tapping the key lightly the small piece falls to a position at right angles to the key and it is then an easy matter to pull the cork out.—Harold E. Benson, Boulder, Colo.



Opening Sardine Tins

Anyone who has opened a sardine tin knows that while it is very easy to roll back the cover by means of the key until it is in the position shown in the illustration, it requires a very powerful pressure on the key to force the rolled cover past the corner of the tin. If, however, when this point is reached, the point of an ice pick, or similar tool, is inserted through the handle of the key in the manner indicated, a leverage is provided that makes it very easy to strip off the remainder of the cover. This kink will be appreciated by the feminine members of the family, whose fingers are not strong enough to apply the necessary force to the key.

Testing Battery Polarity

A simple method of determining the polarity of a battery or cell, and at the same time roughly measuring its strength, is as follows: Dissolve 1 part of potassium iodide in 25 parts of water; place the solution in a shallow dish, soak several pieces of white blotting paper in it, then remove them and allow to dry. To use, moisten a piece of the prepared paper and touch it with wires leading from both poles of the battery, keeping them about ½ in. apart. A dark-brown spot will immediately be produced where the wire from the positive pole touches the blotter. A dead cell or battery will produce no spot. A little experience in judging the rapidity with which the spot is formed, and the shade of the color produced, will soon enable one to tell the condition of the battery fairly accurately, whether it is nearly dead, half charged, or fully charged. This method is applicable to both storage batteries and dry cells, although the wires must be further apart in the case of storage batteries.—Henry D. Hirsch, Chicago, Illinois.

Buggy-Spring Saves Pump Repair Bills

A Wisconsin farmer who had considerable trouble in keeping his windmill and pump in repair concluded that it was the erratic action of the mill that was to blame. The weight of the rods, together with the water being lifted, steadied the mill on the up-stroke but, in a strong wind, the downward motion was always jerky and naturally wearing on the mill and pump parts.

To overcome this, he mounted a half section of a buggy spring on a 2 by 4-in. oak crosspiece as shown in the drawing, and fastened the spring to the plunger rod as indicated. The result was that both strokes were more evenly balanced than before and the jerky action was entirely eliminated, making the mill run smoothly and quietly. The owner claims that this attachment has paid for itself many times over by the elimination of shut-downs and repairs.—G. E. Hendrickson, Argyle, Wis.

An Amusing Trick

An amusing trick that can be performed with a mirror, two pieces of paper, and a pencil is shown in the illustration. One

An Amusing Trick, the Materials for Which Are Available Everywhere

person is seated at a table and is instructed to draw the figure shown in the upper left-hand corner, first drawing the square and then the cross inside of the square. This must be done by looking in a mirror which is held vertically as shown, a piece of paper being used as a shield to prevent the victim from seeing the pencil movements directly.

It will be found rather easy to draw the square, but mysteriously difficult to draw the cross inside. In fact, many people find it absolutely impossible to make the pencil start diagonally in the proper direction, and very few can draw a straight line, even when they do make the pencil move in the right direction.—J. R. Minter, Washington, Ind.

Shellac for Floors

A good and durable finish for floors, stairways, and other surfaces that are subject to heavy wear is obtained by applying a coat of shellac over the filler coat, before using the regular varnish. The shellac should not be mixed with the varnish, and if any thinner is required alcohol should be used. The wear-resisting qualities of the shellac will offer a pleasant surprise to anyone who has to varnish floors often, and the gloss obtained has a long life.

Keeping the Clothespins Handy

The drawing shows a novel method of keeping clothespins handy, much better than carrying them around in a bag or apron. The clothespins used for this purpose are of the spring type, and a number of them are strung on a length of galvanized wire suspended about 4 in. above the clothesline, as shown in the lower insert. The clothespins can be snapped on the line at any desired point, and when not in use they are pushed to the end of the wire.

An Idea that Not Only Keeps Clothespins Handy, But Prevents Them from Being Lost

Dry-Plate Holder Reduces Handling

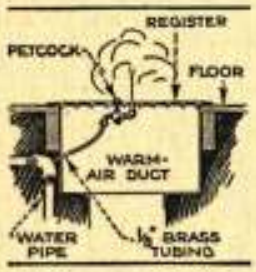
When handling developed plates that must still be fixed and washed there is always some danger of scratching or imprinting finger marks on them, and for this reason the plate holder shown in the photo was constructed. The frame is made of soft-iron wire, and the slides of short lengths of ¼-in. copper tubing, cut lengthwise and soldered to the frame as shown. After the plates are developed they are placed in the holder and immersed into the hypo solution, then the holder is immersed in running water to remove all traces of hypo. In this way the individual plates are not handled from the time they leave the developing solution until they are dry, and there is very little danger of damaging them.—John H. Schalek, Pittsburgh, Pa.

Easy-Starting Fluid for Autos

Many clothes-cleaning preparations on the market are nothing more than pure high-test gasoline, and they form ideal priming fluids for the auto in winter. Purchase a can of cleaning fluid at the drug store—the smell will tell if it is of the gasoline family—and have the druggist put a few drops of ether into the can. The next time the engine is hard to start, prime with this, and the results will be surprising.

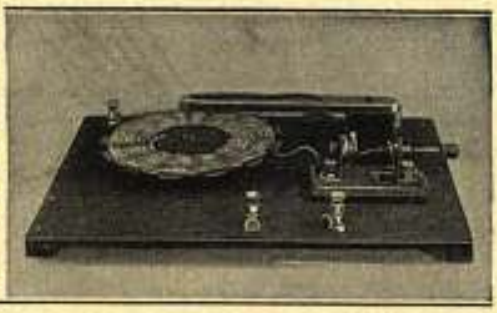
A Furnace-System Humidifier

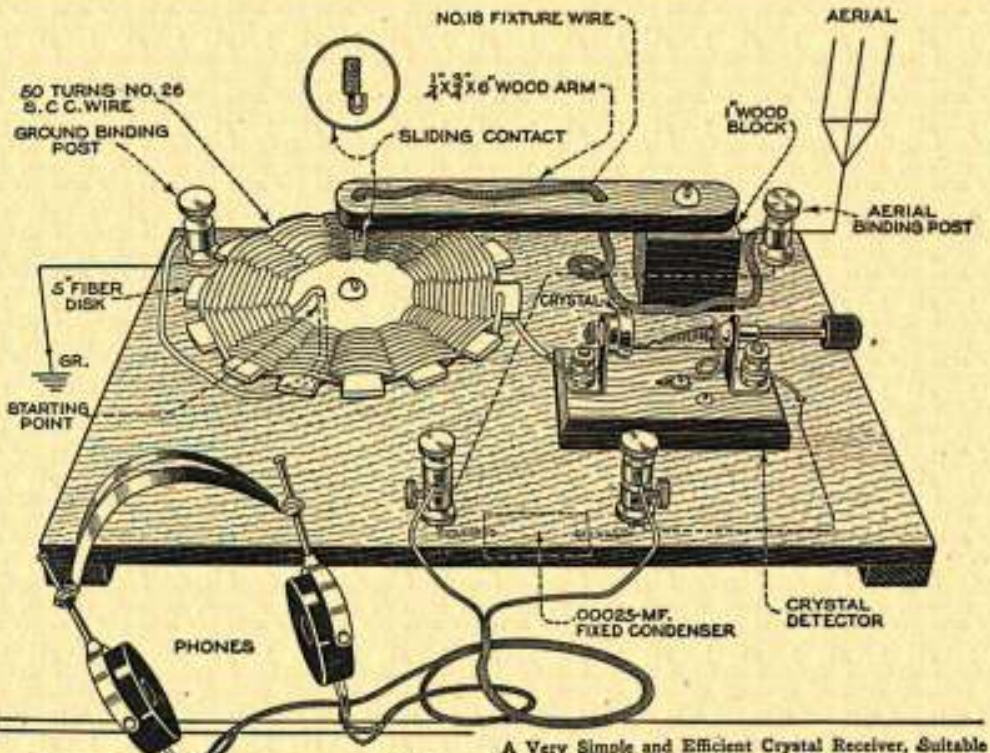
A humidifier for the home using furnace heat can be constructed from a length of ⅛-in. brass tubing and a petcock. It is arranged as shown in the drawing, the brass tubing being connected to the hot-water system, so as to conduct warm water to a register, where it is emitted in a fine spray into the hot-air current. The warmest register in the house should be selected for this purpose. A hole is drilled in the nearest hot-water pipe, and tapped for ⅛-in. brass tubing. A piece of the tubing, long enough to extend to the register, is screwed into the hole, bent as indicated in the drawing, and a petcock screwed on the upper end. The petcock is fitted with a nozzle, made from a short length of brass tubing closed at one end, and having a pin hole punched through it so that a fine spray will be emitted when the petcock is opened. The spray is adjusted by the petcock and should not be allowed to flow so fast that it cannot all be vaporized at once; for this reason the pin hole must be very small. When the spray is once adjusted it will operate without much care or attention. No harm will result if the water is allowed to flow too freely by mistake, as it will then drain down the warm-air duct into the furnace where it will instantly be vaporized.—Paul L. Fetherston, Jackson, Mich.



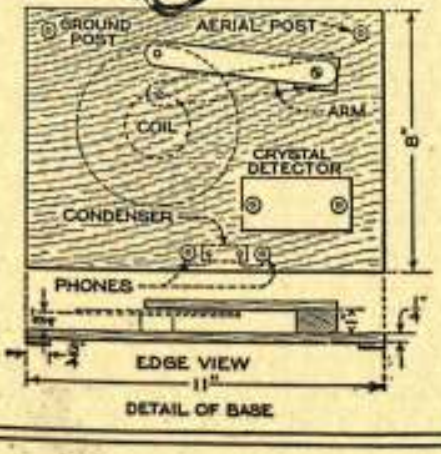
MAKING AN INEXPENSIVE CRYSTAL RECEIVER

THERE is a wide field for a simple and inexpensive crystal detector, both among beginners and "old-timers." The beginner does not usually want to invest much money in a set, until he thoroughly understands the principles involved, and a crystal receiver is ideal for him; the more advanced radio enthusiast, also, can use a crystal set to advantage as a standby for the not infrequent occasions when his large set "goes on strike"—usually when





A Very Simple and Efficient Crystal Receiver, Suitable Either for Beginner or "Old-Timer"



a particularly interesting concert or lecture is "on the air."

The crystal receiver described in this article is easy to build, is always ready to use, will give excellent results up to a distance of 20 miles, and costs only about 65 cents to build.

The coil, which is of the spider-web type, is wound on a form consisting of a slotted fiber disk, ¼ in. thick, and 5 in. in diameter. There are 13 "spokes" in the form, and, if fiber is unobtainable, heavy cardboard may be used instead. Fifty turns of No. 26 single cotton-covered wire are wound on the form, the wire being led through a small hole drilled near the center of the disk and then wound on

the form from the center out, over and under alternate spokes. The turns should be counted every time the starting point is passed, and, when the winding is completed, the end of the wire is passed through another small hole and drilled in the end of one of the spokes.

The coil is screwed to a small block of wood, 1 in. square and ¾ in. high, which, in turn, is tacked or glued to a ¼ by 8 by 11-in. baseboard. A bolt may be used if a hole is drilled in the small block and base, and the bolt passed through both. A strip of wood, ¼ in. thick and ¼ in. wide is then cut to a length of 6 in. and the ends rounded. Two small holes are drilled in this strip to take No. 18 insulated fixture wire, and a hole drilled for a screw or bolt. The strip is mounted on a block of wood 1 in. high, and screwed or bolted to the base so that the arm can move freely. The binding posts, detector, and .00025-mf. condenser are then screwed to the baseboard, the condenser being screwed to the underside, between the phone posts.

A length of No. 18 fixture wire with one end bared and doubled over as indicated in the detail, is threaded through the holes in the contact arm, and the other end connected to the aerial binding post. The arm is then moved so as to mark the path of the doubled end of the wire over the coil, and the insulation is carefully scraped off each turn along this path. This is best done with a small piece of emery cloth, doubled and used on edge. Care must be taken that no two turns touch at the bared spots, and the doubled end of the bared contact wire must be cleaned, and adjusted to make good contact with the coil turns.

The starting end of the coil is now connected to the ground binding post, and the other end to the crystal side of the detector. The "cat-whisker" of the detector is connected to one of the phone posts, the other phone post connected to the aerial post, and the condenser connected across the phone posts, all this wiring being done under the baseboard, as indicated in the drawing.

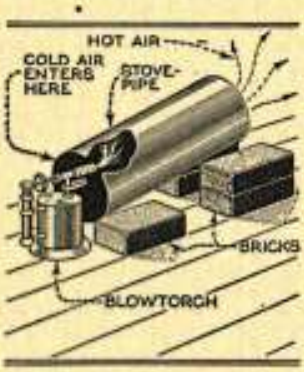
A strip of wood, ¼ by ¾ by 8 in., glued to each side of the base, completes the instrument.

Connect a good pair of phones to the phone posts, solder or clamp a lead from the ground post to a water pipe, and connect up the aerial lead, and the instrument is ready for use. The installation of a suitable aerial and ground for a detector of this type was illustrated and described in the May, 1923, issue of this magazine. If an overhead aerial cannot be used, for any reason, the reader can still get good results by laying three complete turns of ordinary bell wire around the picture molding of the room, leaving one end "open," and connecting the other end to the aerial lead.

This instrument will tune to all wave lengths used by broadcasting stations, and for longer wave lengths it is only necessary to use smaller wire and more turns on the coil.—F. L. Brittin, Chicago, Ill.

Emergency Garage Heater

An emergency garage heater, which is simple but very effective, can be made from a blowtorch, a 1½-ft. length of 8-in. stovepipe, and a few bricks, arranged as shown in the drawing. The stovepipe is set on the bricks at an angle to the floor, and the blowtorch is set at the lower end. It is adjusted to give a bluish flame, which gives the most intense heat, and a circulation of air is immediately set up through the pipe, the cold air entering the lower end, and, after being heated, issuing from the upper end. An improvised heater of this kind will heat a small garage or shed in a very short time.—Perry Chandler, Hillside, Mass.



Trimming Clarinet Reeds

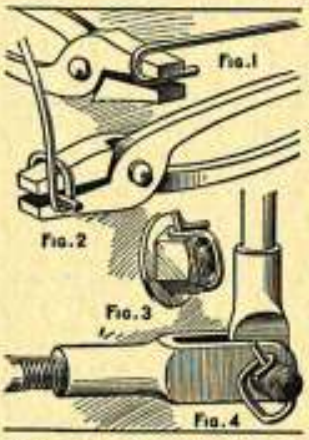
The reeds used for clarinets and saxophones must always be trimmed to take off the rough edges, or to make them stiffer. It is almost impossible to do this perfectly with a knife or shears, but two coins, preferably 5-cent pieces, may be used with good results. Place the reed between them so that the edge to be trimmed projects as much as necessary, having the coins perfectly even, above and below. Hold them with the thumb and finger, and burn off the projecting end of the reed with a match. Run the finger over the burnt edge to take off the charcoal, and this will leave the edge perfectly smooth and round.

Homemade Coal Cabinet

The coal cabinet shown in the illustration is much neater and more convenient than the ordinary kitchen coal scuttle, with its attendant dirt and dust. It is made of strong matched lumber, and, when stained and varnished, makes a presentable addition to the kitchen furniture. A door is fitted at the bottom of the front side, and, directly above the door opening, on the inside an "apron" is nailed, which deflects the coal away from the door; this, with the sloping threshold, prevents pieces of coal from dropping out onto the floor when the door is opened. A ring on the front of the cabinet slips over the door knob and holds the door open when shoveling out coal. The weight of the door holds it shut without any catch.—Jos. C. Coyle, Colorado Springs, Colorado.

Emergency Cotter Pin

A short length of brass or steel wire, bent with a pair of pliers as shown in the drawing, makes an excellent cotter pin, which is self-locking and can easily be attached or removed with the fingers. The wire is first bent over with a pair of flat-nosed pliers as shown in Fig. 1, the end being allowed to project a little. The wire is then given a second twist around the end, as indicated in Fig. 2, and cut off. Fig. 3 shows a pin of this kind used on a bolt, and Fig. 4 how it is used on a clevis pin. An emergency cotter pin, made in this way, serves the purpose just as well as the split cotter commonly used.



Detachable Runners for Baby Carriage

The drawing shows a set of easily made runners for the baby carriage that can be attached or detached in a few moments,

Runners for the Baby Carriage Are Easily Made and Can Be Attached in a Few Moments

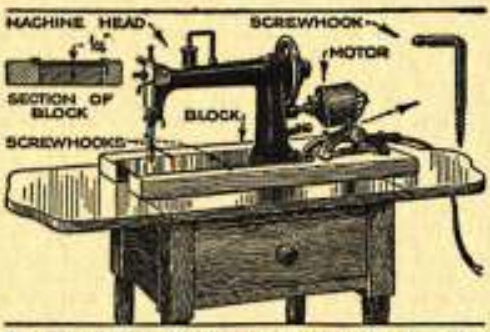
without removing the wheels. The runners are made of light channel iron in which the tires fit fairly snugly, and they are held in place by means of ⅜-in. iron hooks, bent and attached as shown. The front ends of the runners are bent to conform to the curvature of the wheels, and the rear ends should extend about 8 in. beyond the rear wheels. One end of each hook is permanently attached to the runner, and the other end is snapped over the rear axle. The hook should be made a trifle short, as there is a little "give" in the rubber tires, and in this way a tight fit can be obtained.

Vacuum Bottle Aids in Starting Engine

A vacuum bottle, filled with hot water, has been found to be of considerable assistance in starting an automobile engine during cold weather. The intake manifold is wrapped with a woolen rag and the hot water contained in the vacuum bottle is poured over the rag. The object in using a woolen rag is to retain the heat around the manifold as long as possible, wool being an excellent nonconductor of heat. It will be found that sufficient heat is imparted to the mixture inside of the manifold to cause it to vaporize readily.

Remodeling an Old Sewing Machine

An old sewing machine, which was in perfect mechanical condition, but was mounted on an old dilapidated wooden



An Old Sewing Machine Made Portable and Run with an Electric Motor

frame, was made portable by fitting it on another base, and running it by means of an electric motor.

A block of wood 2 by 10 by 21 in. in dimensions, was planed and sandpapered smooth. The head was removed and the space in which it fitted was traced on a piece of paper, making a pattern 6½ by 14 in., with the corners slightly rounded. The pattern was then traced on the new base, leaving a space of 7 in. on the right side, 2½ in. on the back, and 1½ in. on the front. Inside of this mark another rectangle was drawn, ½ in. smaller than the first on all sides except the left side, where it was 2 in. smaller. The block was then cut out on the inside marks, and an opening cut in the left side, as shown in the drawing, so that the bobbin could be manipulated easily. On the outside lines the wood was cut down to a depth of ¼ in., to form a shoulder for the iron base of the machine head. Brass screwhooks of the type indicated, and about 2½ in. long, are screwed into the base on each side of the machine head to hold it in place securely. The base is stained and varnished to give it a neat appearance.

A small motor suitable for running sewing machines can be purchased at any electrical supply store. The motor is clamped in place with one long screwhook of the same type as those used to clamp the head. —A. Seefhoff, Bellerose, N. Y.

¶When cranking an automobile engine with an electric starter, throw the clutch out; this allows the starter to turn the engine alone without turning the clutch and the idler-shaft gears, and consequently prolongs the life of the battery.

Improving Binding Posts

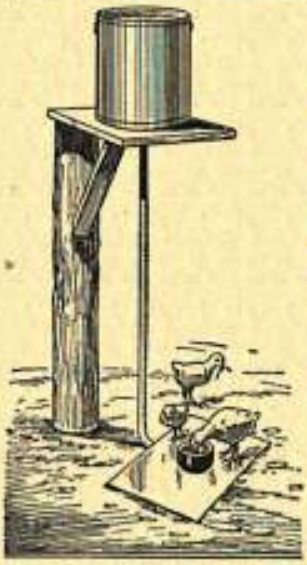
An ordinary screw binding post can be improved considerably by slotting it with a hacksaw as indicated in the drawing. The wire then can be inserted in this slot and the nut screwed down, making it unnecessary to bend the wire. With such a slot cut in the binding post, the phone terminals of a radio set and similar tips can be held securely without the danger of slipping from under the nut, or the necessity of obtaining regular phone posts.

Paste That Will Not Sour

A paste that will not sour is composed of 3 quarts flour, 3 teaspoonfuls powdered alum and ½ teaspoonful powdered blue vitriol. Mix in dry state and make in the usual way. It is safe to make a barrel of this paste at a time if much of it is used.

Poultry Waterer Made from Carburetor

A neat and efficient poultry waterer was made from a discarded carburetor by a Nebraska farmer. The bowl of the carburetor, with the float mechanism, was removed and set into a shallow hole in the ground. The inlet was then connected to a tank set on a post about 2 ft. high, by means of copper tubing. The tank was merely a tin pail, with the tubing soldered into a hole cut in the bottom, and the whole apparatus was located in a shady spot, so that the water would remain cool during hot weather. A sheet of tin, with a hole cut in it for the bowl, was placed on the ground. The float keeps the bowl full.



Cycling on Snow and Ice

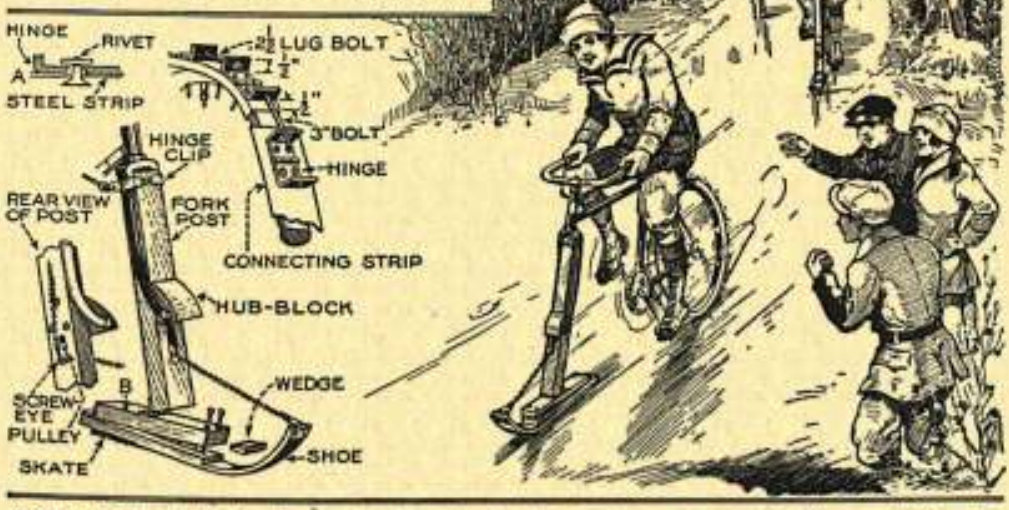
By R. B. CUTLER

SEASONABLY shod with a tread such as that shown in the illustration, the "bike" can be depended upon for winter sport, or ordinary uses over ice and snow. With ordinary tires, cycling is not only hard work, in winter, but precarious; with the tread described here, however, good traction is assured, and the runner makes the machine easily handled.

The necessary materials are; twenty 1⅛ by 3-in. back-flap hinges; seventeen ⅜-in. stove bolts, 2½ in. long, and four 3 in. long; three strips of 26-gauge galvanized sheet steel, 2 by 30 in.; ½ lb. rivets and washers; a pair of light 3-in. strap hinges; a 3-in. T-hinge; a pair of 3-in. butt hinges; a ⅜ by 4½-in. machine bolt; six No. 14 screws, 3 in. long; one 1-in. awning pulley; 2 ft. of steel jack chain, No. 16, ⅝-in. link; one screen-door spring, and a skate. For a 26-in. wheel, one less back-flap hinge is used, nineteen ⅜ by 2½-in. bolts, and one 3-in. bolt.

The twenty hinges are bent at each end at right angles, the lugs being ½ in. long, and the countersunk sides opposite the lugs. Beginning ½ in. from the end of each galvanized strip, rivet the hinges to the strips, using four rivets to each hinge, and keeping them 2 in. apart. Equip two of the strips with seven hinges, and one with six, then connect each hinge to the next with the 2½-in. bolts. Cut the strips with ½-in. ends, center them over the rim of the wheel, and connect the end hinges with the 3-in. bolts. Tighten up all bolts, then, with pliers and hammer, shape the sides of the strips to grip the rim.

From 1-in. ash, cut a runner shoe, 3 in. wide and 25 in. long. Cut down 12 in. at one end to ½ in. or ⅝ in. thick and taper the sides down to 2½ in. wide. Steam the toe, or soak it in hot water, then bend it to shape. The fork post fits



A Simple Tread and Steering Runner for the Bicycle that Will Enable It to Be Used in Winter as Safely as in Summer, and that Lessens the Hard Work of Pedaling in the Snow

below the head and is 2 in. wide and 24 in. long (22 in. for a 26-in. wheel); the hub block is 2 in. thick, 5 in. long, and 3½ in. thick, and is bored to take the machine bolt with the post in place. To fasten the post below the head, shape the 3-in. strap hinges to form a clip, screw to the post, and bolt behind the head. With a bit and keyhole saw, cut a ¾-in. slot, centered below the hub block, and extending down 4 in. at the front but only 2 in. at the back.

Cut the piece B of the runner, 2 by 3 in. long, and shape roughly a 3-in. side to fit the skate, placing the heel even with one end. If it is a clamp skate, remove the clamp and either drill screw holes or secure with three 3-in. mending plates as cleats. With the shoe shaped and dry, lay it over the skate with the toe end of B even with the shoulder of the shoe, and locate the skate toe. This point is the limit of the cutout in the shoe for the blade—a slit centered from the heel of the shoe.

Assemble the runner with the toe point of the skate set in about ¼ in. from the shoe bottom—so that there will be no possibility of "stubbing." At this end there will be perhaps an inch space between B and the shoe. Fit a wedge block here with the heel of the shoe brought up to block B, and secure it with two 3-in. screws driven through B, through the wedge, and into the shoe. These must be countersunk 1 in. and a washer or two used under each screw head. At the heel attach a 4-in. butt hinge, three screws into B and screw in each side of the shoe, then cut off any waste heel. At the toe, rivet the 3-in. T-hinge, as shown.. Assemble the gear to the post with a 3-in. butt hinge centered on top of the B-block.

The 9-in. spring, pulley, and chain keep the runner "headed up" for easier steering, and safety when "jumping bumps." Back of the post, secure the pulley with a screweye set into the lower edge of the 2-in. opening. Cut the spring to length, and with another screweye, fasten one end, then connect up the chain, around the pulley, through the opening to the hinge on the toe of the shoe. With the runner off the ground, if the spring is pulled down to within about 4 in. of the pulley, the tension should be right.

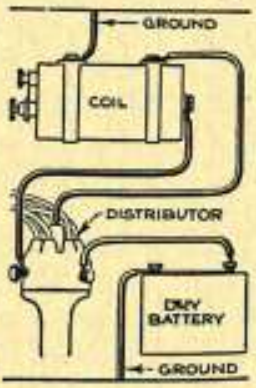
After trying out this tread for a few minutes, tighten up any hinges on the tread if necessary.

Detachable Bird Houses

It is becoming quite the fashion for country, suburban, and even city dwellers to provide small bird houses in yards and parks. They are usually mounted on poles or in trees, and as they are securely fastened, it is not an easy matter to remove them when it is desired to paint, repair, or clean them, which is occasionally necessary. A method of mounting a bird house so that it can readily be detached is shown in the drawing. The top of the supporting post is trimmed down to fit loosely inside a No. 2 fruit can, which is cut and slotted as shown. The can is nailed to the underside of the bird house and slipped over the end of the pole. Nails are then driven into the slots and bent downward at right angles as shown, so that the can will not slip off. When removing the bird house the nails are turned to the position shown in the lower detail, when the can may easily be released, by an upward pull.—G. E. Hendrickson, Argyle, Wis.

Emergency Ignition Repair

Ignition repairs made in emergencies on the road help to keep the car moving but are usually not very efficient, but a simple repair that was found entirely satisfactory is shown in the illustration. An ordinary high-tension coil of the kind used in a light car, which can be obtained anywhere, and a dry battery, were connected up with the distributor as indicated in the illustration. One of these coil units can be used with any breaker system. It may seem that the firing would be too early, but this arrangement has been tried and found to work perfectly.—R. M. Root, Anderson, Ind.



Bumpers for the Garage

Sand bags placed on the floor of the garage make excellent safety bumpers to prevent driving the car against the wall. They are easily dragged about wherever required and may be utilized as cushions upon which to sit or recline when making car repairs. Grain bags, or any heavy canvas bags will serve for this purpose, but they should contain only enough sand to make them about 6 or 7 in. thick.—G. E. Hendrickson, Argyle, Wis.

Simple Copy Holder

When using a typewriter under a fan or near an open window, some kind of holder is necessary to prevent the copy from being blown away. A simple holder can readily be improvised from an ordinary paper clip, the narrow end being left doubled and the wide end bent to the shape shown, so that it will press tightly against the surface of the table. The rubber foot of the left leg is partly unscrewed and the doubled end of the clip hooked around the screw, which is then turned tight to keep the clip in position. The copy is slipped under the spring clip and will be kept there securely.—L. H. Unglesby, Baton Rouge, La.

A Kink for Trappers

Every trapper has experienced the disappointment of finding that an animal had been caught in the trap, but got away. The most common cause of this is that the trap is fastened too securely to a stake or tree and this gives the animal a chance to pull itself loose. This trouble can be eliminated by attaching the chain to one or more small branches that will be dragged along when the animal attempts to escape. The work of dragging these tires the animal so much that it will not go very far with the load, and cannot free itself by sudden jerks.—H. H. Siegele, Emporia, Kan.

Snow Scraper Attached to Rake

A serviceable snow scraper can readily be made by attaching a piece of galvanized iron to an ordinary garden rake, as shown in the drawing. The metal should be at least ¼ in. thick and should be cut to the dimensions given in the upper detail. Short cuts are made at the points indicated and the strips between these cuts bent out as shown in the lower drawing. The loops thus formed should be made so that the tines of the rake must be forced into them, thus preventing the scraper from falling off the rake. A scraper of this kind costs much less than a manufactured one, and, if properly made, serves the purpose just as well.—Lorin A. Brown, Washington, District of Columbia.

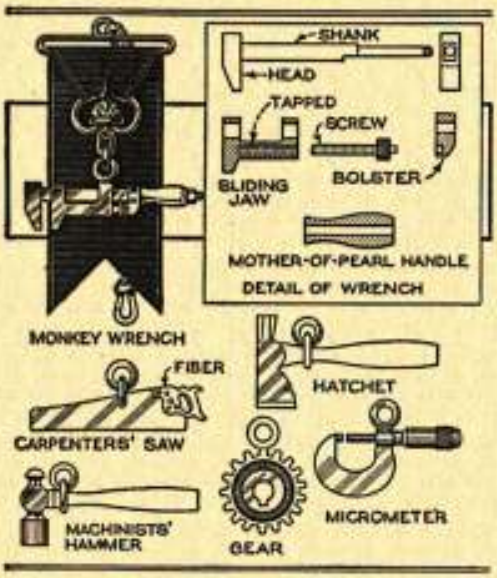
Serviceable Snow Scraper Made from a Piece of Galvanized Iron Attached to the Teeth of a Rake

Safeguarding the Aerial

Frequently a single-wire aerial is strung between the house and a near-by tree, and the swinging of the tree in a storm often breaks the wire or pulls it out of the support at the other end. A good method of overcoming this trouble is to place an ordinary screen-door spring between the end of the aerial and the house. This will keep the wire taut and at the same time prevent its being broken so easily. In some cases it may be desirable to have springs at both ends of the aerial.

Mechanics' Watch Charms

Any mechanic who likes to make things in his spare time, can turn his labor and ability into money by making and selling



A Number of Gold-Plated Watch Charms in the Form of Tools Used by Various Trades

mechanics' watch charms. These charms are made in the shapes of the tools used by various trades. The material used is brass, which is easy to cut, quite strong enough for the purpose, and can readily be gold plated.

A little gold-plated monkey wrench always meets with admiration and interest. The frame is cut from one piece of brass, and the shank is turned or filed down and threaded at the end for a small nut. The handle is made from a piece of mother-of-pearl, cut down to the shape shown and drilled lengthwise to fit the shank. The sliding jaw is made by slitting a solid piece of brass, bending the lugs over the back of the frame, and soldering the ends together. The jaw is drilled and tapped for the adjusting screw, which is turned down and threaded to fit, a knurled head being formed on one end. The bolster slips over the shank to receive the tit of the screw. An eye for attaching the charm to the watch chain is soldered to the lower lug of the jaw. The parts are then gold plated, which will cover all traces of solder, and if well done, the plating will wear for many years.

A neat charm can also be made in the form of a carpenter's saw. The blade is nicked on its lower edge with a knurling tool, making tiny teeth that can be seen and felt. The handle is made of black or red fiber, and attached to the blade by means of small brass rivets.

Hammers and hatchets of various kinds also make attractive charms. These tools should have wooden handles, made of ebony or hard redwood, and polished or waxed after they are cut to the proper size and shape. The attaching ring, in such cases, is made by twisting a length of gold wire into a groove cut around the handle.

A small gear and a micrometer have also been found very neat, especially the latter, when handsomely gold plated and engraved. The only tools necessary for this work, in addition to those already possessed by the machinist, are a jeweler's saw, a jeweler's screwplate, and a set of taps to fit.—J. V. Romig, Allentown, Pa.

Handy Container for Liquids

A handy container for oils, gasoline, or other liquids is shown in the illustration. It is especially useful in that the contents may be transferred from it without spilling a drop. The container is made from an old oilcan, or other large tin can, a 2-in. length of ⅜ or ¼-in. copper tubing, and about 15 in. of rubber tubing. A hole, large enough to allow the copper tube to fit snugly, is made near the bottom of the can. The tube is then soldered in, and the rubber tubing slipped over it, bound on tightly, and taped to prevent the rubber from breaking. Near the other end of the rubber tubing is tied a small wire hook to catch on the handle or filler cap of the can. When assembled and filled, the can should be placed on a support so that, when the liquid is to be removed, the free end of the rubber tube will be lower than the bottom of the can.—Leslie J. Smith, Salem, Ore.

Removing Scratches from Showcases

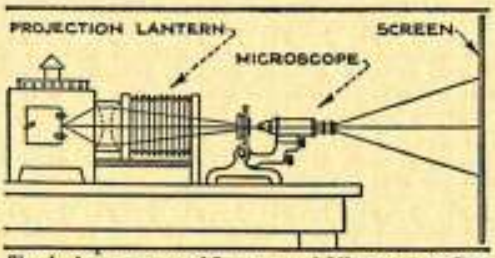
Scratches on showcase tops can easily be removed by moistening some jeweler's rouge with water, and applying it to the surface of the glass with a soft chamois skin or piece of leather, rubbing hard until the scratches disappear.

Drying Clothes in Cold Weather

During cold weather clothes hung out on the line to dry become stiff, due to the frozen moisture in them, and in attempting to remove them they are frequently torn at the corners. This danger can be eliminated by hanging the clothes on wire coat-hangers of the kind used extensively by cleaners. The clothes are hung on the hangers, which are hung on the line. To keep them separated evenly, a number of old yardsticks or laths are used, holes being drilled in them about 3 in. apart, and the hooks of the hangers passed through the holes before they are hung on the line. The clothes are brought in on the hangers and allowed to thaw out before taken off. This method also obviates the usual discomfort of cold hands.—Elizabeth A. Ragan, Seward, Neb.

Projecting Microscopic Slides

Projecting microscopic slides on a screen has been found to be of considerable assistance in a class room, as it enables the whole class to see and discuss the subject at the same time, instead of the students looking through the microscope individually, which takes a great deal of time. The projecting lens of the lantern and the reflecting mirror of the microscope are first removed, and the microscope is then arranged about a foot in front of the lantern, as shown in the illustration. By carefully adjusting the distance between the lantern and the slide, the correct focus

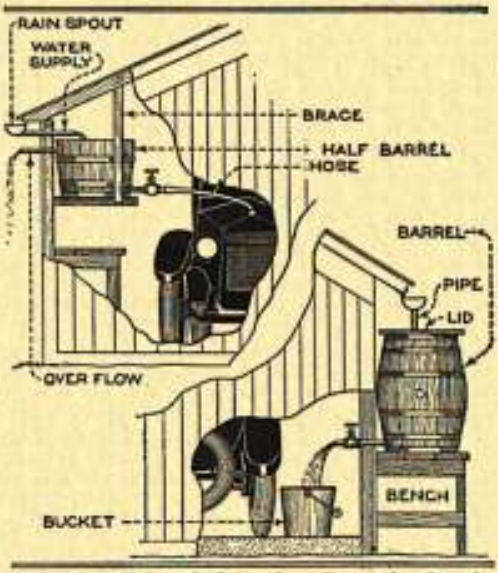


Simple Arrangement of Lantern and Microscope to Project Microscopic Slides in a Class Room

is obtained. The barrel of the microscope is then adjusted so that a clear image will be thrown on the screen, which is located about 15 ft. from the eyepiece of the microscope. The stronger the light in the lantern, the longer will be the distance that a clear image can be thrown. With some types of microscopes it may be found necessary to place a convex lens between the front of the lantern and the slide of the microscope.—W. A. Kimball, Keene, N. H.

Water Supply for Private Garage

Rain water is ideal for use in automobile radiators, as it is free from most of the scale-forming chemicals and salts present



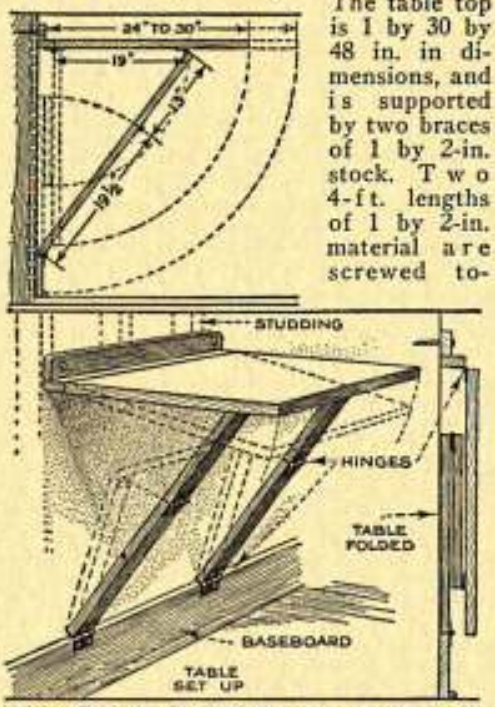
Easily Installed and Convenient Reservoirs for the Garage to Store Rain Water for the Radiator

in well and hydrant water. Two convenient methods of storing rain water in readiness for use are shown in the drawing. The upper figure shows how a half barrel may be arranged on a shelf inside the garage, at a height that will permit the water to flow into the radiator. A gutter is run along the edge of the roof and a small tap pipe from the gutter is brought through the wall as shown, so that the water will drain into the barrel. A short length of pipe, fitted with a valve, is fitted through the side near the bottom and a length of rubber hose is attached as shown. An overflow pipe is also provided. In garages where there is not enough space to permit the installation described above, a barrel may be mounted on a stand outside of the garage as shown in the lower figure. In both cases a fine sieve must be provided in the pipe leading from the gutter, to catch any foreign matter. The inside of the container should be washed out occasionally.

¶When placing a tire chain on a wheel always fasten the inside first and hook it a little tighter than the outside. If this is done and the chain happens to come off, it will most likely come off on the inside, and will be retained by the axle until its dragging is noticed.

A Folding Kitchen Table

In a small kitchen, where space is at a premium, a folding table of the type shown in the drawing will be greatly appreciated. The table top is 1 by 30 by 48 in. in dimensions, and is supported by two braces of 1 by 2-in. stock. Two 4-ft. lengths of 1 by 2-in. material are screwed together at right angles and fastened to the wall by long screws driven into the studs. The table top is then hinged to the lower member as shown. The braces are 32½ in. long, and are cut and hinged so that they will fall into place automatically when the table top is lifted. The dimensions given in the upper detail should be adhered to closely, or enlarged in proportion. To fold the table it is only necessary to strike the joints of the braces with the knee or hand, while holding the table top to prevent it from "slamming." There are no legs to sweep around with a table of this type, and the braces do not prevent a chair from being drawn up close to the table.—G. M. Beerbower, Tarrytown, N. Y.



Folding Table for Small Kitchens that Can Be Set Up or Folded with One Hand

Quick Camp-Fire Lighter

Camp boys in the Yellowstone National Park have a most ingenious mixture for lighting the hundreds of fires in tourists' camps. It consists of sawdust saturated with kerosene, carried in pails, a big spoonful being sufficient to light any fire.

Improving Water Circulation in Radiator

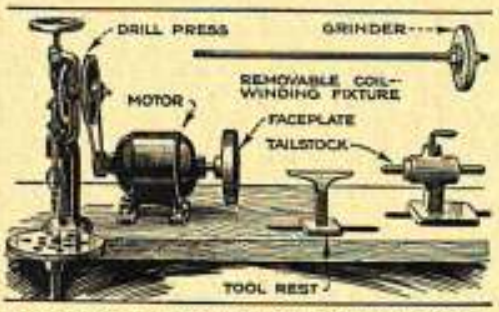
The water in automobile radiators often becomes hot very quickly, without any apparent cause. In such cases the rubber-hose connections should be removed, and it will often be found that the rubber is swollen on the inside, reducing the diameter considerably, which, of course, causes the water to circulate more slowly and makes it heat up more rapidly. To overcome this trouble, procure two new hose connections and also two short lengths of thin brass tubing, which will fit snugly inside the hose. The lengths of tubing must be shorter than the hose connections to allow the latter to be clamped to the radiator and engine in the usual way. The brass tubes will prevent the hose from becoming smaller in diameter and eliminate any future trouble.—William C. Fink, Springdale, Pa.

Increasing Utility of Small Motor

Small motors are very useful pieces of equipment for the workshop, but, in many cases, full advantage is not taken of their utility. The method by which one experimenter doubled the capacity of his motor is shown in the drawing.

Both ends of the armature shaft are utilized. On one end is fitted the small pulley used to drive the drill press. On the other end, a faceplate, interchangeable with a chuck, is fitted, and directly in line with this a tailstock is mounted on the bench, and a tool-rest, to enable light turning to be done. A long arbor, with an emery wheel mounted at one end, is also provided, and may be used for winding coils in addition to grinding. The spools of wire are mounted on simple brackets screwed to the front edge of the bench.

The switch for controlling the m tor may be screwed underneath the bench, at the front.



Doubling the Usefulness of the Bench Motor by Driving from Both Ends of the Shaft

Aero-Propeller Shaft Installations

By J. V. ROMIG

DESIGNERS and builders of aero-propeller-driven craft, such as sleds and boats, are often handicapped by the lack of a suitable but cheap method of installing the propeller shaft. If advantage is taken of standard automobile parts, however, a very neat and close-coupled arrangement, which will give good service and operate efficiently, can be made at a minimum of cost and labor.

Front and rear-wheel hubs from a light car are used to form the main parts of the installation, together with a special shaft and a couple of sprockets. The shaft design is a combination of that of a front-axle spindle and the outer end of a rear-axle spindle or shaft. Between the two parts is a pad or shoulder for the seat of the driven sprocket.

The shaft must be carefully and accurately turned from a solid piece of good machinery steel; the rear end is turned and threaded to the same dimensions as the front-wheel spindle of the car from which the hub is taken, and the seats for the ball races must be held very carefully to size. The front end is turned to fit the rear-wheel hub, threaded for the nut, and keyseated. The seat for the sprocket may then be turned, keyseated, and the thread for the locknut cut.

The front wheel hub, minus the outer flange, is then slipped on, the ball cones adjusted so as to allow the shaft to run freely without any shake, and the locknut tightened and fastened with a cotter pin. The regular hub cap is used, filled with good grease, just as in the car.

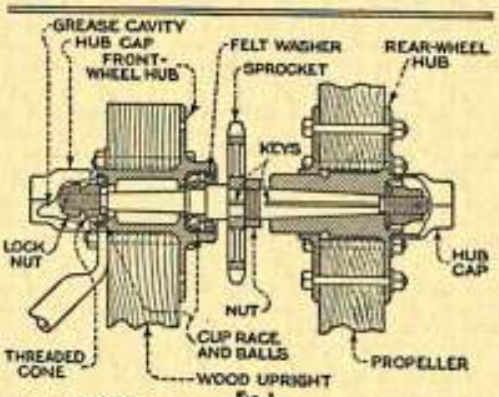


Fig. 1

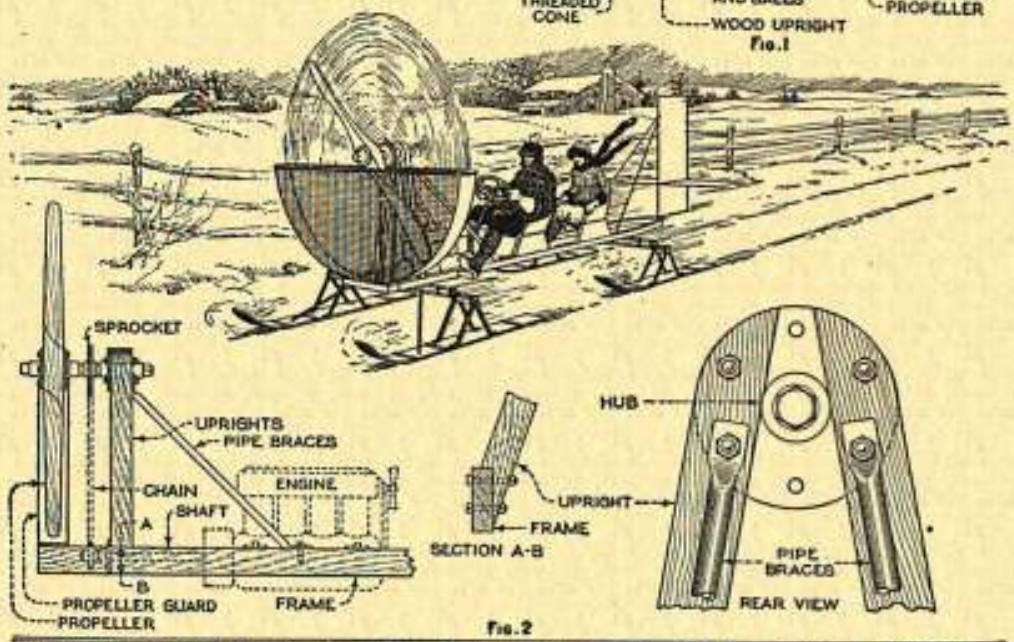


Fig. 2

An Exceptionally Neat Mounting for an Aero Propeller, Made from Standard Automobile Parts, Which Are Easily Obtained and Renewed

The hub that carries the propeller is a rear-wheel hub, as stated above, and it is fitted with a second flange, made out of another hub, which is machined away until a flange is left that will pass over the turned portion of the hub proper.

The propeller hub is drawn up on the tapered portion of the shaft, as in the car, and locked by means of a nut, washer, and cotter pin. The propeller is clamped between the flanges by six through bolts of ⅜-in. diameter, the sliding flange allowing

for a wide variation in the thickness of propeller hubs. A hub cap is screwed on the forward side of the hub, to present a neat and finished appearance.

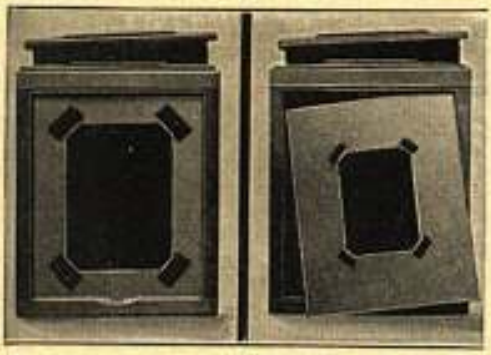
The key that holds the sprocket should be large and set deeply, as it carries all the motor torque.

Two heavy wooden uprights, meeting at the top to form an inverted vee, are bolted to the sills of the frame, and straddle the body of the front-wheel hub as shown. Four ⅜-in. bolts hold the tops of the uprights firmly to the hub. Angular braces, made of 2-in. pipe, are also fitted, the ends being flattened and drilled for the bolts. The propeller should be balanced before installation, to insure vibrationless running.

An arrangement of this type not only presents a good appearance, but, as the bearings are standard, they are easily renewed when worn. Being of the cup-and-cone type, they will take a thrust in either direction, and so are suitable for either tractor or pusher types of propeller mountings. The hub cap should be filled with good grease, to insure perfect lubrication, and refilled at frequent intervals.

Simple Cut-Film Holder

Besides being non-breakable, nonhalation, and light in weight, it has been found that there is also a great economy in using



An Economical Method of Using Pieces of Cut Film of Various Sizes in a Plate Holder

cut films in making negatives. This is especially true if the photographer does much copying work.

Very often only a small piece of film is needed to make the desired copy. A piece of film, is then cut from the regular size on hand, in the dark room. A piece of medium-weight cardboard is cut to the size of the plates for which the plate holder is intended, so that it can be used instead of a plate, and a piece of black paper, cut to the size of the film to be used, is pasted on the center of the cardboard. This is to prevent halation or reflection of light from the cardboard back through the film. Small triangular pieces of paper are cut to fit over the corners of the black paper and these pieces are stuck on the cardboard by means of adhesive tape as shown in the photograph. The film is then inserted under these corners and will be held in place securely. This method of using cut films is economical as the film is cut to the size needed and no margins are wasted. It is, of course, necessary to mark on the ground glass lines corresponding to the different sizes and positions of films used. —Edward H. Flaharty, Denver, Colo.

Improving Radiator Stay Rods

Radiators of most automobiles are supported by a horizontal rod screwed into a bracket on the dash and a boss on the radiator. Due to the constant vibration the threads at the boss sometimes strip and allow the rod to pull out. To repair the boss is a difficult job, and, in any event, prevention is better than cure. If a nut of the proper size is screwed on the rod and locked tightly against the boss, there is very little danger that the threads will ever be stripped.—E. T. Gunderson, Jr., Humboldt, Iowa.

A Weather-Vane-Bearing Protector

Bearings on weather vanes should be protected in some way to prevent them from rusting. This can be done by slipping half of a hollow rubber ball over the bearing. A small hole is punched through the ball to make it grip the shaft securely so that it will not slip down on itself, but can be forced up or down.

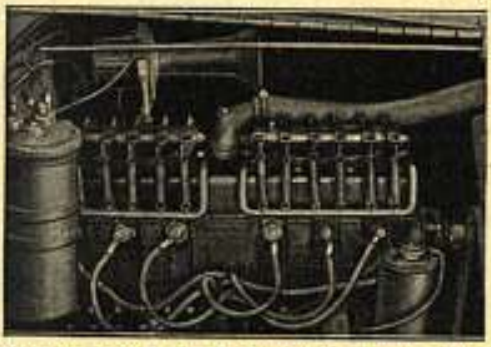
The drawing shows a recording weather-vane protected in this way, the bearing consisting of a bicycle-wheel hub with one flange filed off, and set in the end of a length of pipe, which is split with a hacksaw at the other end, bent and bolted to the roof as shown. The lower end of the rod terminates just below the ceiling of one of the rooms and is fitted

with a pointer. A compass face is provided under the pointer so that the exact direction of the wind can be seen inside the house at any time.

Silencing Overhead-Valve Assembly

In an overhead-valve engine, the wear in the joints of the push-rod and rocker-arm assembly allows considerable play and lost motion. Noise from this source can be partly stopped by careful adjustment of the tappets, but the wear in the rocker arms cannot be compensated in this way, and the engine will be more or less noisy.

This trouble can be avoided almost entirely with the coil-spring arrangement shown in the photograph. Two brackets of ½-in. round steel rod are shaped to fit the head of the engine, as shown, each of the brackets being bolted to the top of the engine and extending down along the push-rod side. A clip of heavy sheet metal is shaped and fitted to each rocker-arm head, above the upper end of the push rod, and short coil springs are stretched from holes in the clips to the brackets. The lower end of each spring



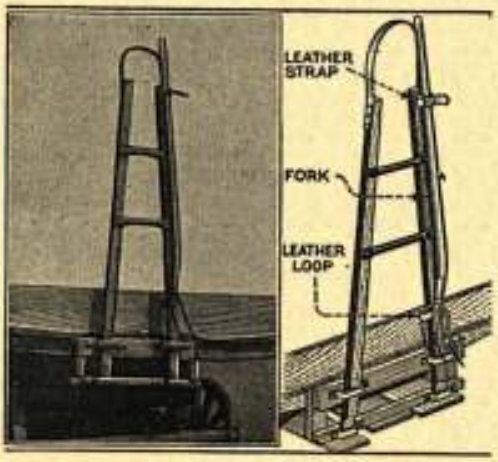
Effective Method of Eliminating the Noise of the Overhead-Valve Assembly on an Old Automobile

is fastened to the bracket by means of a cotter pin; the loop end of the pin is placed above the bracket and engages with the end of the spring, while the split end of the key is spread below the bracket.

The photograph shows a six-cylinder engine equipped with this silencing arrangement. The springs must be of approximately the same length, and arranged so that there is always a slight tension on the rocker arms. These are held tightly against the push rods at all times and thus much of the noise so common to old overhead-valve engines is eliminated.—Lowell R. Butcher, Des Moines, Ia.

Safe Hay-Fork Holder

In hauling hay or grain in the straw it is usually necessary to carry a pitchfork, but accidents often result from placing it



Accidents Are Prevented by Strapping the Pitchfork to the Front Standard of a Hay Wagon

carelessly on the load. A good place to attach the fork, where it will be held securely without any danger, is the front standard of the wagon. Two lengths of leather strap are nailed to one of the upright pieces as shown; the lower strap is simply looped around the handle securely.

With this arrangement the pitchfork cannot be lost, and it is in such a position that accidents are not likely to occur.

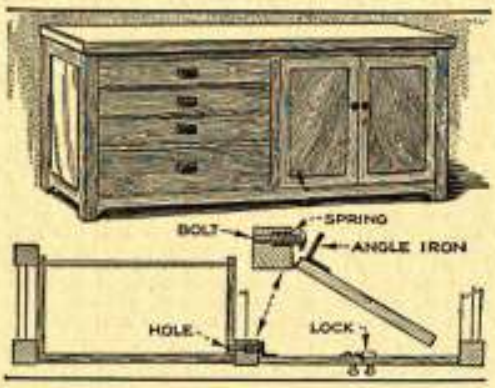
Marking Furnace Grates

When shaking the grates of a furnace it often occurs that a perfectly good fire is dumped into the ash pit because the position of the grates cannot be seen from the outside and are turned in the wrong direction. To avoid this, it is a good idea to mark the ends of the shaker bars that extend outside of the furnace, painting them half white and half black, as shown in the drawing, so that the position of the grate can be seen at a glance.

Dipping the heads of clothespins in white paint makes them easy to find in case they are dropped in the grass.

One Lock Fastens Entire Cabinet

Locking five or more drawers in a cabinet by means of one lock can be done very easily by means of the arrangement shown



A Simple and Practical Arrangement for Making One Lock Do the Work of Five

in the illustration. The detail shows the method of construction; each drawer has a small hole drilled in the side to receive the end of a bolt, which locks it. A small spring, fitting on the bolt under the head, pushes it out of the hole as soon as pressure is released. A length of angle iron is screwed to the inside of the cabinet door, as shown, so that when the door is closed it presses the bolt in and locks all the drawers; one lock on the door will then keep the whole cabinet locked.

Priming the Auto Engine

For quick starting in cold weather, a screw-cap oil cup, of the type shown, is tapped into the intake manifold of the automobile engine, as close to the carburetor as possible. A short piece of frayed-out twine is knotted at one end and inserted through the hole in the bottom of the cup.

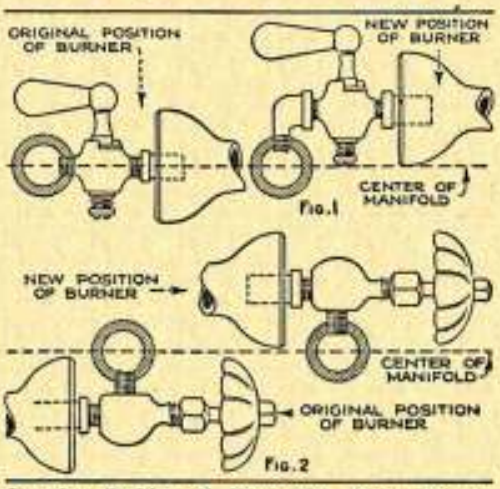
The method of using such a priming device is to squirt some high-test fuel into the oil cup, the fuel being absorbed by the wick and vaporized inside the intake.—J. G. Brown, Evanston, Ill.

A Simple Insecticide

While various kinds of insecticides on the market are effective, they are also rather expensive. A simple solution that is very effective in getting rid of bedbugs and similar vermin, consists of ½ pt. each of kerosene, turpentine, and laundry ammonia. These ingredients are all poured into a quart bottle and shaken well, and the solution is then sprayed or brushed on the surfaces where the bugs have been noticed. It has been found that two applications are usually sufficient.—Tempest W. Fenton, Ashtabula, Ohio.

Raising Gas-Range Burners

The rapid decline of the natural-gas supply has compelled many gas companies during the past year to supply gas at a reduced pressure, and as a result the cook-stoves and ranges designed for high-pressure gas are rendered almost useless. This has resulted in the flooding of the market with so-called gas savers, many of them without any merit whatever. In high-



Changing Position of Natural-Gas Range Burners to Suit Lower Pressures

pressure gas ranges the burner is usually from 2 to 3½ in. below the cooking top. These distances are entirely too great for the continually decreasing pressure, for satisfactory cooking operations.

The U. S. Bureau of Standards experts have made many exhaustive studies of burner positions, and the conclusion arrived at is that less gas will be used at low pressures if the burner is within 1 in. of the bottom of the cooking vessel than at the original high pressures with low burners.

Figure 1 illustrates a straight-cock connection. By turning the manifold through 90° and using a small service ell, the burner of the stove utilizing this type of connection will be raised to a more efficient height.

Figure 2 illustrates an angle-valve connection. By simply turning the manifold through 180° the valve will be above instead of below the manifold and in this way will also raise the burner to a more efficient height. Of course, the valve must be turned so as to face out.

It is a strange coincidence that, on the majority of ranges, this raises the burners to exactly the height recommended by the Bureau of Standards, and is probably the simplest, quickest, and cheapest method of raising burners that can be devised. All that is required in the way of tools are a couple of pipe wrenches.

Closing Furnace Damper Automatically

When opening the door of a furnace to put in coal, the ash pit damper is often left open, with the frequent result that a volume of smoke issues from the furnace door, fills the basement, and penetrates into the rooms above. This trouble can easily be prevented by the method shown in the drawing. The chain that operates the damper on the ash-pit door is made a little slack, and is connected to the handle of the furnace door by a short length of chain, as shown. This arrangement will not interfere with the function of the chain in raising or lowering the damper, and will always allow the damper to close when the furnace door is opened.

Increasing Life of Spare Tires

Motorists will find that the spare tire resists natural aging much better if it is put into service for a day every month. Whatever the cause of the deterioration, it is a fact that a spare carried month after month without being "exercised" does not retain its wearing qualities as well as one that gets an occasional day's use.

Coasting on Ice

Children who live in level regions, where coasting downhill is not possible, will appreciate the device shown in the drawing,

A Novel Method of Coasting on Ice by Means of a Stout Clothesline and Two Heavy Coil Springs

which will enable them to coast on the ice on a pond. A stout clothesline with a heavy coil spring at each end is stretched tightly across the pond, or a bay, between two trees. The sled is pushed backward against the center of the rope as indicated by the dotted lines, and will, as soon as it is released, coast a considerable distance over the ice, due to the action of the coil springs. An old leather heel is nailed to the back end of the sled to hold the rope. The rider pushes the sled backward against the rope by digging the sharp ends of his skates into the ice, or he may be pulled back by another boy.—Dale R. Van Horn, Walton, Neb.

Preventing Pump from Freezing

As an ordinary pitcher pump in good condition does not allow the water in the suction pipe to run down, the water is subject to freezing during winter. To prevent this, I tapped the vacuum chamber directly under the check valves, for a ⅛-in. drain cock, which, when opened, destroys the vacuum and releases the water. When the cock is closed the pump works as well as ever.—W. C. Robson, Cheboygan, Mich.

Carrier for Vacuum Bottle

Vacuum bottles are of great convenience for keeping liquids warm and are used extensively by farmers and workmen, but they are rather bulky to handle and this feature is somewhat objectionable as the bottle is easily broken or dented by dropping it on the sidewalk or ground. Carrying cases are made, but they cost nearly as much as the bottles themselves, and therefore the homemade carrying bag shown in the photo will be appreciated.

An Inexpensive and Serviceable Canvas Bag for Carrying a Vacuum Bottle

For a 2-qt. bottle the bag is made from a piece of canvas or similar heavy cloth, 17 by 18 in. in dimensions. One 17-in. edge is turned over and hemmed on the sewing machine; this edge will later form the top of the bag. The 19-in. edges are then sewed together, and a disk fitting the lower end is sewed on in the same way. Turning the bag inside out will then bring all the seams on the inside. The shoulder straps, which are made from strips of cloth with the edges hemmed, are sewed to the bag as indicated. A bag of this kind is much better than a leather one because it can readily be washed when soiled.—J. R. Koontz, Bremen, Ind.

Stopping Radiator-Hose Leaks

Leakage of the hose connections on automobile radiators can usually be remedied by an application of shellac. The hose connection need not even be removed if the shellac can be run into the joint by gravity. After draining the water in the radiator to a point below the hose level, the clamp of the leaking connection is loosened and some shellac is run in. It is allowed to stand for a few minutes, until nearly dry, and the clamp is then tightened.

Preventing Damage from Battery Acid

Where a storage battery is to be used permanently as for radio, it is well to place it in a shallow wooden lead-lined box, filled with sand, in order to eliminate the danger of having the rug or varnished floor ruined by the acid, which sometimes seeps through. A plain wooden box can be used, but the lead-lined one, with soldered seams, affords absolute protection, while the plain box may allow acid to escape when the sand becomes saturated. Another help is to mix a slight proportion of powdered alkali such as wood ashes or soda in the sand.—George Davis, Oakland, Calif.

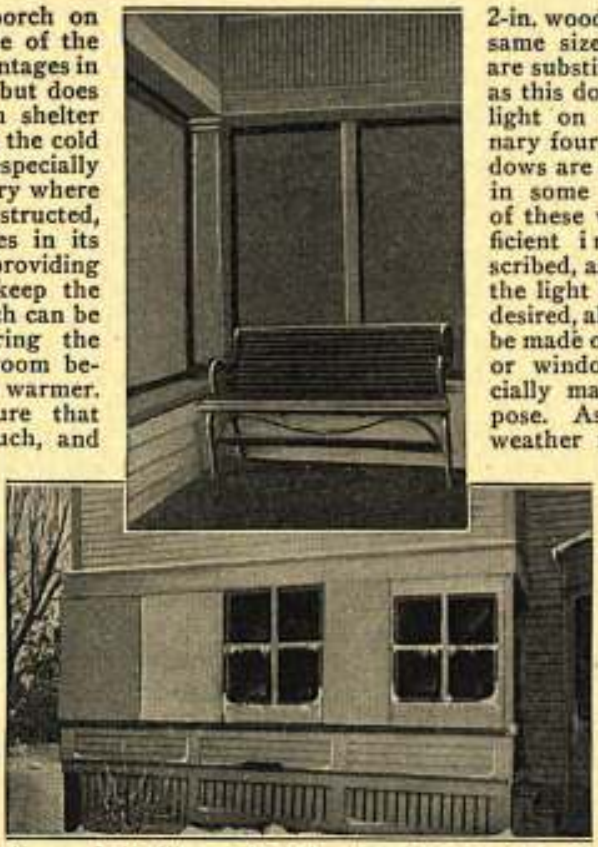
Simple Tube Adapter

It is often desirable to change a dry-cell radio outfit to a larger set using a storage battery for the filament circuit, or to change a larger set so that dry-cell tubes can be used. A simple adapter that permits the use of both kinds of tubes without changing the set in the least is shown in the photograph. It consists of an old tube base that fits the sockets of the set. This is soldered in one end of a 4 or 5-in. length of 1¼-in. brass tubing as shown, and a socket of the proper type to carry the tubes to be used is fastened to the other end of the tube as shown. Four lengths of lampcord are carefully soldered to the terminals of the old tube base, and after being brought through the tube, are connected to the corresponding terminals on the socket. Two ears are formed on the upper end of the tube, bent back at right angles, and drilled so that the socket can be fastened to them with small screws.—W. W. Brackenridge, Harrison, Ohio.

¶A piece of coarse-mesh screen over the flower bowl permits the use of short stemmed blossoms.

Inclosing the Porch for Winter

A large open porch on the northwest side of the house, has its advantages in the summer time but does not provide much shelter or comfort during the cold winter months, especially in the open country where the wind is unobstructed, and the porch lies in its full sweep. By providing an inclosure to keep the wind out, the porch can be made useful during the winter, and the room behind it kept much warmer. A simple inclosure that does not cost much, and can be made in a short time, is shown in the photographs.



Above: Inside View of the Inclosed Porch. Below: Outside View Showing Arrangement of Storm Windows

The screen sections, which were hooked in the space between the frieze and the seat rail, and are of use during the summer months only, are removed and pieces of heavy wallboard, nailed to 1 by 2-in. wooden frames, of the same size as the screens, are substituted. However, as this does not admit any light on the porch, ordinary four-light storm windows are set in the frames in some sections. Three of these windows are sufficient in the case described, as they provide all the light necessary, but, if desired, all the sections can be made of storm windows, or windows can be specially made for this purpose. As soon as warm weather returns, the sections are removed and stored away for the summer, when the screen sections are again brought out and put in place. Extra-heavy hooks and screweyes should be used to fasten the storm section in place.—R. A. Franklin, Rochester, Minn.

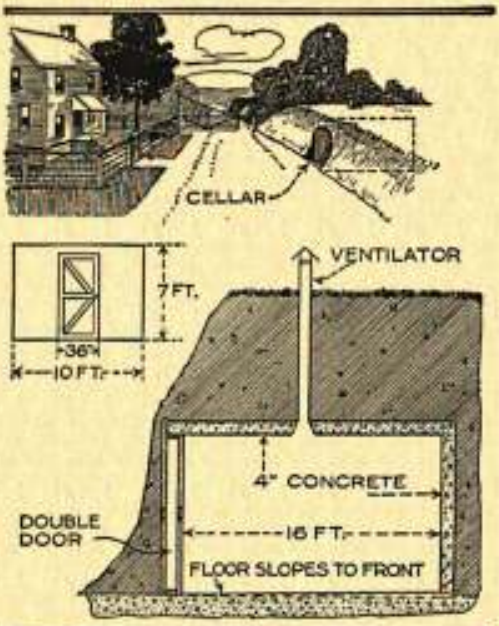
Tanning Muskrat Skins

Formerly many muskrat skins were home-tanned and made into caps, collars, and other articles. The present home utilization of skins is much less extensive, but knowledge of a good method of dressing the fur is still desirable. Most of the methods employed by amateurs involve the use of alum to fix the hair; but satisfactory results, so far as pliability of the pelts is concerned, depend largely upon the labor spent on them. The directions here given, if followed, will give better results than processes using alum.

Prepare a tanning liquid composed of 1 qt. of salt and ½ oz. of sulphuric acid to each gallon of water. This mixture should not be kept in a metal container. Muskrat skins are tanned in this mixture in a day, but they may remain in it longer without injury. When removed from the liquid, wash several times in soapy water. Wring as dry as possible, and rub the flesh side with a cake of hard soap. Then fold them in the middle, lengthwise, over a line, hair side out, and leave to dry. When both surfaces are barely dry, and the interior is still moist, lay them over a smooth, rounded board and scrape on the flesh side with the edge of a worn flat file or similar blunt-edged tool. In this way the inner layer is removed and the skins become nearly white in color. They are then stretched, rubbed, and twisted until quite dry. If parts of a skin are still hard or stiff, the soaping, drying, and stretching process should be repeated until the entire skin is soft. Fresh butter, or other animal fat, worked into the skins while they are warm, and then worked out again in dry hardwood sawdust, or extracted by a quick bath in gasoline, increases their softness.—A. C. Cole, Chicago, Ill.

Cold Cellar Dug in Bank

Many farmers have a concrete cold cellar for storing their vegetables and meat, but in most cases the entrance is very inconvenient, due to the steep and nar-



A Concrete Cold Cellar, Built in a Bank, that Has Many Advantages Over an Underground Cellar

row steps and the trapdoor above them. An additional disadvantage of the underground cellar is that it is difficult to clean out and that water readily accumulates in it. All these objections are eliminated by building the cellar in a bank near the house as shown in the drawing. This arrangement permits easy access to the cellar at all times. A suitable bank may be found close to a great number of farmhouses.

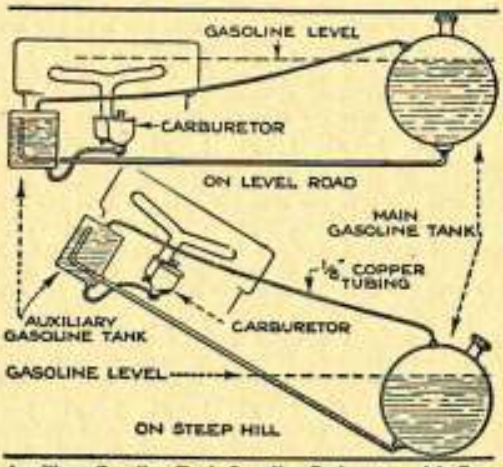
The cellar is made by excavating part of the bank, building the form from rough boards, and pouring the concrete into the form from the top of the bank. Iron rods, pieces of clean wire mesh and clean fence wire are used to reinforce the top. After the concrete has set, the ground is refilled over it to the level of the bank. The top of the cellar should be at least 3 ft. below the top of the bank. A wooden door, about 3 ft. wide, and having a dead-air space as shown, is set in the front end. The floor is laid to slope slightly toward the front so that water will readily drain out, and a 2-in. galvanized-iron pipe, fitted on top with a cap, is installed to provide proper ventilation.—J. V. Romig, Allentown, Pa.

Increasing Humidity of Air

The ordinary furnace water pan has a capacity of about 2 gal., only about half of which is vaporized in one day, under average firing conditions. This is usually not enough and therefore some method of increasing the evaporation must be resorted to. An excellent method, which has been found very effective, is to hang an old flannel or woolen shirt over the edge of the water pan, with one end dipping into the water. The shirt acts as a wick and greatly increases the moist surface in contact with the hot air, and consequently the rate of evaporation.—L. C. Prittie, Ottawa, Canada.

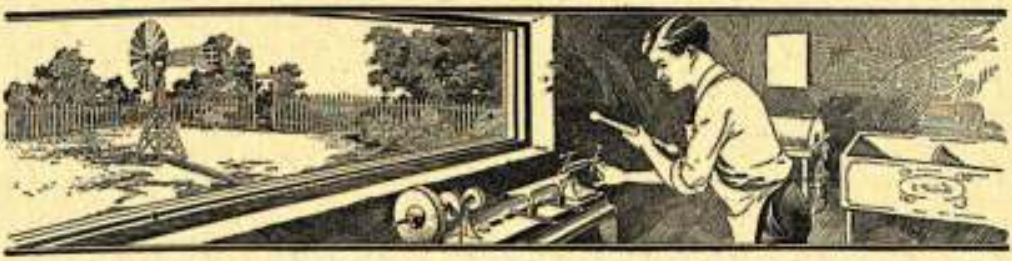
Auxiliary Tank Prevents Stalling on Grade

On automobiles having a gravity-feed gasoline system, the gasoline will not flow into the carburetor when climbing a very steep grade. This trouble can be eliminated by installing a small auxiliary tank in front of the carburetor, and connecting it to the main gasoline tank as shown in the drawing. On a level road the gasoline runs from the main tank into the auxiliary tank and from the latter into the carburetor, so that the auxiliary tank is always full. When climbing a steep grade, the small tank supplies the carburetor, as shown in the lower detail. The gas will not flow back into the main tank because the feed pipe extends almost to the top of the auxiliary tank. A length of ⅛-in. copper tubing connects to the top of both



Auxiliary Gasoline Tank Supplies Carburetor with Gasoline When Climbing Steep Grades

tanks to allow gasoline to drain out of the main line without creating a vacuum in the auxiliary tank.—D. L. James, Wayland, New York.



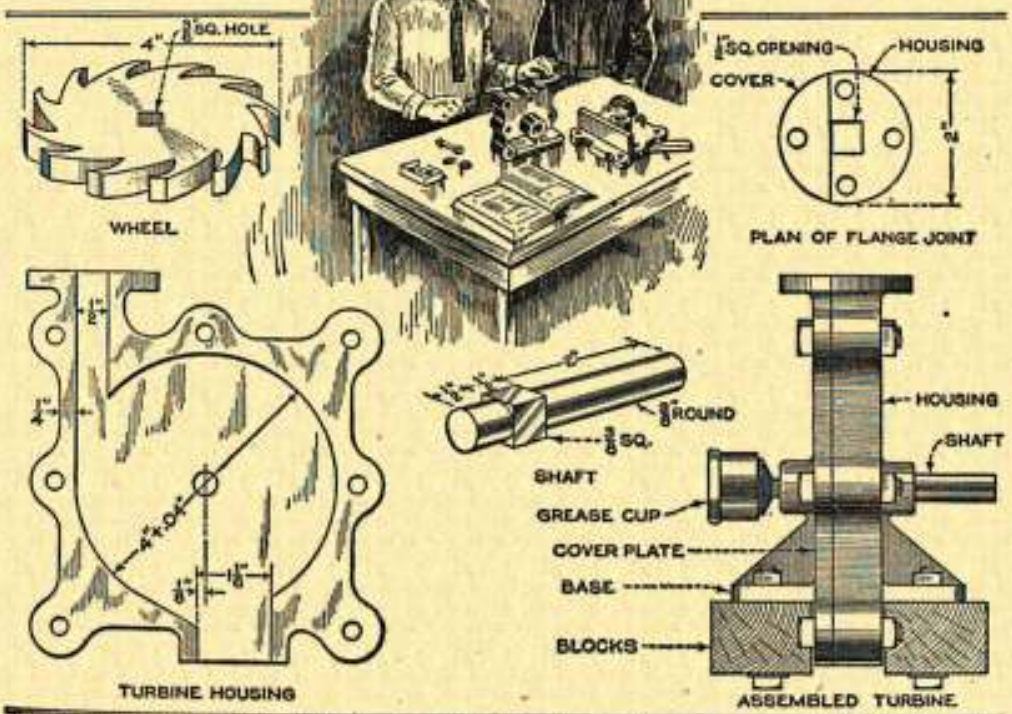
Building a Small Turbine Motor

By B. FRANCIS DASHIELL

A SMALL turbine motor can be used in a number of ways and the one described in this article will operate on steam, compressed air, or the ordinary house water supply. As a water turbine, its efficiency is very high.

The construction work can be done in the experimental shop, and complete dimensions and plans are given herewith in the accompanying drawings. A pattern should first be made for the housing and cover plate, after which the parts may be cast at a foundry in either iron, brass, or babbitt metal, preferably iron. The entire details of the turbine housing are indicated in the drawing, but the cover plate was not detailed, as it should merely be ¼ in. in thickness and shaped so as to match the housing at all points. A base flange is made on the cover plate, the same as that on the housing, and the remaining portion of the top flange is constructed so that when the cover is screwed to the housing, a complete flange coupling is obtained for the bolting on of an ordinary pipe coupling.

After the casting has been made, it should be smoothed up in the



Details of Construction of Simple Turbine for Operation on Steam, Water, or Compressed Air, Which Can Be Built in the Small Workshop and Used for a Variety of Purposes

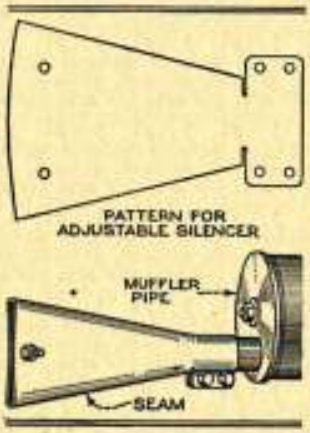
shop. A light cut should be taken in a lathe so as to bring the inside diameter of the wheel housing to the proper size. The face of the housing should be trued up as well as the cover plate. If this is carefully done, the wheel should rotate within its housing, making a perfect running contact with its sides as well as with the periphery of the wheel. Such a perfect sliding fit will add much to the power obtained from the turbine. Drill the shaft hole in the housing, using a 3/8-in. drill. The shaft hole or bearing in the cover plate is not drilled all the way through, but only 1/2 in. in depth. The rest of this hole is smaller and threaded so as to take a small grease cup, which should be screwed in place. Drill all necessary capscrew holes, and tap those in the housing.

The wheel may be a rough casting which has been turned up to an exact 4 in. in diameter. The two sides should be ground or planed down parallel, so the wheel will be exactly 1/2 in. in thickness. A 3/8-in. square hole is cut in the center for the shaft. This shaft is made up of a piece of 3/8-in. square stock, turned down at the ends, but still retaining the 3/8-in. diameter. No key is required to hold the wheel on the shaft as it is impossible for either to move after the cover plate has been bolted in place.

The turbine should be bolted down to two heavy pieces of timber to hold it in position and permit free exhaust or drainage for the waste or overflow, of steam or water. A support may be so arranged that the turbine can be direct connected to a generator for the production of electricity for charging batteries, etc. A small pulley can be fitted to the shaft and used to operate light machinery.

Additional Silencer for Auto

The illustration shows an additional silencer for the automobile exhaust pipe. It consists of a piece of 1/8-in. sheet iron, cut out as shown and bent to the shape of a cone. The narrow end is clamped to the short section of exhaust pipe that extends from the muffler, and the wide end has two holes drilled through it near the edge, and is fitted with a bolt so that the size of the opening can be varied. Of course, this attachment causes additional back pressure, and it should therefore be used in the city only.



When motoring through the country at a greater speed than is customary in the city, it is best to remove the bolt so that the exhaust gas can escape quickly, and there will then be no danger of overheating the engine. The best method of determining the size of the cone is to use the "cut-and-try" method, with a piece of paper as a pattern. The edge of the sheet-metal cone is joined with a seam, made by bending over the edges about 1/4 in. and hammering them down with a light hammer. With the silencer nearly closed, the exhaust causes only a slight whistling sound that can hardly be heard at a distance of 20 or 30 feet.

Rat Poison

The most effective means known for destroying rats is to poison them. Powdered barium carbonate is an inexpensive mineral, and one that is excellent for this purpose.

Other poisons commonly used are phosphorus, arsenic, and strychnine. The use of phosphorus is attended with danger from fire, arsenic is uncertain in its action, while strychnine is readily detected by rats and is too fast in its action to make its use desirable in buildings. Powdered barium carbonate, however, is effective, inexpensive, and relatively safe. It should be thoroughly mixed and worked into soft baits in the proportion of 1 part of the mineral to 4 parts of the selected food. Water is added in sufficient quantity to make the baits moist. Food moistened to the consistency of soft mush is particularly acceptable to rats in dry weather. The barium carbonate should be sifted over sliced baits and rubbed well into them with the fingers or a knife. The slices should be thin and should be moistened if necessary to attain as nearly as possible the 1 to 4 ratio. Soft baits may be mixed with the hands or with a spoon. Barium carbonate has the advantage of being slow in its action so that the rats affected by it have time to leave the premises in search of water or to return to their burrows before they succumb. Baits that are likely to

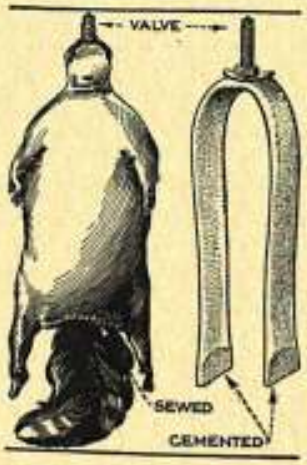
sour under the influence of warmth should be removed daily and fresh bait substituted; if left exposed in warm places for more than a day they will sour and the resulting acid will give them a bitter and highly objectionable taste and odor.

Poison used in chicken inclosures should be put in places that are inaccessible to the chickens, as behind or under boxes, and it should be very wet, or of such a nature that the rats cannot drag it out.

A variety of baits used separately not only gives the rat a choice of foods, but tends to make it less suspicious. One kind of each of the following classes of food mixed with barium carbonate is recommended: Meats such as hamburg steak, sausage, fish, liver, bacon and the like; vegetables and fruits such as thin slices of muskmelon, apple, tomato, or cucumber, canned corn, or squash or pumpkin seed, mashed banana, boiled carrot or baked sweet potato, and cereals. Kitchen scraps and garbage can be worked into the ration to advantage.

Barium carbonate is a relatively mild poison, but the danger from accidents cannot be over-emphasized. It should be kept out of reach of children and irresponsible persons, and from domestic animals and fowls. In case of accident the antidote is an emetic consisting of mustard or salt dissolved in warm water. Vomiting can also be induced by inserting the finger in the back of the throat.

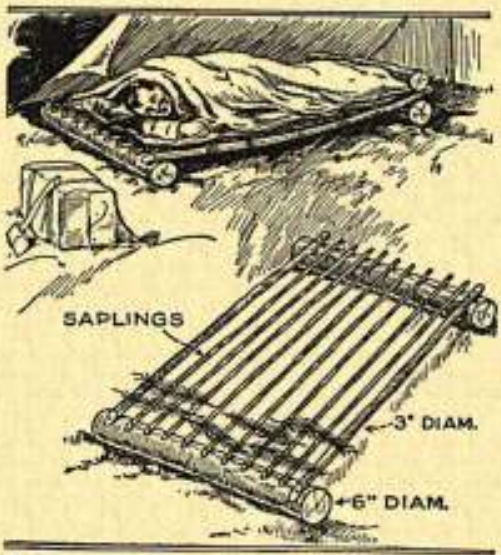
Method of Stretching Green Furs



Old inner tubes can be used to advantage for stretching green furs. The tube is cut off to a suitable length and the ends cemented together as shown in the illustration. It is then put in the fur and after the valve is drawn through the mouth, and the rear part of the fur sewed up, the tube is inflated with an ordinary automobile tire pump. This method will stretch the skin uniformly without distorting or injuring it in any way.—H. H. Siegele, Emporia, Kan.

Improved Bough Bed

To make an exceptionally comfortable bough bed for the camp does not take much more time than is usually consumed



A Comfortable and Healthful Bough Bed for Campers, that Can Be Made as Easily as the Ordinary Type

in the building of an ordinary one. Two logs, about 4 ft. long and 6 in. in diameter are used for the end pieces, and to them are nailed several 7-ft. lengths of springy, green saplings of uniform diameter—about 1½ in., these having been trimmed down to free them from offensive projections and spaced about 3 or 4 in. apart. The saplings on the sides should, however, be about 3 in. in diameter. A 4-in. log can be used across the bottom end to hold the blankets down, which will be appreciated considerably on cold nights. A mattress about a foot thick is then made by placing small twigs across the saplings. Due to the air space underneath, a bough bed of this kind is much more healthful than a bed built on the ground.—R. Melrose, St. John, Can.

Preventing Windows from Steaming

Steamed and frosted windows are a source of annoyance to many housewives as the moisture not only obstructs the view but also soils the glass through the accumulation of dust when sweeping or cleaning. A cloth bag containing a few spoonfuls of tobacco, placed in the water used to wash the windows, will overcome this trouble and will also impart a clear, crystal effect that is very pleasing.—G. E. Hendrickson, Argyle, Wis.

Inexpensive Sign Hanger

Substantial and attractive metal signs can readily be made from lengths of pipe and fittings and a piece of sheet metal.

Substantial Signs Made from Pipe and Fittings and Heavy Sheet Metal

The hanger is attached to a building as shown in the illustration; no guy wires or bracing of any kind are required to support it, still it is so solid that the strongest winds will not loosen it. Two different designs are shown; one for mounting the sign at right angles to the sides of a building and the other for mounting it on a corner so that it can be seen from two streets. The sign itself is a piece of heavy sheet metal attached to the pipe frame by means of metal clips, passed around the pipe and riveted to the edge of the sheet metal as shown.

Bucket Reduces Speed of Fishing Boat

According to manufacturers' statistics about 90 per cent of the detachable rowboat motors are purchased by pleasure anglers who go trolling for trout, salmon, or other fresh and salt water game fish. However, the disadvantage of using these motors for this purpose is that they cannot be throttled down to run slowly enough for trolling, without being fitted with a special low-pitch trolling propeller, which the manufacturers provide as an accessory. One man, experiencing this difficulty, tied an ordinary galvanized-iron water pail to the stern of the boat with a 15-ft. rope so that the bucket would serve as a small "sea anchor" and retard the speed of the boat. The resistance of the bucket dragging astern was sufficient to give the boat the exact trolling speed desired when the motor was operated with throttle half open.

A bucket is part of every angler's equipment and its use for this purpose saves the expense of purchasing a special trolling propeller, which entails the constant bother of changing propellers.

Cleaning White Woolens and Furs

Garments are often dry cleaned at home but the result obtained in the case of white woolens or furs is not always satisfactory. However, the simple trick described below can be employed by anyone, and the results will prove a pleasant surprise.

After the woolen or fur has been washed and rinsed in gasoline, it should be wrung or shaken out thoroughly and placed in a deep pan. A pound or two of white flour should then be sifted over and rubbed into the article. After allowing the article to dry on the line, the flour is whipped out, leaving the garment in a cleaner and whiter condition than usual after cleaning. This is due to the fact that the flour sifts into the fur or fabric and absorbs the dirt with the gasoline that cannot be wrung or shaken out. When whipped out, the dry flour naturally carries the dirt with it.

Pulling Car Out of Mud

When stuck in mud the lone autoist need not despair as long as he has a pair of good chains with him, for, with their help, the car can usually be run out of the mud, providing of course, it is not too deep. One end of a chain is fastened around the tire and to the spokes of a rear wheel, as shown in the drawing, while a short, stout iron bar is pushed through the links at the other end of the chain and a tow rope tied to this bar. If no iron bar is handy or it is too large to be pushed through the links, the tow rope is tied to the last cross chain. The other end of the tow rope is securely tied to a tree located in front of the car, slightly toward the side. By applying power to the wheel, it will run along the chain for a foot or more. The operation is repeated until the wheel is out of the mud.

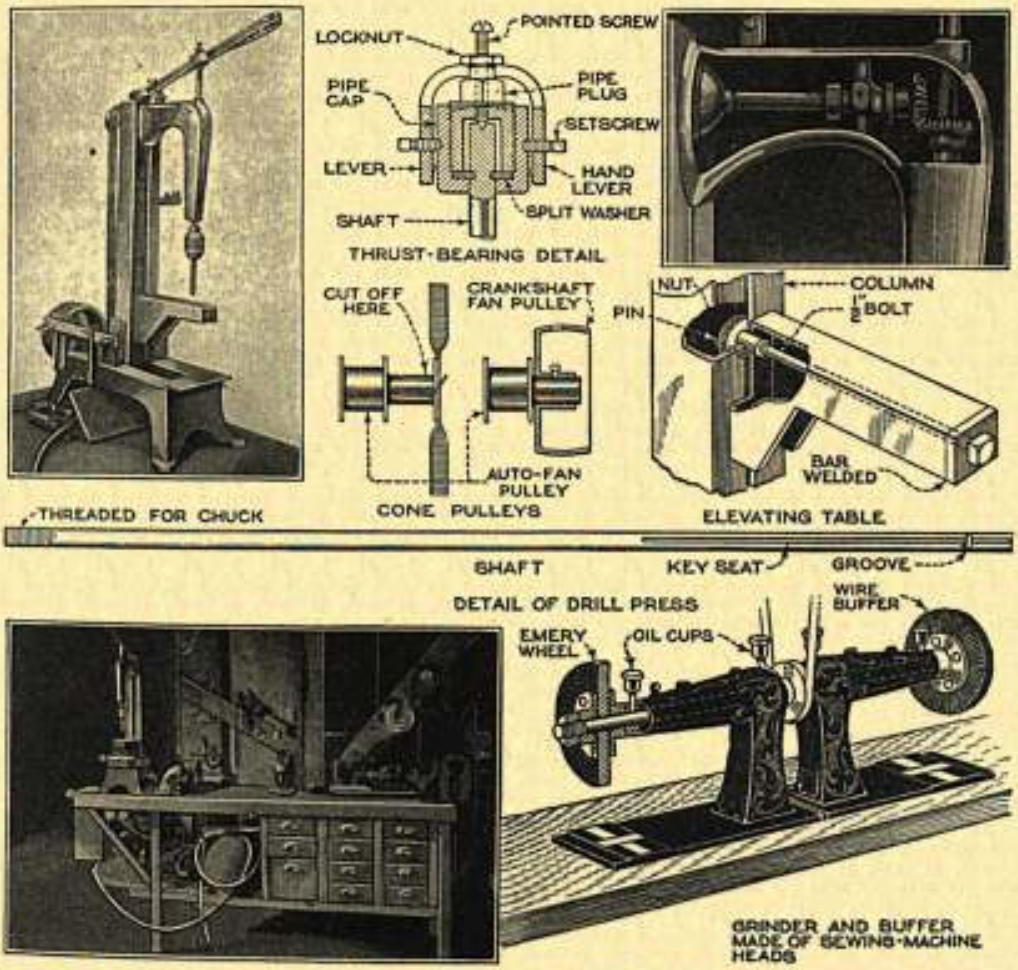
Tools Made from Sewing-Machine Heads

By RUPERT A. ANDERSON

VERY effective small machine tools for the amateur's shop can be made from discarded sewing machines. The drill press shown in the illustration has as its most important feature a sewing-machine head. This was adapted for the job with very little alteration, and saved a great deal of time and work.

The materials needed are: A sewing-machine head complete with spindles and bevel gears in the top; a base, in this case taken from an old cream separator; a set of 6-in. fast and loose pulleys; a set of cone pulleys (made from Ford fan spindles and crankshaft pulleys); shafts of suitable size for head and chuck; small countershaft bearings; a chuck, and a few pieces of auto-frame channel iron and flat bar steel.

The first thing to do after getting the machine head is to decide on the vertical-spindle travel; about 3 in. is suitable for most purposes. The needle-bar end of the head is then sawed off, leaving the bearing flush with the end, and the end of the head dressed off to the shape desired. Both bearings are then reamed to the same size, which should be standard so as to take a cold-rolled steel spindle. The lower end of this spindle is threaded to fit the chuck, which may be a breast-drill chuck, and which may have to be fitted to a sleeve, which, in turn, is fitted to the spindle. The other end is grooved to take a small split washer, used as a thrust bearing. This groove is cut a little farther above the head than the travel of the spindle.



Upper Left, Finished Drill Press; Upper Right, Gearing in Head; Center, Details of Construction; Lower Left, Bench, with Drill in Place; Lower Right, Grinder and Buffer

The thrust bearing holds the spindle up when running idle and pushes it down when drilling. It may be made from a pipe cap and plug as shown in the detail; the plug is drilled to clear the spindle at one end, and for a pointed setscrew at the other. The screw bears against the center in the end of the spindle, and the plug locks the split washer to the shaft and pipe cap. The hand lever is pivoted to the cap by two pointed screws, bearing in drill spots.

The bevel gear is keyed to the shaft, the key being a sliding fit in the gear, and somewhat longer than the required travel. The gear is kept meshed with its mate by a plate fastened to the head under it. The horizontal shaft is now put in, and the head packed in grease.

Two pieces of the channel iron are cut to the desired height and bolted together, webs out, with spacers on the bolts so as to leave ½ in. of space between the edges of the flanges. The standard thus made is mounted perpendicularly on the base, by means of small angle plates, and the head screwed to the upper end, using the same screws as used on the sewing machine. The head must be mounted absolutely square, as upon this depends the accuracy of the machine.

The method of making the cone pulleys is clearly shown, and demands no explanation. The countershaft may be fitted wherever desired, but is neater if mounted on the base. If this is done, the fast and loose pulleys should overhang, so that the belt can be run downward, if desired. A spring is attached to the rear end of the flat-steel hand lever to keep it raised when not in use.

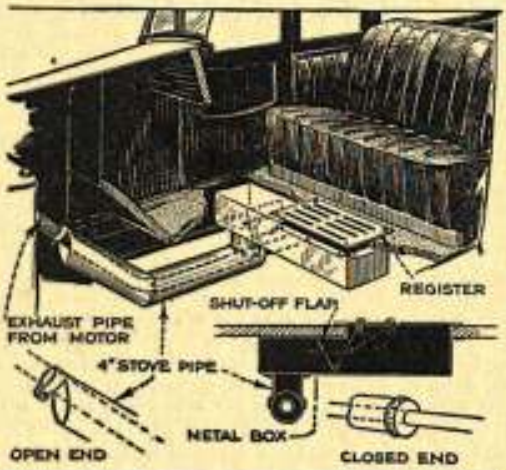
The illustration at the lower right shows in detail the elevating table, which also must be exactly square with the standard. This may be altered so as to allow it to swing to the sides, which would allow work to be drilled that otherwise could not be handled.

In making the grinder and buffer shown in the lower illustration, two sewing-machine heads of the same height are selected. The needle-bar ends are cut off as before, the ends dressed off smooth, and the bearings reamed to standard size. The heads are then mounted on a base, and are held in line by the spindle. The spindle is threaded right and left hand, and provided with nuts and washers to fit. The inner washer at each end is threaded to screw on the spindle.

A small V-grooved pulley is made to fit closely between the heads, and fastened with a headless setscrew. If a hole is drilled in the shaft to take the end of the screw there will be little danger of the pulley slipping. The pulley should be fitted so as to prevent end play. Providing oil or grease cups completes the grinder.

Homemade Auto Heater

The comfort of winter auto riding can be greatly increased by installing a heater of the type shown in the drawing. It consists of a length of 4-in. stovepipe, which is hung on the exhaust pipe as shown, and connected with a sheet-metal box, fastened to the underside of the floor. A hole is cut in the top of the box, and in the floor, to allow the heated air to enter the car. There is no danger of getting any exhaust gas or foul air into the car, as fresh air, rushing through the radiator enters the open end of the stovepipe, and after being warmed by the hot exhaust pipe, enters the car.



A Homemade Heater Adds Considerable Comfort to Auto Driving During the Cold Winter Months

The stovepipe is cut at one end to form a clamp, which is securely attached to the exhaust pipe with a small stove bolt. The length of stovepipe consists of sections, to conform to the shape of the exhaust pipe, the sections being riveted together securely. The rear end is closed so that the heated air cannot escape. The sheet-metal box is made about 2 in. deep, 6 in. wide, and 16 in. long; it has a circular hole cut in the underside at the point where it is connected to the stovepipe and a rectangular hole on top about 5 by 9 in., so that a 5 by 9-in. register can be fitted over it. A number of holes,

drilled in the floor, would serve the purpose of a register, but would not present such a neat appearance. A shut-off flap is provided inside of the box, so that the heat can be shut off if desired. The flap is made of sheet iron, fitting loosely in the box as shown, and operated by a screw sliding in a slot in the register, the screw being connected to the flap with a length of stiff wire.

Drawing on Glass

Writing or drawing on glass is not very easy as the ink will not take well unless the surface has been sized. A good size for this purpose can be made by adding 3 or 4 drops of good glue to an ounce of water, and stirring or shaking the water until the glue is well dissolved. The size should be used at once as it will not keep very long, due to the evaporation of the water.

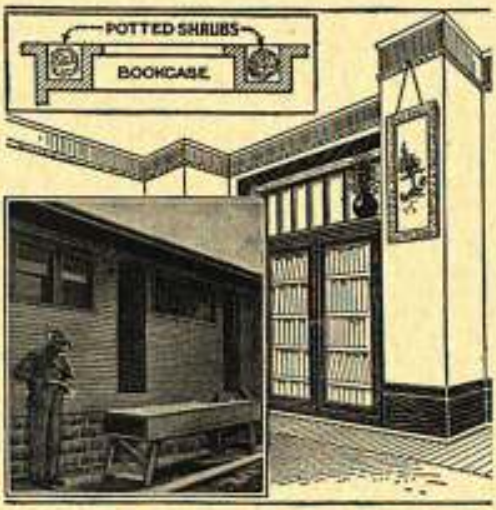
Before applying the size, the glass must be cleaned well. A few drops of the size are then poured on, spread over the surface evenly by turning and tilting the glass, and the glass is then set on a level surface to allow the size to dry. When thoroughly dry, the coated side is ready to be written or drawn upon.

Effective Mud Chain

When the rear wheel of an automobile is sunk in mud nearly up to the hub, it is impossible to get the chain on around the tire, and the motorist then has quite a job trying to get out. In such cases a chain that fits over half of the tire has been found to be of considerable assistance. An old chain is used for the purpose; it is cut in two and one half is slipped over the upper part of the tire as shown. Two 4-in. lengths of chain, having the hooks attached, are cut from the other half of the chain, and used to fasten the ends of the half chain on the wheel. A piece of cloth or leather wrapped around the short chains will keep them from scarring the wheel.—Grover Brinkman, Okawville, Ill.

Jogging Wall for Bookcase

In order that the bookcase in the living room should be flush with the inside surface of the wall, a Nebraska home builder



Jogging a Wall Makes the Bookcase Flush with Interior Surface. Left, View of Outside of Wall

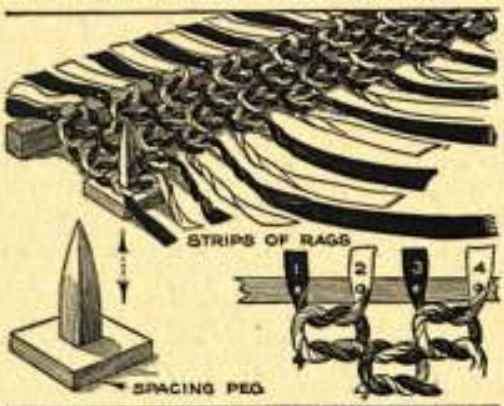
jogged the wall of a bungalow in the manner shown in the illustration, which provided places for potted shrubs outside, and added a touch of distinction and beauty to the architecture of the house. The upper detail shows the plan of this arrangement. A multiple-sash window was provided over the bookcase and this added considerably to the appearance of the room, besides providing more light.—Dale R. Van Horn, Walton, Neb.

Safety Flash-Powder Container

Because of the accidents occurring from the explosion of photographer's flash powder, the safety flash-powder container shown in the illustration was devised. This container does not guarantee against explosion but reduces its force to a minimum. It consists of a length of brass tubing with a cork inserted in each end. Should the powder explode, it will blow the two end corks out of the tube, which is better than having particles of glass fly in all directions, as happens when a bottle "blows up."—H. A. Palmer, Toledo, Ohio.

Simple Method of Making Rag Mats

Excellent doormats can be made at home from strips of rag or burlap. The strips must all be of the same width and twisted until they are about the thickness of a finger. The strips are tacked, about 4 in. from one end, to a length of



Simple Method of Making Rag Mats: Strips of Rag are Twisted and Then Woven Together with Square Knots of Uniform Size

wood, and are spaced ¾ in. apart. The width of the mat depends on the number of strips used, which must be an even number.

After fastening the length of wood to a table or bench, the strips are ready to be woven, which is done by tying them together with "square" knots until the mat is completed. The first knot is tied with the first and second strips, the second knot with the third and fourth strips, the third knot with the fifth and sixth strips, and so on to the end. The second row of knots is begun by tying the second and third strips, then the fourth and fifth strips, and so on. The knots are all tied in the same way, and the method of doing this is plainly shown in the detail. A spacing peg must be used, so that all the knots will be of the same size; the knot is tied around the peg, which is then slipped out. The peg should be about 1 in. square and tapered to a point.

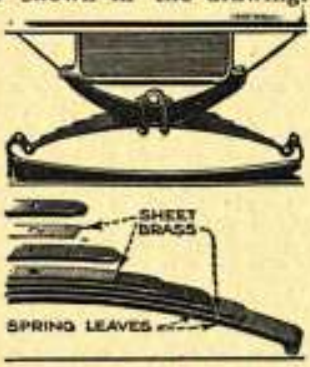
Increasing Effectiveness of Weedless Propeller

There are numerous weedless boat propellers on the market but the majority of motorboat owners who have attempted to drive their boats through heavy kelp, sedge grass, or other aquatic vegetation will testify that the average weedless boat propeller is usually about as weedless as a nonskid tire is actually nonskidding on a wet asphalt pavement.

The writer recently visited the Los Todos Santos Islands off the west coast of Mexico in a motor boat. In order to get to these islands it was necessary to drive the boat through vast kelp beds that were so thick that the boat, even though equipped with a so-called weedless propeller, could scarcely move more than a few hundred yards without the screw becoming fouled by the kelp, making it necessary for a member of the party to go overboard and disentangle the weeds. However, the trouble was finally eliminated by removing the propeller and sharpening the edges. As the propeller was made of bronze the job was easily accomplished by means of a file. After being sharpened, the propeller cut through every bit of seaweed it came in contact with, and no more trouble was experienced. The weed-cutting ability of the sharpened blades is aided by their shape, which gives them a cutting motion similar to a barber's stroke in shaving.—J. E. Hoag, Los Angeles, Calif.

Brass Strips Improve Spring Action

Automobile springs soon become rusty, and this causes so much friction between adjacent leaves that they do not work properly, unless proper attention is paid to lubrication. Their action can be improved considerably by inserting brass strips between them, as shown in the drawing. These strips have smooth surfaces and will not rust, enabling one leaf to slide over another with the least friction, and offsetting lack of lubrication. The strips are cut from ⅛-in. sheet brass, to a length and width corresponding to that of the spring leaves. A hole is, of course, drilled through the strips for the center bolt of the spring, and they are then assembled with the leaves as shown in the lower detail.

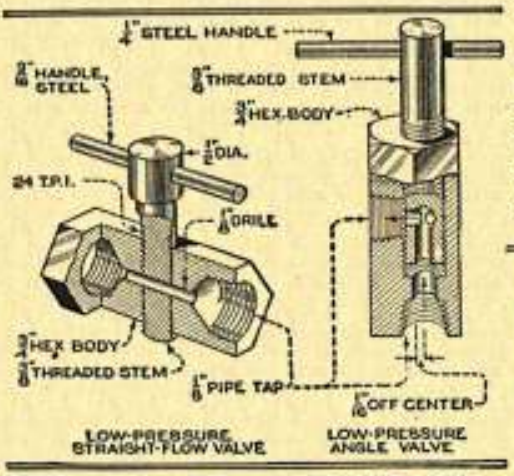


¶To insure prompt reply and safe receipt, when writing to the Bureau of Information, please write name and address plainly.

Easily Made Small Valves

MANY of the mechanisms made in the experimental shop require valves. On experimental machinery, ⅛ and ¼-in. valves are usually large enough, but even these are rather expensive, and, as described in this article, simple and effective valves can quite easily be made, either for high or low-pressure use.

The simplest form of valve is the straight-flow type made by cutting a piece of brass or steel hexagon stock, 2 in. long, drilling a hole in the center, and tapping it ⅜ in.—



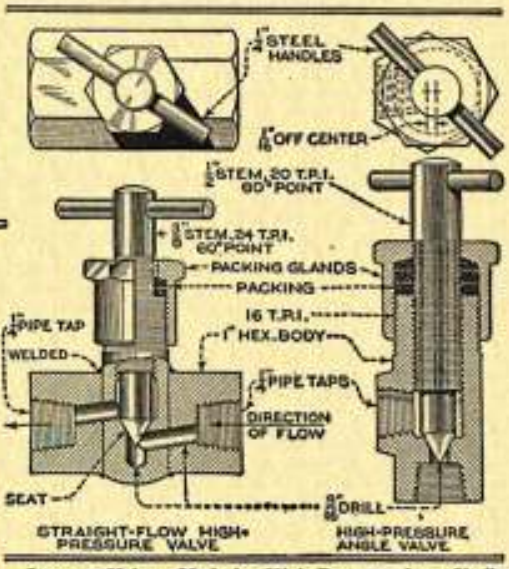
Low-Pressure Straight-Flow and Angle Valves Made from Stock Material

24 threads. Make a stem of the same material and thread it so that it will fit snugly into the body. Fit the stem with a 5/16-in. handle, and screw it into the body until it projects a few threads on the bottom, with the handle parallel to the body. Drill a ⅛-in. hole axially through body and stem, enlarging the ends so as to allow them to be tapped for ⅛-in. pipe. When the handle is turned at right angles to the body, the flow will be stopped. This valve is quite satisfactory for low pressures, if made accurately, and is very simple to make.

The low-pressure angle valve is also made from a 2-in. length of ¾-in. hexagon stock. In this case the ⅜-in. tapped hole is drilled lengthwise, not quite through, and 5/16 in. off center. Fit the stem tightly as before, and drill a ⅛-in. hole through its center from the bottom of the body. This hole breaks into another drilled through the side, as shown, and both holes are enlarged and tapped as before. The stem of this valve has a handle that projects more on one side than the other, and the handle points in the same direction as the side opening or port, thus acting as a guide in using the valve. A half turn opens or closes the valve.

For high-pressure work on gas, liquid, or steam lines, a valve must be used that will not only stand the pressure safely, but will seat tightly when closed. Many mechanics would throw up their hands if asked to make a straight-flow valve for high pressure out of stock material, but it can easily be done. The features mentioned above are incorporated by using heavy hexagon stock for the bodies, and tapered valve seats and stems.

For the straight-flow valve, a piece of 1-in. stock, 2 in. long, is used, and into a hole bored through its center is forced a vertical seat-and-stem piece. The upper and lower ends of the hole must be countersunk, and, after the vertical member is in place, the joints are welded or brazed. This piece is drilled along its axis, and



Stronger Valves, Made for High Pressure, from Similar Materials

tapped ⅛ in.—20 threads, or ⅜ in.—24 threads, for the stem. The bottom of the hole is machined to a 60° taper, and a 5/16-in. hole is drilled for a short distance below the seat, to provide clearance for the point of the stem. The outside of the vertical member is threaded, and a packing-gland nut made and fitted, using two pieces of ⅛-in. packing. The valve stem is made of steel, threaded, tapered to a 60° point, and fitted with a ¼-in. handle. After the valve has been assembled, the ¼-in. pipe-tap holes are drilled, and then the 5/16-in. passages. The latter holes must

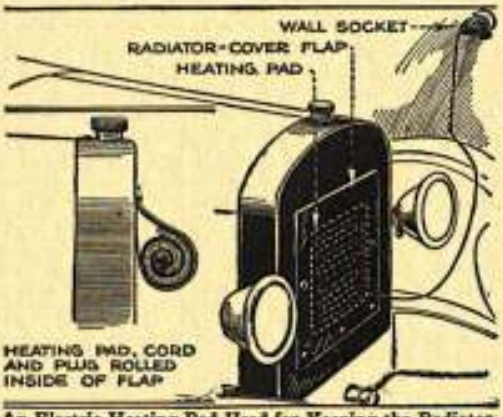
be drilled at an angle, as shown, to avoid drilling into the valve seat.

The angular type of high-pressure valve is of simpler construction. The body is also of 1-inch stock, with the center holes and the turned and threaded parts 5/32 off center. This leaves a thick wall for the side outlet, which is threaded for ¼-in. pipe. The ½-in. stem is fitted and packed in the same manner as the straight-flow stem.

These valves will stand up to 300 lb. pressure, are easy to take apart for repairs or cleaning, and are quite safe for either gases or liquid.

Electric Heating Pad Keeps Engine Warm

An electric heating pad, of the kind used for household purposes, can be used to advantage for keeping the automobile engine



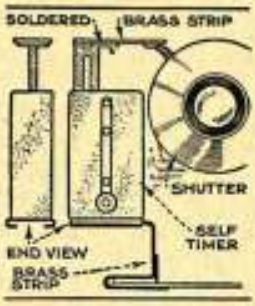
An Electric Heating Pad Used for Keeping the Radiator Warm during Cold Weather

warm during cold nights. It is simply connected to the garage lighting circuit, and sewed on or otherwise fastened inside of the flap of the radiator cover so that it can be rolled up as shown in the left-hand detail. At night it is unrolled, and the plug on the extension cord screwed into the garage lighting socket. The heating pad hanging against the radiator keeps the water warm and causes it to circulate slowly through the engine. This prevents the oil from "gumming," and consequent running down of the battery in an effort to turn the stiff engine.

¶Sharpening indelible pencils near gray cloth, and allowing the dust to settle on the pieces, has been found to damage this material in cotton mills. The "lead" makes a deep stain which shows when the goods, about to be dyed or bleached, are passed through a moistening process.

Shutter Release for Self-Timer

Unable to find a self-timer for use on cameras with a lever-shutter release, an attachment was made to hold a self-timer of the ordinary kind, and used successfully. The attachment consisted of a strip of sheet brass, bent so that it fitted tightly on the bed of the camera, and a smaller piece, soldered to the bottom of the timer and with the edges bent so as to slide over the end of the clamp. Another small piece of brass was soldered to the top of the plunger rack so as to rest on the shutter-release lever. In use, the timer was mounted as shown in the drawing, and operated in the usual way.—J. S. Opferman, Pittsburgh, Pa.



Preventing Water Tank from Freezing

Usually the stock-watering tanks on the farm freeze up very easily, unless the water is kept in constant motion. A method that was found very effective in preventing this is shown in the drawing. A 12-ft. pit, about 2 ft. in diameter, was dug next to the water tank and was walled up with broken stone and bricks; concrete can, of course, be used if desired. A pipe line consisting of 1½-in. pipe and elbows, was arranged as shown, both ends terminating in the tank at the top and bottom, and the pit was then filled with fresh manure. The cold water in the tank naturally runs down the pipe leading to the bottom of the tank, while the water already in the pipe rises in temperature, due to the heat given off by the manure, and flows out of the other end of the pipe, causing a slow but continual circulation which keeps the water in the tank from freezing.

Finger Grips for Gloves

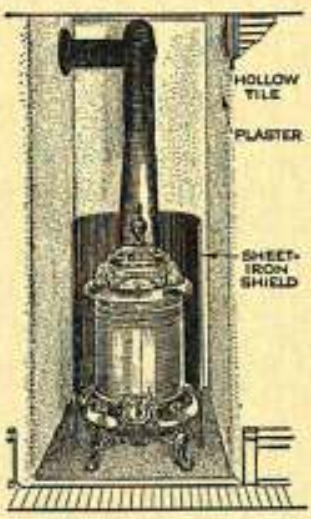
When working outdoors during cold weather when it is necessary to wear gloves, it is rather troublesome to remove them in order to pick up small objects such as screws or nuts. This difficulty can easily be overcome by placing a small coin such as a dime or a penny inside of the glove, in the tips of the thumb and index finger, thus providing two flat surfaces between which a small object can readily be pinched or picked up.—Charles I. Reid, New York City.

Using Old Collars

Old linen collars make excellent tags for packages that are sent by parcel post or express. These tags take ink well and are strong enough to remain attached for the longest journeys. A hole is punched through the tag, near one corner, and a length of stout cord is used to tie it to the parcel. About 6 or 8 tags can be cut from one collar.—Mabel Chase Rundlett, North Adams, Mass.

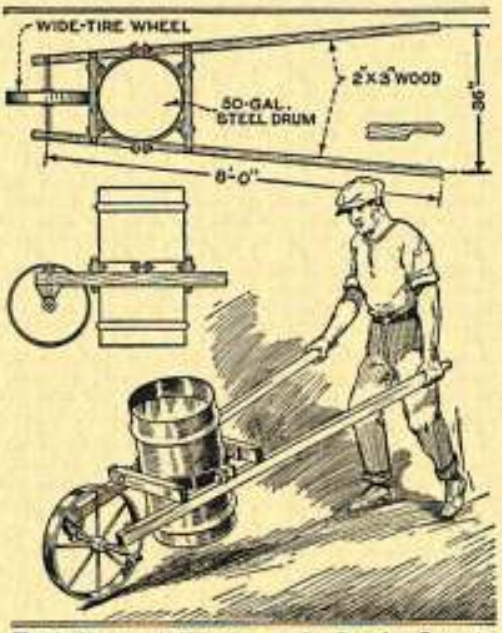
Making the Heating Stove Inconspicuous

Because our grate was found insufficient for heating the house in a semi-tropical climate, it became necessary to put a small stove in the dining room, but this crowded the room, which was small, and also detracted considerably from its appearance. The illustration shows how the trouble was overcome. An opening was cut from the dining room into the pantry just back of the chimney, and a space just large enough for the stove was lined on three sides with hollow tile, to protect against fire; the surface was then plastered. The tile wall was found to keep the heat in well and this effected quite a saving of fuel. A sheet-iron shield was provided behind the stove to protect the plaster from excessive heat.—Jack Spottswood, Jacksonville, Fla.



Wheelbarrow for Concrete

Carrying concrete, sand, and water, or "slops" is greatly facilitated by using a wheelbarrow of the type shown in the drawing. A wheel from an ordinary wheelbarrow, or from an old discarded farm implement is used. The frame is made of 2 by 3-in. hardwood about 8 ft. long, and built as shown. The handles are set about 3 ft. apart so that the barrow can be easily balanced. Two cross pieces of the same material are bolted to the handles and are spaced to accommodate a 50-gal. steel drum as shown, metal straps being provided to hold the drum in place tightly. The drum can be set solidly on the ground.



Handy Homemade Wheelbarrow for Carrying Concrete, Water, Sand, and Similar Materials

Renewing Golf Balls

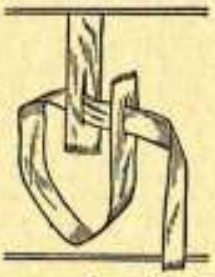
A cheap and practical method of renewing old golf balls is to fill the cracks with white rubber cement, which can be obtained at any drug store. After filling the cracks, the entire surface of the ball is painted. By repairing the balls in this way there are no bumps or cracks, which have a tendency to influence the course of the ball, and the whitened surface will show up well. It is a good idea to wash the balls in cool soapy water before going to the grounds as this helps to retain the old luster and removes stains.—Fred A. Loper, Adams, Neb.

Clips Prevent Loss of Truck Stakes

As soon as the stakes used on motor-truck bodies become worn at the lower ends, it is almost impossible to keep them in place when the truck is empty and bounces over rough roads or streets; they are consequently often lost. This trouble can be successfully eliminated by the provision of clips of the type shown in the illustration. Each clip is made from a piece of ⅛-in. strap iron about 8 in. long and 1 in. wide. Two screw holes are drilled through it as indicated, so that it can be attached to the stake with wood screws. The other end is cut and bent to form a latch that catches under the truck floor or side, and holds the stake in place securely.

Fastening Rag Strips

Rag strips used for making rugs are usually sewed together, but a much better method is shown in the illustration. A slit is cut in the ends of the strips to be connected and the other end of one strip is passed through both slits, as shown, so that when pulled tight, a smooth union is made that is not lumpy. A considerable saving of time is effected by this method.

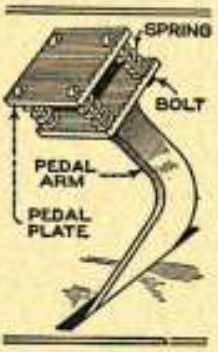


Cork Casters

For medium and light-weight furniture, common corks of large size have been found very serviceable as casters, and in many respects superior to ordinary roller casters or polished metal "domes." Because of their resiliency they yield somewhat, causing the piece of furniture to stand level and solid, and, being soft, they cannot scratch or mar the most highly polished floors but instead gradually wear away themselves. To fit them to the furniture, a hole is drilled in the bottom of each leg for a cork, the hole being, of course, equal to the center diameter of the cork and a little more than half as deep.—Glen McWilliams, Detroit, Mich.

Cure for Grabbing Clutch

To overcome the grabbing tendency of a clutch on a light car, a driver installed an additional pedal plate, attached to the regular pedal by means of four bolts and coil springs, the bolts fitting loosely in holes drilled for them and the springs keeping the plates separated. The bolts used are ¼ in. in diameter and 2½ in. long. They are slipped through holes drilled in the lower plate and reamed out so that the bolts can slip in and out easily when the pedal is under pressure. The auxiliary plate, being the same shape and size as the regular plate, is drilled and tapped to receive the screw ends of the bolts. Before assembling, 2-in. open coil springs, made of No. 10 brass wire, are placed over the bolts, which are then screwed into the threaded holes in the auxiliary plate until they project just a trifle; the ends are then hammered over to keep the bolt from unscrewing. Pressure applied on the pedal causes the clutch to take hold gradually, and all grabbing is eliminated.



Protecting Soldering-Iron Handle

Everyone who uses a soldering iron has experienced the annoyance of having the handle burned off. This is not always an actual burning of the wood but often a charring, caused by the stem of the iron becoming hot. A simple method of overcoming this is to drill out the handle to about twice the size of the iron stem and fill it with molten lead, which will stick firmly to the sides of the hole, and, while the metal is still hot, seat the stem in it. This metal will never become hot enough to char the wood and besides forming a durable handle also balances the iron.

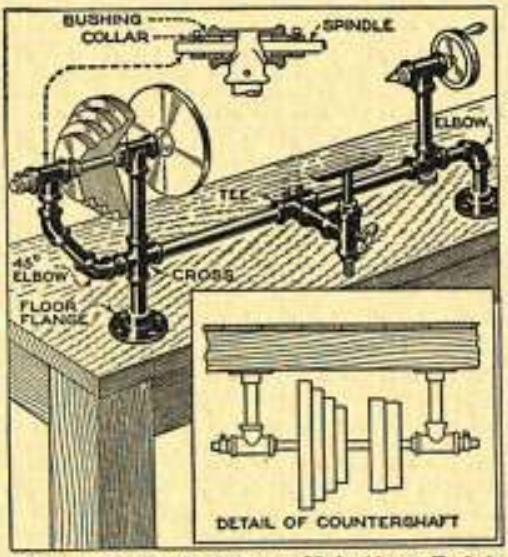
A Bench Lathe of Simple Design

By RODGER L. SIMONS

EVERY budding mechanic craves a lathe on which to develop his ideas, and the one shown in the drawing is not only easily built, but is strong and substantial, and meets the simple needs of the amateur. The only tools needed for making this lathe are those found in the small shop, plus a set of pipe-threading dies; in the absence of the latter any pipe fitter or plumber can do the necessary threading. The machine is assembled as in the drawing. The joints should be screwed up tightly, and white lead should be smeared on the threads before assembling, to make the parts go together more easily and hold them together securely. If the builder has a small taper reamer, it would be well to drill a hole through each joint, ream it out, and drive in a taper pin.

For a lathe with a bed about 2 ft. long, 1-in. pipe, with fittings to correspond, is a good size to use. When assembling the headstock, care should be taken to see that the two tees through which the spindle runs are exactly in line. A 1-in. bushing is screwed into the ends of each tee and the inside threads are drilled out to make a smooth bearing surface for the spindle, or, if any difficulty is encountered in alining the spindle, it can be blocked in position and the tees filled with babbitt. The spindle should be driven out before the babbitt cools, and the bearings reamed to a nice running fit. The spindle is a piece of ¾-in. pipe or rod, turned and polished to a true and smooth bearing surface. If one has a friend who is fortunate enough to possess a lathe, this smoothing and polishing can be done very easily. A thread is cut on one end, onto which a ¾-in. floor flange is screwed as a faceplate. A disk of wood can be used as a pulley until the machine is completed, when a regular wooden cone pulley may be turned, sanded, and fastened to the spindle. A collar should be made from a small piece of round-steel stock and fastened with a setscrew to the outer end of the spindle. The bed is made from a piece of 1⅛-in. cold-rolled steel, threaded on each end for 1-in. pipe, and with a deep, narrow keyway along its whole length, on the upper side.

Holes are drilled in the tailstock and tool rest, tapped, and machine screws, with the ends turned to fit in the keyway, inserted. The screws slide in the keyway and hold the two movable members in line. The tool rest is built up from two 1-in. tees connected by a short nipple and with the long parts, or run, of each at right angles to the other. One tee slides on the bed and the other projects toward the operator; the upper end of the latter is provided with a 1-in. bushing in which the threads have been drilled out. The rest itself is a simple forging that can be made by a blacksmith; the shank is threaded for ½-in. pipe, and a ½ by ¾-in. bushing, with the external threads filed off, is screwed on and the two placed in the tee. A thumbscrew should be provided to tighten the rest at any height, and to prevent it from turning. The tailstock is made by screwing a ¾ by 1-in. bushing into the short end of a 1-in. tee, a long ¾-in. nipple in the bushing, and a ¾-in. tee on the end of the nipple. The runs of the tees should be parallel. A ½ by ¾-in. bushing, the internal threads of which are drilled out smooth, is screwed into each end of the upper tee. A piece of steel bar, of the same diameter as ½-in. pipe, is threaded on one end, and a center point ground on the other to serve as a tailstock spindle; a handwheel is fastened on the threaded end with locknuts. Thumbscrews should be provided to tighten the tailstock to the bed, and the spindle to the tee. In both the tool rest and tailstock the tees that



Simple Lathe for the Amateur, Made Almost Entirely of Pipe and Fittings

slide on the bed must have their threads filed off to allow them to slide freely. The standard supporting the tailstock end of the lathe is built by screwing a 1-in. elbow on the threaded end of the bed, a 1-in. bushing into the open end of the elbow, a long ¾-in. nipple into the bushing, and a ¾-in. flange onto the nipple, as in the drawing.

A countershaft is easily made; a long 1-in. nipple is screwed into a 1-in. flange, a tee is screwed onto the nipple, and a 1-in. bushing screwed into each end of the tee. The inside threads of the bushings should be drilled out smoothly to form the shaft bearing. Two such assemblies are mounted on the floor or ceiling in such a manner that the openings in the bushings are in exact alinement. A steel shaft, of the same size as the drill with which the bushings are drilled, is fitted with a cone pulley of the same size and proportions as the one on the lathe, and with tight and loose pulleys for starting and stopping the machine, and a simple belt shipper is provided.

A Simple Camp Stove

Finding that a mixture of earth and gasoline would burn with a fine hot flame, even if the earth were wet, an ingenious camper devised the simple portable camp

A Very Simple but Efficient Form of Gasoline Camp or Touring Stove

stove shown in the drawing. It consists of a wide, shallow tin can having a row of holes punched through the side along the upper edge. The can is about half filled with earth, then about ¼ pt. of gasoline is poured over the earth and thoroughly mixed with it. Upon lighting this mixture, it burns with an intense heat for about fifteen minutes, which is ample time for preparing coffee. Three tin cans, one a little smaller than the other so that they can be telescoped into each other to save space when carrying, have been found very convenient on camping trips.—J. B. Smoller, Atlantic, Iowa.

¶To restore the color of a shellac surface that has become white in spots, hold a heated iron over the spots.

Removing Water from Mortar

When mixing concrete it often occurs that too much water is added, making the mixture too thin to work properly. Of course, more sand and cement can be added, but this is not always desirable, as it increases the quantity of concrete, and this may not be necessary. A good method of removing the excess of water is to place a few common bricks in the mixture for a few minutes, and it will be found that the bricks absorb so much of the water that the mixture soon becomes workable. A common brick, when thoroughly dry, will absorb about a pint of water.—R. Rittenhouse, Rockingham, North Carolina.

Repair for Carburetor Bowl

The nut holding the bowl of a Ford automobile carburetor in place has a tendency to loosen due to the continual vibration, and the loose bowl then allows a considerable quantity of gasoline to be wasted. The frequent tightening of the nut soon strips the fine thread on the brass overflow pipe on which it screws, making a new part necessary. However, on carburetors of this type, the simple repair shown in the drawing can easily be made and will not interfere with the moving parts. This repair will hold the bowl in position securely and the nuts will not need to be tightened more than once, as lock washers are provided to keep them tight. The U-bolt is passed over the body of the carburetor and a steel disk, drilled to fit the legs of the bolt and the end of the overflow pipe, is fastened on with nuts.

Saving the Cherries

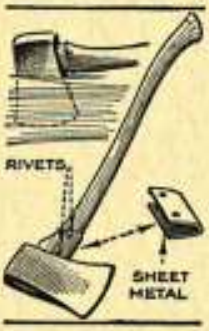
On many farms having cherry trees, considerable annoyance is experienced in having birds pick the trees bare, even before the cherries are ripe. This can easily be prevented by mounting a stuffed owl on a long slender pole, and setting the pole against the tree so that the owl is among the top branches. The birds will then give the tree a wide berth. If no stuffed owl is available, a mounted black snake will answer the same purpose.—C. A. Martin, Lewisburg, Pa.

Radiator Used as Still

The drawing shows a simple apparatus for distilling water, consisting of an old automobile radiator placed in a tub of water. The lower outlet of the radiator is connected by a short length of hose to an iron pipe, which is passed through the side of the tub; the upper outlet is connected to the steam pipe. The steam condenses very quickly in the radiator, due to the considerable surface exposed to the cold water in the tub. A constant stream of cold water is admitted into the tub through a pipe that extends nearly to the bottom, and the water, upon rising, passes off through a short overflow pipe.

Guard for Ax Handles

A southern lumberman, who did much timber splitting, had considerable trouble due to his ax handles wearing close to the head, causing them to break easily at this point, and he therefore devised the simple shield shown in the drawing to prevent the trouble. The shield consisted of a rectangular piece of thin sheet iron, bent over and screwed securely to the handleas shown.



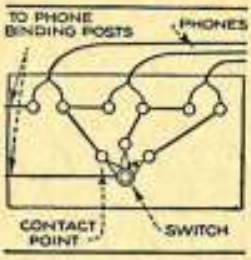
Quick Method of Removing Leaves

The drawing shows an easy method of carrying a large quantity of leaves. A piece of 1-in. wire mesh about 4 ft. wide and 6 ft. long is laid alongside the leaves, which have been raked together as compactly as possible, and the pile is raked onto the wire. Then by picking up the edges as shown, the whole pile can be carried away at once.—Mrs. A. K. Hinkley, Rowley, Mass.

An Easy Method of Carrying Large Quantities of Leaves, by Means of a Piece of Chicken Wire

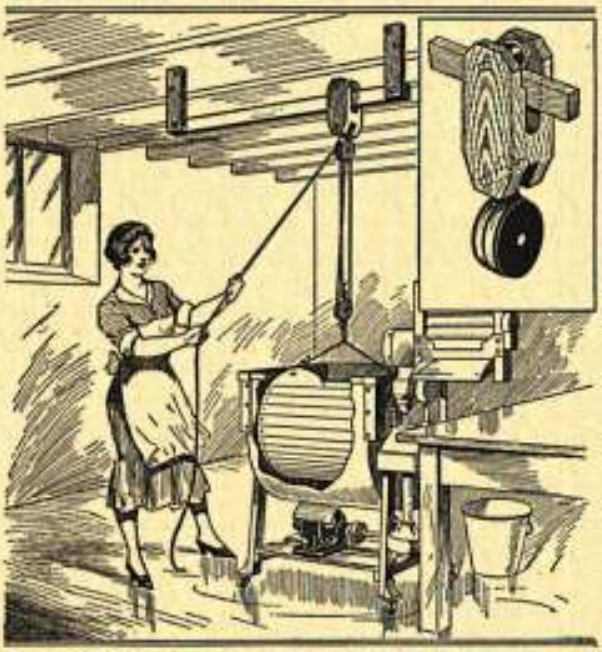
A Multiple-Phone Connector

The amateur radio "fan" who has two or three sets of head phones will find the arrangement shown in the illustration a quick and convenient means of switching from one set of phones to two or three sets, as he may desire. Six binding posts, and a small 1-in. switch, with 3 switch points, are mounted on a small rectangular piece of bakelite, and the switch points and binding posts are connected as shown. The first binding post and the switch blade are connected to the two phone binding posts on the panel. Moving the switch blade from one point to another puts one, two, or three sets of phones into use. The wiring, of course, is done on the underside of the bakelite.



Washing-Machine Cylinder Hoist

It is a back-breaking job to lift the wooden cylinder out of some types of electric washers after washing, and for this reason the cylinder is often left in the tub, which, of course, prevents it from drying thoroughly and may cause mildew. This trouble can be eliminated by providing a small hoist of the kind shown in the drawing. The block-and-tackle arrangement is suspended over the washing machine and enables a woman to raise the cylinder out of the tub with a minimum of exertion.



A Convenient Block-and-Tackle Arrangement Used for Hoisting the Cylinder Out of the Washing Machine

The essential parts of the arrangement are a single and double pulley, both about 1 in. in diameter, a wooden block, and some strong clothesline. The cylinder is attached to the single pulley with a length of rope, ¼ in. holes being drilled in the sides about 1 in. from the ends to admit the hooks provided on the ends of the rope. Another length of rope is tied at one end of the single-pulley eye and passed over the pulleys as shown. This arrangement reduces the pull on the free end to one-third of the pull necessary if only one pulley be used. A cleat should be provided on the wall so that the rope can be tied while the cylinder is left suspended so it may dry.

The wooden block on which the double pulley hangs is not essential but is very convenient. It is made of oak about 8 in. in length, and runs on a wooden rail, supported by wooden hangers bolted to the ceiling joists with carriage bolts. The rail should be about 4 ft. long so that the cylinder can be swung clear of the washer and lowered to the floor.—Donald A. Price, Chicago Heights, Ill.

Firelight Photos

Numerous methods are suggested for coloring pictures to imitate firelight, most of them depending upon the staining of the entire picture with some dye, but few giving satisfactory results. However, a combination of dyeing and chemical toning will give a satisfactory effect. By staining an entire picture light orange and toning the dark portions red, a fine imitation of firelight is obtained.

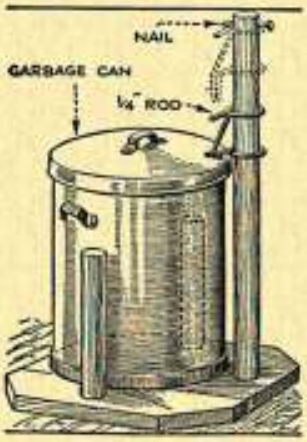
Any developing paper can be used. For the best results, the picture should be printed deeply; the print is first immersed in a bath consisting of 10 grs. of potassium iodide, and 20 grs. of potassium ferricyanide, dissolved in 1 oz. of water. This solution should be made in quantity as required, and the potassium must be the red prussiate crystals, not the yellow. The picture, immersed in this solution, will bleach away almost entirely, but must be left in the bath half an hour longer to convert the nitrate on the print completely into iodide of silver. This chemical is capable of taking up or "mordanting" many aniline dyes, but not all of them. The dye, which is red in case of firelight scenes, is then applied; lanafuschine is the dye to use. After washing out the dye completely, another color such as yellow or orange, in the case with campfire scenes, is applied to the print to stain it completely and to deepen the red tint in the shadows. In this way the print can be dyed almost any color and tint desired. A good dye is necessary for successful work. The quality of any red dye can be seen when the print is washed; if any of the whites remain tinted, the dye should be rejected.

This process of coloring can also be applied to moonlight pictures or landscapes, using blue or green dyes, or even liquid water colors with a brush, as the print will take almost any aniline dye. It is not necessary to place the print in the dye, but better to apply the dye with a brush, paying no attention to the outlines of the picture, as the dye will act only on the chemical portion. If the dye is not strong enough after washing, a second application is made.

This process is also a splendid one for coloring lantern slides, as the silver can be dissolved entirely in an ordinary fixing bath during the process. The slides will be of a soft and delicate appearance and can be tinted with water colors afterward. A French experimenter recommends the following dyes: For red, lanafuschine brilliante S L; blue, cyanol d' alizarine B F; yellow, jaune de quinoeline; green, vert brilliante d' alizarine; violet, violet lanacyl B.

A Garbage-Can Holder

Keeping garbage and refuse in covered cans is a step toward prevention of disease, but it is of frequent occurrence that the garbage cans in alleys are accidentally tipped over by careless handling, by wagons and autos being driven against them, or by dogs, and the contents, emptied over the ground, become a breeding place for flies and bacteria. To prevent the cans being upset in this way, many people drive posts or iron pipes into the ground around them, but it then becomes quite a task to lift them out when they are full. A much better method of holding them is shown in the illustration. This holder consists of a heavy wooden base and three uprights, the center one fitted with a catch made of ¼-in. iron rod and bent to the shape indicated. A slot or hole is cut in the cover to receive the end of the catch. When the can has to be removed, the catch is raised and the can pulled from under it.—E. K. Wehry, Cedar Rapids, Iowa.



"Automatic" Car Jack

When working on the rear end of an automobile, or under it, it is usually necessary to jack up one end of the car to provide more space to work. The illustration shows a pair of simple homemade jacks for this purpose. They are made of 2 by 6-in. unplaned lumber, and constructed as shown in the upper figure, each consisting of a 2 by 6-in. base, two support blocks, and a top board of the same material. The top board is pivoted on one of the support blocks by means of a piece of ½-in. iron pipe, loosely held in place by large staples; it must be about twice as long as the base and beveled at one end as shown, this end being slightly heavier than the other so that the board will fall to the position indicated in the upper figure.

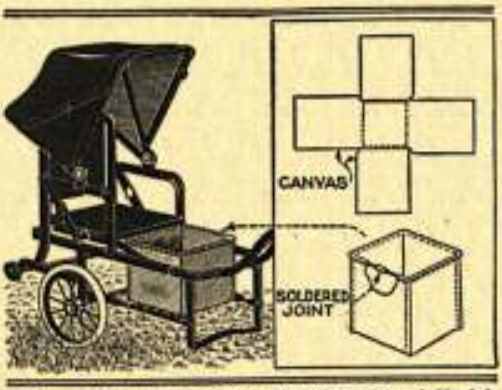
A Pair of Simple Homemade Automobile Jacks that Are Not Only Convenient but Quite Safe

The jacks are placed close to the wheels at the front or rear, and the car driven on. A hook is provided on one support block to keep the top board down, and a short length of iron pipe or rod, fitting loosely in holes drilled through the sides of the top, prevents the wheels from running off the jack while the work is being done, thus making the work perfectly safe.—F. S. Root, Fall River, Mass.

¶A worthless clock can be used in the sick room to indicate the next time medicine is to be given by setting the hand at the proper position.

Keeping Sulky Covers in Place

During cold weather when it is necessary to have the child well covered in the sulky, the blanket often works loose and one end drags in the mud or against one



A Canvas Basket on a Sulky Has Been Found Useful for Keeping the Blanket in Place

of the wheels. This trouble can be avoided by tucking the lower ends of the blanket into a small canvas "box" of the kind shown in the illustration.

The box is made of two strips of heavy canvas, 10 in. wide and 36 in. long. These strips are cut and placed across each other as shown in the upper detail, and sewed together as indicated by the dotted lines, the outer ends being hemmed. Through the hems a length of No. 8 wire is passed, which is bent to a square just a trifle larger than the width of the sulky frame, so that it will rest on the latter. The ends of the wire are soldered together, which is done by bending a small piece of tin around the wire and dropping solder between. If desired, the box can be made of black oilcloth to match the sulky frame. Besides keeping the blanket in place, the basket keeps the child's feet warm, and it can also be used to hold packages when shopping. When the sulky is folded the box is placed in the seat.—E. D. Fahling, Tama, Ia.

Increasing Effectiveness of Spot Light

Putting the automobile spot light in front of the radiator and down close to the ground has been found to increase its effectiveness considerably. This may be accomplished by clamping it to the bumper, body frame, apron, spring, or an auxiliary bracket bolted to the latter. It is not advisable to fasten it to the front axle, however, as the constant jarring will soon ruin the lamp. Care must be taken that the light is behind the bumper, to protect it from damage in case of a slight collision, and just high enough to clear obstructions in the road; the level of the axle is about the right height.

The advantage of this position is obvious; it brings the light down where it is needed and provides a strong light with a wide ray, which will not blind an approaching driver. In rain or foggy weather the usefulness of a spot light located in this position is unquestionable. A small push-button switch on the dash is connected in the circuit to operate the spot light independent of the other circuits. The wires are run under the frame or under the hood—N. T. Peterson, Corvallis, Ore.

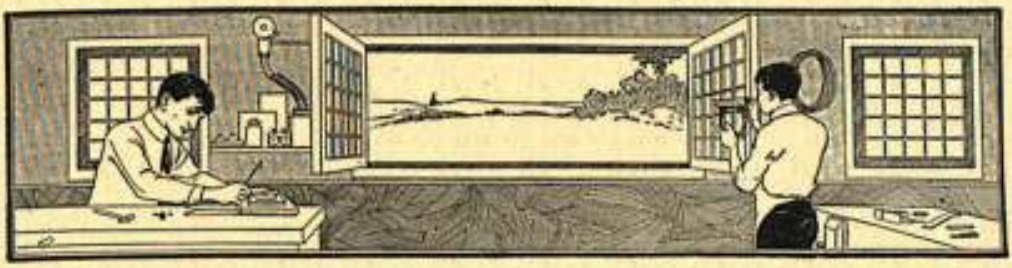
Manuring the Farm Garden

One of the problems in keeping a large house garden on the farm is that the soil must usually be richer than the other farm land, and therefore it must be fertilized iberally. The usual farm manure spreader is not of much use for this purpose as it spreads the manure too thinly, and to spread the manure over a three-acre tract is too much work to be done with a fork. An Oklahoma farmer solved the problem by allowing his cattle to run in the garden during the winter. In order to have the manure spread evenly, he built the movable feed rack shown in the photo; moving the rack occasionally keeps the manure spread evenly over the garden. It consists of two wheels and an axle from an old

A Movable Feed Rack in the Farm Garden Tends to Effect an Even Distribution of Manure

mower, a frame of 2 by 6-in. lumber, and slats of 1 by 6-in. lumber.—J. M. Collins, Kansas City, Mo.

Pure benzine should be used to clean watch hair springs, and it should leave no film on the metal. Pure grain alcohol is also very effective, but denatured alcohol usually leaves a film.

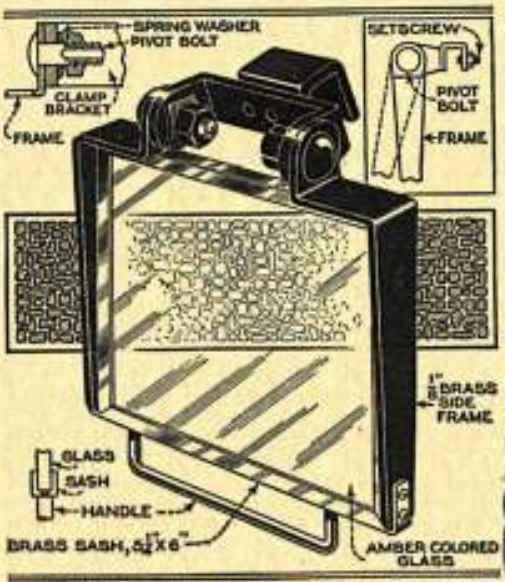


Making a Glare Shield

By J. V. ROMIG

MANY owners object to the type of glare shield that is fitted completely across the windshield. If of the adjustable type, they are unhandy in operation, and, if fixed, the driver must assume an awkward position when endeavoring to shield his eyes from the glare from the headlights of an approaching car.

The best type, to my mind, is the home-made one shown in the illustration, which swings up out of view when not in use. It is easy to make and operate, and is logically placed on the windshield frame.

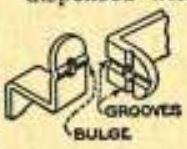


Details of Construction of a Very Efficient Glare Shield for the Automobile; Right, Shield in Use to Protect Driver from Headlight Glare

The shield is composed of a sheet-brass frame, ⅛ in. thick, cut to the shape indicated and fitted with a U-shaped sash, made of thin brass. The sash is soldered or riveted to the sides and top of the side frame and is made just large enough to enable the glass to be slid into place tightly. The sash may be lined with thin felt or rubber, cemented into place, if desired, to prevent rattle, but this is not essential if the glass is a good fit. The lower part of the sash is bent up at the ends and screwed to the ends of the side frame, so that glasses can easily be changed when desired.

For summer driving, an amber-colored glass is desirable, and for winter, a blue or green-colored glass.

The top ears of the side-frame members are pivoted to a clamp member, for the open car. This member is made of ¼-in. sheet brass, bent as shown, and a lug that fits over the windshield frame is riveted and sweated to the back, as shown. The lug is drilled and tapped for ¼-in. steel setscrews, which fasten it to the frame. For the closed car, the clamp member may be screwed to the top frame, and the lug dispensed with; it may be necessary, in some cases, to make a special bracket to carry the shield in a convenient position. The ears of the side frame are bulged across in the manner shown in the



detail, and grooves filed across the ears of the clamp bracket to fit the notches. The angle of the notches depends upon the position of the shield when up and down.

Spring washers are used under the nuts on the bolts that hold the shield frame to the bracket, and these force the bulges into the grooves, and hold the shield rigidly up or down. A substantial U-shaped handle, screwed to the lower sash member, completes the job.

When a car is seen approaching, the shield is snapped down, and, when the car has passed, a touch of the hand throws it up out of the line of vision again.

A Handy Stepladder

To avoid standing on tables and chairs when hanging pictures a useful stepladder can be improvised in a few minutes from almost any kind of stock that is available. The photograph clearly shows how it is constructed; if desired the platform may be hinged so that it can be folded down flat when not in use, and held up by means of a brace. In use, it is set up against the wall as shown. The feet of the ladder may be shod with rubber to keep them from slipping.—D. O. Woodbury, Boston, Mass.

White Covering on Stovepipes

In many up-to-date kitchens where the walls, woodwork, and wooden furnishings are enameled white, and the range and other metal is either enameled white or nickel-plated, a black stovepipe spoils the whole appearance of the room. There is no reason, however, why the stovepipe should be black. A simple method of changing it to match with the rest of the kitchen is to cover it with a layer of asbestos paper, and then apply a couple of coats of white enamel.

The asbestos paper can be pasted on the pipe with the paste used for wallpaper hanging, or, better still, by means of water glass (sodium silicate), which can be obtained at any drug store. The application of the paper around the bends in the pipe is not difficult if it is done correctly. The pieces should be wrapped around the bend, section by section, measured accurately, and then cut accordingly. The edges of the paper should not be overlapped, but should be butted together snugly. The first coat of enamel will soak into the paper, but the second coat will give a fair finish; a third coat is desirable to obtain a good gloss. The heat of the range, under ordinary conditions, will not scorch the enamel in any way; it will remain perfectly white except for the natural discoloration that is characteristic of all white paints and enamels.—J. E. Dekker, Chicago, Ill.

A Lattice Screen for the Garden

When it is necessary to repair worn-out spots on the lawn or to start new plants in bare spots a lattice screen has been found very good for protection. It is laid flat and is held just high enough above the ground by means of supports, one on each corner, to give the seedlings underneath head room, while protecting them against wind and sun and preserving the moisture in the soil. The construction of such a lattice screen is very simple. On a frame of 1-in. material, of almost any convenient dimensions, 2-in. strips are laid 1 in. apart. A frame of this kind will last a long time and when not in use need not be in the way, as it can be hung against a fence or wall, where it will require practically no space.—C. L. Meller, Fargo, N. D.

Novel Photo-Print Dryer

Novelty and simplicity are the outstanding features of the photo-print dryer shown in the illustration. The dryer was made from an empty peanut-butter can, although any other can having a similar shape can be used. It was covered with two layers of white blotting paper fastened by adhesive plaster. Then one-half of an old bed sheet, folded to fit the can, making three thicknesses, was wound on once and fastened by stitching it at the point of meeting, leaving a long

end on which the prints are placed. The prints are placed face down and the cloth is rolled on the can and tied, then, with the cover removed, the can is set bottom side up on a radiator. From 50 to 100 prints can be dried in a few minutes in this manner, and they come out perfectly flat and in good condition.

Repairing Broken Connections

It often happens that a wire is broken off where it comes through a hole and such a break is usually the most difficult kind to repair, without replacing the wire or adding a length. A simple repair that has been found effective is shown in the illustration. A small tight-fitting wood screw is driven snugly into the hole, the screw section wedging tightly against one bared end of the broken wire. Two washers are provided under the head of the screw and the other end of the wire clamped between them as indicated. This method cannot be used for repairing broken connections on wires that carry an appreciable amount of current such as house-lighting wires, and high-tension wires on automobiles, but will do nicely for low-current work.—Wm. J. Edmonds, Jr., Whitehall, N. Y.

Cotter Pins as Curtain-String Tacks

Ordinary cotter pins of small size can be used to advantage as a substitute for tacks on window casings, when used to hold a string across the sash in order to prevent the curtain from blowing outside and getting dirty when the window is up. A small hole is first drilled into the casing on each side so that the cotter pin will drive in tightly. The string or tape can then be slipped through the holes of the cotter pins and the ends tied together. The small, round, polished heads of the cotters look much neater than tacks.

A Dry Spot on a Rainy Day

It often occurs when out picknicking, that a little rain shower spoils the day, even if it does no more than soak the grass and

A Piece of Canvas, Tied to Trees, Provides Shelter for a Picnic Party During a Shower

prevent the party from sitting down on it. The shower need not, however, affect the picnic at all if a piece of heavy canvas is suspended between the trees in the manner illustrated, so that a sort of shelter is provided, under which the grass remains perfectly dry.

The canvas can be of any desirable size, and can be conveniently folded up and placed under the back seat of an auto. A brass eyelet is provided at each corner, to take the strain of the rope.—E. E. Hoppman, Dumont, N. J.

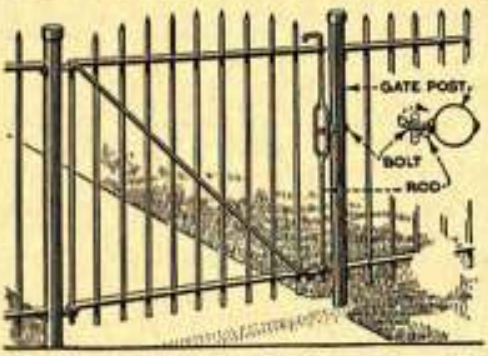
Mouse Trap Used as Cutout Spring

When connecting the muffler cutout on my car to the foot pedal I could not find a suitable spring to pull the cutout closed when the foot pedal was released. As a temporary method, which, however, proved perfectly satisfactory for permanent use, I used an old mouse trap, screwing it securely to the underside of the footboard and connecting the movable jaw firmly to a length of wire that was fastened to the foot pedal and cutout arm.—Harold Pinkerton, Pawnee City, Neb.

Automatic Gate Latch

Most automatic self-locking gate latches wear out in a short time and must be replaced, while the more durable kind must be opened and closed by hand.

The latch shown in the illustration is automatic, simple to make, and has no



Homemade Automatic Gate Latch that Cannot Be Released by Shaking or Rattling

delicate parts that are apt to be easily broken. It consists of an iron or steel rod, with a short piece welded on near the center to form an elongated O-shape as shown. A shoulder is formed at the lower end of the rod so that it will not slip through the crosspiece of the gate and the rod is bent at the top to form a handle. A hole is drilled through the gatepost and a bolt slipped through with a nut to hold it in place. The end of the bolt extends into the O-section, as shown in the detail, so that it strikes one side and gives the rod a quarter turn, thereby locking the latch. By examining the drawing, the action of the latch will easily be understood. The handle must be turned in order to open it.—L. H. Unglesby, Baton Rouge, Louisiana.

Using Discarded Double-Filament Lamps

The double-filament bulbs used on many cars are usually thrown away when one of the filaments is burned out. Although the lamp has a double-contact base it really has two one-wire lamps in the same bulb, each filament being connected to one contact and the other side grounded to the shell of the lamp base. To use these bulbs run a bridge of solder across the two terminals, and the bulb can then be used in the standard single-contact socket. The strength of the lamp will depend on which filament is the undamaged one.—John A. Blaker, West Auburn, Mass.

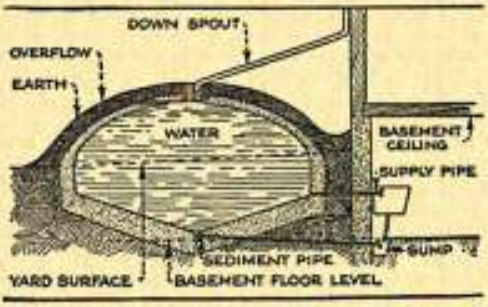
Keeping Pedal Pad Tight

Automobile pedals that are screwed on often have a tendency to work loose, and this is not only annoying but also dangerous. A good method of locking the pedal in place without going to the trouble of runing the thread down further and using a locknut, is to pack the screwhole half full of tough paper, and then screw the pedal down as tightly as possible. The resiliency of the paper will hold the pedal securely in place and prevent it from becoming loose.—G. C. Douglas, Raleigh, North Carolina.

Cistern Supplies Farm Laundry

On the majority of farms it is customary to use a small hand pump to lift rain water up from the cistern. However, if the water in the tank is above the basement floor, it is possible to provide running water for the basement, making the use of a pump in the laundry unnecessary.

The cistern is tapped for a 2-in. pipe, at as low a level as is possible to allow the water to flow into the tub. Two smaller pipes are connected to the 2-in. pipe, one for cold water and the other for hot water. The hot-water pipe is connected to the hot-water system of the laundry stove. The hot-water tank should be placed horizon-



Tapping the Cistern to Supply Water for the Farm Laundry in the Basement

tally and kept at a low level to assure free passage of water in case the pressure is very low.

If the ordinary cistern of 8 or 10-ft. diameter is not large enough the cistern should be built 12 to 20 ft. in diameter. It may be necessary to build the arch a few feet above the grade line, and in this case it should be cemented over and covered with dirt. A concave bottom brings the sediment in the center and this can be removed by opening the valve in a pipe, connected to the bottom for this purpose.—Jesse S. LaRue, Joliet, Ill.

Cutting and Drilling Glass

By L. CLYDE CORNOG

LIKE other processes, there are right and wrong methods of cutting glass, and the right method is usually the easier.

It is not necessary to have a diamond to cut glass; if one knows how to use it, a 10-cent cutter will last the average user a long time. Even the sharp corners on the end of a file can be used to cut glass. The secret of using a cheap cutter is to rub a cloth, moistened with kerosene, across the glass before trying to make the scratch. This takes off all the grease and permits a clean, continuous scratch to be made. Expert cutters often have a rag on one finger with which they make a streak across the glass before scratching. The same results are attained to some extent when the cutter is kept in a bottle of kerosene, although many people think this is done to keep it from rusting. The finer the scratch — and this is why a diamond is so satisfactory — the better the cut will be, but the scratch must be continuous and smooth. The rough edges of a poorly cut piece of glass may be ground smooth on an ordinary grindstone or emery wheel. Of course, the edge of the glass should not be held at right angles across the wheel, because it is apt to be broken this way.

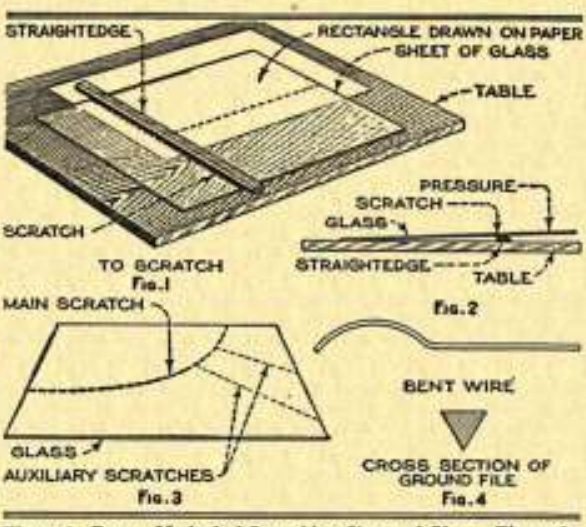


Figure 1: Proper Method of Scratching Sheets of Glass. Figure 2: Breaking the Glass at the Scratch. Figure 3: Cutting Curved Pieces. Figure 4: Bent Wire and File Used in Cutting Bottles and Tubes

If the cut is a good one, the edge may easily be worked with a file, almost as easily as brass, if it is first moistened with a solution of gum camphor in turpentine. This solution should be fresh and is made by dissolving as much camphor as possible in turpentine.

A good method of cutting a rectangle out of a larger sheet of glass is shown in Fig. 1. Draw a rectangle of the required size on a sheet of paper. Put the glass on this and lay a straightedge beside the line so that the scratch will be made directly above it. After the scratch is made turn the glass over and make another scratch directly over it on the other side. Pressure applied, as shown in Fig. 2, will now break off the glass evenly along the scratches. Proceed in the same manner with each edge separately. For large sheets, as, for instance, panes cut from ordinary window glass which is not perfectly flat, it is better to tap the glass with a narrow metal edge just under the scratch. Finally a crack will appear. This can be continued until it extends all the way across the sheet, when it will break easily. Even large sheets of plate glass will break readily when properly supported over an edge. Any straight, sharp edge serves for this purpose.

In cutting out a circle, or a piece having a curved edge, the main scratch is first made. Scratches are made running radially from this to the edge of the sheet, as shown in Fig. 3, and these are then tapped until the whole section not wanted is removed. The remaining piece may be ground smooth as described above. The most essential thing is a clean, fine, continuous scratch.

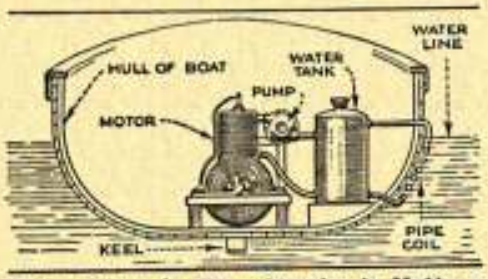
A hole can be drilled through a glass sheet by means of a short length of thin brass tubing, rotated at about 100 r.p.m., and fed with a mixture of fine emery moistened with a solution of camphor in turpentine. The drilling can be accomplished by means of an ordinary drill press, care being taken, of course, not to apply so much pressure that the glass will break, as this is essentially a grinding process.

A bottle or large glass tube may be neatly cut by bending a length of iron wire, about No. 10 or 12, to the curvature of the tube, as shown in Fig. 4, leaving enough

for a handle. Heat the wire until it is red and apply it to the tube. In about a minute the wire is removed and a drop of cold water is placed where it touched the glass. The glass will usually crack off straight along the line where the hot wire touched it. A fine scratch around the bottle, made with an old triangular file, often helps do the work.

Cooling System for Boat

In rivers where the water is heavily charged with sand or other substances that cause trouble with the water pumps and cooling systems of motor boats, the novel



Cooling System for Boats Operating in Muddy or Sandy Waters

cooling system shown in the drawing will be found to be of considerable value.

In this system the water is not taken directly from the river, but a metal tank is kept filled with clean water, which runs through the cylinder jacket and also through a cooling coil attached to the outside of the boat, under the surface of the water. Such a cooling system can readily be installed in any boat that is used in sandy or muddy rivers, where the cooling system of an ordinary marine engine is likely to become clogged and the pump damaged by foreign material in the water.

Coloring Oranges

Citrus fruit may be mature and highly desirable for food while the skin is still green. This is especially true of the Satsuma orange, one of the so-called "kid-glove" variety belonging to the tangerine family as grown in Alabama, where the fruit frequently reaches the palatable stage some weeks before the skin attains its characteristic golden color. If left on the trees the fruit deteriorates, yet, in the mind of the public, a green-colored orange is unfit for food. This condition has led to the perfection of a coloring process based on experiments with lemons in California by the bureau of plant industry of the U. S. dept. of agriculture, a process that gives the fruit the right color without injuring its food value in any way or adding harmful ingredients.

After the fruit is graded it is placed in airtight rooms and subjected to fumes from kerosene stoves or the exhaust gases from a gasoline engine. These gases destroy the green chlorophyll that masks the yellow color of the oranges. Fruit carrying up to 40 per cent of its natural ripe color will ordinarily require about four days in the coloring room to develop its full-ripe color. This process saves the grower from four to six weeks and enables him to get the fruit on the market much earlier than would be possible otherwise. —A. C. Cole, Chicago, Ill.

Nickel-Plate Preserver

An excellent preservative for nickel exposed to the weather, such as the plated parts on automobiles, can be made from ½ oz. of camphor gum, 1 oz. of powdered graphite, and 2 oz. of mutton tallow. The camphor gum is cut to fine shavings and added to the heated mutton tallow, and both are thoroughly mixed. Allow the mixture to cool until lukewarm and then add the graphite. Stir until it assumes the consistency of a thick paste. By using it once or twice a month the nickel parts will never corrode, but will always look bright. —Mrs. A. K. Hinkley, Rowley, Mass.

Adjustable Blocks for Rocking Chair

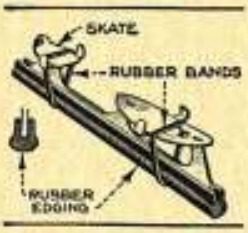
Many rocking chairs can be made much more comfortable by the addition of the simple devices shown in the illustration. Two wooden blocks, about 1 by 1½ in. in dimensions, with the widest part on the bottom, are attached to the rocker, as shown, by means of pieces of inner-tube rubber, so that they can easily be slid back or forth to hold the chair at any angle desired. If it is desired to use the chair as a rocker it is only necessary to slip the blocks over the ends, thus bringing them on top.—J. H. Shadek, Gradell, New Jersey.

First Aid for Wounded Trees

When a considerable portion of the bark around a wounded tree is knocked off the tree is very apt to die. This can usually be prevented, however, by dressing the wound, that is, by cutting down the ragged edges and giving the exposed portion a liberal application of melted paraffin.

An Ideal Skate Guard

The windows and windshields of many cars are fitted with lengths of slotted-rubber edging so that the window will fit snugly in place. This edging, which can be obtained at any auto-wrecking yard, has been found very useful for making guards for the runners on skates, as the runners just squeeze snugly into the slots. Cut off lengths about an inch or two longer than the skate runner and then bind them to the skate by means of a couple of rubber bands on each so that they will not accidentally drop off. With these guards in place the skater can walk from one pond to another, over stones and other obstructions, without danger of injuring the fine-edged blades.



Holding Oven Door Open

It is dangerous to leave the oven door of the range open as one is liable to receive considerable injury by stumbling or bumping against it. Still it is often necessary to allow the heat inside to escape. The illustration shows how this may be done without the above-mentioned danger. A strip of heavy sheet iron, 1½ in. wide and 8 in. long, bent to the shape indicated, is all that is necessary. The bent end is hooked over the top edge of the oven door and the other end placed against the side of the stove, under the edge of the top, as shown. The spring of the oven door will keep it securely in position.—Miss Grace Robey Schoettler, Buda, Ill.

Discouraging Broody Hens

Hens may be completely discouraged from wanting to set by placing them in sacks and hanging these on the clothesline,

A Simple Method of Preventing Hens from Setting, Requiring No Extra Pens

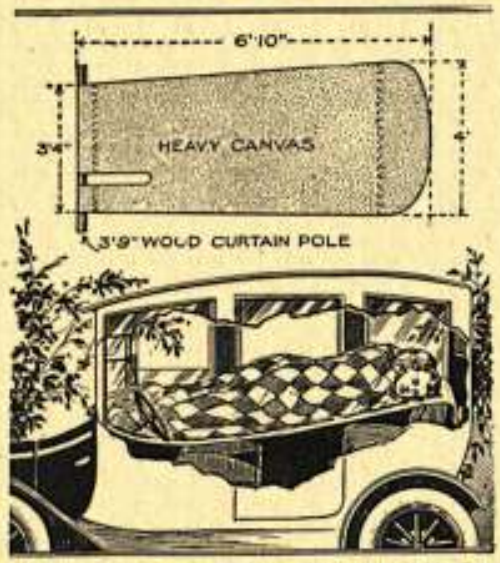
as shown in the drawing. This method usually effects a cure in about three days, and even the most stubborn hens will yield in four days. The sacks should be as thin as possible to allow free circulation of air. Common burlap sacks, loosely woven, are excellent for this purpose. A New Hampshire farmer who used this method instructed his children and the hired help to give the sacks a swing every time they passed under the line to make it still more uncomfortable for the hens.—James F. Hobart, Dunedin, Fla.

Stopping Leak in Cistern

A troublesome cistern leak that allows water from the outside to seep in can be stopped very easily by first making a 6-in. opening through the cistern wall where the leak is located, and then, by means of a small trowel or dipper, manipulated through this opening, digging a small hole in the earth outside to retain all the water that would otherwise leak into the cistern in 15 or 20 minutes. The water is dipped out and the hole in the wall is cemented shut with two hot bricks and mortar. The bricks must be hot so that the mortar will set fast enough to prevent the water from washing it away. This repair is very effective if the leak is not too large.—Nathan R. Baker, Westport, Ind.

Sleeping in Ford Sedan

When traveling or camping it often becomes necessary to sleep in the car, and those who have done this will admit that it is not very comfortable unless special arrangements are made. In the case of a Ford sedan, or similar light car, a comfortable stretcher can easily be installed so that it is ready for use at any time. The



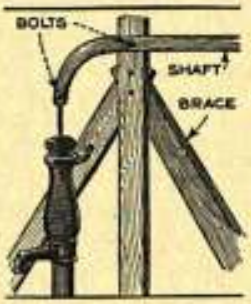
Canvas Stretcher Installed in a Light Sedan Adds Considerably to Travelers' Comfort

back cushion is removed by taking out two wood screws at the bottom of the frame just above the tool box, and lifting upward with two fingers inserted in the finger holes at the center. This movement unhooks the back from the strap located at the center near the top, and allows the cushion to be removed without any difficulty, exposing a large storage space. A heavy strip of wood, which forms part of the body frame, extends across the back behind the cushion about 6 in. below the top. To the underside of this strip is nailed the wide end of a doubled piece of heavy canvas, cut according to the dimensions given in the detail. The double thickness of the material at this point assures ample strength for fastening. At the other end of the canvas a slot is cut to pass over the steering-wheel post, and a 3-in. hem is made to take a length of 1½-in. curtain pole, 3 ft. 9 in. long. All seams are double-stitched with heavy thread.

In making up this bed the folded canvas is taken from its storage place behind the cushion frame and brought forward over the lowered backs of the two front seats to the windshield. The lower portion of the windshield is opened outward and the curtain pole passed through the hem, the ends bearing against the outside of the window frame on each side, as shown in Fig. 2. If proper tension is given, the canvas will not sag enough to touch the front seats and will be sufficiently high at the back so that no pillows are needed. During the day the canvas is folded and stored behind the back cushion, and the curtain pole placed under the rear seat.

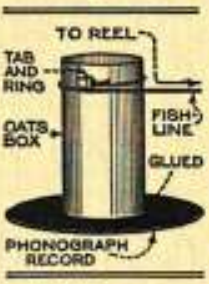
Pump Handle Made from Buggy Shaft

A pump from which the handle, rocker arm, and handle fulcrum had been broken accidentally, was repaired by means of an improvised pump handle consisting of an old buggy shaft cut off about 5 ft. from the bent end. Two holes were drilled through at the points indicated so that the shaft could be bolted to the plunger rod of the pump and to a fulcrum, which was made by inserting a post into the ground just behind the pump. This post was solidly braced and a hole drilled through it about a foot above the pump collar; the shaft was then bolted on loosely.



Drying Fishing Lines

Wet fishing lines rot rapidly; it is therefore not advisable to keep them on the reel, but they should be wound on a drier of some kind, and a simple homemade one is shown in the illustration. It consists of a cylindrical paper box such as a large oatmeal box, glued onto an old phonograph record as indicated. A tab with a ring in it is glued to the box at one end to provide a place to fasten the end of the line. Place the record on the phonograph and start the motor; this enables the line to be wound from the reel to the box in a very short time without any trouble.—W. T. DeWolfe, Toledo, Ohio.



A Seesaw Merry-Go-Round

By HARRY D. TIEMANN

A LOT of fun can be had with the teeter-totter merry-go-round shown in the illustration, and any boy can make it who is at all handy with carpentry tools. If built substantially it will amuse the youngsters, big and little, for years. It will go up and down like a seesaw and spin around like a top until the passengers are dizzy.

All that is needed is an old pair of roller skates, a piece of 1-in. pipe, 18 in. long, a good ash plank about 1½ in. thick, 12 in. wide, and as long as possible to get it, and a solid post or tree trunk, about 1 ft. in diameter and 3½ ft. high. If ash cannot be obtained, a plank of birch, maple, or oak will do very well.

A Novel and Effective Amusement Device for the Youngsters Made from Parts Everywhere Available; Insert, Detail of Roller-Skate Mounting

Make sure that the tree trunk is solid and saw one end off very smooth and level. At the lower end spike two cross pieces of wood with screw-spikes, so as to form a base and hold the post in a firm, upright position. It is very important that the post be firm. Dig a hole and set the base 12 to 18 in. below the surface of the ground, filling in around the post and packing the soil down thoroughly. Bore a 1-in. hole vertically in the center in the top of the post 6 in. deep. Have the pipe threaded for about 6 in. at one end, and screw the pipe tightly into the hole in the post with a pipe wrench. So much for the post. Bore a 1¼ or 1½-in. hole through the middle of the plank; if no expansion bit is available a series of little holes can be drilled in a circle and the wood cut out with a knife or a chisel. Now take the two front ends of the roller skates (extension skates are the best), hammer the clamps out flat and attach these to the plank on opposite sides of the hole. They should be screwed on, preferably by drilling suitable screwholes through the iron skate tops. The arrangement of the two roller-skate ends is clearly shown in the photograph. The distance between the two outer rollers must not exceed the diameter of the post or the circular bedplate upon which they are to run. If a large wagon-wheel hub can be obtained and sawed in two this will make an excellent bedplate or runway if placed on top of the post, upon which the rollers will run. This is what was done in the picture, but it is not essential if a good solid hardwood tree trunk is used. The half hub must be firmly screwed to the top of the post by screw bolts sunk below the top surface.

If this apparatus is carefully made it is astonishing what a lot of rough usage it will stand and how smoothly it will operate. Care should be taken, of course, in

attaching the roller skates, to be sure that the four wheels are in a single line which passes through the center of the pipe.

The plank with the rollers can easily be lifted from the post and taken indoors for protection.

Camp-Chair Kinks

The three chairs shown in the drawing were so popular in a summer camp, where comfort came before style, as to make the

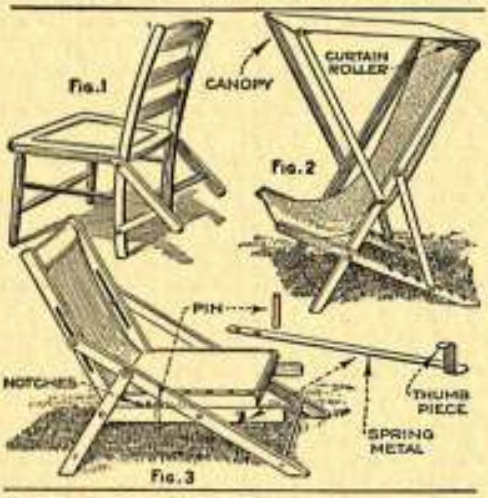


Fig. 1: Extra Legs Permit Leaning Back; Fig. 2: Chair with a Canopy; Fig. 3: Chair with a Sliding Seat

construction of several more necessary for the season.

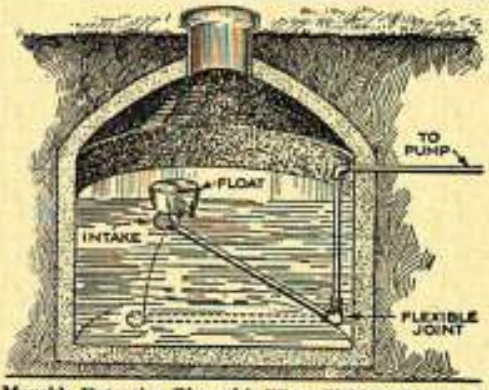
Fig. 1 shows one that was used by those persons who always like to tilt a chair backwards, but also want assurance that it will not go over with them. To attain this, two strong additional legs, attached to the regular rear legs, as shown, were all that was necessary.

Fig. 2 shows a chair provided with a canopy for shade seekers. If the vertical pieces of the back do not extend far enough, metal extension strips are added so that an ordinary curtain roller can be attached. On this is rolled any material that is suitable for a shade, such as canvas, one end being tacked to the roller and the other end hemmed so that it can be slipped on a rod, which is fastened to a wooden strip on each side, as shown. The shade thus made can be pulled out as far as desired and is very convenient as well as neat looking when rolled.

An easy chair with a seat that may be slid back and forth to suit the most comfort-seeking patron, is shown in Fig. 3. Two horizontal rails are nailed to the inside of the legs of an ordinary deck chair. Near the center, the rails are drilled through, vertically, and wood or metal pins fitted loosely in the holes. Wooden strips are attached to the seat on either side; these slide on the rails, and are notched to receive the tops of the pins. A spring-steel lever, formed as shown, is screwed to the underside of each rail, and normally keeps the pins engaged with notches in the seat strips. To move the seat back or forth, the levers are depressed, the pins drop, and the seat is moved. Releasing the levers forces the pins into new notches.

Clear Water from the Cistern

No matter how carefully the water pipes are screened there is always a certain amount of dirt and sediment that gets into the cistern. This soon settles at the bottom, leaving the upper part of the water comparatively clear, but the clear water is not obtained at the pump because the intake pipe usually extends to within a few inches of the bottom and consequently the dirtiest water is pumped up first. An excellent method of obtaining clear water from the surface is to install a movable pipe attached to a float, as shown in the drawing. At the lower end of the present suction pipe screw on two elbows to form a flexible joint. This can be done by using one street elbow and one ordinary one.



Movable Extension Pipe with Filter, Held by Means of a Float, Insures Clear Water at Pump

From this flexible joint extend a length of pipe slightly beyond the center of the cistern so that it will be long enough to reach the surface of the water, the joint being loose enough to allow the extension pipe to be raised or lowered easily.

It is not necessary that the flexible joint be airtight, since it is always below the surface of the water and leakage will not in-

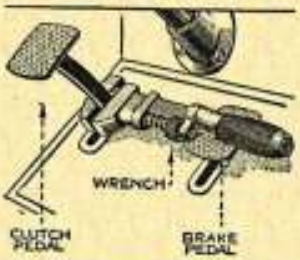
terfere in any way with the suction of the pump. The intake end of the extension pipe is fitted with a filter and is attached to a float. An old copper kettle with the lid soldered on and the spout closed so that it is airtight is well adapted for this purpose. The handle of the kettle is securely wired to the end of the extension pipe, as shown, so that the latter will remain within a few inches of the surface of the water, whatever the depth may be.—Harry D. Tiemann, Madison, Wis.

Cleaning Typewriters

Typewriters are usually cleaned by means of long, thin brushes, with which one can get at the dirty parts only with considerable difficulty, due to the intricacy of the mechanism. It has been found that the dust and dirt can be removed very effectively by means of a vacuum cleaner, when one is available. The hose and one of the blower nozzles are attached and it then takes only a few moments to clean the entire typewriter. With this method the work can also be done much better than with a brush, as the air is forced into the small spaces that cannot be reached with the brush, and there is no danger whatever of doing any damage to the typewriter.—M. B. Brooks, Chicago, Ill.

Wrench Holds Car Pedals

Various devices are used for holding the pedals of the car depressed while equalizing the brake bands or making clutch adjustments. An excellent method of holding the pedal down effectively is shown in the illustration. Any common monkey wrench attached to the shank of one pedal so that the handle extends over the other pedal, as indicated, can be used to do the work. The upward pressure on the handle causes the jaws to grip the shank of the other pedal firmly and prevent the pedal that is depressed from rising.—G. A. Luers, Washington, D. C.



¶A can of lye dissolved in a bucket of boiling water will clear drain pipes of grease and other organic matter.

An Improved Squirrel House

Most children enjoy having pets such as rabbits and squirrels. A house that will accommodate several squirrels, and will permit them to climb a tree without danger

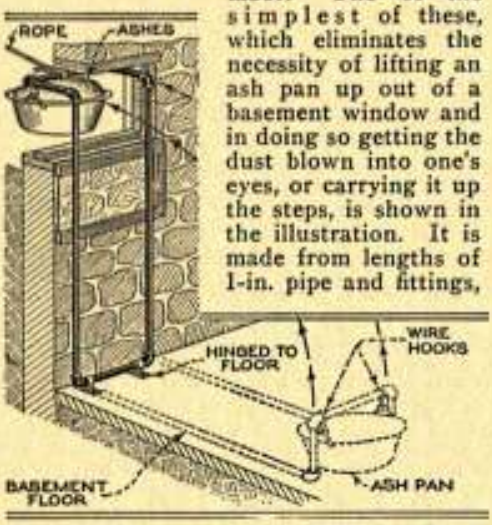
A Novel Squirrel House that Gives the Little Animals Plenty of Room

of escape, has been found to be a great improvement upon the small wooden houses generally used.

The main house should be about 2½ ft. square, with a roof slanting down from the front, and supported on posts 3 ft. high. The front side should face the south; it should be as open as possible, and covered with 1-in. poultry mesh. The house should be located close to a tree, so that a runway, 8 to 10 in. square, can be built from the house to a feeding platform, built around the tree as shown. The runway is built of 1-in. lumber and poultry mesh. The floor of the feeding platform is about 8 or 10 in. wide, made of pine boards and supported by wooden brackets nailed to the tree; a heavy wire frame, covered with 1-in. poultry mesh is used to inclose it. From the feeding platform another runway, also made of poultry mesh, leads up along the tree trunk and over one of the limbs to a small wooden house on the end of the limb.—George L. Furse, Webster Groves, Mo.

Removing the Furnace Ashes

Carrying ashes from the furnace cellar is a task that is usually disliked and many contrivances are designed to lighten this labor. One of the simplest of these, which eliminates the necessity of lifting an ash pan up out of a basement window and in doing so getting the dust blown into one's eyes, or carrying it up the steps, is shown in the illustration. It is made from lengths of 1-in. pipe and fittings,



Convenient Pipe Frame for Hoisting Ash Pans Out of Basement Windows

so that it will reach from the basement floor to the top of the window. One end is securely hinged to the floor and two wire hooks provided on the other end. A length of rope is attached, as indicated, so that the frame can be pulled up to the vertical position by a helper outside.

Repairing Violin Bow

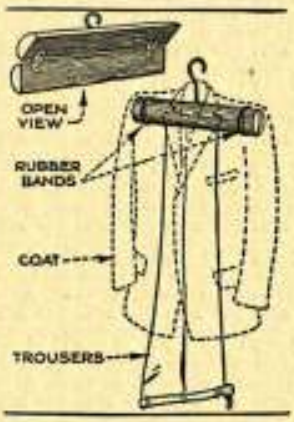
If violin bows are broken at the tip, as shown in the photograph, the job of repairing them is usually given up as impossible, but it has been found that if properly glued, wired, and braced, such bows can be made serviceable for a long time. Glue and wire alone will not hold the broken pieces together, as the tip is placed under considerable tension when the hairs are pulled tight by the thumbscrew at the frog. A small headless wire nail, sharpened to a point at each end, must therefore be set in two shallow notches or holes cut at the points indicated to act as a prop, in addition to the wire; the nail should just fit snugly when the hairs are loose. The bow shown in the photo was drilled in two places at the tip for double wiring, but one wire was found strong enough to hold it.—Leslie H. Phinney, Springfield, Mass.

Destroying Man-Scent Near Traps

Due to the keen sense of smell possessed by most fur-bearing animals, one of the greatest problems of the trapper is to destroy his own scent after having set his traps. There are numerous methods of accomplishing this, but perhaps none is so simple and effective as the following: Several newspapers are spread out over the ground, and the trapper steps on them until he reaches the spot where he is to set the trap. As he walks away on the papers he sets fire to them one by one. The papers burn up, the ashes are blown away by the wind, and all scent of the trapper is lost. There is practically no danger of fire when using this method, as the fur-trapping season is during the winter when the ground is covered with snow, or is wet with rain, but every precaution should be taken to see that no trace of fire remains before the trapper leaves the spot.

Keeping Trousers Pressed

The manner in which trousers are usually folded causes deep wrinkles if they are permitted to remain in this condition for any length of time. By rolling the trousers on a cylindrical wooden clamp, this trouble will be entirely eliminated and the press will even be improved. The clamp consists of a length of round wood about 15 in. long and 3 in. in diameter. It is cut in half lengthwise, and fastened together with two small brass hinges screwed on securely. The cuffs of the trousers are placed between the pieces and rubber bands used to keep the pieces together tightly. The trousers can then be rolled around it. If desired, a clamp of this kind can also be used as a hanger for both trousers and coat, an ordinary screw hook being provided to hang it up, as shown in the drawing.—H. A. Sears, Winfield, Kan.



¶Cream for butter making should contain about 30 per cent butter fat.

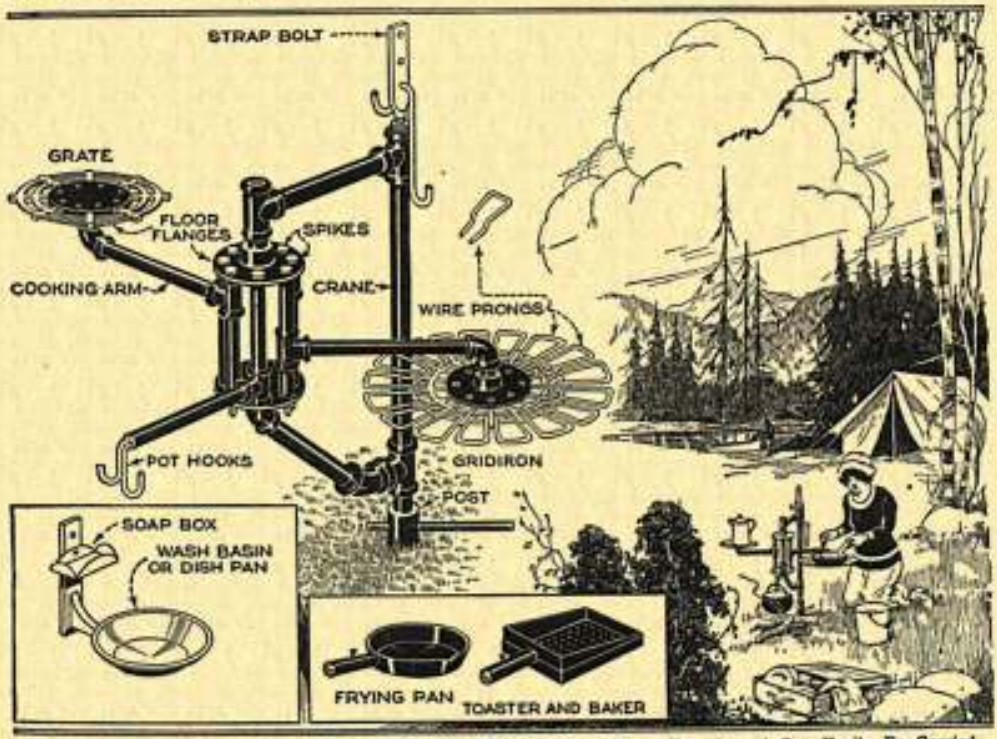
A Convenient Campfire Hob

By ROLAND B. CUTLER

CRUDE methods of holding pots and kettles over the campfire usually cause more or less inconvenience in preparing food, but such trouble can be avoided by providing a campfire hob of the kind shown in the illustration.

The hob is made of pipe and fittings and can easily be carried along in the automobile, as it is small and weighs only about 7 lb. It consists of a post which is driven into the ground almost its entire length and a revolving crane fitted with cooking arms to hold such units as grid, grate and pot hooks. The post is a 24-in. length of ¾-in. pipe having a hole drilled through it about 3 in. from the upper end so that a heavy spike can be pushed through to serve as a rest for the crane, which is set into the end, and also as a handle to pull the post out of the ground when breaking camp. The crane is made of lengths of ¾-in. pipe and fittings; it consists of one 13-in. length of pipe having tees screwed on both ends and shorter extending lengths to support a revolving hob to which the cooking arms are attached. A 4-in. nipple is screwed into the bottom tee on the crane to fit into the top of the post.

The hob is mounted between the two arms as shown. It consists of two large floor flanges with holes drilled near the edges to accommodate large spikes, which



Handy Campfire Hob, Made of Pipe and Fittings, Weighs About Seven Pounds and Can Easily Be Carried in the Auto; the Lower Details Suggest a Few Handy Cooking Utensils

are slipped through ¼-in. pipe nipples of various lengths. These fit loosely between the flanges and are fitted with tees that hold cooking arms extending at right angles. To one of the cooking arms is attached a grate, which is simply an ordinary gas-stove grate or similar contrivance bolted to a floor flange. A gridiron is attached to another cooking arm; it consists of another gas-stove grate, also attached to a flange and fitted with a number of wire prongs, bent to the shape shown. The pot hooks are made of No. 10 galvanized-iron wire, pushed into the end of an arm. A strap bolt fitted with a wire hanger is provided on top of the crane for the purpose of hanging up cooking utensils, wash basin and the like. Both grate and gridiron elbows are fastened to the arms with pins so that they can be used either side up.

Although every camper has his own idea as to which cooking utensils are handiest, the lower details in the drawing suggest some useful ones. A dustpan from which the paint and varnish have been burned and with the bottom perforated, makes an excellent toaster and baker. It is fitted with an extra perforated bottom of sheet metal, bent over and riveted to the sides. A common frying pan is also used, with an extension made from a piece of sheet metal riveted to the handle. The arm tees for these units must be pinned so that they cannot turn over accidentally. The detail at the left shows a wash basin mounted on a bracket that can be hung on the strap bolt.

Fitting Camera Lens

Portrait and copying lenses can be attached to small cameras for which they were not intended by means of a clip made of lengths of wire, bent to the shape shown in the drawing. The wire used for this purpose is cotton-covered wire intended for artificial flower work, three lengths being twisted together. A little experimenting will show the correct length for the hooks. Place the clip in position and the portrait lens about ¼ in. above the center of the camera lens. Then draw the lens down to center and the clip will hold it in position firmly. If there is no space behind the lens mount for the center part of the clip, two separate hooks may be employed.

Stopping Leaks in Incubators

Most incubators from the 100-egg size to the large ones that hold several thousand eggs are heated by means of hot water, circulating in copper or iron pipes. These pipes often begin to leak after a few years of use and this causes much trouble, as it keeps the interior too moist for good hatching results, and also involves considerable labor and trouble in repairing the leaks, resoldering the joints, tightening them up, or replacing sections of piping. A simple and effective method of stopping such leaks temporarily is to use automobile radiator cement, added to the water after the latter has been thoroughly heated. This compound will in no away affect the piping or give off injurious fumes.

The cement should be left in the hot-water system during the entire hatching season, then, when the season is over, a permanent repair can be made. However, if desired, cement can be left in the piping for several years without doing any harm; the writer left the original solution in a small incubator, which leaked badly before the cement was added, for four years, and not one leak has appeared since.—J. H. Ferris, Elberta, Mich.

Serviceable Dandelion Hook

Occasionally the breaking off of a lobe of a hoe renders it unfit for further use and it is then usually thrown away. However, a serviceable tool for the purpose of removing dandelions can easily be made from it. The shank of the broken hoe is straightened in line with the handle, and the blade is cut and filed to the shape shown, a V-shaped notch being cut in the end and filed to a sharp cutting edge. One of the points is cut to form a pulling hook, the throat of which is, of course, dull. A tool of this kind is very handy, as it can be used to cut the dandelions at their stems or pull them out entirely.

Replacing Auto Spindle Bolts

When replacing automobile steering-spindle bolts, it is sometimes difficult to keep the openings in the axle jaws and the one in the spindle lined up. This difficulty can often be remedied by placing the lower end of the spindle in the right position between the axle jaws and turning up another spindle bolt from below far enough to hold the spindle in position. Then bring the upper end of the spindle in place and push down the new spindle bolt from above until it meets the lower bolt. The lower bolt is turned out a half turn at a time, tapping the upper bolt gently each time this is done, until it starts in the threads of the lower jaw.

Improvised Lard or Fruit Press

An efficient lard or fruit press can be improvised in a short time from two lengths of 1-in. oak, 4 ft. long and 7 in. wide at one end and tapered down to form handles at the other. A number of grooves are sawed across the wide ends as shown, about ⅜ in. apart, and two ½-in. holes are drilled at these ends for bolts to make a loose, adjustable hinge. A cheesecloth sack of fruit or lard is inserted between the grooved ends and after the handles are squeezed together tightly, a loop of wire is placed over the ends to hold them. The lard or fruit juice is pressed out and runs in the grooves, dripping off into a receptacle below.—J. T. Garver, Huntingdon, Tenn.

A Novel Wood Yard

In order to avoid the unkempt appearance that firewood thrown carelessly into a pile always presents the wood "yard" illustrated herewith was devised. In effect this yard is a good deal like a small corral, a familiar sight on every western ranch. Built of peeled logs of fairly uniform diameter, the construction is similar to that of a log cabin with the "chinking" omitted. The ends of each log rest in a shallow notch in the bearing ends of the logs underneath. The uprights for the gate are held in place with lag screws, driven into the logs next to them. As a further means of strengthening the gate posts they are mortised into the bottom log, on which they stand. The cross arm on top, consisting of a split log with its flat side resting on top of the posts and held in place by lag screws, adds somewhat to the strength and not a little to the appearance of the yard.

Presenting a Neat Appearance, This "Yard" Keeps Firewood Stored in a Convenient Manner

Such a wood yard will do not a little toward tidying up the picnic grounds or camp sites where firewood is a necessary factor in the activities of the place, nor would it be out of place on many a well-regulated farm. Where timber grows in any quantity at all the material out of which to make it is always at hand.—C. L. Meller, Fargo, N. D.

Milk-Bottle Cover

A common cup or tumbler is often used as a cap on a milk bottle to keep the dirt out. This practice, although convenient, is not very economical, as the cups and tumblers are often broken. It is much better to make a lid from a small tin baking-powder can as shown in the illustration. The can is cut down so that only about 1½ in. of the side remains and four V-shaped slots are cut into the side to permit it to be bent inward as shown. A cap made in this way will fit closely over the mouth of any milk bottle, and can easily be removed.

Portable Garret Step

In bungalows where limited space does not permit built-in garret steps, a "folding" stepladder of the kind shown in the drawing has been found very convenient. It is made of 1 by 5-in. lumber, the risers being

Portable Stepladder for Use in Bungalows Where Limited Space Prohibits Permanent Stairs

set between the sides at such an angle that they are perfectly horizontal when the ladder is pulled away from the wall. Two large screweyes fastened to the top of the ladder are used to hold it on the two vertical guide rods, which are permanently attached to the wall; this arrangement allows the ladder to be raised and lowered to the positions indicated. A couple of casters provided on the feet of the ladder facilitate the work of pulling it out from the wall and pushing it back again.

Re-Using Envelopes

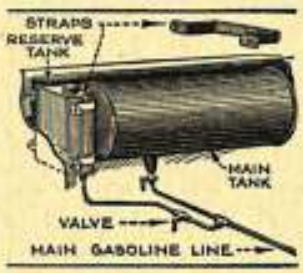
Ordinary envelopes can be used a second time by turning them inside out. To do this the adhesive that holds the flaps together must first be softened, after which they can be turned over and stuck together again. A good method of loosening the flaps is to first moisten a towel, wringing it out until rather dry, and spreading it out between a folded newspaper. The letter is then put on the towel so that the back of the envelope is in contact with it, the newspaper folded over all, and a moderately heavy weight put on to keep it flat. After half an hour or so the flaps can readily be loosened with the aid of a knife. The same gum can be used to stick the flaps together on the opposite side and it only remains to gum the top flap after inserting the new letter. This method may seem "penny-pinching," but in this country anything that effects economy in the office or household is well worth while, and the kink is a good one to know for an emergency.—John L. Allen, Cortazar, Mex.

Making Fishhooks Easily Detachable

When one desires to remove a fishhook quickly from a line in order to substitute one of another style it often occurs that the knot is too stiff to untie. An excellent and simple attachment that allows hooks to be removed and replaced easily is a common dress hook of large size, preferably one with a "hump," which locks the eye in place. The fish line is run through the eyes and tied, and the hook is slipped on as shown in the illustration. Dipping the hooks in black enamel or paint before using will render them less liable to be seen by the fish.—L. B. Robbins, Harwich, Mass.

Reserve Gasoline Tank

A gallon gasoline can, kept in reserve, is a time and trouble-saver for the stranded motorist. The usual practice is to carry a separate can, but this has the disadvantage of being hard to stow without spilling the contents. It is much better to have the can connected to the main line with a T or Y fitting, and provided with a valve so that the contents can be supplied to the carburetor by merely turning the cock. A good place to store the reserve tank is under the front seat, brackets being used to hold the tank securely in position. The connection should be made as close to the carburetor as possible, so that if the main feed pipe becomes clogged, the auxiliary pipe can still be used.—G. A. Luers, Washington, D. C.



Removing Stuck Bullets

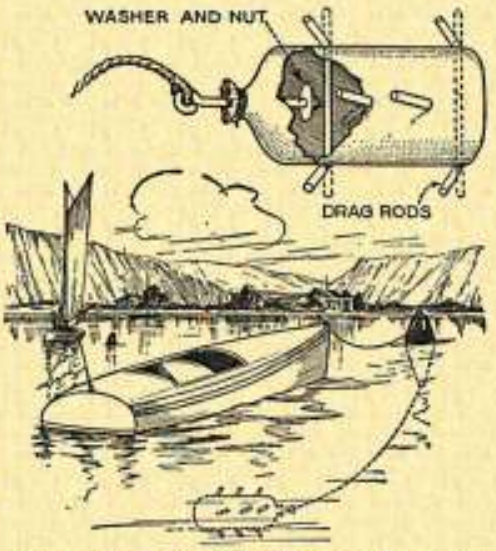
A lead bullet stuck in a rifle barrel can be easily removed in the following way: Get a piece of wire of the kind and size used for barrel hoops and long enough to reach the bullet from the chamber end of the barrel. Flatten one end of the wire by hammering it out cold, forming it to a blunt point like a flat drill, and file the edges sharp, rounding off the corners to fit the bore. If a breast drill is handy the wire is tightened in the chuck and the bullet drilled out. If a carpenter's brace is used it is necessary first to flatten the end of the wire to fit the chuck snugly. As lead is very soft it is a matter of only a few moments to drill out the bullet. The rifle should be thoroughly cleaned and oiled before firing a loaded cartridge.—Clifford Cornwall, Toronto, Can.

A Simple Drawer Stop

It often occurs when one is in haste, that a drawer is pulled out so far that it falls out entirely. This can easily be prevented by means of the drawer stop shown in the drawing. It consists of a small block of hardwood, screwed to the side of the drawer and against the back as shown, the screw being driven through the corner of the block as indicated so that it can be turned down when it is desired to remove the drawer. The block should be raised just high enough to strike against the front crosspiece above the drawer, and the screw should be tightened enough to prevent the block from falling down accidentally.—L. Schneider, Clinton, Mo.

Nondragging Anchor for Small Boats

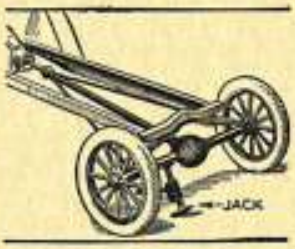
Prices for anchors used to hold small mooring buoys seemed so exorbitant that I decided to make an anchor myself, and did so at a fraction of the cost of a purchased one. I got several 2-ft. lengths of ½-in. iron rod from a neighboring dumping ground, and bent the ends over as shown. Then I forced these rods through a sack of ordinary cement and turned the ends toward the mouth of the sack. Another rod of the same length was threaded at one end, a large washer slipped on, and a nut then screwed on to keep the washer in place, while the other end was bent to form an eye through which the anchor line was slipped and tied. This rod was pushed into the bag of cement with the eye extending outside of the mouth as shown. The cement was saturated with water by means of the garden hose and left to harden overnight. The result was as good an anchor as could be purchased, and it cost only 75 cents—the price of the cement.—J. E. Hoag, Los Angeles, Calif.



Nondragging Anchor for Small Motorboat Made from Sack of Cement and Iron Rods

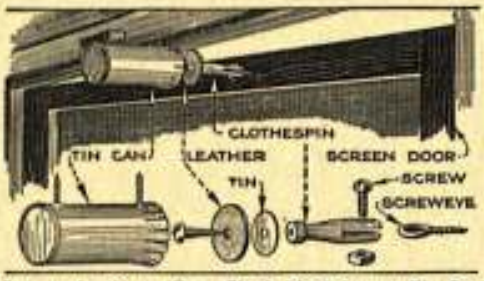
Connecting Ford Rear End

A simple method of connecting the Ford rear end is shown in the illustration. Place the rear end as far forward as it will go. Jack up one wheel with the jack tipped forward as shown. From under the car guide the joint with a screwdriver, and, by turning the wheel to aline the male joint member with the hole, the jack will force it into place. One man can do this alone very easily and quickly.—C. W. Knight, So. Windham, Me.



Simple Screen-Door Check

Considerable annoyance is occasioned by slamming screen doors. To overcome this a simple and inexpensive door check can



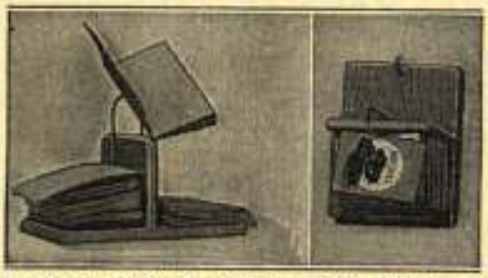
Inexpensive Screen-Door Check Made from a Tin Can and a Clothespin

be made from the materials available everywhere.

The check consists of a tin can with the edges cut and flared out as shown, and attached to the top of the door casing. The remainder of the check consists of a clothespin attached to the top of the screen door by means of a screweye and a stove-bolt, and a heavy leather "piston" or disk, reinforced with a disk of tin, both of which are screwed to the end of the clothespin. Upon closing the door, the piston enters the cylinder and this checks the momentum of the door and prevents it from slamming. It may be found necessary to drill a very small hole in the end of the can, so that the air may escape slowly, and allow the door to close tight.—George M. Beerbower, Tarrytown, N. Y.

Holder for Small Pamphlets

Small leaflets and booklets, such as government bulletins and advertising cook books, can be neatly kept in compact and convenient form by means of the simple

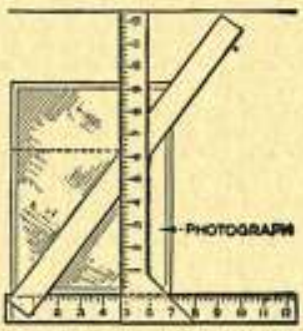


A Handy Holder for Bulletins, Cook Books, and Similar Pamphlets

holder shown in the photograph. It is made of 1 by 9-in. lumber; the base is 12 in. long and the vertical piece which is nailed to the base in the center, as shown, is about 6 in. high. The edges and corners of both are rounded and the whole rubbed smooth with sandpaper. A length of stiff galvanized-iron wire bent to a U-shape is fastened over the vertical piece by forcing the ends into holes drilled into the base. The booklets may then be shifted at will to either side, in the same way as a loose-leaf book. A pamphlet may also be rested, for reading, on the upright, as shown in the left-hand photo. A hole drilled in the base makes it possible to hang the holder and pamphlet up out of the way.—Harold R. Harvey, Buhl, Idaho.

Enlarging and Reducing Photos

The width of enlarged and reduced photos, the height of which is known, and the height, when the width is known, can quickly be found by means of the simple device shown in the illustration. It consists of 3 strips of thin, strong cardboard, two of which are graduated in inches and fractions. The plain strip is laid across the original photograph diagonally from corner to corner as shown, and one of the graduated pieces is then laid parallel to the sides so that it intersects the upper edge of the diagonal strip at a point which is the correct height of the enlarged or reduced photo, as shown by the dotted lines in the drawing. The second graduated piece, or a ruler, which may be used just as well, is laid along the bottom of the photo with the beginning of the scale at the left-hand corner as indicated. The distance from this corner to the point where this scale intersects the perpendicular scale is the width of the desired enlargement or reduction.



A stronger and more elaborate instrument can be made of wood or metal, using a pivot for the plain strip and grooved guides for the graduated ones, but the simple form shown in the illustration and described above is just as convenient. The projection at the foot of the vertical strip aids in getting it exactly perpendicular to the other one.—Harold E. Benson, Boulder, Colo.

Cleaning the Coffee Percolator

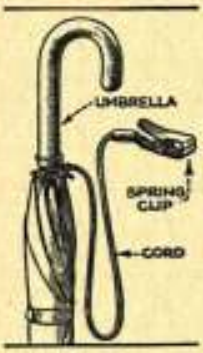
Coffee percolators occasionally become clogged and all efforts to open up the fine holes by scrubbing and washing are usually futile. A good method of doing the work is to hold the percolator in a gas flame for a few minutes and then tap it lightly; this will open all the holes at once. Obviously, this is much better than attempting to prick the holes open with a needle.—H. E. Benedict, Chicago, Ill.

Elastic Mitten on Brush Prevents Sore Hands

Dairymen, creamery workers, and other tradesmen whose duties include the washing and scouring of cans, pails, vats, and tanks often suffer from cramped and bruised hands, due to the constant use of scrub brushes. A Wisconsin dairyman, however, uses a simple protector, which he claims lessens the trouble to a considerable degree. It consists of a section of discarded inner tube, cut and tacked to the back of the scrub brush as shown. The hand fits comfortably within the elastic mitten thus formed, and enables the worker to hold the brush in a working position without straining the muscles of the fingers; the mitten also protects the back of the hand from accidental scratches and bruises caused by contact with the can.

Preventing Loss of Umbrella

It is a common occurrence to lose umbrellas in trains and street cars. A simple method of preventing this loss is to tie a length of stout cord, fitted with a spring clip at the end, to the umbrella handle as shown in the illustration. The clip is attached to the sleeve or coat of the owner so that when leaving the car the weight of the umbrella will remind him of it.—F. W. Erickson, New York City.



An Improvised Ferry

A camping party selected a camp site near the bank of a narrow but deep stream. On the other side of the stream a farmhouse was located and this was the nearest place where the camping party could obtain fresh food supplies such as butter, milk and eggs.

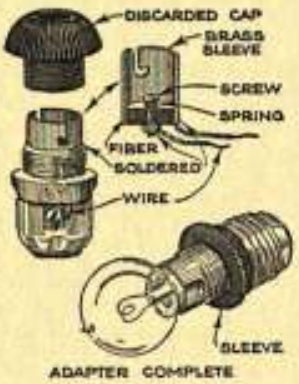
A Novel Method of Using a Rowboat to Ferry Across a Stream

To avoid the necessity of going around to the nearest bridge, and also to avoid the tiresome task of rowing over the stream, which was not pleasant for the women, a simple ferry was improvised in the following way: A small boat was hired and a rudder about three times the usual size was fitted to it. A heavy wire was rigidly stretched between two strong posts on opposite sides of the stream and a sheathed pulley was run on this wire. The boat was attached to the pulley by means of a rope about 30 ft. long, the bow pointing upstream. The boat could then easily be moved from side to side by manipulating the rudder, which, when set to the left, caused the boat to move toward the right and vice versa. Although the velocity of the stream was not very great it only took about three minutes to cross it, a distance of approximately 120 feet.—Dale R. Van Horn, Walton, Neb.

¶Scratches can be removed from furniture by rubbing well with a solution consisting of equal parts of salad oil and vinegar, using a soft rag. After the scratches have disappeared polish can be applied.

Adapter for Bayonet-Socket Lamps

In fitting up a boat, summer camp or garage it is sometimes desired to install standard-sized wire and fittings but to use the low-voltage bulbs. The drawing shows a simple adapter made from an ordinary screw-type attachment plug. The hard-rubber screw cap is removed and discarded; it will then be found that the inner screw sleeve of the plug will just about allow a bayonet-type socket to fit into it. A regular socket may be used or one made up from the right size of thin brass tubing that is slit and drilled out to take the lamp base. A fiber or hard-rubber plug is driven into the lower end of the tube and drilled centrally for a small brass machine screw having a flattened head and a small brass nut. A light spring is placed between the head of the screw and the fiber plug to form a spring contact—a double-contact lamp base would require two such contacts. After soldering two short flexible-wire terminals to the sleeve and bringing them through to connect to the attachment-plug screw-contacts, the sleeve is driven into the attachment-plug sleeve or is soldered in place. The outer swiveling screw sleeve of the attachment plug is then set in place and the adapter is ready.



Extension Handle for Egg-Beater

The writer has long wondered that suffering humanity will put up with the absurd and dinky little handles on egg-beaters. One can just about grasp the average handle and after two or three minutes of beating the hand is tired out holding the beater in position in the bowl. The improved "pistol-grip" handle shown in the drawing was therefore fashioned from stiff metal and tried out, much to the satisfaction of the better half of the household.

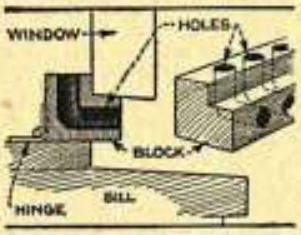
A piece of sheet steel, 6 in. long and 1½ in. wide, was cut to the shape indicated. Three holes were drilled in the small cross arm and the wide section was beaten into a semicircular shape over a piece of pipe. This latter made the handle. Then the top of the beater handle was drilled with three holes to match those in the new handle, the two were riveted together, and the handle was complete. This handle can be grasped firmly, and, owing to its size and position, offers a firm means of holding the beater steady without tiring the hand and arm of the operator.—L. B. Robbins, Harwich, Massachusetts.

Neat Recoil Pad for Trigger Guard

The trigger guard of a "kicking" shotgun quite often bruises the user's middle finger more or less painfully. One sportsman who experienced this trouble remedied it by wiring together side by side four ¼-in. pieces of small rubber tubing, fastening them to the trigger guard as shown in the illustration. This miniature recoil pad was not only efficient but, being practically unnoticeable, detracted in no way from the appearance of the gun.

Easily Made Window Ventilator

Ventilation without annoying draft can be obtained by using a block arranged as shown. This block is permanently hinged on the outside sill and can be instantly pushed over from its position under the window so that the window can be closed. It is made from a length of 2 by 2-in. material, preferably hardwood, cut to fit between the sides of the casing snugly and rabbeted on one edge for the window to fit in tightly. A number of holes are drilled in two adjacent sides at right angles to each other as shown, care being taken that they do not go clear through in one direction. When the block is pulled over toward the inside it will occupy the position shown in the drawing, permitting fresh air to enter the room.—Paul R. Frohring, Cleveland, Ohio

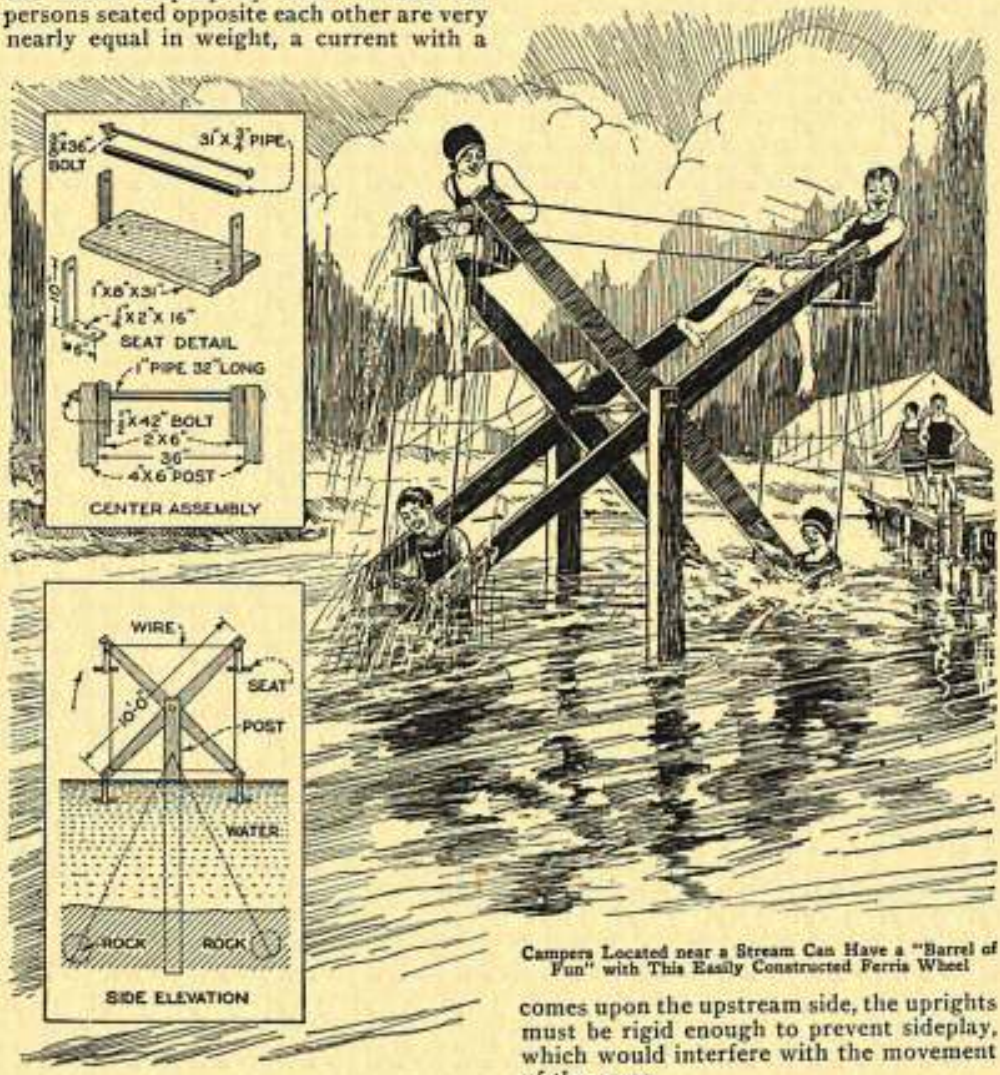


A Water-Driven Ferris Wheel for the Camp

By D. R. VAN HORN

THE chief merit of the amusement device shown in the drawing is the fact that it will give the users alternate sun and water baths as long as they wish and without effort on their part. Because of this wholesome fun and the simplicity of design the wheel is a desirable addition to any summer camp situated on a stream with sufficient current to operate it. If the wheel is properly balanced and the persons seated opposite each other are very nearly equal in weight, a current with a velocity of one mile an hour will turn the wheel. A current of three, four or five miles per hour will keep it going even though there is a difference of 25 or 30 lb. between the riders' weights, but the weights should nevertheless be balanced whenever possible.

Two 4 by 6-in. uprights are set in the stream with an inside clearance of 3 ft. The posts are sunk several feet into the bottom and further braced by one or more guy wires running from each to rocks sunk in the bottom. Though most of the strain comes upon the upstream side, the uprights must be rigid enough to prevent sideplay, which would interfere with the movement of the arms.



Campers Located near a Stream Can Have a "Barrel of Fun" with This Easily Constructed Ferris Wheel

Four 2 by 6-in pieces, each 10 ft. long, are used for the arms. Strips of wood are cut from each edge, beginning at the center, so that the width of the pieces will be

reduced to 4 in. at the ends. These are mounted upon a ½-in. rod, passing through the tops of the upright posts and are held properly spaced by a length of 1-in. pipe, 2 ft. 8 in. long, slipped over the rod. The ends of the rod are threaded, and nuts screwed on to tie the parts.

The outer ends are connected in much the same way by ¾-in. pipe and ⅜-in. bolts. These smaller outer bolts also carry the four seats, which are suspended from them by strap irons, bent as shown in the detail and fastened with screws to the underside of the wide boards. The upper ends are drilled for the rods, and the pipes, which are placed over the rods between the strap-iron supports, not only keep the arms spaced but form good handgrips, as well. The clearance between pipe and seat should be 8 or 9 in. for the greatest comfort. Small holes are bored through the arms as indicated and by means of stiff galvanized wire, the four arms are spaced equally. This bracing withstands any ordinary strain and avoids the need of more complicated bracing at the crossing of the arms. Ordinarily the seats should submerge not more than 20 in., though the greater the depth to which they go, the greater will be the power provided by the current. Assuming that one person takes each seat, the wheel is kept in motion by the push of the water against that person's back which is in the water. As he emerges and begins to ascend, the next person is just entering the water, so that even though the momentum created would carry the wheel over at least one revolution, there is always at least one person in the water and at least one "power impulse" every quarter turn; it will be found that the wheel will turn when empty, by the slight pressure of water against the vacant seats. To prevent excessive wear of the wooden bearings, it is advisable to get four large washers to fit the ½-in. rod, and attach one by means of long wood screws to each side of the arms where they cross at the center. This will also reduce friction. If desired, this plan can be carried out also at the points where the arm-end bolts pass through. If the fit is tight, however, the rods will turn with the wheel and the friction will occur where these rods pass through the strap irons.

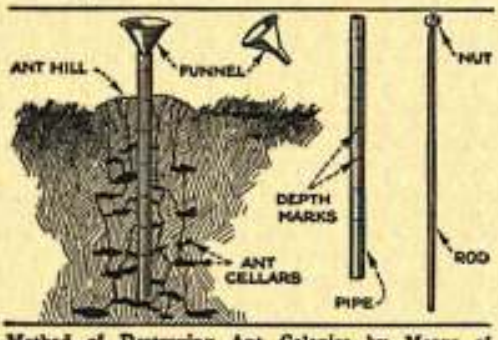
Care should be taken in selecting the wood. A wood that will warp badly when wet, should be avoided absolutely. Straight-grained fir or pine will do very well. To save a little in cost, the posts may be cut on the spot from small straight trees. Plans should be made to remove the wheel when camp is broken and store it away for use again next year.

MATERIAL LIST

2 4" by 6" posts, 15'-0" long
4 2" by 6" pieces, 10'-0" long
4 straight-grained boards, 1" by 8", 2'-7" long
4 pieces flat iron, ¼" by 2", 16" long
4 ¾" pipes, 31" long
1 1" pipe, 32" long
4 ⅜" bolts, 36" long
1 ½" bolt or rod, 42" long
100 ft. No. 9 galv.-iron wire

Destroying Ants

It sometimes happens that the house becomes overrun with ants and some method is necessary to exterminate them. Sprinkling powdered mercury bichloride (poison) around where the ants travel will cause them to leave quickly and stay until every trace of the deadly chemical has disappeared. An alcoholic solution of the bichloride painted on the floor where the ants cross is also very effective.



Method of Destroying Ant Colonies by Means of Formaldehyde

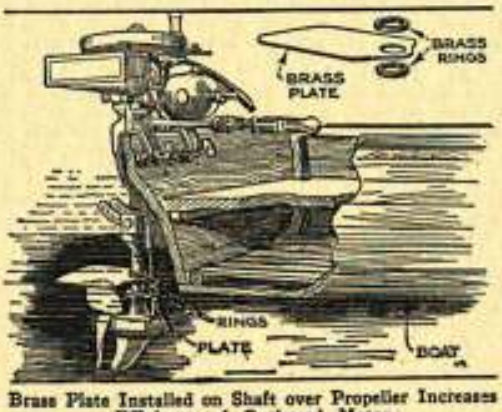
The ants' nest can also be destroyed by means of formaldehyde. Obtain a length of 1-in. pipe 5 or 6 ft. long, and a steel rod to slide easily inside of the pipe. Screw a nut on one end of the rod, place the rod inside the pipe, with the nut on top and drive the pipe down into the ant hill about 16 or 18 in. The pipe should be marked with a file at intervals 8 or 9 in. apart. Withdraw the rod, moving it up and down to dislodge any dirt inside of the pipe, then pour in some formaldehyde and replace the rod, which is worked up and down to force the chemical into the soil, the rod being a few inches longer than the pipe for this purpose. After the liquid has soaked into the ground drive the pipe down to another mark and repeat the operation. Some lively side stepping may be necessary to dodge the ants.

Increasing Efficiency of Outboard Motor

Nearly every user of an outboard motor is aware of the fact that the motor loses power and the boat consequently loses speed owing to the frequent tendency of the water to "cavitate" about the propeller, which is especially noticeable when the boat is bouncing through a heavy sea; when the stern of the boat comes near the surface it often "sucks" air instead of water with the result that the motor races and may be injured.

This trouble can be prevented by the addition of a shield, as shown in the drawing. The shield is a piece of 5/16-in. sheet brass cut to the shape indicated and large enough to project over the propeller. A hole is drilled through one end of the plate so that it can be slid onto the drive shaft. The propeller is removed by loosening the two main boss nuts and giving it a direct pull. A brass ring to serve as a collar is then driven onto the stationary portion of the shaft. This ring should be about ¼ in. wide and can be made by hacksawing off a piece of brass tubing about 5/16 in. in thickness and of slightly larger diameter than the shaft, or better still, of such a diameter that it is a driving fit over the shaft. After the ring is driven down over the shaft the brass plate is set in place and a second ring driven on to hold the plate securely, and the whole assembly is then sweated to the shaft.

The plate's resistance against the water is practically none, for its edge cuts

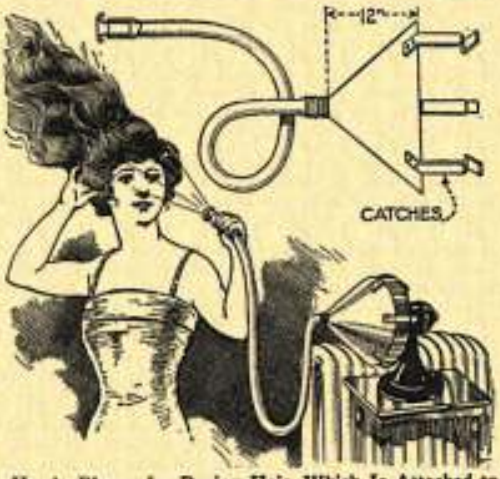


Brass Plate Installed on Shaft over Propeller Increases Efficiency of Outboard Motor

through the water like a knife. Besides eliminating the tendency of the propeller to suck air, it prevents considerable splashing about the stern of the boat, when the boat is running with the wind, and spray is blown into the back of the boat to the discomfort of the occupants.

Hair-Drying Attachment for Fan

Drying the hair with an electric drier is a quick and convenient method, but not every one cares to buy one for such occasional use. Where some other electrical



Handy Blower for Drying Hair, Which Is Attached to Electric Fan and Provides Warm Air

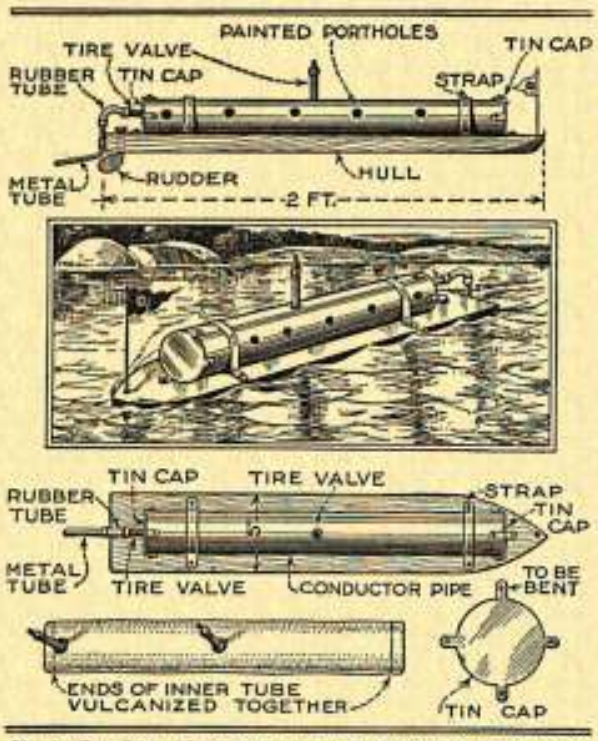
appliances such as a fan is at hand, an attachment can easily be made for it, that will serve the purpose.

The attachment consists essentially of a cone-shaped piece of sheet metal such as brass, to which a rubber tube with a nozzle is attached, as shown. The cone is made by cutting a circular piece about one-third larger in diameter than the fan guard, making a radial cut from the center to the edge, putting the edges thus formed over each other and riveting them together. Three catches made of brass are riveted to the cone so that it can be securely fastened to the guard. The tip of the cone is cut open and flared out so that a brass sleeve, about 1¾ in. in diameter, can be soldered to it. A 6-ft. length of rubber tubing of the same size is attached to this sleeve, and a 4-in. length of brass tubing, with the end rounded as shown, is pushed into the end of the hose to serve as a nozzle. In one case a 1¾-in. motorcycle inner tube was used for the hose, but it may be still handier to use the rubber tubing usually provided with a fully equipped vacuum cleaner. The drier should be placed on or near the top of a radiator so that it delivers hot air.

¶After cleaning all mud from the auto running boards with soap and water, wipe them with kerosene to remove the grease and oil spots. Kerosene is also excellent for cleaning floor boards.

Toy Compressed-Air Boat

Among the many kinds of toy boats that can be built by any boy who is mechanically inclined, is the one shown in the drawing. It is propelled by means of compressed air released under the water at the stern. The hull is a 1-in. board, 2 ft. long and 5 or 6 in. wide. One end is sawed to form a bow and rounded on the underside as shown, while the stern is left square. A hole is drilled for a rudder post in the center and about 1 in. from the stern. The hull is then given one or two applications of paint, the first coat being allowed to dry thoroughly before the second is applied. The power plant is to be installed next. It consists of an 18-in. section of automobile inner tube and an equal length of 3-in. galvanized-iron conductor pipe. The ends of the section of inner tube are vulcanized shut so that it will be airtight. An air valve is provided in the center and also at one end. The former is complete with the inside core, but from the latter the core is removed. A hole is cut in the pipe through which the center valve will project vertically when the air tube is fitted inside. The open ends of the pipe are closed by means of two disks, riveted or soldered on. A hole is cut in one of the disks to allow the end valve to project outside and the conductor pipe is then fastened to the hull by means of two tin straps in such a manner that this valve points toward the stern. A rubber tube connects the valve to a short length of ⅛-in. copper tubing, which is fastened to the stern and bent to project about 1 in. under the water as shown.



Simple Toy Boat Made from a 1-inch Board and Propelled by Means of Compressed Air Released under Water

A small rudder is whittled out of wood and fitted into the rudder hole; it should be tapered so that it will fit snugly. A spring clothespin is used to pinch the rubber tubing shut in order to prevent the escape of air from the air tube when it is inflated. Air is pumped into the tube through the center valve by means of an ordinary bicycle or automobile tire pump, to a pressure of about 10 pounds. As soon as the clothespin is removed the jet of air issuing from the underwater copper tubing propels the boat at a surprising speed.

Ornamental Handles for Auto Doors

A number of the lower-priced automobiles have the inside handles of door catches made in a very rough style. The crude appearance of these handles can be improved considerably by dressing them down on an emery wheel or grindstone so that the dust caps used on automobile-valve stems will fit over them snugly.—L. H. Unglesby, Baton Rouge, La.

Cleaning and Peeling Potatoes

In some parts of the southern states, a novel and interesting method of cleaning and removing potato skins is used. The potatoes are placed in a pail half full of water and a number of rough stones are added. By stirring the potatoes and stones around in the water, the skins soon wear off due to the abrasive action of the stones, and the potatoes are washed clean.

Typewriting Mathematical Symbols

In keeping a notebook with a typewriter it is usually necessary to make such signs as the equality sign, exponent, etc., by hand. However, many symbols can be made with the typewriter; for the equality sign, type a dash in the ordinary manner, then backspace and press the shiftkey very slightly. To make an angle use the underline dash, then backspace and place the oblique line before the dash. Exponents are made by depressing the shiftkey slightly.—Ruth Henderson, Lake Mills, Iowa.

Good Use for Old Carpet Sweeper

When a carpet sweeper no longer sweeps it is usually thrown away. Upon examination, it will be found, however, that quite some bristle is still left on the roller, which may be used a few more years as a push brush of the kind shown in the drawing.

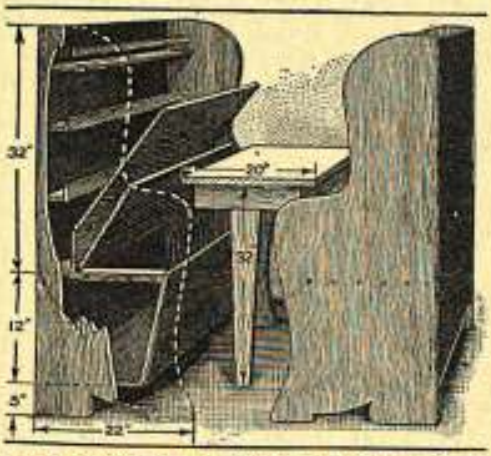
The brush and the wooden handle are removed from the sweeper box and also the metal brace that holds the handle. The shaft of the brush has a bearing hole at each end which usually fits the two pivots on the brace. It may be necessary to bend the brace together a little in order to hold the brush securely. At the ends of the brace are two small holes that were previously used to hold spring wires. Small wire nails are driven through these holes into the wooden part of the brush so that it cannot turn when in use. After one side of the brush has been worn down, the nails are simply removed, the brush turned around and again fastened as before.—Mrs. Caroline Michel, Jersey City, New Jersey.

Muffling the Alarm Clock

It is sometimes desirable to muffle the alarm clock so that it awakens the sleeper without disturbing those in adjacent rooms. A stout rubber band will be found very useful for this purpose. It is snapped around the clock and over the bell as shown, whether the bell is located on top or on the back, and muffles the sound most effectively.

Increasing the Usefulness of the Alcove

A breakfast alcove constructed along the lines shown in the illustration has been found to be a very useful addition to the kitchen, especially where storage space is at a premium. Besides being very attractive, this alcove has special features of usefulness such as the shelves for china or silverware, and capacious boxes under the seats for linen.



Useful Alcove for the Kitchen with Shelves in the Double Back and Capacious Boxes under the Seats

Anyone who is able to handle the few simple tools that are usually found in the home workshop can build this alcove without any trouble. The general dimensions are subject to variation in accordance with the shape and size of the kitchen, as well as the maker's fancy. The entrance should not be less than 10 in. wide to allow one to enter easily. The table can be made to fold against the wall by means of hinges.

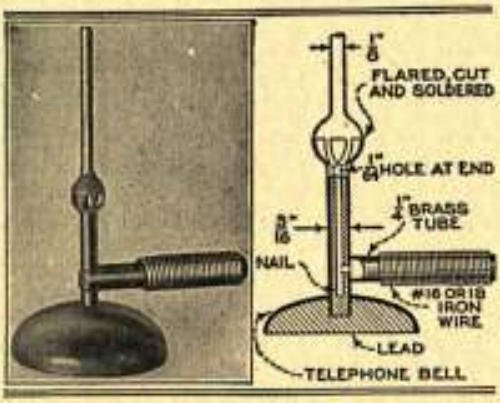
The shelves and back proper, together with the seat and the table, are made of ½-in. wood; the hinged false back is made of good strong wallboard. Small door catches hold the false back in place, and hinges of attractive design should be used for both back and seat.

When completed, the alcove may be enameled if desired, white lead being first used to fill all cracks and nail holes. Two coats of flat white paint are applied, the surface being sandpapered lightly after each coat, then the enamel coats are flowed on.—Ludvig Olson, Gainesville, Fla.

¶A cheap tire cover can be made by slitting an old inner tube on the inside and cutting off a 2½-in. strip all around. The tube is then turned inside out and stretched over the spare tire.

Small Homemade Bunsen Burner

Amateur mechanics and jewelers will find a small bunsen burner of the kind shown in the illustration of considerable



Left, Photo of Homemade Bunsen Burner; Right, Details of Construction

usefulness. It can readily be made in a short time from material always available.

The base consists of an old alarm-clock or telephone bell filled with lead. A short length of ⅜-in. brass tubing has a ¼-in. nipple soldered at right angles to it as shown, and a nail, drilled lengthwise and driven snugly into the tube, is inserted through the screwhole of the bell and into the lead, when the latter is still molten. A good way to fill the bell with lead is to set it on a flat surface and pour the lead in through the screwhole. A length of iron wire is wrapped around the ¼-in. nipple and is sweated on with solder; this provides an excellent grip for the rubber tubing, and prevents it from slipping off. The hole drilled through the nail must be very small and exactly in the center so that a very small jet of gas is passed through the center of the upper part of the burner. A small hole, breaking into the vertical one, is drilled through the side of the tube, in the center of the nipple. The size of the hole in the end of the nail is decreased by tapping on it until it is about ⅛ in. in diameter; if made too small, it may be enlarged by reaming. The upper end of the brass tube is flared out and slots are cut in it as indicated, by means of a small jeweler's saw. A 2-in. length of ⅛-in. brass tubing is also flared out at one end and this end is soldered to the top of the other piece, which completes the burner.

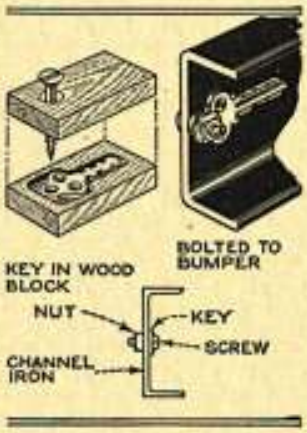
¶To clean a greasy sharpening steel, first soak it in turpentine and then in a solution of strong soda and water.

Sack for Picking Fruit

After using various kinds of sacks for picking fruit, all of which were more or less inconvenient, I found that an ordinary 2-bushel grain sack having a strap at the top and a belt at the bottom so that it could easily be carried, was the most satisfactory. The strap, which can be made from a piece of heavy canvas, doubled over and sewed, is formed into a loop that can be slipped over the head of the worker, and is securely sewed to the top of the sack. Three loops are sewed on near the bottom of the sack for a belt to pass through; the belt should be long enough to encircle both the bag and the waist of the worker, and should have a buckle to make it convenient. With this arrangement both hands are free and a bushel or more of fruit can easily be carried around, and, by releasing the top loop, the fruit can be dumped on the ground at once.—Arthur L. Gillis, Mt. Pleasant, Iowa.

Hiding the Spare Ignition Key

Most autoists have two keys for the ignition lock, one carried on a key ring for constant use and the other kept at home or in the office. But an emergency unprovided against is the loss of one's key ring while far from home, and therefore it is a good idea to have a third key hidden somewhere on the car in a place known only to the owner or operator.

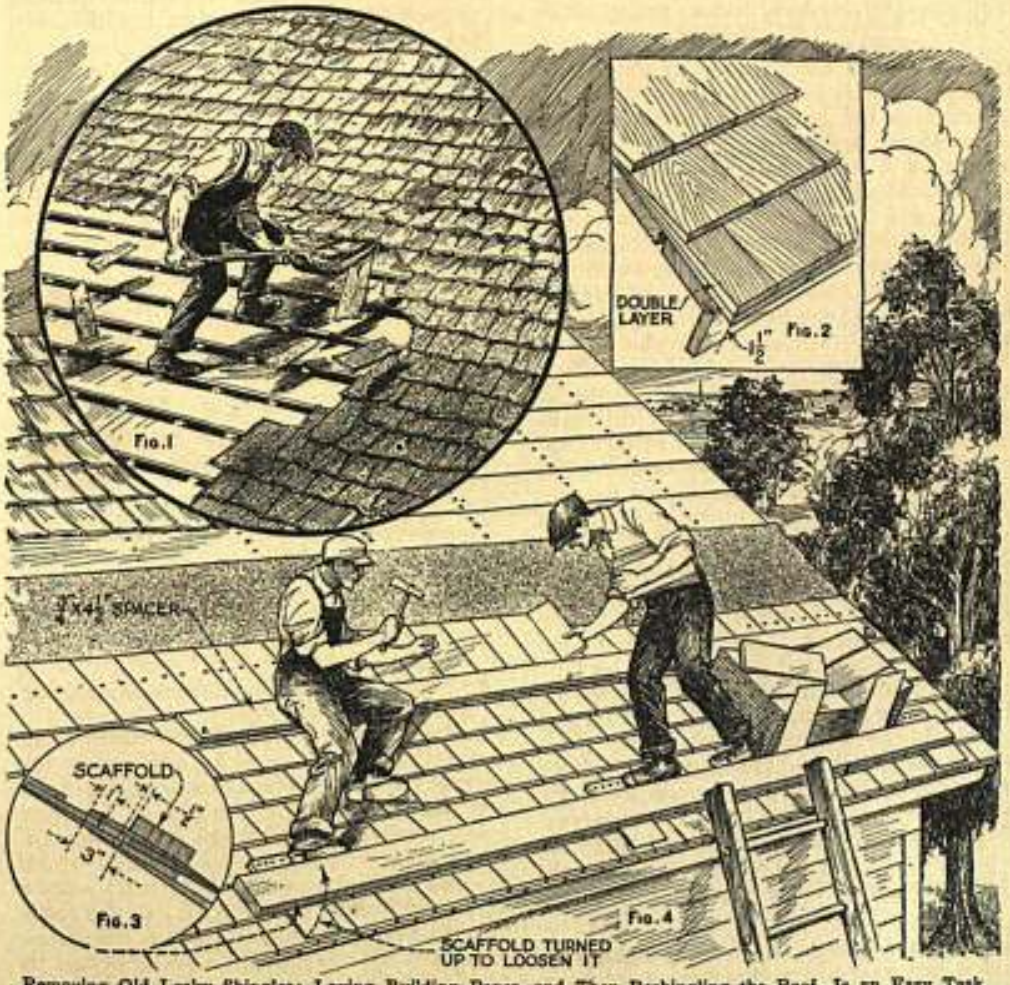


Two methods of keeping this extra key are shown in the drawing. A block of wood, split and hollowed out inside to fit the key, has been used by the writer for several years. The two pieces of the block are held together by means of a single wood screw driven through it as indicated. Being an apparently useless block of wood, no one is likely to take particular notice of it, and it may be safely put in the toolbox without great risk of the key being discovered. The key might also be bolted to the inside of a channel-iron bumper as shown.—J. V. Romig, Allentown, Pa.

Reshingling Your Roof

By E. R. HAAN

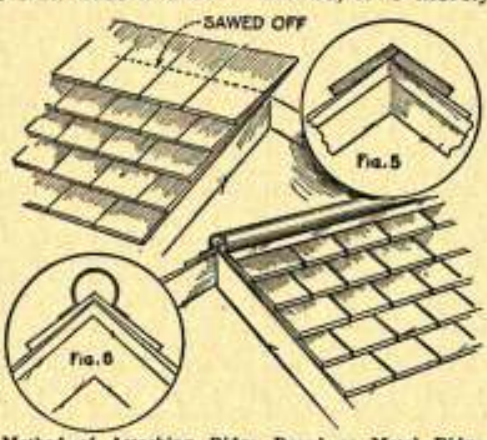
IT seems an easy task to reshingle a roof, and it really is easy if one knows how. By proceeding along the lines given in this article, almost anyone can do as good a job as an expert. The first step is to measure the roof area and then purchase enough shingles and building paper to cover it. The best quality of cedar shingles should always be used. They come in bundles, each containing enough to cover an area of 100 sq. ft. The cost of shingles is from $3.50 to $4.50 per bundle. Building paper comes in rolls, 36 in. wide, each of which will cover 100 sq. ft. The price per roll is about $1.50. Set your ladder against the edge of the roof and re-



Removing Old Leaky Shingles; Laying Building Paper, and Then Reshingling the Roof, Is an Easy Task That Anyone Can Accomplish

move the old shingles with the aid of a shovel, as shown in Fig. 1. Don't rip off the shingles from the entire roof, or you might have the sad experience of seeing an unexpected shower drench the roof and the plaster ceiling in the rooms below, which would mean considerable expense.

Start ripping off the old shingles along the bottom and work upward. Ordinarily it is advisable to remove enough shingles to leave a strip, about 6 ft. wide and extending the length of the roof. Drive all the old rusty nails down and tack a strip of building paper to the roofing boards. Then lay a double thickness of the shingles along the lower edge of the roof, allowing them to project about 1½ in. over the edge, as shown in Fig. 2. You will notice in the drawing that the joints are broken, as in a brick wall, so each shingle covers about half of two shingles underneath, to prevent leakage. A length of ¾-in. board, exactly 4½ in. wide, which is to be used as a spacer, is tacked over the first row of shingles, even with the lower edge, and a new single row of shingles laid over the first double row, observing the precaution of laying them halfway over the ones underneath.



Method of Attaching Ridge Board or Metal Ridge Roll to the Roof after Shingling

Shingle nails are used, and a shingling hatchet will be found convenient and less tiresome to work with than a hammer. Two or three nails are driven into each shingle in line, about halfway between the thick and thin ends. Each time a row is laid and nailed, the spacer is moved up, and the same operation is repeated. As soon as the shingles nearly cover the first strip of paper, remove some more old shingles, drive the old nails down, apply another strip of paper, and proceed as before. After three rows of shingles have been laid, a scaffold is made as follows: Take a suitable length of 2 by 4-in. wood and nail three wide shingles to it, as shown in Figs. 3 and 4. Notice exactly how these are nailed to the scaffold so that they project about 3½ in. from the edge. A second shingle is nailed to the first, with the thick end 4 in. from the thick end of the first. Then the scaffold is nailed to the roof. Four or five shingle nails, all in a row, are driven through the thick end of the upper shingles on the scaffold and into the shingles on the roof. By leaving ½-in. clearance between the edge of the scaffold and the edge of the row of shingles just above it, a couple of shingles can be set up to hold the whole bundle, as indicated. A scaffold of this kind will support considerable weight, and when it is to be loosened and moved, it is merely turned over as indicated by the arrow. When the ridge of the roof is reached, saw off the shingles at the edge and after the other side of the roof has been reshingled, apply a ridge strip, which may be of wood or metal, as shown in Figs. 5 and 6, respectively. The latter can be obtained from any lumber-supply concern. Most old houses have the roof boards spaced 1 or 1½ in. apart, as shown in Fig. 1, which was done mostly for the sake of economy, but newer houses have the roof boards laid close together.

If desired, asphalt shingles can be laid instead of wooden ones. On new houses this can be done without making any changes, proceeding in the same way as with wooden shingles. However, a scaffold of the type described cannot very well be used when applying asphalt shingles as leaks through the nail holes would result, whereas the shingle nails will not go through the wooden shingles entirely, if nailed near the thick end. On old houses having spaces between the roof boards, it is advisable to fill these with strips before applying asphalt shingles. Continuous hip shingles of metal can be used on buildings that have hip roofs.

Fumigating the Incubator

For best results, an incubator should not only be cleaned thoroughly before it is used, but it should also be fumigated. Get a formaldehyde candle from a drug store. Set it in the incubator. Light it and close the door almost tight. The fumes will kill all the germs that may be lodging there and this will better your chances of getting a good hatch. Air the incubator two days before setting eggs.

Ornamental Figureheads for the Canoe

If you want to be the first in your neighborhood to have something really attractive and novel in the boat line, make some figureheads for the canoe. Figureheads, you may know, were always attached to the prows of old ships as a sort of an emblem of good luck. They were carved in beautiful, grained woods, and some that have been preserved in the marine museums are works of art. So, just as a good-luck charm, let's see what can be done to decorate the bow of the canoe.

The illustration suggests four different models that can be used and, of course, your personal likes will suggest many more that can be as easily made. If you have no artistic ability, let an artist friend trace out the shape and suggest the coloring. The figure chosen for your decorative scheme must be one that will lend itself to being shaped to fit the curved end of the canoe. Thus the goose, the moose and the bear fit the purpose admirably.

The selected one can be marked out in pencil on the surface of a smooth piece of soft pine, cedar, cypress or any suitable wood, which is easily sawed and whittled. When the outline and details are drawn in, saw out the portions that can be reached with a keyhole saw. Then cut out all smaller details of the edges with a sharp jackknife until the final outline is finished. After that, go over the edges and both sides with fine sandpaper. Draw in the details again with a soft pencil and give the board a coating of shellac. Prime the board with flat white paint, and when dry, the details can be painted in. As the outlines of the details will show faintly through the priming coat, no redrawing will be found necessary. Use artists' colors if possible and work from a colored print to get the coloring correct. When completed on both sides, set it aside to dry for several days. After the paint has hardened, the surface should be given an application of good spar or automobile varnish. Do not use floor varnish, as this will become white when wet.

Screw a thin strip of oak to the curved part of the back of the figure and let it project 2 or 3 in. at each end. Then, after removing the brass molding from part of the bow, screw the strip in its place. This will support the figurehead in front of and at the top of the bow as illustrated.—L. B. Robbins, Harwich, Massachusetts.

Ornamental Figureheads of a Goose, a Moose, or Any Other Suitable Design, Are Distinctive and Novel, and They Can Readily Be Made by Anyone Having Some Artistic Ability

One-Man Barrel Lifter

One man can easily stand or tip a barrel weighing from 400 to 500 lb. by using the simple lever shown in the drawing. It is merely a pick handle, with steel grips bolted on. Applied as indicated, the handle allows considerable leverage and makes it comparatively easy to manipulate heavy barrels.—Clinton Hinman, Naugatuck, Conn.

Handling Heavy Barrels Is Facilitated by Using This Simple Lifter

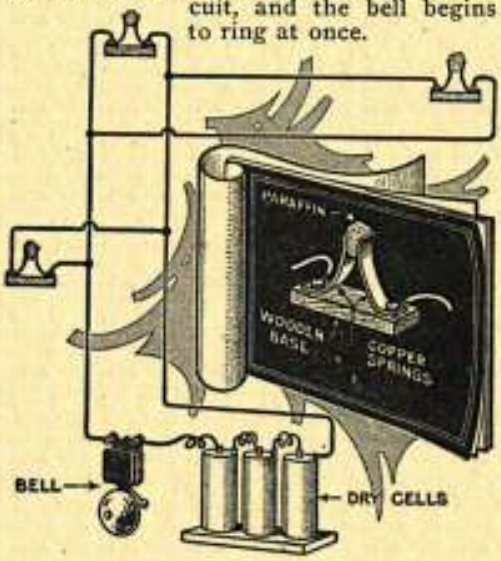
Running In New Motors

New motors, with all bearings and parts fitted tight, are not immune from trouble, as is generally supposed, but must be handled and treated with care. The writer has endeavored to incorporate into a few brief rules, the precautions necessary to observe during the first 1,000 miles of use of the motor.

Add 1 qt. of oil to every 10 gal. of gasoline, continuing this for the first 500 miles of operation. Never exceed a speed of 25 miles per hour or drive in high gear at a speed less than 5 miles per hour. Never open the throttle wide, permitting the engine to race, when the car is standing still, or while shifting the gears. Avoid having the engine running with the spark retarded for any length of time or to idle in this condition. The overheating resulting from this practice, causes bearing wear, stuck valves and rapid carbonization. Rich mixtures are invariably used with new motors, which, combined with the fact that piston rings are seldom lapped into the cylinders, permits considerable seepage and dilution of crankcase oil. The diluted oil fails to lubricate properly with consequent bearing damage. The oil should be changed after the first 150 miles, again after the next 500 miles and also every 500 miles thereafter. The unlapped pistons and cylinder walls are responsible for much metallic dust which contaminates the crankcase oil. By changing the oil at the stated intervals, the clogging of oil distribution pipes and the gritting of gears and bearings will be prevented. Due to the excessive heat in a new motor, attention should be given to the cooling system. The radiator should be refilled daily and should be drained periodically. Outside of the engine there are many new and stiff controls which become dry and will wear quickly if worked in this condition. Keep a filled oilcan handy, giving a few drops occasionally to each control and moving part, which will permit it to work itself into a good bearing seat.—G. A. Luers, Washington, D. C.

Easily Made Fire-Alarm System

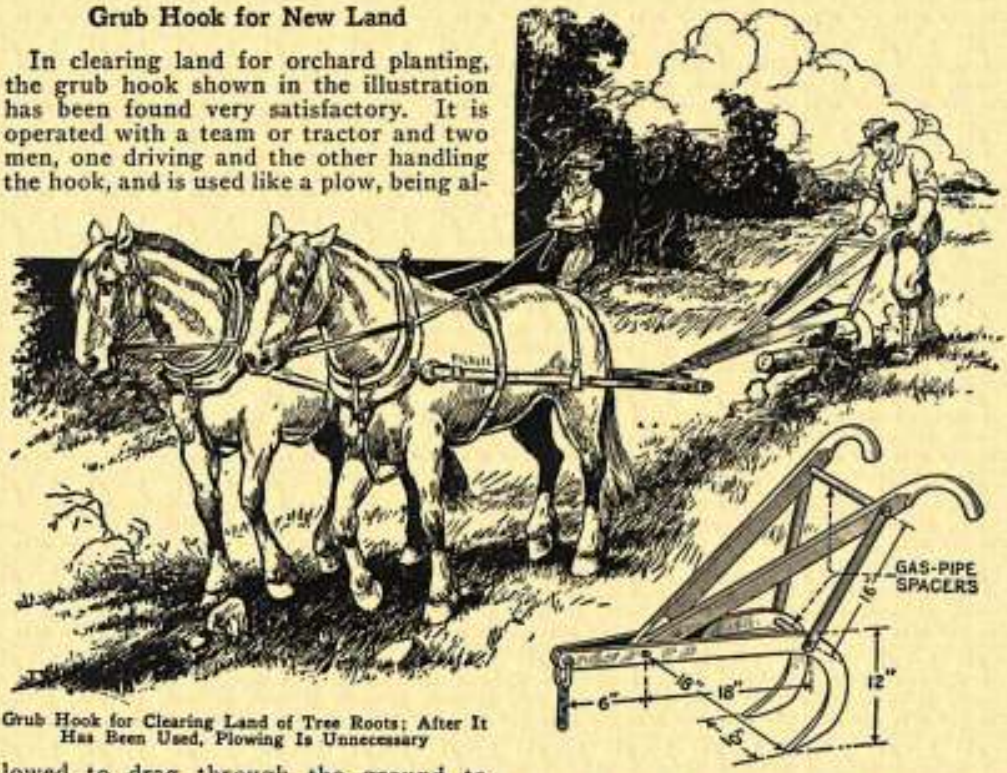
The accompanying diagram shows a simple and useful fire alarm. Two copper or brass springs of the flat type, are mounted on a wooden or other insulating base, and a small block of paraffin is placed between the springs. The springs are placed in different parts of the building and are all connected to a common bell. If a fire occurs, the paraffin quickly melts, the springs make contact, closing the circuit, and the bell begins to ring at once.



Novel Fire Switches Which Close Automatically on Being Subjected to High Temperature

Grub Hook for New Land

In clearing land for orchard planting, the grub hook shown in the illustration has been found very satisfactory. It is operated with a team or tractor and two men, one driving and the other handling the hook, and is used like a plow, being allowed to drag through the ground to catch the roots. A deft turn of the handles frees it from the roots just pulled, without the necessity of stopping. After this tool has been used, the ground will be so well dug up that plowing is unnecessary. The dimensions given in the drawing have been found to be about right. The points should not be spaced farther apart than 10 in.—J. H. Deniston, Bayfield, Wis.



Grub Hook for Clearing Land of Tree Roots; After It Has Been Used, Plowing Is Unnecessary

Soft-Focus Attachment for Enlarging

A soft-focus attachment for the enlarging camera, which gives excellent results for pictorial and portrait work, when the harsh, needle-sharp definition is not wanted, can easily be made from a tin lid of sufficient size to fit snugly over the lens, and a small sheet of brass cloth. The top of the lid is cut out and the brass cloth soldered to it. This makes a diffuser which can be attached or detached at will. Various sizes of mesh can be soldered to as many different lids, and the set will provide diffusers suitable for any work. Very good results can be obtained by exposing the paper only half the necessary time, and then completing the exposure with the diffuser attached. This gives a sufficiently sharp image which at the same time possesses softness. Good, rich blacks are obtained by giving short but sufficient exposure, whereupon the developing is done in restrained developer.—L. C. Ferguson, Ontario, Calif.

Removing Glass Bottle Stoppers

Many devices have been suggested for removing stuck ground-in stoppers from bottles, but for ease in manipulation the wooden handle shown in the drawing is hard to beat. It consists of a strip of wood in which a slot has been cut to fit over the glass handle on the stopper. To loosen a stopper, place the wooden handle over it and try to twist it backward and forward gently. After a few attempts, the stopper will be loosened. Only a gentle effort is required, and if done with care, the glass handle will not be broken.—C. A. Oldroyd, Barrow-in-Furness, Eng.

Chair Sled Accommodating Two Is Latest Departure from Conventional Sled Design

Novel Sled Built like Chair

The novel chair sled shown in the photo is quite a departure from the conventional design and in many ways preferable to the latter. One sits on the seat while footrests on the runners permit another to stand up behind. The weight is well distributed and a handle is provided so that the child standing can hold on securely and also steer the sled. The average boy can easily make one of these from scrap lumber usually found around the house. Strap iron can be used for runners.—W. H. Soames, Minneapolis, Minn.

Effective Method of Trapping Rats

A neighbor of a friend of mine has an effective method of catching rats which might well be tried by anyone who is troubled with these pests. He takes advantage of the fact that rats will go to great pains to get water during a dry season. For a few nights tubs or deep buckets are placed in a barn or basement or in the alley. These are filled with oats or crumbs of bread and enough water is poured in them to come about halfway up the sides. The rats soon learn to dig into the bait for the water. After they have been running to the water a few nights the bait is emptied from the tubs and replaced with water, the tubs being half filled. The surface of the water is covered with screenings of corn or other grain. During the night the rats come as usual, but when leaping over the edge of the vessel they find themselves trapped in the water and soon are drowned. He caught as many as 14 rats in three tubs one night, of which seven were in one tub.—August Jeffers, Bedford, Ind.

Packing Groceries

The proprietor of a self-service grocery store has solved the problem of packing and displaying staple articles, such as dried beans, fruits and similar bulk commodities, in the following way: A screw-top bottle is filled with the article contained in the shelf divisions, and on this bottle a label is pasted, giving the name and price of the goods. During spare time, the clerks weigh out and wrap packages, and the shelves are kept filled, so that the customer need not weigh his own bulk goods or have someone else 'do it. By making the packages of uniform size, the difficulty of dealing with fractional units is eliminated.

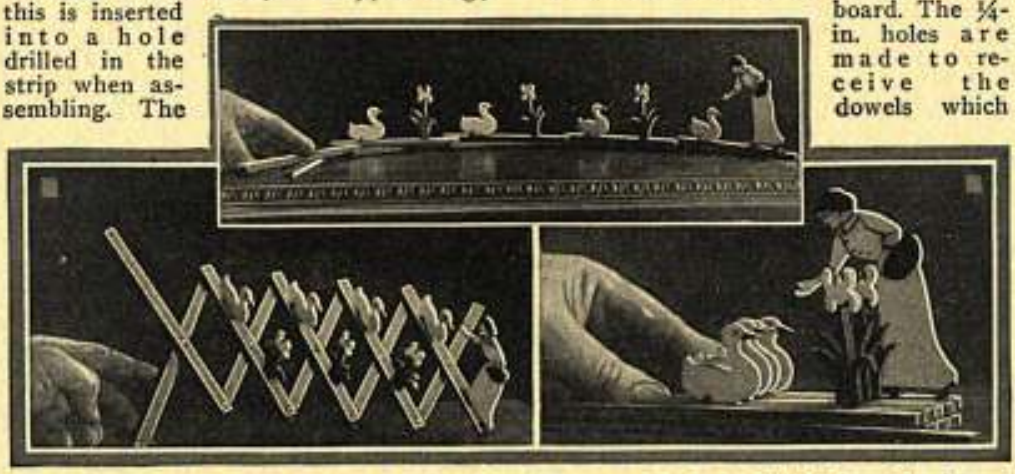
Reinforcing Stove Lining

After relining my kitchen stove several times, I found that the lining first gave way under and between the pipes, where the layer of cement was thin. To lengthen the life of the lining, a piece of ¼-in. mesh screen was bent around the pipes but not against them, as shown in the drawing. Through this screen the cement was worked with a trowel. A few slender wooden sticks were also imbedded in the lining, which tended to reduce, if not entirely eliminate, warping and shelling. Of course, no portion of these sticks was left uncovered by cement as they would then burn. This method of reinforcement was found entirely satisfactory.—R. C. Tarr, Gloucester, Mass.

Two Simple and Interesting Toys

By W. P. MOTT and L. R. BUTCHER

THE extension "duck pond" toy shown in the first illustration is an easily made article, which, when not in use, folds compactly. The supports for the ducks, lilies, and figure are strips of soft wood, ¼ in. thick, ⅜ in. wide and 6 in. long; eight of these are required, and two more of the same stock, 8 in. long, for the handles. The strips are stained a gray-green color. The ducks are made of any available thin wood or veneer, sawed to shape with a coping saw or fretsaw, and painted white with yellow bills. A little stud should be left extending from the base of each duck, about ¼ in. long; this is inserted into a hole drilled in the strip when assembling. The lilies are made of the same material as the ducks and colored with green stems and leaves and purple blossoms; the figure also is of the same material, and has a blue gown, brown hair and basket. The method of fastening the figure and the lilies to the strips is the same as followed for the ducks.



A Simple "Duck Pond" Toy That Any Boy Can Make; Variations of the Design Will Produce Other Interesting Toys

Take four of the 6-in. strips and one of the 8-in., lay them edge to edge, close together, and aline them at one end. Draw a pencil line across all the strips, measuring 3/16 in. from the end of the 6-in. strips. Draw a similar pencil line across the other end. Do the same with the remaining four 6-in. strips and the other 8-in. one. Draw center lines down each of the strips, then assemble them, as shown in the plan photo, and nail. The nails used are small brads, and they are driven through the strips, ⅛ in. in front of the center line of the strips, so that the toy, when extended, will assume a circular form, instead of shooting out straight. The brads are clinched on the bottom. If small washers can be obtained and used under the heads and ends of the brads the action of the toy will be more smooth, but the brads alone will serve very well if washers are unobtainable.

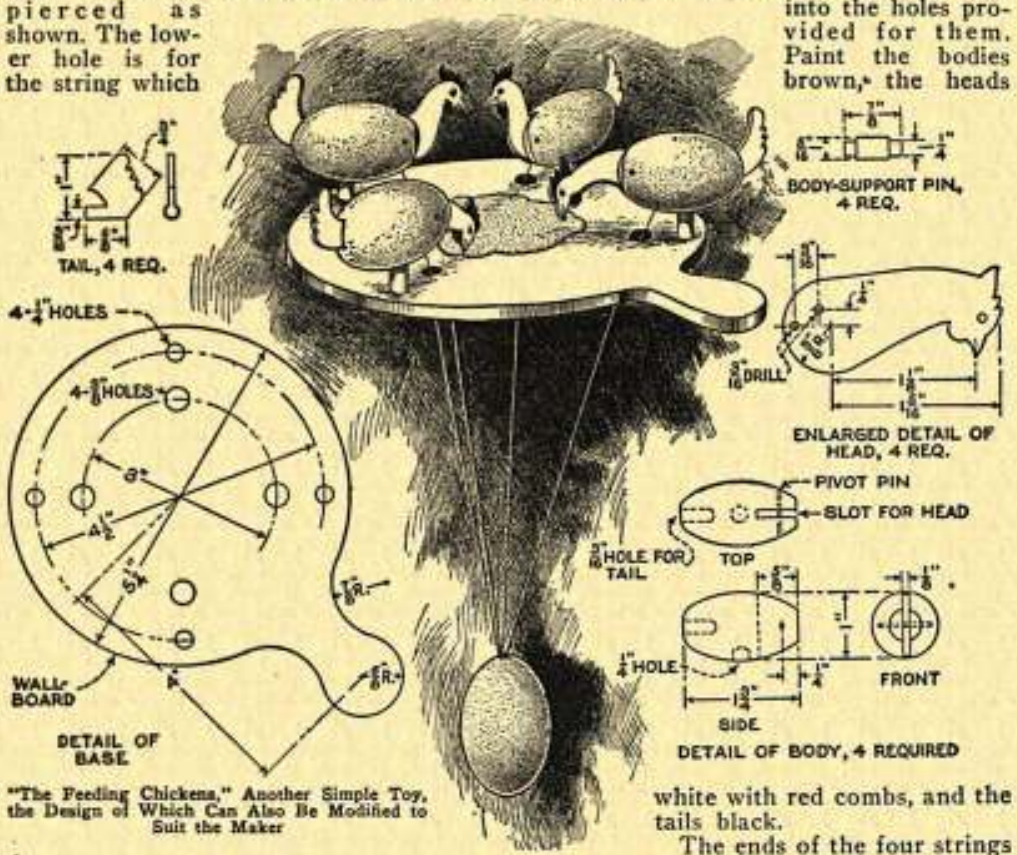
The interesting toy group shown in the second illustration is made to resemble four chickens, which go through the motions of feeding. The swinging of a pendulum suspended below the group causes the "head" of each of the figures to rise and descend alternately. A slight touch of the weight causes the movement to start.

The base is made of ordinary wallboard. The ¼-in. holes are made to receive the dowels which support the figures; the larger holes accommodate the strings from which the weight is suspended. The circular shape is but a suggestion; the holes, however, should be located as shown, from the center, if the sizes given for the other parts of the toy are followed.

The body of each chicken is made by turning a piece of wood to the egg-shaped form shown. Four of these are required; if a wood lathe is not available, ordinary round dowel stock of approximately the correct size may be used. Even thread spools will serve. The hole at one end is drilled 3/16-in. to hold the tail. The ¼-in. hole is for the supporting dowel. The slot at the end allows the head to swing freely on a pivot pin, the location of which is shown in the drawing.

Ordinary dowel stock is used for the supporting pins shown. These are glued to the bodies and the toy assembled by pointing the heads of the chickens toward the center of the base. Glue is also used to fasten the pins firmly in the base.

The head and tail need slight explanation. Stout cardboard or light sheet metal is used for stock in making four each of these. The head pieces are pierced as shown. The lower hole is for the string which is attached to the weight; the hole slightly higher up is for the pivot pin, while the top hole is the eye of the chicken. A piece of string, 9 in. long, is fastened to each of the head pieces and passed through the 3/8-in. hole in the base. Each of the head pieces is then pivoted to a body by means of a small brad driven through the body and passing through the pivot hole in the piece. The tail pieces are pressed into the holes provided for them. Paint the bodies brown, the heads white with red combs, and the tails black.



"The Feeding Chickens," Another Simple Toy, the Design of Which Can Also Be Modified to Suit the Maker

The ends of the four strings are attached to a weight below the base. Care should be taken to have the strings as nearly even in length as possible. As the pendulum swings, the heads of the chickens move up and down in a lifelike manner as long as the weight is in motion.

How to Make a Fluorescent Screen

Many experimenters have occasion to use a fluorescent screen, particularly those interested in X-ray work. Such a device is quite expensive if purchased, and may be made as follows:

Mix 1 oz. each of common salt, sodium tungstate, and calcium chloride. Place the mixture in a crucible and heat it dull red in a coal fire, for several hours. It will melt into a clear liquid, and should then be removed and permitted to cool. The liquid will crystallize into a hard glasslike mass. Break this out of the crucible and crush it into small pieces. Put them into a jar of clear water. The sodium chloride resulting from the chemical change by heating, will gradually dissolve and the calcium tungstate will fall to the bottom in fine crystals. Wash this precipitate until all trace of the salt disappears; then pour the crystals upon a sheet of filter or blotting paper to dry. After drying, place them in a mortar and grind them to a fine powder, when they will be ready for use. To make the screen proper, procure a piece of thin white cardboard of the size desired. The calendered board known as three-ply is satisfactory. Paint the cardboard on one side with a thick solution of gum arabic

in water, or better still, with celluloid dissolved in amyl acetate. Permit the gum to become "tacky" before dusting with the chemical. The latter process requires care, to produce an even layer on the cardboard, and it is advisable to practice with ordinary salt before attempting it on the cardboard for the screen. The calcium tungstate should be placed in a dry jar and a piece of fine muslin fixed over the mouth of it. The chemical may be dusted over the surface with this sieve.

Shake off the superfluous crystal and permit the screen to dry thoroughly. Fasten a piece of mica, or sheet celluloid, over the sensitized surface to prevent damage to it. Mount the sensitized cardboard in a wooden frame of suitable size and arrange a hood around its edges to cut out unnecessary light. The sensitive side of the screen is, of course, held toward the observer.

Wooden Roller Made without Lathe

If a lathe is not available, a small hardwood roller to mount on a short journal can be made as follows: The piece of wood is drilled through lengthwise for a driving fit and the journal driven in. Then the block is roughly shaped up to approximate size by splitting off corners. Spools are slipped over the ends of the journal, and the whole is mounted in an improvised fixture made of 2 by 4-in. hardwood. The holes for the journal are drilled for a tight fit and centered below the top of the block and board just the radius of the finished roller. Then a carpenters' jointer is used to plane down the roughly formed roller, care being taken to start the stroke at the end of the roller and stop it before the bit of the plane hits the end block. The roller is turned, until it is planed all around, then finished with a fine file.

Improved Electrode for Water Rheostat

Water rheostats are usually made of a large glass or porcelain jar containing horizontal electrodes. An improved vertical electrode which has a greater surface than that of the horizontal type, is shown in the drawing. This form allows the gases to escape more easily. The electrode is made of a strip of galvanized iron, 1 in. wide, bent to form a spiral with a ½-in. space between turns. Two strips of iron are crossed on the spiral and soldered to it where they touch. The vertical rod is fastened to the crosspieces, which may be done by drilling the latter and threading the rod. Two of these electrodes may be provided or one of them may be simply a rod. Of course, greater current will be passed if both electrodes are of the spiral type.—H. Busholwitz, Philadelphia, Pa.

Economy in Motorcycle Tires

Caution in the use of motorcycle tires with a minimum of abuse will result in a considerable tire saving. Tremendous wear on a single spot results when the power is thrown in so suddenly that the driving wheel makes several revolutions before gripping the ground. The proper air pressure must be maintained in the tires in order to obtain good wear. Guessing is a poor method of determining the air pressure, and the exact condition should be noted from time to time with a gauge. Ordinarily, a pressure of 45 to 50 lb. should be maintained in the rear tire and about 20 per cent less in the front tire, in the case of 3-in. tires. Rim-cutting from running motorcycle tires underinflated is the commonest abuse. Dents in the edge of the rims cause undue wear on the tire, the fabric being worn through by the constant rubbing. Bent rims are often caused by insufficient air pressure in tires, the liability to injury being increased when crossing tracks or bumps.

Old Shutter for Chicken Run

Because the older chickens consumed most of the feed, leaving little for the new-hatched ones, one farmer made a

Old Window Shutters Make a Good Chicken Coop That Will Keep the Larger Fowls Out

coop from four old shutters, as shown in the illustration. With the shutters wide open, only the small chicks can scramble through to the feed thrown in through the top, while the large chickens feed outside. When the shutters are closed, the chicks are protected from driving wind, and an old blanket is sometimes thrown over the top to make the coop comfortable. Later, as the chicks grow, some of the shutter panels are removed to permit their passage.—Dale R. Van Horn, Walton, Nebr.

Automatic Control for Homemade Refrigerator

I have constructed a couple of homemade refrigerators like the one described in the November, 1923, issue of Popular Mechanics. I made it unnecessary to go to the machine to start and stop the motor, by installing an automatic pressure-control switch. These switches may be bought at a cost of $8 to $15 and the installation is quite simple. Place a tee in the pipe leading to the high-pressure gauge and run a line to the opening tapped in the base of the switch. The wiring to the motor is changed and run to the line terminals in the pressure switch and the wires from the load terminals are connected to the motor. In operation, the switch is adjusted to kick the motor on and off, to keep the pressure within the desired limits, by turning the large screw on top of the switch until the desired adjustment is obtained. After the switch has been installed and properly adjusted, the outfit will require no attention other than an occasional inspection.—Leon D. Quick, Milesburg, Pennsylvania.

Cooking Food on Auto Heater

Nearly all modern automobiles are equipped with some sort of heater, especially if the car is of the closed type. I have a small sedan in which I installed a floor-type exhaust heater, as shown in the photo. The heater itself consists of a cast-iron body through which the hot gases circulate, and a perforated cover, which keeps passengers' feet or other objects from coming in contact with the hot surface of the heater. On most heaters this perforated cover is bolted solidly to the heater top. I removed the cover and riveted hinges on the edge next to the back seat, then fastened it to the heater top so that it could easily be swung up, leaving the heater top exposed. If the motor is run a few minutes, the heater top will become very hot so that, if the

Auto-Floor Heater That Can Be Used Effectively for Cooking Meals

cover is swung back and cooking utensils are put on the heater as shown, eggs, coffee and many other things can be cooked as well as on any common stove. I can boil a quart of water in four minutes with the motor running slowly. Of course, it costs a little more to cook this way than on a gasoline stove, but the big advantage is that it is always available and takes up no extra space. If the road is smooth, one can put a coffee pot on

and drive along until it is boiled. The pot can be prevented from being shaken off the heater by using a piece of wire to steady it. Altogether I have found this heater a very handy device on the road.—A. E. Granville, Cincinnati, Ohio.

Applying Wall Paint

One of the most common reasons why many amateur jobs in painting fail is improper application, particularly in wall work. When painting walls, the amateur usually works horizontally across the wall from the ceiling down. It is impossible to do a good job in this way, as the laps can never be covered, nor can sufficient surface be painted in time to lay on an additional strip before the paint of the preceding lap has dried. The secret of success is to paint a strip about 2 ft. wide from the ceiling to the floor and cover this area well. The next lap can be painted before the paint of the first lap has dried and the edges of the laps will never be noticeable. This is quite a valuable hint as this method of painting does not require any particular skill and can be used with all colors.

Lighting the Gasoline Lamp

Many people have new gasoline lamps of the kind shown in the drawing. It is rather difficult to light them with matches and unhandy to do so with a torch made of paper. A better method is as follows: Bottles of shoe blacking in liquid form have a little brush attached to a cork. The sponge or batting on the end is pushed up, which leaves a hook on the end so that it can be hooked on the mantle. The batting is thoroughly saturated in kerosene, lighted and can easily be blown out after the gasoline vapor has been ignited.—Charles Latour, Jr., Plattsburg, N. Y.

Floating Bait Box

Fishermen will find the floating box shown in the drawing of considerable convenience as it is always within easy reach and, as it is submerged, keeps the minnows alive. It is made from a piece of ¼-in. wire mesh about 18 in. long and 6 in. wide, the ends being soldered together to form a 6-in. cylinder. Two 6-in. tin-can covers are soldered on the ends but before doing this the top cover is screwed to a wooden disk, cut from 1-in. material, and a 4-in. circular hole is cut through it and the tin cover, to permit getting the bait in and out. The box is tied to the boat by a cord attached to a staple in the cover.

Floating Box Keeps the Bait Alive

Greasing Ford Ignition Systems

Special battery-ignition systems used on Ford cars have a casing at the lower end in place of the timer, which contains a pair of gears running in grease. It is a good plan to drill and tap a hole in this casing, at a point which will not interfere with the gears, and to install a grease cup or high-pressure fitting. Grease can then easily be forced into the casing when necessary. There is not much space back of the fan, so that care should be taken to place the grease cup where it cannot be struck by the fan.—E. T. Gunderson, Jr., Humboldt, Iowa.

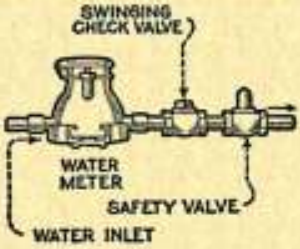
How to Make a "Swimming Johnny"

A "swimming Johnny" is an amusing toy, and one that any boy can build from odds and ends about the house. Properly assembled, it will travel several yards in calm water and can be used in the bathtub as well as outside. The body, cut from a piece of soft pine or cedar, is 8 in. long and 2 in. wide. Bevel the corners of what is to be the front end and taper the sides toward the rear as indicated. Cut out a head and taper the bottom down to a slender neck which can be fitted tightly into a hole an inch from the front of the body. Cut a square hole just back of the head to take a small spool as shown. On each side of the body screw a piece of brass or tin to serve as a bearing. Plug the spool, force a piece of stiff wire through the wood and fit the ends in the bearings, allowing them to project about ¾ in. The arms consist of two pieces of soft wood beveled on one end and the opposite ends are fitted securely over the ends of the wire axle. Be sure the bevel is uppermost when the arms are forward. Connect the spool with a long elastic band that passes below the body and attaches to a screweye near the rear end. This should be just taut when the spool is unwound. Paint the device any suitable color and oil the spool and the wire in its bearings. The head can be painted any design desired. Wind up the elastic on the spool until it is quite tight, being sure to wind the arms to the right when the head faces left. Place "Johnny" in the water and let go of the arms. They will thrash around in an overhand stroke and push the toy ahead at a good speed.—L. B. Robbins, Harwich, Massachusetts.

Amusing Toy for the Children Which Resembles a Person Swimming

Protecting Water Meters

Hot water is now being obtained during the winter months from many hot-air furnaces by inserting a pipe coil into the fire box, which in turn is attached to the boiler. It happens in the majority of well-designed jobs that the water is overheated during very cold weather, which produces steam and causes considerable pressure on the water-supply line, forcing the water to back up through the meter. This ruins the meter for future operation. The practice of obtaining hot water from the furnace cannot then be continued unless some method of protection for the meter is provided. In the accompanying illustration is detailed an arrangement of two inexpensive fittings, which can easily be installed. On the house side of the meter, install a horizontal check valve and immediately behind it a small safety valve, set to the proper pressure. Setting this valve is not difficult. It should be set about 5 lb. above the maximum pressure which has been known on the water main. What happens when the water in the boiler gets up excessive pressure is this: When the pressure on the boiler overcomes the pressure on the water line, the check valve closes and the safety valve opens taking care of the boiler and at the same time saving the cost of a new meter.—L. H. Georger, Buffalo, N. Y.



¶A double-filament headlight lamp can be used again for a tail light after the bright filament has burned out, by dropping solder between the two contacts, which makes it a single-contact lamp.

Ridding Public Buildings of Flies

In many schools, stores, churches, and other public buildings, flies become a great nuisance during the summer season. If the building has a ventilating fan, it may be used to advantage to get rid of the flies. Drill a small hole in the side of the fan casing, large enough to admit the nozzle of a vaporizing pump. Shut all windows and doors in the room. Open the top ventilators and close the bottom ones. Now start the fan and fill pump with a good insecticide. Operate the pump and direct the vaporized liquid into the hole. The fan will blow the vapor all over the building and fill the rooms. Don't open the doors or windows for about an hour. This plan has been tried successfully in the local high school.—Wilfred Sorenson, Humboldt, Iowa.

Using Rope as Tire

In an emergency, when the autoist had no spare tire with him and did not wish to ruin the rim by running on it, he improvised a tire from a towrope, which he carried along. After the tire had been removed, the rope was wound around the rim, as shown in the drawing, so that it projected above the rim. Then a length of wire was twisted around both rim and rope to prevent its coming off. The car was driven for a considerable distance in this way without any damage to the rim.

Cleaning Zinc

There are many zinc articles used as kitchen fittings. To clean them, do not use the customary powders. A better way, and one that takes much less effort, is to use a cotton cloth dipped in kerosene. Rub the zinc well and then dry with a clean cloth of the same material. This method has been found very effective.

Seat Aids Gardener and Saves Space

In order to have easy access to every row of plants a gardener made the seat shown in the photograph. It consists of a 12-in. plank with two heavy legs and slides, which are also made of 12-in. stock, to make it easier to shift the seat from row to row. Besides the ease of access gained, there is the additional advantage of being able to have the rows closer together, as space for working is unnecessary.—Frank Harazim, New York City.

Handy Seat for the Gardener Permits Him to Get At the Plants Easily and to Set the Rows Closer Together

Improving Old-Style Gillette Razor

If your old-style Gillette razor does not give satisfaction, do not discard it at once. A slight difference in the width of the blade causes it to lie very close to the safety guard, making it too rigid to cut the hair smoothly. Even new blades often seem to be dull. This condition is easily remedied by making the razor adjustable. Place one or two thin paper or metal washers around the middle peg of the razor before putting in the blade, as indicated in the drawing. This gives the blade less curvature and consequently removes the cutting edges a little from the guard, and a greater portion of the blade is free to vibrate, thus insuring greater flexibility and therefore a keener cut. Of course, it reduces the safety somewhat, as the cutting edges are farther away from the guard, but, with care to obtain the proper adjustment and if the razor is applied lightly, this method will give good results and prove beneficial to the skin.—Hatto Tappenbeck, Hollywood, Calif.

Paris Carpenter Finds Use of Stilts More Practical Than Stepladder

Stilts to Take Place of Stepladder

For various kinds of work where stepladders are customarily used, a Paris carpenter finds stilts more practical, as they save the time lost in descending and ascending the stepladder every time its position is changed. The stilts are made so that the steps can be adjusted for height.

Measuring and Cutting Paper from Rolls

A handy cradle which facilitates measuring and cutting off paper from rolls is shown in the photo. It is attached to the end of the counter or bench on the top of which a scale is marked off. The roll of paper is placed in the cradle and the end is pulled along the top of the counter until the proper length is unwound. Then the paper is cut off by simply pulling a pair of shears along the edge of a sharp piece of metal extending across the end of the counter.—Charles W. Geiger, San Francisco, Calif.

Cradle on End of Store Counter Facilitates Cutting Off Measured Lengths from Paper Rolls

How to Keep an Aquarium Successfully

"I never had much luck with my aquarium," is a statement you have often heard, but did you stop to consider that, may be, it wasn't so much poor luck as it was lack of knowledge? Fish, to thrive, need good treatment and good food as much as dogs, cats or birds. They breathe oxygen, which is found in the air, and exhale carbon dioxide. Plants, however, need carbon dioxide and give off oxygen. So, you see, that if there are enough fish and enough plants in an aquarium everything works well. This is called a "balanced aquarium." However, if there are too many fish or too many plants, there is too much of one kind of gas and not enough of the other, and one or the other of the living things in your aquarium begins to die. This is one of the biggest troubles of the aquarium keeper, but when you know the reason for it you have it cornered, as it is easily possible to increase or reduce the number of plants until you have a balanced aquarium and so keep all your fish alive.

Feeding fish is fortunately not difficult, but there are some important things to remember about it. Experiment to find out how much your fish readily eat, then give them just that much and at a certain time each day. Be regular about feeding them. Variety of food is one thing that makes healthy fish. Give them a change. Here are some kinds to try: cut-up grubs, scraped or shredded beef, and the manufactured forms, such as ant eggs, wafer food and ordinary crumb food. How often the water should be changed depends on the size of the aquarium. A small bowl ought to be changed every week, a medium-size, every ten days or two weeks, and a large tank, well stocked with growing plants, only when the water is dirty or you wish to rearrange it. Make the aquarium comfortable for the fish; have a castle or some rock work

and some sand or pebbles on the bottom. Seashells are not advisable for the fresh-water aquarium, as they contain lime, which is injurious to the fish. Place the plants so that there is a stretch of clear water for swimming. Don't let the sun or very bright lights shine on the bowl, for this will heat the water, and warm water is uncomfortable for fish. Snails are scavengers, which help keep the fish bowl clean, and it is therefore a good thing to have a few in the aquarium.

Fish diseases are better left alone by amateurs, as their correct treatment is difficult. If you have healthy fish to begin with and treat them properly, you need have little fear of disease. However, for general poor condition, put the afflicted fish in a small basin of cold, salt water for a few minutes. It is advisable to do this during exceedingly hot weather also. If you have become very interested in your aquarium, you may wish to have some other aquatic pets besides goldfish. A paradise fish or two make a suitable addition, as they are beautiful and graceful, or some of the wild game fish will also thrive. The latter, of course, cannot be placed with the goldfish on account of their warlike tendencies. You may expect your fish to live to a ripe old age if you treat them right, for fish do not die young naturally. In fact, there is in Japan a goldfish which is 19 years old. —Donald Culver, Montclair, N. J.

Sealing Canned Meat

To prevent canned meat from rising above the fat or paraffin sealing. I cut a number of strips of cedar ½ or ¾ in. wide, a little longer than the diameter of the neck of the jar. These were pushed under the shoulder of the bottle as shown in the drawing. The paraffin was then poured in. This arrangement keeps the meat down effectively. When opening the can the stick is split and can then be removed easily.—Mrs. M. G. Alexander, Farran's Point, Can.

Snubbers for Ford Car Made at Home

After he had broken three front springs in one summer, an autoist looked around for a cheap means of preventing further breakage. The remedy he finally devised consisted in riveting snubbers, made from an old belt, around the front axle and the frame of the car. The belting was of four-ply canvas, 5 in. wide, and was cut in two, overlapping the splices 4 in. The photo shows the installation clearly.—Dale R. Van Horn, Walton, Nebr.

Old Belting Makes Good Snubbers for Light Cars and Prevents Breaking Springs

Putting Life into Moth Balls

Putting life into moth balls is an interesting experiment for anyone to carry out as it causes curiosity to all those who see it, and is also a good advertising stunt to draw attention to window displays. A druggist found that it brought over 30 persons into his store every day to make inquiries and 25 of these made a purchase. Take a fruit jar that can be made air-tight and has good clear walls. Fill this two-thirds full of water and add equal quantities of potassium bicarbonate and citric acid until the solution is about 1 in. from the top. Then put four or five or more moth balls into the container and screw on the lid. The chemicals will begin to react and the balls will move upward and downward, sometimes two at a time and sometimes all of them, without apparent reason, and the glass wall magnifies the balls and makes them look like balls of cotton.—David J. Morris, Austin, Tex.

¶Small drills are easily broken, but if a short piece of pencil, with the lead removed, is slipped over them, with only the proper length exposed, pressure can be applied without danger of breakage, as the pencil will prevent the drill from bending and consequently breaking.

A Good Garden Weeder

After breaking a tine out of his potato or spading fork a neighbor of mine made a handy weeder out of it by removing the other middle tine and riveting a piece of old saw blade across the points, as shown.

With the two remaining tines bent to a slight curve, and the blade sharpened, the implement is used much as one would use a shovel, slicing down the weeds without any earth collecting on the blade. Small holes are drilled through the ends of the outside tines and the saw blade beveled as indicated. Its shape can be altered to suit the user. The rivets are set midway between the edges of the saw blade and hammered down tight. The blade can be sharpened on an emery wheel and later finished with a fine file or oilstone. The maker says much more ground can be covered with this tool than with a hoe, and that it makes the operation far less tiresome.—Dale R. Van Horn, Walton, Nebr.

Testing and Caring for Files

To test a file hold it so that the light will be reflected sharply from the teeth and observe whether their edges are flattened and appear as white lines. If so, the file is dull and should be recut if of considerable size and value.

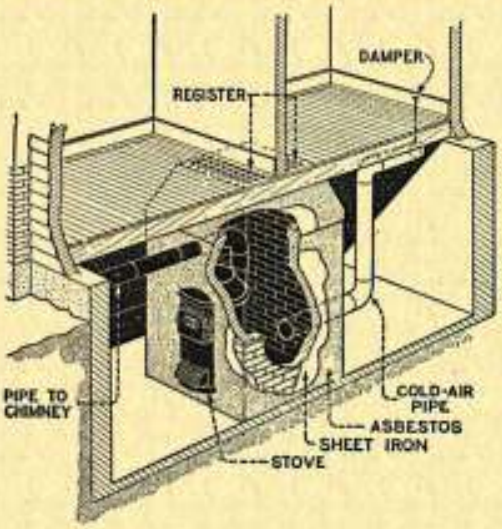
Files should not be thrown into drawers and mixed with other tools, but should be set in racks or drawers made for the purpose. A mechanic would not throw a straightedge into a drawer containing other tools, and a file should be given similar consideration, as every nick in the teeth impairs the efficiency of the tool.

Files may be sharpened by dipping them into sulphuric acid, but care must be taken not to permit the acid to come into contact with one's clothes or person. Water is used to wash off the acid.

Each should be provided with an individual handle. This prevents injury to the hand of the worker and aids in the proper use of the file. Handles should be carefully fitted and be made of a size proportionate to the file. In removing a handle from a file, strike the handle at the end nearest the file, by sliding a piece of hard wood along the surface of the file, as the blow is struck with it. Do not use another file or metal object in thus removing a handle, as it will injure the latter.

Stove Forms Homemade Furnace

The renter of a small home had no furnace, so he planned a method of providing heat for the house at a minimum cost. There was a small pit under the dwelling. He obtained a stove at a secondhand store, and a lot of bricks that had been discarded from a wrecked building. He purchased a large hot-air register, some lengths of stovepipe, sheet iron, asbestos paper and cement. With these materials, costing less than $10 all told, he built a satisfactory furnace, which worked well all through the winter. The register was first placed in



Improvised Hot-Air Furnace Made from Old Stove and Discarded Bricks

the floor, between the living and dining rooms. The stove was placed in the basement and walled up with brick on all sides leaving only the doors in front exposed, as shown in the illustration. A pipe connected the stove to the chimney and another line of pipe ran from

the bottom of the hot-air chamber to the top of the ground, thus insuring plenty of air. A damper, set in this pipe, regulated the amount of draft. When this had been done, the brick walls were connected to the register with sheet iron covered with asbestos paper. This is a good way for those without proper heating facilities or without sufficient cash to obtain a good furnace.

Backstop in Garage Prevents Damage

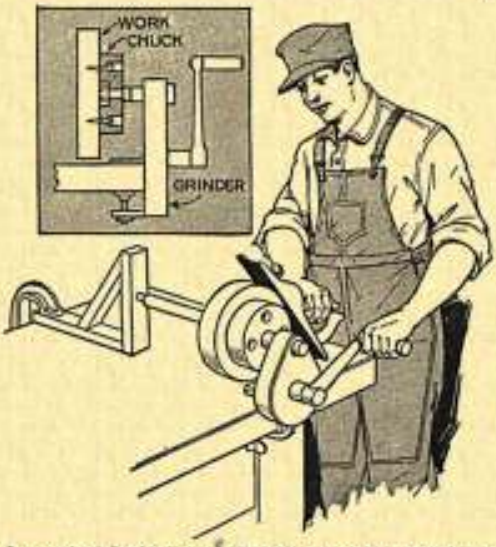
Some garages for automobiles are only a little longer than the car and there is then danger of running up against the wall so that both car and garage may be damaged. One driver built an up-sloping platform at the rear end of his garage so that the front wheels would strike this, stopping the car effectively without any danger of damaging it. This installation is especially recommended for inexperienced drivers.—Charles Latour, Jr., Plattsburg, N. Y.

Bedroom Sandals Made from Paper Bags

Bedroom sandals are not always at hand, but a dozen pairs of paper sandals, which will serve just as well as the more expensive article, can be made for just a few cents. Ordinary bags, obtainable at a grocery store, are used, the size depending on the size of the foot for which they are intended. The bag is cut away at the top on one side, as shown in the lower detail of the illustration, to fit over the instep. If the paper is stiff and the edges seem sharp, they can be folded over. These sandals keep the feet clean and may be thrown away after use.—L. B. Robbins, Harwich, Massachusetts.

Makeshift Lathe for Emergency

In the absence of a small wood lathe, a satisfactory substitute for some work can be made from a grinder as shown in the drawing. The emery wheel is first removed and a wooden wheel substituted,



Improvised Lathe Found Useful in the Small Workshop

which serves as a faceplate on which the work is fastened with screws. A wooden brace, clamped to the bench top with a C-clamp, serves as a tailstock. An ordinary plane can be used as a cutting tool, while the grinder is operated by hand.—B. C. Shilling, Walton, Ind.

Cheesecloth Takes Place of Glass for Storm Doors and Hotbeds

For poultry houses, storm doors and hotbeds, a good substitute for glass can be made by taking cheesecloth or any lightweight muslin and ironing paraffin into it. An electric iron does a fine job, but care must be taken not to let the iron get too hot or the cloth will be scorched. After it is treated in this way, it becomes nearly transparent. This treatment also makes the cloth waterproof.

¶When new lumber, particularly white pine, contains many knots, it is good policy to use less oil in the paint, substituting turpentine for the oil eliminated; oil in paint causes later coats to draw the sap out of the knots, and this naturally leads to bad checking, but the substitution of turpentine for some of the oil prevents this.

Fig. 1, Sulphated Battery Plates, Note the Low Acid Level; Fig. 2, Plates Ruined by Sulphation; Fig. 3, Separators between Plates Worn

How to Save Your Battery

The Little Black Box under the Seat Is the Heart of the Car; It Takes Only a Little Care to Keep It Healthy

DEAD battery! All motorists know what that means. It usually happens just when the driver is farthest from a service station or just when he is in a hurry and can least spare the time to lug it to the station to rent one. Yet most motorists are themselves to blame for the run-down condition of the "box of juice," because they will not spare the little time required for its proper upkeep. Even in summer, when the water in the battery evaporates fastest, it is not necessary to look at the battery more than once a week to see that the water level is maintained. This takes only five minutes, yet we find owners who think it "too much trouble" to do this, and allow the water level to get down so far that the battery is seriously damaged before they will look at it.

There is no need to study the storage battery deeply in order to take proper care of it. Simply knowing how to use a hydrometer is enough—if the hydrometer is used. A storage-battery hydrometer syringe can be bought from any auto-supply house cheaply, and a bottle of distilled water for 15 cents at any drug store. With these the owner is equipped to add months, and sometimes years, to the life of the battery. The hydrometer syringe has a small float inside of it; this is the hydrometer proper, and is marked or graduated to indicate the specific gravity of the acid solution in the battery. As the specific gravity depends directly on the state of charge of the battery, the hydrometer tells the owner all he needs to know about its condition. To take a "gravity reading," remove the cap from one cell of the battery, squeeze the syringe bulb and insert the end of the rubber tube of the syringe into the liquid in the cell (this liquid is called the electrolyte). Now release the bulb and the electrolyte will be drawn up into the glass tube. Draw up enough to float the hydrometer. The latter will float in the electrolyte at a height dependent on the specific gravity, and the mark on the scale of the hydrometer even with the surface of the liquid is the "battery reading." After reading the scale, press the bulb and discharge the electrolyte back into the cell from which it was taken. Don't neglect this; never put electrolyte taken from

one cell into another. Read all the cells. Don't depend on the reading from one or two cells only. If the reading is down around 1.160, have the battery charged immediately, and never permit the battery to become discharged below this point. The following readings indicate the state of charge of the cells: 1.275 to 1.280, fully charged; 1.260, three-quarters charged; 1.225, half charged; 1.160, quarter charged. A cell is completely discharged when the reading is 1.125.

If the readings of the three cells are the same within 20 points, that is .020 degrees on the hydrometer, then all three cells are running together in good order. If one cell indicates more than 50 points below the other two, this is an indication of a partial short circuit in that particular cell, and the battery should be placed in the hands of a good repairman at once.

It is a good plan to make it a rule to test the gravity of the battery once a week, summer and winter. The level of the electrolyte in the cells should be inspected once a week in the summer anyway, and, as most people use the hydrometer syringe to put water into the cells, it only takes a couple of minutes more to take readings from the cells. If the habit is formed of inspecting the battery on a certain day, it becomes automatic and no trouble at all; therefore, keep up the weekly inspections throughout the winter so as not to break the regular routine, and spoil a good habit. The level of the electrolyte should be maintained ½ in. above the plates, as shown in one of the illustrations, and pure distilled water only should be added. Never, under any circumstances, add acid; this is a job for the repairman, should it ever be necessary.

All this seems a lot of care when it is set down in black and white. As stated before, however, it takes but a few minutes a week; and if it is neglected—look at the illustrations! Fig. 1 shows the effect of neglecting the level of the electrolyte. Sulphate of lead forms on the plates when left for a time in a discharged condition, and it will form much more rapidly on the plates that are not protected by the electrolyte. The low acid level in this particular cell can be seen very clearly marked on the plates. This meant a job for the repairman, and expense for the owner. Now look at Fig. 2. These plates are very badly sulphated, and this was caused by letting them stand after the electrolyte was spilled. The battery

Fig. 4. Buckled and Broken Plates, Due to Overcharging and Vibration from Loose Battery Clamps; Fig. 5. Plates Ruined by Overheating

should have been refilled and charged immediately. When the plates are sulphated, a long, slow charge is necessary to dissolve the sulphate, as much as four or five days being required in many cases. This explains why your battery station was so long in charging your battery the last time, perhaps, and you shouldn't have been sore about it. It was all your own fault. Impure water containing minerals, when used in the battery, also causes it to be very slowly charged, as the salts clog up the pores in the plates. Sometimes it will not charge at all, so don't take a chance on anything but distilled water.

It is a good thing, when you have driven your car for a while and know about the average speed that you like to drive, to go to the battery station and have them adjust the charging rate of the generator to suit your driving habits. If, for example, you drive mostly in the daytime, and very little at night, then the charging rate of the generator will probably be too high. If the electrical system is not regulated correctly and delivers more current than the battery can absorb, something is certain to be damaged by that excess. This is generally the positive plates of the battery, and opening the cells will show this condition by the burnt and loosened active material and the buckled and loosened plates. See Figs. 4 and 5. In this case, the charging rate should be lowered. If, on the other hand, most of your driving is done in the evening, or if you must start and stop the motor often, the charging rate should be increased to keep the battery properly charged.

The following incident illustrates how the charging rate depends on the driving habits of the owner. A car was used constantly, but was not started or stopped often. The battery could never be made to come up to more than half charge by means of the generator, and yet the battery and generator were in good order, as far as the service station could see. After riding with the owner for a few trips, a friend found the trouble. The automobile charging generator is designed to deliver its maximum output around the average driving speed, 25 to 30 miles an hour. Above this speed the charging rate begins to fall off rapidly. The generator on this car had been set, as are most of them, to give 10 amp. at 25 miles an hour, as the service man did not know, of course, what the driving habits of the owner were. As a matter of fact, according to the friend who diagnosed the trouble, the owner didn't know what 25 miles an hour felt like, except in traffic; his average speed was close to 50 miles an hour, and up to 65, just the range in which the generator output had fallen to the minimum. When the charging rate was adjusted to suit the owner's driving range, the trouble disappeared.

Then in the winter the demands on the battery are more severe. The car is harder to start, the lights are used for longer periods, and the battery is not quite so efficient in cold weather as in warm. It will often be found necessary to boost the generator output to take care of the additional drain on the battery. Have your service station do this. Be especially careful to keep the battery fully charged, not only for your own comfort in starting, but to prevent it from freezing. A fully charged battery will not freeze until the temperature reaches 95° below zero, but a battery that is only quarter-charged will freeze at zero, and a fully discharged battery will freeze at 13° above zero. Be as easy on the battery as conditions will admit. Prime the engine before starting up from cold, and turn the engine over a few times with the hand crank before stepping on the starter. In summer, the main precaution to take is to keep up the level of the electrolyte, as evaporation is faster than in cold weather.

When on a long drive, it is expedient to burn the lights in the daytime in order to prevent overcharging the battery and consequent danger of buckling the plates. Have the service station check up on the charging rate of the battery again, especially if this has been boosted for the winter, and reduce it again to the proper rate for summer driving.

It will pay you to take care of your battery, for new ones are an expensive item, and a good battery can be ruined in a very few months by lack of attention.

Screen Holder for Shipping Tags

In shipping poultry and eggs, where crates and cases are returned empty to the shipper, the removal of tags and changing addresses is quite a task. This difficulty is easily overcome in the following way: A number of

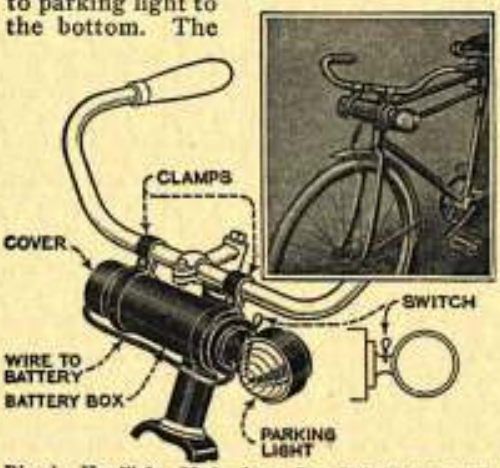
pieces of wire screen, 4 by 6 in. in dimensions, are creased and folded on the lines indicated in the drawing. When tacked in place, one upon the end of each crate or case, they provide pockets for the easy insertion of the shipping tags, and a single tack through the eye of each tag holds it in place. To change the name and address, the commission dealer merely has to remove one tack and replace it after reversing the tag and putting it back into the pocket.—G. E. Hendrickson, Argyle, Wis.

Coal Ashes Save Fence Posts

A farmer, having observed that the growth of grass and weeds around his fence posts held the moisture and caused the posts to decay at the ground line, prevented this trouble by tamping ashes into the ground for several inches around them. When building fences, he carried a barrel of coal ashes in his wagon, and, after a new post was driven, packed in the ashes. This prevents the growth of vegetation around the post and allows the sun and air to dry the soil quickly after a rain.

Bicycle Headlight

Any boy can easily make the dry-cell lamp shown in the illustration. Obtain a metal dry-cell holder and fasten an auto parking light to the bottom. The



Bicycle Headlight Made from Dry-Cell Holder and Auto Parking Lamp

lamp should be of the type having a switch. The wires are brought through the cover and connected to the lamp. A pair of clamps are made of strap iron by means of which the dry-cell box is attached to the handlebars in the position indicated in the drawing.

Floating Hunter's Suit

During the duck-hunting season the floating suit shown in the photo has been found very satisfactory by a California

Duck Hunter's Novel Floating Suit Found to Be Very Practical

hunter. It consists of a large inner tube, a pair of high rubber boots and a piece of sheet rubber, which is cemented to both inner tube and boots. This arrangement permitted him to float safely without getting wet and allowed free movement of the arms and hands.

Dressing for Fishline

A quick-drying dressing for fishlines may be prepared as follows: Mix equal parts of boiled linseed oil and gold sizing; apply this to the line in a moderately thick coat. Dressing which will not dry as rapidly but which will resist the water as well is made by melting together 4 parts of paraffin and 1 part of rosin. Melt the paraffin in a deep metal vessel over a small fire, and add the rosin after the paraffin has dissolved. Care must be taken not to permit the fire to come into contact with the mixture. Allow it to cool slightly and then coil the line in the vessel. Draw it through a piece of wet sponge held between the fingers. This will cool the mixture rapidly and the line may then be stretched and polished with a wet rag.—A. E. Tetu, Ottawa, Canada.

Hints for the Amateur Mechanic

By J. V. ROMIG

THE amateur mechanic will greatly improve the quality of his work if he takes advantage of the following suggestions, relative to design, selection of materials, and constructional details.

Before starting actual construction, sketch the job in at least three views, giving all dimensions, so that it will be seen just how the finished article is to look, from any point or angle. The design thus roughly sketched can usually be improved by changing a few lines or dimensions, which takes but a few moments. Minutes spent in sketching mean hours saved in construction. In designing any article, the amateur mechanic should always endeavor to hold to simplicity of design, combined with strength.

The best aid to the amateur in learning how to design, in addition to textbooks, is the reading of catalogs and trade journals pertaining to machinery, etc., that can be obtained from many sources. Catalogs should be kept in order; it is best to file them in alphabetical order, or number them, and keep an index book handy so that any book can be found in a moment.

In the selection of materials, the amateur mechanic must have a good knowledge of sizes and shapes usually available. In wood selection, use the tables of comparative strength to be found in handbooks and catalogs. Also select the proper wood for each particular use, as some woods are only good for inside use, while others will withstand the effects of weathering. First-grade lumber costs more, but is worth it. Rather buy dressed lumber from the planing mill than attempt to plane it down from the rough at home, and have the planing mill make extra-thick and wide sections by laminating, as it is equipped with the proper facilities for gluing and pressing.

Steel-shape books are obtainable from all leading steel companies, and, in these, the designer has available the dimensions of I-beams, H-columns, channels, and angles, as well as tables of their strength and other factors. These figures on beams, etc., are particularly useful in the designing and fabrication of small machinery, for which such materials may often be used instead of castings. Structural-steel shapes are easily procured at a few cents a pound, cut and drilled to the buyer's specifications. A knowledge of pipe and pipe fittings is also advisable. Handbooks and catalogs contain tables that show both internal and external sizes, weight per foot, strength, etc., and all such data should be religiously filed and applied.

Mill supplies, such as hangers, shafting, belting, and pulleys, are listed, together with a complete line of tools and equipment, in the mammoth catalogs sent out by large mail-order houses. Their mill and hardware-supply catalogs also give an accurate description and price of each article, and enable one to estimate the cost of completed machines. In many cases, material can be obtained from these houses that cannot easily be obtained locally. Another valuable source of material is the local scrap or junk yard. Here pulleys, flywheels, and gears and wheels from discarded farm machinery and automobiles are found in all sizes. Pulleys that are too small can be rebored, while those that are too large can be bushed down. Shafting can be sawed to suit. Such junk should be bought by the pound, and should not cost more than one-half the amount of similar new materials per pound. Pipe and fittings for high-pressure work, however, should never be bought at the junk yard, but from dealers selling hydraulic and refrigerating machinery and supplies.

When, in the building of any machine or article, special castings are required, the patterns for them should be made as simple as possible. If only one or a few similar pieces are needed, omit, if possible, the cores, as holes can be drilled cheaper than a corebox can be made. Round off all corners of the patterns with fillets of generous size, as castings with sharp corners pour badly, and are apt to crack and break at the sharp juncture of the two angular surfaces. Observe all rules for shrinkage of metal and give sufficient draft to allow the free withdrawal of the pattern from the sand. Fit dowel pins accurately, as a casting never comes out better than its pattern. When building a pattern for a casting, allow for all necessary machining by extra thickness of metal, but try to hold machining down to a minimum. Always have a spare casting or two made up if possible; the added cost is usually not high and saves one the trouble of going into the work again in case the first one is spoiled or broken. Many small bearings can be cast solid in bronze or brass, saving the trouble of bushing a casting made in iron.

Time and expense can often be spared if standard ready-made parts are used, instead of trying to make them.

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