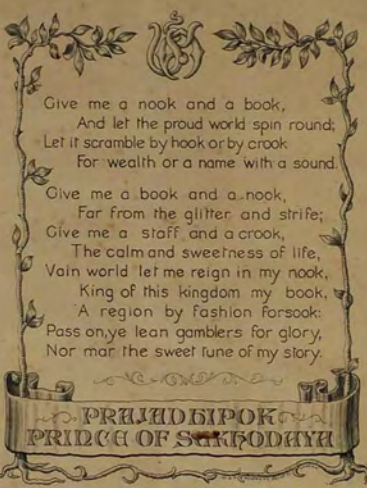




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1935

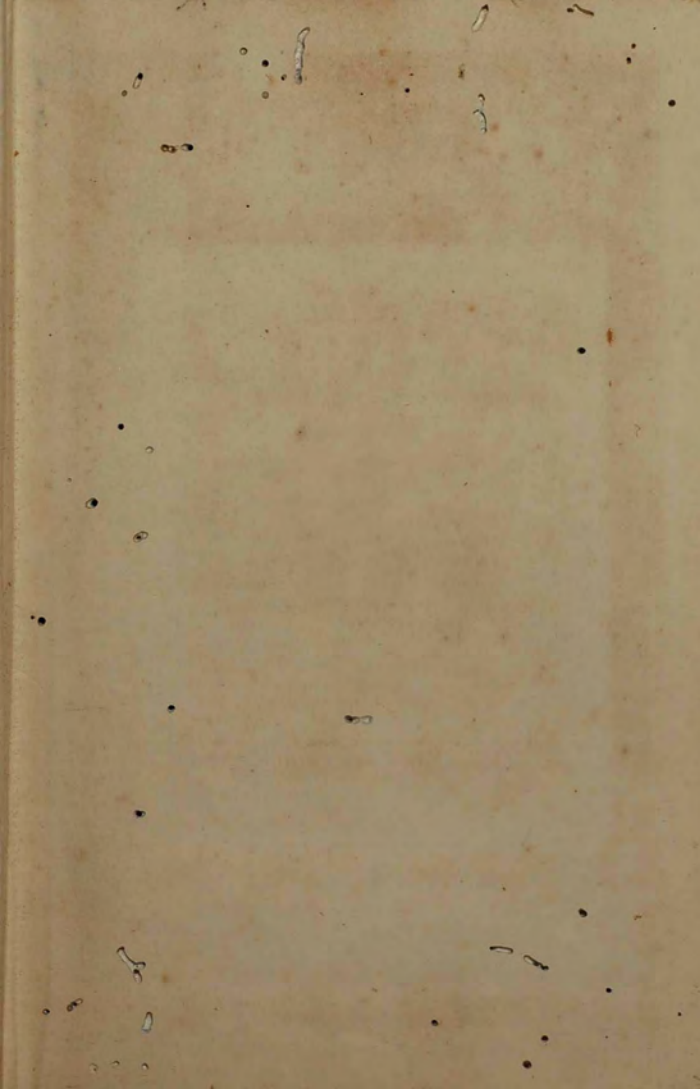


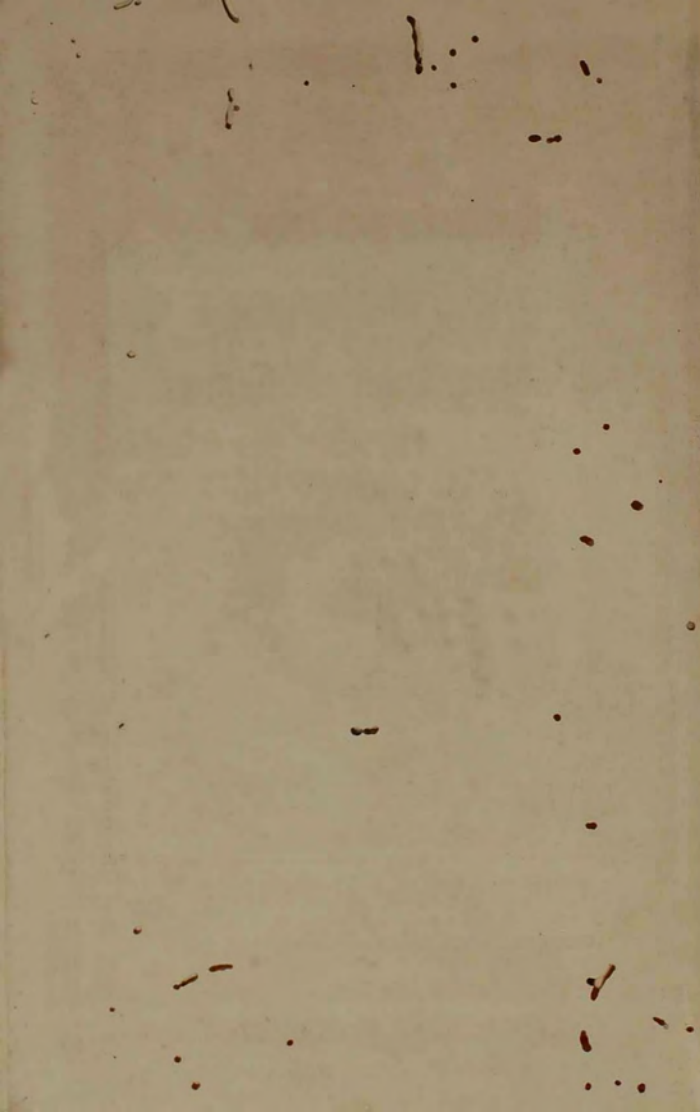


Give me a nook and a book,  
And let the proud world spin round;  
Let it scramble by hook or by crook  
For wealth or a name with a sound.

Give me a book and a nook,  
Far from the glitter and strife;  
Give me a staff and a crook,  
The calm and sweetness of life,  
Vain world let me reign in my nook,  
King of this kingdom my book,  
A region by fashion forsook:  
Pass on, ye lean gamblers for glory,  
Nor mar the sweet tune of my story.

ПРИНЦА  
PRINCE OF SAKHODIYA





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THE  
BRITISH JOURNAL  
Photographic Almanac  
1935



64 Gravure Pictures

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## THE ROSS XPRES LENS

These lenses are the finest examples of modern most ultra rapid lenses. Cinematograph, Reflex, Focal Plane and Press Photographers will find them invaluable. A distinctive feature of F/3.5 lens is its wide angle of view.

### PRICES ROSS XPRES LENS, f/1.9

Equiv. Focus		Plate Covered	Flange Size	In Iris Setting	Code Word Iris Setting	Flange Size	In Focussing Jacket	Code Word Focussing Mounts
mm.	in.	mm.	in.	£ s. d.	Yeda	in.	£ s. d.	Yedafo
25	1	16 × 12 in.	1½	10 0 0	Yeda	1½	11 0 0	Yedafo
38	1½	1 × 1½	1½	10 10 0	Yefe	1½	12 0 0	Yefefo
50	2	1 × 2	1½	11 0 0	Yegi	1½	12 15 0	Yegifo
75	3	2½ × 1½	2	13 0 0	Yeho	2½	15 0 0	Yehofa

### ROSS XPRES LENS, f/2.9

Equiv. Focus		Plate Covered	Price Iris or Sunk Setting	Code Word Iris Setting	Price in Focussing Mounts	Code Word Focussing Mounts
mm.	in.	in.	£ s. d.	Zuabo	£ s. d.	—
25	1	16 × 12 mm.	8 10 0	Zuabo	—	—
50	2	1 × 2	9 0 0	Zuace	10 10 0	Zuaced
62	2½	1 × 1½	9 15 0	Zuadi	11 5 0	Zuadid
75	3	2 × 1½	10 10 0	Zuafu	12 0 0	Zuafud
144	5½	3½ × 2½ & 4½ × 3½	15 10 0	Zubal	18 0 0	Zubald
165	6½	4½ × 3½ & 5 × 4	17 10 0	Zucem	21 0 0	Zucemd
215	8½	5 × 4 & 6½ × 4½	25 0 0	Zudin	—	—
254	10	6½ × 4½	35 0 0	Zufop	—	—

### ROSS XPRES LENS, f/3.5

Equiv. Focus		Plate Covered	Price in Iris or Sunk Setting	Code Word Iris Setting	Price in Focussing Mounts	Code Word Focussing Mounts
mm.	in.	in.	£ s. d.	Zabse	£ s. d.	Zebune
38	1½	1 × 1½	6 10 0	Zabse	7 12 6	Zabsefo
50	2	1 × 2	6 10 0	Zenar	7 12 6	Zenarfo
75	3	1½ × 1	7 10 0	Zecuno	8 12 6	Zecunofa
90	3½	2½ × 1½	8 0 0	Zecupa	9 10 0	Zecupfo
100	4	2½ × 1½	9 0 0	Zedan	11 0 0	Zedanfo
112	4½	3 × 2½	10 0 0	Zefep	12 5 0	Zefepfo
136	5½	4½ × 3½	11 10 0	Zegir	13 15 0	Zegirfo
152	6	4½ × 3½	12 15 0	Zehos	15 5 0	Zehosfo
165	6½	5 × 4	14 0 0	Zejut	—	—
184	7½	5½ × 3½	16 0 0	Zekav	—	—
254	10	6½ × 4½	30 0 0	Zelew	—	—

In sunk settings for Reflex Cameras at same price as ordinary mounts.

The Special Focussing Mounts are for Hand Cameras of fixed extension.

These special mounts do not admit of between-lens Shutters.

Cost of pairing lenses for Stereoscopic work, 15/-



## THE ROSS XPRES LENS

The Ross Xpres F/4.5 lens combines extreme speed with a quality of definition unequalled in lenses of the same aperture. Its critical definition at full aperture is maintained over the whole of the plate. Faults usually associated with similar lenses such as Ghost, Flare and Coma are totally absent.

### PRICES ROSS XPRES LENS, f/4.5

Equiv. Focus		Plate Covered	Price in Iris or Sunk Setting	Code Word Iris Setting	Price in Focussing Mounts	Code Word Focussing Mounts
mm.	in.		£ s. d.		£ s. d.	
75	3	2 1/2 x 1 1/2	6 5 0	Xasal	—	—
90	3 1/2	3 1/2 x 2 1/2	6 5 0	Xama	—	—
105	4 1/4	3 1/2 x 2 1/2	7 0 0	Xanaf	—	—
112	4 1/2	3 1/2 x 2 1/2	7 0 0	Xapel	8 15 0	Xeptre
120	4 3/4	3 1/2 x 2 1/2	7 0 0	Xalas	8 15 0	Xartra
127	5	4 x 3	7 10 0	Xaqes	—	—
136	5 1/2	4 1/2 x 3 1/2	7 10 0	Xeros	9 10 0	Xestree
140	5 1/2	4 1/2 x 3 1/2	7 10 0	Xemes	9 10 0	Xemtred
152	6	5 x 4	8 10 0	Xines	10 15 0	Xintrop
165	6 1/2	5 1/2 x 3 1/2	10 0 0	Xopos	12 5 0	Xoptemp
184	7 1/2	6 1/2 x 4 1/2	11 0 0	Xugus	13 10 0	Xuqtrrowp
215	8 1/2	7 x 5	14 10 0	Xares	—	—
254	10	8 x 5	20 0 0	Xesis	—	—
305	12	8 1/2 x 6 1/2	29 0 0	Xitos	—	—
360	14	10 x 8	40 0 0	Xustic	—	—
420	16 1/2	10 x 8	50 0 0	Xovus	—	—
533	21	12 x 10	75 0 0	Xuras	—	—

In sunk settings for Reflex Cameras at same price as ordinary mounts.  
The Special Focussing Mounts are for Hand Cameras of fixed extension.  
These special mounts do not admit of between-lens Shutters.  
Cost of pairing lenses for Stereoscopic work, 15/-

### THE f/4 WIDE ANGLE ROSS XPRES LENS

The angle embraced by this lens is 80° and the definition is maintained from centre to margin at full aperture. Designed for special aerial surveying, it is eminently suitable for all classes of work where critical definition, together with large aperture and great covering power are required.

Equiv. Focus	Plate Covered at Full Aperture	Price	Code Word Iris Setting	Code Word In Special Mounts with Long Screw threads and Clamping Flanges
in.	in.	£ s. d.		
5	5 x 4 or 6 1/2 x 4 1/2	14 0 0	Wafs	Wafaf
6	6 1/2 x 4 1/2 or 8 x 5	15 10 0	Wags	Wagaf
7	7 x 7 or 8 x 5	21 0 0	Wais	Waaf
8 1/2	9 x 7	24 10 0	Wals	Walaf
10	10 x 8	33 0 0	Wams	Wamaf
12	12 x 10	46 0 0	Waps	Wapaf
14	15 x 12	67 0 0	Wars	Waraf
20	22 x 18	125 0 0	Wass	Wasaf

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# THE ROSS TELEROS LENSES



These lenses can definitely be claimed to be the finest of their type. The Teleros F/5.5 (Two Power) and F/6.3 (Three Power) give an image rather more than twice or three times as large respectively as that of an ordinary lens from the same viewpoint. Giving critical definition they are perfect for high speed photography of inaccessible objects and those difficult to approach.

### PRICES ROSS TELEROS LENS, f/5.5 (Two Power)

Equiv. Focus	Size Plate	Flange Inside dia.	Length Over-all	Infinity Back Cell to Screen	Back Cell to Flange	Price in Iris Setting	Code Word
in. 6½	2 ⅞ × 1½	1½	1 ⅞	3½	in. 1 ⅞	£ 10 0 0	Tilau
9	3½ × 2	1	2 ⅞	4½	1 11/16	11 10 0	Tilba
11	4½ × 3¼	1 1/8	3 ⅞	5 ⅞	1 ⅞	14 0 0	Tilce
12	5 × 4	1 ¼	3 ⅞	5 ⅞	1 ⅞	15 5 0	Tildi
13	5½ × 3½	2	3 ⅞	6 ⅞	1 ⅞	16 15 0	Tilfo
17	6½ × 4½	2½	4 ⅞	8	1 ⅞	27 10 0	Tilgu
22	8½ × 6½	3	6 ⅞	10	2 ⅞	47 0 0	Tilhe
40 f/8	8½ × 6½	3½	10 ⅞	20	3 ⅞	85 0 0	Tilji



### Mounted in Focussing Settings.

Equiv. Focus	Flange Sizes	Price	Code Word
in. *4	1½	£ 8 10 0	Tilica
6½	1½	12 10 0	Tilaus
9	1½	14 0 0	Tilhas
11	2	17 10 0	Tiljes
12	2½	18 15 0	Tilkis
13	2½	20 5 0	Tillos

### Teleros Lenses in Iris Settings with threaded back cells for screwing into shutters.

Equiv. Focus	Compur
in. 6½	No. 00-0
9	" 0S
11	" 1S
12	" 1S
13	" 2-4/1
17	" 3-6/1

\* In Leica Setting, complete with hinged finder mask.

### ROSS TELEROS LENS, f/6.3 (Three Power)

Equi. Foc.	Plate Covered	Flange Inside Dia.	Length Over-all	Infinity Back Cell to Screen	Back Cell to Flange	Price in Iris Setting	Code Words	Shutters Suitable
in. 9	2½ × 1½	1½	3 ⅞	3 ⅞	in. 1 ⅞	£ 11 10 0	Triras	1 Compur
13	3½ × 2½	1½	4 ⅞	4 ⅞	1 11/16	14 10 0	Triret	2/5 "
17	4½ × 3½	2	5 ⅞	6 ⅞	1 ⅞	22 0 0	Tririo	compound
25	6½ × 4½	2½	8 ⅞	8 ⅞	1 ⅞	47 0 0	Trirov	5

Prices in focussing settings on application.



## THE ROSS HOMOCENTRIC LENSES

The Homocentric Lenses are excellent anastigmats, suitable for practically all branches of photography. The smaller sizes are most popular for small hand cameras. The single components of the F/6.3 and F/8 lenses give very good results with a medium stop.

### PRICES

#### ROSS HOMOCENTRIC LENS, f/6.3

Equiv. Focus		Plate Covered		Flange Sizes	Price in Iris Setting	Code Word
		Full Aperture	Medium Stops			
mm.	in.	in.	in.	in.	£ s. d.	
127	5	4½ × 3½	5 × 4	1½	5 10 0	Heath
140	5½	4½ × 3½	6 × 5	1½	5 15 0	Hebra
152	6	5 × 4	6½ × 4½	1½	6 2 6	Hector
165	6½	5½ × 3½	7 × 5	1½	6 12 6	Hecat
178	7	6½ × 4½	7½ × 5	1½	7 2 6	Hedon
218	8½	7½ × 5	8½ × 6½	2	9 2 6	Heeg
254	10	8½ × 6½	10 × 8	2½	12 15 0	Hefra
305	12	10 × 8	12 × 10	2½	18 15 0	Hebron
380	15	12 × 10	15 × 12	3½	26 5 0	Hehlor

#### ROSS HOMOCENTRIC LENS, f/8

Equiv. Focus		Plate Covered		Flange Sizes	Price in Iris Setting	Code Word
		From	To			
mm.	in.	in.	in.	in.	£ s. d.	
178	7	6½ × 4½	8½ × 6½	1½	6 15 0	Hida
218	8½	7½ × 5	10 × 8	1½	8 5 0	Hiendel
254	10	8½ × 6½	12 × 10	2	11 0 0	Hiffar
305	12	10 × 8	15 × 12	2½	15 0 0	Higor
380	15	12 × 10	18 × 16	2½	20 0 0	Hihone
455	18	13 × 11	22 × 18	3½	28 0 0	Hikur
533	21	15 × 12	25 × 22	3½	37 0 0	Hileh
610	24	18 × 16	30 × 24	4	47 0 0	Himal

Special Focussing Mounts, provided with Iris Diaphragm, are supplied at a small extra cost for use with Cameras of fixed extension. These special mounts do not admit of between-lens shutters.

Cost of pairing two Lenses for Stereoscopic Work, 15/-



## THE ROSS PROCESS XPRES LENS AND REVERSING PRISMS FOR LINE, HALF-TONE AND THREE-COLOUR WORK.

The Process Xpres Lens has been specially designed to meet the most exacting requirements of all branches of modern process work. It is unrivalled for three-colour photography and the finest line and half-tone work.

### PRICES

Focus		Aperture	Plate covered at full aperture copying same size	Price			Code Word	Prism No.
mm.	in.			£	s.	d.		
330	13	F/9	13 × 9	15	0	0	Phaba	1
406	16	F/10	15 × 12	20	0	0	Phace	1a
460	18	F/10	18 × 13	24	0	0	Phadi	2
530	2 1/4	F/10	20 × 16	28	0	0	Phafo	3
635	2 5/8	F/10	25 × 18	38	0	0	Phagu	4
760	30	F/16	30 × 20	48	0	0	Pheha	4
914	36	F/16	36 × 24	68	0	0	Pheje	5
1066	42	F/16	40 × 30	87	0	0	Pheli	6
1130	48	F/16	45 × 36	110	0	0	Phemo	6

\* A Lens is required with a Reversing Prism add the letter "P" to code-word for Lens.

### ROSS REVERSING PRISMS for Photo-Mechanical Work

These Prisms are made of carefully annealed colourless crown glass and are accurately rectangular. The mount of the Prism screws directly to the hood of the lens, bringing one of the non-reflecting surfaces close up to the front lens. The Prism is thus used to full advantage. The Hypotenuse surfaces are silvered to ensure complete reflection. To obtain accurate centering it is necessary to send your lens when ordering.

### PRICES of Prisms mounted in Metal Box with revolving collar.

No.	Length and Breadth of non-reflecting surfaces		Price			Code Word
	in.	mm.	£	s.	d.	
1	2 1/4	65	18	0	0	Promote
1a	2 1/2	70	22	0	0	Promost
2	3	75	26	0	0	Promont
3	3 1/4	80	30	0	0	Promove
4	3 1/2	90	38	0	0	Prompt

Prices for Achromatic Lens of similar foci for colour work and Prisms of larger size on application.



# THE ROSS EPIDIASCOPE



**T**HE vast experience of Ross Ltd. has enabled them to produce a most efficient Epidiascope at a reasonable price, and embodying many exclusive features which place this instrument in a class by itself.

The lenses are of the finest optical quality and give perfect definition. A new system of illumination and ventilation enables the most valuable and delicate specimens to be shown without fear of damage by heat.

Opaque objects and lantern slides are projected with equal brilliance, whilst the placing and withdrawing of opaque objects is most easily effected.

The change over from episcopic to diascope projection is very simple and effected almost immediately.

A metal pointer with universal adjustment allows the lecturer to draw attention to any part of the object shown whilst still operating the instrument.

When the instrument is tilted, critical definition is easily secured by the adjustment of a screw on the front of the lamphouse.

## THE PRICE

"Ross" Epidiascope with Condensers, Mirrors, 10½ ins. focus large aperture diascope and 17 ins. ditto episcopic projection lenses, Slide Carrier for either English or Continental size lantern slides, Table Stand, complete but without projection Lamp is

**£35 10 0**

Extra for: 500-Watts Lamp . . . . . £1 5 0  
1000-Watts Lamp . . . . . £1 12 0

Descriptive and illustrated booklet sent post free on application

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## THE ROSS STANDARD REFLEX CAMERA

This camera is of the highest quality and best workmanship throughout. It is fitted with every adjustment necessary for the finest reflex work but has no elaborate and unnecessary movements to complicate the working of the camera and get out of order.

Among several special features is the focal-plane shutter. With this shutter the various speeds are obtained by simply altering the width of the slit.

Complete details and specification on application.

### PRICES

	3½ × 2½ 5 in. lens	½-plate 5½ in. lens	Post-card Size, 6 in. lens	5½ × 3½ with Stereo attach- ment and 2 5 in. lenses	5 × 4 6 in. lens	½-plate 8½ in. lens
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Camera with 3 Solid Slides, no lens	23 10 0	23 10 0	27 0 0	30 0 0	30 0 0	40 0 0
With Ross Xpres, f/2.9...	5½" lens 39 0 0	6½" lens 41 0 0	—	—	—	—
Code Words...	Minilex	Refbex	—	—	—	—
With Ross Xpres, f/3.5...	5½" lens 35 0 0	6½" lens 37 10 0	6½" lens 41 0 0	—	7¼" lens 46 0 0	10" lens 70 0 0
Code Words...	Minimop	Refjut	Refjas	—	Refkav	Reflyj
With Ross Xpres, f/4.5...	4½" lens 30 10 0	—	6½" lens 37 0 0	—	6½" lens 40 0 0	—
Code Words...	Minileg	Refule	Refews	45 15 0	Refnok	54 10 0
With Ross Homocentric Lens, f/6.3	29 0 0	29 5 0	33 2 6	41 15 0	36 2 6	49 2 6
Code Words	Miniflap	Reflap	Reflate	Refster	Reffloor	Reffloat
Solid D.D. Slides, each	0 15 0	0 15 0	0 18 6	0 18 6	0 18 6	1 7 6
Book-Form Slides, each	1 10 0	1 10 0	2 0 0	2 0 0	2 0 0	2 10 0
For Swing Front, extra	3 8 6	3 8 6	3 15 0	3 15 0	4 5 0	4 15 0
Changing Box for 12 plates	4 5 0	4 5 0	5 0 0	5 0 0	5 0 0	5 17 0
Film-pack Adaptor	1 15 0	1 15 0	2 2 6	2 2 6	2 2 6	2 16 0
Antinous Release, extra	0 5 6	0 5 6	0 5 6	0 5 6	0 5 6	0 5 6

New Shutter Release Time Valve, 40/-  
Stereo Focussing Magnifier, fits hoods of all cameras, £1 1s. 0d.

The post-card size cameras are not fitted with reversing back.

L. & R. Cases for any outfit to order.

Prices for Continental sizes post free on application.



## ROSS EXTRA WIDE FIELD



## STEREO PRISM BINOCULAR

MAGNIFICATION 7 DIAMETERS "STEPNITE"

"STEPNITE" has been specially designed for use at dusk and for observation at night.

The light transmitting power is very greatly in excess of that of any prism binocular previously made, and by reason of large prisms and lenses and eyepieces of special design, the illumination at margins of field is 137 per cent. greater than that obtained with other binoculars of the same power and aperture. Further, the central illumination is fully 20 per cent. greater and the perfect definition is maintained over practically the whole field, whereas in other types of binoculars the definition falls off rapidly towards the margins of field. These qualities of great luminosity and critical definition at margins of field make this binocular unsurpassable for the use of officers of the Navy and Mercantile Marine, Yachtsmen, Huntsmen, Sportsmen, Surveyors and others.

With "Stepnite" objects can be picked up and clearly seen immediately they enter the field of vision, whereas generally these objects escape notice altogether.

Effective diameter of		Stereoscopic Power	..	14
Object Glasses 50 mm.		Weight of Binocular	..	34 oz.
Real Field of View	.. 7°	Price	..	£21 10 0
Linear per 1,000 yards	.. 122	Code Word	..	"Stepnite"
Description and Illustrated booklet of other models and of telescopes post free on request.				

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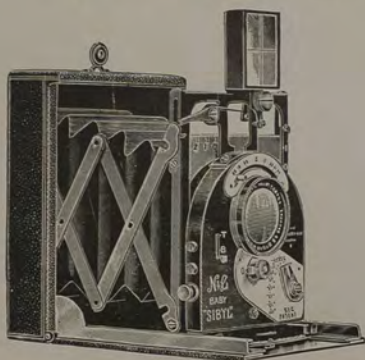
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N & G

“BABY” SIBYL



THE FIRST AND STILL THE BEST  
MINIATURE CAMERA.

Full Vertical and Horizontal rise.

“N & G” Shutter, with Accurate Speeds.

$\frac{1}{2}$  sec. to  $\frac{1}{200}$ th sec.

Accurate focussing scale.

Weight of plate model, 9 ozs. only.

*Complete Catalogue of Cameras and Sundries Post Free.*

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# "N & G"

## "SIBYL" CAMERAS.

For Plates and Film Packs or Roll Films.  
THE "BABY SIBYL,"  $4\frac{1}{2} \times 6$  c.m.  
The "NEW SPECIAL" and "SIBYL  
VITESSE"  $3\frac{1}{2}$  in.  $\times$   $2\frac{1}{2}$  in., or  $6\frac{1}{2} \times 9$  c.m.

THE NEW IDEAL  $\frac{1}{4}$  plate.

THE "SIBYL EXCELSIOR" Roll Film.  $4\frac{1}{2}$  in.  $\times$   $2\frac{1}{2}$  in.

All "SIBYL" Models are fitted with lenses of F4.5 aperture, except the "Vitesse," which is fitted with F3.5 lens.

They are **LIGHT, COMPACT** and **ACCURATE**, are of all metal construction, covered in the best Morocco Leather, with finest leather Bellows.

**THE "N & G" HIGH PRECISION SHUTTER.** An exclusive "SIBYL" feature. Every speed is guaranteed correct to within 10% of scale. The range of speeds is from  $\frac{1}{2}$  to 1/200th of a second, on Baby "Sibyl" models;  $\frac{1}{4}$  to 1/150th on  $3\frac{1}{2}$  in.  $\times$   $2\frac{1}{2}$  in. models; and  $\frac{1}{2}$  to 1/100th on the  $\frac{1}{4}$  plate models. Also time and bulb movements.

**THE SHUTTER** on the new "EXCELSIOR" and "VITESSE" models is of "N & G" design, embodying new principles, giving a unique range of Accurate Speeds from 2 Seconds to 1/150th second; also positive Ball and Time movements when shutter is set at any speed.

**FOCUSING.**—"N. & G." patent lever focussing is fitted to all "Sibyl" models, all distances are individually scribed for each Camera, are well separated, and clearly engraved in yards.

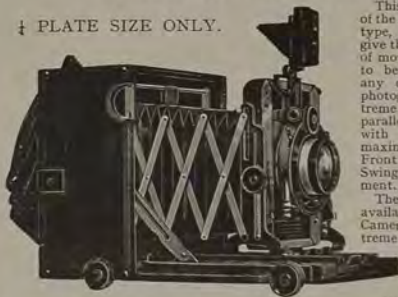
**THE "N & G" PATENT FOLDING REFLECTOR FINDER** is fitted to all "Sibyl" models, save only the "Baby Sibyl" plate model. This finder has a sliding lens, accurately scaled to show rising front, and is fitted with levels.

**FULL RISING FRONT**, both horizontal and vertical, is provided on all models.

**TELE-PHOTO LENSES** of the Dallmeyer "Dallon" and Ross "Teleros" type can be fitted to all "Sibyl" models.

## "TRELLIS" CAMERA.

$\frac{1}{4}$  PLATE SIZE ONLY.



This apparatus is of the Hand or Stand type, designed to give the fullest range of movements likely to be required for any description of photography. Extreme rigidity and parallelism of front with plate. The maximum of Rising Front and Central Swing Front movement.

The extension available on this Camera, and the extreme rigidity of same as a whole, at all positions, are its special features.

Price of "N & G" "Trellis" Camera, complete with three double dark slides, but without Lens or Shutter,  $\frac{1}{4}$ -plate Camera, complete with three double dark slides, fitted with "N & G" "Excelsior" Shutter and No. 7 Ross Combinable Lens—6" and  $10\frac{1}{2}$ " foci ... .. £20 0 0

... .. 47 0 0



**"N & G"**

**PATENT  
FOLDING REFLEX.**

Manufactured in Two  
Models:—

**SPECIAL.** F/2.9 and  
F/3.5 Lenses.

**STANDARD.** F/4.5  
Lenses.

ONE SIZE ONLY.

$3\frac{1}{2} \times 2\frac{1}{2}$ " or  $6\frac{1}{2} \times 9$  c.m.

The product of over  
thirty years' experience  
in the design and con-  
struction of the best.

The Camera is finished  
in the usual "N & G"  
style; to previous users of  
our apparatus no more  
need be said, it is simple and  
straightforward to manip-  
ulate and is by far the most  
practical and successful  
Folding Reflex on the  
market.



Standard  
Model.

**CAMERA OPEN.**—Is as rigid as a Box Form Reflex. Focussing by means of focussing mount on each lens supplied. The camera is entirely self-contained, with no projections, a long handle being provided.

**SHUTTER.**—The "N & G" Self-capping, quick wind focal plane shutter is fitted. Speeds from 1/10 to 1/800th of a second, with ball and time.

**THE MIRROR** is very light, free from noise and vibration; all movements are of the finest steel to eliminate wear.

**THE RELEASE** is on left side of camera, leaving right hand free for focussing, and is delicate, yet positive. Antinous or pneumatic releases can be supplied.

**THE REVOLVING BACK** is adapted to take either "N & G" double book-form metal slides, "N & G" film pack adapter, roll holder, or "N & G" changing boxes.

**RIISING, FALLING AND HORIZONTAL SWING FRONT** movements are provided in Standard Model only.

**LENSES.**—Only the highest grade British Lenses are fitted of F/4.5 aperture, and  $5\frac{1}{2}$  in. focal length in the Standard Model, and F/2.9 and F/3.5 of approx.  $5\frac{1}{2}$  in., in the Special Model. These are quickly interchangeable with large aperture fixed focus telephoto lenses, of the Ross F/5.5 "Teleros" and Dallmeyer F/5.6 "Dallon" type, by means of the "N & G" quick change lens flange.

**MAGNIFIER LENSES** in hood, folding inside. A Tripod Bush is provided. The Standard Model weighs only 3 lbs. 8 ozs., complete with F/4.5 lens. Duralumin body-work, and in other parts where possible the Camera is absolutely climate proof.

## PRICES. PATENT FOLDING REFLEX.

Camera complete with 3 "N & G" Double Metal Book Form Dark Slides, Dark Slide Adapter, and Hooded Focussing Screen.

	£	s.	d.
<b>STANDARD MODEL.</b>			
Fitted with Ross F/4.5 Xpres Lens, 5½ in. ... ..	47	10	0
Fitted with Dallmeyer F/4.5 Serrac Lens, 5½ in. ... ..	47	0	0
Dallmeyer F/5.6 Dallon Telephoto Lens, 10 in. focus ... ..	15	10	0
Ross F/5.5 Teleros Lens, 11 in. focus ... ..	18	5	0
<b>SPECIAL MODEL.</b>			
Fitted with Ross F/2.9 Xpres Lens, 5½ in. ... ..	57	0	0
Fitted with Dallmeyer F/2.9 Pentac Lens, 5½ in. ... ..	56	0	0
Fitted with Ross F/3.5 Xpres Lens, 5½ in. ... ..	53	0	0
Fitted with Dallmeyer F/3.5 Dalmac Lens, 6 in. ... ..	51	0	0
Ross F/5.5 Teleros Lens, 11 in. focus ... ..	18	10	0
Dallmeyer F/5.6 Dallon Telephoto Lens, 10 in. focus ... ..	15	15	0

## "SIBYL" CAMERAS.

**PLATE MODELS, complete with 3 "N & G" Metal Double Dark Slides and Focussing Screen.**

Lens.	Baby 4½ × 6 c/m	New Special 3½ × 2½ or 6½ × 9 c/m	New Ideal ½-plate or 4½ × 3½
Ross F4.5 Xpres ... ..	£19 5 0	£23 0 0	Double Dark Slides cannot be supplied
T.T. and H. F4.5 Sibyl Aviar ... ..	19 5 0	—	
Dallmeyer F4.5 Serrac ... ..	18 10 0	22 5 0	
Wray F4.5 Lustrar ... ..	17 10 0	21 5 0	
<b>The New "Sibyl Vitesse."</b>		3½ × 2½ in. or 6½ × 9 c/m.	
Ross F/3.5 Xpres Lens ... ..		£30 0 0	
Dallmeyer F/3.5 Dalmac Lens ... ..		28 0 0	

**PLATE MODELS, complete with 6 Single Metal Dark Slides, instead of Double Dark Slides.**

Ross F4.5 Xpres ... ..	Single Dark Slides cannot be supplied	£21 10 0	£25 0 0
T.T. and H. F4.5 Sibyl Aviar ... ..		—	25 0 0
Dallmeyer F4.5 Serrac ... ..		20 10 0	24 5 0
Wray F4.5 Lustrar ... ..		19 10 0	23 5 0

### ROLL FILM MODELS.

**The New "Sibyl Excelsior."** 4½ × 2½

Ross F4.5 Xpres ... ..	£29 10 0
T.T. and H. F4.5 Sibyl Aviar ... ..	29 10 0
Dallmeyer F4.5 Serrac ... ..	28 15 0

Lens.	Baby 4½ × 6 c/m.	New Special 3½ × 2½ or 6½ × 9 c/m	New Ideal ½-plate or 4½ × 3½
Ross F4.5 Xpres ... ..	£19 15 0	£23 0 0	£26 0 0
T.T. and H. F4.5 Sibyl Aviar ... ..	19 15 0	—	26 0 0
Dallmeyer F4.5 Serrac ... ..	19 0 0	22 5 0	25 5 0
Wray F4.5 Lustrar ... ..	18 0 0	21 5 0	24 5 0

**TELE-PHOTO LENSES for use with "Sibyl" Cameras.**

Dallmeyer F6.5 Dallon ... ..	(5½ in.) £5 10 0	(9 in.) £8 12 6	(10½ in.) £10 10 0
Ross F5.5 Teleros ... ..	(6½ in.) 10 10 0	(9 in.) 12 5 0	(11 in.) 14 15 0

# KODAK

## FOREMOST IN PHOTOGRAPHY

*A world-wide organization at the service of Amateur and Professional Photographers, Photo-finishers, Photo-mechanical Workers and Cinematographers at home and abroad*

### BRANCHES OF KODAK LTD. IN THE BRITISH ISLES

- LONDON** - - - - Kodak House, Kingsway,  
London, W.C.2  
184-186 Regent Street, W.1  
43 Kensington High Street, W.8  
59 Brompton Road, S.W.3  
96 Victoria Street, S.W.1  
91 Bishopsgate, E.C.2
- BIRMINGHAM** - - - 45 Corporation Street, 2
- LIVERPOOL** - - - - 70 Lord Street, 2
- NEWCASTLE-ON-TYNE** - 32 Grainger Street, 1
- GLASGOW** - - - - 46 Buchanan Street, C2
- DUBLIN** - - - - 89 Grafton Street, C3

**Kodak****KODAK COVERS THE WORLD**

ASSOCIATED COMPANIES IN 44 COUNTRIES

ALGERIA	DENMARK	HUNGARY	POLAND
ARGENTINE	DUTCH EAST	INDIA	PORTUGAL
AUSTRALIA	INDIES	ITALY	ROUMANIA
AUSTRIA	EAST AFRICA	JAPAN	SOUTH AFRICA
BELGIUM	EGYPT	JUGOSLAVIA	SPAIN
BRAZIL	FRANCE	MEXICO	STRAITS
CANADA	GERMANY	NEW ZEALAND	SETTLEMENTS
CHILI	GREAT BRITAIN	PALESTINE	SWITZERLAND
CHINA	GREECE	PANAMA	SYRIA
COLOMBIA	HAWAIIAN	PERU	TURKEY
CUBA	ISLANDS	PHILIPPINE	UNITED STATES
CZECHOSLOVAKIA	HOLLAND	ISLANDS	URUGUAY

**KODAK COVERS THE PHOTOGRAPHIC WORLD**

APPARATUS AND MATERIALS FOR PHOTOGRAPHY IN ALL ITS BRANCHES :

Kodak Regular Film  
 "Verichrome" Film  
 Super Sensitive Panchromatic Film  
 "Panatomic" Film  
 Ciné-Kodak Film (8 mm. and 16 mm.)  
 Kodak X-Ray Film  
 "Kodaline" Film  
 Kodak 35 mm. Motion Picture Film  
 Eastman Flat Films  
 "Velox" Gaslight Paper  
 Kodak Bromide Papers  
 Kodak Warm Black Papers  
 "Kodatone" Daylight Paper

"Kodaks" and "Brownies"  
 Professional Studio Cameras  
 X-Ray Cameras and Accessories  
 Ciné-"Kodak" and "Kodascopes"  
 (8 mm. and 16 mm.)  
 Ciné-"Kodak" and "Kodascope"  
 Accessories  
 Kodak Anastigmat Lenses  
 Developing and Printing Apparatus  
 Wratten Filters  
 Wratten Dark Room Lamps  
 Kodak Tested Chemicals  
 Kodak Mounts and Albums



KODAK WORKS HARROW, ENGLAND

# Foremost in Photography

## SOME KODAK SERVICES

Research Laboratory  
 Medical Cinematography  
 "Kodascope" Home Movie  
 Library  
 Technical Advice  
 "Kodak Magazine"  
 Handbooks on Photography



KODAK WORKS, HARROW, ENGLAND.



KODAK WORKS, HARROW, ENGLAND.

There are three great Kodak Factories within the British Empire :

GREAT BRITAIN	-	Harrow, Middlesex
CANADA	- - -	Toronto
AUSTRALIA	- - -	Abbotsford, Melbourne

The Kodak Factory at Harrow is the second largest photographic works in the world. (The Kodak Factory at Rochester, New York, U.S.A. is the largest).

The Harrow Factory covers 14 acres of floor space, and with the English distributing organisation gives employment to about 4,000 British employees.

**Kodak**

**T**HE world's largest photographic factories and most complete selling and servicing organization provide you with the world's finest range of photographic equipment.

50 years of experience and research are built into every Kodak product.

## **KODAK PIONEER WORK**

Kodak have been responsible for

- the first daylight loading camera
- the first daylight loading roll film
- the first 35 mm. motion picture film
- the first super sensitive panchromatic emulsion for motion picture work
- the first sub-standard (16 mm.) ciné film, camera and projector
- the first natural-colour sub-standard ciné film
- the first 8 mm. ciné film, camera and projector

# Foremost in Photography

THE multifarious range of Kodak-made products obviously cannot receive full treatment in these pages. We have therefore selected certain leading items representative of different divisions of Kodak activities—amateur, professional, photo-mechanical, photo-finishing and ciné.

But Kodak do more than make and supply photographic equipment; they offer service based on unique experience. The nearest Kodak House will give authoritative technical advice on any aspect of photography or cinematography, freely placed at your disposal by Kodak Experts.

Kodak Dealers throughout the world carry stocks of Kodak Supplies and will be pleased to pass on enquiries to the appropriate department.

Kodak Ltd., Kodak House, Kingsway, London, W.C.2

# Kodak

## “BROWNIES”

In snapshot language, “Brownie” stands for “Perfect Simplicity.” And never have there been better “Brownies” than to-day. The current models are smaller (because they take the latest-type all-metal 620 spool) and smarter than their predecessors.

Details have been further improved; the viewfinders are larger and give a more brilliant image.

Six-20 “Brownie” with its Landscape, Group and Close-up settings reaches new standards of versatility for a box-type camera.

Kodak workmanship, Kodak quality, for as little as—

Six-20 “Brownie” Junior	..	8/6
Six-20 “Brownie” Junior Super Model	.. .. .	15/-
Six-20 “Brownie”	.. .. .	21/-





# Foremost in Photography

## “KODAKS”

Folding hand cameras for every purse and purpose. Simple and advanced.

STANDARD SIZE AND MINIATURE

*with every type of lens—every type of shutter—  
for every type of picture*

Precision made, as befits the products of the largest photographic factories in the world; compact, carefully finished, good to look at, quick and easy to handle, fine makers of fine pictures.

There are “Kodaks” from **39/6**.

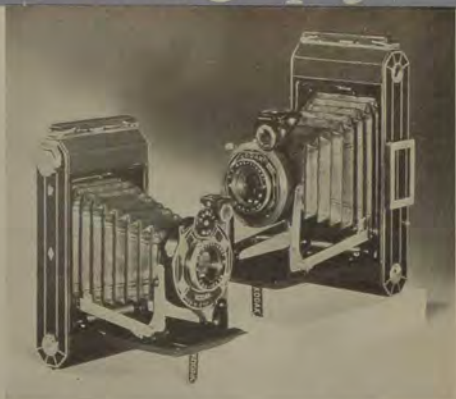
Kodak manufacturing resources enable high power Anastigmat Lenses to be fitted on low priced models. There are *f*6.3 “Kodaks” from **55/-**; *f*4.5 “Kodaks” from **£5.5.0**. Details on following pages.

Kodak Ltd., Kodak House, Kingsway, London, W.C.2

# Foremost in Photography

## KODAKS™

Finest, neatest, most luxuriously equipped "Kodaks" taking standard-size pictures.



### SIX-20 and SIX-16 "KODAKS"

( $3\frac{1}{2} \times 2\frac{1}{2}$  in.)

( $4\frac{1}{2} \times 2\frac{1}{2}$  in.)

CHOICE OF LENSES

Powerful K.S. Anastigmat  $f6.3$  or  $f4.5$ . Lens-mount focussing  $3\frac{1}{2}$  feet to 'infinity.'

CHOICE OF SHUTTERS

Three-speed O.V.; Three-speed O.P.S. (delayed-action); Eight-speed "Compur" (delayed-action).

TWO FINDERS

Waist-level—reversible reflecting. Eye-level—spring-open direct vision.

TWO TRIPOD SOCKETS

Plugged with dust-excluding screws.

SAFETY COVER

For red window; allows "Panatomic" and Kodak Super Sensitive Panchromatic Film to be used without risk of fogging.

FILM

The number of the film is indicated by the name of the camera. SIX-20 "Kodak" takes Kodak Film No. 620 and SIX-16 "Kodak" takes Kodak Film No. 616 in each of the four famous Kodak Grades: "Verichrome", "Panatomic", Super Sensitive Panchromatic and Regular.

From - - £3 : 12 : 6

Kodak



## The "RETINA"

A new high-precision Miniature Camera taking 35 mm. film at a record low price

**£10 10 0**

Wide aperture Schneider "Xenar"  $f3.5$  Lens in "Compur" Shutter—both fully protected when camera is closed.

Takes 36 exposures at a single loading.

Daylight loading and unloading with new Kodak 35 mm. film cassette— $3/6$  for 36 exposures—"Panatomic", or Super Sensitive Panchromatic.

Very easy to use.

Exposure Counter indicates at a glance how many pictures have been taken.

Film automatically stopped in the right position for each successive exposure—no red window to watch.

Depth of Focus scale.



# Kodak

## CINÉ-"KODAK" EIGHT

provides *maximum running time for minimum film outlay.*

The unique principle by which the film is made to go four times as far as in an ordinary ciné camera results in running costs being cut nearly two thirds.

Ciné-"Kodak" Eight Film costs 10s. per roll, sufficient for 25-30 separate scenes. As Kodak do the processing free and pay return postage, it means that, with the Ciné-"Kodak" Eight you can make clear sparkling movies of holidays, family, friends, for 6d. a scene or less.

### CINÉ-"KODAK" EIGHT

pocket-size spring-driven camera, holds 25 ft. Ciné-"Kodak" Eight Film (equivalent in running time to 100 ft. 16 mm. film). Direct vision view-finder; self-setting footage meter, built-in exposure guide.

With Kodak Anastigmat <i>f</i> 3.5 (fixed focus) .. .. .	£9 17 6
With Kodak Anastigmat <i>f</i> 1.9 (focussing) .. .. .	£15 0 0

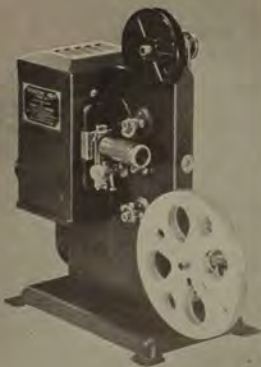
### "KODASCOPE" EIGHT-30

Home Projector for Ciné-"Kodak" Eight pictures. Plugs straight into house electric circuit, 100-150 or 200-250 volts, throws brilliant steady pictures up to 30 x 22 inches. Holds 200 ft. 8 mm. film—16 minutes running time. .. .. .

### "KODASCOPE" EIGHT-80

De Luxe 8 mm. projector; 300 watt lamp gives powerful illumination; motor driven fan; rewind; table lamp can be plugged in for use alternately with projection lamp under single switch control. Including Resistance

£33 0 0



# Foremost in Photography

## 16 mm. CINÉ-"KODAK" APPARATUS

CINÉ-"KODAK" B.B. JUNIOR

Lens:  $f3.5$  (fixed focus) or  $f1.9$  (focussing, takes black-and-white and "Kodacolor" pictures).

Holds 50 ft. of film; spring-motor driven. Direct-vision finder; footage indicator; built-in exposure guide.

With  $f3.5$  lens .. £13 13 0

With  $f1.9$  lens .. £18 18 0

## "KODASCOPE" MODEL D

Powerful 300 watt lamp gives brilliant projection qualities. Holds 400 ft. 16 mm. film (about 16 minutes showing time). Plugs straight into any house circuit 100-250 volts. High-speed rewind; motor driven fan.

Including Supplementary all-voltage Resistance. £25 0 0

For particulars of more advanced 16 mm. apparatus—

CINÉ-"KODAK" MODEL K

and

"KODASCOPES" MODELS K50, K75,  
and L.

write for descriptive leaflets



# Kodak



CINÉ -  
"KODAK"  
SPECIAL

The world's  
finest camera  
for 16 mm.  
filming.

With a versatility of performance comparable only with that of the big professional film studio cameras, the Ciné-"Kodak" Special enables the innumerable devices of 35 mm. technique to be enjoyed at 16 mm. running costs. Double Exposure, Lap Dissolves, Fades, Slow Motion—all the means to advanced cinematography are made available to amateur ciné societies, doctors, physicists, engineers, athletic instructors, and everyone who, for business or pleasure, wants to do something more than straightforward filming.

Even a bare outline of the Ciné-"Kodak" Special's features and possibilities would occupy too much space here, but we will gladly send a fully descriptive illustrated brochure if you are interested in knowing more about this ciné masterpiece.

# Foremost in Photography

## CINÉ-KODAK FILM

Modern Cinematography began when Kodak produced the first celluloid film in 1889.

For well over 40 years Kodak has been the world's leading producer of Professional Film, and four years ago Kodak *Super Sensitive Panchromatic* Film revolutionised studio technique.

Kodak originated 16 mm. and 8 mm. Amateur Cinematography and Amateur Cinematography in Natural Colours ("Kodacolor").

## ADVANTAGES OF REVERSAL FILM

All Ciné-Kodak Film—16 mm. Black and White, "Kodacolor" and 8 mm.—is *Reversal* Film. Reversal Film has two very important advantages which led to its adoption by Kodak for all Amateur Movie Films :

**FINE GRAIN** The larger grains of silver are bleached out in reversal ; this means finer quality, more brilliance, and allows bigger pictures to be projected.

**AUTOMATIC COMPENSATION** for exposure errors ; mistakes are corrected by an exclusive Kodak device when the film is being processed.

You enjoy both these considerable advantages with Ciné-Kodak Film.

## WORLD ORGANIZATION FOR CINÉ-KODAK FILM USERS

In whatever country they may be, travellers and tourists can always get prompt processing service from the nearest establishment in the world-wide chain of Ciné-Kodak Film Processing Stations.



# Kodak



PORTRAIT BY HOUSTON-ROGERS OF LONDON ON  
EASTMAN SUPER SENSITIVE PANCHROMATIC FILM

# *Foremost in Photography*

## PROFESSIONAL SUPPLIES

THE man who lives by photography has the highest possible claim to the best that knowledge, skill and experience can give him in the shape of equipment for his work.

Make Kodak materials standard throughout your business and you will be able to give free play to the creative expression that satisfies—and is profitable.

The Kodak range of supplies for professional and commercial photographers covers their requirements in every minute particular. We can fit out a complete studio and darkroom from a 12 × 10 in. stand camera down to the last measuring jug; from an anastigmat lens to a card index system for keeping studio accounts. Films, papers, chemicals, mounts, and an immense number and variety of Sundries find a place in the 212 page Kodak Catalogue of Professional Apparatus and Materials.

A request on business letter heading will bring a copy to any professional photographer.

Kodak Ltd., Kodak House, Kingsway, London, W.C.2

# Kodak

## EASTMAN PROFESSIONAL FILM

The Standard Sensitive Material for every kind of Portraiture and Commercial Work in Daylight or Artificial Light.

### EASTMAN PORTRAIT FILM

Par Speed: Rapid emulsion, suitable for average conditions.

Super Speed: Extremely rapid emulsion for brief exposures in poor light. Double coated.

### EASTMAN PORTRAIT PANCHROMATIC FILM

### EASTMAN SUPER SENSITIVE PANCHROMATIC FILM

Two films that combine extremely high speed with complete colour sensitivity.

Eastman Portrait Panchromatic is evenly sensitive to all colours and is recommended for portraiture.

Eastman Super Sensitive Panchromatic is exceptionally sensitive to red, and is most useful for commercial work.

### EASTMAN COMMERCIAL PANCHROMATIC FILM

Completely colour sensitive. Useful for commercial work where extremely high speed is not required.

### EASTMAN COMMERCIAL ORTHO FILM

Suitable for all kinds of work requiring general, but not red, sensitiveness.

### EASTMAN COMMERCIAL FILM

A slow, fairly-contrasty emulsion for copying.

# Foremost in Photography

## KODAK BROMIDE PAPERS

*The list that follows reveals their rich variety.*

Nearly every grade is made in Single and Double Weights and in three degrees of Contrast.

"NIKKO"  
VELVET

PLATINO MATTE SMOOTH  
PLATINO MATTE NATURAL  
PLATINO MATTE ROUGH  
PERMANENT SMOOTH  
PERMANENT ROUGH

TINTED ROYAL  
WHITE ROYAL  
FINE GRAIN TINTED ROYAL  
FINE GRAIN WHITE ROYAL  
OLD MASTER CREAM  
"FINISHER"  
PARVEL

KODAK BROMOIL PAPER

## Press—Pictorial—Portrait—Commercial—

the grade to make a fine print from a fine negative—and to get the most out of the negative that is soft or hard, dense or thin—is here in the Kodak range.

## KODAK WARM TONE PAPERS

Warm tone papers are the finest sellers of portraits for the professional, and provide a rich and expressive medium for the pictorialist.

In the five varieties made by Kodak, all except one of which are available in a number of colours, textures and surfaces, there is scope for the widest possible range of attractive selling styles and the most exacting pictorial technique.

"KODURA"

Ten grades—single and double weights—cream and white.

ETCHING BROWN

Three grades—smooth matte white; smooth matte cream; rough matte cream.

"KOTHENA"

Three grades—white semi matt; white smooth matte; cream matte.

"KODOPAL"

Seven grades—delightful opalescent base.

"KOVITA"

Fast enough for enlarging work with reasonably short exposures. Four grades.

# Kodak

## KODAK UNIT SYSTEM OF STUDIO LIGHTING



The simplest, most flexible, most readily controlled method of providing a ground-work of general lighting upon which high-light modellings can subsequently be built up.

The 'unit' of the system is a curved metal reflector, fitted to take either a 1,000 or 1,500 watt bulb, and provided with a front reflector and a fixing bracket. Each side is made so that other units can be easily attached; if one unit is to be used alone, side wings can easily be fitted.

Mercury Vapour Tubes can be fitted to sets of 3 units. The blue-green mercury vapour light plus the yellow-red of the half-watt bulbs result in an intensely actinic combination, approximating in colour balance to daylight.

Single Kodak Unit (without lamp) .. .. .	£2 5 0
Light-weight Aluminium Model .. .. .	2 17 6
Mercury Vapour Tubes : D.C. .. .. .	8 12 6
A.C. .. .. .	11 2 6

# Foremost in Photography

## SUPPLIES FOR THE PHOTO-FINISHING TRADE

Both aspects of photo-finishing—the purely technical operations of developing, fixing, washing, drying, printing, glazing, enlarging, etc.—and their organisation, with the related processes of office control, invoicing, etc., into an orderly routine system—have been catered for in the Kodak array of equipment.

### APPARATUS

Vertical Tanks	Printers
Electric Immersion Heaters	Enlargers
Tank Rods	Rocker Washers
Double Clips	Rotary Washers
Self-Draining Bottom Clips	Glazing and Drying Machines
Film Pack Hangers	Print Trimmers
Plate Cages	Chromium Glazing Plates

### AIDS TO ROUTINE WORKING

- Film Strip Boxes
- Sorting Racks
- Control Tablets
- Kodak D. & P. Clerical and Routine Control System
- D. & P. Counter Order Pads
- Sundry D. & P. Stationery

Free service in connection with Organisation, Management, Control and Production problems, suggestions for re-planning D. & P. plants, and draft layouts, with estimates for necessary equipment, are among the other facilities that Kodak provide for the photo-finishing trade.

Kodak Ltd., Kodak House, Kingsway, London, W.C.2

# Kodak



For Photo-Finishers<sup>c</sup>  
 Professional Photographers  
 Process Workers  
 Amateur Photographers

## “KODAPAN”

Saves: Time  
 Eyesight  
 Money  
 Speeds: Production  
 Improves: Working conditions  
 Quality of output

*The All-Purpose Dark-room<sup>c</sup>  
 Lighting System—*

## “KODAPAN” UNIT ILLUMINATION

“Kodapan” provides *one* kind of light, adequate but safe, for *all* kinds of negative material—including Panchromatic. It is cool, restful, resembling subdued twilight in effect and can be used in any darkroom, large or small.

In a few minutes from entering a “Kodapan” illuminated dark-room an operator can see everything clearly, even down to the markings on a thermometer or the hands of a clock.

The particular section of the spectrum that “Kodapan” employs is one to which the eye is extremely sensitive, even though the light is of low intensity.

Write for particulars of “Kodapan” Unit illumination, and advice on its installation in relation to the existing layout of any dark-room.

# Foremost in Photography

## WRATTEN AND PHOTO-PROCESS DEPARTMENT

The Process Engraving Trade being essentially photographic in character, it follows that Kodak, the largest photographic organisation in the world, should be well equipped to satisfy its requirements.

In addition to the range of Eastman and "Kodaline" Films, made specifically for use in photo-mechanical operations, Kodak supply Dark-Room Equipment, Silver Nitrate and other chemicals, Wratten Filters (standard all over the world for making three-colour negatives) and a hundred and one Sundries.

And supplementary to the actual supplying of goods, we maintain a department to look after the interests of the photo-mechanical trades. Its service is at your disposal.





# Kodak

## MEDICAL SUPPLIES AND SERVICES

To the growing number of ways in which photography is acting as recorder and interpreter of medical science—as in X-rays for diagnosis, record photography for clinical purposes, cinematography for training and health propaganda—Kodak Ltd. makes its special contribution in the shape of the finest modern apparatus, dependable materials and skilled service.

Kodak X-Ray Film, for example, has become the standard sensitive medium wherever X-rays are employed. Made at the Kodak Factory at Wealdstone, Middlesex, it is backed by the same resources of knowledge, research and manufacturing experience that have given Kodak products pre-eminence in every other field.

Kodak also supply a full range of cameras, developing outfits, dark room sundries, chemicals, etc.—everything necessary for the operation of a complete medical photographic service.

At Kodak House, Kingsway, a fully-trained staff, employing an elaborately fitted X-ray installation, are constantly engaged in checking current radiographic practice and devising improvements in technique. One of the functions of the Kodak Medical Department is to pass on to radiographers and the medical profession the benefit of experience gained in this way.

Sub-standard cinematography is now very widely used for making medical, surgical and chemical records, in training medical students, and in health propaganda and welfare work.

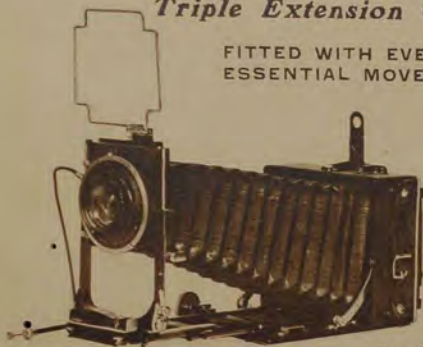
We maintain an extensive library of medical motion pictures, including many intended solely for the use of the medical profession, and a number of first-aid, health and welfare films for general audiences. We are always ready to give technical advice in connection with the production of films of this character.

Address your enquiries to the Medical Department, Kodak Ltd., Kodak House, Kingsway, London, W.C.2.

# The "SOHO PRECISION"

*Triple Extension Camera*

FITTED WITH EVERY  
ESSENTIAL MOVEMENT.



For  $3\frac{1}{2} \times 2\frac{1}{2}$  Plates  
or Film Pack Adapter.

An instrument that is to all intents and purposes a Field Camera, and yet as mobile as a pocket Camera, incorporating every essential movement required by the serious worker in Photography.

Fitments include:—Double and Triple Extension, Rising Cross and Swing Front, Revolving Back, Direct Vision View Finder and Sighter, Spirit Levels, Dropping Baseboard, Focussing Milled Wheel.

**PRICE.** The price of the Camera for  $3\frac{1}{2} \times 2\frac{1}{2}$  in. pictures with 3 First Quality Double Plate Holders, but without Lens is—

**£13 10s. Od.**

**SOHO LIMITED, Soho Square, London, W. 1**

Telephone:  
GERRARD 2184.

Telegrams:  
NOIRAM-RATH-LONDON.

# The "SOHO REFLEX"

Is still the Best Camera in the World  
and in a class by itself.



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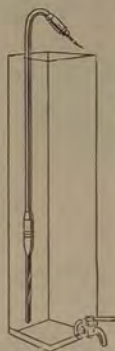
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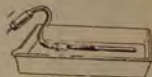
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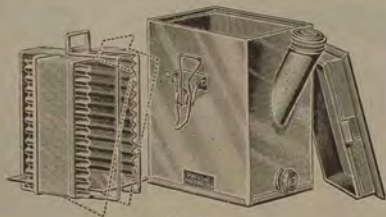
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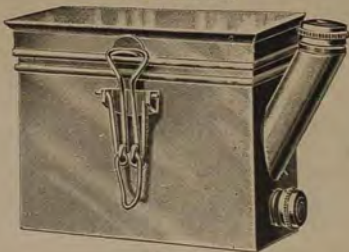
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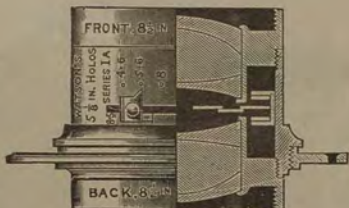
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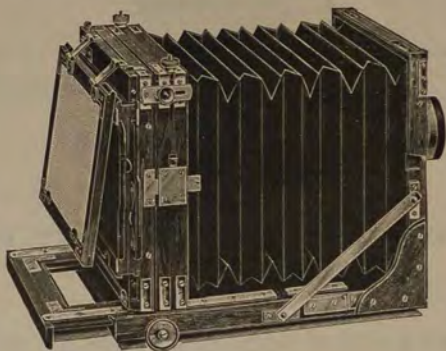
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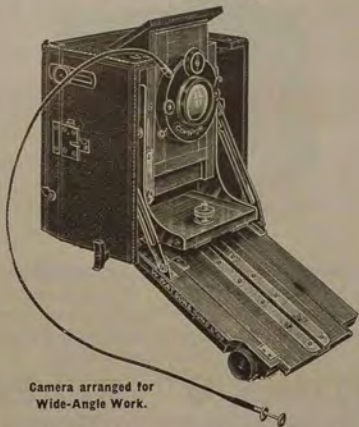
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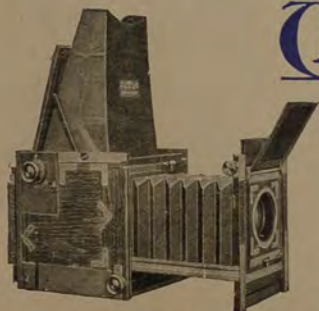
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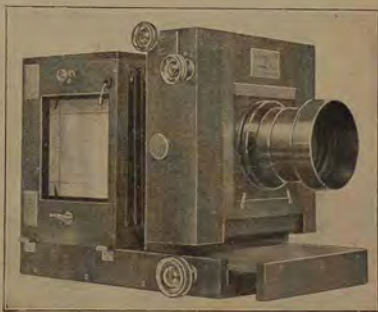
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SUPER-SPEED PORTRAIT ... ..	700
ORDINARY ... ..	100
ROLL FILM (SELF-SCREEN).	

\* Also supplied in Barnet Matt-Emulsion.

Prices on Application.

ELLIOTT & SONS LTD., BARNET, ENGLAND



# BARNET

## Plates, Papers and Films

ALL BRITISH MANUFACTURE

### Barnet Bromide Papers

Standard Grades for general use

#### ENAMEL

Surface.

Single and Double Weight ...	} Glossy.
Extra Vigorous, Vigorous ...	
Normal and Soft ...	

#### MATT

Single Weight ...	} Matt.
Vigorous and Normal ...	
Double Weight ...	
Vigorous, Normal and Soft ...	

#### SEMI-MATT

Single Weight ...	} Semi-Matt.
Vigorous and Normal ...	
Double Weight ...	
Vigorous, Normal and Soft ...	

#### ILLUSTRO

Single and Double Weight ...	} Glossy.
Extra Contrasty, Contrasty, ...	
Normal and Soft ...	

#### CREAM CRAYON

Double Weight	} Platino-Matt : Smooth.
Vigorous and Normal	
Double Weight	} Semi-Matt.
Normal ...	
	} Platino-Matt : Rough.

#### PLATINO-MATT

Single and Double Weight ...	} Rough.
Normal ...	
Single and Double Weight ...	} Smooth.
Normal and Vigorous ...	

#### ORDINARY

Single and Double Weight ...	} Rough and Smooth.
Normal ...	
Single and Double Weight ...	} Smooth.
Vigorous ...	

#### TIGER TONGUE

Double Weight Normal ... Cream Extra Rough.

Prices on Application.

ELLIOTT & SONS LTD., BARNET, ENGLAND

PLATES, PAPERS & FILMS

# BARNET



# BARNET

## Plates, Papers and Films

ALL BRITISH MANUFACTURE

### Barnet Bromide Papers

(Continued)

<b>REGAL ROUGH</b>	Surface.
Double Weight <i>Normal</i> ...	White and Cream.
<b>MEDIUM ROUGH</b>	
Double Weight ...	... } Cream and
<i>Vigorous and Normal</i> ...	... } White.
<b>VELBRO</b>	
Single Weight <i>Normal</i> ...	Velvet (Pebble Grain).
<b>LINEN GRAIN</b>	
Double Weight <i>Normal</i> ...	White and Cream.
<b>POST CARDS</b>	in all Grades.

### Barnet Chloro-Bromide Papers

#### VERONA DE-LUXE

For Contact Prints and Enlargements.  
Yields a very rich warm brown-black colour by direct development. Also, if required, a wide range of pleasing warm tones can be obtained.  
Grades (all Double Weight)—

Cream Matt.	Cream Silk-Lustre.
Cream Smooth Natural.	White Silk-Lustre.
Cream Rough Natural.	White Matt.

#### VERONA

A warm-tone paper of superb quality. Grades as follows:—

“**Standard**” for Contact Prints—

Cream Smooth Natural.	Cream Matt.
Cream Semi-Matt.	White Matt.

“**Rapid**” for Enlargements—

Cream Smooth Natural.	Cream Matt.
Cream Rough Natural.	White Matt.

All Double Weight.

### Barnet Negative Cards

Supplied in two Grades:—

“**NORMAL**” ... Suitable for out-door photography.

“**RAPID**” ... For Studio work.

ELLIOTT & SONS LTD., BARNET, ENGLAND



# BARNET

## Plates, Papers and Films

ALL BRITISH MANUFACTURE

### Bar-Gas

(Barnet Gaslight Paper)

A Gaslight Paper of great charm, clean working and reliable. Made in a variety of grades to suit negatives of any character, whether thin or hard in quality.

An ideal paper for Snapshot prints and highly recommended for

#### D. & P. WORK.

Supplied in the following Surfaces and Grades:—

**GLOSSY**... .. In Vigorous, Medium, Soft and Extra Soft.

**ART** ... .. In Vigorous, Medium and Soft.

**MATT** ... .. In Vigorous and Soft.

**CREAM SILK-LUSTRE** In Vigorous, Medium and Soft.

### Barnet Line-Tone Negative Paper

For photomechanical work.

### Barnet Document Paper

For copying and recording work.

## Trade Printing

Enlargements and Contact Prints made from Photographers' own Negatives.

**PORTRAITURE. ARTISTIC FINISHING.**

**COMMERCIAL ADVERTISING.**

**PICTORIAL.**

*Prices on Application.*

**ELLIOTT & SONS LTD.**  
**BARNET, HERTS, ENGLAND**

Telephone: Barnet 0011. Telegrams: "Elliott, Barnet."  
Cable Codes: Western Union & A.B.C. 4th and 5th Editions.

PLATES, PAPERS & FILMS

BARNET





# ENSIGN

## ENSIGN MIDGET

The Camera you wear like a watch

WHETHER you use a big camera or not, just slip a Midget into your pocket, and you need never miss anything of pictorial interest. You won't even know it's in your pocket. Very strongly made. 3-speed shutter, scientifically adjusted lenses giving pin-point definition at all apertures—making perfect enlarging negatives. Uses Ensign Lukos E10 film, 6 exposures 6d.

With All-distance Lens	...	30/-
„ Ensar Anastigmat f/6.3		50/-

ENSIGN, LIMITED, HIGH HOLBORN, LONDON

BRITISH  
THROUGHOUT



## ENSIGN AUTORANGE

With Automatic Focussing Coupled Range Finder

For pictures  $2\frac{1}{4}'' \times 3\frac{1}{4}''$

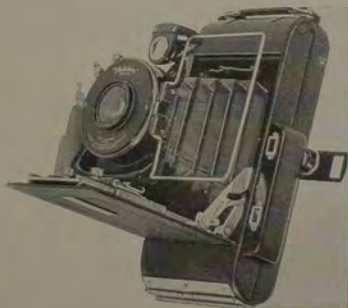
Fitted with rising and cross front. May be fitted with any standard lens.

The eye-piece is adjustable for variations in eyesight, and can be set with absolute precision for any sight.

Ensar Anastigmat f/4.5 Trichro shutter £6 10 0

Ensar „ f/4.5 Compur „ 9 15 0

Zeiss Tessar „ f/4.5 Compur „ 12 15 0

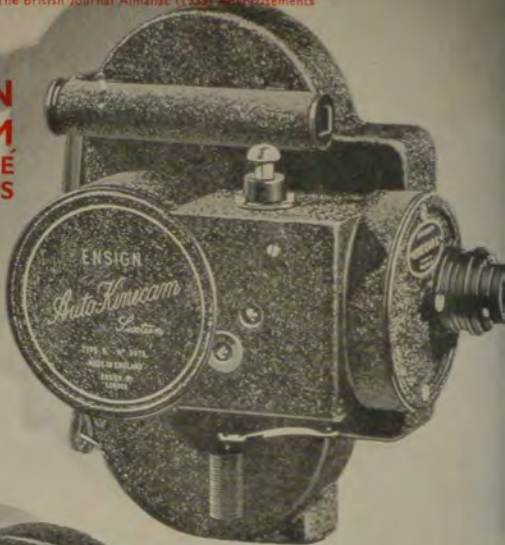


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BRITISH  
THROUGHOUT

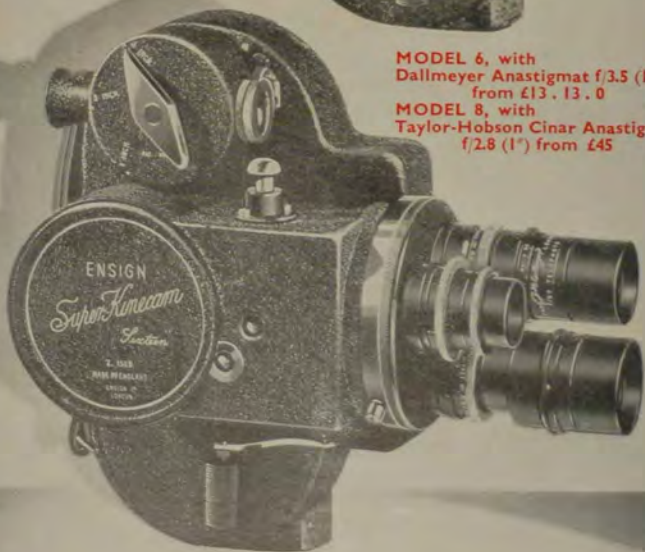
# ENSIGN KINECAM

16 mm. CINÉ  
CAMERAS



**MODEL 6, with  
Dallmeyer Anastigmat f/3.5 (1")  
from £13. 13. 0**

**MODEL 8, with  
Taylor-Hobson Cinar Anastigmat  
f/2.8 (1") from £45**







PORTRAIT BY COURTESY OF THOS. FALL



& CO. LTD.

**ENGRAVING  
PRINTING &  
PHOTOGRAVURE**

**SPECIALISTS IN  
ILLUSTRATION &  
REPRODUCTION  
PROCESSES**

**HOODS** have for many years specialized in illustrated matter for all purposes. Let us help you please; we offer an efficient blockmaking plant with a comprehensive service covering everything likely to be required. Under the same roof is an efficient printing plant with modern typefaces; special facilities for printing fine Tone Blocks; also a Photogravure plant (this advertisement is Hood gravure, please see the next 3 pp.).

*Historical note!*—Hoods have been Printing for 70 years, Engraving for 46 years, and Gravuring for 18 years. (Established in Middlesbrough in 1865)



CHRYSANTHEMUMS AT THE SANBRIDE WORKS  
MIDDLESBROUGH

## ENGRAVING

Hoods make finest Tone Blocks and Line Blocks, and deliver them quickly, or to promised times. Great care is taken in making Hood **STANDARD TONE BLOCKS** to see that every tone in the original is faithfully reproduced; if a poor original, the picture is improved at each stage in reproduction. The fine mounting includes the Hood Patent Bevel, which makes printing easy and clear. Instead of costing more, Hood blocks cost less than the ordinary prices; moreover exceptionally good Trade discounts are allowed to professional Photographers, Printers, and Publishers.

**RETOUCHING:** Hoods can work wonders with retouching on suitable subjects. Nearly all machinery subjects are much improved by careful working up. We will gladly quote on inspecting the work to be done.

We also offer an unusual **SCREEN Chart** which is issued free of charge to the Trade; it indicates clearly which halftone screen is suitable for any paper. Hood Line Blocks are good, clear, sharp, deep, and quick.

AT WHITBY BATHING POOL



NIGHT PHOTOGRAPH BY HOODS

**AUTOBLOCKS** (Regd.) are cheap blocks mass-produced, intended for jobs where the cost of standard blocks would be too much. But have you our Price List? If not, send for one!

## HOODS ALSO PRODUCE:

### COLOUR BLOCKS

2, 3 or 4 colour, from Coloured Objects, Pictures, Autochromes, or from uncoloured Photographs.

### NEWSBLOCKS

Very rapid, reliable despatch.

### STILTSBLOCKS

Really extra deep, with stilts-like dots. **METAL MOUNTED.** Will print on any kind of paper.

### LINE BLOCKS

Reproducing line drawings. Two or more colours if required.

### DESIGNS

Retouching, Lettering, Type-setting at very low prices for very excellent work.

### NAME & DOOR PLATES

In every suitable metal and every finish.

**HOODS Engravers**  
SANBRIDE  
WORKS, **Middlesbrough**

# FINE PRINTING

Hoods PRINT blocks exceptionally well; a rigidly high standard is maintained. We produce School Prospectuses (showing pictures); Souvenirs for civic events; View Books large and little; Tariffs and Booklets for Hotels; Catalogues of cars, cameras, cottages, typewriters, turbines, tombstones,—anything illustratable. Also modern letter paper and all business stationery: labels for parcels, printed gummed tape, Xmas cards, calendars. Though we specialize in ILLUSTRATION, we print and bind books of solid facts without so much as a portrait in them; books of solid tables of figures; books of poetry.

have a finger in all the reproduction processes you can rely on unbiased and genuine advice on the best method of treatment for any project,—literary or publicity.

"I cannot speak too highly of your long and happy collaboration in quality and service. Your Blocks have won expressions of warm admiration from many sides; we have been very delighted with the results, and I have every reason to be grateful for your unflinching courtesy and the advice you have generously given." A.F.B.

"... The booklets to hand are beautifully done, and I am very pleased with the work. It is very creditable to all concerned." C.A.S.

## HOODS

Sanbride Works  
MIDDLESBROUGH



BY  
COURTESY OF  
MARCUS ADAMS

"His Royal Highness the Duke of York was interested to learn that the brochure, which has been generally admired, was the product of Messrs. Hood. The presentation copy of the official brochure was exquisitely bound in blue morocco." N.E.D. Gazette.

Hoods also produced a magnificent presentation album elaborately bound and with illumination for Imperial Chemical Industries Ltd. for a similar Royal occasion, when H.R.H. visited the vast Billingham works.

The late Mr. Geo. E. Brown said to a correspondent: "... I advise you to write to Hood & Co. of Middlesbrough; they know all there is to know about the reproduction of illustrations."

With all modesty may we say now that we also know most of what there is to know about the production of all sorts of Booklets, Catalogues, Brochures and View Books. As we



An experienced customer writes:

*"We congratulate you on these gravures, they are rich in tone and clear in detail. We are critical people as you know, but no one obvious point has been taken to get the best results. We want to convey to you our most cordial thanks." M. & Co. (Sussex).*

*"... the Photogravure Post Cards. I would like to say how pleased I am with them. I do indeed congratulate you most highly on the results. The views are beautifully clear and finished on such good cards. I am certain they will have a ready sale." J.E.H. (Somerset).*

*"Will you also convey to Mr. Hood my thanks for the excellent way in which the work has been carried out. The booklet has called forth numerous letters of appreciation both of the matter, as well as the style of workmanship." R.W.C. (Scarborough).*



**HOOD PHOTOGRAVURE** gives marvellous richness of effect and fulness of tone, and reproduces a picture with a really photographic appearance and fidelity. Suitable for Booklets, Calendars, Catalogues, Folders, Postcards; also for single pictures, impressions, or supplements. We are sometimes asked "what is the snag in producing a job in gravure, compared with half-tone?"—The answer is that there is none: half-tone suits some jobs, gravure others. We willingly advise which on learning your requirements. May we send you a selection of specimens? Even small jobs can now be done by Hood Gravure.

**HOOD POSTCARDS:** A large proportion of our output is View POSTCARDS in half-tone or gravure. We will, on request, forward our Price Lists of each process. These cards are extraordinarily good and much cheaper than real photo cards. Note: Either block-printed or gravure cards can be supplied in highly glossy finish. Please also see our advertisements in the last few years' B.J. Almanacs. Use Block-printed cards for urgent work, gravure cards for excellence and where several subjects can be ordered at a time. Examples from our lists:—

**A Standard marginal Block costs 14/8 and 1000 postcards from it 17/6**

**PHOTOGRAVURE:** (no blocks necessary).

**1000 each of 24 subjects, 25/4 per 1000; or reprints 15/7 per 1000**



*"Your photogravure process is infinitely better than collotype, and it is also cheaper than I have been paying. Your "Leighton Glory" cards are certainly extremely good,—one would scarcely imagine, without examining very closely, that they were printed from blocks."*

T.G. (Edinburgh)

*"Our customer was delighted with the way the job was turned out both in excellence of workmanship and prompt despatch."*

T.M. (Bd. Cas.)

**HOODS**

Sanbride Works

MIDDLESBROUGH

The Adhesive Dry Mounting Co., Ltd.

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THE

**Adhesive Dry Mounting Co.**

---

LIMITED

THE

**Pioneers of Dry Mounting.**

---

*Important Notice.*

When ordering Tissue, see that you  
Specify

**“ADEMCO TISSUE”**

---

*THE ORIGINAL AND BEST*

Every packet bears the Watermark  
“ADEMCO,” also the packet should  
bear our own label.

*Ask for*

**“ADEMCO”**

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TISSUE.

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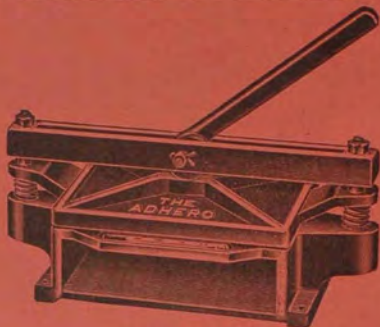
27 & 28, Fetter Lane, London, E.C.4.

## The Adhesive Dry Mounting Co., Ltd.

Telegrams—"Accroitre, London," Code A.B.C.

The ADHESIVE DRY MOUNTING CO., Ltd.,  
27 & 28, Fetter Lane, London, E.C.4.

*ORIGINATORS OF THE DRY MOUNTING PROCESS*



### "THE ADHERO"

The only machine for amateurs at the price giving even pressure over the whole of the surface of the print at one and the same time.

Those acquainted with the extreme value which may be attached to the Dry Mounting method candidly admit that this apparatus brings the amateur in line with the professional as regards mounting.

The Dry Mounting method is most simple and effective.

The "ADHERO" machine will mount a  $\frac{1}{2}$ -plate, 5 by 4, or a  $\frac{1}{4}$ -plate print on a mount up to 10 inches wide in one pressure. Whole plate prints on 10 by 15 mounts in two pressures. Size of heated plate  $7\frac{1}{2}$  by  $5\frac{1}{2}$ , width between arms  $10\frac{1}{4}$  inches.

#### PRICES.

OUTFIT No. 1, for Gas heating, 55s. 0d. complete	
.. .. 2, .. Spirit .. 60s. 0d. ..	
.. .. 3, .. Electricity. 75s. 0d. ..	

Each Outfit includes Accessories and One Packet of Adhesive Tissue Border Tints, and Mounts.

27 & 28, Fetter Lane, London, E.C.4.

The Adhesive Dry Mounting Co., Ltd.

## DRY MOUNTING MACHINE

### THE "M" PRESS

*A Dry Mounter for Amateurs and Professionals*

This machine is suitable for amateur and professional photographers who go in for larger work than half-plate. It is the best value at the price.



THE  
"M" PRESS

PRICE.		Nett.	
		£	s. d.
Heated by Gas	... ..	6	10 0
Heated by Electricity	... ..	10	10 0
Size of Heated Plate, 12 by 8 in. Width between the Arms, 13½ in.			
Will mount prints up to 12 by 8 in. on a mount 13½ by 10 in. in one pressure			
or a 12 by 15 print on a mount 13½ by 18 in. in two pressures.			

#### ACCESSORIES FOR "M" MACHINE.

			s. d.
Mounting Covers, size 12½ by 9½ in.			
No. 1, Glazed Surface, Zinc	... ..	each	3 6
No. 2, Matt	... ..	"	3 6
Fixing Iron in Wood Handle	... ..	"	2 6
Spirit Lamp for Heating Fixing Iron	... ..	"	4 6
Gas Burner for ditto	... ..	"	7 6
Extra Thermometer for Gas Machines	... ..	"	3 6
" " " Electric Machines	... ..	"	5 0

Write for Illustrated Catalogue post free.

27 & 28, Fetter Lane, London, E.C.4.

# The Adhesive Dry Mounting Co., Ltd.

## The IMPROVED MODEL DRY MOUNTER

### "J" PRESS

Designed to meet the requirements of every Professional Photographer.



This new model Dry Mounter has a platen of 15½ in. by 12½ in., width between the arms 24½ in., allowing of a mount to be inserted 24½ in. full; a most convenient size for mounting 15 in. by 12 in. prints. Can be heated by gas or electricity. When ordering for electricity please state voltage.

#### PRICES.

Nett.

Heated by Gas ... ..	£	s.	d.
.. .. Electricity ... ..	11	10	0
	16	0	0

#### ACCESSORIES FOR "J" MACHINE.

Mounting Covers, 16 by 13							
No. 1, Glazed Surface, Zinc	...	...	...	...	...	...	s. d.
No. 2, Matt ...	...	...	...	...	...	...	7 6
Fixing Iron in Wood Handle	...	...	...	...	...	...	7 6
Gas Burner for Iron	...	...	...	...	...	...	2 6
Electric Fixing Iron	...	...	...	...	...	...	7 6
Extra Thermometers	...	...	...	...	...	...	12 6
							5 0

27 & 28, Fetter Lane, London, E.C.4.



## The Adhesive Dry Mounting Co., Ltd.

### "ADEMCO" ADHESIVE DRY

### MOUNTING TISSUE

*THE ORIGINAL  
AND THE BEST*

EFFICIENCY AND HIGH GRADE  
OF MANUFACTURE GUARANTEED.

Absolutely Reliable. Perfect Adhesion  
and permanency after the lapse of any  
length of time.

Used by the leading photographers the  
world over.

FOR TROPICAL COUNTRIES.

We supply Tissue interleaved with  
special material for Tropical Countries;  
this greatly reduces the risk of damage  
during transit.



See that every packet bears  
this Trade Mark.

*Write for Catalogue of Prices.*

### "ADHERO" CAMBRIC AND MATT BORDER TINTS.

These papers are coated on the back with our Dry Adhesive, so that it is  
only necessary to trim to the desired dimensions. They make a very  
unique and effective finish to any mount.

Sample free on application.

### FLEXIBLE MOUNTS

ADHERO SERIES.

ANTIQUARIAN SERIES.

Specially adapted for Dry Mounting.

Sample Book free on application.

Customers' own prints mounted in our own showroom at reasonable prices,  
or special quotations given for quantities.

27 & 28, Fetter Lane, London, E.C.4.

## The Adhesive Dry Mounting Co., Ltd.

### The "ADEMCO" ELECTRIC MOUNTING IRON



PRICE, complete with Thermometer, Fixing Iron, Metal Plate, Mounting Tissue, Mounts and Tints, packed in a convenient wooden box, together with 5 feet of flex.

WHEN ORDERING PLEASE STATE VOLTAGE.

COMPLETE 35/-

### ELECTRIC DRY MOUNTING FIXING IRON

Every Photographer using an Electric Dry Mounter will find this iron a great advantage over the old method of heating the fixing iron by gas or spirit. The consumption of current is exceedingly small, and is adapted for use on any voltage.



Please state voltage when ordering.

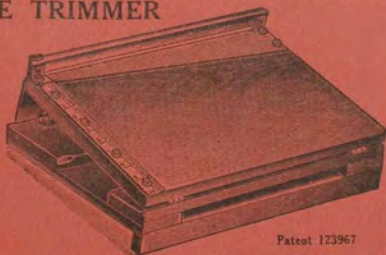
Price complete with 5 feet of flex, 12/6 nett.

27 & 28, Fetter Lane, London, E.C.4.

## The Adhesive Dry Mounting Co., Ltd.

### MERRETT'S PATENT AUTOMATIC VISIBLE TRIMMER

The most efficient and practical Print Trimmer on the Market Will trim printsequally well wet or dry



Patent 123967

	s.	d.		s.	d.
8½ in. cut (21 cm.)	12	6	15½ in. cut (41 cm.)	55	0
10 " " (25 cm.)	25	0	24 " " (60 cm.)	90	0
12½ " " (31 cm.)	35	0	Larger sizes up to 42 in.		

### THE NEW MERRETT MARGIN TRIMMER



This trimmer is constructed to serve a double purpose, it can be used as an ordinary print trimmer, also converted into a Margin Trimmer, to trim margins from  $\frac{1}{8}$  to  $\frac{1}{2}$  of an inch.

Price  
25/-  
nett

Made to cut up to 8½ in., larger sizes made to order.

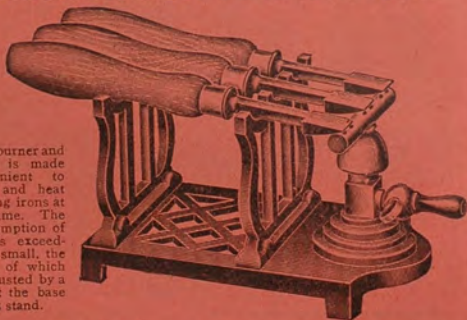
Sole Agents for Merrett's Trimmer, Margin Trimmers & Trimmeretts.

27 & 28, Fetter Lane, London, E.C.4.

The Adhesive Dry Mounting Co., Ltd.

**NEW TRIPLE GAS BURNER AND  
HOLDER FOR FIXING IRONS**

This burner and stand is made convenient to hold and heat 3 fixing irons at one time. The consumption of gas is exceedingly small, the flame of which is adjusted by a tap at the base of gas stand.



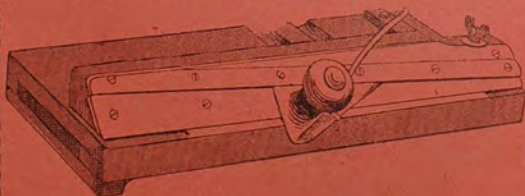
Price 10/6

Irons extra, 2/6 each.

**THE "MERRETT" MOUNT BEVELLER**

*All British throughout.*

For Hand Beveling Photographic Mounts or Showcards.



Made in the following sizes:

	8 in.	10 in.	12 in.	15 in.	18 in.	25 in.
Price	30/-	35/-	40/-	50/-	60/-	80/-

Spare Knives for all sizes can be supplied.

27 & 28, Fetter Lane, London, E.C.4.

# QUALITY

The distinguishing characteristic of all Ilford Photographic Materials is consistent unfailing quality. It is on this that the reputation of Ilford has been built and it is this which has gained popularity for Ilford products all over the world.

In torrid heat and arctic cold Ilford materials are just as reliable as when used under favourable climatic conditions.

There is an Ilford grade of Plate, Paper and Film for every photographic requirement and every one is of the highest quality.

## ILFORD LIMITED

### ILFORD LONDON

#### FACTORIES

ILFORD, WARLEY, PARK ROYAL  
CRICKLEWOOD, MOBBERLEY, WATFORD

AGENTS AND DISTRIBUTORS  
ALL OVER THE WORLD



# ILFORD PLATES AND FILMS

The Ilford series of Plates and Films for Professional and Commercial Photography represents a comprehensive selection of fast, medium speed and slow plates and films all characterised by an unfailing standard of quality, and all specially made to conform to professional and commercial requirements.

For studio portraiture the Golden Iso-Zenith Plate is invaluable. It combines high speed with a long scale of gradation and colour sensitiveness.

The Iso-Zenith Plate is a fine colour sensitive plate for general use, having the same characteristics as the Golden Iso-Zenith but a slower speed.

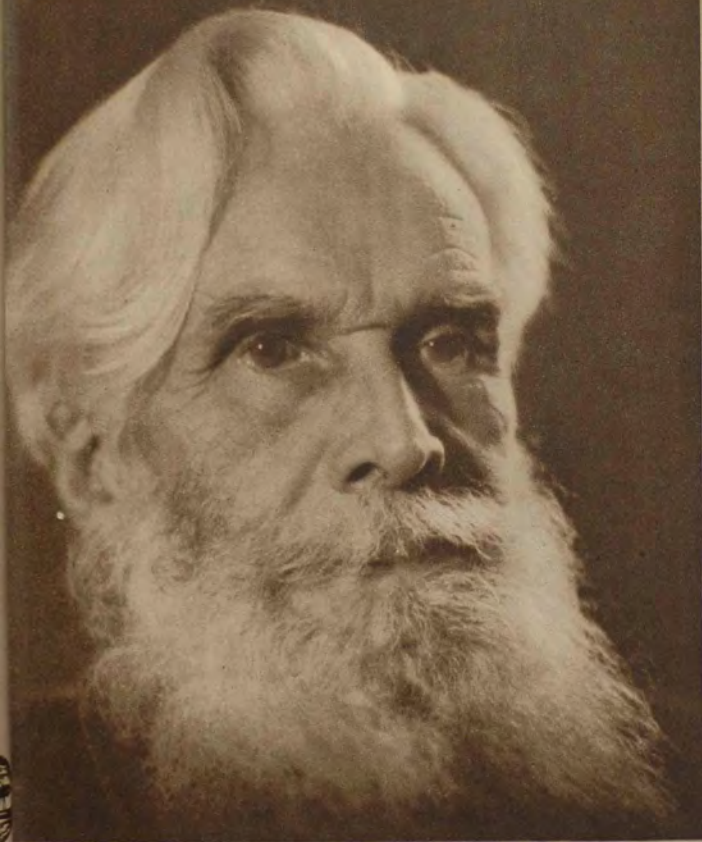
Ilford Hyperchromatic Film with a speed of 1,500 H. & D. is comparable with the Golden Iso-Zenith Plate. It is an excellent film for studio work.

Further details of all Ilford Plates and Films will be found in the Ilford Price List of Plates, Papers and Films.



ILFORD LIMITED  
ILFORD LONDON

## THE PIRIE MACDONALD PRIZE PORTRAIT



This is the winning portrait out of 265 entries for the PIRIE MACDONALD PRIZE, 1934, for the best portrait of a man. It was taken "at home" by Maurice Turney of "Hugo," Cheltenham, who used an

ILFORD HYPERSENSITIVE PANCHROMATIC PLATE

# ILFORD PANCHROMATIC PLATES & FILMS

By far the most popular Panchromatic Plates and Films are those made by Ilford Limited. The fame of Ilford panchromatic materials has spread all over the world, and for all purposes where a fully colour sensitive material is required Ilford products are used. For scientific work, professional or commercial photography they are supreme.

The Ilford Hypersensitive Panchromatic Plate has a speed to daylight of 2,500 H. & D. and to half watt lighting of 8,000 H. & D. It is invaluable for all kinds of artificial light photography, street scenes at night, banquets, etc.

The Soft Gradation Panchromatic Plate is particularly suitable for portraiture by artificial light. It gives negatives of beautifully soft gradation and of fine printing quality.

The Ilford Hypersensitive Panchromatic Film has the same general characteristics as the Hypersensitive Panchromatic Plate, but is slightly slower, having speeds of 2,000 H. & D. to daylight and 5,000 H. & D. to half watt lighting.



ILFORD LIMITED  
ILFORD LONDON



Negative by Bedford Lemere & Co.



THE BANK OF ENGLAND

Taken on

ILFORD SPECIAL RAPID PANCHROMATIC PLATE

# ILFORD

## Double-X-Press Plate

(NEW EMULSION)

This new plate is the outcome of long continued research in the Ilford Laboratories and is of the greatest value and importance to all Pressmen. It combines, as no other plate does, the essential properties for a press plate of rapid developing, fixing and drying, with high speed and exceedingly fine grain. In addition it has a very high colour sensitivity and because of its remarkable latitude is equally efficient on dull days as when the light is brilliant. These attributes are supplemented by the Ilford standard of consistent quality and make the new plate a remarkable advance in the production of high speed fine grain plates.

ILFORD LIMITED  
ILFORD LONDON



REGISTERED  
TRADE MARK

# Negative by Fox Photos



Taken on  
ILFORD DOUBLE-X-PRESS PLATE

# ILFORD

## Process

### Plates and Films

The Ilford series of Plates and Films for the Process and Photo-mechanical Industries comprises a complete range of the utmost utility for every process. These plates and films are tested under everyday working conditions in the Process Department at Ilford and all grades conform to the most exacting standard of quality before any coating is passed for issue.

The new anti-halo backing on Ilford Process Plates is a distinct improvement over any type of backing previously employed, and as it disappears in processing it ensures a vastly better negative in the final result with no more trouble than the use of unbacked plates.

Full details of all Ilford Plates and Films will be found in the booklet, "Ilford Products for the Process and Photomechanical Industries."



ILFORD LIMITED  
ILFORD LONDON

# Negative by Noel Griggs, London



Taken on

ILFORD SOFT GRADATION PANCHROMATIC PLATE

# ILFORD PLATES AND FILMS

FOR SCIENTIFIC WORK

Photography is being increasingly used by workers in the Sciences and Ilford Limited fully realising their needs manufacture many special grades to meet their requirements.

A complete list of these special grades is contained in a booklet entitled "Photography as an aid to Scientific Work, a copy of which will be forwarded on request.

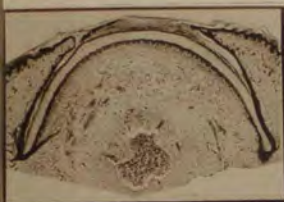
This booklet describes the various grades of Ilford Plates, Papers and Films and indicates the processes for which the particular materials are required. It will prove of exceptional interest and assistance to all those engaged in the various branches of scientific work, including Astronomy, the Biological Sciences, Chemistry and Physics, Metallurgy and Metallography, in which photography is used as a means of investigation and record.



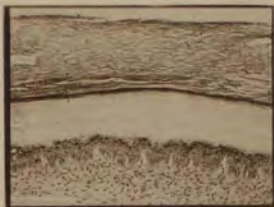
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# Photomicrographs on Ilford Plates



Vertical section of a Finger, at the point of emergence of the Nail.  
Magnified  $\times 50$  times.



The detailed structure of Cuticle, Nail, and the very sensitive Nail-bed are shown magnified  $\times 250$  times.



Vertical Section of Human Scalp.  
Magnified  $\times 50$  times.



A sector of the HUMAN EYE (seen from within).  
Magnified  $\times 25$  times.

Showing the Suspensory ligaments, and the Ciliary bodies which "accommodate" the sight by focusing the lens.



Fibers of Muscle under foot control have this characteristic appearance when magnified  $\times 750$  times.



The detailed structure of the "oil" gland and duct shows the source of production and distribution of the lubricant which keeps the hair pliant and imparts the glossy appearance.  
Magnified  $\times 250$  times.



Vertical Section of the palm of the Hand. The pores of the skin are the openings of the cork-screw-like sweat-ducts which pass from the deep soft flesh through the horny layer to the surface. Magnified  $\times 75$  times.

The Minute Structure  
of  
Some Tissues of  
the Human Body  
as observed under the  
Microscope

F. J. FITTICK  
Author of Anatomy  
Imperial College, London

These reproductions are made at  
the request of Ilford Photographic  
which are the property of F. J. Fittick  
the Royal Photographic Society &  
Robert Mond Ltd 1934.



The covering of the "Guller" (Ostophilagus) in its extreme delicacy of structure, contrasts with that of the outer skin.  
Magnified  $\times 400$  times.

## ILFORD TAKE A LOOK



Photo Press have proved the wonderful ability of the by this fine picture of the Motor Show, which was second at F/8. There is no plate more suitable for a be short and where accurate repr



# AT THE MOTOR SHOW



ORD HYPERSENSITIVE PANCHROMATIC PLATE with the ordinary lighting of Olympia. Exposure  $1/15$ th of a second. In ordinary light photography where exposures of necessity have to be long, attention of colour gradation is required.

# ILFORD

## Bromide Paper

There is an almost unlimited selection of beautiful surfaces in white and cream in the Ilford range of Bromide Papers, many of which are made in five degrees of contrast, thereby providing for all the requirements of all classes of photographers.

Ilford Bromide Paper is of unvarying consistency and unparalleled latitude. It has an exceedingly long scale of gradation and gives pure black and white prints by ordinary development. It is ideal for sepia toning and gives a rich sepia both by sulphide and hypo alum processes.

Ilford Bromide Paper is of the highest quality, is free from mechanical defects and is the ideal paper for contact printing and enlarging. It reproduces the detail in deepest shadow and highest light, and differentiates in correct degree the gradations in the various tones.



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Negative by Richard N. Haile



Taken on  
ILFORD GOLDEN ISO-ZENITH PLATE

# ILFORD

## Clorona Paper

Ilford Clorona Paper is the portrait photographer's paper, *par excellence*. There is no other paper which gives such a wide variety of tones by development only. The range of tones is remarkable, from the normal colour which resembles an old mezzotint engraving—rich, mellow and full of beauty—to warm black and sepia on to vivid red.

A properly made Clorona print is a beautiful example of photographic art and is characterised by rich, luminous shadows, finely graded tones and glistening highlights. Clorona is equally suitable for contact printing and enlarging.

Clorona is made in a variety of tints and in an assortment of surfaces which cannot be surpassed for texture and beauty of finish.

Full details of all grades will be sent on request.



ILFORD LIMITED  
ILFORD LONDON

# ILFORD PAPERS

(For Amateur Printing)

## *Selo Gaslight*

Selo Gaslight is essentially a paper for amateur use. It is easy and convenient to handle, yet it gives prints of excellent gradation, clear highlights and deep rich shadows. Any negative—weak, medium or dense—can be made to yield its best result on SELO GASLIGHT.

## *Seltona Collodion Self-Toning Paper*

Seltona is a daylight printing paper which tones as it fixes and produces beautiful rich warm sepia tones. Immersion in a bath of common salt previous to fixing gives pleasing cold tones.

## *Enitone Gelatino-Chloride Self-Toning Paper*

Enitone is a daylight printing paper of the gelatino-chloride type, and gives beautiful tones from red to purple by fixing only.



ILFORD LIMITED  
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# SELO ROLL FILMS

Selo—700 H. & D., the original fast film. Perfect for amateur use.

Selochrome—1,000 H. & D.

An extra fast, highly orthochromatic film, multi-coated and having an anti-halation backing. Of special value when lighting conditions are poor.

Selo Fine Grain Panchromatic Film—1,200 H. & D. This film is unequalled for the photographer who requires correct colour rendering with the advantages of a fast fine grain emulsion; very particularly is this applicable to the users of miniature cameras for which apparatus there is no film possessing so many advantages and good qualities.

Selo Hypersensitive Panchromatic—2,000 H. & D. A film of extreme speed and remarkable colour sensitivity. It is sensitive to the entire visible spectrum.

Fast moving objects, theatre and street scenes at night can be photographed with ease.

A film which is a delight to use on account of its great versatility and reliability.



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# Selochrome in the Tropics

## SELOCHROME

BENGAL NAGPUR RAILWAY HOUSE,  
KIDDERPORE,  
CALCUTTA,

Dear Sirs,

8.8.34.

Some two years ago you sent me two rolls of Selochrome film. Shortly afterwards I proceeded on leave, taking the films with me, and they lay in my luggage until I unearthed them on my return 10 months ago.

While passing through the Red Sea I put a roll in the camera and made some exposures. It remained in the camera from the middle of February until late in May, the weather having been exceptionally hot in Bengal.

It is usually presumed here that 10 days is about the safe limit in the hot weather. I therefore had little hopes of recognisable results, but had the film developed. Every negative was perfect.

I consider this an exceptionally creditable result, and have been happy to bring it to the notice of my friends who have suffered, as I did previously, from mottled negatives. Please make any use you like of this letter.

Yours truly,

(Signed) W. W. CREALOCK.

ROLL FILMS AND FILM PACKS

# SELO FILM PACKS

Selochrome Film Pack—1,000 H. & D. This pack is mechanically and photographically perfect. It possesses many special features, each of which represents a remarkable advance in film pack construction. It is absolutely light proof, is easy to open and allows of the withdrawal of exposed films with the utmost ease. It fits perfectly in every type of adapter, including those with rounded edges.

Selo Hypersensitive Panchromatic Film Pack—2,000 H. & D. This pack is mechanically the same as the Selochrome Film Pack and is loaded with Hypersensitive Panchromatic Film identical in all respects to the Selo Hypersensitive Roll Film referred to on the previous page. The high speed worker will find this film pack invaluable for all his work, particularly for photography at night in artificial light. To half watt light this film has a speed of 5,000 H. & D.



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# SELO

## SAFETY CINE FILM

16 mm.

(Negative-Positive)

Selo (Orthochromatic and Panchromatic) 16 mm. Film is non-reversal—that is, it has a separate negative from which prints are made. In this it conforms to professional standards.

The film is double coated and possesses great latitude and anti-halation properties.

The emulsions used are highly colour sensitive, of extreme speed and of excellent gradation.

Booklets dealing with 16 mm. film and the processing services which are available may be obtained from Ilford Limited, Ilford, London.

# SELO

## SAFETY CINE FILM

(Reversal)

9.5 mm. and 16 mm.

Selo Reversal Safety Cine Film is now available in the 9.5 mm. and 16 mm. sizes. Full particulars are available from Ilford Limited, Ilford, London, but briefly it may be stated that this new film conforms to all the requirements of the amateur cine worker and in particular is coated with a remarkably fine grain emulsion which possesses very high speed.



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# ILFORD

## Lantern Plates

There are four varieties of Ilford Lantern Plates: brief details of each grade are given below.

### *Ilford Special Lantern Plate*

This is the fastest of the Ilford Lantern Plates and is suitable for slide making by contact or reduction. Has a very fine grain and gives brilliant contrasts and delicate gradations.

### *Ilford Warm Black Lantern Plate*

This plate is somewhat slower than the Special Lantern Plate, and gives slides of a beautiful warm, black colour. It is equally suitable for slide making by contact or reduction.

### *Ilford Alpha Lantern Plate*

Considerably slower than either the Special or Warm Black grades and intended for slide making by contact. The Alpha Plate is almost grainless and yields slides of superlative brilliance and general quality. It gives a wide range of charming colours, reds, browns and sepias.

### *Ilford Gaslight Lantern Plate*

The slowest grade of Ilford Lantern Plates. Intended for contact work and can be manipulated throughout in subdued artificial light. It is especially suitable for making slides from weak negatives.

All four varieties of Ilford Lantern Plates may be obtained either backed or unbacked.

The Ilford booklet, "Making of Slides and Transparencies on Ilford Lantern Plates," will be sent free on application.



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# ILFORD X-RAY FILMS

(Double Coated)

Ilford Limited have been supreme for a long time in the manufacture of X-Ray Film, and during the past year have introduced the new Ilford Blue Base X-Ray Film coated on both Nitrate and Acetate (Safety) bases. This blue tinted base can be supplied clear or translucent. The translucent or "Pearl" film is unique in that it combines the advantages of matt film with the ease of recognition of fine detail and small shadow differences usually associated with clear base.

### *Ilford X-Ray Dental Film*

Ilford X-Ray Dental Film is of the same high quality as Ilford X-Ray Film and is supplied in a very convenient form of packing which is easy to open, thereby facilitating work. The special contrast grade, although slower than the standard film, is a great aid to diagnosis because of its power to give radiographs of extreme contrast.



ILFORD LIMITED  
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## ILFORD PRODUCTS

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Tel@grams: "PLATES, PHONE, ILFORD"

Telephone: ILFORD 3000 (20 lines)

### CODES:

A.B.C. 4th, 5th & 6th EDITIONS,  
MARCONI INTERNATIONAL

BENTLEY'S COMPLETE PHRASE CODE  
BENTLEY'S SECOND PHRASE CODE

ILFORD LIMITED "PRIVATE"

# IMPERIAL PLATES



IMPERIAL·DRY·PLATE

·CO·LTD·CRICKLEWOOD·LONDON·N·W·2·

# IMPERIAL PLATES

have retained the confidence of photographers in all parts of the world for over 40 years because of their exceptionally high quality, wonderful keeping properties and exemplary behaviour even under unfavourable conditions. Imperial Plates have characteristics which make them particularly valuable for every phase of photography — professional, process and amateur use — and can be depended upon to yield the best results it is possible to obtain.

A selection of the popular grades is given on the following page, but further details may be had on application.



IMPERIAL · DRY · PLATE · CO

· LTD · CRICKLEWOOD · LONDON · N · W · 2

# IMPERIAL PLATES

## STUDIO, PRESS AND COMMERCIAL PHOTOGRAPHY

	H. & D.
S.S.S. Press Ortho .. .. .	850
Eclipse Ortho Soft .. .. .	850
Eclipse Soft .. .. .	850
Eclipse Ortho Soft .. .. .	650
Eclipse Ortho .. .. .	650
Eclipse .. .. .	650

## PANCHROMATIC

Eclipse Panchromatic Soft .. .. .	850
Panchromatic B Plates .. .. .	400
Panchromatic Process .. .. .	70

## PROCESS WORK, COPYING, ETC.

Panchromatic Process .. .. .	70
Process .. .. .	25
New Series Process .. .. .	10-15
Fine Grain Ordinary .. .. .	40
Ordinary .. .. .	80-100

## AMATEUR PHOTOGRAPHY

Special Rapid .. .. .	250
Special Rapid Ortho .. .. .	250
Special Sensitive .. .. .	300
Special Sensitive Ortho .. .. .	300
Non-Filter Ortho .. .. .	250
Non-Filter Ortho New Series .. .. .	450



LONDON · N · W · 2 ·

IMPERIAL · DRY · PLATE · CO · LTD · CRICKLEWOOD

# IMPERIAL FILMS

## FOR PROCESS WORK, COPYING, ETC.

These Films are especially manufactured for photomechanical work, copying, etc., and are of the utmost utility. They possess all the fine characteristics of Imperial Plates and will not fail to respond to all demands made upon them. They have been used by many of the leading Process Engravers and Commercial Houses with unfailing success for many years. The following is a list of Imperial Films. Further details will be supplied on application.



IMPERIAL · DRY · PLATE ·

- Hard Process
- Process
- Process New Series
- Process E Thin Base
- \*Fine Grain Ordinary
- \*Ordinary

\*These films can be supplied Matt to order.

CO · LTD · CRICKLEWOOD · LONDON · N · W · 2



**BOOKS ON PHOTOGRAPHY****Filmcraft.**

By Adrian Brunel. An outline of the technique of film production.

3/6; postage 3d.

**Film Technique.**

By Pudovkin. New edition of his classic work on film technique.

3/6; postage 3d.

**Amateur Talking Pictures and Recording.**

By Bernard Brown, B.Sc.

7/6; postage 4d.

**The Cine Camera.**

By Herbert C. McKay, F.R.P.S.

6/-; postage 4d.

**Cine Titling and Editing.**

By Herbert C. McKay, F.R.P.S.

6/-; postage 4d.

**Cine Photography for Amateurs**

By J. H. Reyner. 188 pages; 76 illustrations.

10/6; postage 9d.

**Film-Play Production for Amateurs.**

By G. H. Sewell.

5/-; postage 6d.

**Travel Photography, with the Miniature Camera.**

Useful hints on selecting subjects.

2/6; postage 2d.

**The Book of the Miniature Camera.**

A practical exposition of miniature cameras.

2/6; postage 2d.

**The Miniature Negative its Development and Care.**

Many hints on developing.

2/6; postage 2d.

**The Leica Data Book.**

Contains valuable information applicable to all cameras using standard 35 mm. cine film.

2/6; postage 2d.

**Portraiture with the Miniature Camera.**

Tells how a miniature camera can be used for portraiture at home.

2/6; postage 2d.

**Colour Photography with the Miniature Camera.**

The latest book on colour photography.

2/6; postage 2d.

**Pictorial Photography with the Miniature Camera.**

2/6; postage 2d.

**Commercial Cinematography.**

By G. H. Sewell, F.A.C.I. 192 pages.

7/6; postage 4d.

**Modern Photography with Modern Miniature Cameras.**

By William Alexander. A new book dealing with all types of miniature cameras and enlargers.

3/6; postage 4d.

**The Art of the Photographer.**

By Edward Drummond Young. Deals with high-class professional photography.

21/-; postage 6d.

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By F. C. Tilney, F.R.P.S. 228 pages. 80 half-tone illustrations.

25/-; postage 9d.

**Photographic Art Secrets.**

By Wallace Nutting. 12/6; postage 9d.

**The Lure of the Fine Arts.**

By F. C. Tilney, F.R.P.S.

15/-; postage 9d.

**Pictorial Composition in Photography.**

By Arthur Hammond. A beautiful volume, fully illustrated.

15/-; postage 1/-.

**Photographic Chemicals and Chemistry.**

By J. Southworth and T. L. J. Bentley.

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**Photography—Theory and Practice.**

By L. P. Clerc. Probably the most complete treatise on the science and practice of photography published.

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**The Technique of Colour Photography.**

By Frank R. Newens, F.R.P.S. Illustrated in colours.

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By G. L. Hawkins, M.C., F.R.P.S.

21/- net; postage 9d.

**Commercial Photography.**

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**Illustrative Photography in Advertising.**

By Leonard A. Williams, A.R.P.S.

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**Modern Miniature Cameras.**

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Illustration of the year's best photography.

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New edition. By G. E. J. Wall, F.R.P.S.

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**The Photographic Darkroom.**

By G. E. J. Wall, F.R.P.S.

6/-; postage 6d.

**The Rolleiflex Book.**

By Dr. Walther Heering. A new book for users of Rolleiflex cameras, fully illustrated.

6/-; postage 3d.

New catalogue of 200 Books on Photography FREE.

The postage quoted is for Great Britain only

**Sands Hunter & Co. Ltd., 37 Bedford St., London, W.C.2**

# Optochrom Automat

## Daylight Loading Developing Tank for Roll Films

The Optochrom Automat Daylight-loading Developing Tank makes the user of roll film absolutely independent of a darkroom. No changing-bag is needed; nothing but the Optochrom Automat Tank itself, free from any "gadgets," glass-parts, or anything that can go wrong. Before developing, the paper backing to the film is drawn away, leaving all parts of the film surface equally free to take the developer—without spots, fog or inequality.

Size I—To take  $2\frac{1}{2} \times 2\frac{1}{2}$  in. or  $2\frac{1}{2} \times 3\frac{1}{2}$  in. films. } **35/-**  
 Size II—To take V.P. size  $1\frac{1}{8} \times 2\frac{1}{2}$  in. Price }  
 Optochrom Thermometer (Fahr.)... .. 2s. 6d.  
 Optochrom Developing Powders, per 1/-doz. pairs ... .. 1s. 6d.



## Optochrom

LIGHT FILTERS



**SETS OF OPTOCHROM FILTERS FOR LEICA & ROLLEIFLEX CAMERAS**  
 These Filter Sets consist of Nos. 1 and 2 "Optochrom" Yellow Filters, "Optochrom" Green Filter and "Optochrom" Red Filter.  
 To fit Rolleiflex cameras **£2 5 0**

Diameter of filter mount 28.5 mm.  
 To fit Leica cameras **£2 10 0**  
 Diameter of filter mount 36 mm.

**WILL NOT BLISTER OR FADE, MADE OF OPTICAL GLASS COLOURED DURING MANUFACTURE**

OPTOCHROM Green Glass Filters are recommended for use with Panchromatic Plates or Films of all kinds..

OPTOCHROM Yellow Glass Filters are for use with Orthochromatic Plates or Films. The REFORM is a filter graduated from clear glass to deep yellow. No extra exposure is necessary with the Optochrom Reform filter.

The OPTOCHROM U.V. Filter is for use on snow subjects and distant views, no extra exposure is necessary when using a U.V. Filter.

OPTOCHROM Red Glass Filters for use when photographing highly-coloured objects, or when extreme contrast is required from Panchromatic Plates or Films.

### PRICES FOR "OPTOCHROM" FILTERS IN ADJUSTABLE HOLDERS

To fit on lens	Red, Yellow and Green	Reform and UV
19 to 21 mm. ... ..	8/6	11/6
22 to 24 mm. ... ..	10/-	12/6
25 to 28 mm. ... ..	10/-	12/6
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39 to 43 mm. ... ..	15/-	22/6
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48 to 53 mm. ... ..	18/6	32/6
54 to 58 mm. ... ..	21/-	40/-
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**SANDS HUNTER & CO. LTD.**  
 37 BEDFORD STREET, STRAND, LONDON

# NEW ACCESSORIES

## 'RHACO' DEVELOPING TANK FOR PLATES, FILM PACKS OR CUT FILMS



After the tank has been loaded in a darkroom, the process of developing, fixing and washing can be carried out in daylight without handling the contents.

$3\frac{1}{2} \times 2\frac{1}{2}$ in. or $6.5 \times 9$ cm. for 6 plates	£1 0 0
for 12 plates	£1 5 0
Carriers for Cut Films or Film Packs ...	10/0 doz.
$4\frac{1}{2} \times 3\frac{1}{2}$ in. for 6 plates	£1 5 0
for 12 plates	£1 10 0
Carriers for Cut Films or Film Packs ...	12/0 doz.
$9 \times 12$ cm. for 6 plates	£1 5 0
for 12 plates	£1 10 0
Carriers for Cut Films or Film Packs...	12/0 doz.

## 'RHACO' DIRECT VISION VIEW-FINDER

When using the Rhaco Finder the camera can be held at eye-level. Clipped on to any folding camera in a moment. Instantly removed. Price 10s. 0d. With Blue-glass lens, 12s. 0d. Leather Case, 2s. 0d. extra. State make of camera when ordering.



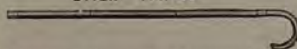
## 'RHACO' FINDER MAGNIFIER

This new focussing magnifier enables the user of any folding camera to see the image in the finder more clearly than with a reflex camera. Instantly clipped on to the finder by spring grips.

Price ... 6/6



## THE 'TRIPOCANE' WALKING STICK TRIPOD



A complete telescopic tripod contained in a walking-stick. The tripod is light, yet remarkably rigid. In appearance, the 'Tripocane' cannot be distinguished from an ordinary cane. Price with detachable handle 30s. 0d. With swivel handle ... 35s. 0d.

## THE 'WALLET' POCKET TRIPOD



This new de luxe quality pocket tripod folds flat when not in use and weighs only 14 oz. It is of light metal construction throughout. Length when closed  $8\frac{1}{2}$  in., 46 in. high when fully extended

In flat leather case, 9 in.  $\times$  2 $\frac{1}{2}$  in.  $\times$   $\frac{1}{2}$  in.

Price ... 30/-

## THE 'RHACO' CAMERA HOLDER



A neat portable accessory, fitted with camera screw, with ball and socket head. Can be attached to a fence, gate, tree, table or any other solid support, from which the desired view can be photographed.

Price ... 7/6

Soft leather case extra ... 2/6

## 'RHACO' LENS HOOD AND FILTER HOLDER

The 'Rhaco' Lens Hood can be quickly attached to any lens mounted in a between-lens shutter. Prices: Model I, to fit lens hood  $\frac{3}{4}$  to 1 in. diam. including leather case 11s. 6d.

With Yellow Glass Filter ... 15s. 0d.  
Model II, to fit lens hood 1 to  $1\frac{1}{4}$  in. diam., including leather case, 13s. 6d.

With Yellow Glass Filter ... 17s. 6d.  
Model III to fit lens hood  $1\frac{1}{2}$  to  $1\frac{3}{4}$  in. diam., including leather case ... 17s. 6d.  
With Yellow Glass Filter ... 22s. 6d.



## THE 'LEUDI' EXPOSURE METER

A real vest pocket meter, size only  $1\frac{1}{2} \times 1 \times \frac{3}{8}$  in. Indicates the correct exposure without reference to tables. Equally reliable for use indoors or out of doors. No lens, no focussing. Price including leather pocket case 6/-



**SANDS HUNTER & Co. Ltd.**  
37 Bedford Street, Strand, W.C.2

# NEW ACCESSORIES

## 'PHOTOSKOP' ELECTRIC EXPOSURE METER

For 'Still' or 'Movie' Cameras. Fully automatic. Does not depend on human eyesight but utilises the properties of the photo-electric cell. Indicates exposures directly without calculations or tables. The 'Photoskop' works entirely without battery and there is no part to be replaced.

It will give a life-time of useful service. Price, including leather case £5 5 0



## 'AKRISKOP'

A focussing aid, for use with vertical enlargers. Simple to use, and positive in results, the Akriskop eliminates all waste due to poor focussing, and assures the best possible results from miniature negatives. It is accurate to a microscopic degree which cannot be attained by the unaided eye. Price £2 17 6



## 'RHACO' GRADUATED FILTERS

The revolving holder enables the filter to be used for either horizontal or vertical subjects without removal from lens mount. To fit on lens, diameters:—

$\frac{1}{2}$ " -  $\frac{3}{4}$ " 15s. - 1 - 1" 17s. 6d. 1  $\frac{1}{2}$ " - 1  $\frac{1}{2}$ " 23s. 6d. 1  $\frac{1}{2}$ " - 1  $\frac{3}{4}$ " 30s. 0d.

## 'RHACO' LIGHT FILTERS

Set of 3 Filters, 2X, 4X, 8X, with Rhaco Spring Holder. To fit lens, diameter

$\frac{1}{2}$ " to  $\frac{3}{4}$ " 15s. 0d.  
1" to 1  $\frac{1}{4}$ " 17s. 6d.  
1  $\frac{1}{2}$ " to 1  $\frac{1}{2}$ " 20s. 0d.  
1  $\frac{3}{4}$ " to 1  $\frac{3}{4}$ " 26s. 6d.  
1  $\frac{3}{4}$ " to 2" 40s. 0d.



## 'CORREX' ROLL FILM DEVELOPING TANK

The film is wound on a reel together with a separating apron, in a dark-room, and inserted in the Correx daylight developing tank. Developing, fixing and washing can be completed without handling the film.

No. 731. 'Correx'

Tank for V.P. size film, 25s. 0d. No. 733.

'Correx' Tank for 2  $\frac{1}{2}$ " x 3  $\frac{1}{2}$ " or 2  $\frac{1}{2}$ " x 2  $\frac{1}{2}$ " in.

films, 25s. 0d. No. 735 for 2  $\frac{1}{2}$ " x 4  $\frac{1}{2}$ " in. films,

30s. 0d. 'Correx' Thermometer, 2/6;

'Correx' Developing Powders per  $\frac{1}{2}$ -dozen,

1/6; Spare Apron, 8/0; Spare Reel, 7/0 for

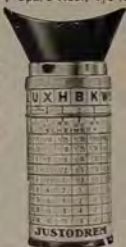
731 or 733.

## "JUSTODREM" EXPOSURE METER

The "Justodrem" will show the correct exposure at a glance, with any lens aperture or with any film or plate. A table of Scheiner speeds is included with each instrument.

Price ... 15s. 0d.

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1935

EDITED BY

HENRY W. BENNETT, F.R.P.S.

AND

PHILIP C. SMETHURST.

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# MODERN PHOTOGRAPHY

BY HENRY W. BENNETT.

The present trend of photography is, in many cases, of such a nature that all real lovers of art, all who love beauty, pause instinctively to think. The question which rises naturally to their lips is, whither are we drifting?

The cubists appear to have been able to secure a large following for their crudities in all forms of art. Their influence is seen in pictures, in architecture, in sculpture, in decorative designs for the home, and in all forms of art or decoration. But it is not the cubists alone in graphic art who have exercised this influence. Similar crude impulses have influenced music, and beautiful combinations of melody and harmony have been displaced by vastly inferior work on the plea that the latter was "original." There seems to be a craze for the worship of ugliness rather than of beauty.

It is difficult to imagine that there can be any other standard than the romantic conception of beauty. Simplicity, with gracefulness of form and outline and harmonious combinations of soft colours constitute beauty. Certainly there is beauty in ruggedness and strength, but there must still be some quality to confer attractiveness. Harsh rigid outlines, forbidding forms, unwieldy and exaggerated, may be daring and striking, but they cannot be called beautiful. They do not attract, they repel. Beauty attracts.

No one who desires progress would ever decry originality. But these crude departures from normal or beautiful work are not originality. They are just as much stereotyped reproductions as the hard mechanical photographs of earlier times. No man who sets out with the fixed object of producing something original ever achieved originality. Originality is the unconscious expression of personality, and is not attained by striving to be original. The man who produces really good original work is the man who possesses true creative artistic instinct and expresses just what he feels.

There are many men doing original and somewhat daring work which involves radical departures from orthodox types. A host of imitators try to follow in their footsteps without possessing the faculty of appreciating the genius and the per-

sonality that these works display. These imitators succeed only in being eccentric.

There is one quality which confers value on any work of art whether it be a photograph, a painting, a piece of music or any other work of creative art. And that quality is that evasive and subtle thing, which is so difficult to define in set terms, called personality. Genius has been described as the faculty for taking infinite pains. But is it? For a production to be described as a work of genius it must show personality. No amount of labour, no amount of painstaking effort, can atone for the absence of the expression of personality.

I would contend, too, that something more than personality is essential in a work of art. It must possess charm and beauty, hence my condemnation of the worship of ugliness in many modern works. But, further, like originality, charm in a work must be an instinctive expression of the artist's personality. Charm cannot be attained by mere striving any more than originality.

Some of these so-called modern tendencies are returns to the work of many years ago. They are retrogressive rather than progressive: and this retrogressive tendency is not confined to photography nor even to the extremists in pictorial photography. It is seen in commercial art as an advertising message.

Take, for example, the architectural design of many recent buildings; "packing-case" architecture as it has been called. In what way do these designs differ from the old dingy houses of a century ago still standing in our London Squares and the older streets of the west-central district? These old houses have dingy flat brick façades pierced at regular intervals with rectangular holes for windows. The modern buildings differ principally in the fact that they are constructed of stone instead of brick. As the stone becomes dull and grey with age these buildings will look just as unprepossessing as their predecessors. Frequently, in photographing these buildings for advertising purposes the camera will be pointed upwards in such a way that the print shows the building as a pyramid. For this there is no defence: it is eccentricity or affectation.

As a contrast, a modern house with its garden, designed by a very prominent architect, is shown in Fig 2.

#### MODERN APPARATUS.

It may be well to consider, for a moment, the changes which have taken place in modern apparatus and materials, and the wonderful facilities which they have placed in the hands of the photographer. This is the day of the small camera for portraiture, technical and commercial work, quite as much as

for purely pictorial photography. In modern times very few men work with large cameras excepting for photographs of machinery and similar subjects where blocking out backgrounds is necessary.

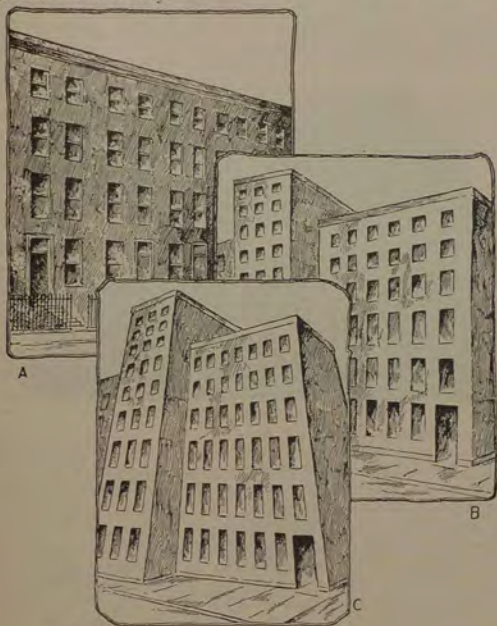


Fig. 1. A—Century-old houses in a London Square.  
 B—A "modern" building.  
 C—A "modern-angle" photograph of the modern building.

The modern small camera is a wonderful instrument both in design and workmanship. Every requirement for technical work and every feature have been thought out with the greatest care and ingenuity. Considering what is required and expected from these small instruments, the utmost accuracy in their manufacture is essential.



Differing in its scope from the ordinary small camera is the miniature. This is a film camera considerably more limited in its application than the small camera designed for all types of technical or commercial work. But it is an instrument of precision possessing distinct advantages within its special scope, not the least being the great rapidity of the lenses available in these very small sizes.



Fig. 2.

Not only has the manufacture of cameras attained a high standard, but the quality and capabilities of lenses have advanced equally. The modern rapid anastigmat, in conjunction with the small camera, has rendered work practicable and, comparatively speaking, simple, which would have been regarded as practically impossible not very many years ago. And, in this review, we are not so much concerned with the miniature camera, which has a specialised application, as the quarter-plate and  $3\frac{1}{2}'' \times 2\frac{1}{2}''$  sizes, which are now used so extensively for all classes of work. For these, anastigmat lenses are produced by the leading makers working at  $f/4.5$  and  $f/3.5$ , allowing moderate use of the rising front and giving superb definition. For technical work of such a character that rapidity is not essential, slower lenses, including those which embrace a very wide angle on the plate for which they are designed, are available. They allow extensive use of the rising front and give exquisite definition to the extreme margin of the plate with comparatively large apertures when contrasted with the former types of wide-angle lenses.

For many types of photography the large apertures available for use in moderately small cameras possess overwhelming advantages. Consider for a moment one factor, depth of focus combined with rapidity. A  $4\frac{1}{2}$ -inch lens—a very usual size for  $3\frac{1}{2} \times 2\frac{1}{2}$  cameras—working at  $f/4.5$  will give precisely the same depth of focus as a 16-inch lens working at  $f/16$  on a  $12 \times 10$  plate, and the rapidity of the small lens is more than twelve times that of the larger.

#### SENSITIVE MATERIALS.

The photographic chemist and the scientific investigator have certainly kept pace with the progress in the design of lenses and cameras. The manufacturers of sensitive materials have profited to the utmost from the result of these investigations. In plates the first steps were made many years ago from the "colour-blind" to the colour-sensitive plates by the introduction of the orthochromatic or yellow-sensitive emulsions. From that, colour sensitiveness has advanced step by step until the present time, when panchromatic plates exceedingly rapid and sensitive to all visible light and special plates sensitive to infra-red are standard articles of manufacture.

Colour-sensitiveness is, however, not the only advance to record. Little more than thirty years ago a plate registering 250 H. & D. was advertised as the fastest in the world. Now there are plates which indicate a rapidity of 2,000 H. & D. when exposed by daylight and from 7,000 to 8,000 when artificial light is employed. A further advantage is that they are fully colour-sensitive, a great additional gain.

Rapidity and colour-sensitiveness would lose much of their value if the quality had not been maintained. These plates possess working qualities such as fine rendering of gradation, character of the image and freedom from fog fully equal to the comparatively slow plates of years ago. There is one point in connection with these plates which is not always fully appreciated by modern photographers. It is this. Although they possess such high speed and fine qualities, these plates cost very little more than those of "ordinary" character.

As negative material has advanced so have printing papers equally. The older processes, carbon and platinotype have practically disappeared from ordinary practice, though carbonyl—a carbon print produced by squeegeeing the tissue to a bromide print instead of exposing it to light under a negative—has, to some extent, revived the beautiful carbon process. But there have been such great advances in the quality of bromide paper and in the variety of tone, texture, and surface in which it is manufactured, and, in addition, the introduction of the

warm black chloro-bromide in varied speeds and character has so added to the attractiveness of the results obtainable by artificial light printing processes that these two now hold the supremacy against all rivals.

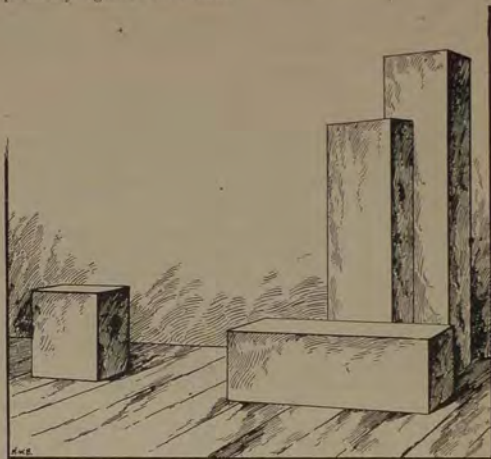


Fig. 3.

#### A REVIEW OF THE RESULTS.

To return to a review of modern photography, the work produced by the apparatus and materials described. The question naturally arises; have photographers made the most of the opportunities that these advances have placed in their hands? Have they worked and utilised these opportunities to render their photographs more beautiful and attractive as well as more perfect technically? Many have, unquestionably, their work is attractive in every sense; but a large number have not. And, there is an important point to add. In order to take full advantage of these improvements, a high training is essential coupled with a capacity for appreciating beauty and a desire to attain it. Beauty is not a fashion as some superficial thinkers and writers would have us believe. The principles of beauty are enduring and unchanging. It is only a fashion or a passing craze which changes.

## COMMERCIAL WORK.

Many posters exhibited are simply "freaks" without any artistic merit. They seem to have been produced by men who had never learned to draw. One of our railways recently issued posters which depicted holiday makers, some in bathing costumes, some in ordinary dress, lying about on the sea beach. But all their clothes, even the bathing costumes, were so drawn that they appeared to be made of sheet metal, and the figures, faces and limbs of the holiday makers were hard, wooden and mechanical. Such productions may call attention to themselves momentarily but they never attract, they repel. Their commercial value must really be very much less than that of artistic well-drawn pictures. Eccentricity may gain a fleeting notoriety but it can have no enduring quality.



Fig. 4.

Many photographs produced for commercial advertising show the same spirit as these posters. They are taken from unnatural angles and in almost impossible positions. But, striking as some of them may be, it is a very open question whether they exercise so much influence in inducing sales as representations of the objects as they would be usually seen.

It will be realised, however, that there are many—very many—photographers at the present time who are producing work far finer in quality, artistically and technically, than that of a past generation. Our pictorial supplement shows many

beautiful examples. But there are still many who are making photographs of excellent technical character, but who are so imbued with what they are pleased to call the "spirit of modernism" that the value of the technical quality is counter-balanced by the absence of artistic beauty.

The great advances in quality as well as the retrogressive tendencies are seen equally in all branches of photography; portraiture, architecture, commercial and general technical. One branch of photography, however, may be cited as an exception—the purely scientific. That only shows advances, wonderful advances. Scientists have no use for freaks or eccentricities, and are not interested in beauty.

#### PORTRAITURE.

Our pictorial supplement contains some fine examples which indicate how skilled photographers are utilising all modern developments for producing beautiful work. But others, striving after "originality" fail to attain the same artistic quality. Modern artificial lighting systems provide exceptional opportunities, but, even in that, many men seem incapable of appreciating the best quality that this power of



Fig. 5.

controlling lighting gives them. For example, there are many who use the spot light to such an extent that its unnatural effects ruin the picture.

The same principle applies to backgrounds and accessories. They should always be in harmony with the sitter and the sitter's dress. Who could defend, for example, the "cubist" accessories and background illustrated in Fig. 3? They are simply a series of long square blocks and cubes. And yet,

these rigid blocks formed the complete set of accessories for a series of photographs of an attractive girl which I saw recently. If a photographer can select nothing better than these hard mechanical accessories, he should content himself with plain backgrounds.

#### ARCHITECTURE AND ENGINEERING.

In engineering and architecture photographers will sometimes try to adopt what they call "the modern angle" and produce views of buildings or works in progress that are uncommon and unnatural. Neither architects nor engineers have any interest in freak photographs. They wish that an attractively designed building should look attractive in a photograph and that a view of a piece of machinery should show its working and purpose.

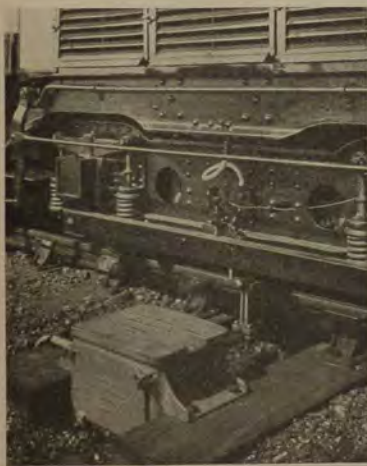


Fig. 6.

ing, designed by a modern architect, and photographed as the architect wished his work to be represented.

Fig. 5 is a photograph of a recently completed electric signal cabin. The engineers naturally desired to illustrate

The south transept, Chartres Cathedral, is shown in Fig. 4. Imagine how this beautiful example of Gothic architecture would look if photographed by some "modernists" with the camera tilted upward and the upright lines converging. The building, as it stands, is wonderfully impressive: it would cease to be impressive if distorted in a photograph.

Brandon House, Fig. 2, is a modern build-

the working of the electric controls and other mechanism.

Another type of subject—mechanism in operation—in which any departure from technical excellence would be inadmissible, is shown in Fig. 6. It is an automatic "train stop," a device in use on electric railways for cutting off the electric current and applying the brake if a train attempts to pass a signal at "danger." The trigger on the locomotive is just about to engage the small lever by the side of the rail.

Another example, fig. 7, 3,000 feet below the ground illustrates the working mechanism for operating the small trucks in a coal mine and propelling them into the cage.

These three illustrations, figs. 5, 6 and 7, are reproduced by the courtesy of the Westinghouse Brake and Saxby Signal Company Limited, the manufacturers of the mechanism.



Fig. 7.

Subjects of this character frequently tax the ingenuity and skill of a technical photographer on account of the difficult conditions under which they have to be taken.

There is still a large field for the skilled technician to explore. But whatever his work let him realise that artistic beauty combined with fine technique is the surest pathway to success.

# AERIAL PHOTOGRAPHY

BY P. C. SMETHURST.

Now that aerial photography has established itself, it has imperceptibly grown so large that it warrants a special chapter in any book on photography. As far as the amateur is concerned, aerial work is often just a series of interesting experiments with questionably suitable apparatus, but for the professional aerial photographer, it is just as much a business as the taking of portraits in a town studio.

Two very distinct branches of the work are Pictorial and Survey. Pictorial work may range from oblique shots of famous houses, castles and rivers, to photographs taken straight out of the aeroplane cockpit of distant mountain ranges and cloud effects. Survey work is almost invariably done with a special camera designed for the work in hand, and is generally done in accordance with a preconceived plan. Record work is a half-way house between the two branches. Records are often wanted of works, docks, and towns, yet the accuracy with which they are taken need not be so great as if a mapping survey were in question, and consequently the directly vertical survey view may give way to semi-oblique pictures which demonstrate the subject better.

Pictorial work is entirely oblique or perspective in character. A special camera made for use in aeroplanes is usually to be preferred, but the amateur who wishes to try his hand need not go to this expense if he takes into account the various technical factors which make for success. In the first place, it is clear that long-focus lenses will be necessary, so that the great distance between the camera and the subject will not dwarf detail to insignificant proportions. Normal cameras made for aerial work comprise a long-focus lens, but the amateur who is prepared to use—say—a 9-inch lens on a quarter-plate should be able to get excellent results.

Rigidity of the camera is absolutely necessary, so that a special front should be built on the camera to take the lens, and it is often worth while to build a wooden lens-hood well out in front of the lens to prevent it from being reached by the slipstream of the propeller. The "press" camera is as rigid as any normal type, and is thus to be specially recommended for the work. Filters are usually necessary, and high shutter speeds essential. It will probably be found that the first trip results in a dozen useless results, and the negatives





(Courtesy Aerofilms Ltd.)

Fig. 1. The Pictorial Aerial Photograph.

should be carefully examined to see what is the matter. In general, contrast will probably be poor, and the next series of negatives should be made with a deeper filter, or else developed for a longer time. Panchromatic material is, of course, a necessity, for there may be many occasions where a really deep orange filter is needed, and plates are unquestionably superior to films for aerial work.

The matter of exposure time is important. Not only will the machine be travelling at least at 90 miles per hour, but also there is often vibration trouble, which means that the camera must never be rested against the side of the cockpit. As a general rule, a shutter speed of 1/100th of a second is the smallest that can be given, and if the lens aperture and light conditions will allow double this speed, it should preferably be used. These figures are given for work where the camera points straight downward, and can naturally be reduced to some extent if the camera is pointed obliquely forward. All the same, they are useful to keep in mind as minimum speeds of shutter under all conditions.

In a closed machine the problem of wind resistance and



(Courtesy Aeroflms Ltd.)

Fig. 2. Record Work: Sudbury Court Housing Estate.

rigidity of camera is not so important as when one is just in an open cockpit, and it may also be as well to remind amateur aerial photographers that the safety belt is a simple and necessary contrivance which is intended to be used.

Special "pistol" type cameras are often used for commercial pictorial photography from aeroplanes, and are fitted with  $f/4.5$  lenses and shutters giving  $1/500$ th of a second. Larger film cameras taking 100-exposure magazines are used for large contract work.

The survey photographer has a different problem to solve. When he is to make a map of a district, it is clear that his camera must point vertically downward in order to get a "map" effect in the finished print, and thus survey photography from the air tends to become more a mechanical problem than a photographic one. Large aperture lenses are still more necessary, and film or plate magazines taking a large number of exposures are essential.

Cameras for survey work are usually electrically driven and automatically operated, which makes for accurate results and uniformity in the prints. As it is essential that a record of each exposure should be kept, the camera is arranged to record

the height above the earth, the time the exposure was made, the number of the exposure, and a tablet on which other data may be written. These exposures are made through a series of small lenses on the side of the film, at the actual time of exposure, so that they are permanently attached to the picture negative and can always be consulted.

The lenses used in survey cameras have undergone an interesting modification on account of flying costs. It is cheaper to fly low than to fly high, and clearly cheaper to fly a short distance than a long one, so that the lenses used have been changed to wide-angle types which cover a large field compared to their focal length, work at large apertures, and give full illumination right to the edge of the picture.

When working on a survey, the machine is flown over the district in a predetermined series of loops (as shown in fig. 3) and the automatic camera adjusted to expose every so many seconds according to the speed of the aircraft. The result, as may be clearly seen in the figure, is a set of overlapping pictures, which can afterwards be printed and pieced together into one homogeneous whole. In order that the camera



(Courtesy Aerofilms Ltd.)

Fig. 3. Course of aircraft for a Photographic Survey.



(Courtesy Aerofilms Ltd.)

Fig. 4. Mosaic aerial map of Central London.

may be as steady as possible, a lamp in the pilot's cockpit lights some moments before each photograph is taken, so that he can devote his attention to steadying the machine on an even keel while the camera is exposing.

After development, the negatives are enlarged carefully according to the height from which they were taken, and the separate prints equally meticulously pieced together to form one large section. Figure 4, which shows the central district of London, is made up of a number of originals in this way.

It cannot be expected that photographic survey can be as accurate as similar work done with chain and theodolite on the ground, but there are many occasions on which the air survey is much less arduous and costly. Reference need only be made to mountain areas and swamps—both of which are likely to need mapping just as much as ordinary building-ground—to realise the truth of this, and the striking growth of record and survey work from aeroplanes proves that the marriage of aviation with photography has proved of great benefit in all parts of the world.

# "REPORTING" WITH A MINIATURE CAMERA

By ALEX. STRASSER.

*(Translated by P. C. Smethurst)*

Photography in the open streets is always rather troublesome in that the attention of passers-by, casual loungers, and those in the field of the camera is attracted. This is particularly unpleasant when single persons in a street are to be taken, for the large crowd of sight-seers round the camera invariably upsets the subject, who—as soon as he sees that he is going to be photographed—stares hard into the lens and loses any semblance of naturalness.

I originally set out to take a series of pictures of London slums, but soon found that the photography of children at play in the gloomy streets was made terribly difficult on account of the fact that they at once stopped playing to pose for my camera, or else ran nervously away from me. On the other hand, numerous other children greeted the sight of a camera with the displeasing request "Take me picter, Mister!"

After one or two expeditions of this sort it became clear that the quarter-plate camera, which needed careful adjustment before taking a photograph, was totally unsuited to my purpose, and that what was required was something quicker in action and less noticeable to the general public. So I put my quarter-plate away at the back of the cupboard and thought seriously about a miniature camera. For various personal reasons, I chose to buy a Leica, and went out armed with it one Sunday afternoon to see if I could get a series of pictures of the "Orators" in Hyde Park. I will say at once that the results were so satisfactory, and the camera so quick, easy, and convenient for the work that it was clear that in this case the larger camera was not to be compared with the miniature one.

These cameras have a standard lens of focal length 5 cm. (2 inches) and the aperture varies according to the price paid. As it was not possible to get near enough to the "Orators" I found that I had to replace this standard lens with one of 7.5 cm. (3 inches) focus, and the result was then entirely satisfactory. For more distant work, it would have been



possible to use a 10 cm. (4-inch) lens, for the beauty of miniature cameras is that they can be fitted with a whole series of interchangeable lenses which can be taken out and replaced in a few seconds. The universal finders provided with such lenses assure that the camera is properly directed.

With the 3 inch lens, however, it was easy for me to stand behind the listeners and wait until a suitable moment for a





picture during the flood of eloquence. In the meantime, focussing was necessary, but since the interchangeable lenses of my camera were coupled with a distance meter this took a very short time. The depth-of-focus scale provided made matters even easier, since from the table provided the depth is read off against the lens aperture at once. Conversely, for a given depth of focus, the requisite aperture is simply determined.

For quick work it is very valuable to use the so-called "two-point-focussing" system, by which it is possible to use the largest

possible lens aperture combined with the greatest necessary depth of focus. In this way, near objects do not need to be specially focussed in the distance meter.

The "two-point" system is sufficiently interesting to merit a brief description. When photographing Hyde Park orators, or children at play, it is fairly certain that they will be between 8 and 15 ft. from the camera. Using a lens aperture of  $f/9$  and setting the focussing scale to read "12 ft.", everything in this range will be in focus, for the depth of focus under these conditions of distance and aperture setting extends from 8 ft. 6 ins. to 25 ft. (This is with a 2-in. lens. With a 3-in. lens, the depth would be between 9 and 24 ft., and with a 4 in. lens between 9 ft. 9 ins. and 20 ft.) The very useful extra depth of focus given by the miniature camera will be realised when it is calculated that for a quarter-

plate camera under the same conditions the depth would only extend from 10 ft. 6 ins. to 17 ft. 6 ins.

The setting given above is for near objects, for when any objects between 12 ft. and infinity are required in focus it is only necessary to use the same aperture of  $f/9$  and to focus on 25 ft. For the same depth of focus with the larger camera an aperture of  $f/18$  would be necessary, which would need four times the exposure.



Since the most important point of "reporting" with a camera is the possibility of making exposures quickly, the spool-chamber of the miniature camera—holding 36 exposures at once—is a great boon. Everyone must at some time have had the unpleasant experience of losing a first-class picture because the last exposure had been made, and the film had to be changed. At the same time, the automatic wind-on of the miniature camera avoids the possibility of giving one section of film a double image.

Just a few words about the film used. Since all pictures from miniature negatives must essentially be enlarged, the question of grain is all-important, and the greatest value must be placed on materials which give small grain size. A fine-grain developer is equally essential. The highly orthochromatic films now on the market are to be preferred



to the panchromatic ones, since the latter have as a rule a much coarser grain. For the best results, it is naturally essential that the exposure should be correct, and a glance at the meter before each "shot" will save many wasted negatives.

For all "reporting" work, the "angle view-finders" made to fit miniature cameras are ideal. These make it possible to look in a direction at right angles to that in which the camera is actually pointing, so that while the photographer looks forward his camera is actually focussed on those people to his left. In this way people who are taken are not disturbed or excited in any way, and I have to thank this device for some of my best and most amusing pictures taken in Hyde Park.

To conclude, I feel I must say that my experiences with the miniature camera do not really conflict with my work on the quarter-plate size, for I do not consider it a complete substitute for every purpose. My quarter-plate camera is still used for portraits, landscapes, and for special occasions, although the miniature camera would probably also be quite suitable for these purposes. But for work in the streets, in the open generally, in the theatre, or in conferences and gatherings, the Leica has become my constant companion, and it has never let me down.

[The illustrations to this article were taken in Hyde Park by Herr Strasser under the conditions described above—Eds.]

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# A SIMPLE GUIDE TO THE USE OF INFRA-RED

SOME PRACTICAL NOTES FOR THE AMATEUR

BY BERNARD ALFIERI, JNR.

Infra-red photography has, in the last few years, passed from a highly technical subject into an interesting process within the scope of every amateur. It presents a means of photographing objects and landscapes from a long distance, and lends itself to a new form of technique that can be turned to advantage not only for recording infinite detail and distant views, but as a means of producing unique studies that are as instructive as they are interesting.

Recent developments in speeding up infra-red plates and producing them in a convenient form within the means of every amateur, combined with the large aperture lenses available on small cameras of to-day, increase the range from one of a tripod and time exposure, into the realm of slow snapshot; the inclusion of figures, and very slow moving objects, and the entirely new colour rendering which may be abused from one point of view, lends itself to encouragement from another.

## GENERAL OUTLINE OF THE PROCESS.

Briefly, the daylight by means of which we expose our outside subjects, is composed of a multitude of light waves comprising the various colours of the spectrum, ranging from ultra-violet at one end, through blue, green, orange and red at the other, and beyond the longest red rays that are visible to the human eye are the infra-red, a large band of light waves that form the link between light and heat, and it is by means of these waves that infra-red photographs are taken.

A light filter that will pass the infra-red rays and cut out the visible light must be placed across the lens of the camera, otherwise the preponderance of visible light made up of all the other colours would fog the plate, and naturally a specially sensitised plate is supplied that is sensitive to infra-red light. The same plate is also very sensitive to light of other colours, and for this reason it must be handled with care.

Having placed the lens filter in position and made an exposure, the plate is developed in any standard developer in total darkness, or development can be carried out in comfort



Fig. 1. A long-focus camera.

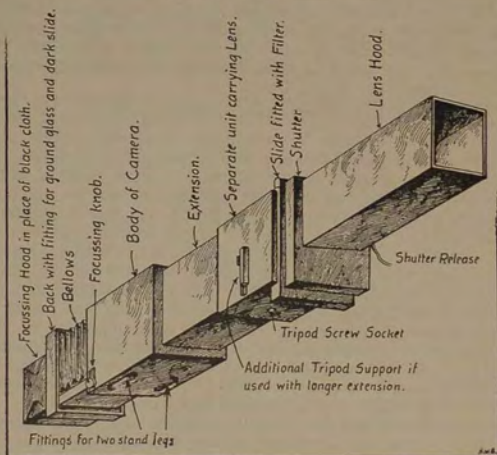


Fig. 2.

by the light of a special infra-red safelight to the illumination of which the plate is practically insensitive, and it is interesting to note that sufficient light is available through such a filter to read the small print of a newspaper. It is then fixed in a hypo bath in the usual manner, after which it can be treated in the same way as any other plate or film.

#### THE CAMERA.

Any small metal camera using metal dark slides will be found satisfactory for the work, and although much has been said about specially corrected lenses, it will be found that most lenses will give excellent results at a moderate stop, and many can be used at full aperture. Technically, the focal distance of infra-red light is slightly different from that of visible daylight, but the variation is so minute that for all practical purposes, it will not be great enough to matter. Few amateurs use a wooden camera to-day, or wooden dark-slides, but if such is the case, and it is found that the plates become fogged due to infra-red light penetrating the wood, black paper such as the plates are wrapped in will answer as a good preventive, and this may be pasted over the offending parts.

A telephoto lens and a long focus camera will be of service to magnify parts of the subject if long distance work is to be undertaken, and it is quite often possible to adapt an extension to the front of an ordinary hand camera for this purpose. A camera specially constructed for long-focus infra-red work is illustrated in figs. 1 and 2.

#### FOCUSSING.

The next point for consideration is the method of focussing, which, as infra-red light is invisible, means that we cannot see the image on the ground glass once the filter has been placed in position.

If a stand is used, this does not matter as we can focus in the ordinary way, and then fix the filter in position, but the point will not arise at all if the camera is fitted with a focussing scale, and we can estimate the distance, and set it on the scale.

If a reflex camera is going to be used in the hand, it is an entirely different matter; in the first experiments the writer held the camera, and relied on the assistance of a friend to place the filter on the lens just before the exposure was made, but once the instrument proved useful for the work, a light wire holder was attached to the lever operating the mirror,



Fig. 3. Exeter from a distance of two miles.

*By courtesy of the Western Morning News.*

so that when focussing, the filter was in an inoperative position and the action of raising the mirror lifted the filter across the lens. In actual practice it was found necessary to fix a cardboard lens hood in front of the filter as a shield against reflection.

#### THE EXPOSURE.

As a rough guide to exposure, Ilford infra-red plates with filter in position are approximately 20 H & D, which means that we shall have to give about 50 times the exposure that would be required on a very rapid plate in the ordinary way. But if we consider that on a bright summer day we should be giving an exposure of about 1/500th of a second with a large aperture for an open landscape, the same subject could be taken with infra-red in 1/10th of a second, and on exceptionally bright days, particularly in direct sunshine, the writer has obtained well exposed infra-red plates with as little as 1/25th of a second at F.4.5.

#### INFRA-RED FOR LANDSCAPES & LONG FOCUS WORK.

It is a popular fallacy to expect infra-red plates to record distant detail under any conditions. The result will usually be an improvement over ordinary plates or film, but for exceptional distances, a very clear day should be chosen.

In some countries where the atmosphere is of crystal clearness most of the time, the distance recorded on the plate is amazing ; but infra-red rays are cut off by smoke and dirt or fine particles of dust in suspension ; and it is for this reason that the results over big cities are so often disappointing. On the other hand, the haziness which we sometimes define as atmosphere, is largely composed of moisture, and it is a known fact that the longer the wave length, the less light will be scattered by water vapour, and this is why infra-red plates score over any other type of sensitive material for recording long distances.

#### THE INFRA-RED COLOUR RENDERING.

A land of snow white trees, and a general colour rendering that is unfamiliar to us. Some people remark that it is wrong, something that is not true, a failing of the infra-red process ; but we have got to enlarge our ideas on the subject, it is not as we see it, but it is an accurate record of the infra-red light on the subject.

We can apply it as a matter of interest, and explain that white foliage is caused by the colouring matter in the leaves known as Chlorophyll, which in protecting the plant from the



Fig. 4. Dartmoor from Sidmouth Beacon.

*By courtesy of the Western Morning News.*



Fig. 5. Bournemouth in the foreground, Swanage Bay and Purbeck Hills in the distance.

heat of the sun also reflects the infra-red rays which are getting within the definition of heat, but what is much more to the point, we can apply it as a means of obtaining a special effect, we can modify the excessive whiteness by choosing a moment without direct sunlight to make our exposure, and we can often utilise it as a medium for expressing a pictorial effect in an unusual manner.

#### LANDSCAPES.

The effect of sunshine is clearly illustrated in fig. 5, a photograph from Constitutional Hill, Bournemouth; the foreground, which is in shadow from a passing cloud, is almost normal in colour rendering with dark trees and light coloured houses, in the middle distance is a patch of brilliant sunshine with the usual snow-like effect and black buildings, then in the distance is alternate sunshine and shadow, with the usual dark coloured sea and sky.

Sometimes during dull and rather wet weather, excellent results may be obtained showing considerably farther than the eye can see, and at other times possibly in bright and very dry weather when there is a lot of dust in the atmosphere, the results are disappointing.



Fig. 6. A Night effect due to the fact that blue sky will appear black when photographed by infra-red.

Personally, I do not resent the white effect, and as can be seen in fig. 4, a picture of Dartmoor from Sidmouth Fire Beacon, it decidedly helps to pick out the detail and show up the distant landscape. It can again be turned to advantage if we make the exposure when any given object in the distance is either in shadow or in sunshine, while the rest of the picture is the reverse.

The use of a long focus camera, or a telephoto lens is of great assistance in magnifying small sections of the picture, but it must be remembered that the longer the focus of the lens, the more the angle of view will be restricted. It is like looking at a thing through a telescope, we enlarge a small part of the subject, which is essential if a long distance is to be recorded, but in doing so we often lose all sense of composition. For instance if a well-known view or beauty spot is to be photographed, it will mean that only a small portion of the subject can be included on one plate and to make a comprehensive panorama it may be necessary to expose a whole series of plates joining up the prints afterwards; also a very long focus lens causes a distortion of distance. Objects 8 or 10 miles away often seem just behind others in the foreground, and it is a good plan as far as possible to avoid a multitude of bulky detail too near to the camera.



## PICTORIAL EFFECTS AND CLOUDS.

Infra-red lends itself to pictorial effects and clouds, trees in the foreground that are in shadow offer a wonderful effect due to the transmitted light, whilst blue sky being almost free of infra-red, clouds are particularly easy to obtain, and the bold effect of white cumulus against a black setting offers considerable scope to the pictorial worker; also if the picture is framed by foliage in direct sunlight, the white result balanced by the dark leaves against a light sky, will give us delicate greys on a dark background.



Fig. 7. London from a height of 10,000 feet, from Grosvenor Bridge on the left to Waterloo Bridge on the right.

## NIGHT EFFECTS.

Due to the absence of infra-red light in a blue sky, use has been made of the process to produce night effects. An example of this is shown in fig. 6, which is a photograph of houses taken in bright sunshine against a blue sky, but naturally care must be taken to make the exposure when the sky is entirely free of clouds, or they will stand out with amazing clearness, and spoil the whole effect.

## AERIAL PHOTOGRAPHY BY INFRA-RED.

At a time when flying is within the means of most people, it may be of service to include a few notes on aerial infra-red photography, which is not quite as easy as it sounds, due to the comparatively slow exposures that are necessary and the vibration and extreme speed of the machine.

When taking pictures from a height exceeding 5,000 feet, the ordinary flying speed of from 80 to 90 miles an hour is not great enough for exposures of  $1/25$ th or shorter to show movement, providing the photograph is taken in an oblique angle facing as near as possible the way the 'plane is travelling, and the photographer should hold the camera in the hand without resting the arm against any part of the machine which would cause the body to vibrate.

One of the greatest difficulties in a passenger 'plane is that of obtaining a free view in a forward direction, and the tremendous draught, particularly if the operator is in the slip stream from the propellers, makes it hard to hold the camera steady out of a window, but it can be done, and the accompanying picture, fig. 7, taken at 10,000 feet over London, was obtained in this way.



Fig. 8. Clouds photographed over London at a height of 10,000 feet. The blue sky appears quite black.

The writer has also taken aerial infra-red pictures on a dull day from a 'plane with an exposure of  $1/10$ th sec., but in order to do this, the engine was shut off, and the photographs were taken whilst the machine was gliding, the view being taken from the front, in the same direction as the 'plane was travelling.

During summer weather in bright sunshine, very rapid exposures can be made, and if the photographer is using any of the small modern cameras with a very large lens stop, it may even be possible to obtain oblique views from the side window of a passenger plane with an exposure of about  $1/100$ th of a second at from  $f/2.5$  to  $f/3.5$ .

#### GENERAL NOTES.

It is never wise to over-develop an infra-red plate of a landscape or seascape subject, as nearly always the picture will include some white object, which without any such encouragement will quickly develop into a dense part difficult to print through. A fully exposed and rather under developed infra-red plate can often be saved and will give bright good prints on a contrasty grade of bromide paper, but an under exposed and over developed plate is usually so hard that the thin parts will lose all detail long before there is any chance of printing through the high-lights, even on a soft grade paper.

# “WORLDS WITHOUT END!”

By HOWARD COSTER.

Anyone who has lectured on any subject, be it what it may, must, if he has any imagination at all, be amazed at the power of the spoken word, and again and again have lost the thread of coherent thought, because of the mysterious and unknown worlds of thought he is constantly witnessing in the eyes of those who are listening.

Some of them are arid places, others again are quick with “Life”; it is with the latter that one feels one’s whole being surging up and out to make that “Life” seek fresh avenues of endeavour, to pour down, as it were, the rain of one’s own experience, so that the seed germinating in their minds might push through to conscious effort and result in enriching each individual thinker, with the sure knowledge of the limitless possibilities that lie within their own thought-world of good work that can never reach finality—praise be!

To those whose minds are arid and drought-stricken of imagination through wrong thinking, nothing can be done, except the ground be broken up by the rains of bitter experience—or their determination to seek where imagination may be found.

It is with and for the few minds that are “alive” all one’s sympathies go out. So much is asked, so little given.

Unlike other age-old crafts, photography is comparatively modern, and in consequence those of us who have practised it from a business point of view have not cared so much for the possibilities of depicting life as it touches us all, but more often than not have applied ourselves to “fake” and make-believe!

Yet the eagerness of the minority of the young students *is* there, the willingness to learn is obvious to anyone who is not stone-blind. It should be satisfied.

In parenthesis: There can be few punishments to equal that of being given the opportunity to create inspirational thoughts in others less experienced than one’s self, and because of one’s own lethargy of missed opportunities; unable to witness the enthusiasm such quality of thought inevitably returns to the creator of it.

No one can foretell the future trend of photography, be it in the field of portraiture, commercial or technical. Thanks to the physicist in particular, that which is considered miraculous to-day will by to-morrow have become commonplace.

Because then of the increasing importance of photography in the three paramount factors of our present-day civilisation, *i.e.*, science, industry and commerce, the demand for a higher quality of thought manifesting itself in design, colour and technique of each individual photographer's work is inevitable.

This being admitted, I contend that to go into full details, complete with diagrams, with the object of teaching studio technique of lighting and posing serves no useful purpose.

Photography is a dynamic thing, not something static! It is essentially the medium of graphic expression; therefore hard and fast rules should be anathema—individualism is only gained through trial and error.

The urgent need to-day, as I see it, is for original expression, if the young people studying photography are to escape from the low paid ranks of mediocrity, and lift themselves out of much heart-breaking boredom.

If it were only possible to detail how to achieve this—to draw diagrams which would be self-explanatory; how simple, and how worthless, it would all be!

But there is a path along which their minds can be directed, and paradoxically, it is practical and will achieve the objective, Individualism, because of its seeming impracticability!

One can only suggest and advise; it is by their own "will" that individual students will discover the worlds within their own minds, if taught to realise that it is possible to add daily to them, thereby enriching those they already have! That the appetite grows upon that on which it feeds is a truism that only the foolish will deny.

The technique of exposure, developing, printing, etc., as practised to-day is, comparatively, routine work and should be subordinated to the vital thing, which is an ever growing appreciation (through knowledge) of the power of photography to make manifest their own imaginative thought.

# DOCUMENTARY FILMS

BY G. N. BOOTH.

When the majority of Amateur Cinemateurs are asked why they do not make documentary films, one of two answers is generally received: either (a) "Documentary films are too high-brow for a normal person like me to bother about, old boy" or (b) "Such films do deserve more consideration, but I really haven't the time, you know."

And so everyone gets the impression that very few documentary films are made. Actually, this is not the case. There are many such films made, but they are generally made unwittingly and very badly, so that they are not recognised as such.

If we look in the dictionary for a definition of the word "Documentary" we find "Pertaining to documents or written evidence," which does not help very much. But if we look at the word "Document," we find "Any official or authoritative paper containing instructions or proof for information, establishment of facts and the like." Now, if we substitute the word "Film" for "Paper," we can get a fair idea of the meaning of the words "Documentary Film." It is a film which is informative, one which carefully marshals the important facts of the subject under review and presents them in a clear, concise way, without padding, after the manner of an official document. It is a film which deals faithfully with the subject and presents only authoritative matter without exaggeration.

It will be noticed that the subject matter is not specified. It is possible to make a documentary film about any subject under the sun, providing that it lends itself to treatment on the lines indicated above, and it will be easy to see that most subjects can be thus treated. Yes, even the "Baby on the Lawn."

Normally, a "Baby on the Lawn" film is made with a view to producing an authentic record of the baby to which the parents can refer in the future, and a film which is an authentic record is definitely a documentary film.

But where the majority of such films fail is that they treat but one small aspect of the subject. They only show what baby looks like, which could be done just as easily by means of still photographs. In fact, many of these films are made by putting baby on a rug on the lawn, pointing the camera



at him, or her, and pressing the button, consequently they become nothing more nor less than a series of moving snapshots. To make a true documentary film record of "Baby on the Lawn," we must show how he got there, what he does when he gets there, and, generally, how he likes being on the lawn.

Take another much photographed subject, "Our Holidays." The majority of films bearing this title, or a similar title, are nothing but a series of shots of the landscape or seascape, surrounding that part of the country in which the holidays were spent, intermingled with a few shots of the family on the beach, or in the hayfield, and one or two shots of holiday acquaintances.

Such a film is documentary inasmuch as it gives a fairly true record of what the country looked like and also of a few of the things the family did while on holiday, but it is not by any stretch of imagination a true record of the holiday. To do this we should show where we went; what the place was like, the principal things we did; how the family enjoyed themselves; the interesting people we met—and any amusing incident worthy of note. In fact, our film should be somewhat similar to a verbal account which one would give to a friend on returning home.

This sounds as if the film would be several hundred feet in length, but this need not be the case. In describing our holidays to a friend, we do not always go into minute detail. A great deal depends on how much time we have and how well we know the "friend." It is possible to give a brief account thus: "We went to Blanksea. It is a very small place, but there is plenty of life and lots of outdoor sports. We bathed, Father and John played golf, while the twins played tennis. I (mother) spent my time lazily, and we all feel very much better for the change. Our hotel was full of very nice people and we often had bathing parades before lunch for the whole company. We also went out fishing one day and John caught a very fine cod, the only really large fish of the day. At nights we either danced in the hotel or played bridge. At the end of the week, Father won the local golf contest and was, of course, very delighted. We were all very sorry to have to come home."

This description only takes about 40 seconds to repeat, and yet it covers all the essentials of the holiday. By a method to be described later in this article it would be possible to film the whole, to make a clear and concise record in about 150 feet of 16 mm. film, and, although only a simple example, it really would be a documentary film.

The more complicated the subject, the more difficult the film is to make. A complicated subject will have many different aspects and can be approached from various angles. In some cases it is as well to attack the subject from one angle only, as to deal successfully with all sides would be to make a film which would be costly to produce and probably too long to retain interest. For instance, a film on "Unemployment" would spread over many reels if the subject were treated in full. We would be expected to show the whys and wherefores of unemployment; what happened to the men who were unemployed; their chances of getting employment; intricacies of the "dole"; the effect of unemployment on their families; and so on, which would be almost impossible.

But it *would* be possible to make a documentary film on one of the many aspects of unemployment. For instance, "Unemployment Centres," "A day in the life of an unemployed man."

This would apply to a number of complicated subjects, such as "Slum Clearance," "Town Planning," "Road Traffic Problems," all of which could be made from many points of view. Take "Slum Clearance," as an example.



There is the way the Medical Officer of Health would look at it. There is the parents' point of view, the building side of the question, while another important aspect is that of the children.

If the film were made from the builder's viewpoint, it would be expected to deal with the different methods of solving the problem, the advantages of centrally placed flats over suburban housing schemes, or vice versa.

But the film could be tackled in quite a different manner. It could show how the present insanitary conditions of the slum home were against the good development of the children and did not allow them to put into practice the lessons they learnt at school. It is interesting to note that a film on these lines is now being made by amateurs.

There are two ways of treating a documentary film and the method employed depends on the type of film. One can either make the film in chronological order, event by event, as each happens, as would be done in a film of some manufacturing process, or one can treat the subject boldly as a whole without paying much attention to the chronological order, as could be done in a film with the title "Policemen at work and at play."

The first method takes more film than the second, but is essential for all films in which the subject must be followed through step by step, as in the case of scientific films, films of manufacturing processes, or films of natural phenomena. Unless the pictures are self-explanatory, a number of sub-titles will be necessary, and this is generally the case.

Let us briefly examine the outline of a film of a manufacturing process, say the design and building of structural steelwork.

This film would probably open in the drawing office where the steelwork is being designed. After this the drawings would be sent to the template shop where they are set out to full size and the templates (or patterns) are made. When the templates are finished the steel sections are marked off from the templates for cutting and holing, after which the sawing, shearing and drilling takes place. The separate members are then riveted up and the whole is painted and dispatched to the destination and then erected. As well as these processes there are numerous others which sometimes apply, such as smithwork, welding, machining, hydraulic pressing and bending. It is easy to see that without sub-titles this film would be so much Greek to the non-mechanically-minded man. Well written and fully explanatory sub-titles would be essential to its success.



The second method is the more interesting of the two as it entails a great deal of thought in the preparation of the shooting script. The object of this method is to produce a film which is understandable to anyone without the addition of a number of explanatory sub-titles—and in fact, the film will be improved if no sub-titles whatever are used. No doubt this sounds most difficult, but actually, if one has a little imagination and a reasonably good knowledge of the cinema, it is not too difficult and is certainly most fascinating.

Another point is that the subject is not always followed through chronologically, but the position of each shot depends more on the association of the idea contained in the shot to the next or the previous one.

It might be as well at this point to give an illustration from the shooting script of an actual film made on these lines, and to explain the principle after the sample has been examined.

The following extracts are taken from the film "Saturday," made by the Bolton A.C.A. last year. It is a documentary film and its object is to show how a large industrial town spends its Saturday. The film starts with the populace going to work in the morning, and one or two examples of their work are shown. Next follow the women shoppers. Just before noon the workshops are going at full speed, everyone

trying to finish their tasks in order to get away "on the dot." Lunch follows and then the afternoon arrives, with sport, leisure, walking, motoring and the rest. The evening meal is the prelude to the evening's entertainment of dancing, cinema, theatre or "what-have-you" and the film finishes appropriately on the putting out of the family cat for the night.

In this film the shots are *more or less* chronological, but in every case the position of the shot depends on its relation to the preceding shots.

The following shots are taken from the morning sequence:

M.S.—Shop assistants arriving at the entrance of a large store.

C.S.—Assistants clocking-on.

S-C.S.—Hat hung on a peg.

S-C.S.—Ditto.

S-C.S.—Ditto and coat.

S-C.S.—Ditto and umbrella.

C.S.—Hand opens a large ledger.

S-C.S.—Head of business reading a letter. He leans back and lights a cigar.

S-C.S.—Taxi driver waiting on the rank is seated at the wheel and is smoking a cigarette.

M.S.—Policeman on point duty.

M.S.—Street sweeper at work.

C.S.—His broom brushing the street.

C.S.—Servant "Hoovering" a carpet in the home.

S-C.S.—Typist at work.

S-C.S.—Engineer working at a lathe.

S-C.S.—Clerk adding up figures.

M.S.—Shop assistant works cash register and hands the change to a customer.

M.S.—Customer leaves shop.

M.S.—Shoppers with their baskets in the street.

The shots of the assistants clocking-on and the hats being hung up need not be long. If in fact, they are cut down to 2 to 3 seconds a shot (*i.e.*, not more than one foot in length), the result will be good, as it will give the feeling of the early morning bustle before work begins.

The opening of the ledger, which should be done slowly, is symbolic of the starting of the morning's work. The shot of the business man follows quite naturally, and the smoke from his cigar connects this shot with the next.

We are now in the streets and can show one or two jobs which have to be carried on in the open air. The policeman and the street sweeper are given in this case, but any other

would have been just as good, except that the street sweeper allows us to get a very obvious connecting link with the servant in the home.

We next contrast the work at home with the work in the office, the engineer in the works, then back to the office again. The clerk adding up figures suggest an adding machine—and what better for our purpose than a cash register, as it allows us to bring in the Saturday morning shoppers and coffee drinkers, which follow later.

And so to the afternoon's sport; hiking, motoring, tennis football, gardening, golf and walking are all brought in, each contrasting with the others.

A few suitable hiking shots then help to introduce the afternoon's sport without appearing out of place and without any troublesome pause in the run of the film.

Another sequence worthy of note comes in the evening:

M.S.—Newsboy with a news bill and papers.

C.S.—Theatre bill.

C.S.—Cinema bill.

C.S.—Cinema commissionaire.

C.S.—Theatre bill.

C.S.—Theatre commissionaire.

C.S.—Theatre bill.

C.S.—Cinema bill.



M.S.—Theatre queue.

M.S.—Crowd round a cinema.

M.S.—Lone walkers on the moors, admiring the sunset.

L.S.—The sunset.

L.S.—Theatre show from the house.

M.S.—Behind the scenes at the theatre.

M.S.—In the operating box at a cinema.

S-C.S.—Operator working spot light at a Palais-de-Dance.

L.S.—The dancers on the floor.

Here we have more very fast cutting to give the atmosphere of the bustle and crushing of the people attending the theatres and cinemas. The walkers on the moors, and "Nature's Show" contrast with the man-made show of the theatre. Then we go behind the scenes and follow with a shot of behind the scenes at a cinema, the operating box. The arc lit projectors suggest to us the spot lights at the local dance halls and so to the dancers.

These examples should explain the method of attack when making a documentary film about a subject which can be handled in a "Dramatic" rather than a "Text-Book" manner. Carefully chosen shots which can be connected, either by contrast or comparison, with the preceding and following shots make sub-titles unnecessary. Their insertion in fact, becomes an insult to the intelligence of the audience.

Such a scenario demands two things if the film is to be a success. Good photography and good editing. It will be realised that the audience must be able to see what the film maker is trying to convey, and that they should be able to spot all the connections between the shots easily and quickly. One cannot get up during the showing of a film and explain that the shot of Father, asleep in the garden, following the shots of Mother busy about the house, is meant to be humorous. The audience should be able to see this for themselves. In this case, when photographing Father, the photographer would have to place his camera just far enough away from Father to show he was in the garden but near enough to show that he was asleep. The editor would have to be careful to place the shot in just the right place. For instance, he could work up the sequence of Mother with progressively shortened shots to give the impression of increased activity, then follow these with a longish shot of Father asleep. Properly done, this could not help but raise a laugh. This is a very simple example, but it will probably suffice.

The photography is most important. Each action must be perfectly clear and deliberate, to this end close-ups are a



great help and their use should not be neglected. It is, in fact, a good rule always to photograph the subject as near as will accommodate the action or the idea to be conveyed by the shot. The camera-man should always strive to make the associations between the shots perfectly clear and he can often force home these associations by means of carefully chosen camera angles. In the film "Saturday," a shot of a golfer in difficulty in a bunker is followed by a shot of a gardener. The golfer is sending the sand from the bunker up into the air with his wild strokes and the gardener is shovelling rubbish into a heap. By photographing both men from the same low angle, so that in each case the dirt flies in the same direction across the screen, the association between the shots is emphasised.

With regard to the editing. As with any type of film, the editing can either make or mar the finished result. With a documentary film of the second type the editing should carefully follow the script upon which so much time has been spent in perfecting the continuity of the shots. The main difficulty in editing such a film is to get the correct timing of the shots. The length of each individual shot is very important for not only is it necessary to cut to the correct length, so that the shot more or less matches the previous shot, with

which it is associated, either in metric length or in the amount of action portrayed in the shot. (If one were cutting a dance band sequence, one might take the drummer and find out what length of film contained four beats, it would then be possible to cut shots of the other instruments to the same length and intercut, giving a definite rhythm to the sequence; on the other hand, in the gardener-golfer sequence, the golfer might take, say, eighteen inches of film to make three strokes, whereas the gardener might require thirty inches of film for his three shovels-full and, in this case, one would match the contents of the shots rather than their metric length.)

Film tempo, however, must be carefully watched. The tempo of all films, whatever their type, varies according to the demands of the "story" throughout their lengths. Some films demand more variation than others. A "text-book" documentary, whatever story it may tell, demands but little variation. On the other hand, a documentary handled in the "dramatic" manner will, in most cases, demand a much greater variation.

Violent or sudden changes in the tempo are better left alone and only used in very exceptional circumstances. The film should flow smoothly and a fast tempo is, in the majority of cases, better when it is gradually built up by the progressive shortening of the shots.

Again, ultra fast cutting, say below ten frames, should not be indulged in too frequently. For, however much it may make the audience sit up, it is always rather tiring to the eyes and too much of it tends to become annoying.

It will be noticed that, in the portions of the shooting script of "Saturday" given in this article, no fades or mixes are used. Actually no mixes are used in the whole of the film and there are only two fades—one at the beginning and one at the end of the film. This is a feature of this method of film making. By carefully choosing the shots so that each is related to each other by means of the content, and not by the actual associations of screen time and place, we are not dependant on such aids to continuity as the fade and the mix. In what I call the "Dramatic Documentary" the direct "cut" is the best link in almost every case.

This should commend itself to the amateur, who, unless he has special apparatus, generally finds difficulty in making mixes and, to a less degree, fades.

(The illustrations are enlarged "Stills" from the film "Saturday.")

# THE COST OF SHARP FOCUS

By DAVID CHARLES.

This is an article rather for the newcomer to photography than for the "old hand" who has run the gamut of several cameras, and who has at last, if not his ideal camera, at least one with whose falling short from the ideal he is perfectly well acquainted.

For the newcomer to-day the choice of a camera must be a bewildering matter—so many sizes, so many shapes—each of which means some advantage which he cannot properly understand, still less the inevitable inhibitions on the contra side which each advantage entails. Even to say, "Tell me what you want to photograph, and I will tell you which camera to buy," is not very helpful to him who has only the vaguest idea of why the photographic urge has got him. Still less can he classify subjects, from the camera point of view, in the way that one might paraphrase as an example the summing up of a celebrated Punch railway porter, "Babies is dawgs, and daffodils is dawgs, but a giraffe is machinery, and a long-distance shot."

The whole purpose of a camera is to obtain sharp focus of the subject upon the negative. All the peculiar attachments of the modern camera are devoted to that one end. Some make it easier or quicker to do that with certain classifications of subjects, while necessarily being less suited to others. Therefore it will be more helpful, in my opinion, to exemplify how various subjects can be illustrated with cameras which are not the ideal ones, than merely to show superlative results produced by the cameras most suited to them. Which, of course, manufacturers are perfectly competent to do. This necessarily involves illustrations which fall short of perfection—in some cases very much so—in explaining why another camera would have done the job better.

## BUT WHAT IS "SHARP FOCUS"?

The popular-priced fixed-focus type of camera may be said to give sharp definition on all average subjects. On applying the additional attachment provided for "close-ups," which costs a few extra shillings, the latter type of subject immediately becomes sharply focussed. But when negatives from these cameras are enlarged, one still finds that the best defined





Fig. 1. Relief against the softened background shows the value of selective focussing which a rapid long-focus lens will give. But the cost is either skill or time in preparation. Neither the cheap box nor the costly miniature will do this.

"snap." This entails the use of a stand or other support. The duration of the exposure may involve movement of the group, or of the trees or the yachts, showing in the result, while the time taken to make the adjustments may induce self-conscious expressions in members of the group, or the yachts may have vanished from the scene. So the cost of sharp focus may be the whole value of the lost picture! On the other hand, if much money is paid for a camera which enables sharp focus to be secured swiftly, even on moving subjects when the beautiful clouds necessarily reduce the light-power, even then the cost is not alone that amount of cash. Still more is paid in either of two ways.

#### COST OF LARGE-APERTURE LENSES.

The principal cost of using a large-aperture lens, as fitted to a reflex or a "speed" camera, is that of attaining skill in its

pictures are obtained from those in which the subject was at a certain definite distance from the camera. Usually this distance is about twelve to fifteen feet, "group distance," with the normal setting, and around forty inches with the close-up adjustment. The "sharp-focus" of details at other distances is only comparative. Some users prefer and some subjects require, still greater "depth," which is obtained by using a smaller stop or "hole in the lens" but at a cost of considerably extended exposure. This extra exposure may not be the only cost. By no means!

Unless the light is unusually bright, a short time exposure *must* replace the

use. For an ultra-speed lens has scarcely any "depth" at all. The sharp focus obtained is only on things at one precise distance. This fact is sometimes very useful to get the sharp subject shown in bold relief against a fuzzy background as Figs. 1 and 2. But the accurate judging of distances is not learned in ten minutes. Nearer than nine feet there are few who can trust their judgment. The reflex, of course, helps tremendously, but for its use in close-ups there is a point which I shall treat of later, and it entails a low viewpoint which is not ideal for portraits and for many views.

Many people regard the difficulty in dealing with the limited depth of sharp focus of the average speed camera as too great a price to pay, so they fly to the miniature instrument with its wealth of detail-rendering. The cost of these beautiful tiny negatives, seemingly vying with needle-etchings in the sharpness of their "focus," is extremely small in cash, once the camera is paid for. The real cost is in the extra care required in processing, not to damage them or to increase their "grain," and in the extra trouble necessary to prevent specks and blemishes showing on enlargements. The "picture mortality" may be somewhat higher, too, since local doctoring of these tiny negatives is almost impracticable. A poor large negative can be tinkered up in many ways, but the tiniest fault in a miniature negative may loom up big and bold in the enlargement. We just have to take the risk, or take an extra exposure or two of a specially favoured subject, and here, again, the cost—this time of negatives—must be taken into account.



Fig. 2. None but a reflex will ensure sharp focus on an un-self-conscious model. Resting the camera *sideways* on the lap secured this, while conversing beside her on a garden seat.

## SOME PRACTICAL EXAMPLES.

A saunter round with a borrowed camera and making a few photographs on the lines of those shown here should soon provide experiences which help to discover where photographic fancies may eventually lead, and at the same time determine how far any particular type of camera will assist. The griffin monument at Temple Bar is just such a subject that almost any camera worthy of the name will secure from a distance and an angle which will include it, on a Sunday when there is no traffic in that particularly narrow but busy and never sunlit spot. But to one who is architecturally or historically interested in detail, nothing short of a wide-angle lens used with a "rising-front" will really serve us well in the narrow space available. That entails the use of a stand- or a hand-stand camera supported on a tripod for a time exposure. What then can the hand-camera user do about it?

## ARCHITECTURE WITH HAND CAMERAS.

Well, there is a stone balustrade opposite, from which the ironwork is conveniently broken. Wedging the camera level with the aid of a few coins, a short "bulb" exposure was made at each lull in the traffic until the total time required was reached for the dirty old bronze work in the dark old street. Fig. 3 is the result. Too much foreground, of course, which enlarging of the principal part will cure. It is useful to note that a result as good as this can be got this way with *any* hand camera. One provided with a reasonable amount of "rise" to the front would do still better by getting in more of the monument, but the utmost satisfaction can only be got with a camera specially built for that special work, such as a Sinclair Una, the Soho "Precision," or the "Sanderson." But if your interests (and so your choice of camera) lie mainly elsewhere than in architecture, remember that you *can* make detail photographs of this type of subject at the cost of either a little "wangling" or of some of the detail as I have shown. On the other hand you may feel more inclined to point your camera upward deliberately, and produce "angle pictures." But do one or the other. If you must tilt, go the whole hog.

By "specially built" I mean that these particular cameras possess the various "movements" which allow the lens to be displaced from the centre, as well as replaced by those of other focal lengths, in the various apparently weird ways which inconveniently positioned architectural subjects, both

inside and outside, call for. The use of a stand is practically a *sine qua non* when utilizing these special features.

### BABIES.

From the rectangular to the rotund! No need here for special "movements"—the subjects provide those! Excepting in the best light a rapid lens is required, which in its turn demands precision in focussing a subject which often refuses to remain put. And because we want to get comparatively close up, this precision in focussing becomes still more acute a problem, for even a few inches back or forward may spoil the sharp focus. There is nothing to equal a

reflex for babies, of any age, sex, or genus. But it is a mistake to attempt to focus with the pinion should the subject make a movement to or fro. The thing to do is to make sure one has sharp focus at the desired distance, standing with one foot advanced, in such a way that one can sway the whole body, and the camera with it, so keeping the lens at the same distance from the subject all the time. Keeping one's eye on the glint in the subject's eye, or on its teeth or other small



Fig. 3. The Griffin Monument, Temple Bar. A centre-fixed lens used in architecture involves too much foreground, like this.

detail as seen sharply on the focussing-screen, sharp focus is *kept* while waiting for the expression, rather than wiggling the screw for it. The same with daffodils or dogs, as I said before. Then when the baby smiles, the dog cocks his ears, or the breeze lulls for the daffodils, one is ready to press the trigger.

I don't know any other camera with which really close-up snapshots can be taken with any certainty of sharp focus if the subject has the slightest tendency towards camera-consciousness. Examples are seen in fig. 1 and fig. 2. But the cost of sharp focus here is the weight of the reflex camera and its high cost.

## CURIOS AND CUSTOMS.

If you travel about in search of things which definitely interest you, rather than take casual snapshots of such scenes as happen, you will probably be fastidious in your judgment as to the success or otherwise of your results. Now "curiosities" may cover a most varied range of subjects, from a staircase or a tomb, down to a snuff-box or an arrow-head. If your staircase or your tomb, or the ancient hostelry, is in any way distinguished by its still vertical posts or pillars, you will feel offended if these appear to lean in the picture, which they undoubtedly will do if the camera is not level at the time of exposure. But it is noteworthy that in two of these types of subject there is more interesting "meat" *above* eye-level, while in the other the interest may be entirely *below* eye-level, which means that a large part of your negative will be devoid of interesting "meat."

The "movements" of the architectural specialist's camera will serve you better, although you may prefer to compromise by the use of an "all-round" sort of camera, getting the picture small as in fig. 3 with subsequent enlarging out of the essential. But this is a process which has its limits. You cannot expect, outside the rare exception which proves the rule, to enlarge a small portion of a miniature negative with as good a result as from a  $3\frac{1}{2} \times 2\frac{1}{2}$  or a quarter-plate.

The rising-front of the average all-round camera is far from sufficient for the specialist in old inn signs or cathedral gargoyles, if he must have his uprights upright. And the camera fitted with a speed lens may render even that rise of little advantage, since a



Fig. 4. If you must tilt, then tilt, and let the uprights go.

lens of  $f/6.8$  maximum aperture has usually more reserve of "covering-power" for such purposes than its heftier and more costly cousin of  $f/3.5$  or larger aperture.

The small curio collector requires a camera of long extension, a facility which is also possessed by the better "hand-stand" types already mentioned, and by many of the reflex pattern. For occasional small objects the possessor of the short extension camera can do much by the use of magnifiers clipped on the lens and used at specific distances.

But "customs" come into an entirely different category. The reflex is again pre-eminent for securing sharp focus on the principal performers, while the speedy lens and ready shutter enable one to secure the right instant. Working in a crowd, a reflex can be held above the head, while still observing the composition and the definition of the subject. If one is prepared to pay the cost of infinite practice, and the precision of the pressman in judging distances is attained

almost any good camera will serve. Even the hand-stand is excellent, for its reserve of movements for specialised technical purposes can be so sweetly switched away. But let me tell a secret—the pressman does not judge every variation of distance. The embryo press photographer works for some appreciable period on "five-yard-shots" until his judgment of fifteen feet becomes sub-conscious. Then he gradually adds the more difficult "three-yard-shot" to his repertoire. Those two distances cover a tremendous scope!

#### THE ALL-ROUND CAMERA.

When we come to think of it, the "average" camera user does



Fig. 5. Slight softening of the subordinate figures and background demands a rapid lens, and so do scenes in dull streets. A reflex or nicety in judging distance are required and also a ready finger.

mainly photograph "customs" . . . those of his immediate family and friends, rather than those of strange tribes. The speedier his lens, the greater will be his cost in terms of the acquisition of skill in distance-judgment. With a less costly instrument he will sacrifice many a possible picture by movement of his subjects during the more lengthy exposure, or by under-exposure when light is not so good, or by self-conscious attitudes and expressions assumed when stillness is demanded. Close-ups he can do if preparation is practicable, but he cannot seize the unexpected opportunity at quite close-quarters. Except for this ambitious type of subject, and those of the fastidious specialist, the all-round camera is really fine.

#### THE MINIATURE CAMERA.

There are really two types, the miniature reflex, and the still smaller negative-maker usually described under this heading. Apart from their compact efficiency and convenience, the main advantage of these cameras is the enormous depth of sharp focus at large "relative aperture," which, of course, means plenty of clear detail under the most unpromising conditions. A snap is still possible when a bigger camera demands a small stop and a time exposure which movement of the subject, or the absence of a stand, prohibit. The range-finder provides a means of securing the keenest definition on the principal item in the "miniature" type, while the mirror-box principle provides the same facility together with "full-view" of the subject in the "miniature-reflex." The capital outlay is the biggest cost of ensuring sharp focus on a bigger range of subjects and conditions than many other cameras will manage. The other cost is the sacrifice of high and low verticals, and of extreme close-ups, for there is usually no rising-front, nor extra-long extension. Because of the extreme "depth" of sharp focus, we cannot secure, with a miniature camera, that kind of relief which is provided by a long-focus lens which gives a sharply defined subject against a very diffused background and which is the portraitist's aim, as well as that of the animal photographer.

But one can scarcely think of a better camera for him who photographs the customs of his friends or of his enemies, his own land or foreign scenes, without regard for weather, with comfort and ready convenience, and at small expense; provided he is prepared to be a little more meticulous than usual in his "processing" and projection-printing.



Fig. 6. Let no one sneer at the stand camera. This was taken with a thirty-year-old half-plate outfit. Time is the principal element of cost, not in exposure but in preparation. The professional view photographer does not grudge it.

#### SPEED AND YET MORE SPEED.

The internal-combustion engine provides this on the land, the sea, and in the air. But even in our city streets the speeding-up is tremendous, and makes street scenes far more difficult to photograph than they were even in the slow-plate days. Yet depth of focus one must have, even though the lens be speedy. Anything bigger than  $3\frac{1}{2} \times 2\frac{1}{2}$  makes things difficult, yet a rising-front is almost essential. A camera held horizontally, with the cross-front used here as a rising one, is perhaps the best all-round compromise and the all-round camera finds one of its many metiers. But at Brooklands, at the air-pageant, or at the motor-boat race, we would like to get individual subjects of good size in the negative. A longer focus but speedy lens is certainly the specialist's instrument, which in hands less than extra-efficient involves the cost of high mortality in the way of failures. Distances are so difficult to judge from second to second, and while adjustments are being made the subjects vanish! But because the subject rarely fills more than an iota of the film a miniature negative would need to be exceptionally perfect, to permit of satisfactory enlargement.



## NIGHT PHOTOGRAPHY.

Snapshots in the street, or at the theatre, denote again a lens of the speediest, which in its turn calls for either time spent in adjustment, or securing sharp focus by reflex or range-finder, for there is no "depth" in the ultra-rapid lens. On the other hand a fairly sharp line must be drawn between these night scenes and those which consist of the lights and shades of flood-lit buildings and murky alley-ways. The latter kind of picture is better tackled with a less specialised kind of camera, for two reasons. The first is that it may call for a less narrow angle of view, and will often require not only depth of focus, but some rise of front, which the physical dimensions of the speed lens, and its optical covering-power, may forbid. The second reason is that the images of lamps and the like, which are such a prolific cause of "glare" and of halated rings and blurs, are, generally speaking, far less likely to arise with the anastigmat of modest aperture, and cost, than with the former type of lens.

## COMPROMISE NOT A DISADVANTAGE.

The conclusion must still be that if a camera approaches the ideal for a particular kind of subject, it not only calls for special skill in the getting of sharp focus, but it has drawbacks for other kinds of work. The all-round camera is still the best for the all-round photographer, who does not expect, though he may with luck secure, exceptional results from exceptional subjects. At the cost of certain refinements for special purposes, he gets sharp negatives within the normal range of "photographic weather."

But if he wants to arouse envy and admiration, he must pay the price of concentrating his endeavours with greater energy in a less extended field. I hope these notes may assist some to decide what that range shall be, and what sort of camera will help them most.

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# CAMERA ANGLES FOR THE CINÉ WORKER

BY PHILIP LAZENBY.

Since the basis of the cinema is the art of emphasis, whether detailed or general, those who wish to make the most of their films must clearly examine and consider the various technical means at our disposal for obtaining it. Some of the methods, including lighting, cutting, and deliberate tone falsification, have already been reviewed at length, but the present article is to consider the function of the little written-about camera angle.

The camera angle, which is just a convenient way of referring to the direction from which the shot was taken, clearly conditions the view-point from which the audience sees the object photographed. To use a well-worn phrase (originated, I believe, by a Russian named Dziga-Vertov), the camera must be considered as the eye of the audience. It is clear that not only must the audience see the scene from the most effective view-point, but also that this view-point must be the most convenient and comfortable one to demonstrate the action within the shot. Considering the camera as an eye, this eye must be in a position to see everything that goes on, and from the most natural and effective position.

Everyone who has seen some of the modern photographs which defy the laws of perspective and show us "bird's-eye" or "worm's-eye" views must have been struck by the fact that by using view-points of this sort, the emotional effect of the result is far and away greater than it would be if the normal camera position had been used. Figure 1, for example, which shows a factory chimney belching out smoke, would have been insignificant if the camera had been taken quarter of a mile away and then used at a normal angle.

These distorted-perspective pictures, however, are not the only ones where an abnormal camera angle may be used. Close-up rendering of detail very often calls for the most careful placing of the camera, in order that the result may be effective and demonstrative. Take the humble door-knob, for example. One may easily push up the camera and lower the tripod until it is level, using the camera horizontally. This gives one view of a door-knob. But when making a film,



Fig. 1.

*(Courtesy Stuart Films, Ltd.)*

a door-knob is usually photographed for some special reason, and the chances are that someone is meant to be watching it turn slowly. In this case, the level shot would be out of place, for no human being (except of course a child) sees door-knobs at their own level. It would probably be preferable to bring the camera high up on the tripod and tilt the head over so that the camera pointed down at an angle of 60 degrees. From this position the door-knob would be connected in the mind of the audience with a human being, who was looking down and watching it turning.

This seems perhaps an exaggerated point, but there is no question of the right and wrong way of taking even such small details as door-knobs and drain-pipes, if a film is to run smoothly through and be a co-ordinated whole to the audience.

From this illustration, however, a key is obtained to the method of working. It is clear that when a certain point is to be clearly shown, the camera must be placed in the position the eye would adopt to see it. Take, as example, fig. 2. The shot was intended to show the action of the hockey stick, and in order to show clearly the position and grip of the hands, the camera had to be lowered to within 2 ft. from the ground. The enlarged picture shows very neatly that the movement of the hands from side to side



Fig. 2.

*(Courtesy Stuart Films, Ltd.)*



Fig. 3.

*(Courtesy Stuart Films, Ltd.)*



Fig. 4

*(Courtesy Stuart Films, Ltd.)*

when swinging the stick would be quite comfortably within the camera field, so that the entire action could be shown within a single shot.

A completely different problem is illustrated in fig. 3. Here the working of a milling machine had to be shown so that workers could be trained by means of the film. The controls are therefore shown from the position the worker would adopt when running the machine, and the camera (as can be clearly seen) is placed over the shoulder of the man actually using the handles. The main positions of the three controls are picked out by the lighting as an additional aid to the audience.

Fig. 4 shows a further portion of the same film. Here the "T" guides in the bed of the milling machine have to be shown, and the camera was placed within 2 ft. and tilted over at an angle of 45 degrees—just in the position which the human eye would have to be placed to see and appreciate the details.

The camera angle, therefore, is not—as supposed by some people—to be an arbitrary conception based on "hitting the audience in the eye" and attracting attention to itself, but a very precise and nice estimation of the exact angle at which the camera must view the objects to be photographed.



ROUEN

HENRY W. BENNETT

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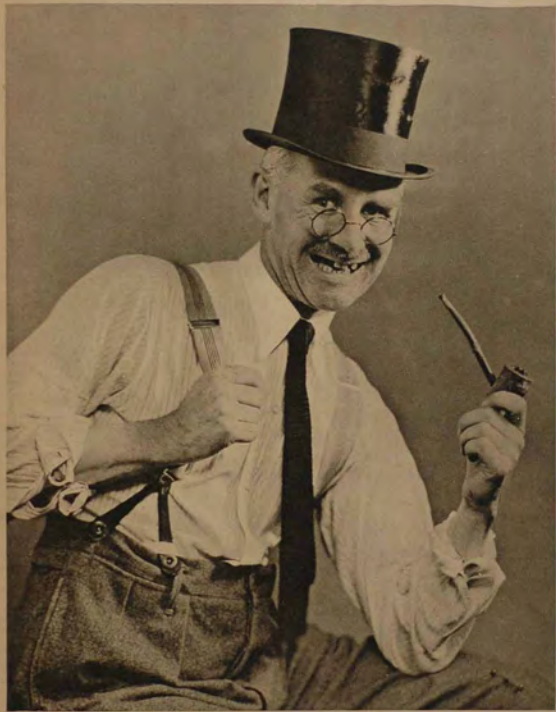
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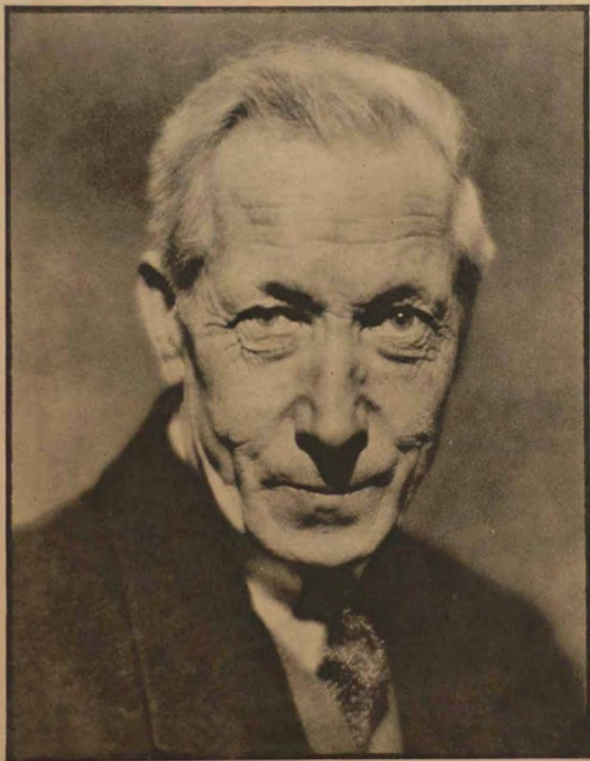
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STUDY

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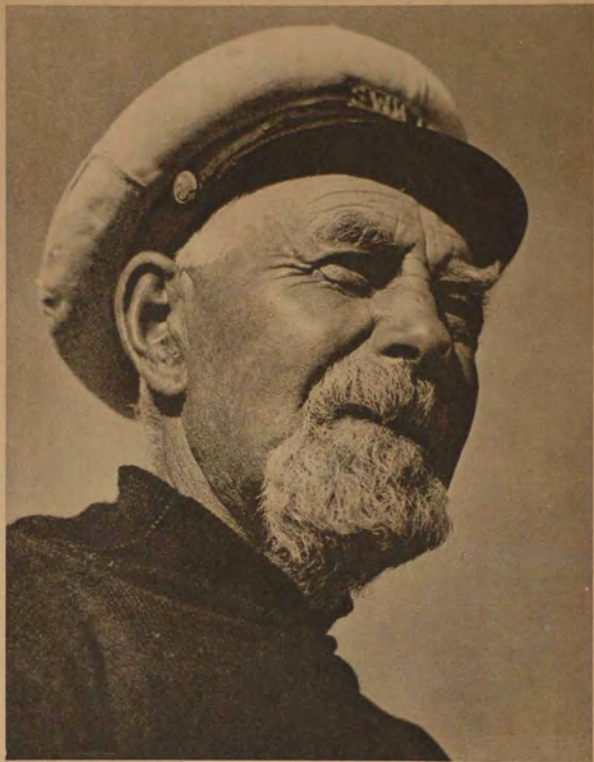
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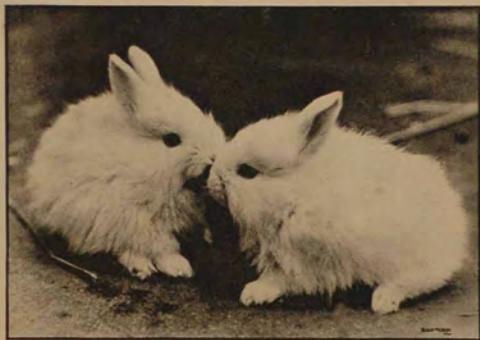
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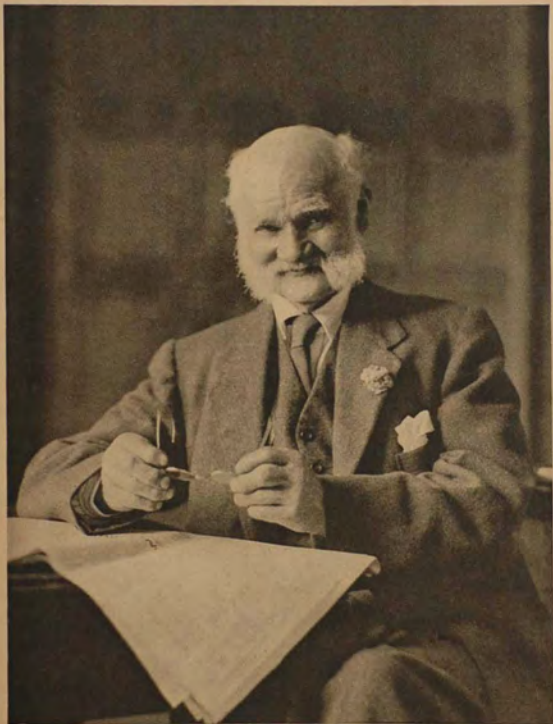
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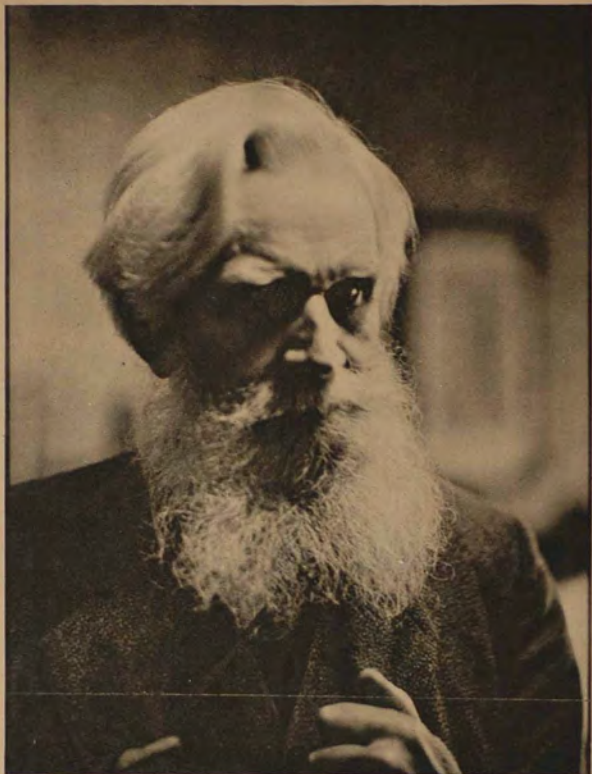
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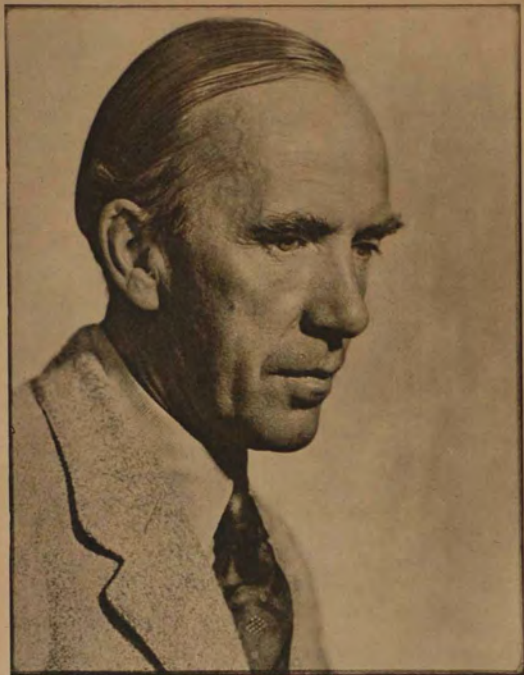
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PORTRAIT

RICHARD N. HAILE



PORTRAIT

HELENA THORNHILL



HEAD WITH SPECTACLES

G. SCOTT BUSHE

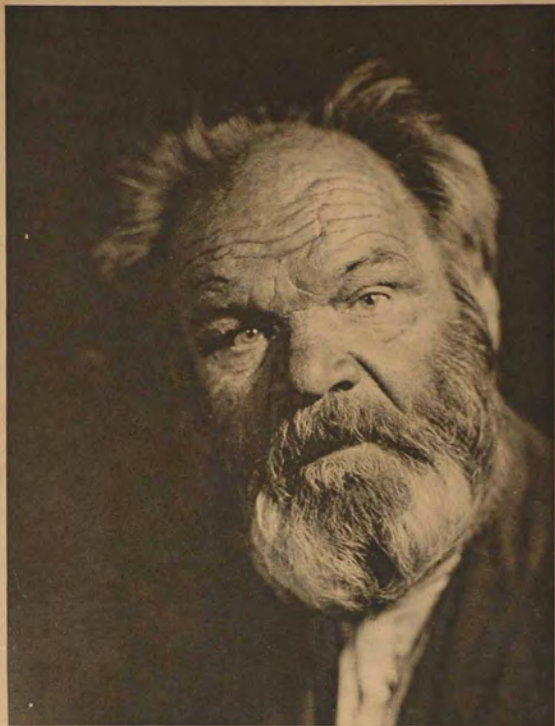


GRAIN

*(By courtesy of Associated Flour Mills, Ltd.)*

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- HAROLD HOOD (Middlesbrough).—Cortina Before Sunset.
- W. H. CUMMING (Weymouth).—Young France.
- STEPHEN SHORE (London).—An Italian Vagabond.
- WALTER LEE (Grantham).—Head of Girl.
- AEROFILMS, LTD. (London).—Drying Coated Films.
- S. A. CHANDLER (Southampton).—Pan.
- VIVIANS (Hereford).—Comus.
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- CHRIS J. SYMES (Birkenhead).—A Castle in Spain.
- N. BUNTING (South-Bank-on-Tees).—The Sweep.
- LEON ISAACS (London).—Christmas Shopping.
- T. F. EMMS (Westcliff-on-Sea).—Circus Shadows.
- J. PECSI (Budapest).—Stilleben.
- F. W. SCHMIDT (Manchester).—Gabriel Toyne.
- DAISY E. EDIS (Durham).—The White Hat.
- HOWARD COSTER (London).—Aldous Huxley.
- R. LABHARD (Zurich).—Study.
- WITHERINGTON STUDIOS (London).—Taxi Driver.
- K. N. HAILE (Bognor Regis).—Public Enemy No. 1.
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- JOAN CRAVEN (London).—Satisfaction.
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- R. L. BURROW (Ilfracombe).—The Philosopher.
- ERIC COOP (London).—Come to the Cookhouse, Boys!
- H. B. BURDEKIN (Reigate).—Carnival.
- N. A. SQUIRE (Kingsbury).—Finding Her Own Clothes.
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—Grain.  
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G. SCOTT BUSHE (London).—  
Head with Spectacles.  
J. HINDLE HIGSON (Clitheroe).  
—La Petite Demoiselle.  
J. EDWARDS (Oldham).—The  
Philosopher.  
RUPERT GOODCHILD (Man-  
chester).—The Hoop.  
K. REITZ (Wembley).—Some-  
thing Good.

# SNAPSHOTS AT NIGHT

BY LEON ISAACS.

The ever-fascinating hobby of night photography has recently been given a fillip by the introduction of high-speed panchromatic emulsions and lenses of unheard-of full aperture. Actual snapshots showing moving traffic and people can now be obtained with comparative ease, so that even the most hardened pictorialist cannot complain that his night effects are unnatural.

The photographer has not only been helped by his emulsion- and lens-makers but by improved street and shop lighting, as well as the general use of Neon tubes for advertising lighting.

The most important factor in obtaining successful results is the lens, and since super-sensitive panchromatic emulsions can now be had in both roll-film and film-pack form, it may quite truthfully be said that practically any camera with a large-aperture lens will take snapshots at night.

When using snapshot speeds between  $1/5$ th and  $1/30$ th of a second only a wide aperture will give sufficient exposure, even for the super-speed emulsion, and, in general, nothing smaller than an aperture of  $f/3.5$  is of real use. The photographs illustrating this article, for example, were all taken with lenses of aperture  $f/3.2$  or greater, but with the  $f/3.5$  lens and a shutter time of  $1/20$ th second, fully-exposed snapshots under theatre canopies are possible, though street scenes will probably be under-exposed. Since, however, many cameras are nowadays fitted with lenses of  $f/2.9$ ,  $f/2$ , or even  $f/1.5$ , the range and scope of night snapshot work can be greatly extended into the range of less brilliantly lit scenes.

Unfortunately, as the aperture gets larger the depth of focus becomes less and less, so that focussing must be very carefully carried out. This difficulty can be partly overcome by the use of short focus lenses with their greater depth of focus for relative aperture. The modern miniature camera with a large-aperture lens is thus clearly the ideal camera for this type of work, owing to its ease of operation and range finder for critical focussing, but since all my own pictures are taken with a 30-year old quarter-plate Sanderson it is clear that so long as a good lens has its axis perpendicular to the emulsion any camera will serve. The lens must have a deep hood to avoid flare from the brilliant points of light outside the field, and if the hood is omitted the shadows are liable to be fogged.



Fig. 1. Refreshment Stall in Charing Cross Road.

From the fact that all street lighting comes at the present time from half-watt or neon lights, it is clear that only panchromatic material is useful to the night snapshotter who wants to obtain the utmost detail with the least possible exposure. At times the mercury-cum-neon-lamps may be found in street lighting systems, and these will of course emit blue rays as well as the red of the half-watt lamps. Here however, the fastest panchromatic emulsions are as fast—if not faster—than orthochromatic material, so that no change need be made.

There are several makes of panchromatic film and plates on the market claiming speeds up to 8,000 H. & D. They are all good, but as I personally prefer to use plates, my own work has been chiefly done on Ilford Hypersensitive plates—*backed*. The last word is important and should be noted. In daylight work backing is nothing like so important, but it is absolutely essential for night-work where naked lamps may appear in the picture, and before buying material it is necessary to ascertain that it is backed.

Having obtained our three requisites for night snapshots: a fast lens, a deep lens hood, and backed "super-sensitive"

panchromatic material, we can go out and look for masterpieces. A night after rain has fallen is the best, for the wet pavements not only reflect light into the shadows and help to reduce the exposure necessary, but the pictorial effect is considerably enhanced by the reflections. For a first attempt, choose the well-lit entrance to a theatre or large cinema, as here there will be no difficulty in getting full exposure and there will be plenty of naked lights in the picture to test the lens and material. To get a better depth of focus in the picture, stand back about 30 or 40 feet from the scene, and expose when there are not too many people nearer than this distance from the camera.

For the less illuminated scenes an exposure of 1/10th second may be found necessary, but while this extra time is useful it is apt to show movement when passers-by are walking at a brisk rate. It is here that patience is necessary. There are always a certain number of people who saunter slowly past shops and cinemas, and these people must just be waited for. It may easily be 5 or 10 minutes before such a thing happens, but the moment will come when people are moving slowly in the picture, and this is the moment for pressing the shutter release.



Fig. 2. Traffic duty at Piccadilly Circus.





Fig. 3. Cinema crowds in Piccadilly Circus.

In the West End of London, Friday night seems to be the best time of the week to avoid crowds—especially fast-moving ones—and after the theatres have started at 8.30 p.m. work may be begun. After 11 p.m. is again a bad time as the theatres are emptying, and the roads are so full of people that a good result is impossible. Patience is absolutely necessary to the night photographer, and it is generally only after some training that it becomes second nature to “wait for it.”

While waiting, try to conceal the camera in a pocket, ready focussed, or else stand in a doorway. The camera at night seems to have a peculiar attraction for passers-by.

Experience will soon teach the beginner to judge the exposure necessary, and after this the development is a simple matter. As regards development proper, I have found it best to desensitise and then develop with a plain Metol developer of the following formula:—

A		B	
Metol ... ..	100 grains	Sodium carbonate	$\frac{1}{2}$ oz.
Sodium Sulphite	2 ozs.	Water ... ..	10 ozs.
Water ... ..	10 ozs.		



Fig. 4. The Strand on a wet night. (Note moving bus.)

For use mix equal parts. With the Ilford Hypersensitive plates 4-6 minutes at 65° F. will give clean negatives of adequate contrast.

Many night snapshot negatives look hopeless compared to daylight ones, but appearances are very deceptive and no negative should be abandoned as hopeless until it has been printed carefully. The results are sometimes very surprising.

Sometimes contrasts are too extreme, in which case the negative can be re-halogenised (see "formula" section of the present edition) and the high-light density reduced without the shadows being very much affected. On the other hand, a really thin negative may be intensified in mercury and ammonia, and after this treatment produce a really excellent print.

Negatives giving only a "ghost" image can be bleached white in the mercury bleacher. After washing for 15 minutes or more, the whiteness is accentuated, and after the negative has been backed with good black paint the image can be copied on a process plate. This last is developed for contrast, and a good printable negative should result.

## A REMINDER OF THE "OLD DAYS."



Some seventy years ago a firm in Ashford, Kent, called Barnes Brothers were so delighted with their up-to-date travelling dark-room that they took a photograph of it. To-day Mr. Penfold, the present owner of the business, sends us the print as a record of photographic business still carried on in Ashford. The dark-room was drawn by a horse, as may be seen from the shafts in front, and carried with it (among other things) an open-air canopy under which specimens could be displayed. This canopy is seen on the left of the picture.

The firm still possesses an elaborate series of indoor and outdoor "effects" which were evidently used in the days before studios were conceived, and the books still show records of incredibly long exposures on dull days.

The photograph is an interesting reminder of the—at the present day—inconceivable difficulties that the first photographers had to combat, and will serve as a useful corrective to those of us who are for ever grumbling about the difficulties of the photographic process.

# TABLE-TOP PHOTOGRAPHY AND AN OFF-SHOOT

BY J. HINDLE HIGSON, A.R.P.S.

Most of us are interested in the top of a table—about three times a day—when, quite agreeably, we acquiesce in nature's demands for our physical sustenance. Again, it has been put into various shapes and sizes for our mental recreation—Billiards, Bridge, etc., and if, with these things, we include the office table (sometimes of doubtful interest) to most men it has functioned in all its completeness. But creative photographers, "movie" artists and technicians have seized on other possibilities which this humble piece of furniture has presented to them—to such an extent that the uncanny reality of their creations often leaves us in a state of bewilderment. On a few square feet of a table top have not cities been erected, has it not supported the heart of the African jungle, a majestic range of snow-clad mountains or been the scene of devastating earthquakes and spectacular happenings of every conceivable kind? It is not, however, this large scale aspect of table-top photography I wish or am qualified to approach, but rather that phase of it which fires the imagination of the independent worker in the seclusion and privacy of his home. Each passing year supplies abundant evidence to show that such work is of absorbing interest to many serious photographers. And their themes are legion—grave and gay, romance and realism, curves and angles, and any little household god, it would appear, is eligible to play a part. Thus, then, it happened during the long evenings in the early part of the year that many of my leisure hours were given to this fascinating branch of photography. It also happened about this time that I had acquired two or three quaint little figures clad in equally quaint little frocks. These were to be arranged in a setting of cut flowers—daffodils or tulips—an intriguing arrangement of corrugated paper for the background, a little imagination in the placing of half-watt lighting sets to supply the dramatic touch, an actinometer test, and panchromatic plates would take care of the rest. It was, in fact, all poetry—until the moment I emerged from the dark room with my first results. Alas, those negatives. Alas, the poetry. My lovely daffodils had turned to wax, my background suggestive of an engineering works, harshness everywhere. Crestfallen but undaunted I attacked the



La Petite Demoiselle.

problem again. With less ambitious notions, the lay-out simplified, the lights removed to a more respectful distance, the results became more promising. Continuing these experiments from time to time, a sudden brain ripple led to another idea. Why not find a natural setting for the little lady in the garden—growing flowers and sunlight? And so, in this environment have I been experimenting—and thrilled. Naturally, as in all other channels of photography, the work has its own peculiar little problems and pitfalls.

As to equipment, a camera with focussing screen, generous extension and swing front or back is a *sine qua non*. The position being near the ground, a reflex fulfilling these conditions would be ideal. Two other essentials are a dwarf tripod and panchromatic material. In the search for a suitable



What's all this ?

setting it is obvious that this must be viewed from the low camera level. Again, as exposures will usually run into seconds, such work cannot successfully be accomplished when flowers are swaying in the breeze. Let the setting be simple, avoiding an all-over pattern of flowers, and particularly let a way in or approach be suggested for the figure. A result which suggests that the little figure has just been dumped there is quite disappointing. Finally, in this matter of setting, it is absolutely necessary to visualise the result in monotone. The image on the focussing screen may be all desired in arrangement, composition and appropriate contrasts. It must not be overlooked, however, that colour contrasts in the subject may be of the variety that we cannot reproduce photographically, and thus, for instance, yellow flowers may



In the wood.

almost be lost against a pink dress. Having satisfied ourselves that all is well in the subject, a word on technique. Being a "close-up" the depth of field is very slight, but here the swing back or front comes to our aid. Nevertheless, it will be found that a very small lens aperture is called for. Working with a  $7\frac{1}{2}$ " lens on a quarter-plate camera I have never used a stop larger than  $f/22$ . The use of a filter will be decided by the character of the subject and the result we are seeking.

In conclusion, although I have not hitherto exploited the commercial possibilities of these subjects, it is quite conceivable that they have some publicity value. In the quest for novelty "La Petite Demoiselle," for instance, might strike an interesting note in the window display of a fashion house or floral establishment. Again, and particularly in full colour, Calendars and Christmas Cards suggest another market.

## OBITUARY.

Among those whose deaths have taken place since the 1934 volume of the BRITISH JOURNAL ALMANAC was closed for printing are :—

Frederick Hollyer (November 21st, 1933).

Professor J. Joly (December 8th, 1933).

Sir Cecil Herslett (March 4th, 1934).

B. V. Storr (April 5th, 1934).

A. C. Braham (May 2nd, 1934).

James Walker (May 19th, 1934).

Walton Adams (June 12th, 1934).

Edgar Clifton (July 6th, 1934).

F. E. Greenwood (July 23rd, 1934).

George E. Brown (August 23rd, 1934).

John Harrington (August 24th, 1934).

A. Mackie (September 14th, 1934).

### George E. Brown.

George E. Brown was born in 1872, and was educated at Dorchester Grammar School and Birmingham University, where he was Tangye Scholar in chemistry for 1892—1893. After working with the Great Western Railway Company for some time, he became associated with the "Photogram," but relinquished this position on being appointed Editor of the BRITISH JOURNAL OF PHOTOGRAPHY and the BRITISH JOURNAL ALMANAC in November, 1904. His editorship of these two publications became the work of his life, and under his guidance they rose to their present high position in the



GEORGE E. BROWN

Photographic world. In addition to this work, he was responsible for many translations from French and German, and edited the English edition of L. P. Clerc's standard work "La Technique Photographique." He also wrote books on Indexing, Copyright, and Robert Louis Stevenson.

### Frederick E. Greenwood.

Frederick E. Greenwood, who died at the age of 76, had been a prominent member of the firm of Elliott & Sons, Ltd., of Barnet for over forty years. He became a director of the firm in 1894, and for many years held the position of Managing Director. Although in recent years his son, F. W. Greenwood, had filled the latter position, Mr. Greenwood held an active directorship until his death. He had also been the Honorary Secretary of the Bri-



tish Photographic Manufacturers' Association since its formation.

#### Edgar Clifton.

Edgar Clifton, who was in his 73rd year, had been "in Photography" from the very early days, and had known everyone of note who had contributed to its progress. He seems to have



EDGAR CLIFTON

been employed in the firm of James Epps & Co. at an early age, but afterwards took a position in a publishing house.

Later on, he entered the firm of Dallmeyer and became manager of their London office, inventing a number of ingenious devices. Latterly he was on the teaching staff of the Regent Street Polytechnic Photographic School, and only resigned from this post a year or so ago. In the last twenty years a great number of articles (mostly anonymous) appeared in the BRITISH JOURNAL OF PHOTOGRAPHY from his pen, and literally hundreds of individual questions were answered by him.

#### Professor J. Joly.

John Joly is chiefly known to photographers on account of his early attempts to produce a satisfactory mosaic-screen colour plate, though his other achievements include geological research and the treatment of cancer by radium. In 1895 he produced the first practical one-plate screen for colour photography, and although the principle of using ruled lines of colour had been previously considered by Ducos du Hauron, it was Professor Joly who first gave it practical form and superintended the marketing of the screens for the process.



## CAMERAS AND EQUIPMENT.

Camera Back for Making Film Slides.—For use where large numbers of negatives have to be made for 35 mm. film slides, a camera back for the studio camera described by G. Wiley is found extremely useful and quick in operation.

A new back for the studio camera (1) is made, and two guide strips (2) screwed on it. Springs (6) hold a sliding panel (3) in the recess so formed, and stop-blocks (8) limit the movement as required to one side and the other.

On the panel (3) are screwed a cut-down Ansco "Memo" camera for 35 mm. film (4) and a focussing box (7) containing a ground-glass screen (5). The Memo camera was cut down so that the aperture plate was  $1\frac{1}{2}$  ins. from the panel, and parallel with it, a hack-saw being convenient for the purpose, while the ground-glass screen was arranged to be in register with this.

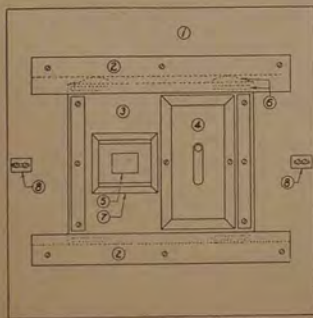


Fig. 1.



Fig. 2.

Figs. 1 and 2 show the construction of the back very clearly.

As strips of film longer than 50 frames are often used, the Memo magazines were scrapped, and the camera loaded in the dark-room with a roll of naked film. This is taken up in the lower compartment on a cut-down reel from a roll-film (size 116) camera, and a winding key provided (from a box roll-film camera) to take up any slack that the ordinary film-moving lever did not take up completely.

The lens was now too far from the focal plane for useful work, so it was recessed in an inverted cone some 6 ins. into the front of the camera. A focal length of 7 ins. was found convenient under these circumstances.

The camera is worked on the copy bench in the usual way, prints or originals being placed between two sheets of glass, and held down under an old negative carrier. A shadow box, painted black, and 12 ins. square, on the copy board, ensured a true black background to the prints or originals.

In use, the moving panel is shifted to the right to focus the print or original, and the shutter then closed. Moving the panel to the left and exposing the film completes one negative, and care must be taken that the film is moved on between each exposure and the next. Since the film in the Memo camera is naked, the shutter having been removed, the camera shutter must be shut before pushing the panel across to the "taking" position.

In practice, with two people working together, 50 negatives can be made in 45 minutes. The film—if short—is then developed and printed in a "Cirkut" printer, but if long, and many copies have to be made, a standard 35 mm. film printer may be used. In this case, the negative is made an endless loop, with a short blank strip to act as leader on the printed positive.—Camera (Philadelphia), Dec., 1933.—B.J., 1933, Dec. 22, pp. 752-3.

**Mirror Telephoto System for Cameras.**—The use of mirrors instead of lenses in cameras has often been proposed as a means of eliminating aberrations. The mirror system developed by the Askania Werke, Berlin, which is described in the Journal of the Society of Motion Picture Engineers, however, makes use of mirrors for the purpose of obtaining unusually long focal lengths for motion picture work. In the diagram the light enters the mirror system from the right and is reflected by a large concave mirror to the right on to a smaller mirror and lens system. Then it is reflected through an



aperture in the larger mirror to the film. Focussing is done by finely-adjusted movement of the smaller mirror. It is stated that the effective focal length is five times the distance between the two mirrors, and it would thus appear possible by this means to obtain an extremely narrow angle of view.—*B.J.*, 1934, Mar. 9, p. 140.

**Making a Parallax View-Finder.**—When photographing very near objects, particularly in the case of cine cameras, the finder provided is often quite inaccurate. P. C. Smethurst has therefore fitted to a cine camera a direct-vision finder adjustable for parallax.

The finder frame is made of 16 gauge brass sheet, and the peep-sight is an old army gun-sight, with the peep-hole reamed out to 1/10 of an inch.

The calculation, assuming that the finder is in the same horizontal or vertical plane as the lens, may be seen from the diagram. The lens is at O, the finder frame being OB inches behind the lens, and BC inches vertically distant from it. For distant objects, BOA—the centre line of the lens field—will be parallel to DCX, the central line of sight of the finder. When nearer objects, however, are in question, the peep-sight of the finder must be moved to some point D', where D'C, and Y, the latter the object photographed, are in a straight line.

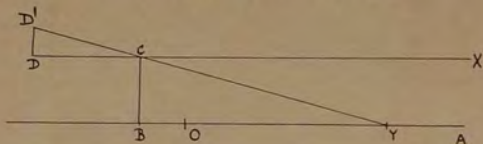
For calculation, triangles CDD' and YBC are similar, so that

$$\frac{DD'}{DC} = \frac{BC}{BY},$$

or, in other words:  $\frac{DC \times BC}{BO + OY} = DD'$ .

By this calculation, the position of the finder peep-sight can be calculated for any distance OY of the object from the

camera lens, and a series of file marks made on the adjustable slide of the sight, corresponding with the focussing distances on the lens mount.—B.J., 1934, Feb. 2, pp. 59-60.



**A Distorting Camera.**—The "Distortograph," an ingenious invention by H. G. Ponting, brings almost limitless possibilities to caricature work. Not only can "still" photographs be distorted to suit any occasion, but also films may be taken and the distortion altered *while exposures are being made*.

Fig. 1 shows the Ponting Distortograph attached to a Newman-Sinclair film camera, and fig. 2 five specimens of the distortions possible on a single portrait. The top left-hand picture is undistorted, for comparison.—B.J., 1934, Mar. 23, pp. 163-5.

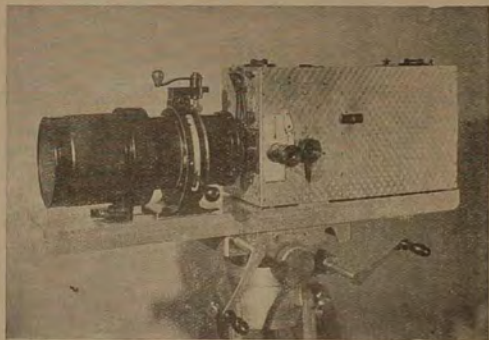
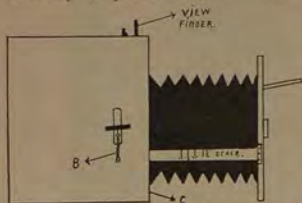


Fig. 1.



Fig. 2.

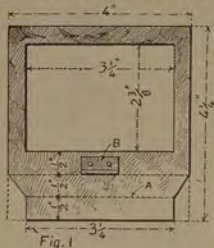
**Reflex for High-Speed Work.**—George Wilkinson has suggested alterations which turn a reflex into what is virtually a press camera. When used at eye-level, it is particularly convenient for rapid subjects.



The object is sighted in the view-finder screwed to the top of the camera and the mirror hood closed permanently. Focussing is arranged by scratching marks on the brass racks carrying the camera front, and the side of the camera body shows as a "pointer" for focus.

In order to do away with the long travel of the shutter ever, a chain with a ring on the end is attached underneath it, and the ring put over a small screw in the camera body. Only a quarter of an inch play is left, which makes the rapid release of the shutter a simple and accurate matter.—B.J., 1933, Dec. 8, p. 721.

**Direct-Vision Finder for the Reflex.**—A. A. Francis, who finds that the reflex is often usefully employed over the head, has made a neat direct-vision finder for this position.



A piece of sheet metal, 24 gauge, was cut to the form and dimensions shown in fig. 1, the cutting being done with a hard chisel and then the edges finished with a file. The frame was put in a vice, with the dotted line A level with the top of the jaws, and then bent over at an angle of 90 deg. An ordinary 1-in. butt steel hinge was attached by means of two rivets, as shown at B.

A second piece of metal, 24 gauge, was cut to the form and dimensions shown in fig. 2, bent to an angle of 90 deg. at the line C, and a 1-in. butt



A second piece of metal was shaped as shown in fig. 2, bent to an angle of 90 deg. at the line C, and a 1-in. butt



Fig. 3.

hinge fixed at D, by means of two rivets. The sight-hole, E, was first cut with a  $\frac{1}{4}$ -in. drill, and then filed to an oblong shape. In order to ascertain the correct position for this sight hole, the distance from A to the centre of the opening in fig. 1 was taken,  $\frac{1}{16}$ -in. added to it, and that was the distance from the line C to the centre of the hole.

A sound piece of red deal, slightly under  $\frac{1}{2}$ -in. thick, was finished and cut to the dimensions shown in fig. 3. When perfectly true it was shaped to the form illustrated. The free portions of the hinges, shown in figs. 1 and 2 at B and D, were screwed to the wood

The finder is attached to the bottom of the camera by means

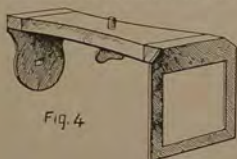


Fig. 4



Fig. 5.

of the screw which is supplied with the camera for fixing it on a tripod. In determining the position of the hole F, for the tripod screw, it will be necessary to allow sufficient clearance for the revolving back of the camera.

When the finder is attached to the camera it is perfectly rigid: it can be fixed or removed in a few seconds. It is shown complete

ready for fixing to the camera in fig. 4, and folded for travelling in fig. 5. Folded like this it can be easily carried in the pocket. B.J., 1933, Dec. 8, p. 721-2.

**Synchronising Flash and Camera Shutter.**—Describing a flash-powder igniter coupled to the camera shutter, B. Alfieri, jun., remarks that there are occasions where the flash bulb has not sufficient intensity for satisfactory work, as specially in the case of timing it to flash at the right time when using a high shutter speed.

Fig. 1 shows the flash-gun used. Insulating pieces of fibre, A,A, are held in position by metal spring clips, B,B, a



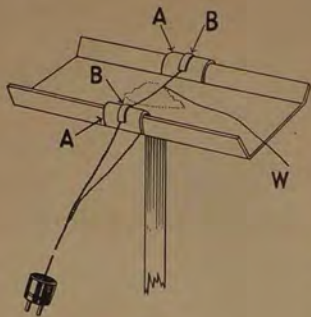


Fig. 1.

small magnet *M* is also wired in series with the battery, and carries in front of it a keeper *K*, the latter operating the camera release either by flexible cable or through a second pivoted arm made of stout wire.

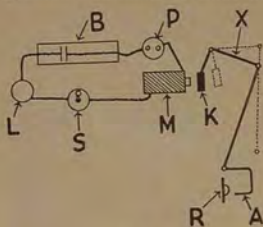


Fig. 2.

The camera with the attachments is shown in fig. 3, and the additional letters are: *D*, a spring to hold the keeper away from the magnet, *E*, an extension of the keeper-arm for convenience in setting, and *F* a stop to set the keeper in the best position.

The switch *S* is turned "on" when all is ready, and the pilot lamp will then light. The current is not enough to heat the lead wire and fire the flash, so that any ordinary means of ignition may be used. When the current is "on" the magnet will hold down the keeper, and the shutter can be wound up and set. As soon, however, as the flash is ignited, the lead wire melts, and the circuit is broken. The keeper is thus released from the magnet, and the spring *D* operates the camera shutter.

In practice, shutter speeds of 1/1000 of a second can be satisfactorily used. If exposures of this speed are needed

small piece of lead wire being laid across the strips and heaped over with flash-powder. (*B,B* are connected to the flexible cable from the camera). Ignition of the flash-powder *A* in any usual way works the camera release.

Fig. 2 shows the circuit used, where *B* is a small battery mounted on the camera, and connected through a pilot lamp *L*, switch *S*, and plug socket *P* to the flexible wire from the flash-gun in fig. 1. The

The camera with the attachments is shown in fig. 3, and the additional letters are: *D*, a spring to hold the keeper away from the magnet, *E*, an extension of the keeper-arm for convenience in setting, and *F* a stop to set the keeper in the best position.

The switch *S* is turned "on" when all is ready, and the pilot lamp will then light. The current is not

alternately with those of, say, 1/10 second, some trouble in synchronising may be experienced, but since the whole design of the device is for rapid exposures no trouble will be experienced provided that the shutter *tension* remains constant.

As an intense flash lasting as short a time as possible is required, the flash-powder should be heaped up in the middle of the pan, and not spread out along it.—B.J., 1934, April 27, pp. 239-240.

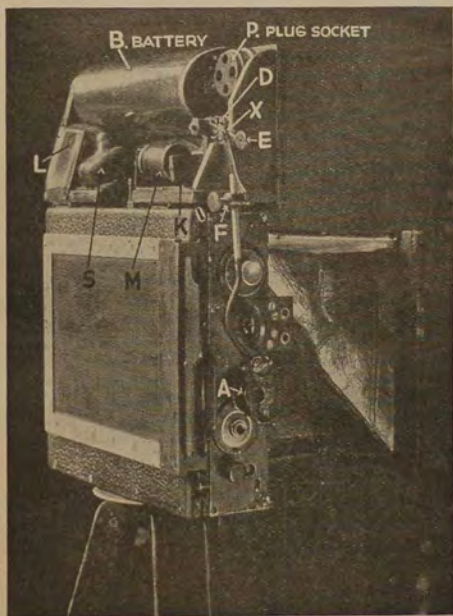


Fig. 3.

**Increasing Swing Back Movement.**—Finding that the swing back of his square-bellows camera did not allow enough movement for certain kinds of commercial work, G. Wilkinson modified the camera as shown in the two illustrations.

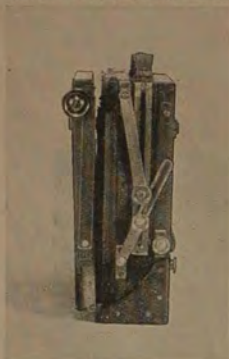


Fig. 2.

The necessary parts are clearly shown in fig. 1, which also illustrates the very considerable angle through which the back may be swung with the new gear in action, the maximum difference on a half-plate camera being  $3\frac{1}{4}$  ins. between the top and the bottom distances of the plate from the lens.

The camera is still as portable as before the alteration, and fig. 2 shows that none of the parts project beyond the front of the camera when it is folded for transport.—B.J., 1934, April 13, p. 209.

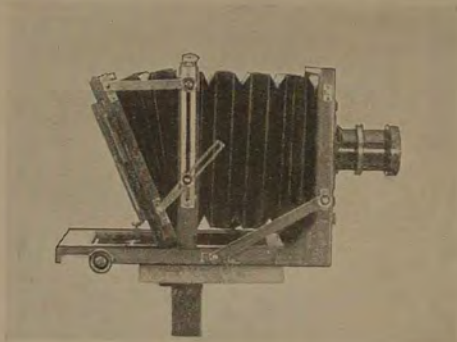


Fig. 1.

**Lens Hood and Filter Holder Combined.**—A neat combined holder for gelatine filters and lens hood is described by W. E. Stuckes. Having found that it is very inconvenient to unscrew lens combinations continually when changing filters, and having to use a hood continually, he recommends the following solution.



A wooden former about  $\frac{1}{8}$  in. larger than the external diameter of the lens mount is procured, and cartridge paper pasted round this to form a tube  $\frac{1}{8}$  in. thick and of length equal to the diameter. Inside this at one end is pasted a strip (the "inner ring" of the figure) which is about  $\frac{1}{8}$  in. wide and thick enough to make the tube a push fit on to the lens mount. This strip forms a rest for the gelatine filter as well as a grip for the mount.

A second tube is made, with outside diameter the same as the inside diameter of the first. This second tube is shorter, and pushes into the outer tube until it is flush with the end of the latter.

The gelatine filters can now be cut out to size, and when in use are placed inside the longer tube, with the shorter one pushed in on top to hold them firmly. When cutting the filters to size, it is convenient to place the gelatine between two clean pieces of card, the top one of which is marked with the circle to be cut.

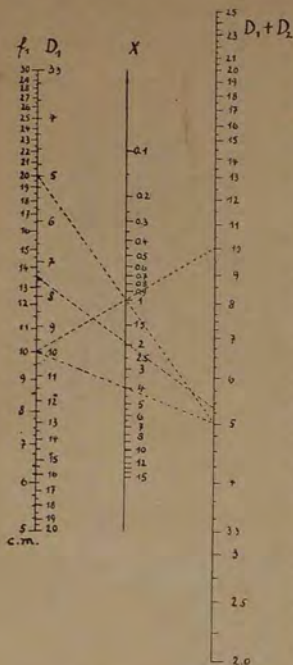
As the gelatine must not be touched by hand, the filters are carried in pill-boxes and tipped into the tube as required. They are also tipped back into the pill-boxes in the same way.—B.J., 1934, Aug. 3, p. 457.

**Exposure Factors with Supplementary Lenses.**—Dr. Funk and Dr. Steps, of Jena, have shown a simple abacus by which the necessary increase of exposure when using a supplementary lens can be calculated.

The formula for exposure factor X runs:—

$$X = \left( \frac{D_1}{D_1 + D_2} \right)^2$$

where  $D_1$  is the curvature of the camera lens in dioptries, and  $D_2$  the curvature of the supplementary expressed in the



same way. Since dioptric values are not usually used in practical photography, the left-hand scale of the abacus is arranged to have focal lengths in centimetres on one side, and dioptric values on the other.

In this way, a focal length of 5 cm. can be read off as 20 dioptries, a focal length of 20 cm. as 5 dioptries, and so on.

Having found the focal lengths of the camera and supplementary lenses in cm., convert them to dioptries by this scale. Add the two values to obtain a point on the right-hand scale marked  $D_1$ , plus  $D_2$ . The line joining this point and the value on the left-hand scale  $D_1$  will intersect the centre scale at the exposure factor.

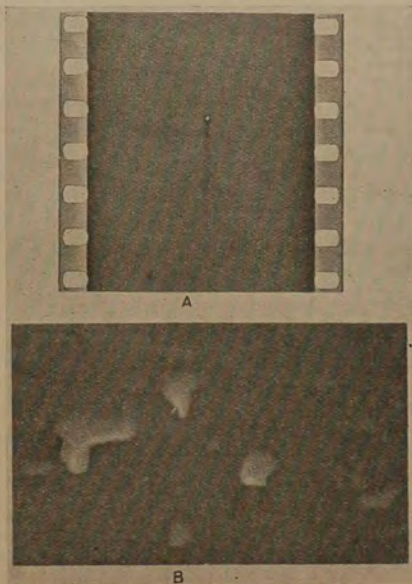
Thus, when the camera lens has dioptric value of 10, and the camera lens curvature plus supplementary lens curvature is 5 dioptries, the exposure factor will be five times normal, as seen from the lowest dotted line in the figure.

The abacus is a simple means of finding the factor, but since it can hardly be carried in the camera case, each supplementary lens should have the exposure factor marked on its case that will be necessary when used with the normal lens of the camera.—Die Photographische Industrie.—B.J., 1934, Aug. 17, p. 494.

## NEGATIVES &amp; DEVELOPMENT.

The Technique of Development.—In the course of a communication from the Kodak Research Laboratories, J. I. Crabtree and G. E. Matthews give useful data regarding faults in development.

The temperature should be kept constant at 65°, to begin with, as lower temperatures sometimes affect the working of the developer and higher ones lead to fogging. Agitation of films and plates while in the developer removes all chance of developer mottle, and agitation in the rinse before fixing removes the developer from the emulsion more quickly.



The three following rules will lead to disappearance of nearly all development marks:—

(1) Keep the solution accurately at a temperature of 65° F.

(2) Discard a solution as soon as it shows signs of being exhausted.

(3) Agitate all materials when first immersing in any bath, and also at intervals during development.

Rules for the prevention of typical markings are also given. Air bells, as at A in the figure, are due to air bubbles trapped on the surface of the emulsion, and cause a white spot on the fixed film or plate. With slow first immersion and immediate vigorous agitation, these may be avoided.

Blisters are caused by the formation of gas bubbles within the gelatine film on transferring to the fixing bath. They can be largely prevented by keeping the temperature accurate and rinsing thoroughly in water before putting the plate or film into the fixing bath.

Tear drops, as at B in the figure, are due to uneven drying of the gelatine, particularly when the drying temperature is excessive. If the films are wiped over with chamois leather and allowed to drain for a few minutes before the drying air is turned on, formation of such tear markings is prevented.

All apparatus should be kept scrupulously clean, and chemicals kept away from the action of light, air, and dust, as well as moisture.—B.J., 1934, Aug. 10, pp. 470-2.

**Streamer Markings in Tank Development.**—Research has been undertaken by the Agfa Central Research Laboratories on the formation of streamer marks in tanks.

By infra-red photography, or the use of a deep red filter and panchromatic emulsions, the movement of the developer round the film or plate being developed has been recorded, and the illustration shows an example of rising currents following immersion of a film in developer after washing in water.

The results obtained show that when films or plates are not washed prior to development, and the tank is then not agitated, streaks downward (toward the bottom of the tank) arise, from those parts of the image which yield density during development. The greater the density, the more pronounced the streak.

When, however, the films or plates are washed before development, the streaks rise upward, and are weaker the greater the density produced. These can be clearly seen in the illustration.—B.J., 1934, Feb. 9, pp. 73-4.



**Development in the Tropics.**—Experiences in Brazil, where the development temperature was high (washing water often reaching 95° F.) are given by W. F. A. Ermen.

Developers with alkaline character caused great swelling of the gelatine, and recourse was made to the "Almanac" formula for par-amidophenol, which contains no free alkali if the solution is arranged to contain a little free par-amidophenol base. The caustic Soda is then all converted either into the sodium salt of the base or else into sulphite. This process does not impair development in any way.

The plates are tank-developed, rinsed quickly, and fixed in acid-hypo, containing alum. Another quick rinse after fixing was followed by a 10-minute immersion in 5 per cent. formalin solution, after which it did not matter what the temperature of the washing water was.

After washing it was essential to give a further formalin bath (this time 1 per cent. solution) otherwise the cockroaches made a meal of the gelatine overnight.

The B.J. instructions (see p. 344) are also criticised regarding making-up the amidophenol base. If sodium carbonate was used as precipitant, the base was found to oxidise rapidly in solution, so that the developer was inherently unstable. Sulphite should therefore be used instead of the carbonate, and the potassium salt is to be



preferred to the corresponding sodium one. Furthermore, the sulphite should be in considerable excess, since this preserves the base from oxidation, and as much as 600 parts of potassium sulphite to 100 of amidophenol have been found in commercially made-up par-amidophenol developers.—B.J., 1934, Jan. 5, pp. 11-2.

**Electric Heater for Developers.**—G. L. Boedeker has designed and made a simple device for keeping developing dishes warm in winter. As shown in the figure, it consists of a box about 4 ins. high, the sides being of wood and the top of sheet aluminium or iron.



Inside the box are a number of low-power electric vacuum bulbs painted with heat-proof enamel to keep the light from escaping. Three are used in the figure, but any number may be used as required.

In a test, two dishes filled with water at 65 degrees were placed one on the table and one on the heater. After half an hour the dish on the table had fallen to 54 degrees, while after three hours the one on the heater had only risen to 70 degrees.—B.J., 1933, Dec. 19, p. 778.

**Dry Ice for Cooling the Developer.**—The long spell of hot weather has made developer temperatures go up to abnormal figures, and A. E. Bawtree, F.R.P.S., makes an ingenious suggestion regarding cooling.

The use of ice hung in the tanks in rubber bags is unsatisfactory, since it takes a long time to affect the solution temperature, and if ice is put direct into the developer, it will dilute it.

Experiments were therefore made with solid carbon dioxide, known commercially as "dry ice." Since carbon dioxide is a gas at normal temperatures, it cannot dilute the developer, and as the lumps disappear in a stream of bubbles, the solution is stirred from the bottom and evenly cooled. At the same time, the layer of carbon dioxide on the surface of the developer in the tank prevents oxidation while the surface is bubbling.

The results of negatives developed in the tank were identical with previous ones, and there does not seem to be any trouble from dissolved gas in the developer, which might be expected to cause bubbles on the emulsion. It seems likely that if free caustic soda or caustic potash were present in the developer, some alteration in the constitution would result, but with metol-hydroquinone solutions, using sodium carbonate as alkali, no change in developing power can be noticed.

It is also suggested that possibly the "dry ice" may result in the developer keeping longer, since if the solution is saturated with carbon dioxide no air can enter it.

The solid carbon dioxide can be usually obtained from the local agents for "Stop Me And Buy One" ices, since it is used in the tricycles as a freezing mixture, the price being about 4d. per lb. plus carriage. It is also sold by Messrs. Barrett & Elers, Ltd., Old Ford, London, E. 3.—B.J., 1934, July 6, pp. 396-7.

**Altering Contrast in Over-Hard Negatives.**—A useful suggestion for reducing the contrast of an over-hard negative is made by W. B. Ferguson.

A positive of suitable contrast is made from the negative, and the two bound up together in exact register for printing. The negative can thus be altered to suit any type of printing process.

Parallax is sometimes troublesome when using glass plates for the positive, and Barnet "Line-tone paper for photo-mechanical work" is the best medium to use. The paper base is thin, grainless, and very translucent, which makes it ideal

for contact printing. Thin cut films, of course, may also be used for this purpose.—B.J., 1934, Mar. 23, p. 168.

**Summary of Physical Development Experiences.**—Dr. A. F. Odell contributes useful experiences with physical development (see B. J. ALMANAC 1934, pp. 224-29) received from correspondents.

It appears that when the fore-bath is used, and the bromide of the emulsion thus converted to iodide, normal exposure gives perfectly satisfactory results. Experiments made, in fact, have shown that half normal exposure will give a perfectly good negative.

Tests were also made, by exposing two films identically and developing one physically, the other with glycin in a tank. In every case the physically-developed negatives were to be preferred.

Difficulties in judging the physically developed image on account of its transparency may be overcome by judging only by the printed result. The final judgment should be made on the points of detail and gradation, since one of the chief merits of physical development is that of almost microscopic truthfulness in object detail.

Desensitisers may be used either before or after the iodide fore-bath, and when this iodide bath is used it is not necessary to hold the film horizontal in a dish. Vertical development may therefore be conducted without further trouble after using the fore-bath.—"Camera" (Philadelphia), Feb., 1934.—B.J., 1934, Feb. 16, pp. 91-2.

**Physical Development of Leica Films.**—G. P. Mair summarises his experiences with physical development of Leica films by the Odell method. His conclusions are as follow:—

(1) The exposure requires to be well on the full side. This was found by making a series of exposures on the same subject with the ratio 4, 2, 1,  $\frac{1}{2}$ ,  $\frac{1}{4}$ , where 1 is the normal exposure as measured by photo-cell meter. The film is cut, and each portion developed, one in Kodak D-76 developer, and the other by the physical method No. 2. Fifty per cent. above normal exposure seems to be about right. The film used was Kodak S-S Pan. grey-backed, developed vertically in the Correx tank.

(2) Using the forebath for 30 seconds and not agitating during development gave streaks. Agitation every ten minutes of the development bath also gave streaks, but to a lesser degree. Using the forebath, however, for one and a half minutes, and agitating the developer as before gave no streaks.

(3) At fifteen times linear enlargement no marked difference in grain is shown, but the definition appears to be better, as one would expect. Under the microscope there is a very marked reduction in the size of the grain, and negatives developed with paraphenylene-diamine and an equal quantity of glycin give grain midway between the D-76 and the physical developer.

(4) High-lights do not appear to block up so much with physical as with chemical development. This is probably what Dr. Odell means by his reference to "better gradation."

(5) Skies in big enlargements do not show so much mottled effect which one always gets with chemically developed Leica films, or other films greatly enlarged.

For enlargements up to  $12 \times 15$  ins. or less, it seems doubtful, however, whether physical development is worth while.—B. J., 1934, July 27, p. 452.

**Physical Development of Roll-Film.**—Since negatives being developed physically must be held flat in order to avoid streaks, J. R. Carter has designed and made a special tank for the long strips of film used in Leica and similar cameras. The tank itself is made of wood, glass, and beeswax, and the bottom is  $30\frac{3}{8} \times 1\frac{1}{2}$  ins. wide (fig. 1).

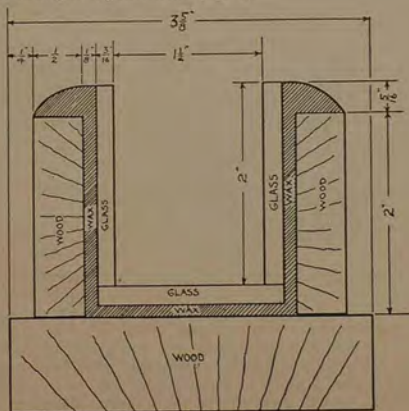


Fig. 1.

In order to avoid developing the total length of film of some five feet, the camera strip is cut in two. This necessitates leaving blank exposures 18 and 19, so that no important negative is spoilt by the cut.

The beeswax is applied with a brush, when molten, to the wood, and a flat surface for bedding down the glass provided by ironing with a warm flat-iron. The glass itself is brushed over with ammonia, given a coat of wax (the ammonia ensures the latter sticking) and bedded down on to the bottom and sides of the tank.

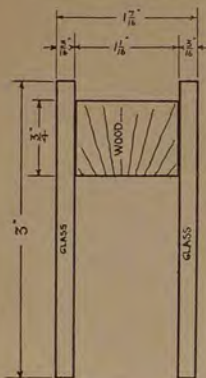


Fig. 2.

Fig. 1 shows a cross-section of the tank when complete, the dimensions being important.

In order to keep the film flat in the tank, a weight, shown in fig. 2, and consisting of two pieces of glass, spaced apart by wood blocks, is used. The outer surfaces of the glass are arranged to be overall  $\frac{1}{8}$  in. less than the width of the tank, so that a neat and accurate fit is ensured. The wood blocks are attached to the glass with liquid aluminium cement, and when in the tank, the long edges of the glass— $29\frac{1}{2}$  ins. in length—hold down the 35 mm. film by pressing on its edges. This ensures a completely flat film, yet none of the picture area is held down and damaged.

The tank is finished in dull black paint outside, the inside being left an area of clean glass, and beeswax. An inverted tray of wood is useful to cover the tank while development is proceeding, and this should not touch the glass side of the tank but stand on the shoulders of the base-board.

In use, the tank is opened, the weight removed, and the 35 mm. film laid along the bottom. The weight is then placed on top, the tank filled with developer, and the cover replaced until development is over. A light swabbing of the emulsion surface is useful to break up air bells, as soon as the developer has been poured into the tank.—"Camera" (Philadelphia), Dec., 1933.—B.J., 1933, Dec. 15, p. 740-1.

**Stress Marks on Leica Films.**—An interesting piece of research work on the length-ways parallel markings sometimes found on Leica films has been undertaken by R. V. Dent, A.R.P.S.

Experiments on the markings produced in the camera showed that grain developed through them, while a scratch with an engraving tool showed clear portions. In the photo-micrograph the parallel lines are clearly seen. The oblique line is a scratch made with an engraving tool, and the other thin oblique lines are stress marks made with a blunt wooden pen-holder to imitate stress markings. The parallel lines are thus clearly stress-marks.

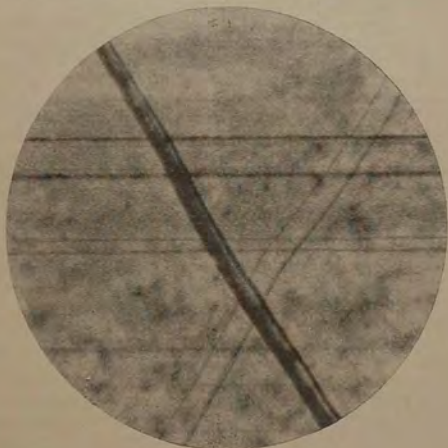


Photo-micrograph 27 diameters.

One-half reduction of the negative will clear the lines, though this is not always convenient, and further work on the camera and spool-boxes was undertaken.

It was ultimately found that if the film is inserted on the take-up spool absolutely dead against the knob side of the spool, the pointer left at "R" when loading, and the film tensioned from the re-wind knob and *not* from the forward-

winding one, no stress marks appear. When the film has clicked into the teeth of the sprocket and has been tensioned with the re-wind knob, the pointer can be turned to "A" and the film wound on for the first exposure as usual.

It is clear, therefore, that the parallel stress-marks are caused by uneven pressure sideways on the film, and can be completely avoided if the film is properly loaded into the take-up spool when it is being put in the camera.—B.J., 1934, Aug. 17, pp. 483-4.

**Lining Wood Developing Tanks.**—Referring to a query, E. G. Pascal writes that he has used a set of wood developing tanks for some years without any trouble at all.

The tanks were made of American white wood, without knots, 1 in. thick, and were screwed every four inches with 2-in. No. 8 wood screws. Pitch was poured in at each of the right angles, and about an inch or so at the bottom of the tank.—B.J., 1934, Jan. 5, p. 11.

S. E. V. Poole, however, maintains that teak is the only wood which is of real use in the manufacture of developing tanks. If tongued and grooved, and set in hot pitch, it will stand hypo very well, though the caustic alkalis in developing solutions will attack the wood in a short time. He recommends, therefore, that the tank should be painted inside with stone enamel, and have cotton fabric pressed down on to the paint while still wet. Several other coats of the enamel on top of the fabric, each applied after the one before has thoroughly dried, will complete the work.—B.J., 1934, July 20, p. 435.

**A Dryer for Plates.**—In order to dry plates in ten minutes, A. Marriage has built the dryer shown in the illustration. It is found that the ordinary fan blades are not very suitable, so pieces of bent metal are attached to a low-power electric motor. This type of motor is preferred to a commercial-built fan, since the latter has seldom adjustment enough to work vertically downward.

The table on which the plates are held is turned round by pieces of metal attached to the side, which catch the draught and move under its pressure. Small screws stop the drying plates from flying off the table.

When hypersensitising, this apparatus is abandoned in favour of a biscuit tin through the lid of which the blades of the fan are made to project. A rack of plates is placed inside, and under them a tray of calcium chloride to absorb the moisture. When used in this way, the fan will probably



have to be slowed down, which is conveniently done by putting a lamp-bulb in series. With the particular rig-up in question a 60-watt 230-volt bulb is used.

With this latter method, however, drying generally takes longer, and is normally complete in 15 to 20 minutes.

If large numbers of plates are to be dried after development, it is surprising how much difference is made by running the fan (quite slowly) a yard or so from the racks on the table.

When using a fan for drying in this way, dust must naturally be avoided as much as possible, or it is driven into the gelatine of the plates.—B.J., 1933, Dec. 29, p. 770.

**New Hardening-Fixing Baths.**—Ilford laboratories have been making a special study of combined acid hardening and fixing baths, and have evolved a new formula which has many advantages over those at present in use, in that it avoids fixation being complete before the material is adequately hardened, and also ensures that the material is not excessively hardened before it is properly fixed.

The formula for plates and films is as follows:—

Sodium hyposulphite	...	$\frac{3}{4}$ lb.	300 gms.
Potassium metabisulphite...		1 oz.	25 gms.
Chrome alum	... ..	$\frac{1}{2}$ oz.	12.5 gms.
Water, up to	... ..	40 ozs.	1,000 c.c.s.

The sodium hyposulphite and the metabisulphite are dissolved



first in about 30 ozs. of the water. The chrome alum is then dissolved in about 10 ozs. of warm water, which is allowed to cool, and then added to the remainder of the bath slowly and with stirring.

The formula for bromide and gaslight papers is:—

Sodium hyposulphite	...	$\frac{1}{2}$ lb.	200 gms.
Potassium metabisulphite...		1 oz.	25 gms.
Chrome alum	... ..	55 grs.	3 gms.
Water, up to	... ..	40 ozs.	1,000 c.c.s.

The bath is made up in the same way as that for plates and films.

The secret of success in using chrome alum fixing baths is to make them up according to the instructions, and to see that each chemical is completely dissolved before adding the next. The greenish colour of the bath is correct, and may be disregarded, as also may the slightly cloudy or opalescent appearance.—B.J., 1934, Oct. 5, p. 600.

**Developing Miniature Negatives.**—"Larry Leica" gives a review of developers and developing tanks suitable for miniature films, and makes a number of interesting comments on the process.

Whatever developer is used, filtration of the solution is very necessary, more particularly when a desensitiser is used, as small fragments of undissolved chemicals have a far greater effect on the results than in the case of larger negatives.

It is specially mentioned that in certain tanks the developer does not always get to the centre of the reel and wet the emulsion, which causes bad results on the first two or three negatives exposed. This may be avoided by shooting off into the lens hood the two first exposures on the film, though such a procedure is admitted to be wasteful.

A better solution to the difficulty is to "wet out" the negative before development in a mixture of 15 minims Turkey Red Oil in 20 ounces of water. This solution not only wets the negative thoroughly, but also washes off dust and any fine hairs that may be clinging to it, and its use is exceedingly satisfactory. Since the solution is acidic in character, it should be used as a fore-bath instead of adding it to the developer, though experiments may show that other wetting-out agents, such as the sulphonated fatty alcohols sold under the trade names of Ocenol and Lorol, are equally suitable, and can be added to the developing solution itself, since they have no such acidic properties.

After development in any well-known fine-grain developer,

the negatives should be fixed in an acid hypo bath of normal strength.—B.J., 1934, Aug. 31, p. 517.

**Two-Bath Development for Fine Grain.**—A German writer gives useful details of the so-called "Kusa" system of fine-grain development, and contributes tables for times in the two baths, optimum temperature, and classification of films. The time of development is rated on the contrast produced by the film specified when treated for 4 minutes development in "Agfa" Metol-Hydroquinone, one/four dilution.

Development tables are as follows:—

GAMMA VALUE OF MATERIAL. <i>Calculated for 4 mins. develop- ment in Agfa Metol-Hydro- quinone 1 : 4 dilution.</i>	CONTRAST CHARACTER.	DEVELOPMENT IN MINUTES.				OPTIMUM TEMPERA- TURE Degrees Centigrade
		<i>For Miniature Film.</i>		<i>For Larger Sizes.</i>		
		<i>Forebath</i>	<i>Afterbath</i>	<i>Forebath</i>	<i>Afterbath</i>	
0.6-0.8	Soft	12	15	7	12	20
0.9-1.1	<i>Normal</i>	10	15	6	12	19
1.2-1.5	Brilliant	8	15	5	12	18
1.6-1.8	Hard	6½	15	4	12	18
1.9-2.3*	Extra-hard	5	15	3	12	18

while the developer is made up as below:—

(a) First developing bath. "Detrast."

Sodium sulphite (crystal) ... ..	16.00 gms.
Hydroquinone ... ..	0.80 gms.
Glycin ... ..	2.50 gms.

Dissolve in a half-litre flask with about 300 c.c. distilled (or boiled) water at about 70 deg. Centigrade, in the above order. On cooling after complete solution add:—

Sodium carbonate (crys.) ... ..	25.00 gms.
Potassium bromide ... ..	0.40 gms.

Water added to make either 500 c.c. or 350 c.c. as required.

(b) Second developing bath. "Nachbad."

Sodium carbonate (crys.) ... ..	25.00 gms.
Tribasic sodium phosphate (tertiary) ... ..	0.50 gms.
Water to ... ..	500 c.c.

These baths are to be used as "forebath" and "afterbath" according to the details given above.

The classifications according to film contrast are given as the gamma values in the following table:—

<i>Maker's Name and Name of Film.</i>	<i>Gamma Value obtained</i>	<i>Maker's Name and Name of Film.</i>	<i>Gamma Value obtained</i>
AGFA Isochrom (new series)	0·8	PERUTZ— <i>contd.</i>	
Amateur Film	0·7	Braunsiegel	0·8
Panchromatic Portrait Film	1·0	Persenso plate and Leica Film	1·0
Fine-grain Film	1·1	SCHLEUSSNER Tempo Rot Film	0·8
GEVAERT Super-Press	0·6	Tempo Gold Film	0·5
Express Film	0·9	Fine-grain Leica and Viridin	1·0
HAUFF Ultra and Flavin Films	1·0	Positive Film	1·4
Ultra, Lutar and Ulcroma	0·8	Virid Film	0·7
Modula	1·0	VOIGTLAENDER Film,	0·8
IMPERIAL Film	0·9	Illustra li	0·6
Panchromatic Film	0·7	Sigurd li and Satrap double-coated	0·7
PERUTZ Leica-special (Aviation) Film	1·5	ZEISS IKON Film	0·8
Leica antihalo	1·2	Ultra antihalo Film	0·9
Aviation Film and Plate (Fliegerplatte)	1·7	Pernox Film	1·4
Special Portrait	0·7	Ultra ortho (for Contax)	2·0
		Fine grain (for Contax)	2·3

and panchromatic films (listed separately) are also given optimum development temperatures.

<i>Maker and Name of Film</i>	<i>Character.</i>	<i>Gamma.</i>	<i>Temperature degrees Centigrade.</i>
AGFA—Superpan	Soft	0·8	20-21
Superpan-fine-grain	Soft	0·8	20-21
Finopan	Brilliant	1·2	19-20
KODAK—Panatomic	Brilliant	1·15	19-20
"SS" Super-sensitive	Soft	0·7	20-21
PERUTZ—Rectepan	Brilliant	1·2	19-20

"Pharmazeutische Zentralhalle fuer Deutschland" and B.J., 1934, Sept. 7, pp. 531-3.

**Fine Grain by Desensitising.**—A writer in *American Photography* states that physical development by the Odell method does not give grain as fine as other methods of development, and has made experiments in the use of a desensitiser, already known to reduce grain size. When pinakryptol green is used between the iodide fore-bath and the actual physical developer an ultra-fine grain is given, the desensitising bath being used at a concentration of 1 : 5,000. Apart from this bath, the instructions remain those of Dr. Odell. Photomicrographs are shown, but no data given as to useful degree of enlargement.—"American Photography," Nov., 1934, and B.J., 1934, Nov. 2, pp. 649-50.

G. H. Donald, however, writes to suggest that the lack of fine grain complained of may be due to using the developer at a temperature of over 65°F., which he has found to give a marked "clotted" effect, similar to reticulation in appearance. He states that with Agfa Superpan film and the iodide forebath method he can enlarge to 20 diameters on glossy paper, and 40 diameters on rough paper, without any trace of grain.—B.J., 1934, Nov. 16, p. 691.

**Buffered-Borax Developer.**—The "B-B" developer, now much used in U.S.A. for fine grain, is explained and commented on by S. T. Abrams. The buffering solution of borax and boric acid makes the developer resist changes of pH, and stabilises the action.

The formula was produced some time ago by the Kodak Research Laboratories, and reads as follows:—

Elon (metol)	... ..	15 grs.	1 gm.
Hydroquinone	... ..	38 grs.	2.5 gms.
Sodium sulphite (anhydrous)	... ..	1½ ozs.	50 gms.
Borax	... ..	15 grs.	1 gm.
Boric acid	... ..	105 grs.	7 gms.
Water to	... ..	16 ozs.	500 c.c.s.

Development is relatively slow, and normal "medium-speed" emulsions will need some 15–17 minutes at 65° F. The keeping properties of the developer are good.—"Camera," Philadelphia, and B.J., 1934, Oct. 26, pp. 638-9.

**Semi-Physical Development for Fine Grain.**—Following work done by Lumière and Seyewetz in 1904, P. Lazenby suggests that a semi-physical fine grain method of development may be practicable. When using a solvent of the emulsion bromide in the developing solution, development proceeds in two stages: (1) A faint image is produced by chemical development and silver bromide dissolves in the developer; (2) chemical development is reinforced by physical precipitation on the image from the solution. This is the case with developers such as paraphenylenediamine and orthoaminophenol, as shown by M. Seyewetz (B.J., 1934, Aug. 3, p. 456), and the emulsion must be removed from the developer to avoid full chemical development, which would give large grain.

Work has therefore been done with amidol 2 grs. per oz., sodium sulphite (anhydrous) 14 grs. per oz., as developer, made up with 15 per cent. solution of ammonium chloride (a solvent of silver bromide) instead of water. The ammonium chloride acts very powerfully in restraining development, and the solution is rather sensitive to temperature.

Test enlargements at 10 diameters showed that compared with 4 minutes in an unbromided amidol developer (same formula as above, but with ammonium chloride omitted) a considerable decrease in grain size resulted with 4 and 6 minutes development. The contrast was lower than with normal amidol, and clearly a compromise between grain size and contrast should be found before this type of development can be usefully applied. There seems no doubt, however, that fine grain is possible with a simply constituted solution with approximately the above formula. The film strips had all the appearance of physical development, and though no attempt was made to hold them flat in the developer, no streaking occurred.—B.J., 1934, Nov. 9, p. 663.

## POSITIVE PROCESSES &amp; TONING.

Experiments in Sepia Toning.—O. J. Morris reports a series of interesting experiments in the sepia toning process. An untoned bromide print was chopped up into five pieces, numbered respectively 1 to 5. No. 1, as the basis of comparison, was left untoned. No. 2 was toned by the standard potassium ferricyanide bleach plus sodium sulphide darkener. No. 3 was toned by the Greenall process, with bleach of acid potassium permanganate, followed by the usual sulphide darkener. No. 4 was bleached in a bath made up of potassium bichromate (5 per cent. solution) plus hydrochloric acid (10 per cent. solution), equal amounts of each being mixed. This was followed by a clearing bath of 10 per cent. potassium metabisulphite, and the print was then toned in sodium sulphide. No. 5 was bleached in the same bichromate bath, but the stain was cleared by a 20 per cent. solution of sodium sulphite. The print was then toned in the standard sodium sulphide bath. The five pieces were then mounted side by side for the sake of comparison.

Compared with No. 1 (untoned) strip, No. 2 appeared to be a shade darker (in contradistinction to the age-old theory). This was probably a visual illusion caused by the tone, which was of a rich warm brown. No. 3 offered an interesting comparison, inasmuch as the tone was very much colder, verging on purple. The depth of this strip, allowing for the colour, was roughly identical with that of the untoned strip; i.e., a shade lighter than No. 2. No. 4 was the merest trifle deeper than No. 3, but the tone was a very decided yellowy-brown, still pleasant to the eye, and probably a nearer approach to the popular notion of "sepia." The interesting point about No. 4 was the decided degradation of the high-light (sky) into greenish-white on the wet print—a tint which veered to grey on drying. This is the direct result of the potassium metabisulphite clearing bath, and the effect is not unpleasing. No. 5 had been reduced very considerably on toning, although the tone remained fairly good, with a good deal of the yellow in it. So great had been the reduction that the background had disappeared almost entirely.

The following conclusions were drawn. One of them was that the bichromate bleach is apt to yield a very good warm tone, and, as some papers are prone to "plumminess," through irregular development tactics, it might conveniently be used fairly often. The great objection is, of course, the amount of washing which is necessary to remove the

bichromate stain. Flooding with potassium metabisulphite immediately after bleaching, and even after three or four preliminary rinsings, infallibly yields the high-light stain. There is only one course open, patience and plenty of water. However, the metabisulphite bath can usefully be introduced at the visual completion of stain-clearance; that is, when the surface of the print appears free. It is just at this juncture that failure is, otherwise, likely to ensue. The print "looks all right," but the pores of the paper are still charged with bichromate solution, and the result (whether in toning or redeveloping to black) is frequently a crop of nasty stains. The final metabisulphite bath is used at this point in the proceedings, and no degradation of the high lights follows.

The very heavy reduction apparent in No. 5 suggests that here is the germ of some means by which tone depth can be controlled, so that the overprinted "black and white" may ultimately be saved. It should be noted that, using the sulphite bath to clear the stain, it becomes impossible to re-develop the print to black. This method may warrant some further investigation.

The contrast in tone between Nos. 2 and 3 suggests the advisability of choosing the bleaching bath according to the "temperature" of tone desired. No. 3 (permanganate bleach) approaches nearest to the strictly correct "sepia." No. 2 would pass with most people as "right."—B.J., 1933, Dec. 15, pp. 735-6.

**Thiocarbamide Toning.**—Students in the Ecole de Photographie at Paris are trained in the use of a process of sepia toning using thiocarbamide instead of the more usual sodium sulphide. The use of thiocarbamide removes the unpleasant smell associated with sulphide toning, and has certain other advantages.

The normal ferricyanide and bromide bleaching bath is used, but after a wash of about two minutes the prints are darkened in a bath made by mixing 2 ozs. of a 5 per cent. thiocarbamide solution and 1 to 2 ozs. of a 10 per cent. caustic soda solution with water up to 20 ozs. The tone given by this bath is pure brown to chestnut brown, while yellowish tones are due to lack of sufficient caustic soda in the toning bath.

It is essential that the toning bath should not contaminate the bleacher, since it decomposes it.

Mlle. Wilbart has also used variants of the process,

involving acid permanganate or bichromate as a bleacher. Both of these bleachers will give satisfactory results, but the richest tones are obtained with the ferricyanide-bromide bleach, always assuming that the prints have been correctly fixed and washed.—"Photo-Revue."—B.J., 1934, May 25, p. 301.

**Sodium Sulphide Solution to Keep.**—H. D'Arcy Power, M.D., F.R.P.S., while admitting that a stoppered mineral water bottle (as advocated by H. W. Bennett, F.R.P.S.) is infinitely better for the storage of sodium sulphide solution than the usual corked bottle, suggests a new way for storing the strong solution.

A saturated solution of sodium sulphide is mixed with four times its volume of glycerine. The mixture gives no smell in the room after use, and sulphides a wet paper or negative with great rapidity. Full tone is reached in 2 to 3 minutes, in the case of prints. With negatives, there is a chance of the emulsion separating from the base when this time is exceeded. This is due to the strong solution of sulphide, and can be avoided by hardening the negative in 5 per cent. formaline before bleaching.

The strong solution can be returned to the bottle and used until it is exhausted, while even a loosely corked bottle may be used without degeneration of the sulphide taking place.—B.J., 1934, April 27, p. 252.

**Treatment of Prints for Machine Drying.**—A patent has been taken out by Messrs. Gevaert, of Antwerp, on a process which avoids the changes in emulsion consequent on drying prints on heated rollers. It is pointed out that this change causes a lack of covering power of the silver image, and prints tend to have non-uniform blacks if some form of special treatment is not given.

The patent is particularly applicable to papers which, on account of the high degree of hardening of the emulsion tend to develop a cloudy appearance.

The process is one of using a substance capable of producing a colour change in the print (similar to toning) but not in such a manner as to alter the print colour, and instead only to stabilise it. Prints are therefore treated with such substances for such a short time, or in such small concentration, that no "visible" toning effect takes place.

It is immaterial at what time in the process the compounds are used. They may be incorporated in the emulsion itself,



or else to the developer, fixing bath, or wash water. Substances used include compounds containing gold, platinum, palladium, sulphur, selenium, or tellurium. Selenium, particularly in the form of an alkali seleno-sulphate, is particularly adapted to the needs of the patent since it reacts extremely slowly with the silver image.

Two examples are given.

(1) Prints are immersed for one minute after development, fixing, and washing, in a solution of 40 gm. ammonium thiocyanate in a litre of water, to which 40 cc. of a gold chloride solution of 1 per cent. concentration has been added. The prints are then washed and dried as usual.

(2) 1/10 gm. of sodium selenite is added per litre to the fixing bath which is used as usual. After washing the prints are dried in any preferred way.

Slight colour changes are sometimes noticed, but this is in every case far less than the toning effect when using a specially prepared toning bath containing the same substances.—Brit. Pat. No. 401,961 of April 6, 1933.—B.J., 1934, Jan 19, pp. 34-5.

**Bromoil Transfer Without a Press.**—Those who have been deterred from bromoil transfer work on account of the cost of a press will welcome the transfer board described by H. How.

The following materials are required:—

2 Brass strips,  $14 \times 1 \times \frac{1}{16}$  ins.

2 Brass strips,  $11 \times 1 \times \frac{1}{16}$  ins.

4 Brass strips,  $1\frac{3}{4} \times \frac{1}{2} \times \frac{1}{16}$  ins.

4 Countersunk setscrews  $\frac{1}{4}$  in. diameter  $\times \frac{1}{2}$  in. long, with wing nuts.

A 5-ply board  $17 \times 14$  ins.

A sheet of pressure packing,  $16 \times 11 \times \frac{1}{16}$  ins. thick. (This can be obtained from an engineers' supply stores.)

The dimensions of the board and sheet given are suitable for transfers up to  $12 \times 10$  ins., but may be modified to suit individual requirements.

A  $\frac{9}{32}$  in. hole is first drilled  $\frac{7}{16}$  in. from each end of the two 14-in. brass strips. Along each of the 11-in. sides of the pressure sheet a 14-in. brass strip is fastened on one face of the sheet, and an 11-in. strip on the other face. To do this the strips should be clamped in a vice with the sheet between them, and three equally-spaced holes drilled right through. The strips are then fastened together with small screws and nuts. The longer strips should project  $1\frac{1}{2}$  ins. on either side of the sheet.

The four small brass strips are now taken and drilled with an  $\frac{1}{8}$ -in. hole  $\frac{3}{16}$  in. from each end. To the centre of each of these pieces a  $\frac{1}{4}$ -in. setscrew is soldered, head downward. The screws are then passed through the holes in the 14-in. strips, and the wing nuts screwed on tightly. The sheet is adjusted centrally on the board, and the small strips screwed down in the corners. A cross or other mark should be placed on one end of the board and on the adjacent brass strip. The pressure sheet may now be removed from the board by unscrewing the wing nuts. The complete transfer desk is shown in fig. 1.

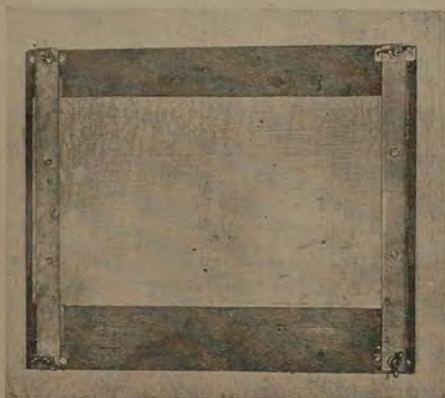


Fig. 1.

The transfer pressure is applied by means of a ball-race  $2\frac{1}{2}$  ins. in diameter and  $\frac{3}{4}$  in. wide. Through the central hole a loosely-fitting wooden handle about 12 ins. long is passed (fig. 2).

To make a transfer, the paper which is to receive it is damped, and the back covered with a thin coating of weak glue. The best consistency for the glue must be found by experiment, and depends upon the type of paper used. The glue should be strong enough to hold the paper closely to the

pressure-sheet during the transferring, but not so strong as to make its removal afterwards difficult. Hard, well-sized papers are best. Unsized and Japanese papers should be glued along the edges only.



Fig. 2.

The inked print, to the back of which several touches of gum have been applied, is placed face upward on the centre of the board, and the paper placed upon it, glued side up. On this the pressure sheet is placed and screwed down to the board by means of the wing nuts. The marks previously placed upon them indicate which ends of the board and sheet should be together. The board is placed upon a low table or other support, and the transfer made by placing a hand on either end of the handle and rolling the ball-race up and down over the pressure-sheet, applying as much pressure as possible without undue exertion, and working slowly from side to side until the whole area of the print has been covered. After working across and back, one end of the sheet should be released and lifted from the board.

After the transfer is finished, the paper is pulled away from the pressure-sheet. If the glue is too thick, and the paper sticks, it can be removed by soaking in warm water.

The face of the roller should not be wider than  $\frac{3}{4}$  in. or it will be impossible to apply sufficient pressure to obtain a good transfer.—B.J., 1934, June 15, pp. 347-8.

**Black Backgrounds.**—Since it is not easy to get a truly satisfactory background when doing commercial jobs in a confined space, W. McWilliam hit on the following process:—

The negatives were made on one of the new anti-halo cut-films, care being taken to get the exposure absolutely correct.

After the developed film was dry, the subject was carefully cut round with a surgical knife, and the discarded celluloid thrown away. In this operation it is advisable to cut with the plain side of the film uppermost, as the burr which rises then consists of plain celluloid. If cutting is done with the emulsion-side uppermost, the burr may possibly cause a white border-line to appear on the print, necessitating removal afterwards. Printing or enlarging from the subject portion of the film is carried out in the usual manner, and if good-class bromide paper is used, a particularly rich black background results.

When complicated shapes are met with, it is usually easy to arrange a dark cloth behind such parts, after which it is not necessary to trouble much about following the outline when cutting out.

For the complete success of this method of isolating an object from its surroundings it is necessary to emphasise that the exposure of the film in the camera must be just right. Errors of judgment in this direction lead to subsequent difficulty in cutting the film correctly, so the use of a reliable exposure meter is advocated.—B.J., 1934, Sept. 14, p. 554.

**Sodium Sulphoselenate to Keep.**—Tests show that a solution of sodium sulphoselenate, comprising 2-3 grams ( $1\frac{3}{4}$ - $2\frac{1}{2}$  grains) selenium and 40 grams (35 grains) of sodium sulphide in 100 c.c. (20 ounces) of water, begins to decompose in a tightly corked bottle in a few weeks, and is useless after two or three months.

If, however, the solution is diluted with a 5-10 per cent. solution of anhydrous sodium sulphite when it is being made up (the ingredients are normally dissolved in a small quantity of hot water and diluted to full volume) the keeping powers are considerably prolonged.—"Revue Photo-Cinema" and B.J., 1934, Aug. 24, p. 504.

**Modification of an Enlarger Carrier.**—"Milligramme," having found that the carrier in his cheap enlarger was not suitable for fast and accurate work, has built the following modified carrier which has correction for crooked negatives, provision for focussing both film and plate negatives, and is very much quicker in use.

The materials used were:—Three-ply wood about  $\frac{1}{8}$  in. in thickness, sheet brass, secotine, glass-paper, small brass screws and two unexposed but fixed plates of V.P. size.

The construction will be sufficiently clear from figs. 1 and 2. No dimensions are given as these must obviously depend upon

the enlarger and the size of negative to be accommodated. The present carrier is designed for  $3\frac{1}{2} \times 2\frac{1}{2}$  in. plates.

A is the foundation board with two apertures, one a square of side equal to the longer dimensions of the negative, the other a rectangle of suitable size to accommodate the ruled plates used for focussing.

B are strips of wood, separated from A by distance pieces of such thickness that the carrier will fit snugly into the slot provided on the enlarger.

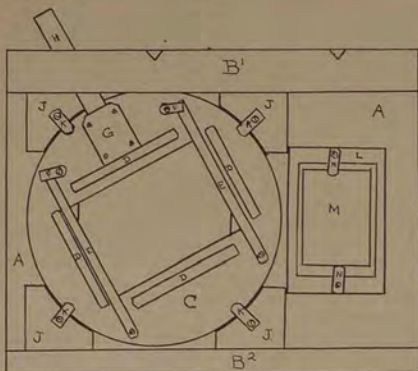


Fig. 1.

C is a circle of wood with a rectangular aperture of sides  $\frac{1}{4}$  in. less than the negative it is to accommodate, placed centrally over the square aperture in A. It is cut out with the fret-saw and the edges smoothed with glass-paper.

D are strips of wood, positioned to allow the negative to lie easily between them.

E are brass springs, pivoted at the lower ends and held in place by

F small brass turn-buttons.

G is a brass plate covering the slot for

H a removable handle.

J are wooden guides of the same thickness as C between which C revolves. The inner edges should be rubbed smooth with glass-paper.

K are short lengths of brass to hold C flat down to A. The inner angles of the brass are slightly turned up by means of pliers so that C turns smoothly under them. The outer angles are similarly turned down to grip the wood and prevent their movement. Alternatively the length of the brass strips could be increased and two screws used in place of one.

L is a frame of wood with the same aperture as that cut in A, for the ruled focussing plates. It is important that it should be of exactly the same thickness as C, and it is best to cut both from the same piece of wood.

M are two unexposed and fixed out plates, ruled for focussing. One is fixed film downwards on L, the other film downwards on the first. The former will be in register with and is for focussing glass negatives. The latter will be in register with and is for focussing film negatives sandwiched between glass plates. These two fixed out plates are held in place by

N two short brass strips.

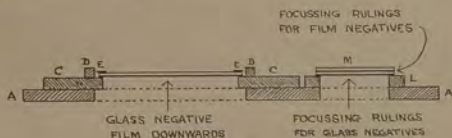


Fig. 2.

The two triangular marks at the top edge of B<sup>1</sup> indicate the centre lines of the revolving negative carrier and the ruled focussing plates respectively. A corresponding mark is made on the centre line of the enlarger.

Fig. 2 shows a section through the carrier. It will be noted that since the frame L is identical in thickness with the revolving member C, the film of the bottom plate in the focussing aperture is in the same plane as that of a negative placed film downwards in the recess on C. A cleaned negative of the same thickness is selected and reserved for the bottom plate when sandwiching film negatives and hence the film of the upper ruled focussing plate will be in the same plane as the emulsion side of the film negative.

One half of the films of each of the fixed out plates has a series of fine lines ruled upon it with a very fine needle point, including two marks half an inch apart. It is extremely easy to focus these rulings, while the degree of enlargement

is readily obtained by measuring, on the easel, the distance between the marks showing the half-inch length. The lower film also bears the letter P (indicating "plate"), and the upper the letter F (indicating "film"). Hence, when focussing there is no uncertainty as to which set of rulings should be used. The two focussing plates are assembled so that the half of the glass bearing the "plate" rulings is situated opposite the clear half of the glass bearing the "film" rulings and vice versa.

The only constructional difficulty likely to be experienced is in obtaining sufficiently hard brass for the springs E. Most brass sheet easily obtainable is soft. Advantage may be taken of the fact that brass can be hardened by "cold working," and after the brass strips have been well hammered on a wooden door-step for some minutes they become sufficiently springy for the purpose.

If it is found that the circle C does not revolve smoothly when pressed down into contact with A, a little powdered graphite will rectify matters.

The method of use of this carrier is very simple. The springs E are released at one end by turning the buttons F. The negative is placed film downwards in the recess over the opening and held firmly in place by re-fastening the springs. The carrier is then placed in the enlarger, adjusted to centre and the required degree of enlargement arranged. The carrier is then drawn to the left until the focussing plates are in the centre position. Focussing is performed by means of the appropriate rulings (a very speedy operation) and the carrier pushed back to centre the negative. Any necessary adjustment of the horizon is effected by means of the handle H. All is then ready for the exposure.

The illustrations show the carrier in position for a horizontal view. If a vertical position is required the handle H is withdrawn, the carrier C revolved counter-clockwise through 90 degrees and the handle replaced.—B.J., 1934, Aug. 24, pp. 499-500.

**Matt Varnish with Variable Grain.**—Since the grain formed by the usual matt varnish composed of Sandarach resin in benzole is erratic in size, W. J. Smith and E. L. Turner have worked out a new formula whereby the grain can be varied in size at will, and can be made to appear always in a definite size.

Two stock solutions are made up, one of a 10 per cent. solution of Sandarach in 0.720 ether, and the other a 5 per

cent. solution of mastic in rectified benzole. Two parts of the Sandarach solution to one of mastic gives a fine open grain, which becomes coarser as the proportion of mastic is increased.

Some practice is necessary in coating the plate, and it is as well to use a fan (some 5 to 6 ft. away) to hasten drying, though violent draughts should be avoided. Coating must not take place in the same room as a naked flame.—B.J., 1933, Dec. 8, pp. 717-8.

**Transfer of Image Through Paper.**—A curious case of an image on gold-toned collodion paper is brought to our notice by Klein & Peyerl of Madras. The photograph was taken in Manchester about 1913, and in the course of time has formed an image through the fly-leaf of the mount on the front cover. The colour of this image is a burnt sienna tint, and is so even and distinct that it could be copied.

The fly-leaf shows no trace of an image, and the original collodion print still looks like new.—B.J., 1933, Dec. 29, p. 778.



(Original Photograph on the right, transferred image on the left.)



## TECHNICAL & COMMERCIAL APPLICATIONS

**Photographing Ancient Manuscripts.**—It is well known that some ancient manuscripts, normally illegible, can be rendered readable by photographing them under ultra-violet or infra-red light. Intensive research has been undertaken by G. C. Brock, M.Sc., A.I.C., and R. W. Ditchburn, Ph.D., in order to determine the most satisfactory conditions for this work.

The MSS. in question were found to have suffered from the following causes: (a) fading of the ink, (b) rubbing of the surface, (c) dirtying of the surface, (d) staining of the parchment, and one or more of these troubles may be present at the same time. In the case of (a) the results will probably be successful, though not certainly. With (b) the damage to the surface will limit the application of the processes, and if the dirt in case (c) completely absorbs the ultra-violet or infra-red rays, no result can be expected. Such MSS. can, however, sometimes be cleaned. Staining, as in (d) is most difficult to deal with, and results depend on the nature of the stain.

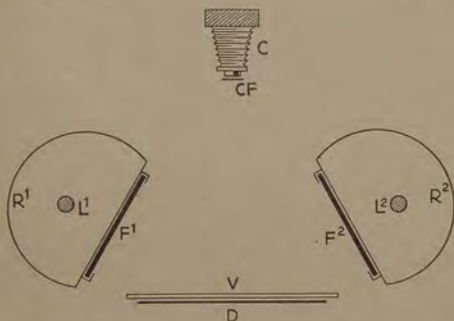
Two methods are available for photography: (1) by reflected light, (2) by the method of fluorescence.

When using reflected light, visible light in conjunction with contrast filters may at times be satisfactory. At others, infra-red or ultra-violet (the latter involving special lamps and a quartz lens) may be necessary. The sources of light and camera are set up as in the fig. and when using infra-red rays (to which carbon inks are more or less opaque, and iron oxides more or less transparent) it is sometimes possible to photograph the original writing on a document which has been subsequently erased and written over.

The fluorescent method of photographing documents depends on the fact that parchments often emit other wavelengths of light than those illuminating them, while inks are seldom disposed to do so. Since the light which is photographed is thus completely different in wavelength from the source of light, overlapping filters have in general to be used on the camera lens, which will cut out the light-source illumination and pass the emitted fluorescence. Visual results, even, may be obtained by flooding the MSS. with ultra-violet light (since the wavelength of the excited fluorescence is practically invariably of longer wavelength than the exciting illuminant) when a greenish glow will be seen from the parchment, the writing remaining dark. A blue-green glow

usually predominates, though fluorescent emission throughout the spectrum can often be traced.

The filter on the camera should thus cut out the ultra-violet light, while passing the blue-green glow, and on account of the feebleness of fluorescence, exposures will be lengthy. This method appears to be specially useful in the case of stained documents.



L<sub>1</sub>, L<sub>2</sub>=Lamps. R<sub>1</sub>, R<sub>2</sub>=Reflectors. D=Document. V=Sheet of Vita Glass.  
C=Vertical Camera. CF=Filter on Camera Lens. F<sub>1</sub>, F<sub>2</sub>=Ultra-Violet Filters.

For the production of ultra-violet light, the mercury arc is stated to be unrivalled. The carbon and iron arcs are useful, but cause a great deal of heat, besides taking much current and needing constant attention. The quartz mercury-vapour lamp is excellent, though a set of bulbs made in "Pyrex" glass by the experimenters were also very successful, and had the merit of being cheap to produce if a knowledge of blowpipe work is available.

The lamps were mounted in aluminium boxes, polished on the inside, which reflects forward the ultra-violet well. Even on quartz mercury-vapour arcs, ventilation is essential, otherwise the vapour pressure may rise too high and extinguish the arc.

Ultra-violet filters of metallic silver deposited in a thin film were first used, though later a colloidal silver filter was found to be more efficient.

Any wavelength between 250 and 390 milli-microns was found to be suitable for fluorescent photography, and this

may be cut out of the lens by an Ilford "Q" filter, which absorbs those rays which pass the glass of the lens, and passes the fluorescent rays from the MSS. For "far" ultra-violet work with 200 milli-microns wavelength an aluminium arc was used, in preference to an expensive monochromator, and fluorescence photographs by this means proved quite practical.

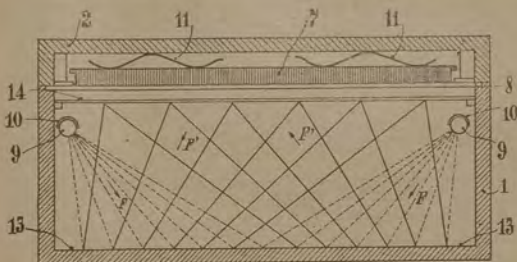
Three of the "Corning" glasses—"Red Purple Ultra," "Red Purple Corex" and "Violet Ultra," were found to be of great use in separating the ultra-violet light from visible rays by putting them over the front of the lamp-houses. These glasses transmit ultra-violet, a little violet, and the red beyond 720 milli-microns. Trouble has been experienced in getting a lens filter which will cut off in conjunction with these glasses, since it is desirable that the red they pass should be cut off. On the whole, however, the Ilford "Beta" can generally be successfully used with a panchromatic plate. Should the MSS. also reflect the red light, an orthochromatic plate will ensure that this does not affect the photographic result.

If the Corning glasses are thin (say 3 mm.) it may happen that they will transmit rays up to 440 milli-microns. In this case the Ilford "Micro 4" or "Micro 9" filters, which have a cut-off at about this figure, may be used instead of the normal "Q" which absorbs ultra-violet only.

Experiments have further been made with X-rays, but no useful results obtained. After-fluorescence, however, which is the residual glow of the MSS. after the ultra-violet light-source has been turned out, can be used in extreme cases. Difficulty here is experienced in that the after-glow may only persist for a very short time from the turning out of the light-source, and in any case lengthy exposures—intermittent with lighting the MSS. again—will be found necessary.—B.J., 1933, Dec. 15 and 22, pp. 737-9 and 753-6.

**Better Reflex Copying.**—A recent patent (No. 413,936 of November 21st, 1933) has been taken out by Nicholas Borovsky dealing with an improved frame for obtaining reflex copies of original documents, such as deeds, insurance policies, contracts, and so on. The sensitive paper and sheet to be copied are placed together over the glass plate 8 of the figure, and pressed into firm contact by the pad 7 and springs 11 when the lid 2 of the box is closed.

Beneath the plate 8 is a translucent opalescent glass sheet 14 to provide uniform illumination from the lamps 9. In order that the utmost uniformity in light intensity may result, the



light is reflected entirely from the bottom of the box 13, as shown by the lines in the figure. Reflectors 10 are placed behind the lamps 9, and the bulbs themselves have a yellow filtering envelope which transmits only the wave-lengths 700 to 490 milli-microns, which light is specified as being the most suitable for obtaining detail and half-tints in the copy in their correct tone values. Other wave-lengths are not so satisfactory.

The printing box is preferably made transportable, so that it may conveniently be carried round and used wherever copies are to be taken.—B. J., 1934, Sept. 7, p. 536.

**Photo-Stencils by Carbon Process.**—A new departure of the carbon process, due to the Autotype Co., Ltd., is that of preparing stencils for placing over the silk screen used in normal stencil work.

A positive is first made of the subject of the stencil, and this should be masked when used as a negative for printing the carbon tissue. The tissue is pigment paper, sensitised in a weak solution of potassium bichromate, and dried. This is exposed under the positive, producing a negative carbon print. An actinometer should be used for the printing time.

The exposed paper is soaked in cold water, then laid in contact with a prepared temporary support paper. The two are squeegeed together and left between blotters for some minutes.

Development in hot water is then begun, and when this is complete the negative design will appear black on white on the temporary support. The stencil is now transferred to the stretched silk. The print on its temporary support is dipped in cold water, trimmed close to the outline of the mask, and laid on the stretched silk. A light squeegee presses the

gelatine into the mesh of the fabric, and the stencil and silk can then be allowed to dry. When dry, the temporary support can be stripped off, and the stencil is then ready for use.

The cheapness of this process, and its simplicity, will make it interesting to many. With ordinary care, 2,000 copies can be taken from one stencil, and besides paper, the impression may be received on a number of surfaces, including wood and leather.—B.J., 1934, Feb. 2, pp. 60-1.

**Increasing the Scope of the Matelux Lamp.**—Although the small table stand provided with the Matelux lamp is both portable and convenient, S. J. Brown suggests a tall stand as extra equipment when commercial work in factories is undertaken.

The stand is shown in being 15 ins. square for square for the upright. of pitch pine, the base and additional pieces in the figure to prevent

Rubber door stoppers make the stand firm on two-pin socket sunk in

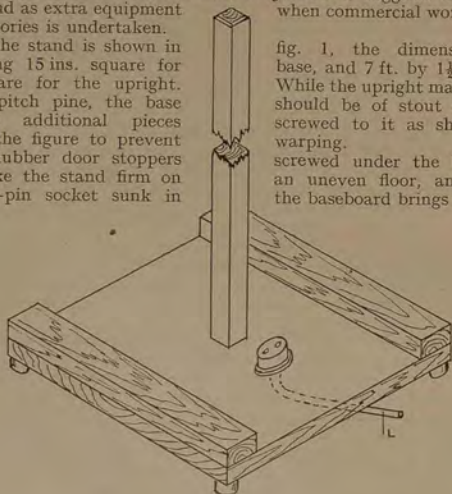


Fig. 1.

fig. 1, the dimensions base, and 7 ft. by 1½ ins. While the upright may be should be of stout oak, screwed to it as shown warping.

screwed under the base an uneven floor, and a the baseboard brings cur-

rent to the lamp through the flexible cable L. A good rubber-covered cable is best for this purpose, as it is more durable than lighting flex and has not the same tendency to kink.

The holder for the lamp is illustrated in fig. 2. The thumb-

screw A holds the clip at any required position up the stand, while that marked C screws into the reflector socket. (Note that the thread of C should not project more than  $\frac{1}{8}$  in. from the other side of the clip, or it will "bottom" on the reflector socket and allow it to hang loosely instead of tightly.)

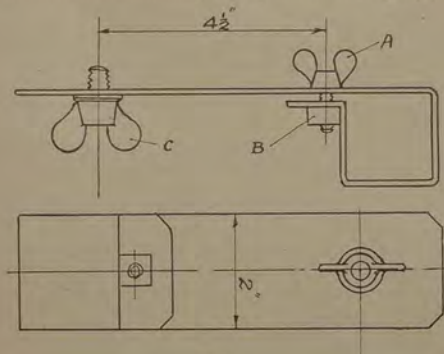


Fig. 2.

When in use, the existing flex and plug from the lamp is used, and the plug placed in the two-pin socket at the base of the stand. If desired a switch in the cable L can be used for control, in which case the switch on the lamp itself is left permanently in the "on" position.—B.J., 1934, May 18, pp. 295-6.

**Essentials of Flashlight Work.**—Child "snapshots" in particular are dealt with by G. Wilkinson, who uses flashlight to give the effect of daylight.

For this purpose, a high-speed ortho plate—backed—is essential, and a flash large enough to expose the plate properly is also necessary. If these two precautions are adopted, the production of pleasantly graded prints is simple if the plate is merely developed to suit the printing paper.

The camera used is a T-P Reflex (quarter-plate) with a  $5\frac{1}{4}$  in. lens of full aperture F/4.5, and a strong tripod is essential. A Fleet flash-lamp with "Geka" Fulmosin powder (which does not smoke, and is therefore to be preferred in private houses) are used for the flash.

It is useful when dealing with children to ignite a small flash first to see whether they will cry, or merely jump at the light, since it is naturally better to know the reaction before starting work.—B.J., 1934, Jan. 26, pp. 44-6.

**Flashlight and Daylight Together.**—H. W. Bennett, in the course of work in industrial concerns, has found it necessary, when "action" photographs are to be made, to use flash-powder in conjunction with daylight.

The use of flashlight, it is found, is particularly useful where, owing to the position of industrial gear, the aperture of the lens has to be  $f/16$ , and by its use even a descending drop-hammer may be shown stationary.—B.J., 1933, Dec. 8, pp. 722-5.

**Easy Copying From Books.**—A device for use in copying books, which has the advantages of great simplicity and convenience, has been designed and made by W. P. Gamble.

As shown in figs. 1 and 2, it consists of a shallow box with a glass framed top. A false bottom in two halves, each of which carries springs under it, holds the book, and when the box

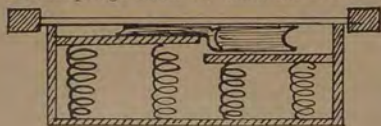


Fig. 1.

is closed presses the two pages of the book into firm contact with the glass.

A size of  $15 \times 12 \times 4$  ins. deep is suggested, and

scrap wood can easily be used up in its construction. The springs may be obtained from any upholsterer.—B.J., 1933, Dec. 29, p. 771.

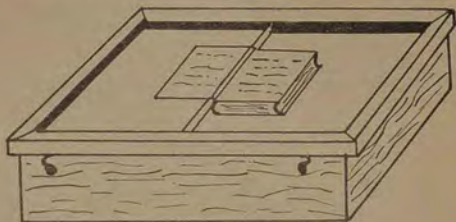


Fig. 2.

Photography in (Nature's) Fog.—F. McCubbine describes an interesting experiment in fog photography without adequate filters. The work requested was of interiors, and as no



Fig. 1. Reproduction of Print from Original Negative

artificial light was available a K3 filter was taken in preference to a red one. After the interiors were finished, an exterior of the house was suggested, in a thick fog!

Using the K3 filter, careful exposure was given, so that grain due to over-exposure was avoided. The film (Kodak Commercial Panchromatic) was developed slightly longer than usual, and a print gave the result shown in fig. 1.

The negative was cleared slightly in a very weak Farmer's reducer, the intention being to affect the shadows only and leave the high-lights intact, and a positive made from it. This was done by copying on to a Barnet process plate in the camera, using soft reflected light to obtain the most contrasty result possible, yet one which included the gradation of the subject without blocking up.

A second negative was then made, also on a process plate, in the mercury-vapour enlarger. This form of illuminant was used in order to try and soften the grain, which had become rather pronounced. Retouching and spotting followed, and





Fig. 2. Reproduction of Print from Final Negative.

the final print was then made on matt paper to keep the grain as unobtrusive as possible. Local treatment, and printing in of a little cloud, made the result very passable, as shown in fig. 2.—B.J., 1934, Jan. 5, pp. 3-4.

### CINEMATOGRAPHY.

**Exposures on Reversal Cine Film.**—Discussing the general subject of exposure on reversal film, P. Lazenby stresses the fact that exposure should be consistent within each reel of film exposed, rather than absolutely exact.

The general lack of latitude in reversal emulsions has been compensated by various processes, and consistency of exposure (even assuming that all exposures are over- or under-exposed) will make it easy for the processing firm to get good results. When shots of a reel are alternately over- and under-exposed, very little compensation is possible, and the results are bound to be poor.

Reversal processes are of three types:—

(1) Where first development alone compensates for incorrect exposure.

(2) Where a solvent of the emulsion silver is used in the first developer, thus giving increased compensation.

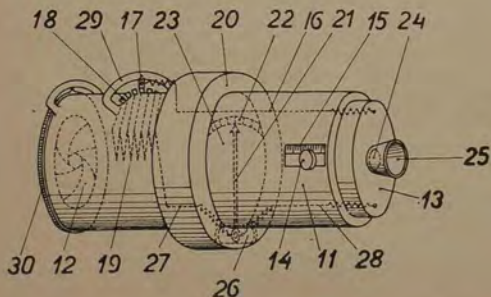
(3) The patented variable second exposure to light process.

With each of these three compensation processes, providing that a meter is used on every shot in a consistent manner, good results may be expected. It is advisable to ascertain by trial and error just what speed number to use with a particular film, so that exposures are given according to practical results desired and not on abstract speed numbers which may be misleading.

It is worthy of note that in the first two processes an under-exposed film is liable to be over-developed for purposes of compensation, and in this case will sometimes be over-contrasty with black shadows and burnt-out high-lights. This is particularly possible in the case of work in artificial light, where contrasts are generally larger than in exterior work.—B.J., 1934, Aug. 10, pp. 467-8.

**New Exposure Meter Design.**—A new type of photo-cell exposure meter is the subject of a recent patent by Odön Riszdorfer.

In order to do away with the difficulty of sighting the photo-electric exposure meter and remove the possibility of a false reading, it is proposed to use the photo cell at the back of a tubular meter, the dial for reading being inserted in the tube, where it is read at the same time as the scene is viewed through the tube.



In the figure, 25 is an eyepiece through which the subject is examined, examination being made through the centre of the photo cell 13. A magnet, 20, round the tube of the meter and

a moving coil, 26, constitute the measuring instrument, and the needle 21 is visible against the scale 22 on looking through the instrument.

In use, an iris diaphragm, 12, may be used to adjust either for shutter speed or lens aperture, according to whether the instrument is to be used for still photography or cine work. Once this diaphragm is adjusted to the correct constant, a glance through the meter not only gives the angle of view, but also shows at the same time the exposure or aperture to be used. A further refinement, which can be used to alter the calibration of the instrument for different speeds of emulsion or for increased exposures with filters, is the provision of a shunt resistance 19, and a sliding contact 17, moving along the tapping points 18. The latter are calibrated with figures for emulsion speed and filter factor, and variations in either or both of these physical factors can be taken into account when reading the exposure or aperture necessary.

The angle of view may also be adjusted by sliding the tube attached to the photo cell in and out of the external tube 11 of the instrument, while the actual angle is indicated by the scale 15. Once the required angle of view of a particular lens is found, the screw 14 holds the instrument at that value permanently.—B.J., 1934, July 20, p. 433.

**Hardening Film During Reversal Processing.**—A new means of hardening films during reversal process is the subject of a recent patent by Otto Perutz, G.M.B.H., Munich.

When a photographic plate or film is reversed, it is subjected to a first (negative) developer which is strongly alkaline, then to a strongly acid reversing bath, and later to another strongly-alkaline developer. In order to avoid the effect on the gelatine of this alternation of stresses, it has been advocated that acid developers should be used for the process, but such baths are extremely unstable, and deteriorate after relatively few hours.

Hardening as an intermediate process is also a possibility, but this is liable to be reduced in effect when put into the second alkaline developer. Apart from this, treatment with formaldehyde, the most potent hardening agent in practice, makes it necessary to wash the film or plate more than usual. When, however, from 5 to 10 grms. per litre of hexamethyltetramine are added to the first developer for this effect, development may be conducted as usual. The mild hardening given by this substance does not affect subsequent treatment with water, as in the case of formaline.—B.J., 1934, Aug. 17, pp. 491-2.

**Grainless Reversal Process.**—M. Leiber suggests a modified reversal process based on the coloured oxidation products formed by certain developers. The positive image is produced as a stain and is thus virtually grainless.

The first development is conducted in a non-staining developer such as metol, and after the negative image is fully developed is immersed in a 6 per cent. solution of sodium carbonate, this solution being changed once or twice during the ten to fifteen minutes immersion of the film. Second exposure to light follows, and the positive image is developed in the following staining developer:—

Pyro ... ..	17½ grs.	2 gms.
Pyrocatechin ... ..	175 grs.	20 gms.
Water ... ..	20 ozs.	1,000 c.c. (1 litre)

Development is some 60-120 seconds, and a further immersion in the sodium carbonate solution for 3 minutes follows. After this, the reduced silver in the film is dissolved out with Farmer's reducer, and the positive image remains as a stain on the emulsion.

If intensification of the image is judged to be necessary, this can be done either with an ammoniacal silver nitrate bath or with silver chloride.—"Photographische Korrespondenz," Aug., 1934; and B.J., 1934, Aug. 17, p. 485.

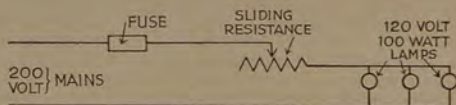
**Fades in the Camera.**—A. Campbell describes the manufacture of a "Fading-Glass," much used in U.S.A. for creating fades on reversal stock in the camera by drawing the glass across the lens slowly.

An ordinary photographic plate may be exposed to light under a slide which is slowly moved across the plate so that one end gets maximum exposure and the other none at all. The plate may then be developed for maximum density in any developer and fixed and washed. Cutting to the size needed is the final stage of the process.

Alternatively a plate may be fogged over its whole surface and developed "black." Then with a swab of cotton wool and a solution of "Farmer's reducer" the density can be reduced at one end until a graded density from transparent to full black is reached. After this the plate should be placed in fixer to clear any yellow colour, and washed and dried for use.—"American Cinematographer," July, 1934, p. 129.

**Over-run Bulbs for Interior Film Work.**—An anonymous writer contributes some useful practical comments on the art of "over-running" electric bulbs to get more light from them.

Bulbs of 100 watts capacity (half watt type) for 120 volts are recommended, since they last longer when over-run at 200 volts than those intended for 100 volts only. On no account should the higher voltage be put straight through them, but a sliding resistance must be inserted in series and gradually taken out of circuit when full light is needed. When they are treated gently in this way, a life of about 7-10 hours, according to the lamps in use, may be expected. When treated in this way they seldom blow out and shatter, though when used near to property and persons a sheet of glass or diffuser should certainly cover them to avoid the risks attached to flying glass. The circuit for the resistance is shown in the figure.



A fuse is very necessary in the same circuit, since the load is relatively heavy and it is better to blow a branch fuse than the house mains.

A second correspondent writes later to suggest that the large resistances as used for high-power projectors with variable wattage lamps may be used as a sliding resistance. If the peg which stops the travel of the sliding contact is removed, a very efficient sliding "dimmer" is produced. As these resistances work on 50 volts as a rule, one designed for a 200 watt bulb may be expected to pass a current of 4 amperes without over-heating. Since the bulbs take about twice normal current when running on double voltage, the number to be included in circuit safely can easily be reckoned.

The light emission from bulbs intended for use on 120 volts are used in this way on 200-220 volt mains is nothing short of astounding.—"I.A.C. Bulletin," March and April, 1934.

**Centring Titles in Small Titlers.**—K. E. Palmer suggests that two fine wires should be stretched across the back of a small titling frame, so that they cross in the exact centre. When the card is put into the frame, a light placed behind it will show through, and accurate centring of the words on the title is a simple matter.—"Movie Makers," Jan., 1934.

**Negative-Positive Development of 9.5 mm. Film.**—  
Colin Butement provides interesting data regarding develop-  
ment and printing of 9.5 mm. stock.

The following negative developer works well and is to be recommended :—

Metol	...	...	...	...	72 grains.
Crystalline Sodium sulphite	...	...	...	...	16 ounces.
Hydroquinone	...	...	...	...	140 grains.
Borax	...	...	...	...	72 grains.
Water to	...	...	...	...	80 ounces.

In this developer, the normal times at 65°F., will be :—

Gevaert Panthro super reversal or Pathé P.S.P. developed as negative	...	...	...	9 minutes.
Gevaert or Pathé ortho negative	...	...	...	5 minutes.

After development, fixing in the following solution is preferred :—

Hypo crystals	...	...	...	1 pound.
Potassium metabisulphite	...	...	...	2 ounces.
Warm water	...	...	...	80 ounces.

Cool, and use at 65° F.

The film after washing should be run through a chamouis leather that has been wrung out in water, or in weak hydrochloric acid (1 oz. strong acid in 100 oz. water), if the tap water is rich in calcium salts.

Printing may be undertaken either by a special machine or by an attachment to the projector, and before printing the negative should be dusted by running through a piece of clean velvet. Dullness on the back of the film should be removed by polishing with a leather dipped in methylated spirits.

The printed positive is developed in a solution composed as follows :—

Metol	...	...	...	...	30 grains.
Crystalline Sodium sulphite	...	...	...	...	5 ounces.
Hydroquinone	...	...	...	...	170 grains.
Sodium carbonate (crystal)	...	...	...	...	3½ ounces.
Potassium metabisulphite	...	...	...	...	45 grains.
Potassium iodide (1% solution)	...	...	...	...	100 minims.
Water to	...	...	...	...	80 ounces.

With a normally exposed print, the development will be complete in three minutes at 65°F., and the stock may then be fixed and washed as in the case of the negative.

When projecting, it must be remembered that a print will

face in the opposite direction to a film developed by direct reversal.—"Amateur Cine World," Sept., 1934, pp. 247-8.

**Maximum Depth of Focus.**—C. H. M. White quotes three formulæ for focussing purposes from which any camera user can derive figures for his own lenses.

Assuming that  $H$  is the figure for focussing distance on the lens which will give the greatest depth of focus with a particular lens and aperture, then—

$$H = \frac{F^2}{12 \times f \times C}$$

where  $F$  is the focal length of the lens in inches,  $f$  is the lens aperture, and  $C$  the circle of confusion, the last to be taken as  $1/1000$  of an inch.

When, for example, a 1 in. focal length lens is used at  $f/1.9$  the formula becomes—

$$H = \frac{1 \times 1}{12 \times 1.9 \times 1/1000} = 44 \text{ ft. approximately.}$$

Hence the lens must be focussed to 44 ft. on the scale round the mount in order to have as much as possible in focus.

On the other hand, if  $X$  is the distance marked on the focussing mount, the two distances for "nearest object in focus" ( $X^1$ ) and "farthest object in focus" ( $X^2$ ) can be found as follows—

$$X^1 = \frac{H \times X}{H + X} \quad \text{and} \quad X^2 = \frac{H \times X}{H - X}$$

When  $X$  is greater than  $H$ , the result for  $X^2$  is naturally infinity.

As numerical examples, suppose that  $H$  is 44 ft. (from the previous example) and  $X$ , the distance to which the lens is focussed, 10 ft. Then :

$$X^1 = \frac{44 \times 10}{44 + 10} = 8.14 \text{ ft.} \quad \text{and} \quad X^2 = \frac{44 \times 10}{44 - 10} = 13 \text{ ft.}$$

Thus when the lens of aperture  $f/1.9$  and focal length 1 in. is focussed for 10 ft., all objects between 8 ft. 2 ins. and 13 ft. will be, for all practical purposes, in focus.

From the two formulæ a series of tables for each lens aperture and focussing distance can easily be prepared and stuck down to the lid of the camera case.—"Personal Movies," Dec., 1933.

**Home-made Film Cement.**—The following formula for home-made film cement may be of interest to those who are dissatisfied with commercial products :—

Gelatine	...	...	4½ grs.	5 gms.
Glacial Acetic Acid	...	...	50 minims	50 c.c.
Water	...	...	10 minims	10 c.c.
Methyl Alcohol	...	...	5 fl. ozs.	500 c.c.
Acetone	...	...	5 fl. ozs.	500 c.c.

The English formula is in this case to be preferred, since the other makes up over a litre (35½ fluid ounces) of cement, and is likely to last for several years.—"Film fuer Alle," Feb., 1934.

**Mroz 9.5 mm. Colour Film.**—Details of the process devised by Herr Mroz for colour films on 9.5 mm. stock have recently been given. The principle is that of a two-colour filter revolving in front of the camera and projector lenses, so that alternate exposures are made through red and green gelatine.

It is a simple matter to adapt a 9.5 mm. camera to the process by building in a shaft to carry the revolving filter, and a normal panchromatic film is used. It is stated that when a super-sensitive stock is in question, an aperture of  $f/3.5$  is ample.

The processing is conducted just as in the case of black and white films, and either reversal or negative positive systems may be used equally well.



Fig. 1.



Fig. 2.

When the positive is obtained, however, it may either be shown in a special projector having a revolving double filter like the camera, or else alternative frames may be coloured with a special lacquer and a normal projector used. When a filter is used in front of the projection lens, the lack of blue in the light must be compensated for, and a filter with openings as in fig. 2 is generally necessary. (The camera filter is as in fig. 1, since no special correction of this sort is needed.)

The disadvantages of the system are that the film must run at double normal speed to get a non-flickering picture, and that



with rapidly-moving objects "fringing" colour bands are seen. Though the process is a two-colour one, the camera filter may be changed for different subjects, and thus a reasonably accurate colour reproduction is possible.—"Oesterr. Amateur-Filmer," March and April, 1934.

**Editing Bench for 16 mm. or 9.5 mm. Films.**—L. J. Hibbert, head of the photographic section of the Regent Street Polytechnic, has had made an ingenious editing bench which can be converted from 16 mm. to 9.5 mm. in a few seconds. The films are wound on discs instead of the more usual reels, and the two splicers are mounted one on each side of a swinging platform, so that either of them can be moved into position merely by pulling out a knob and turning the platform over.



A guide of rollers leads the film past a set of prisms, and a small lamp behind it shows an enlarged image of the film passing the rollers on a hooded screen, so that each frame of the film may be seen by the editor. The convenience of such a bench is a great help in film work, and the interchangeability of the rollers and splicer for each of the two film sizes makes it even more useful.—B.J., 1934, Nov. 2, p. 658.

**Titles on Positive Film.**—W. S. Bussey gives useful data for titling direct on positive film stock. As he remarks, the cheapness of positive film and the fact that it can be handled in an orange-yellow light are considerations not to be overlooked.

The title is made up with black letters on white card, which is reversed to a white letter and black background picture on development. This title may then be spliced into a reversal film with the emulsion on the same side of the film as in the shots.

White or very light grey card is specified for the background and a matt ink or paint used in lettering. (Red paint is just as black as black paint as far as positive film is concerned, and many red paints "cover" better than black ones.) If picture backgrounds are used, they should be *negatives* and not positives.

Two Photoflood bulbs, one on each side of the title board, and two feet from the card, will provide adequate light for full exposure at an aperture of  $f/4$ . When a fade is required, it is necessary to *open* the lens instead of closing it, in order to over-expose the film and make the title turn black when developed.—"Movie Makers," Feb., 1934.

**Processing Compensation in Reversal Stock.**—A recent patent is of interest in that it proposes to compensate for exposure errors on reversal stock by varying the time of development of the positive image.

A negative image is produced on the film after exposure by means of the normal negative developing bath. The process is stopped by washing, or by means of a stop-bath, and the negative image then dissolved out by means of a suitable reversing bath. An acid-bichromate bath is found to give the best results when under-exposure has occurred (this is a usual feature of multi-colour screen negatives), while for over-exposure the acid-permanganate bath is preferred.

Light of standard intensity is then passed through the negative image and focussed on to a photo-cell, which gives an appropriate reading corresponding to the average density of the remaining silver salts in the emulsion. This light should be non-actinic, but this is not essential. The film is then washed in sodium sulphite to remove the products of the bleaching bath, and the remaining sensitive material exposed to light. A suitable value is 10 seconds at half a metre from a 100-watt half-watt lamp, though this is purely an arbitrary judgment.

The second latent image is then developed for a time corresponding to the reading shown by the photo-cell, and then immediately fixed to remove all other sensitive material that remains undeveloped.

It is found that for the best results the film or plate used in this process should have approximately double the weight of silver salts normally provided on similar negatives used without reversal.

In the second development it is desirable to use a weak developer, of perhaps one-quarter strength, so that the time of development may be under accurate control. A hydroquinone-ammonia developer is specified for the first (negative) development, while the second (positive) development may be conducted with any suitable solution capable of the requisite dilution.—(Patent No. 414,157, of February 13, 1933, by T. T. Baker and Dufaycolour, Ltd.).—B.J., 1934, Aug. 31, p. 526.

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## COLOUR PHOTOGRAPHY.

**Portraits on Colour Plates.**—The desiderata for successful portraits on colour plates are set out by R. M. Fanstone, A.R.P.S. As he points out, when a sitter has a pleasant colour of hair and a good complexion, colour portraits will very often be ideal.

The lighting must be soft and flat, for any shadow on the face tends to black up and spoil the quality of the result. When out of doors, portraits may be taken in the shadow of the house, where plenty of diffused light is present. The same considerations regarding soft lighting apply also in the studio.

The choice of background is very important, as it may make or mar any colour portrait. The background should always harmonise with the other colours present, though it may with advantage be out of focus in some cases. For portraits of young people a light grey background is preferred, since it gives greater delicacy in the finished colour.

Strongly coloured objects near the face will cause colour distortion, and at times the deep blue of a dress may interfere with the face of the subject. In such cases, however, a deep

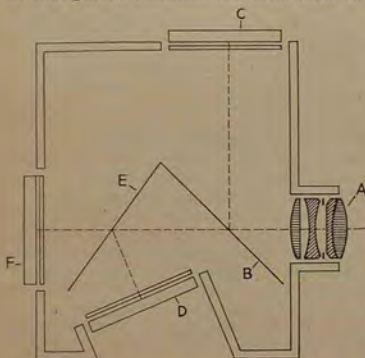
lens hood will remove the trouble, and the lens hood is always to be recommended.

Exposure must be on the full side, since the complexion is otherwise rendered a dirty grey colour, with no delicacy of tone.

Such colour portraits are best mounted with a wide black frame round them, which serves to isolate the picture and show the colours in their full brilliance. If this is not done the portrait will not show up to the best advantage.—B.J., "Colour Photography" Supplement, 1934, July, p. 28.

**New Single-Exposure Three-Colour Camera.**—A new three-colour camera in which collodion pellicles are used as transparent reflectors has been built to the design of Mr.

Klein for Messrs. Colour Photographs, Ltd.



In the figure, the lens A passes the incident light to the first pellicle mirror B, which reflects a portion to the plate C, and allows the remainder to pass to the second pellicle E. Here again a portion of the light is reflected to the plate D, the rest passing

through to the last plate F.

Plates of  $2\frac{1}{2} \times 3\frac{1}{2}$  ins. are used, in conjunction with colour separation filters directly in front of them. The body of the camera is rigid, and perfect registration is thus obtained.

A 7-in.  $f/4.5$  Dallmeyer lens in a Compur shutter is fitted to the camera, and exposures of  $1/100$  second are possible in winter sunshine.—B.J. "Colour Photography" Supplement, 1934, Mar., p. 11.

**Correct Rendering of Violet and Pure Blues.**—Discussing the correct rendering of certain colours by subtractive processes,

G. Geoghegan shows that the lack of truth when rendering violets, blues, and pure reds can be traced to the blue filter negative.

A blue filter which transmits the whole of the violet is particularly necessary for the correct rendering of pure blues and violets. This transmission is not given by the standard tricolour blue filter, and though the Wratten 35 filter will transmit the entire violet spectrum, it transmits also a little at the red end, which cannot be allowed with high-speed modern panchromatic plates and films.

The Wratten 47 filter, however, has no red end transmission, though a slight transmission in the green from 500 to 610 milli-microns, and if this is used with an "ordinary" emulsion (such as Fine Grain Ordinary) a great improvement in the rendering of the violets and blues will result.

This method would appear, however, to create difficulties later on, in that it might be rather difficult to control the gamma value of the developed negative to match the Red and Green filter negatives.—B.J., "Colour Photography" Supplement, 1934, Aug., p. 31.

**Intensification and Reduction of Colour Plates.**—A useful summary of after-treatment for faulty development and exposure on colour plates is given by R. M. Fanstone. As he remarks, some such after-treatment is necessary in nine cases out of ten when the process is in the hands of an average photographer.

Correct exposure and development are the two essentials. With under-exposure, there is no remedy except perhaps to use "Farmer's" reducer, which leaves the positive thinner, but the colours weak. A similar "black" result occurs with under-development, but in this case shadow detail will be present, and after slight reduction with "Farmer's," the plate may be intensified.

For intensification, the Agfa one-solution mercury intensifier is very effective on plates and films of the same make. Another very satisfactory formula used by the writer for some years is the following:—

BLEACHER.

Perchloride of Mercury	...	45 grs.	0.5 gm.
Common salt	...	90 grs.	1.0 gm.
Water	...	20 fl. oz.	100 c.c.

DARKENER.

Sodium sulphite (cryst.)	...	1 oz.	5 gm.
Water	...	20 fl. oz.	100 c.c.

If desired the positive can be darkened in a 1 per cent. solution of ammonia. This gives a black image and intense colour, which is at times very useful.

The chromium intensifier is also very satisfactory, and has the advantage that the process may be repeated if the first intensification is insufficient. The pyro-silver intensifier, as sold in made-up "Tabloid" form by Burroughs Wellcome, is also suitable. After this treatment the positive has to be fixed in hypo solution, so that when pyro silver is used the second development must be complete, and development in strong light, with fresh developer, for not less than three minutes, is essential.

Intensification should be done after the second development and before the plate or film is dried. Two minutes' washing in gently running water is necessary between the processes, which will remove most of the developer remaining in the emulsion. Slight reduction with Farmer's reducer may then follow, with a further brief but efficient wash before intensification.

In the case of under-development, this reduction is essential, and the best subsequent intensifier is the pyro-silver solution. Chemical cleanliness with the pyro-silver solution is necessary, and when the colours are judged to be sufficiently intensified, the plate or film is given a short wash and fixed out. The fixing bath will remove any high-light stain and leave the colours clear and transparent.

With the chromium intensifier it is necessary to work in weak light when bleaching, and a strong light when re-developing, and while the bleaching is very quick, development must take at least two minutes.

When properly intensified, the results are permanent. Plates intensified in 1919 are now just as good as they were originally.—B.J., "Colour Photography" Supplement, May, 1934, pp. 17-8.

**Three-Colour Pictures with Bi-Pack.**—A recent patent of the German Dye Trust (No. 395,124 of May 2, 1931) obtains three-colour results with all the simplicity and convenience of a two-colour process.

A bi-pack is used in conjunction with a lenticulated film for the front component, and a colour filter is placed on the camera lens. Positives can be produced from the negatives by any of the known processes.

The filter on the lens is composed of two sections, one of which transmits a single colour separation component, the

other transmitting the remaining two. Thus, one half of the filter might be blue-purple, transmitting only the blue component, while the other would in this case be light yellow, transmitting green and red components.

The emulsion on the lenticulated front film is arranged to be sensitive to two components of the three, while the back emulsion (naturally in contact with the front one) is sensitive to the third. When the blue record is to be recorded on the front film, a dye filter must naturally be placed between it and the back emulsion.

Supposing the front emulsion to be sensitive to green and blue, the two-section filter will produce (through the lenticulated screen) green and blue areas, while the red component, passing through the dye filter, will record on the back emulsion which is red-sensitive. This produces a red component negative which is screened (for there is no record under the blue-component image) but by suitable variations of the process, the red component may be recorded as a uniform unscreened negative.—B.J., "Colour Photography" Supplement, 1933, Dec., pp. 45-6.

#### Bi-Pack Colour Transparencies with Miniature Cameras.—

—The Du Pont Company has put on the market in U.S.A. a bi-pack film suitable for use in the Leica, Contax, and other miniature cameras.

The two films are loaded into the camera with the emulsions facing each other, the one nearer the lens being sensitive to blue and green alone, and carrying a filter dye passing orange and red, while the back emulsion is a normal panchromatic one. Only half the normal film length can be put in the magazine, and at the moment no daylight loading chargers are available. The film is naturally rolled on to the spool as tightly as possible to have the maximum number of exposures in the camera.

The films used are matched for stretch, so that they fit the sprockets of the camera without "jumping," and it is found that the pressure plates of miniature cameras will pass the double film without any trouble.

Only a very slight increase of exposure is needed, which is a valuable feature of the process, and when an excess of blue is present the Wratten K1 or K2 filters may be used without throwing the colours seriously out of balance. An accentuation of greens and darkening of blues is all that is noticed.

The lens should theoretically be set back 0.006 in. to give correct focus, but in practice this is so small that it can be neglected.

After exposure, the films may be pinned together and developed in a Correx (or similar) tank with any fine-grain developer. Washing and fixing are similar to the normal black and white process. The orange dye on the front film is removed by bathing until the colour has vanished in a  $\frac{1}{2}$ -3 per cent. solution of Sodium hydrosulphite, and the two hung up to dry. (Note that this solution does not keep, and must be made up fresh each time of use.)

The positive transparencies from the two negatives should be marked to show whether they are red positive (from blue-green negative) or blue-green positive (from red-orange negative), in order that mistakes are avoided. Both positives are developed and fixed in the normal way, and are toned subsequently as below:—

## RED TONING BATH.

Potassium Oxalate...	...	24 grs.	2.7 gms.
Uranium nitrate ...	...	65 grs.	7.4 gms.
Potassium ferricyanide ...	...	20 grs.	2.3 gms.
Hydrochloric acid ...	...	25 minims.	2.5 c.c.
Water ...	...	20 oz. (fl.)	1,000 c.c.

Owing to occasional variations in tone, some workers prefer the alternative dye toning formula:—

A. Potassium ferricyanide	...	...	10 grs.
Water ...	...	...	10 ozs.
B. Chromic acid ...	...	...	10 grs.
Water ...	...	...	10 ozs.

The positive transparency for this bath should be developed in dilute developer to produce a thin soft image. Fix and wash thoroughly, then bleach in the two solutions (A) and (B) mixed. Wash 2-3 minutes only, then dye up by immersion in a solution of either Auramine, or Pheno-Safranine to which a little Auramine has been added to make an orange-red shade. Wash again to discharge all unmordanted dye.

The red negative print is then toned to blue-green in the following bath:—

## GREEN-BLUE TONING BATH.

Iron and Ammonium Oxalate	120 grs.	14 gms.
Hydrochloric acid ...	...	50 minims. 5 c.c.
Potassium Ferricyanide ...	45 grs.	5 gms.
Water ...	...	20 ozs. 1,000 c.c.

In about 10 minutes this bath tones the image to the correct colour, and it can be fixed, washed and dried as usual.

The positives are bound up together in correct register



between glass in the usual manner of lantern slides, and masks can be obtained measuring  $1 \times 1\frac{1}{2}$  ins. which will "black out" blank areas and perforations.

The entire process is stated to be simple, practical, and remarkably satisfactory.—B.J., "Colour Photography" Supplement, 1934, Jan., pp. 2-3.

**The "Irix" Colour Process**—During the last few months this new colour process has been introduced into this country, and as certain novel features seem to be incorporated in the working, we give a short description below.

The process falls into various sections, as follows:—

1. Three separate negatives are produced behind the usual filters. For moving objects any of the existing three-colour cameras may be used, which are already obtainable. After studying the existing cameras, the inventors have constructed a special optical trisector, which allows the three negatives to be placed in one line. In this way the camera constructed requires a small compass and compares well with the usual snap-shot cameras. With this new camera and the aid of higher sensitized fine-grained negative material, exposures up to one-sixtieth of a second can be made. For cinema purposes a three-colour filter camera with trisector may be used to avoid parallax.

2. The part negatives are now copied on printing matrices which result in so-called "washed-out reliefs."

The "washed-out reliefs" are produced in a similar manner to the Jos-Pé-Process or by normal development through "bromide bleaching agents" and washed. As, however, in the processes so far known the production of "washed-out reliefs" has presented many difficulties, the inventors have simplified the new process by adopting a special emulsion of sensitivity 8 to 9 degrees Scheiner in such a way that after developing, the washing can take place in water of any temperature between 30 and 80 degrees C., without affecting in any way the colour-tone-values of the matrix. One therefore obtains "washed-out reliefs," which in the gradation corresponds perfectly to the original.

3. The further process is obvious. The printing matrices are dyed in colours provided and transferred upon the print medium, which is a glass-clean gelatine layer on a celluloid film, or paper, etc.

The main feature of the new process consists in the nature of the dyes used. The dyes have not hitherto been used in photography, and are neither acid nor basic. These dyes produce a perfectly harmonized, very quick transfer upon

the picture carrier without any bleeding or spoiling of the perfect whites. The transfer time is less than 5 seconds, and this will probably shortly be further reduced. The dye is conveyed completely upon the picture carrier, the matrix being entirely free of dye after transfer, and as the matrix can only take up a certain limited quantity of dye, the process is absolutely foolproof and simple. The gelatine layer of the picture carrier is specially prepared to ensure a perfect adhesion of the colours.

Any of the dyes so transferred may be reduced gradually to elimination-point without in any way affecting the other colours already transferred thereon, by using one of the three correcting solutions provided.

A short calculation of production possibilities for cinematographic purposes is given by the inventors:

"For the colour transfer on to about 6-ft. film (about 100 pictures) say 5 seconds are required, therefore in one hour about 4,500 ft. may be completed. No drying in between the transfer of each dye is required, so that the time of production given represents the complete work required. If, therefore, three transfer machines are used about 30,000 ft. of colour films can be produced in a working day. No special cost will be incurred in providing new machinery, etc.

"It must be emphasized that, contrary to the present additive three-colour system, in which the colour synthesis was produced by optical delusion, with consequent flickering, the colour film produced by the new process is entirely free of any flickering. Compared with other well-known methods, upon identical conditions of enlargement and projection, the Irix colour film is by far superior through the absolutely correct reproduction of the colours, perfect transparency and sharpness, which latter reaches the standard of the ordinary black and white film, as the image is likewise produced on one thin gelatine layer, while the other well-known methods require two layers of gelatine, *i.e.*, one in each side of the film."

Coloured images can be transferred upon specially prepared paper as well as on to films. To ensure proper fitting of each matrix for correct transfer a special apparatus is available. In the event of large quantities of prints being required, several series of printing matrices are simply produced and these may then be transferred by the use of suitably constructed mechanical devices.

The inventors of the process are Ing. Richard Gschopf and Chem. Karl Pokorny, both of Vienna.

**Screens of Sensitised Emulsions for Colour Work.**—The difficulty of making screen plates or films in which the emulsion itself forms the screen elements is emphasised in a patent (No. 397,489 of Feb. 17, 1931) of G. Von Gerdanovits.

One of the chief troubles is that the selectivity of the three component emulsions used for coating the base is not sufficiently pronounced, and when printed there is a certain dulness of colour, and also perhaps a reddish-brown overall tint in the result.

To obtain satisfactory filter action the colours in the emulsion elements must be very intense, and it is necessary to have the blue elements very much more sensitive than the green and red elements. This last fact makes it possible to print the blue elements without affecting the red or green ones, on account of their comparative insensitivity. On the other hand, the red and green elements may be printed subsequently in lights of their own colour, without affecting the blue elements.

The colours carried in the emulsion may be of the "lake" class of dyes, which are easily pulverised very finely, and do not dissolve in the emulsion or affect it chemically.

When coating, it may be necessary to use stiffeners in the emulsion, and dextrine, sugar, albumen and gum arabic are specially mentioned as suitable. A protective dye of yellow colour (subsequently removed by washing in the usual way) may also be applied to the green and red components with advantage.

The colouring of the screen elements must be done with extremely fast dyes, the normal basic and alcohol-soluble dyes being insufficiently fast for the purpose. Indanthrene or other vat dyes may be used, and the after-treatment and fixing of such dyes may be done after printing.

As an example, the red emulsion elements may be dyed with Indigol scarlet HB, the green with Indigol green AB, and the blue with O4B Indigol. Fixing is achieved by the addition of sodium nitrate to the dye, and subsequent treatment with sulphuric acid in the normal manner.

Accuracy of the printing rollers is essential, and they should be locked in position when once set correctly. It is noteworthy that in the case of coloured cine films the helical printing lines are advantageous, as it is possible with them to arrange that lines corresponding with one colour in a certain frame are coincident in position on the projection screen with a line of another colour in the next frame.—B.J., "Colour Photography" Supplement, 1933, Dec., pp. 46-7.



## FOR STILL PHOTOGRAPHY.

*(Cine Requisites see page 322.)*

### ROLLEICORD TWIN-LENS ROLL-FILM REFLEX CAMERA.

(Sold by R. F. Hunter, Ltd., 51, Gray's Inn Road, London, W.C. 1.)

This excellent little camera is modelled on the famous Rolleiflex, with certain simplifications, so that it can be sold at the price of £10 10s., a figure which brings it within the purchasing power of a new and larger class of users who have looked with envy on the possessors of the Rolleiflex. Although the Rolleicord has not automatic wind of the film nor one or two other features of the Rolleiflex, it is, nevertheless, a first-rate little instrument of most attractive design and efficient performance.



The taking lens is an  $f/4.5$  Tessar of 3 ins. focus, giving excellent definition over the  $2\frac{1}{4} \times 2\frac{1}{4}$  ins. film. The finder-lens is a Heidoscope, giving a very bright image on the focussing screen. Focussing is done by a milled disc on the right-hand side of the camera, which is also fitted with a focussing scale showing distances up to 0.8 metre (less than 3 ft.). The hood of the upper "camera" erects itself on being released, and is fitted with a magnifier which is brought into operation simply by lifting up a spring-held plate (carrying the magnifier) on the back of the hood, and turning it over the top of the

hood, where it engages by a catch. The magnifier can be put into position in a second. The front of the hood can also be turned

back to serve as a direct-vision finder when using the camera at eye level. This convenient and efficient design of the hood is on a par with that of other parts of the camera.

The Compur shutter, for example, is arranged so that the one lever serves for both setting and releasing it. When holding the camera, you press the lever to the right to set it, and to the left to release it. The shutter gives exposures up to 1-300th sec. in addition to bulb and time, and carries the iris diaphragm of the lens, which can be closed down as far as  $f/32$ . The single release of a metal cap unlocks the cover of the back of the camera, disclosing the film chambers. Of these the upper one, carrying the take-up spool, is fitted with a little rod and milled disc which actuates an exposure counter placed on the left-hand side of the camera and arranged so that the numbers 1, 2, 3, and so on, up to 12 successively come into view as the film is wound on after each exposure. When No. 12 shows, one pushes a little catch-button, and the film indicator then automatically returns to No. 1.

The design of the camera allows of the two lenses being placed with the minimum of separation, so that effect due to difference of view-point is reduced to the minimum. Such effect is always a minor matter, except when taking subjects at very close quarters, and in regard to these the makers have provided compensation, so that the amount of subject seen on the ground-glass is actually obtained on the film. With these many excellent features the Rolleicord should have no difficulty in making innumerable friends for itself on account of its very moderate price and the low cost of film, 12 exposures being obtained on the popular 8-exposure  $3\frac{1}{2} \times 2\frac{1}{2}$  film. The camera can be obtained in a leather case of a special design, which allows of the case remaining attached to the camera when the latter is in use. The price of this case is £1.

### "TABLOID" FINE-GRAIN DEVELOPER.

(Sold by Burroughs Wellcome & Co., 12, Snow Hill Buildings, London, E.C. 1.)

We have made a lengthy test (including microscopic examination of grain) with this new developer, and can recommend it for fine-grain work without reservation. The carton contains sufficient "tabloids" for 30 ozs. of normal strength developer, or double this quantity of tank developer, and although development is (as is usual for fine-grain developers) rather longer than that with an ordinary metol-hydroquinone solution, the developed negatives are extremely clean, and of quite adequate density and contrast.

The "tabloids" are merely dissolved in plain water to give the developing solution, though the makers recommend that when extremely fine grain is desired, it is advantageous to replace part of the water with a 20 per cent. solution of anhydrous sodium sulphite. The claim that the normal water-solution developer gives fine enough grain for enlargements of some ten diameters would seem to be substantiated in our experiments.

Time and temperature tables, as also factors for visual development, are printed on the instructions, and it is quite simple to get

consistent contrast in the developed work. It should further be emphasised that no exposure increase is necessary when using the developer.

### THE "LABORA" ROLL-FILM DEVELOPING TANK.

(Sold by Garner & Jones, Polebrook House, Golden Square, London, W. 1.)

The "Labora" tank is yet another of the developing tanks for roll-film which are loaded in the dark-room, and can thereafter be taken into a lighted room. The film is wound on to the central reel under an apron, made of embossed celluloids of the apron hold the the film in a spiral.



Apertures are provided for pouring in and out the various developing and fixing solutions, and the lid of the tank locks in position when placed on the body proper. The "Labora" tank is made in several sizes, according to the film to be developed, and costs for films  $1 \times 1\frac{1}{2}$  ins. (Contax, Leica, etc.) 25/-, while special models for V.P. ( $4\frac{1}{2} \times 6$  cm.) and  $2\frac{1}{2} \times 3\frac{1}{2}$  ins. of roll film are available at the same price. Spare reels and aprons cost 8/- and 7/- each respectively.

### SELO HYPERSENSITIVE ROLL-FILMS.

(Sold by Ilford Limited, Ilford, London.)

Users of roll-film will be pleased that the hypersensitive emulsion is now available in roll-film form. The Hypersensitive roll-film is stated by the makers to be rather slower than the corresponding plate, but anyone who has a lens aperture of  $f/3.5$  and a shutter giving a tenth of a second should be able to take useful snapshots at night under conditions of good illumination. With  $f/2.9$ , really good results may be expected under similar conditions. The film develops slowly, and grain when enlarging to ten diameters is rather noticeable on glossy prints. From the very high speed of the emulsion, however, this is only to be expected.

**D. & P. AMIDOL DEVELOPER.**

(Sold by Johnson &amp; Sons, Ltd., Hendon, London, N.W. 4.)

This developer has been put on the market for those who must have amidol as a developer, yet hesitate to make up large quantities of solution for fear they "go off" and oxidise before they can be used. The components other than the amidol are made up as a stock solution in one gallon of water, and when the diluted solution is required, amidol in powder is added according to the volume necessary. This makes it possible to have a fresh supply every day, or every other day, as occasion may demand, and there is no risk of the made-up solution deteriorating before it can be used. The tin supplied makes up 5 gallons of working solution. In use the developer gives on bromide prints the blue-black tone characteristic of amidol.

**THE "MIDGET" CAMERA.**

(Sold by Ensign, Ltd., 88/89, High Holborn, London, W.C. 1.)

This little camera for taking pictures about  $1\frac{1}{2} \times 1\frac{1}{2}$  ins. ( $44 \times 35$  mm.) size is the acme of portability, for it measures a shade more than  $3\frac{1}{2}$  ins. in length, only  $1\frac{1}{4}$  ins. in width, and



slightly less than  $\frac{1}{2}$  in. in thickness. It is emphatically a camera that can be carried in a man's waistcoat pocket or in a woman's small hand-bag without making its presence uncomfortably felt. And, as we have proved to our own satisfaction, it takes good, sharp pictures. We exposed two of the tiny spools of Ensign Lukos film (6 exposures), and got a dozen negatives, all of which are of good sharpness. There can be no doubt that the camera will sell on sight,

because of its minimum size and natty appearance. A girl will call it "sweet," and will want to be given one. And the purchaser who knows next to nothing of cameras, yet expects great things from them, will not be disappointed with the results.

From a part only of two of our negatives, namely, a part measuring only about 1 in. by  $\frac{3}{4}$  in., we have  $10 \times 8$ -in. enlargements, which are of a reasonable degree of sharpness. This is a degree of magnification very much greater than most people will want. Probably the majority of users of a camera like this are satisfied with a  $5 \times 4$ -in. print, or something smaller, which is all to the good as regards the crispness of the definition in the enlargement.

The design of the camera follows more or less standard lines, inasmuch as the lens front is very rigidly supported on two pairs of spring struts in the manner of the professional Press camera. A brilliant finder is neatly mounted on the back of the lens front and can be used for both upright and oblong pictures. There is also a direct-vision finder for use at the eye-level. The spool holders are mounted each on a pair of side struts, which also carry

the film roller guides. The arrangement allows of the holder being turned out and up of convenient insertion of the spool. The winding key pulls up out of the way to allow of this being done in the case of the take-up spool. From the point of view of ease in loading, the camera can give points to others at a much greater price.

The Midget is made in two models, one at the price of 30s., with "all-distance" lens, and the other at 50s., with  $f/6.3$  anastigmat in mount, which allows of focussing from infinity to 3 ft. The shutter gives the speeds of 1-25, 1-50, and 1-100 sec. in addition to time and bulb.

### KODAK HOME ENLARGER.

(Sold by Kodak, Ltd., Kingsway, London, W.C. 2.)

The encouragement which has recently been given to the elementary amateur to do his own development and printing will be assisted by the Kodak Home Enlarger, which has just been introduced.



This is an extremely light and small enlarger which folds up into a small compass when not in use. The enlarging lantern, baseboard, and easel are in one unit, the enlarger itself sliding in a groove in the baseboard. The board is kept tilted slightly downwards by means of a peg, the easel remaining vertical. The lantern throws a horizontal beam, and, although it moves uphill when moved back, the only effect is that the centre of the picture rises higher on the easel. The

easel will take paper up to  $14 \times 11$  ins., and the maximum enlargement is about four diameters. The enlarging lantern is of the diffuser type, and takes an ordinary 60-watt electric bulb. The objective lens is a Kodar, with an aperture of about  $f/8$ . In order to assist in focussing the picture, a small circle of ground-glass is inserted in the centre of the easel, by means of which the negative can be focussed by watching the image through the ground glass. Sliding metal clips on the easel enable the paper to be fixed without recourse to pins. Altogether everything has been done to present an instrument which the amateur will find easy to use. We may perhaps add that, although there is no provision for the purpose, the instrument could easily be hung vertically. The price complete, without electric lamp is £5 12s. 6d.



## THE "SYNCHROFLASH" AUTOMATIC FLASHLAMP.

(Sold by W. Heaton, Ltd., 119, New Bond Street, London, W. 1.)

This electric flashlamp is intended for use with either everset shutters of the "Vario," "Derval," or "Kodak" type, or for the "Compur" shutter in a separate model. The apparatus comprises a small adapter for the screw-in socket for the shutter cable, a flexible cable leading to the battery and flash-pan, and a pilot lamp, the last in a special socket. The pressing of the flexible cable release, which screws into the shutter-adapter, makes contact and fires the flash at the same time as opening the shutter. The odd pilot lamp is convenient to check the synchronism of the device, as it may be held in front of the shutter and the release pressed. Providing



that the bulb is seen lighted through the shutter, the flash and shutter naturally operate at the same moment. When the pan for the flash-powder is unscrewed from its socket, the latter may be used equally well for the ignition of flash-bulbs, so that the apparatus serves a double purpose. The shutter may be set at any speed up to 1/50th of a second, which is often very convenient where other lighting is present. The entire set of parts costs £1 10s., and includes a dry battery of large capacity, while a tripod-head to hold the lamp may be had at 3s. 6d. extra.

## SELO FINE-GRAIN PANCHROMATIC ROLL-FILM.

(Sold by Ilford Limited, Ilford, London.)

This recent addition to the range of Selo roll-films is of considerable interest. The Fine-Grain Panchromatic film is of normal speed, and excellent colour sensitivity, so that it will be particularly interesting for holiday-makers and landscape workers. Under test, when both negative and print were forced, an enlargement of ten diameters showed very little grain on a glossy paper, while fifteen diameters showed grain which was practically removed by using a rough-surfaced paper. Developer in the test was Metolborax, as given in the formula section of the present ALMANAC.

### AGFA SPEEDEX CAMERA WITH F/4.5 APOTAR LENS AND COMPUR SHUTTER.

(Sold by Agfa Photo, Ltd., 1/4, Lawrence Street, High Street, London, W.C. 2.)

Considering the mass of the lens and Compur shutter on this camera, the makers have managed to keep its dimensions within surprisingly small limits. The size of film taken is  $3\frac{1}{4} \times 2\frac{1}{4}$  ins.,



and the camera measures overall  $1\frac{1}{2} \times 3\frac{1}{2} \times 6\frac{1}{2}$  ins. Although of the now common "self-erecting" variety, the Speedex has a novel release-button for re-folding, which releases the struts and removes the possibility of their bending under the thumbs of the over-zealous amateur. Direct vision and brilliant finders are provided, and the Compur shutter is speeded to  $1/250$ th of a second, delayed action for self-portraits also being provided.

The lens is the "Apotar," with aperture  $f/4.5$  and focal length 10.5 cm. ( $4\frac{1}{4}$  ins.). A practical test showed that excellent definition was given at full aperture, and that the distances engraved on the focussing jacket of the lens were sufficiently accurate for even the most exacting work. The figures for distance are engraved very large, and have thus the advantage of being properly read, even in a dull light.

Finished in chromium and dull, black leather, the Speedex will appeal both on account of its technical efficiency and its pleasant appearance, and at the low price of six guineas it will certainly be popular in all quarters.

### THE "PERFECT" ROLL-FILM DEVELOPING TANK.

(Sold by the Westminster Photographic Exchange, Ltd., 119, Victoria Street, London, S.W.)

This roll-film developing tank has the advantage that it can be altered to suit any width of film from miniature 35 mm. to  $2\frac{1}{4}$  ins. The two spirals may be screwed nearer or farther from each other by a simple thread, and a lock-ring holds the moving one in position during development. Loading is done in the dark room, where the free end of the film is fed into the two spirals, and runs in of its own accord when pushed. The lid of the tank is then shut, and developer poured in. Agitation during development is arranged by inserting an



ebonite rod into the filling funnel, when two projections on its end engage in slots on the reel, the latter thus turning as required. The price of the complete tank is £1 5s. 0d.

**SUPER IKONTA ROLL-FILM CAMERA 530.**

(Sold by Zeiss Ikon, Ltd., Mortimer House, Mortimer Street, London, W. 1.)

This new model of the wonderful Super Ikonta camera is for taking 16 pictures of  $2\frac{1}{4} \times 1\frac{1}{4}$  ins. size on the  $3\frac{1}{4} \times 2\frac{1}{4}$  spool. In this model the user combines greater portability of the camera, economy in the cost of film and the production of a smaller picture. Inasmuch as critical focus is obtained by use of the range-finder, which is coupled to the camera lens, the smaller size cannot be considered a drawback. On the contrary, a  $2\frac{1}{4} \times 1\frac{1}{4}$  ins. negative, taken with a camera of the precision of the Super Ikonta, may be regarded as ideal—large enough for contact prints and also yielding sharp pictures in the shape of enlargements to almost any size. The 530 Super Ikonta is fitted with  $f/3.5$  Zeiss Tessar of  $2\frac{1}{2}$  ins. focal length, mounted in Compur



shutter working up to  $1/300$  sec. In addition to this automatic focussing by range-finder, the camera embodies the Zeiss Ikon two-point setting of lens focus and diaphragm aperture for best general definition. The direct-vision finder shows an exceedingly clear picture of the subject, and throughout, the mechanical workmanship is of the highest description. In short, the makers have been most successful in providing a highly pocketable camera, taking the universal  $3\frac{1}{4} \times 2\frac{1}{4}$  spool, of ultra simplicity in manipulation, yet yielding negatives of extreme sharpness, thanks to the most efficient and scientific means of focussing. Even now we find we have omitted to mention the self-erecting feature of the camera. On pressing a button the lens front automatically comes out and needs only a touch (if that) to set it in place for use, whilst the finder also opens itself. With so many merits, the 530 Super Ikonta is not excessively priced at £16 12s. 6d.

**ILFORD LINE FILM.**

(Sold by Ilford Limited, Ilford, London.)

This new film is for the copying of line originals and makes it the easiest matter to obtain negatives of the extreme opacity of ground coupled with perfect clearness of the lines which is given by the wet-collodion plate. While it is especially designed for photo-litho line work, it is a most useful material for the various jobs of line copying which photographers require to undertake from time to time. The beautiful black-and-white negative which it yields in about 2 minutes' development with hydroquinone made up with caustic potash must be seen to be believed. A slight reduction with the Farmer's solution may be needed to obtain perfect clearness of the lines, but, nevertheless, the production of negatives from line diagrams and similar originals becomes the most easy and rapid operation when using this film.

Moreover, the "resolution," otherwise sharp rendering of the

finest lines, is excellent, due, no doubt, to the coloured backing of the film as well as to the fine grain of the emulsion. The backing disappears completely as the films are fixed. The Line films are made in two thicknesses of celluloid, namely  $7\frac{1}{2}/1,000$ ths of an inch and  $3/1,000$ ths of an inch, the latter, judging by touch, being slightly thinner than ordinary roll-film. Negatives on the thinner film may thus be printed from either side without loss of sharpness, a feature which is frequently of value when making negatives or transparencies which are reversed as regards right and left. The ease with which the negatives may be cut with a trimming-knife or pair of scissors renders them especially convenient for various types of composite negative making, such as the insertion of titles or letterpress in a negative of a full-tone subject. Commercial photographers will undoubtedly appreciate the power which the films place in their hands in this respect, and on many occasions will equally experience the convenience of a sensitive material which can be cut to the size required for a particular job.

### KODAK "RETINA" CAMERA.

(Sold by Kodak, Ltd., Kingsway, London, W.C. 2.)

This camera, a product of Kodak's German factory, represents a new departure in the activities of the firm. The pictures it takes are the "miniature" size,  $24 \times 36$  mm. ( $1 \times 1\frac{1}{4}$  ins. approximately), and the special daylight-loading spool provides 36 exposures without re-loading.



The film does not move over sprockets in the camera, but one of the perforations on the 35 mm. film used engages a sprocket wheel which registers the moving on of the film in winding, and stops the winding knob turning when the next picture is correctly framed in the film aperture. Re-setting the camera for further winding after exposure

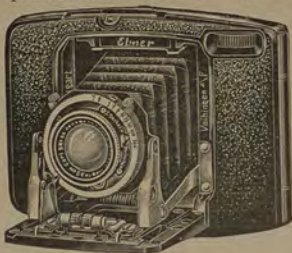
automatically moves on the exposure counter (which can be pre-set to any desired number) to the next higher figure. To load the camera the spool is inserted, and the loose end of the film inserted in the empty spool. The slack is then taken up and the camera closed, when a further winding-on places a section of unexposed film in position for exposure. No guide rollers are used, the edge of the spool serving this purpose, and after exposure of the entire film it must be rewound into the original daylight spool before the camera is opened. The back of the camera opens for loading, and is held by a particularly neat catch, which avoids any question of accidental opening. The lens and shutter equipment of the camera are of the highest class. A Schneider "Xenar" lens of full aperture  $f/3.5$  and focal length 5 cm. (2 ins.) is fitted, while the shutter is

the well-known Compur, giving exposures from 1 second to 1/300th, as well as bulb and time. Focussing is arranged by helical threads on the lens mount, and a feature of special convenience to users of the camera is that duplicate scales for aperture and focal distances are engraved on the sides of the shutter casing, so that they may be seen either with the camera horizontal or longitudinal. To avoid confusion with the "marks" for the settings, one scale for each adjustment is red and the other bare metal. A depth of focus table is also fitted. The shutter is not only released by the usual Compur lever, but is also provided with a piston release, so that whatever the position in which the camera is held, one or other of the shutter releases falls naturally in a convenient position. The optical equipment is completed by a direct-vision view-finder of the optical type, and the lens board opens and shuts sweetly and accurately. At the price of £10 10s. the camera should find a ready sale among those who require an efficient "miniature" instrument at a low price.

### THE EBNER CAMERA FOR 16 PICTURES ON 1½ × 2½ ROLL-FILM.

(Sold by R. F. Hunter, Ltd., 51, Gray's Inn Road, London, W.C. 1.)

The Ebner camera, which has been the subject of much comment on account of its unusual design and finish, is now available for 16 pictures on the usual 2½ × 3½ roll-film. While the general style



and outward appearance of the larger model has been retained, the lens-board is placed vertically across the camera instead of longitudinally, the lens springing automatically into position when the camera is opened. A neat catch for the front avoids any necessity to press the struts when closing the camera, and prevents any possibility of bending them.

The lens is placed in a helical mount for focussing, and all scales, whether for shutter time, focussing distance, or

lens aperture, are easily visible from the top of the camera.

The excellent appearance of the camera, and its novel construction in moulded Bakelite, will be points of interest to those contemplating a camera of this size and type, while the camera is of comfortable size to be slipped into the coat pocket.

Three models are available: No. 304, with a Meyer Trioplan lens of aperture  $f/4.5$  in delayed-action Pronto shutter, selling at £6; No. 307, with Meyer Trioplan  $f/3.5$  and Compur shutter, at £10 15s.; and No. 308, with Zeiss Tessar  $f/3.8$  and Compur shutter, at £12 17s. 6d.

**NEW LENSES ON THE MINI-FEX CAMERA.**

(Sold by R. E. Schneider, 189, The Grove, London, W. 6.)

While the specification of the Mini-fex camera has not been altered, a new range of lenses are now available. The camera with an  $f/3.5$  lens in Vario shutter costs £4 16s. 0d., while with an Astar (Astro make) lens of the same aperture in Compur shutter the price is £8 15s. 0d. A Tachar lens, also of Astro make, and full aperture  $f/1.8$ , can also be supplied fitted in the Compur shutter, the camera then costing £19 5s. 0d.

**LEICA 250 CAMERA.**

(Sold by E. Leitz, 20, Mortimer Street, London, W. 1.)

In view of the fact that certain types of work demand a large number of exposures without re-loading, Messrs. Leitz have introduced the "250" model Leica, which takes 250 photographs without re-loading. Large film chambers and the extra size and weight of the camera are the main changes from the ordinary models, and since it is inconvenient to rewind back into the original "cassette" the whole of 33 ft. of film, two light-tight spools are provided. The camera has the excellent finish that is characteristic of all Messrs. Leitz's products, and their ingenuity in arranging to house 33 ft. of film without unduly enlarging the instrument is itself remarkable. The price of the "250" Leica with 2 in.  $f/3.5$  Elmar lens is £44 16s. 6d.

**CRITERION "700" AND "700 ISO" PLATES.**

(Sold by Criterion, Ltd., Stechford, Warwickshire.)

Messrs. Criterion have brought their range of material up to date by introducing these two plates, the "700" and "700 ISO." Under test the plates showed that their speed was fully up to expectations, and though the samples submitted were unbacked, their cleanness of working was beyond question. They can therefore be used for all purposes where a plate of this type would be suitable without fear of non-success.

**PANATOMIC FILM-PACKS.**

(Sold by Kodak, Ltd., Kingsway, London, W.C. 2.)

Those who require a considerable degree of enlargement from their negatives will be glad to learn that the Panatomic emulsion is now available in the form of film-packs, of the sizes  $3\frac{1}{2} \times 2\frac{1}{4}$  ins.,  $\frac{1}{4}$ -plate,  $5 \times 4$  ins.,  $4\frac{3}{4} \times 3\frac{3}{4}$  ins. ( $12 \times 9$  cms.), the prices being 4s., 6s. 3d., 7s. 6d., and 7s. 3d. It will be recalled that the Panatomic film is panchromatic, with a considerable sensitiveness to the red

end of the spectrum, and having a speed similar to that of the Verichrome film. Its particular characteristic is the very fine grain of the image.

### THE SINCLAIR FILM-PACK ADAPTER.

(Sold by J. A. Sinclair & Co., Ltd., 3, Whitehall, London, S.W. 1.)

Messrs. Sinclair, who have found from time to time that trouble was experienced in fogging of film-packs due to pressure on the velvet when tearing off the strip of black paper, have devised a new and improved film-pack adapter to remove the trouble. Instead of tearing the paper against the metal edge of the film-pack, the adapter has a special metal strip—velvet coated—pressing down the black paper tabs firmly. When a tab has been pulled out, it may be torn off against this metal edge, and the velvet light-trap of the film-pack is unaffected by the pull necessary to shear the paper. Prices of this adapter for various registers and sizes may be had by application to Messrs. Sinclair.

### ILFORD THIN-FILM HALF-TONE PANCHROMATIC PLATES.

(Sold by Ilford, Limited, Ilford, London.)

A new plate of special interest to the process trade and also to commercial and technical photographers has just been brought out by Ilford Ltd., and embodies a combination of qualities which in the aggregate make the plate most valuable for many kinds of work and establish a new standard of technical quality in material of this kind. The plate is one with panchromatic emulsion giving the highest degree of contrast, and thus rendering fine lines or the dots in a screen negative for photo-engraving of the utmost sharpness. As those acquainted with photo-engraving well know, any woolliness in the dots of a screen negative requires to be remedied by successive reduction and intensification, which processes, while effective for their purpose, are not the most desirable things for retaining the gradation of the negative. The new Ilford plate, however, yields dots of such sharpness that this after-treatment of the negative may be dispensed with, with advantage to the quality, apart from the saving of time. This high resolution, which is a distinguishing feature of the plates, is combined with full panchromatic sensitiveness and with a speed which roughly may be taken as about three times that of the Ilford Thin-Film Half-Tone Plates. Resolution is no doubt aided by the backing of the new type which disappears entirely in the developer without staining the latter or the fingers of the operator. Moreover, the thinness of the emulsion coating allows of negatives being fixed, washed and dried in a much shorter time than usual.

Photo-engravers and others making plates of various kinds for the printing press will be under no misunderstanding respecting the advantages of a plate of these special qualities for their particular purposes, but it may be emphasised that the commercial photographer, who frequently has to photograph subjects which call for the finest definition, and also for sensitiveness to all colours, has

his work simplified by the introduction of an emulsion combining these distinctive features. The treatment of the plates is that of the ordinary kind for a process emulsion, namely, development with hydroquinone compounded with caustic potash. The plates are issued at the same prices as all other panchromatic plates, and it may be appropriate to mention here that Ilford Ltd. have now a special department dealing solely with the requirements of the reproduction trade, and will welcome the opportunity of placing their expert knowledge at the disposal of those concerned in the problems which arise in such branches of work.

## LEICA "FOCOMAT" AUTOMATIC-FOCUS ENLARGER

(Sold by E. Leitz, 20, Mortimer Street, London, W. 1.)

In putting this automatic focus enlarger on the market, Messrs. Leitz have naturally had in mind the miniature negative, of size  $24 \times 36$  mm., produced by their own camera. Automatic focussing from 2 to 10 diameters enlargement is arranged, and a simple knob locks the enlarger at one point. The suspension is by a parallelogram frame work which is held by a spring, and the movement can be arrested anywhere without fear that the lamp-house will move and alter the degree of enlargement. The lens is the standard 5 cm. focus Elmar used in the Leica camera, so that it is not necessary to go to the expense of buying a new lens for the enlarger if one possesses the camera. Hand adjustment of focussing is also arranged, so that if degrees of enlargement are greater than 10 diameters are required, focussing is still possible. While the standard film guide and mask take the miniature negative, other sizes up to  $4 \times 4$  cm.

may be had at an extra price. The film guide is specially neat, and when the film is placed in it a locking device is brought into action, so that the negative is pressed firmly into contact with an optically flat glass. Good definition is thus assured. The film guide also has two holes at top and bottom, so that when using numbered negatives the numbers are shown beside the enlarged image on the baseboard. Confusion between negatives to be enlarged is thus obviated. Without the lens the price of the enlarger, with film guide, 75 watt lamp, and masks is £14 9s. 6d. If, however, the buyer is not a Leica user and thus needs a lens, the enlarger with standard Elmar lens is priced at £19 13s. 0d.





**"SUPER NETTEL" CAMERA FOR 35 mm. FILM.**

(Sold by Zeiss Ikon, Ltd., Mortimer House, Mortimer Street, London, W. 1.)

This new camera is a notable addition to the series of miniature cameras taking  $1\frac{1}{2} \times 1\frac{1}{4}$ " pictures on 35 mm. cine film. Instead of having a fixed lens in front, the camera works on the folding and self-erecting principle, with neat struts and a tiny bellows. The shutter is of the metal focal-plane type, giving exposures from  $1/1,000$ th to  $1/5$ th of a second, while "bulb" is also provided. In order that long time exposures may be given on the "bulb" setting, a flexible release is provided which, when pressed, remains down until a small ring is touched, when it springs back into the normal position once more.



Time exposures of any duration can thus be effected. The lens is a Zeiss Tessar, of 5 cm. (2 ins.) focal length, and full aperture  $f/2.8$ , so that with fast films work by artificial light should be perfectly easy. A depth of focus scale at the various apertures is provided, and focussing is by coupled lens and distance-meter. The normal spools for miniature cameras may be used in the "Super Nettel," and these are inserted easily and quickly, while the camera back removes merely by turning two rings in the base of the instrument. A tripod-screw socket is naturally provided. A particularly neat box of very attractive design is supplied with the camera, and the black and chromium finish on the instrument itself makes it an attractive proposition. The price is £23 10s., complete with leather neck-sling.

**KOSMOS BETA BROMIDE CARD.**

(Sold by Kosmos Photographics, Ltd., Letchworth, Herts.)

A new variety of paper base of card thickness, and of exceedingly pleasing "Smooth Natural" surface, is now being coated with the well-known Kosmos bromide emulsion. The paper may be had either cream or white, and in each tint may also be obtained in No. 2 grade (normal) of contrast or in grade No. 3 (vigorous). While Kosmos papers already comprise a wide range of tints, surfaces and grades of contrast, these new papers represent a combination of qualities which will certainly be appreciated by the discriminating photographer, and especially by those seeking to make large prints of distinctive and handsome appearance. The "Smooth Natural" surface of the paper well bears out its name, for it is not definitely matt nor anything approaching glossy, having a peculiar smoothness which is difficult to describe, yet most agreeable to behold. So far as the photographic qualities of the material are concerned, it readily yields prints of excellent colour and gradation when developed in the usual way with amidol or metol-hydroquinone. Any normal developer for bromide, of course, may be used with the paper.

**SIX-20 BROWNIE JUNIOR, SUPER MODEL.**

(Sold by Kodak, Ltd., Kingsway, London, W.C. 2.)

This improved model of the Six-20 Brownie Junior has recently come on the market. While its optical and general construction remains the same as those of the earlier camera, a new and improved view-finder of the "Brilliant" type has been added, which makes it easier for the user to see just what he is taking. A disc-type winding key with milled edge has also been fitted to make the business of winding on even more convenient and simple. The finish of the camera is black, with all metal parts chromium plated, and the name of the camera is picked out in bright letters round the lens mount. The Super model sells at 12s. 6d. and takes "620" film ( $3\frac{1}{4} \times 2\frac{1}{4}$  in. pictures). Both camera



and price, therefore, are exceedingly attractive.

**AUTOTYPE THREE-COLOUR FILTER ATTACHMENT**

(Sold by the Autotype Company, Ltd., 59, New Oxford Street, London, W.C. 1.)

This attachment has been introduced by the Autotype Company for use by the colour worker who does not wish to go to the expense of a repeating back. The tri-colour filters are bound and cemented side by side between two pieces of high quality glass, so that by a simple slide holder each may be placed quickly before the lens in turn.



The standard set stocked is suitable for all lens mounts, other than those requiring a screwed-on filter, up to  $1\frac{1}{8}$  ins. diameter, and the price, including the set of filters and the holder, is £1 2s. 6d. Larger sizes can be obtained to order.

While the attachment does not, of course, offer the same facilities as the repeating back, it certainly affords a simple and rapid means of changing the filters, and as such will be very useful.

**FINE-GRAIN D. AND P. DEVELOPER.**

(Sold by Messrs. Johnson &amp; Sons, Hendon, N.W. 4.)

The fine grain developer for miniature films, recently brought out by Messrs. Johnson, has already sold largely among the many amateurs using the popular cameras of ultra-small size. In view



of the fact that a considerable and increasing proportion of the films which come into the hands of trade processing firms are of these small dimensions, they are now supplying this same developer in tins of sizes to make 1, 3, 5, 10 or 20 gallons of solution. The trend of amateur work is plainly in the direction of the small camera, and thus D. and P. firms must provide for this change in the situation and set apart tanks charged with developer which will yield the greater fineness of grain necessary for satisfactory enlargements from these small negatives. The fact that Messrs. Johnsons Fine Grain developer has been adopted by at least one leading maker of miniature cameras is sufficient evidence that processors can serve themselves well and with the least disturbance

of their existing arrangements by taking advantage of this new developing preparation. In contradistinction to certain types of fine-grain developer, no exposure increase is needed in the camera. For D. and P. work this is a point of much importance.

**VERONA DE LUXE CHLORO-BROMIDE PAPER.**

(Sold by Elliott &amp; Sons, Ltd., Barnet, Herts.)

Always noted for the quality and distinction of their many development papers, Messrs. Elliott have excelled themselves in this new de luxe variety of their Verona. We learn that emulsion of a new composition is responsible for the improved photographic quality of Verona De Luxe. It must have been difficult to make a better paper than the previous Verona, but, after using a quantity of the new introduction, we can certainly salute it as deserving the saying of many good things concerning it. It is made in six varieties, one of white tint and matt surface, and another also white and of a distinctive and most attractive surface which Messrs. Elliott call "Silk Lustre." The other four varieties are all of cream tint, and of matt, smooth, rough and "Silk Lustre" surface. The cream tint of the base is especially in harmony with the warm-black or brown tone of image readily obtained with the metol-hydroquinone developer recommended by the makers. Personally our liking is almost always for the normal warm tone which is given by a chloro-bromide paper, but for those who are fond of warmer colours there is no difficulty in getting these with Verona De Luxe by use of a metol

hydroquinone-glycin developer. The range of such warm tones is in fact considerable, and is obtained by using more or less bromide in the developer. In short, as regards gradation and colour of the prints, tint of the base and surface of the paper, we can pronounce the new Verona as emphatically "de luxe."

### ILFORD PROCESS FILMS.

(Sold by Ilford Limited, Ilford, London.)

While Ilford Process plates have been highly esteemed for a generation, it is now possible to obtain emulsions of various kinds not only on glass, but also on film of about the thickness of  $7\frac{1}{2}$  thousandths of an inch; also, in some cases, on film of about half this thickness. These process films comprise emulsions eminently adapted for work in line and continuous-tone from monochrome originals and also others of the same application, but of panchromatic sensitiveness. In addition there are commercial ortho films and also films of exceedingly fine grain. A feature of these various materials is the anti-halation backing, which contributes to the finest rendering of fine lines or minute detail and disappears completely in the course of development. The convenience of film material for the making of negatives which are to be cut up to form composites scarcely needs to be emphasised. Those making use of dry-plate emulsions for any purpose connected with the printing industry will find one or other of these new Ilford Process films of service. The distinctive properties of these new products, and their particular uses in process work, are set forth in a most excellent large catalogue entitled "Ilford Products for the Process and Photo-mechanical Industry." This valuable publication is obtainable from Ilford Limited by persons or firms genuinely interested in the use of the material.

### LENSES FOR THE EXAKTA.

(Sold by J. H. Dallmeyer, Ltd., 31, Mortimer Street, London, W. 1.)

Specially for use with the highly-portable Exakta reflex camera, two lenses which extend the scope of this excellent instrument have been brought out by Messrs. Dallmeyer. One is an  $f/5.6$



Dallon telephoto lens which is of 6 ins. focal length, yet fits interchangeably with the standard lens of the Exakta, and gives pictures on twice the linear scale. The price is £8. The other lens is an  $f/1.9$  Super-Six anastigmat of 3 ins. focal length, the very large aperture allowing of snap-shots in interiors or at night, and proving of service under conditions of bad light such as would almost render photography out of the

question except with a lens of extreme aperture. The price of this Super-Six is £17.

**AGFA VERDEX (GREEN TONE) GASLIGHT PAPER.**

(Sold by Agfa Photo, Ltd., 1/4, Lawrence Street, High Street, London, W.C. 2.)

This new gaslight paper is a distinct departure from any silver development paper yet introduced. By simple development with metol-hydroquinone the prints are *green*. The colour is a rich soft green, somewhat similar to that produced by vanadium toning, and no special treatment is required for producing this colour with certainty. Development is slow in comparison with other gaslight papers, 2½ minutes being the normal time. The type of negative required, and the degree of contrast resulting, are similar to those of the soft brands of gaslight paper. Slightly varying shades of green may be produced by varying exposure and development. The gradation and quality of the prints are all that could be desired, and "Verdex" paper should be very popular with those who wish for prints of this tone, as the results should be more stable than those produced by toning a black print.

**KODALINE STRIPPING PAPER.**

(Sold by Kodak, Ltd., Kingsway, London, W.C. 2.)

This new paper, introduced especially for use in the process trade, is a material similar to Kodaline film, but with the advantage of lower price, and with other features not possessed by the film. The paper is of double weight and is coated with an orthochromatic emulsion similar to that of the rapid Kodaline and of extreme contrast. An anti-halation backing is dissolved out by the developer. When developed, fixed, washed and dried in the ordinary way, the negative film is readily stripped off by slightly detaching it at one point from the paper base and then steadily drawing it off from the latter. The stripped film is tough and can be used as it is for printing. Owing to its extreme thinness, printing may be done from either side without any loss of sharpness. The film may also be laid down on to glass or celluloid which has previously been flowed over with a 10 per cent. solution of gum arabic. On being squeegeed down, the film remains firmly in place.

Kodaline Stripping Paper is chiefly applicable to the making of line or screen (half-tone) negatives for any description of photo-mechanical work. The very "hard" character of the emulsion allows of extreme contrast being obtained within a time of development of only about two minutes when using an M.Q. developer containing about four times as much hydroquinone as metol. This quickness in development is a characteristic of the paper which will be specially appreciated. Straightforward development gives an intensely black line on a perfectly clean ground, but if required the negative may be "cut," as customary with plates or films, by a dip in the hypo-ferricyanide reducer. The new paper should find many uses apart from process work, since it is an ideal material for the making of line copies. Lantern-slides of diagram originals may be made on the paper, stripped, and the film bound up between cover glasses. Also for the copying of very flat continuous-tone

originals, the extra vigour of the emulsion will allow of presentable results being obtained without any difficulty. The new paper is supplied in cut sizes from  $6\frac{1}{2} \times 4\frac{3}{4}$  to  $60 \times 40$  ins. and also in rolls of width from 12 to 18 ins.

### THE RAJAH VERTICAL ENLARGER FOR ROLL-FILMS.

(Sold by the Westminster Photographic Exchange, Ltd., 62, Piccadilly, London, W. 1.)

This vertical enlarger is intended for negatives  $4 \times 4$  cm., though carriers for smaller sizes down to the 35 mm. film used in miniature cameras are also available.

Enlargements up to 7 diameters may be made. The lamp-house is approximately spherical in shape, and accommodates a 60-watt lamp and a  $2\frac{3}{4}$  in. condensing lens. These assure even illumination over the entire field of the negative. The lens is an anastigmat of aperture  $f/4.5$  while a "semi-Waterhouse stop" is provided for reducing the aperture when fine definition is necessary. The film itself is placed in a glass to glass carrier, opened by a lever on the front of the carrier. When the carrier is closed by releasing this lever, the film is firmly pressed between the two glass plates, and is in proper register. The glass plates of the carrier are easily removed for cleaning. With negative carriers for the smaller sizes, and including 4 ft. of flexible cable and a switch, the Rajah enlarger sells at £8 8s. 0d.



### ILFORD SELO-RAYON GASLIGHT PAPER.

(Sold by Ilford, Limited, Ilford, London.)

A large number of the more serious users of gaslight paper, as well as those who take their films to the dealers for developing and printing, have no doubt regretted that they could not obtain their Selo prints on a cream base. Through seeing rich bromide enlargements on a cream paper, they have wished for similar effects in their small gaslight prints.

Such a paper has now been introduced by Ilford Limited as "Selo-Rayon." The paper base is a very delicate cream tone, and it possesses a fine grain, somewhat resembling artificial silk in appearance. It also has a slight sheen, just sufficient to give great depth, richness and transparency to the shadows. The grain,

being fine, is not too pronounced for small prints; detail is not lost in landscapes, and the texture is not evident even in portraits of children.

Prints on Selo-Rayon are characterised by fine gradation and very rich quality: the paper will make a strong appeal to all discriminating users of gaslight paper. Prints, after washing, dry perfectly flat.

The paper is made in double weight only, and in two grades of contrast only, "Normal" and "Vigorous." The prices are the same as for ordinary double-weight paper.

### MEYER LENSES FOR MINIATURE CAMERAS.

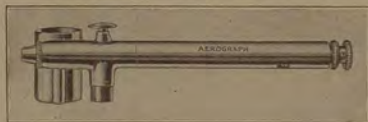
(Sold by A. O. Roth, 85, Ringstead Road, Catford, London, S.E. 6.)

A number of miniature camera enthusiasts will be pleased to know that Meyer lenses, in a wide variety of focal lengths, are available for use with their own particular camera. The range begins with a Plasmal of aperture  $f/1.5$  and 5 cm. (2 ins.) focal length, which may be coupled to the automatic focussing of the Leica and Contax cameras in the same way as the standard lens. A Plasmal of the same aperture, but of 7.5 cm. (3 ins.) focal length is also available, and can equally be used with automatic focussing. In each case a special Aglacolour filter is available at extra cost when working on colour film with either of these lenses. Longer focus lenses include the  $f/4.5$  Plasmal of  $4\frac{1}{2}$  ins. focal length, the  $f/2.8$  Plasmal of  $4\frac{1}{2}$  ins., and the Tele-Megor series of lenses with full aperture  $f/5.6$  and focal length 6 ins., 7 ins. or 10 ins. The Tele-Megor series, however, cannot be mounted with the automatic focussing device of the Contax or Leica cameras. Prices for the lenses and for fitting to individual cameras may be had on application, since they vary with the exchange rate ruling.

### THE "NUMOGRAPH" AIR BRUSH.

(Sold by The Aerograph Company, Ltd., Lower Sydenham, London, S.E. 26.)

In producing this low-priced air brush, the Aerograph Company have made a number of alterations from their standard pattern. The colour needle is now hand-set, and may be either screwed in



and out to vary the amount of colour sprayed, or else pushed into the nozzle for cleaning purposes. The button on the top of the instrument controls the air jet as usual. A specially interesting feature of the "Numograph," however, is the fact that the colour is kept in a small container on the right-hand side of the instrument, so

that a number of such containers may be kept full of different colours and quickly substituted during the course of the work. The air jet is only blown for a short time when changing, to clear the former colour from the passages, and then when the new container is inserted no colour mixing takes place. It is clear that the "Numograph" will find its place very quickly in photographic work, for the quick changing from one colour to another will lighten labour to a large extent and quicken the work. Though intended specially for beginners it will not be scorned by the "old hand." The price of the "Numograph" handpiece is £1 Is., and it may be fitted to any existing air compressor plant.

### THE "IHAGEE EXAKTA" ENLARGER.

(Sold by Garner & Jones, Polebrook House, Golden Square, London, W. 1.)

This is an entirely new model of enlarger from the Ihagee works,



specially designed for use in conjunction with the "Exakta" camera. The camera lens, complete with its mount, is bodily unscrewed from the camera and put into the enlarger, where the original helical mount does duty as focuser. The enlarger box is covered with black leatherette, is white enamelled inside, and is fitted with a flashed opal diffusing glass to promote even illumination. The negative holder is fitted to take  $4\frac{1}{2} \times 6$  cm. negatives, and if necessary the strip may be used instead of single pictures. The baseboard is of wood, and may be erected either vertically or horizontally, while a clamping screw anchors the lamphouse in any desired position. Enlargements from "Exakta" negatives up to  $12 \times 10$  ins. or more may be made, and the enlarger is also made in a size designed for use with  $3 \times 4$  cm. negatives. Either model is priced at £4, and a glass-fronted enlarging frame (as shown in the illustration)

for use with it is extra at £1 Is.

### "DUXOCHROM" COLOUR PRINTS.

(Made by Johannes Herzog & Co., Hemlingen-Bremen, Germany.)

Samples of colour prints made by the well-known "Duxochrom" process have been sent us for examination. They are good in colour and the flesh tones are particularly true to life, while both blacks and whites are really well rendered. Prints may be made to any size from tri-colour separation negatives, and as prices vary with the particular negatives and size of print required, all enquiries must be sent to Bremen.



**SASHALITE PHOTO FLASH BULB AMATEUR OUTFIT**

(Sold by Kodak, Ltd., Kingsway, London, W.C. 2.)

The Sashalite amateur outfit consists of a small battery, contained similar to that of a pocket torch, but carrying a bayonet holder for the Sashalite bulbs at the end. The small bulbs used are sufficient for amateur snapshots at night, and the complete outfit, containing battery, holder, collapsible reflector, and two Sashalite bulbs sells at 7s. 6d. Spare bulbs are priced at 10½d. each.

**THE "IKOFLEX" ROLL-FILM CAMERA:**

(Sold by Zeiss Ikon, Ltd., Mortimer House, Mortimer Street, London, W. 1.)

The "Ikoflex" is a new addition to the series of twin-lens reflexes taking 12 pictures, 2½ × 2¼ inches on an 8-exposure 2½ × 3¼ roll-film, and presents a number of novel features. The finder hood



is self-erecting in the usual way, and the focussing screen is arranged to be slightly smaller than the actual picture to avoid the effects of parallax, while focussing and film travel movements are arranged by means of levers instead of knobs. The film itself moves from left to right across the camera, and loading is particularly simple. For lens equipment a Novar anastigmat of either  $f/6.3$  or  $f/4.5$  is provided in a shutter giving 1/25th, 1/50th, 1/100th of a second, bulb and time. A depth of focus scale for each aperture is placed next to the focussing scale, so that estimations of depth are specially easy.

As the scale revolves when the camera focus is changed, the exact reading can be seen at a glance. Two picture counters are provided, one for metal and the other for wooden film spools, the "metal" one being marked so that mistakes cannot occur. With the  $f/6.3$  lens, the "Ikoflex" is priced at £6 10s. 0d., and with the  $f/4.5$  lens the price is £7 10s. 0d. Various accessories, such as supplementary lenses for close-up work, filters, and a lens hood, are available at extra prices.

**SELO HYPERSENSITIVE FILM-PACKS.**

(Sold by Ilford Limited, Ilford, London.)

The well-known Hypersensitive emulsion of Messrs. Ilford, Ltd., is now available in film-pack form. The emulsion characteristics are practically identical with those of the Hypersensitive cut film, and the speed to light is slightly less than that of the original Hypersensitive plate. For those who prefer film-packs, the new material will be found of great use in trying conditions under artificial light, and the "soft" character of the developed image under such harsh conditions is of equal value.

## CERTO SUPER-SPORT DOLLY ROLL-FILM AND PLATE CAMERA.

(Sold by Actina, Ltd., 29, Red Lion Square, London, W.C. 1.)

This camera occupies a place by itself among high-class instruments, since it takes the popular  $3\frac{1}{2} \times 2\frac{1}{4}$  ins. spool, and is made for allowing 16 exposures ( $2\frac{1}{4} \times 1\frac{3}{4}$ ) on this spool or, alternatively,



8 exposures  $2\frac{1}{2} \times 2\frac{1}{2}$  ins. In addition single metal plate-holders, or film-pack adapter may be used for pictures  $2\frac{1}{4} \times 1\frac{3}{4}$  ins. By an ingenious device, the film may also be wound backward, so that exposures of different sizes may actually be made on the same film when desired. The camera is of most substantial build, and of the self-erecting type, the lens coming out into position for use simply by putting down the baseboard. It is fitted with the delay-action Compur shutter, and may be had with one or another of a variety

of lenses of 3 ins. focal length, ranging in aperture from  $f/3.8$  to  $f/2.9$ . With  $f/3.5$  Trioplan the price is £11 8s. 0d., or with  $f/3.8$  Zeiss Tessar, £14 17s. 0d. These prices include detachable focussing screen and three single metal plate-holders in case. Although fulfilling the double purpose of a film and a plate camera, the Super-Sport is reasonably compact. It measures a shade more than 5 ins. in length, less than  $3\frac{1}{2}$  ins. in width, and less than  $1\frac{1}{2}$  ins. in thickness. With its covering of real black leather and highly polished nickel fittings it is of very attractive appearance, and design and workmanship are both of a kind that should ensure long life.

## PHOTO-MICROGRAPHIC LIGHT FILTERS.

(Sold by Carl Zeiss (London), Ltd., 37/41, Mortimer Street, London, W. 1.)

A new series of special filters for photo-micrography is now issued by Messrs. Carl Zeiss. The range includes a trichromatic series of two filters, which are yellow and blue, but give an excellent green when superimposed. The yellow filter used alone is intended for contrast work on orthochromatic plates, and transmits with almost unaltered intensity the yellow and yellow-green. The blue filter is useful when objects coloured faintly yellow come into question, while the green combination of the two filters is an excellent contrast filter on many of the red and purple dyes (fuchsin, carmine, and so on) used in staining sections. The filter discs are 35 mm. in diameter, and sell complete with holder at £2 11s. 6d. A series of two special filters is also issued for infra-red work. The discs

are violet and deep red, each of which has high transmission in the infra-red region, and the combination removes all visible light. Complete with filter holder this series costs £2 1s. 6d., and workers in this field will find it a useful accessory for research.

### CORREX MODEL 1A ROLL-FILM DEVELOPING TANK.

(Sold by Sands, Hunter & Co., Ltd., 37, Bedford Street, London, W.C. 2.)

The new model 1a of the Correx Tank will be welcomed by those who need a roll-film tank taking films 2½ inches wide. In construction it is similar to the older Correx tank, and has a mechanical stirrer with which the reel is agitated during development. The construction of the reel and celluloid apron remains the same as the older model, and the price of the No. 1A is £1 10s. 0d.

### KODAK ROLL-FILM DRIER.

(Sold by Kodak, Ltd., Kingsway, London, W.C. 2.)

This roll-film drier is a high-capacity machine suitable for D. & P. finishers. Fifty films can be dried in about thirty minutes without any question of melting or rendering them brittle. The machine is in the form of a cupboard 6 ft. 9 ins. in height, and is strongly constructed of sheet and angle iron. Films are loaded into it without removal of clips or rods, and the rack accommodating them may be drawn out to make loading a simple and quick process. Heating is provided by gas burners at the top of the cabinet, by which the drying air is warmed to 100° F., and the forced downward draught is by means of a large fan, 16 ins. in diameter. An inspection window and thermometer are provided on the front door of the machine, so that observation during drying is a simple matter. The outer finish is neat and workmanlike, and the drier will be of great interest to those who have to handle large numbers of films at once. The price is £18 10s. 0d. carriage forward.



### PATENT METAL ART ANGLES.

(Sold by Bennett & Jennison, Ltd., Ladysmith Road, Grimsby.)

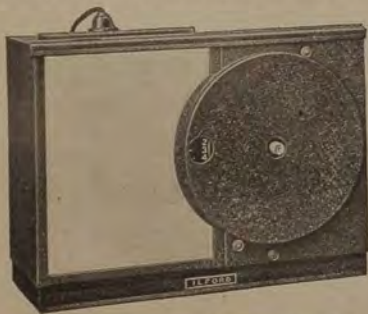
By means of these metal angles, which are made in such bright colours as green, red, and blue, frames of any size may be simply

and quickly made for window display, and the frames themselves can be taken apart quickly after use and re-assembled in different ways. The angles are sold to suit wooden mouldings, painted in contrasting colours, of size  $\frac{3}{4}$  in.,  $\frac{1}{2}$  in.,  $\frac{3}{8}$  in., and 1 in.

## ILFORD DARK ROOM LAMPS AND SAFELIGHTS.

(Sold by Ilford Ltd., Ilford, London.)

Among the five dark room lamps made by Messrs. Ilford, one is of real interest to those who do varied work. It is arranged in turret form, so that each of three safelights can be presented at will,



merely by revolving the housing. This is model number 5 and is priced at £2 17s. 6d. Ceiling reflector lamps are also available at £1 17s. 6d. and take a 12 x 10 inch safelight. Yet another model (No. 1) takes 10 x 8 inch safelights, and has a clock dial rotating past a fixed

pointer which indicates the time. The dial is also illuminated so that it can easily be seen. This lamp is priced at £2 5s. 0d., and is shown in the figure. The usefulness of this "clock" model is clear, and it should be an asset in any darkroom. Safelights in six grades are available to fit these lamps, and cost 5s. 6d. in 10 by 8 inch size. The 12 by 10 size is 8s. 6d. and larger sizes may be obtained to order. These prices include all grades but the infra-red, which cost 7s. 0d. and 10s. 9d. respectively for the two sizes.

## PHOTOGRAPHIC PRINTING.

(Produced by B. Matthews, 134/140, Idle Road, Bradford.)

Messrs. Matthews send us for examination a number of photographic reproductions from catalogues, brochures, and leaflets, together with a selection of postcards of all kinds and a series of reproductions from paintings in the National Portrait Gallery. Many of the leaflets, produced photographically, are hand coloured, and have a very realistic effect. The reproductions from the National Gallery are naturally the most attractive specimens to art-lovers, and their finish and quality is unexceptionable.

**KODOPAL WARM-BLACK DEVELOPMENT PAPER.**

(Sold by Kodak, Ltd., Kingsway, London, W.C. 2.)

This new printing paper is of extreme interest to professional photographers on account of the distinctive opal effects obtainable with it. Kodopal is a printing medium of the most distinctive charm, and deserves this description on account of the peculiar beauty of the warm-black image, and also of the tint and texture of the paper-base. Such things as these are among the hardest to describe in words, but we may give some indication of the quality of Kodopal by saying that the image is a shade colder than that familiar to photographers in Kodura. By that we mean the absence of the faint purplish hue in Kodura prints. As regards the paper base, Kodopal is made in white cream and a tint designated "old ivory," and the latter in particular marks an added refinement of quality. It is distinctly lighter than the well-known Kodura E. Here, again, attempts to describe these delicate distinctions fail to convey the effect which is apparent at a glance.

Kodopal is supplied altogether in seven grades, three of which (C, G and H) are white and are respectively of matt, fine-grain lustre and fine-grain matt surface. But the most popular of the grades will be those of slightly tinted paper-base, and particularly the grade P, in which a delicate cream tint is combined with ivory-like surface. In the grade R the surface texture is a fine-grain matt of the same delicate hue, whilst grade E (cream) simulates a natural surface of paper.

As regards speed, Kodopal comes between Kodura and Etching Brown, and may be developed with Kodura No. 2 developer plus extra potass. bromide. Apart from the excellences of colour and texture which the prints exhibit, the gradations of tone show the skill with which the emulsion maker has produced a paper which gives delicate nuances in the shadows and tones in the high-lights. All usual sizes of the paper are available.

**ZEISS "NEOPHOT."**

(Sold by Carl Zeiss (London), Ltd., 37/41, Mortimer Street, London, W. 1.)

This new instrument is designed for three separate purposes: (1) microscopic observation and photography with bright field, dark field, or by polarised light; (2) low-power survey photography; (3) micro-photography of large objects at either full size or with slight magnification or reduction. The microscope stand is centrally placed on a metal rail, built on the optical bench principle, and comprises in one unit all the various devices necessary for dark field and polarisation work. The various changes from one type of illumination to others may be done with ease and great speed, and there is no necessity whatever to disturb the focus or the instrument setting. A ready comparison of the various results is thus possible. The polarising device is of new design, and rotates with the diaphragm, while the actual objectives are not screwed in, but merely placed on a locating ring, thus rendering them very readily interchangeable.

The supporting structure of the bench is arranged to be as nearly vibrationless as is possible, and work at high magnification is possible even under conditions of serious vibration. The camera is normally supplied to take metal dark slides with sensitive material  $18 \times 13$  cm. with a maximum bellows extension of 85 cm., but if desired a plate or film slide to take  $24 \times 18$  cm. sizes, and extension to 1 metre, may be supplied instead. A mirror is mounted behind the focussing screen so that the image may be observed from the observer's



position at the centre of the optical bench, and scales enable the camera extension to be read off even in a dimly-lighted room. The camera front may be equipped either with a simple cap or with a time and instantaneous shutter. The focussing adjustments are made by means of roughened rubber rollers. These do not interfere with the direct operation of the coarse and fine micrometer screw heads, and by their use it is possible to work in perfect comfort from every position. Various light-sources may be supplied as desired, and a useful feature is the incorporation of an exposure calculator for the various magnifications. Prices for the basic instrument and for all accessories may be had on demand from Messrs. Zeiss.

## SCHNEIDER "XENAR" LENSES FOR SMALL CAMERAS

(Sold by R. F. Hunter, Ltd., 51, Gray's Inn Road, London, W.C. 1.)

Messrs. Schneider have recently produced a special version of their "Xenar" Lens, working at  $f/3.5$  full aperture and of focal length 5 cm. (2 inches). This lens is specially intended for fitting to small cameras of the miniature type, where such a focal length is becoming standard. The specimen we have examined was housed in a Compur shutter, and on test showed excellent definition and illumination over a considerably larger field than that of  $24$  by  $36$  mm. ( $1 \times 1\frac{1}{2}$  inch). Prices, which depend considerably on the shutter fitted or other housing specified, may be had on application.



**NORFOLK CAMERA WITH F/2.9 LENS.**

(Sold by The Sheffield Photo Co., Ltd., 6, Norfolk Row, Sheffield.)

The Norfolk camera reviewed in the 1934 ALMANAC has now been issued in a modified form with a lens of aperture  $f/2.9$ . In order to accommodate the new lens the baseboard of the camera has been altered, and now



bears a circular projection some  $1/8$ th of an inch deep. The other features of the camera, which include brilliant and direct-vision viewfinders, a spirit level, rise and cross front movements with indication of centre-point, and micrometer screw action, remain the same; while the long extension given by the channelled metal run-

ners will be useful for many types of near work. The lens, a "Zerantar" of 105 mm. focal length (approx. 4 ins.) is mounted in a Compur shutter with delayed action mechanism, and for use with  $3\frac{1}{4} \times 2\frac{1}{4}$  plates the camera costs £9 9s. 0d. This figure includes a wire release for the shutter and three single metal slides in a leather pouch.

**LEITZ ATTACHE-CASE FILM PROJECTOR.**

(Sold by E. Leitz, 20, Mortimer Street, London, W. 1.)

This projector shows film "slides" on the well-known 35 mm. film. When packed for travelling it is extremely neat and compact, and can be stowed away in a very small attaché case. The film transparency carrier and actuating sprocket wheel for moving on to the next picture are dismantled and housed inside the projector for transit. The illumination consists of a 100 watt projection bulb in a centred socket, large reflector, and triple condenser, while the lens may either be the 5 cm. Elmar lens from the Leica camera or else a specialised projection lens specially designed for the instrument. The transparencies may either be 1 in.  $\times$   $1\frac{1}{2}$  ins., or else  $1 \times 1\frac{3}{4}$  ins. in dimensions, without any alteration to the projector. For use with the standard Leica lens, the projector costs £11 13s. 0d., inclusive of flexible connection and plug, while the 80 mm. Milar or Epis lens is an extra £3 2s. 0d. when the Elmar lens is not available.

## THE "MIRA" ENLARGING BOARD FOR VERTICAL ENLARGERS.

(Sold by Sands, Hunter & Co., Ltd., 37, Bedford Street, London, W.C. 2.)

The "Mira" enlarging board is a combined masking and framing board which has a very unusual feature. By slackening off two nuts, the entire frame of the board may be moved diagonally across the plane of the paper, so that the corner can always be placed in the required position when enlarging from a portion of a negative. This movement is effected by means of a knob working a rack, and in use the action is beautifully simple and accurate. The black steel enlarging masks move on graduated millimeter scales, so that a variable white edge to the enlargement may be obtained, and when screwed home they are devoid of whip. The entire board has the hall-mark of careful and accurate machine work,



and the price of £3 3s. 0d. (which is for a size taking prints up to 10 x 8 ins.) is extremely reasonable.

## MENTOR STUDIO REFLEX CAMERA.

(Sold by A. O. Roth, 85, Ringstead Road, Catford, London, S.E. 6.)

This new production from the Mentor factory is intended to be a complete reflex embodying every device that is necessary in portrait work. The camera front is provided with tilt and swing action, worked by micrometer screws, so that full aperture may be used with critical focus on the different planes of the subject. Two focussing hoods are provided: one is for the normal observation of the picture at waist level, the other (fitting into an interchangeable frame) with an additional optically-worked mirror for observation at almost eye-level. When this second mirror is in use, a view straight forward is obtained through the two mirrors. The rack extending the camera front is very generously built, and large aperture lenses may be used without the front showing any tendency to flutter. The shutter is self-capping, and gives times from 1/5th second to 1/1500th, as well as bulb and time. The shutter speed may be set either before or after winding the blind. The revolving back, giving vertical or horizontal pictures, is connected with the



focussing screen, so that the latter is automatically masked according to the position of the camera back, and no mistakes are possible. Prices for the camera in various sizes from  $3\frac{1}{2} \times 2\frac{1}{2}$  ins. to  $5 \times 7$  ins. may be had on application. The standard specification includes either a Meyer Plasmat  $f/4$  or Meyer Trioplan  $f/3$ .

### PLAUBEL MAKINA II CAMERA.

(Sold by Garner & Jones, Ltd., Polebrook House, Golden Square, London W.1).

The Makina II now embodies interchangeable lenses, the focal length varying from 7.3 cm. ( $2\frac{7}{8}$  ins.) to 21 cm. ( $8\frac{1}{4}$  ins.). Either the normal lens of 10 cm. (4 ins.)



working at a full aperture of  $f/2.9$ , a wide-angle Orthar of 7.3 cm., working at  $f/6.8$ , or the Tele-Makinar of 21 cm. focal length and  $f/6.8$  full aperture may be placed on the camera, and the focussing adjustment for each lens remains unaltered. The price of the Makina II with the standard 10 cm. lens remains at £37 10s., while the wide-angle Orthar costs £7 5s. and the Tele-Makinar £12 12s. extra. Supplementary lenses for short distance focussing are also available at 16s., or

£1 each, the price depending on the distance on which sharp focus is required. A yellow filter (available in two grades) is further available at an extra charge of £1 5s.

### KODALINE EXTRA RAPID FILM.

(Sold by Kodak, Ltd., Kingsway, London, W.C. 2.)

This new material is specially intended for photo-mechanical work, and in particular for photogravure transparencies and continuous tone positives. The makers state, however, that it will be found equally suitable for screen work. The speed is given as roughly 100 H. and D., and under test (in an enlarger) this figure would seem to be accurate. Density is obtained easily in a normal metol-hydroquinone developer, and the resultant contrast is extremely satisfactory. At the same time, the handling in developer and fixer is simple, but the dark-room light should be adjusted for orthochromatic material, or considerable fogging may result. The anti-halo backing readily dissolves during developing and fixing, and no traces remain. Prices of the various sizes range from 3s. 10d. per dozen sheets for half-plate to 476s. per dozen for  $60 \times 40$ -in. sheets, and all normally used intermediate sizes are supplied.

## ILFORD DARK ROOM CLOCKS.

(Sold by Ilford Ltd., Ilford, London.)

Although this new dark room clock is issued strictly for use when timing exposure and development of X-ray photographs, it will be found of great use in the ordinary dark room. The dial is 8 inches in diameter, and the large hand makes reading exceptionally easy even under a dark green safelight. The large hand makes one revolution per minute, while the smaller one indicates up to 10 minutes. The clock is started and stopped at will by a lever on the side of the casing. Both plain and luminous dials may be had, the former being priced at £2 2s. 0d. and the latter at £2 12s. 6d. At these very reasonable prices the two models should be of interest to all types of workers.



## DE LUXE ALBUMS.

(Sold by V. Guzzetti, Via F. Bronzetti 11, Milan.)

These albums are of most artistic design, with flexible leather covers and linings of watered rayon, and have been produced in a considerable range of sizes and styles. The albums, a number of which have been sent to us, are of loose-leaf pattern, with leaves measuring  $11\frac{1}{2} \times 8\frac{1}{2}$  ins., and held in place in the covers by a silk cord. The covers are of beautifully-worked flexible leather lined with watered silk and bound with leather round the edges. The decoration on the cover varies. In some albums it is a design in silver; in others most striking bands or other patterns in colour, whilst in



others the cover takes the form of an embossed rendering of a picture or classical design, exceedingly well done and most effective for its purpose. With the object of making known the quality and variety of these goods throughout the world, Mr. Guzzetti is ready to send twelve different albums of the above size for a prepaid sum of £2 14s. 0d. inclusive of packing and carriage to any country in the world. A further series, the "900," are  $13 \times 9\frac{1}{4}$  ins. in size, and retail at 8s. 4d. each. Both series represent excellent value for money, and should interest every dealer.

## PRINTING AND FINE PHOTO-ENGRAVING.

(By Messrs. Hood & Co., Sandbride Press, Middlesbrough.)

Messrs. Hood send us for examination a large number of brochures, specially bound limited editions, and other printing work, recently executed by them to customers' orders. The quality of printing



remains as high as ever, and it is clear that the firm have in no way reduced the quality of their workmanship. A particularly interesting book, printed to private order, contains a number of colour reproductions of gardens, each carefully placed on a neutral-toned paper, and the result has to be seen to be appreciated. Other more ordinary uses of printing are amply shown, and the gravure postcards of the English countryside are charming both in workmanship and effect. The illustration shows the outside cover of a special work, though the reproduction can hardly give the effect of the original, which is beautifully carried out.

## THE "OPTOCHROM AUTOMAT" ROLL-FILM DEVELOPING TANK.

(Sold by Sands Hunter & Co., Ltd., 37, Bedford Street, London, W.C. 2.)

The Optochrom developing tank is designed for daylight loading and development of roll-film, and has a neat and ingenious construction. The film is loaded into the tank very much in the same way



as into a camera, and then the backing paper is carefully pulled out through a slit specially provided for this purpose. The ease of this operation is shown in the illustration. As the paper is pulled out, the film coils itself round a series of spirals inside the tank, so that when the paper finally comes away, and the slit is shut for development, it is naked and evenly spaced inside. Development follows in the usual way, and a filling funnel is provided at the top of the tank with a generous lip to avoid splashing.

After development, the drain plug at the bottom of the tank is

removed, and the developer run off and fixing solution substituted. For washing, an attachment is provided for a rubber tube to the tap, which screws into the filling funnel. In this way the tank may be left to wash with the tap gently running. The tank is well made in moulded plastic material, and the various parts are easily separated for washing and cleaning. At the price of 35s. for  $2\frac{1}{4} \times 3\frac{1}{4}$  films (special thermometer 2s. 6d. extra), the Optochrom tank is a very interesting proposition, and should be of great interest to all roll-film amateurs.

### PAN-ORTHO GREEN FILTERS.

(Sold by R. E. Schneider, 189, The Grove, London, W. 6.)

These colour filters have been introduced to supply the need for a universal filter for both orthochromatic and panchromatic material. Two grades are made (light and heavy), and the colours are produced in the mass of the glass during manufacture, so that no peeling of glass from gelatine is possible. With panchromatic material, the filters give a colour rendering as nearly correct as possible, while with orthochromatic material the blues and ultra-violet are depressed, and a quite good rendering obtained, with the exception of colours beyond orange. The filters are made as push-on fits to lens mounts of various diameters, and special sets are provided for Contax, Leica, and Rolleiflex cameras. A light blue filter is also provided in the set of three, which is useful for reducing the reds when using half-watt lights on panchromatic material, and promotes a more natural rendering. Various prices are quoted for the different sizes: the set of filters costs £1 1s. 6d., for lens mounts of 21/22 mm. diameter, while other prices range up to £3 5s. 0d for mounts of outer dimension 61/62 mm. For the Contax, Leica, and Rolleiflex the prices are respectively £1 4s. 6d., £1 12s. 6d., and £1 4s. 6d.

### THE IHAGEE "EXAKTA" REFLEX CAMERA.

(Sold by Garner & Jones, Polebrook House, Golden Square, London, W. 1.)

Although the "Exakta" camera has already been on the market for some time, a new and altered model is now available with delayed-action shutter release and automatic time exposures. An auxiliary control button is provided on the top of the camera, and by setting this to definite marked speeds, shutter times of 1/10th second to 12 seconds are possible. When using the delayed-action shutter release with this mechanism, however, only shutter times from 1/10th to 6 seconds are possible. The delay mechanism allows 12 seconds to elapse before the exposure is made. The camera is finished extremely well in black and chromium, and the price, including an Ihagee Anastigmat of  $f/3.5$  is £18 10s. Models are also available with a Zeiss "Tessar"  $f/3.5$  at £22 10s., and a Zeiss "Tessar"  $f/2.8$  at £26. An interchangeable telephoto lens by J. H. Dallmeyer can be supplied at an extra cost of £8 15s. This has an aperture of  $f/5.6$  and gives a 2-diameter magnification.

**ILFORD INFRA-RED ROLL FILM.**

(Sold by Ilford Ltd., Ilford, London.)

The infra-red sensitive emulsion already well-known to users of plates is now available in roll-film form. The characteristics of the roll-film material appear to be almost identical with those of the plates, and the speed viz. : 20 H & D to daylight and 200 H & D to half-watt light, is also that of the plates. On tests, the films were easy to work in developing, and gave excellent results when exposed on the basis of the above figures, so that it may safely be said that a large number of amateurs who have previously not been interested in infra-red sensitive material on account of their not owning plate cameras will make tests for themselves to try out the possibilities of a completely new type of emulsion. The films, as the plates, must be exposed with a special infra-red filter (also supplied in various forms by Messrs. Ilford Ltd.), in front of the lens. Prices are as follows :—No. 20 film, 2s. 3d. ; No. 16 film, 2s. 9d. ; No. 27 film, 2s. 3d. 35 mm. film for miniature cameras : Daylight loading spools, 36 exposures, 6s. each. Darkroom loading : Box of 3 films, 16s. 6d. Other sizes are priced 50 per cent. over those ruling for panchromatic roll films. It may be as well to remind photographers that many woods are not opaque to infra-red rays. While fogging is less likely to occur from this point with films than with plates, the fact should be borne in mind that fogged film may be due to this cause.

**AGFA ACCESSORIES.**

(Sold by Agfa Photo, Ltd., 1/4, Lawrence Street, High Street, London, W.C. 2.)

Since the last ALMANAC was published a number of price alterations have been announced in some of the Agfa accessories. The flash lamps are now priced as follows :—No. 1, 14s. ; No. 1 with pan extension, 26s. ; No. 2, 18s. ; and the Flash Pistol, 4s. 6d. Flash powder prices are :—10 grams, 1s. 6d. ; 25 grams, 2s. 6d. ; while Rodinal developer in concentrated form costs 2s. for 3 ozs., 4s. for 8 ozs., and 7s. 6d. for 16 ozs. fluid.

**NEW MODEL APTUS AUTOCARD CAMERA.**

(Sold by Moore &amp; Co., 101/103, Dale Street, Liverpool 2.)

This camera, taking negative cards of the " Ferrotipe " variety, is now made to take  $3 \times 2\frac{1}{2}$  or else  $2\frac{1}{2} \times 1\frac{1}{2}$  in. pictures, and includes a high-quality lens of aperture  $f/4.5$  made by Aldis. The body is all-metal, with bronze and black finish, while the tank is made of vulcanite. The magazine has been re-designed, and is now constructed of bakelite on a new principle, and extra magazines can be supplied if both sizes of print are required from one camera. The new model with  $f/4.5$  lens costs £10 10s. 0d., complete with tripod, while the De Luxe model (fitted with  $f/3$  lens) costs £17 10s. 0d., also with tripod.

**SALEX "SUPREME DE LUXE" CAMERAS.**

(Sold by City Sale &amp; Exchange, Ltd., 59, Cheapside, London, E.C. 2.)

This new camera takes  $3\frac{1}{2} \times 2\frac{1}{4}$  roll-films, and is an example of an instrument with really modern facilities at a reasonable price. The camera opens automatically to infinity, and has the usual folding strut action. Focussing is achieved by turning the lens mount, the lens itself moving forward on a helical guide, and focussing to within 7 ft. is possible. The lens itself has an aperture of  $f/3.8$  and is a Meyer Trioplan anastigmat, while the shutter is a delayed-action Compur, speeded from 1 second to  $1/150$ th. Brilliant and direct-vision view-finders are fitted, and the camera is well finished in seal leather and chromium. At the price of £6 7s. 6d. it is certainly excellent value for money. A further range of "Supreme" cameras is also shown by the same firm. One model

has an Ibsor shutter speeded  $\frac{1}{2}$  second to  $1/125$ th and has a Meyer anastigmat lens of aperture  $f/4.5$ . A focussing scale is also incorporated, and the finish is similar to that of the "Supreme de Luxe," while the price is £3 16s. 9d. A cheaper model of the same camera is available at £2 19s. 9d., and has a shutter speeded only from  $1/25$ th to  $1/100$ th second. The quality of the various models represents good value for money in each case.

**THE NEW 'RHACO' TANK FOR PLATES, FILM-PACKS AND CUT FILMS.**

(Sold by Sands, Hunter &amp; Co., Ltd., 37, Bedford Street, London, W.C. 2.)

This tank is one of the type which is provided, with a light-tight inlet for pouring in the developer while the outlet is unshielded.

Plates, film-packs, or cut films may be developed vertically in the thin metal sheaths provided, and the tank will hold either 6 or 12 plates according to the size in question. The metal sheaths are well made, and the construction of the tank extremely solid, while a special rubber tube is provided for attachment to the tank for washing from a water tap. This last is a great convenience, as all those who have worked with tanks will realise. For  $3\frac{1}{2} \times 2\frac{1}{4}$  plates and films the tank costs £1 0s. 0d. for developing 6 negatives, and £1 5s. 0d. where 12 negatives must be developed at once. Meta sheaths are 10s. a dozen. For quarter-plate sizes of material, the two sizes of tank cost 5s. extra; viz. £1 5s. 0d. for 6 negatives and £1 10s. 0d. for 12. In this size, also, the metal sheaths cost 12s. per dozen.



**THE "BARRETT" SYNCHRONISED FLASH LAMP.**

(Sold by D. Allan, Whitfield Works, Mansfield Street, London, E. 2.)

This flashlamp is designed to explode the flashpowder and press the shutter release simultaneously. The powder itself is enclosed in a box, the lid of which holds a pivoted metal strip against a spring. As the powder explodes, the lid is blown open, and the metal strip is released. Pulled by the spring below it turns on its pivot and presses the button of a flexible cable release below. The action may clearly be seen from the accompanying illustration, and the lamp is neat and very effective. The price, fitted with "spark" ignition of the powder, is £1, which price includes a 24 in. cable release. An electric "Tell-tale" model may also be had at an extra price. On trial, the flashlamp was found to work extremely well. Even with a small charge of powder the lid of the box jumps open when the powder fires, and those who work in bad weather will appreciate the fact that this lid protects the powder up to the moment of firing. Another point worth noting is that the residue of the burnt powder remains in flakes in the pan of the lamp. There is thus less smoke in the room, which will at times be a great convenience.

**"OPTOCHROM" FILTER SET FOR LEICA AND ROLLEIFLEX.**

(Sold by Sands, Hunter &amp; Co., Ltd., 37, Bedford Street, London, W.C. 2.)

Special filter sets intended for users of Leica and Rolleiflex cameras are now on the market. The filters are in optically worked glass, and are provided with spring rims to be a push fit on the lenses employed. The filters consist of (1) "Optochrom" yellow filters, numbers 1 and 2, (2) "Optochrom" green filter for full correction and haze cutting, and (3) "Optochrom" red filter for highly coloured objects on panchromatic material, also for work with infra-red plates and films. The set of four filters, in a lined case, is £2 5s. 0d. for the Rolleiflex camera (28.5 mm. lens mount) and £2 10s. 0d. for the Leica camera (36 mm. lens mount).



The filters are all of glass coloured in the mass, and have no gelatine in their construction.

**VICTORIA ROLL-FILM CAMERA.**

(Sold by the Westminster Photographic Exchange, Ltd., 111, Oxford Street, London, W. 1)

Built to take 16 pictures on ordinary  $3\frac{1}{4} \times 2\frac{1}{4}$  roll-film, this camera is made of plastic material instead of metal, and has a very clean and neat appearance. The front erects automatically when the button opening it is pressed, and special lugs for pressure are provided for re-folding the struts. An interesting feature of the camera is that no "brilliant" view-finder is provided, its place being taken by an optical direct-vision finder, which erects itself into position by a touch. The lens is a Meyer Anastigmat with full aperture  $f/2.9$ , mounted helically for focussing, and the shutter is a delayed-action Compur scaled from 1 second to  $1/250$ th. At the price of £5 15s. 0d. the camera is an interesting proposition, the more



so since the smooth finish of the moulded case is unusual in appearance.

**ASTRO IDENTOSCOPE WITH 30 INCH LENS.**

(Sold by Cinepro, Ltd., 1, New Burlington Street, London, W. 1.)

The Identoscope attachment for miniature cameras comprises a reflex mirror, a long-focus lens, and a neat eye-piece for focussing. This bald description, however, does very much less than justice to a piece of apparatus which must be seen to be appreciated. The particular lens shown to us is of focal length 800 mm. (very nearly  $31\frac{1}{2}$  ins.), and has a maximum aperture of  $f/5$ , though other lenses of varying focal lengths between this figure and 150 mm. (approximately 6 ins.) are also available. Focussing is arranged by means of a large handle moving through a range of turn of 180 degs., and the action of focussing the  $31\frac{1}{2}$ -in. lens at full aperture is as simple as a similar adjustment on any reflex camera. As, moreover, the eye-piece accommodates only one eye, and has a rubber surround to shield light from the magnifier and ground-glass screen, the picture is actually seen considerably more brilliantly than with many reflex cameras. Two large clamping screws make it possible to revolve the entire lens and camera within a ring housing, so that pictures may either be taken in the "upright" or "horizontal" position, and a sturdy tripod holds the entire apparatus. It may be said at once that when a miniature camera is attached to the back of the lens it is very easy to laugh at the result. There is, however, nothing laughable about the definition of the image seen on the ground-glass focussing screen, and it can easily be imagined that for long-distance sports work the attachment

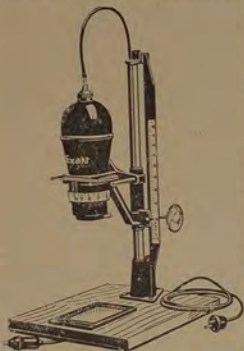


has no rival. The magnification can be gathered from the fact that when photographing an elephant at 100 yds., the 31½-in. lens renders the animal rather too large to be completely included in the picture. The finish of the attachment is admirable, and not the least interesting mechanical feature of the apparatus is the neat way in which the camera release is also arranged to lift the reflex focussing mirror. The weight of the 800-mm. lens attachment is about 22½ lbs., and the price £300, which includes a handsome carrying case.

### EXAKT VERTICAL ENLARGER.

(Sold by R. F. Hunter, Ltd., 51, Gray's Inn Road, London, W.C. 1.)

This very convenient enlarger embodies two scales, one denoting the degree of enlargement and operated by the hand wheel seen on the right of the illustration, and the other a corresponding scale on the lens by which the latter is set to give perfectly sharp focus. While there are these two adjustments, the apparatus is very quick in operation, thanks to the most convenient mechanical construction. The Exakt is made in three sizes: I for negatives up to 4 × 4 cm., and parts of 3½ × 2½ negative; II for negatives up to 6 × 6 cm., and parts of quarter-plate negatives, and III for negatives up to 3½ × 2½ ins. and parts of quarter-plates. Prices (on application) are inclusive in each case of f/4.5 Steinheil lens, negative holder, orange lens cap, negative mask, electric flex, plug, switch and lamp. The construction is excellent, the apparatus (apart from the wood base) being made of cast light metal. In the various models the range of degrees of enlargement is from about 2 to 7½ diameters, amply sufficing for all ordinary purposes.



### KALART PHOTOFLASH SYNCHRONISER.

(Sold by L. A. Rogers, 4, Powis Gardens, Golders Green, London, N.W. 11.)

The Kalart Synchroniser has been improved and modified since it was first put on the market, and the new model works on any between-lens shutter as well as with the focal-plane shutters of the "Leica" and "Contax." All speeds up to 1/1,000th of a second may be used. The synchroniser attaches to the cable release

opening of the camera and the battery case screws into the tripod socket. One turn of a knob sets the device for action, and as all parts are attached to the camera, there is no need to use a tripod. The improved model "C" outfit sells at £5 7s. 6d.—this price being based on par of exchange.

### WRAY MINIATURE MICROSCOPE.

(Sold by Wray, Ltd., Bromley, Kent.)

In presenting a small microscope giving magnifications from 30 to 200, Messrs. Wray have done a large number of people a great service. Although the price is low—£3 10s. 0d.—the optical system is really good, and the objective thread is standard R.M.S., ensuring easy interchangeability. The limb hinges about a heavy horseshoe base, so that the instrument may be used for projection of large-magnification pictures if desired. Focussing is arranged by a rotating scroll. Light is focussed by a concave mirror and provision is made for the insertion of a sub-stage if such is required. Altogether a very neat and useful little microscope, which should be of value to many photographers.

### THE "V.I.S." FILMSLIDE PROJECTOR.

(Sold by V.I.S. Projectors, 168A, Battersea Bridge Road, London, S.W. 11.)

This projector uses 35 mm. film strips instead of glass slides, and is extremely simple and effective. The film strip is fed into a slit at the top of the projector body, and the feeding sprocket is arranged in such a position that no "tail" of film needs to be passed through the projection gate before a picture is projected. The turning on of the current, the focussing of the picture on the screen (which is accomplished by moving a pin in a helical guide) and the moving on of the picture by turning a knob are the only three movements required, and this simplicity in handling will find favour in many quarters. The whole projector is neat and very clean in appearance, and may be had either with a battery below in its case for £8, a resistance for all electric voltages between 100 and

250, whether alternating or direct current, for £6 5s., and with a transformer for use on alternating current only for £6 5s. also.



### THE NEW "LUMICOLOR" ROLL-FILM.

(Sold by Thos. K. Grant, Ltd., Polebrook House, Golden Square, London, W. 1.)

The unusual point of this new film for direct colour photography is that no lens filter is needed, and it is convenient in that it will

fit any normal camera. As a guide to exposure (which is rather critical) 40 times that necessary for an average roll-film is required, and time exposures will still be necessary with a lens aperture of less than  $f/4.5$  and anything except bright sunlight. The film is sold at a price which includes the processing, for which the film must be sent back to the laboratory, and the 4-exposure spool for  $3\frac{1}{4} \times 2\frac{1}{4}$  pictures costs 5s. 6d., while that for the same number of pictures  $4\frac{1}{2} \times 2\frac{1}{2}$  costs 7s. 6d.

### VOIGTLAENDER "ILLUSTRA" ROLL-FILM.

(Sold by Messrs. Schering, Ltd., 188/192, High Holborn, London, W.C. 1.)

The new "Illustra" film from Messrs. Voigtlaender's works is now just appearing in this country. At the moment only V.P.,  $3\frac{1}{4} \times 2\frac{1}{4}$ ,  $4\frac{1}{2} \times 2\frac{1}{2}$ , and quarter-plate sizes are stocked, and may be obtained at the normal prices. The film is rated for speed at 18/10 degrees Din., which roughly corresponds to about 28° Scheiner. In practice it is clean in working, and of very high daylight speed, while development proceeds normally and adequate density and contrast results.

### LINHOFF PRECISION CAMERA MODEL 34.

(Sold by R. E. Schneider, 189, The Grove, London, W. 6.)

This all-metal camera is now made in sizes taking plates of  $9 \times 12$  cm.,  $10 \times 15$  cm., and  $13 \times 18$  cm. The back of the camera is fitted with a rotating turntable, which can be moved round to give a horizontal or upright picture even when the shutter of the dark slide is withdrawn. This back clicks into position when completely square with the lens board. Double extension is fitted, and a particularly generous rise of front allowed. Cross movement is also arranged, and the lens board may be dropped from horizontal when using very short-focus lenses. To make the camera as universal as possible, the new model has also a swing back, and though this has not the same range of swing, perhaps, as those present in field cameras it will be a very valuable asset for technical and commercial work. A focussing screen protects the back of the bellows when no slide is in the camera, and a large direct-vision finder is also fitted. The lens on the model we have been sent is a Zeiss Tessar of full aperture  $f/4.5$ , and a delayed-action Compur shutter gives exposures from 1 second to 1/200th, also bulb and time. For precision work the metal construction has everything to recommend it, and to those whose work is necessarily of an exacting nature it should be very valuable. Prices may be had on application.

### WRAY "RAYLITE" BINOCULARS.

(Sold by Wray, Ltd., Bromley, Kent.)

This new product of the Wray factory is intended to be a lightweight binocular which has the normal attributes of the heavier



models. The effective aperture is 30 mm., and the magnification 8 times. These figures are those ruling for other Wray binoculars, but the difference in weight is really surprising. Whereas the normal pattern binoculars weigh  $1\frac{1}{2}$  lbs., the "Raylite" has been reduced to 15 ozs. without the least sacrifice in optical qualities, and for users to whom weight is an important consideration the new pattern will be extremely attractive. The finish is black enamel, and is of the usual high standard of the Wray product.

### WELTA PERFECTA CAMERA FOR $2\frac{1}{2} \times 2\frac{1}{2}$ PICTURES.

(Sold by Peeling & Van Neck, Ltd., 4/6, Holborn Circus, London, E.C. 1.)

This folding reflex camera takes the normal  $3\frac{1}{2}$  by  $2\frac{1}{2}$  roll film, and gives 12 exposures  $2\frac{1}{2}$  by  $2\frac{1}{2}$  instead of eight of the larger size. The construction is extremely neat, and the front springs forward when the release button is pressed. For re-folding, two small catches on the camera front are pressed, and this unlocks the lens board, which can then be pushed back to the "shut" position. The view-finder folds up automatically when the lens board is pushed in in this way. This ingenious folding construction is quite unique in small roll-film reflexes, and it is certainly very effective in reducing the space taken up by the camera. Focussing is arranged by helical lever, and a Compur shutter houses a Zeiss Tessar lens of full aperture  $f/3.8$ , the focal length being 75 mm. (approx. 3 inches). The aperture may be reduced down to  $f/22$  if necessary. The view-finder hood is self-erecting when released, but must be folded up when not used and pressed down until the catch holds it. A brilliant image is obtained on the ground glass, and the finder lens is matched to the taking one, so that the whole front can move in and out for focussing, in one piece. The finder lens also has a grub screw and helical mount for any subsequent adjustment needed. This action will be very handy where critical work must be done with colour roll-films, since the focus must be scaled back for the emulsion thickness. A tripod screw is provided, and the finish is in black leather of close grain, while all metal parts are heavily plated. Including the  $f/3.8$  Tessar mentioned above, the price of the camera is £19 5s. 0d.



**BAUCHET NEGATIVE CARD, H & D 400**

(Sold by Actina, Ltd., 29, Red Lion Square, High Holborn, London, W.C. 1.)

This sensitive card has been put on the market specially for the benefit of those who take "Walkie Snaps" and for reflex operators doing beach work. It has the desirable qualities of brilliancy and medium speed which are required for this work, and the resulting negative is of good gradation. Although various sizes are available, the "Post-card" size of  $5\frac{1}{8} \times 3\frac{7}{16}$  ins. will probably prove the most popular, and the new product is an interesting addition to the range of negative card material now on the market.

**PARAPHENYLENEDIAMINE-GLYCIN FINE-GRAIN DEVELOPER.**

(Sold by Wallace Heaton, Ltd., 119, New Bond Street, London, W. 1.)

The paraphenylenediamine-glycin developer formula is very much better known on the Continent and in U.S.A. than in this country, and it is interesting to find that Messrs. Heaton are now marketing it. The developer is well-known to give excellent fine grain, with a time of development of some 20 to 30 minutes. The tin—making 20 fl. oz. of solution—sells at 1s., and we are glad to find that Messrs. Heaton warn users that contact with the human skin is liable to cause toxic effects. Some such warning as this is clearly necessary in the case of paraphenylenediamine, and it is of advantage that sellers of the substance draw attention to the fact.

**NEW ZODEL SPECIAL DE LUXE PLATE AND FILM-PACK CAMERA.**

(Sold by Wallace Heaton, Ltd., 119, New Bond Street, London, W. 1.)

This latest addition to the "Zodel" range of cameras takes  $3\frac{1}{4} \times 2\frac{1}{4}$  plates and film-packs, and is a neat and well-made instrument. The camera is



fitted with double extension, so that the use of longer focus lenses is simple, and the channels in which the camera front runs are solid and rigid. A focussing scale is provided, and the front draws out to infinity automatically. The camera front itself has rising, falling and cross movements worked by knobs and quick-thread screws, and generous latitude in all directions is arranged. The lens is a Zodellar anastigmat, of aperture  $f/4.5$  mounted in a compur shutter scaled from 1 second to  $1/250$ th. Delayed-action is also provided. Two finders are fitted, one a "brilliant" and the other a "direct-vision" with wire frame. A spirit level is attached to the brilliant finder, and turns sideways when taking horizontal pictures. The finish of the camera is in dark leather and chromium plating, and the price, including dark slides or film-pack adapter, is £6 17s. 6d.

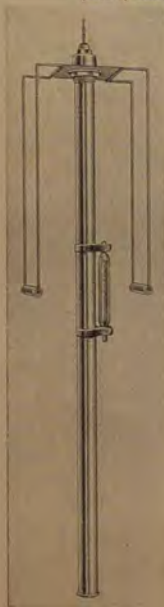
**BLACK AND WHITE "PLASTICINE."**

(Sold by Harbutt's Plasticine, Ltd., Bathampton, Bath.)

Since the colour of ordinary "Plasticine" was misleading photographically, Messrs. Harbutt have produced a special type in photographic black and photographic white. This is specially intended for use in advertising work, and will unquestionably be very useful, since the surface is rather more matt in character than that of the former colours. The black is a particularly rich charcoal in shade, and there is no doubt that Messrs. Harbutt have done photographic workers a real service by its introduction. The price per pound has been reduced to 1s. (1s. 6d. by post direct).

**D. & P. IMMERSION HEATER.**

(Sold by Ensign, Ltd., 88/89, High Holborn, London, W.C. 1.)



An accessory which should be an invariable item of equipment in every D. and P. works where electric current is available is a heater for keeping the temperature of the developing bath up to the normal. As the result of their own experience in D. and P. work Ensign, Ltd., have recently introduced an immersion heater of substantial build, which is arranged so that heat is given out along the whole length of the heater, amounting to about 42 ins. The appliance consists of a stout chromium-plated tube which accommodates the electrical heating elements and is fitted with a pair of handles by which it is supported on the top of the tank and also with a thermometer fixed about half-way down the length of the tube. The heated developer rises round the tube of the heater, thus providing adequate circulation of the solution in the tank. Thus, this heater needs simply to be immersed in a tankful of developer or other solution in order to bring the latter to the correct working temperature, evenly throughout its bulk, within a few minutes. By lifting the heater about 18 ins. out of the solution, the actual temperature of the latter is read on the thermometer. This last is specially convenient since the maximum solution temperature is shown. The heater takes relatively little current (750 watts) and is obtainable for various voltages. The price, complete with 3 ft. of flexible cable is £2 15s.

**FOTH DERBY CAMERA WITH F/2.5 LENS.**

(Sold by Peeling &amp; Van Neck, Ltd., 4/6, Holborn Circus, London, E.C. 1.)

The Foth Derby Camera, which takes 1 by 1½ inch pictures on V.P. film, has now been issued in a new form with a lens of full aperture *f*/2.5. Externally the camera remains very much the same



as before, except for the inclusion of a delayed-action mechanism for the focal-plane shutter, which—in conjunction with "bulb"—will give an automatic exposure of some two seconds "time." Focussing is by helical mount, and is scaled up to a distance of 2½ feet from the camera. The lens is a Foth anastigmat of focal length 5 cm. (2 inches) and may be stopped down to *f*/18.

The finder is of the optical direct-vision type, and is ingeniously arranged to turn on a hinge for greater convenience to the user when the camera is used in either horizontal or vertical position. With lens equipment as above and a focal-plane shutter giving 1/25th second to 1/500th, also bulb, the price is £7 5s. 0d.

**ZODEL DE LUXE ROLL-FILM HOLDER.**

(Sold by Wallace Heaton, Ltd., 119, New Bond Street, London, W. 1.)

This roll-film adapter for plate cameras is unusual in that the back opens in two sections for insertion of the film. A sliding plate locks the two sections firmly together when the film is in place, and the action of the lock forces the film itself firmly down into the focal plane. The spool chambers are strongly built, and the full-spool holder has a locking device, so that film cannot be wound on until a lever is moved. A red window is provided, as usual, for examination of the film numbers, and the metal slide in front of the film moves smoothly and accurately in its slots. At the price of £1 1s. 0d. for 3½ × 2½ films, the adapter will be of great use to those who wish to use roll-film on their plate cameras. When ordering, details of the register of the camera should be given, otherwise the film plane may not coincide with the ground glass focussing screen.

**KOSMOS BROMIDE CARD, SMOOTH NATURAL SURFACE.**

(Sold by Kosmos Photographics, Ltd., Letchworth, Herts.)

This bromide card is a comparatively recent production of the

Kosmos factory, and is of excellent quality. Normal and vigorous grades are available, and cream and white base may be had at will. The smooth natural surface is particularly pleasant in texture, and has just that trace of irregularity that is of such use in producing large prints of first-class quality, while the emulsion gives good rich gradations when correctly exposed and developed. All standard sizes of paper may be had in packets or rolls.

### ENGEL POC-KET ART CORNERS.

(Made by The Engel Mfg. Co., 4711, 178, Clark Street, Chicago, Ill.)

These gummed corner pieces for mounting prints in albums are now available in an enlarged range of colours, including black, white, grey, gold, sepia, red, and silver. The price remains at 10 cents per hundred in U.S.A., 15 cents in Canada, and 8d. in Great Britain.



### THE "PHOTOSKOP" ELECTRIC EXPOSURE METER.

(Sold by Sands, Hunter & Co., Ltd., 37, Bedford Street, London, W.C. 2.)

This latest of electric meters, measuring the exposure by means of a photo-cell, embodies new features which render it of extremely wide scope in use, whilst the manipulation is of the utmost simplicity.



The meter is so designed that it indicates the exposure which must be given not only under good conditions of light, but also when the light is so poor that the taking of photographs is almost out of the question. This facility is obtained by the use of two separate scales, one of which is employed for reasonably good lighting, whilst the other applies to conditions of poor illumination. In neither

case is there any calculation; the exposure to be given is indicated by the meter. The price is four guineas.

### "ZIRCA" FLASHPOWDER.

(Sold by Johnson & Sons, Ltd., Hendon, London, N.W. 4.)

This flashpowder is put on the market in the usual two bottles, which are to be mixed together and kept in a tightly-corked bottle. In use, it generates an extremely brilliant light, and 100 grains exploded in a normal flash-lamp gave practically no smoke afterwards.

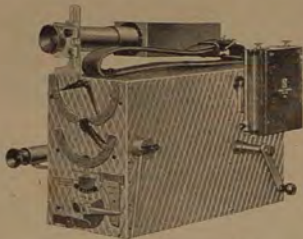


## CINE REQUISITES.

### THE "N.S." STANDARD 35mm. CINE CAMERA, MODEL 4.

(Sold by J. A. Sinclair & Co., Ltd., 3, Whitehall, London, S.W. 1.)

Since the standard model made by Messrs. Sinclair was first put on the market, numerous alterations and improvements have been made in the design, all of which show in the No. 4 model



now on the market. Externally the camera remains very similar to the original model, except that a parallax viewfinder, scaled down to 3 ft., has been fitted to the body, and reflex viewfinders of various lengths are available. Internally, however, great changes have been made. The No. 4 model runs equally well either way, and special provision is made for take-up of film when

running backward. A new and improved gate is also fitted, and embodies quite a new principle. The film is held to the presser pad of the gate by two lugs, and as the gate itself opens by cam-action each time the film is moved forward the emulsion is lifted from the metal surface. Scratches are thus avoided. When the gate closes for exposure of a frame, however, the film is clamped firmly between the two metal plates, and is thus held—by a registering pin—accurately in the focal plane. One result of this new gate is that a 17-inch telephoto lens will give practically as sharp and well-defined images as the standard 2-inch lens fitted to the camera. The camera itself turns easily (a distinguishing mark of all the "N.S." models) and a very small electric motor will take the film through it without any slackening of speed whatever. A commendable feature of the electrical arrangements for drive is that the motor resistance moves easily and smoothly along its travel, so that the camera is not jogged when speed is regulated. This may appear to be a small point, but is none the less an important one. With a Ross Xpres lens of aperture  $f/3.5$  the model 4 Standard camera sells at £250 0s. 0d., while accessories of the most varied nature are to be had at extra prices.

### NEW MODEL "PHOTOFLOOD" LAMPS.

(Sold by Kodak, Ltd., Kingsway, London, W.C. 2.)

These improved lamps are less in cost than the original "Photofloods," yet the illumination is some 150 per cent. more brilliant.

The life of the lamps, however, has been reduced to some two hour's burning time in producing this extra intensity, so that it is clear that the new type should be turned off, or the voltage on them reduced by a resistance, when not actually in use. With this degree of over-running the light is extremely actinic, and short exposures are possible. The new model incorporates, as in the older one, a safety fuse, and is made for all standard voltages. The price per lamp is 4s., against 7s. 6d. for the older model.

### THE WESTMINSTER CINE TRIPOD.

(Sold by the Westminster Photographic Exchange, Ltd., 24, Charing Cross Road, London, W.C. 2.)



This tripod is unusual in that the legs spread against metal lugs, and cannot splay out beyond a certain position and drop the camera on to the ground. This fact alone will commend it to many amateurs. Three sections of leg are incorporated opening to 50 ins. in maximum length and measuring when closed 25 ins. Reversible spikes and rubber buffers are provided at the bottom of the legs, and the adjustment for height is made in the top section and not the bottom one. This makes for convenience in handling. A tilt and pan head is fitted, with locking devices for each movement, and a folding handle for operating the head works the tilting lock as well as adjusting the camera angle. The head itself is strongly built, while the entire tripod is rigid when erected and shows a commendable absence of "flutter" when the camera is running. The entire tripod is made in metal and weighs some 3½ lbs. The price, £4 17s. 6d., is reasonable, considering the many movements and general rigidity of the construction, while the weight is not in any way excessive.

### KALEE NP3 16 mm. CINE PROJECTOR.

(Sold by Soho, Ltd., 3, Soho Square, London, W. 1.)

The introduction of this machine is of interest, as it marks another instance in which a well-known maker of 35 mm. apparatus has entered the 16 mm. field. Unlike some other such makers, however, Kalee have not based their 16 mm. projector entirely on 35 mm. experience, but have followed established sub-standard practice. Either a 400 or 500 watt biplane filament lamp may be used, and this, together with the rapid film movement and three-blade shutter, affords an extremely bright, steady, and flickerless picture. The machine is well made, metal to fibre gears being incorporated, the entire machine being made by Kershaws, of Leeds, with the exception of the lens, which is a Dallmeyer "Superlite." A large number of features are incorporated to render operation

safe in the hands of the inexperienced. There is only one flex for resistance and machine, and this can only be fitted one way round. The main switch starts the motor, so that the lamp is always being cooled while alight. A clutch starts the mechanism, and the clutch is automatically cut out on the loss of either loop. A pilot light burns until the light switch is turned; but the projector lamp only lights slowly as the switch is turned further. This avoids the sudden surge of current through a cold lamp, conserving its life, and should also afford a useful fade at the beginning and end of the film. Stills may be shown, for which purpose a heat filter is brought into play, and the film may also be shown backwards. The masking is optically compensated, and the machine is easily tilted on its pedestal by means of a knob at the back. Rewinding is effected on extensions of the reel spindles, it being possible to rewind as the next film is shown or to rewind separately. The price, including carrying case, reels, and tools, is £60.

### "S-K-S" TITLING BENCH.

(Sold by Cinepro, Ltd., 1, New Burlington Street, London, W. 1.)

This titling bench is made of metal, and comprises a table for the ciné-camera working by rack along slides, an adjustable series of rods and tubes for coarse setting-up of the distance from camera to title, and a title-board which is arranged to move up and down and side to side for purposes of centring. When not in use, the title board itself is folded over the camera table, and the instrument is compact for storage. The maximum size of title which the board will take is  $7 \times 9\frac{1}{4}$  ins., but by bringing the camera nearer to the board, sizes of title down to the original size of the picture on the film can be used. The only part of the apparatus that is not made of metal is the opal glass background in the title board, by means of which backlight for the letters can be used. Two camera screws—one for English and the other for continental threads—are provided, and the entire apparatus will meet with the approval of the serious amateur cinematographer. Prices may be had on application.

### DALLMEYER "POPULAR" TITLING OUTFIT FOR CINE CAMERAS.

(Sold by J. H. Dallmeyer, Ltd., 31 Mortimer Street, London, W.1.)

This outfit for photographing ciné titles consists of an optical bench of mahogany, with camera base at one end and title board at the other. The title board itself is fixed in position, but the camera base is movable, and thus either 8 mm., 9.5 mm., or 16 mm. cameras may be used to make titles. Two 40-watt electric lamps provide suitable light for the work, and these also can be moved back and forward from the title board according to the camera in use. With normal white



on black titles and normal-speed panchromatic film, a lens aperture of  $f/3.5$  is stated to give ample exposure. The titles themselves are cut out of thin white felt, and stick on the black velvet titling board without further attention, so that setting up the titles to be photographed is neither troublesome nor slow. The letters are provided in capitals and lower case, and number 200. The price of the outfit, complete with all accessories and two lamps, is £3 3s., while an extra fount of 200 letters may be bought extra at 10s. 6d.

### KODAFLECTOR JUNIOR.

(Sold by Kodak, Ltd., Kingsway, London, W.C. 2.)

The Kodaflector Junior is a small reflector and stand intended for use with a "Photoflood" lamp. By its use the light is concentrated in one direction, and the efficiency of the lamp increased  $2\frac{1}{2}$  times. The reflector comprises a conical card reflector, a wire stand, and 9 feet of electric cable with lamp-holder and bayonet adapter, all finished in a pleasant shade of bright green. The wire stand may be stood on any article of furniture available, or else hung up over a chair-back or picture rail, so that its usefulness is not limited to the standing position. As an accessory for home portraiture, amateur cinematography at night, and so on, the value of the Kodaflector Junior is without question,



and the price, 6s., cannot be considered anything but extremely reasonable.

### SIEMENS & HALSKE MODEL D CINE CAMERA.

(Sold by Cinepro, Ltd., 1, New Burlington Street, London, W. 1.)

This 16 mm. camera follows closely the lines of the other Siemens models, but has a sliding lens front carrying three lenses, any of which may be brought into action by a touch. A special prismatic view-finder is fitted, which is so near to the lens that practically all parallax effect is avoided, and close-up work may be done with certainty. The lenses available are of 1, 2, 3, 4, or 6 ins. in focal length, while special "mirror-lenses" made by Askania-Werke are available in focal lengths of 3 and 8 ins. All lenses are mounted on a standard thread and are thus interchangeable with one another. Four filming speeds are provided, giving 8, 16, 24 and 64 frames a second, and the change from one speed to another may be made while filming. The changing of the camera speed, however, does not (as in former models) alter the lens aperture automatically. The spring motor takes twenty feet of film through the camera before re-winding is needed, and a footage indicator is provided. The finish is in crystal black varnish, all metal parts being nickel-plated, and the weight of the camera including 1, 2, and 3-in. lenses is 4 lbs. Prices on application.

**B.T.H. 16mm. SOUND-ON-FILM PROJECTOR.**

(Sold by the British Thomson-Houston Co., Ltd., Rugby.)

Since the first model of this projector was announced last year, numerous improvements in the mechanism have been made, and the entire instrument has been redesigned. The use of a special



optical system has enabled a picture some 8 feet wide to be shown with good brilliancy, and which can be seen comfortably by 400 people. The sound output is also arranged to correspond. A special tandem condenser is used in the illuminating system, and a screen illumination of 300 lumens is claimed. The sound optical system is built on one plate, and a special sound drum is fitted which is arranged to avoid any

possible flutter due to gear action. The film itself conforms to the S.M.P.E. 16 mm. sound-film, with single perforations, and arms either for 800 feet or 1,600 feet spools may be fitted. I.C.E. standard films can, however, also be shown. The two arm sets are interchangeable. Mechanical rewind is also fitted as a matter of course. Both picture and sound from the projector are very satisfactory, and when the projector case is closed there is very little mechanical noise to interfere with the sound output. Provision for tilting the projector is included. The projector proper is one unit of the equipment, the other two being a mains unit and the loud-speaker case. The mains unit is arranged for all voltages of alternating current and is small and compact, while the loud-speaker case holds as well all the various wires necessary for convenience in work. The weight of the entire apparatus is 120 lbs., and the price complete £160.

**REFLECTOR CARD FOR "PHOTOFLOOD" LAMPS.**

(Sold by Kodak, Ltd., Kingsway, London, W.C. 2.)

It often happens that when one "Photoflood" lamp is used for lighting home portraits, the result is rather harsh. The present reflector card has been introduced to soften these hard contrasts, and consists of a corrugated material with a metallised surface, which effectively diffuses the shadow thrown by the naked "Photoflood," and renders the lighting effect more pleasing. A large sheet, 20 x 18 ins., costs the small sum of 1s. It goes without saying that the card is equally useful for other light-sources.

**ENSIGN 16 mm AUTOKINECAM.**

(Sold by Ensign, Ltd., 88/89, High Holborn, London, W.C. 1.)

A number of minor alterations have been made during the past year in the ciné cameras supplied under the title of "Autokinecam" by Ensign, Ltd., one of the most important being the provision, at an extra price, of a parallax view-finder, on the side of the body. This attachment makes it possible to make certain that near objects in close-up work are correctly in line with the camera lens—a point that is usually very difficult with the normal finder that does not lie in the lens plane. The sight of the parallax view-finder is adjustable for varying positions of subject from camera lens, and the distances are very legibly engraved on the scale. With this axial parallax view-finder, and a 1-in  $f/2.8$  Cinar anastigmat, the Model 6 camera sells at eighteen guineas, while the Model 9 turret-head camera with the same view-finder sells at £25. The other mechanical and optical details remain substantially the same as those of previous models.

**THE "FILMO 121" 16 mm. CINE CAMERA.**

(Sold by Bell &amp; Howell, 320, Regent Street, London, W. 1.)

This camera is a complete departure from traditional "Bell & Howell" lines in that it is of rectangular shape, and uses a charger of film holding 50 ft. Once the door in the back of the



camera has been opened and the charger inserted, the door is closed and nothing further need be done before starting to film. The camera is neatly and solidly made, and carries on one side an exposure finder, which will be of the greatest use for beginners. The lens is a 20 mm. (universal focus) one with an aperture of  $f/3.5$ , so that in dull light filming is still possible on fast stock. Both "waist-level" and "direct-vision" finders are

supplied, and the camera will run at either 16 or 24 frames per second. Not the least useful feature of the clockwork mechanism is that it automatically stops the camera when the motor has run down. This means that it is not possible for the motor to slow down

gradually, and cause bad results through exposure changes. The finish is particularly pleasant, in brown and black (the latter for the lens mount), and a short strap is provided for carrying in the hand. The camera is priced at £19 0s. 0d., including lens and leather carrying case, and should prove an attractive proposition for beginners in film work.

### AGFA FINE GRAIN PANCHROMATIC NEGATIVE 16mm. CINE FILM.

(Sold by Agfa Photo, Ltd., 1/4, Lawrence Street, High Street, London, W.C. 2.)

This film has been introduced by Messrs. Agfa as a "normal" speed negative panchromatic ciné film for amateurs, and the results obtained are highly satisfactory.

As far as we can judge from standard tests, the daylight speed of the film is approximately 18 degs. Scheiner, as judged on an extinction-type exposure meter, and when used at this value exposures are slightly on the "full" side. The speed to half-watt lamps is more difficult to judge, but we should judge a value of 19 degs. Scheiner would give good exposure. In view, however, of the variations of various exposure meters, it would be necessary to make further tests for this type of work.

Although the sensitivity to red of the film is not so relatively great as in the case of emulsions of the "super-speed" type, good colour correction can be obtained in daylight without a filter, and it is clear that full correction will only involve the use of a relatively light filter.

The grain is undoubtedly fine, and only traces of granularity appear when the *negative* is projected. This is possibly achieved partly by soft development of the negative, but there is ample contrast in the negative result when the contrasty nature of positive stock is considered.

The positive print supplied is also commendably free from grain when projected, and it is only under conditions of seriously incorrect exposure in the original negative that it becomes in any way noticeable. There seems to be adequate correction in printing for variations of negative density, and good contrast is shown throughout. Our test was made on a variety of subjects, under conditions of both correct and incorrect exposure.

The new film should be popular among amateurs who prefer to use negative material, yet who have been troubled by the thought of grain in their results, and it is worthy of note that the film returned to us was beautifully polished on the "shiny" side. This point is of more importance in negative film than is generally realised. Prices are the standard ones for film, developing, and printing, viz., 19s. per 100 ft. for film, and 15s. for developing and supplying a print. Special 33 ft. lengths are supplied for the Agfa "Movex" camera, and here a 40 ft. length cannot be used, for the negative film is rather thicker than the reversal stock.

**THE "ARRI" PRINTER FOR 16mm. AND 9.5mm. FILMS.**

(Sold by Sands, Hunter &amp; Co., Ltd., 37, Bedford Street, London, W.C. 2.)

In placing these machines on the market here, Messrs. Sands Hunter have at last made available a full range of apparatus for the processing of a sub-standard film. The printer is made for



both 16 mm. and for 9 mm film, both models being on the same lines. They are very well made, and have the advantage of simplicity. The negative and the raw positive stock are placed on reels at the top of the machine, and are fed down through the gate by a simple double-claw mechanism. No pick-up is provided, as the films are intended to be led down into baskets or bins. The drive is by means of a small electric motor, and this and the electric printing lamp within the machine can be run off any normal specified electric line voltage. A very simple clutching and de-clutching device is connected with the motor, so

that the printer can be started or stopped in a moment. The film is printed in steps, as in a projector, the light being cut off by means of a shutter during the movement of the film. The pressure-pad of the gate is of ruby glass, so that the printing can be watched, and a change in the printing light be made at any change in the density of the negative. For this purpose a simple three-way switch is provided which in effect gives separate control of the motor and the light. There must be a wide field for these instruments. Many amateurs have been known to rig up their own printers, and there are a good many of those who are making commercial films, to whom the negative-positive process is very desirable, who will welcome the opportunity to cut away from cine D. and P. and keep the whole of the photography in their own hands. The price of the printer in each size of film is £20.

**KODASCOPE MODEL D 16mm. CINE PROJECTOR.**

(Sold by Kodak, Ltd., Kingsway, London, W.C. 2.)

Readers will recall that Kodak, Ltd., have more recently been in a position to convert the well-known Kodascope C projector to take a 300-watt lamp. The Model D machine, which has now become available, is the Model C specially adapted to take the larger wattage lamp, with a consequent improvement in compactness

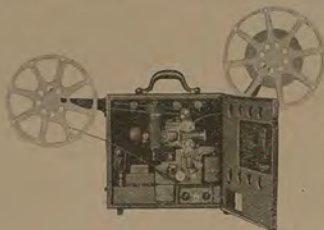


and appearance over the special adaptations formerly made. Apart from the addition of fan-cooling, the only other variation from the Model C is the fitting an objective lens of  $1\frac{1}{4}$ -in. focus, as standard. In view of the amount of light available, a brilliantly-lit picture is thus obtained at a relatively short throw. The machine, which is light and portable, should find favour not only in the domestic circle, but more particularly for classroom use and shows in small halls. Apart from anything else, these considerations are weighty ones when the popularity of small "shows" is taken into account. The price, including the resistance for voltages from 100 to 250, is £25.

### THE "FILMOSOUND" TALKIE REPRODUCER.

(Sold by Bell & Howell, 320, Regent Street, London, W. 1.)

This 16 mm. sound-on-film reproducer has a sound output of 15 watts, and a projection lamp of 500 watts, so that an audience of 300 will be no detriment to its use. The outfit is in two cases;



one housing the projector, amplifier, and electrical gear, and the other the loudspeaker and flexible leads. Neither of the cases is unduly cumbersome, though they are naturally fairly heavy. On opening the sides of the projector case, all parts are readily accessible, and threading-up is very simple. For use, however, the sides are closed, and

the controls worked from outside, which implies that projector sound will be cut down to a large extent. The lens equipment is a Cooke, of aperture  $f/1.65$ , so that Kodacolor film can also be shown in reasonable brightness, and the film is the single-perforation

S.M.P.E. standard. Spools for housing 1,200 or 1,600 ft. are provided, so that long shows can be given without any necessity to rethread the machine. 110-volt alternating current is the standard for mains supply, but the price of £200 0s. 0d. includes the projector, speaker, and a tapped transformer for use on standard line voltages. For direct current a switch must be turned over on the machine, and a separate rotary converter used. It only remains to be said that reproduction, both of picture and sound, is really good, and that projector noise is relatively low.



## THE PATHÉSCOPE 17.5 SOUND-ON-FILM TALKIE PROJECTOR.

(Sold by Pathéscope, Ltd., 5, Lisle Street, London, W.C. 2.)

Messrs. Pathéscope, not being satisfied with any of the sub-standard film gauges now on the market, have devised one for their new "talkie" projector which has a number of merits. The 17.5



film may be printed direct from the original 35 mm. negative, and then slit, giving two films, which clearly makes for a reduced cost of film production. At the same time, the sound track can be of really large dimensions, for there is plenty of "room" on the film for both picture and track, and finally, the track is well away from the row of sprocket holes, thus avoiding any question of "flutter."

If the film size is original, so also is the projector. The lamp, 125 watts consumption, lights both picture and sound track, and is so well placed relative to the mirror and condenser that a brilliant picture, 8 ft. wide, is easily obtained. The small amount of light necessary for sound-track scanning is thrown upward through a lens system, and passes through the sound track on to a concave mirror, being then reflected backward into the aperture provided on the amplifier cover for the photo-cell. The volume control is merely a barrel shutter, which may be turned to exclude light from the photo-cell, and is extremely effective in operation.

The projector shutter is of the barrel type, and there is an entire absence of flicker on the screen during projection, while the projection lens is 32 mm. in focal length. Other lenses will be available later, and interchangeable with the standard one.

Threading-up is simple, only one sprocket being used, and pleasantly few guides are to be found. The motor is a large synchronous model, thus being completely stable in speed on 50-cycle A.C. and the machine includes a resistance for all voltages between 110 and 250.

The performance of the projector has to be heard to be appreciated, for both reproduction and volume are really excellent, and there are certainly many cinemas using 35 mm. standard film that do not give such good results. For carrying, the machine remains in its

sound-proof case, and the loud-speaker is carried as a separate unit. The entire outfit weighs some 40 lbs. and sells complete at £60.

### KANDEM OVERHEAD 2000 WATT LIGHTING UNIT.

(Sold by Kandem, Ltd., 711, Fulham Road, London, S.W. 6.)

This unit has been evolved to provide high-intensity overhead light in a concentrated form, and will have a number of applications in ciné work. A long-focus parabolic stippled reflector is fitted behind the lamp, and the metal hood surrounding the reflector is adjustable. The hood is intended to adjust the area of illumination and to keep the light out of the camera lens. A wire screen and silk diffuser are also fitted, so that lamp breakages are unlikely and the beam can be simply diffused, while the entire unit is mounted on two metal arms terminating in a combined slinging cradle and junction box for the current. The unit is of ample size to avoid undue overheating, and ample provision for focussing the lamp itself is provided. The price (without lamp) is £11 2s. 6d.



### TRANSFORMERS FOR CINE PROJECTORS.

(Sold by J. H. Dallmeyer, Ltd., 31, Mortimer Street, London, W. 1.)

Since modern ciné projectors have tended in recent years to use high-power lamps, Messrs. Dallmeyer have introduced a modified version of their cine projector transformer. The new model has an output of 850 watts, at 100 or 110 volts, the mains input being 200 to 250 volts, 50 cycles. These transformers are suitable for all projectors running on 100 to 110 volts, and are an attractive proposition at the price of £7 10s. each.



### THE ENSIGN TITLE WRITER.

(Sold by Ensign, Ltd., 88/89, High Holborn, London, W.C. 1.)

This new addition to the very long list of ciné accessories marketed by Ensign, Ltd., provides in a very convenient and portable form a ready means of making titles with the well-known "Kinecam" 16-mm. ciné camera. It consists of a short ebony-finished board,

at one end of which is a "saddle," into which the camera is firmly fixed on its side. At the other end a small folding frame lifts up, and into this is inserted a card  $4\frac{1}{2}$  ins.  $\times$   $3\frac{1}{2}$  ins., bearing the written title. A supply of cards in four shades, black and white titling ink, penholders and nibs is also included. No titler could be simpler, and it has the merit that when not in use it occupies but very little space. Complete, in a strong box, the price is £2 2s.

### THE ZEISS IKON KINOX 16 mm. PROJECTOR.

(Sold by Zeiss Ikon, Ltd., Mortimer House, Mortimer Street, London, W. 1.)

The Kinox is a portable-type projector which resembles a black suitcase when closed. The sides fall open when two buttons are pressed, and the good design of the instrument can then be appreciated.

The lamp-house and lamp, which are situated on the side of the case, are carried within the body and are locked down when the case is shut in order to avoid damage. On removing the lamp-house from its locking clamp, it may be lifted out and put in position by means of three locking pins on the side of the case, the current being carried by a two-pin plug which fits automatically into contacts on the case itself.

The projector is provided either with a 250 watt—110 volt, or 375 watt—75 volt lamp, and an adjustable resistance and air blower is provided with the latter, so that overheating may be avoided. Air-cooling for the various resistances used to reduce the mains voltage is also built into the case, and the resistances may be easily changed when necessary.

An unusual feature of the Kinox is that two shutters, one with two blades and one with three, are provided in the standard outfit, and the change from one to the other is a few moments work only. As the lamp is on the side of the housing, a mirror reflects the light

at right angles into the film gate and the lens, the latter being of aperture  $f/1.4$ . Still pictures may be shown by turning a knob on the outside of the case, and a heat screen falls into position as the speed of the motor falls, so that burning of films is rendered impossible, even with the high-power lamp.

Refinements of the Kinox include on and off positions for projection on a separate switch from the motor resistance, motor rewind, interchangeable lenses of various focal lengths (at extra cost), and the finish and appearance is extremely good. With a 250 watt lamp the projector sells at £55 10s. 0d., and with a 375 watt lamp at £62 10s. 0d. These prices including 10 feet of flexible cable and two 400-foot spools. At an extra price a suitable projection stand, as illustrated, may be had.



**VICTOR CINE CAMERAS.**

(Sold by J. H. Dallmeyer, Ltd., 31, Mortimer Street, London, W. 1.)

Of these well-known 16 mm. cameras, a new model, No. 3, has recently been issued with most attractive russet-brown finish of the case, and with non-detachable winding crank. This Victor ciné camera is fitted with 1 in.  $f/2.9$  triple anastigmat in micrometer focussing mount, and is sold at £22 1s. Messrs. Dallmeyer now have the new Victor Animatophone, the machine for ciné film projection plus sound reproduction (Sound-on-film). This machine, complete with phono-pickup and loud speaker in neat carrying case is supplied



at the price of £126.

**THE AMACINE TITLING BOARD.**

(Sold by Amateur Cine Service, 52, Widmore Road, Bromley, Kent.)

This board has been introduced to meet the demand for a titling board giving white letters on a black background at a price within the reach of every amateur cinematographer. The board is of card, with four slotted grooves to take the letters, the latter being pushed in from one end. The letters themselves are supplied in considerable number, and are of pleasing design. Their black backgrounds match the board itself, so that when properly lit no lines should be visible in the finished title. The board is provided with a back strut by means of which it is held in a vertical position during filming. At the modest price of 7s. 6d. for board and letters we feel that it should be very popular.

**THE "SUPER-CELFIX" CINE SCREEN.**

(Sold by R. F. Hunter, Ltd., 51, Gray's Inn Road, London, W.C. 1.)

Up till recently it has not been possible to obtain these portable bead screens in a larger size than  $8 \times 6$  ft., but with a number of manufacturing improvements sizes up to  $13 \times 10$  ft. are now possible. These still retain the same portable and folding construction as the original "Super-Celfix" screen, and may be had at the price of £36 for  $9 \times 7$  ft., £40 for  $10\frac{1}{2} \times 8$  ft., £48 for  $12 \times 9$  ft., and £60 for  $13 \times 10$  ft. sizes.



## THE ROTH UNIPOD.

(Sold by A. Roth, 85, Ringstead Road, Catford, London, S.E. 6.)

This unipod is made of drawn metal tube, and is specially



intended for use with light cameras of the miniature type, or sub-standard ciné cameras. It may be used fully drawn out, the end resting on the ground or on any convenient ledge, or else may be closed and the end placed in a special leather bucket slung by a strap round the neck. In either position it will be found a very useful accessory for users of small ciné cameras, and will allow the hands to be left a little freer for manipulating controls than when the camera is held in the hand alone. Including the leather bucket and strap, Size 1 (closed 10 ins.—full extension 4 ft. 3 ins.) weighs 10 ozs., and costs 15s. Size 2 (closed 13 ins.—full extension 5 ft.) weighs 13 ozs., and costs 17s. 6d. For cameras having a continental screw thread in the bush, an adapter is supplied at 1s. extra.

## TELEPHOTO LENSES FOR CINÉ CAMERAS.

(Sold by J. H. Dallmeyer, Ltd., 31, Mortimer Street, London, W. 1.)

In continuance of their policy of designing and supplying telephoto lenses for every purpose, Messrs. Dallmeyer have brought out one of their Popular telephotos of  $f/4$  aperture and  $1\frac{1}{2}$  ins. focal length for use on the Ciné-Kodak Eight 20. The price of this lens is £4 4s., and Messrs. Dallmeyer will fit it interchangeably with the standard lens of the Ciné-Kodak at a further charge of 10s. 6d.



Also for the Model BB Junior Ciné-Kodak they supply a 3 in.  $f/4$  Popular telephoto at the price of £5 5s. This lens can be fitted interchangeably with the standard  $f/3.5$  or  $f/1.9$  lens of the BB Junior at a charge of £1 1s.

**THE SIMPLEX POCKETTE 16 mm. FILM CAMERA.**

(Sold by E. Gorse, 86, Accrington Road, Blackburn.)

This 16 mm. camera is made by the International Projector Corporation of New York, and has only now appeared in this country. It is simply but sturdily built, and loads by means of a charger, the latter being inserted into the camera through a door in the back. The charger is arranged to avoid any threading-up, and once it has been pushed into the camera and the door shut the film engages automatically.



The lens is a Kodak Anastigmat of focal length 25 mm. (1 in.) and has a full aperture of  $f/3.5$ , while the "brilliant" finder is near enough the lens to avoid parallax effects. The wire finder on the side of the camera opens from its bed easily, and appears to be accurately

matched with the "brilliant" one. The lens itself does not focus, but is of the all-distance type.

The exposures may be made at 16 or 12 frames a second, and single pictures can be made at will, while by pushing the exposure button to the limit of its travel it locks down automatically, thus enabling the camera to be left running unattended. The shutter is of the barrel type, and two claws are provided for film travel, one being merely to position the perforations so that tearing is avoided.

A special device exposes any pre-determined footage of film and stops the camera when it has run off, and the clockwork motor provides exposures some 25 ft. in a winding. The winding handle is of the non-rotating variety, and is placed conveniently to the hand.

The finish is in grey metallic cloth and bare metal, and the appearance is extremely good, while the price of £22 10s. will attract favourable attention.

**GUMMED CELLULOSE TAPE.**

(Sold by Amateur Cine Service, 52, Widmore Road, Bromley, Kent.)

This product, which has been on the market in U.S.A. for some time, has the peculiarity that it remains sticky indefinitely, and it can be removed from a film to which it is attached and replaced once more without loss of tenacity. This is invaluable in sub-standard work, for it is not yet possible to achieve the wide range of "wipes" and other effects achieved by the 35 mm. printer. At the same time, there are a number of other uses for the tape—such as sealing up film tins—which will suggest themselves to any cinematographer who has expended the sum of 5s. on a roll of it.



(All formulae have been revised for the present edition).

## ORTHOCHROMATIC PROCESSES

### Colour Sensitisers.

Sensitol Red and Sensitol Violet both sensitise strongly for red, orange and bright (yellowish) green. Sensitol Green sensitises strongly for the whole of the blue-green, yellow-green, and yellow, and well into the orange-red.

Plates treated with the red or violet dye may be handled by the light of a safe-lamp transmitting only bluish-green light between  $\lambda 50$  and  $\lambda 52$ , but no other light is permissible. Plates treated with Sensitol Green may be handled by a deep ruby light.

A clean working plate, and in the case of Sensitol Violet a slow plate, such as Ilford Ordinary or Empress, should be selected for treatment in order to obtain sensitised plates free from veil.

### Stock Solutions.

In making these it is preferable to dissolve the dye first in part of the solvent (heated), and then to dilute to the requisite strength. The Sensitol Red is made up to 1:1000 and the Sensitol Violet up to 1:5000 with alcohol or industrial spirit.

Sensitol Green is also made up to a strength of 1:1000, but a quarter of the solvent, in

which the dye is first dissolved, should preferably be methyl alcohol or wood spirit, the remainder being alcohol or industrial spirit.

All these solutions keep indefinitely in the dark; there is, however, a tendency for Sensitol Red to crystallise out at low temperatures, in which case it should be re-dissolved by careful warming.

### Bathing Process.

The actual sensitising baths may be obtained by diluting the stock solutions with water (red and green dyes only) or with spirit.

### Aqueous Dye Bath.

Distilled water, 1,000 parts; stock dye solution, 15-20 parts.

Bathe for about 3 minutes, wash well in running water or frequent changes for several minutes, and then dry as quickly as possible in a current of warm dry air free from dust.

### Alcohol Dye Bath.

	<i>Red.</i>	<i>Green.</i>	<i>Violet.</i>
W ...	500	500	500
S ...	250	250	200
D ...	10	15	50

W is distilled water; S, industrial spirit; D, stock dye solution.



Bathe for about 3 minutes, and then dry, without washing, in a current of dry air; this must be cool in the case of the Sensitol Violet dye.

All the above operations should be conducted in darkness or in a minimum of deep red light (in the case of Sensitol Green) or of bluish-green light (for Sensitol Red or Sensitol Violet).

The aqueous baths gradually deteriorate on keeping.

The alcoholic baths keep in good condition and may be renewed, after use or after long storage, by the addition of a little stock dye solution.

### Safelights.

The following formulæ are for safelight screens made by coating glass with gelatine solution containing a dye. They are suitable for use with electric light, but the screens are liable to fade and become unsafe when used as filters of daylight.

Throughout, the gelatine is one of 6 per cent. strength (60 gms. dissolved in 1,000 c.c.s. water). Each dyed solution is applied in the proportion of 7 c.c.s. per 10 square inches of glass.

Each safelight is made by binding together two coloured gelatine-coated glasses film to film, with or without insertion of white tissue or other paper according as direct or diffused light is desired.

### Bright Yellow.

*For Lantern Plates or Gaslight Papers.*

Gelatine solution ... 500 c.c.s.  
(Naphthol Orange, 4 gms., dissolved in 100 c.c.s. water.)

### Orange.

*For Bromide Papers.*

I.—Gelatine solution 100 c.c.s.  
Tartrazine ... 0.8 gm.  
II.—Gelatine solution 100 c.c.s.  
Rose Bengal... 0.3 gm.  
(I. and II., bound film to film, form the safelight.)

### Red.

*For Ordinary and Yellow-green-sensitive Plates.*

Gelatine solution ... 500 c.c.s.  
Dark-Room Red  
(Höchst) ... 4.5 gms.  
(dissolved in 100 c.c.s. water.)

### Green.

*For Ordinary and Yellow-green-sensitive Plates.*

Gelatine solution ... 500 c.c.s.  
Dark-Room Green  
(Höchst) ... 4 gms.  
(Dissolved in 100 c.c.s. water.)

### Dark Red.

*Relatively safe for Panchromatic Plates.*

Gelatine solution ... 500 c.c.s.  
Dark-Room Dark  
Red (Höchst) ... 4.5 gms.  
(Dissolved in 100 c.c.s. water.)

### Dark Green.

*For Panchromatic Plates.*

Naphthol green 61 grs.  
(8 gms.)  
Filter Blue soln.  $\frac{1}{2}$  oz.  
(32 c.c.s.)  
Gelatine (8%) ... 16 ozs.  
solution (1,000 c.c.s.)

The Filter Blue solution is prepared by dissolving 0.1 gm. (0.88 grs.) of Filter Blue in 1,000 c.c.s. (20 ozs.) of water, and adding 1 c.c. (1 minim) of ammonia. Of the mixed solution allow 7 c.c.s. per 100 sq. cm. (750 minims per 100 sq. ins.)

## MAKING SOLUTIONS.

To dissolve chemicals with least labour, suspend in muslin or calico bag at top of liquid; solution falls as it is formed, and fresh water constantly comes in contact with the crystals or powder.

If these latter are at the bottom, the heavy solution collects round them and requires constantly stirring to remove it.

Make sure that every bit of the developer is dissolved; metol and amidol are the least soluble developers, and undissolved particles will cause black spots on plates.

When making single-solution developers, dissolve the alkali (soda carbonate or caustic soda) separately in, say, one-quarter of the water and the other chemicals in three-quarters, to which then add the alkali solution.

A bottle with a flat rim of shape shown in fig. 1 pours badly as a rule; the liquid dribbles down the outside.

Fig. 2, on the other hand, is the kind of bottle neck which pours well.



Fig. 1



Fig. 2

In making up the solutions note that those containing the developer do not keep in good condition indefinitely, and that therefore it is well to prepare

not more than for, say, three months' use. The alkali, usually the B. solution keeps longer, but should be kept in a corked bottle, not one with a glass stopper, which is liable to stick.

Distilled water is not necessary for making up developers, though it is the best. But it is advisable to use ordinary tap or rain water after boiling briskly for five minutes and allowing to stand quietly to cool.

### Filtering.

Filtering a solution consists in passing it through a porous paper held for convenience in a glass funnel.

The circular filter is folded once (fig. 3).



Fig. 3

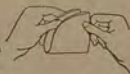


Fig. 4

Then again (fig. 4), taking care not to run the crease right down to the point, as this may break the paper.

And then opened out into a cone (fig. 5).



Fig. 5



Fig. 6

The funnel is placed in the neck of a bottle, inserting a strip of card so as to form a vent for the air, or supported on a filter stand (fig. 6).

## NEGATIVE DEVELOPERS.

### Weights and Measures.

In all formulæ the metric weights are not equivalents of the British item for item, but each formula gives a solution of the same composition.

### Desensitising.

Various safranin dyes, notably pheno-safranin, may be employed in the form of a 1:2000 solution for the desensitising of sensitive materials in a preliminary bath before development. Alternatively, this solution may be added to the working developer in the proportion of 1 part to 10 parts of developer.

After an immersion of at least one minute, all plates and films of moderate speed and colour-sensitiveness may be safely developed by subdued white light or by a bright yellow safelight. Ultra-fast and panchromatic plates still require care; the behaviour of the latter varies with the mode of sensitising and may necessitate a feeble white light in preference to a red safelight.

With a safranin-treated plate a hydroquinone developer becomes as quick-acting as metol; M.Q. is almost unaffected; pyro-soda and amidol are slightly restrained, the Watkins factor being depressed by one third.

Slight pink stain produced by these desensitisers has no effect in printing, but may be removed by treating with:—

Sodium nitrite ...	50 grs.
	(5.2 grms.)
Hydrochloric acid	100 mins.
	(10 c.c.s.)
Water ...	20 ozs.
	(1,000 c.c.s.)

Immerse for 5 minutes; remove the resulting blue com-

pound by 5 minutes' washing.

A 5 per cent. solution of washing soda will also remove the stain from the fingers and, to a large extent, from the negatives.

### PINACRYPTOL-GREEN.

Used as a 1:5000 solution pinacryptol-green acts as efficiently as safranin with ordinary plates and more so with colour-sensitised plates. It also requires at least 1 minute's immersion and may be used in the developer by adding 5-10 drops of stock 1:500 solution to each ounce of developing solution.

Like safranin, pinacryptol similarly energises hydroquinone, has little effect with M.Q. or pyro, and markedly restrains the amidol developer.

The extent to which panchromatic plates are desensitised varies according to their mode of sensitising; many forms can, however, safely be developed by bright red or yellow safelight.

### Amidol.

While amidol is one of the best developers for bromide paper it can be used for plates, with which it gives somewhat soft negatives.

Amidol ...	40-60 grs.
	(4.2-6.2 grms.)
Soda sulphite ...	500 grs.
cryst.	(52 grms.)
Potass bromide...	10 grs.
	(1.04 grms.)
Water, to make	20 ozs.
	(1,000 c.c.s.)

It is best to use the developer on the same day that it is made up, although the solution can be used during the next day or two. Especially for prints, it is best to dissolve the sulphite when making up the developer.

## AMIDOL TO KEEP.

A method of making amidol developer which will keep for several weeks in good working condition is as follows: A solution is made of sulphite and metabisulphite, viz. :—

Soda sulphite	4 ozs.
cryst.	(182 gms.)
Potass. meta-	$\frac{1}{2}$ oz.
bisulphite	(227 gms.)
Water, to make	20 ozs.
	(1,000 c.c.s.)

It is best to boil this mixture after having dissolved the chemicals in moderately hot water. Boiling is not essential, but it improves the keeping qualities of the solution. The developer is made by taking :

Amidol ...	... 40-60 grs.
	(4.2—6.2 gms.)
Stock sulphite ...	4 ozs.
solution	(200 c.c.s.)
Potass bromide...	10 grs.
	(1.04 gms.)
Water, ...	20 ozs.
to make	(1,000 c.c.s.)

## Azol.

For Plates and Films :—

Normal exposures.

Azol ...	... $\frac{1}{2}$ oz.
	(5 c.c.s.)
Water ...	6 ozs.
	(120 c.c.s.)

Under-exposures.

Azol ...	... $\frac{1}{4}$ oz.
	(5 c.c.s.)
Water ...	8 ozs.
	(160 c.c.s.)

Over-exposures.

Azol ...	... $\frac{1}{4}$ oz.
	(5 c.c.s.)
Water ...	4 ozs.
	(80 c.c.s.)

For stand development :—  
Azol, 1 part; water, 100 parts.

For tank development —  
Azol,  $\frac{1}{4}$  part; water, 40 parts.  
Time of development of films at 60 deg. F., 20 to 30 minutes.  
This solution may be used several times in succession.

## Ferrous Oxalate.

A.—Potass. oxalate (neutral), 5 ozs.; hot water, 20 ozs. Cool, and pour off clear liquid.

B.—Warm water, 20 ozs.; sulphuric acid, 30 minims; sulphate of iron, 5 ozs.

Mix 1 oz. of B with 3 to 4 ozs. of A (pouring B into A).

## Chlorquinol-Metol.

(Johnson's)

Metol ...	... 16 grs.
	(1.67 gms.)
Chlorquinol ...	48 grs.
	(5.0 gms)
Soda sulphite,	1 oz.
cryst ...	(45.5 gms.)
Soda carbonate	1 oz.
cryst	(45.5 gms.)
Potass bromide	4 grs.
	(0.42 gms.)
Water, to make	20 ozs.
	(1,000 c.c.s.)

Dilute with equal bulk of water, for plates, films and bromide papers. For gaslight papers, use as above.

## Glycin.

ONE-SOLUTION (HÜBL).

Sodium sul-	2 $\frac{1}{2}$ ozs.
phite, cryst.	(568 gms.)
Boiling water ...	4 ozs.
	(1,000 c.c.s.)

When dissolved, add—

Glycin ...	... 1 oz.
	(27 gms.)

And then in small quantities—

Potass. car-	5 ozs.
bonate	(1,137 gms.)

This forms a thick cream, which must be well shaken, and then diluted with water; for normal work, dilute 1 part with 12 or 15 parts of water; for very soft results, with 30 parts of water.

Glycin is a slow-acting developer, which keeps for a very long time, and yields negatives perfectly free from stain. It is the best developer for "Stand Development" (which see).

### Hydroquinone.

Made up with soda carbonate (as per the first formula below) hydroquinone is a rather slow-acting developer. The caustic-soda formula is quicker, but easily gives excessive density and contrast; it is best suited for line drawings or subjects where full contrast is required.

#### ONE-SOLUTION.

Hydroquinone ...	100 grs.
	(10.4 grms.)
Soda sulphite ...	1½ ozs.
cryst.	(68 grms.)
Soda carbonate	3 ozs.
cryst.	(136 grms.)
Water, to make	20 ozs.
	(1,000 c.c.s.)

May be diluted with an equal volume of water.

This formula is not so quick in action as the next one, but there is less tendency for the great density in the high-lights which is easily produced in cases of under-exposure. In all cases the temperature of the hydroquinone developer should not be allowed to fall below 60 deg. F. (15° C.), otherwise the solution becomes inert.

#### ONE-SOLUTION (FORMALINE).

Hydroquinone ...	130 grs.
	(13.6 grms.)
Soda sulphite ...	6 ozs.
cryst.	(273 grms.)
Formaline ...	3 drs.
	(18.5 c.c.s.)
Water, to make	20 ozs.
	(1,000 c.c.s.)

A slow developer, giving great clearness in the shadows, and plenty of density in high-

lights, and specially suitable for line-subjects

#### TWO-SOLUTION (CAUSTIC SODA).

A. Hydroquinone	160 grs.
	(16.6 grms.)
Soda sulphite	2 ozs.
cryst.	(91 grms.)
Citric acid ...	60 grs.
	(6.25 grms.)
Potass. bromide	40 grs.
	(4.16 grms.)
Water, to make	20 ozs.
	(1,000 c.c.s.)
B. Caustic soda	160 grs.
(stick)	(16.6 grms.)
Water, to make	20 ozs.
	(1,000 c.c.s.)
For use:—A, 1 part; B,	
1 part; water, 2 parts.	

### Metol.

#### ONE-SOLUTION.

Metol ...	150 grs.
	(15.6 grms.)
Soda sulphite	2½ ozs.
cryst.	(114 grms.)
Soda carbonate	3½ ozs.
cryst.	(1.9 grms.)
Potass. bromide	16 grs.
	(1.66 grms.)
Water, to make	20 ozs.
	(1,000 c.c.s.)

For portraits, take stock solution, 1 part; water, 2 parts. For landscapes, stock solution, 1 part; water, 1 part.

#### TWO-SOLUTION.

A. Metol ...	150 grs.
	(15.6 grms.)
Soda sulphite	2½ ozs.
cryst.	(114 grms.)
Water, to make	20 ozs.
	(1,000 c.c.s.)
B. Soda carbon-	3½ ozs.
ate, cryst	(1.9 grms.)
Potass. bromide	16 grs.
	(1.66 grms.)
Water, to make	20 ozs.
	(1,000 c.c.s.)

For landscapes, A, 1 part; B, 1 part. For portraits, A, 1 part; B, 1 part; water, 1 part.

Metol gives delicate negatives with great detail and little density unless development is greatly prolonged.

In making up all metol developers, dissolve the metol first, then the sulphite, and then the other chemicals, using warm but not hot water.

### Metol-Hydroquinone.

Dissolve the chemicals in metol-hydroquinone developers in the order given in the formulæ.

#### ONE-SOLUTION.

Metol ... ..	35 grs.	(3.66 gms.)
Soda sulphite cryst.	2 ozs.	(91 gms.)
Hydroquinone ...	50 grs.	(5.2 gms.)
Potass. bromide	15 grs.	(1.56 gms.)
Soda carbonate cryst.	1½ ozs.	(68 gms.)
Water, to make	20 ozs.	(1,000 c.c.s.)

This is mixed with an equal volume of water at the time of use.

#### TWO-SOLUTION.

A. Metol ... ..	40 grs.	(4.16 gms.)
Soda sulphite cryst.	120 grs.	(12.5 gms.)
Hydroquinone	50 grs.	(5.2 gms.)
Potass. bromide	15 grs.	(1.71 gm.)
Water, to make	20 ozs.	(1,000 c.c.s.)
B. Soda carbonate, cryst.	½ oz.	(22.7 gms.)
Water, to make	20 ozs.	(1,000 c.c.s.)

Mix in equal parts.

In cold weather it is best to increase the quantity of metol to, say, 60 grs. (6.25 gms.), and reduce the hydroquinone to, say, 30 grs. (3.2 gms.).

### Metol-Pyro-Hydroquinone.

#### TWO-SOLUTION.

A. Metol ... ..	40 grs.	(4.16 gms.)
Pyro ... ..	60 grs.	(6.24 gms.)
Hydroquinone	60 grs.	(6.24 gms.)
Soda sulphite cryst. ...	1,280 grs.	(133 gms.)
Citric acid ...	80 grs.	(8.3 gms.)
Potass. bromide	40 grs.	(4.16 gms.)
Water, to make	20 ozs.	(1,000 c.c.s.)
B. Soda carbonate cryst. ...	1,280 grs.	(133 gms.)
Water, to make	20 ozs.	(1,000 c.c.s.)

In preparing the A solution, the sulphite should be dissolved in warm water first, then, in the following order, citric acid, metol, pyro, hydroquinone, potass. bromide. If the pyro is added immediately after the metol, they both dissolve together in a few seconds.

For average subjects, take A, 1 part; B, 1 part; water, 2 parts. For softer results (portraits, etc.), the water may be increased to 4 or 6 parts.

This developer, though non-staining, combines the qualities of pyro and metol-hydroquinone. Solution A will keep in perfect working condition for a very long time, even if the bottle is frequently opened. If prepared with distilled water it is almost colourless.

Negatives suitable for enlarging are obtained by developing for 4 minutes at 65° F., from average subjects. For stronger negatives, for contact bromide printing, 6 minutes.

**Metol Poisoning.**

Metol (among other developers) has a poisoning effect on the skin of many people, causing painful sores and irritation.

The following ointment has a very beneficial effect in such cases:—

Ichthyol	... 10 grs.
Lanoline	... 40 grs.
Boric acid	... 40 grs.
Vaseline...	... 30 grs.

Apply two or three times a day, and rub in well before retiring for the night.

**Metol Staining.**

The stains on the skin and finger-nails produced by metol developers may be prevented as follows:—

The fingers are dipped before starting and fairly frequently while developing in:—

Water	... 10 ozs.
Hydrochloric acid	10 drops.

The acid stops the action of the developer by neutralising the alkali in the same way that an acid stop-bath does with prints.

If used constantly this bath will also be found to be an effective preventative of metol-poisoning.

**Paramidophenol.**

A. Paramidophenol	$\frac{1}{2}$ oz.
hydro-chloride	(68 gms.)
Water, hot	... 6 to 7 ozs.
	(600 to 700 c.c.s.)

Filter this solution, if necessary.

B. Soda, sulphite	45 grs.
	(9.36 gms.)
Soda carbonate,	150 grs.
dry	(31.2 gms.)
Water	... 2 ozs.
	(200 c.c.s.)

Add B. to A. The paramidophenol base is thrown down. When mixture is cool, filter off the deposit on cloth, and let

the paste dry until its bulk is not more than 3 ozs. (300 c.c.s.)

Then, in a graduate, mix it with 1 oz. (100 c.c.s.) of soda bisulphite lye 35° B. and add strong solution of caustic soda of 40° B. (about 50 per cent.) until the base is just dissolved. Water is then added to make 5 ozs. (500 c.c.s.). The solution is diluted 20 to 30 times for use.

**TWO-SOLUTION.**

A. Paramido-phenol hydro-chloride	200 grs.
	(20.8 gms.)
Potass. meta-bisulphite	100 grs.
	(10.4 gms.)
Distilled water	20 ozs.
to make	(1,000 c.c.s.)
B. Soda sulphite...	$1\frac{1}{2}$ ozs.
	(57 gms.)
Potassium carbonate	$1\frac{1}{2}$ ozs.
	(57 gms.)
Distilled water	20 ozs.
to make	(1,000 c.c.s.)

For use, mix 1 oz. of A with 2 ozs. of B.

**Pyro-Soda.***B.J. Non-staining Formula.*

Make up two solutions according to the following formula:

A. Pyro	... 1 oz.
	(45.5 gms.)
Soda sulphite	8 ozs.
cryst.	(364 gms.)
or anhydrous	4 ozs.
	(182 gms.)
Potass. meta-bisulphite	1 oz.
	(45.5 gms.)
Potass. bromide	120 grs.
	(12.5 gms.)
Water	... 60 ozs.
	(3,000 c.c.s.)
B. Soda carbonate, cryst.	12 ozs.
	(546 gms.)
or anhydrous	$4\frac{1}{2}$ ozs.
	(205 gms.)
Water	... 60 ozs.
	(3,000 c.c.s.)

Mix A, 1 part; B, 1 part water, 2 parts.

In making the A solution the sulphite and metabisulphite should be mixed together dry, and put together into hot water. When they are dissolved, the solution should preferably be brought to the boil and boiled for about a minute, after which the pyro is dissolved—when the solution has cooled. The boiling greatly improves the keeping qualities of the solution.

If preferred, the sulphite and metabisulphite can be dissolved in only half the water and the necessity of heating or boiling so much solution thus avoided. The second half can be added cold, and the pyro then dissolved.

This developer will produce negatives free from pyro stain, and 4 to 6 minutes development at normal temperature with full exposure will yield soft negatives full of detail and well suited to enlarging. The advantages of the developer are its cleanliness and the extraordinary keeping qualities of the A solution, provided it is made up as directed above.

When stronger negatives are required the developer can be made up by taking equal parts of A, of B, and of water, or equal parts of A and B alone can be used, this giving a developer containing about 4 grains pyro to the ounce.

The mixed solution can be used for several plates in succession if a little extra time is given for development in each case.

#### Ordinary Formula.

The following is a formula for the pyro-soda developer on the lines recommended by most of the British plate makers, *i.e.*, with metabisulphite only as the preservative of the pyro in the A solution; with sulphite in the

B solution in amount generally equal to that of the soda carbonate therein:—

A. Potass. meta-	30 grs.
bisulphite	(8.12 grms.)
Water, to make	20 ozs.
	(1,000 c.c.s.)
Pyro ... ..	$\frac{1}{2}$ oz.
	(11.4 grms.)
B. Soda carbon-	2 ozs.
ate, cryst.	(91 grms.)
Soda sulphite,	2 ozs.
cryst.	(91 grms.)
Potass. bro-	10 grs.
mide	(1.04 grm.)
Water, to make	20 ozs.
	(1,000 c.c.s.)
Mix equal parts of A and B.	

#### Pyro-Metol.

A. Pyro ... ..	80 grs.
	(8.32 grms.)
Metol ... ..	70 grs.
	(7.28 grms.)
Potass. meta-	180 grs.
bisulphite ...	(1.87 grms.)
Potass. ...	30 grs.
bromide	(3.12 grms.)
Water, to make	20 ozs.
	(1,000 c.c.s.)
B. Soda carbonate	3 ozs.
cryst.	(136 grms.)
Water, to make	20 ozs.
	(1,000 c.c.s.)

For normal exposures, use equal parts. For under-exposures, increase the proportion of B and add water.

Pyro-metol is a developer which gives both detail and density quickly. The negatives are of slightly greenish-black colour, of good printing quality.

#### Pyrocatechin.

##### ONE-SOLUTION.

Soda sulphite,	5 ozs.
cryst.	(227 grms.)
Water, to make	20 ozs.
	(1,000 c.c.s.)
Caustic soda ...	260-300 grs.
	(27 to 31.2 grms.)
Pyrocatechin ...	400 grs.
	(41.6 grms.)



The chemicals are dissolved in this order, and the stock solution kept well corked. It is diluted with 20 times its volume of water for use. An extremely energetic developer, suitable for under-exposures. Very clean-working and tending to soft contrasts.

#### TWO-SOLUTION.

A. Pyrocatechin ...	175 grs. (18.2 grms.)
Soda sulphite, cryst.	1½ ozs. (68 grms.)
Water, to make	20 ozs. (1,000 c.c.s.)
B. Potass. ...	2½ ozs. (114 grms.)
carbonate	
Water, to make	20 ozs. (1,000 c.c.s.)

Equal parts are mixed together. A slow-acting developer.

#### Maximum-Contrast Hydroquinone.

A. Soda bisul- ...	220 grs. (23 grms.)
phite	
Hydroquinone	220 grs. (23 grms.)
Potass. ...	220 grs. (23 grms.)
bromide	
Water to make	20 ozs. (1,000 c.c.s.)
B. Caustic soda ...	394 grs. (1 grms.)
Water, to make	20 ozs. (1,000 c.c.s.)

For use, mix A and B in equal parts.

#### For Contrasty Subjects.

A. Pyrocatechin ...	175 grs. (18.2 grms.)
Water, to make	20 ozs. (1,000 c.c.s.)

B. Potass. car- ...	4 ozs. (182 grms.)
bonate cryst.	
Water, to make	20 ozs. (1,000 c.c.s.)

For use, take 1 part of A, 1 part of B and 3 parts of water; the mixed solution to be used only once, immediately it is prepared. Produces a brown tone which may be effectively employed for bromide or gas-light prints.

#### Maximum Energy Developer.

(Kodak D-82.)

Recommended for under-exposures.

Water ...	24 oz. (about 125° F.)
(750 c.c.s.)	
Wood alcohol ...	1½ ozs. (48 c.c.s.)
Elon (Metol) ...	200 grs. (14 grms.)
Sodium sulphite (anhydrous)	1½ ozs. (52.5 grms.)
Hydroquinone	200 grs. (14 grms.)
Caustic Soda ...	125 grs. (8.8 grms.)
Potass. bromide	125 grs. (8.8 grms.)
Cold water to make	32 ozs. (1,000 c.c.s.)

Develop from 4 to 5 minutes at 65° F. (18° C.)

#### Fine-Grain Developer.

Metol ...	18 grs. (1.87 grms.)
Soda-sulphite, ...	2 ozs. (91 grms.)
dry	
Hydroquinone ...	45 grs. (4.68 grms.)
Borax ...	18 grs. (1.87 grms.)
Water, to make	20 ozs. (1,000 c.c.s.)

## Physical Development for Fine Grain.

(*Odell's formulæ.*)

Two processes have been worked out. In Process No. 1 the plate or film is developed in a solution containing hypo, soda sulphite, silver nitrate and amidol. For this process the plate or film requires to be given an exposure exactly five times that which is correct for ordinary development. Development lasts about  $1\frac{1}{2}$  hours.

In Process No. 2, the plate is first put in a bath of soda sulphite and potass. iodide for  $1\frac{1}{2}$  minutes and then developed in the same solution as used in Process No. 1. With this process exposures do not require to be longer than for ordinary development.

### PROCESS NO. 1.

#### Stock Solution.

Hypo	...	...	$3\frac{1}{2}$ ozs. (159 gms.)
Sodium sulphite, anhydrous			$1\frac{1}{2}$ ozs. (57 gms.)
Silver nitrate, cryst.			150 grs. (1.56 gms.)
Water, to make	...		20 ozs. (1,000 c.c.s.)

It is best to use distilled water for this solution, but not absolutely essential.

*The order and method of mixing is very important.* Dissolve the hypo and the sulphite in 12 ounces of water. Dissolve the silver nitrate in the remaining 8 ounces of water; then add the silver solution to the solution of hypo and sulphite slowly, stirring vigorously with a glass rod during the whole of the addition.

If the method of addition is accidentally reversed, silver thio-sulphate will precipitate and promptly decompose into silver sulphide, thus being lost. The mixing is best carried out in subdued daylight and the combining of the two solutions done so slowly that the precipitate which forms is immediately dissolved on stirring.

The solution is quite stable and will keep indefinitely in the light in any bottle. If a cloudiness persists, due to impurities in the water, it may be necessary to filter it. If a slight black precipitate forms, this is probably due to impurities in the hypo, and as it settles it does no harm to the bath.

Mix:—

A. Stock solution	1 oz.	(100 c.c.s.)
Water	...	1 oz. (100 c.c.s.)

In a separate graduate, dissolve:

B. Amidol	...	$3\frac{1}{2}$ grs. (0.73 gm.)
Water	...	2 ozs. (200 c.c.s.)

Mix A and B.

Physical development of plates or films *must* be carried out with the material lying flat in the tray. Tank development, *i.e.*, with the negatives standing on edge, is not possible.

For negatives physically developed in this formula, the exposure must be exactly five-times normal.

The exposed negatives are placed in the freshly-prepared developer, and the surface of each plate or film wiped gently with the ball of the finger,

preferably with a rubber cap on it. This ensures thorough wetting of the emulsion surface and the avoidance of pin-holes, which latter seem to occur more in physical development than in chemical development. The dish is then covered and allowed to stand for one and one-half hours at 65 to 70° F.

The development is greatest in the first hour. At the end of the 1½ hours, development should be complete. The operation is performed in the dark-room, and, still in the dark-room, the negatives are removed, slightly rinsed, and placed in a tray containing ordinary acid fixing and hardening solution. They will appear to be cleared in the developer but they are not fixed. The hardener in the fixing bath toughens the film so that loose silver deposited on the surface may be wiped off with a bit of cotton. The fixing required is not long—a matter of a few minutes—after which the surface is again swabbed with cotton, and the negatives washed and dried as usual.

Exposure to light before fixing may result in partial reversal and brown stains and the solutions given are best used only once for a single set of negatives.

#### PROCESS No. 2.

##### *Fore-Bath.*

Potassium iodide ...	94 grs. (9.8 gms.)
Sodium sulphite, anhydrous	238 grs. (24.7 gms.)
Water, to make ...	20 ozs. (1000 c.c.s.)

The normally-exposed negative is placed in this fore-bath for exactly one and one-half minutes, removed and rinsed slightly, and then placed in the physical developing bath as described in Process No. 1.

The same precautions are observed as in Process No. 1 throughout and after 45 minutes, the negatives are examined. The negatives appear very different from those made by Process No. 1. The silver bromide in the emulsion has been changed largely to silver iodide, and the negatives do not clear up, but rather they have a white and very opaque appearance in the undeveloped portions. This condition requires longer fixation in the ordinary acid hypo bath (from 15 to 20 minutes) due to the slow solubility of the silver iodide. The fixation will be fully equal to, if not longer, than the usual fixing time in chemical development. The final washing should be about two hours in running water.

All dishes used for physical development must be chemically clean. Any dirt is fatal.

#### Film Quantity Developer.

The following metol-hydroquinone-pyro formula of the Kodak Co., is known as D75 and is for tank development of roll-film, etc., in about 10 minutes.

In making up 10 gallons of developer, 2 gallons of water are placed in the tank, Sol'n No. 1 added, then Sol'n No. 2, then No. 3 and No. 4—with thorough stirring after adding

each. Finally add water to make 10 gallons, again with thorough stirring.

*Solution No. 1.*

Water (125° F.) ... 1 gall.  
Elon (Metol) ... 1½ oz.

*Solution No. 2.*

Water (125° F.) ... 1 gall.  
Soda Sulphite (cryst.) 1 lb.  
Sodium bisulphite ... 15 ozs.

*Solution No. 3.*

Water (160° F.) ... 1 gall.  
Soda sulphite (cryst.) 14 ozs.  
Hydroquinone ... 5 ozs.  
Pyro ... 1½ oz.

*Solution No. 4.*

Water (125° F.) ... 1 gall.  
Soda carbonate (cryst.) 5 lbs.

The developer should be kept at 68° F., never below 65° nor above 70°. For each degree above or below 68° allow one minute less or more in time of development. Time at 68° is 10 minutes

For strengthening developer after use, a stock solution is kept at hand, viz. :—

Water (125° F.) ... 1 gall.  
Elon (Metol) ... 1½ oz.  
Soda sulphite (cryst.) 15 ozs.  
Soda bisulphite ... 7½ ozs.  
Hydroquinone ... 2½ ozs.  
Soda carbonate (cryst.) 3 lbs.

6 ozs.  
Water to make ... 2 galls.

A portion of this stock is mixed with an equal bulk of water before adding to the solution in the tank. Enough of this (diluted) solution is added to bring the tank developer back to its original volume.

### Capacity of Tanks.

One cubic inch equals about 278 minims (16.4 c.c.s.) equal to .58 oz. or .0036 gallon (Imperial). Therefore the capacity of a tank can be ascertained

by measuring the width, breadth and depth in inches, multiplying the three figures together. This gives the capacity in cubic inches. To find the capacity in ozs., multiply by 4 and divide by 7. To find the capacity in gallons, multiply by .0036 or divide by 280.

### Stand Development.

Glycin is a very suitable developer for this purpose, and the following directions are given for the use of the Hübl formula (given on another page) for a concentrated solution.

Normal developer:—Stock sol., 1 part; water, 80 to 90 parts; potass. bromide, (10 per cent. sol.), 1/6 part.

In this solution a properly exposed plate should make its appearance in 15 or 20 minutes, and obtain full density in several hours.

For under-exposures:—Stock sol., 1 part; caustic soda sol. (10 per cent.), 1 part; water, 50 parts, warmed to 75 deg. F.

For over-exposures:—Stock sol., 1 part; potass. bromide (10 per cent. sol.), 1 part; water, 25 parts.

### Developer-Fixer.

*Ferrotypes.*

Hydroquinone ... 205 gr.  
(21.3 gms.)  
Soda sulphite, ... 1½ oz.  
cryst. (79.6 gms.)  
Soda carbonate, 1½ oz.  
cryst. (57 gms.)  
Hypo ... 3½ ozs.  
(170 gms.)  
Liq. ammonia, ... 12½ drams.  
(78 c.c.s.)  
Water to make... 20 ozs.  
(1,000 c.c.s.)

The plates develop and fix in one minute and are then simply rinsed in water.

# FIXING, WASHING & DRYING.

## Hypo Fixing Bath.

The average strength of hypo for fixing negatives is 4 ozs. per 20 ozs. (200 gms./litre). It should not be less, but may be more—5, 6 or 8 ozs.

A convenient method of keeping hypo is: dissolve each pound (500 gms.) in about 20 ozs. (600 c.c.s.) of water (hot), cool and make up to 32 ozs. (1 litre) in all. Every 2 ozs. of this stock solution equals 1 oz. hypo. It is used as follows to make up baths of various strengths:—

Col. 1.

8 ozs. (40%)	Stock, 4; water, 1.
6 ozs. (30%)	Stock, 3; water, 2.
5 ozs. (25%)	Equal parts.
4 ozs. (20%)	Stock, 2; water, 3.
3 ozs. (15%)	Stock, 3; water, 7.
2 ozs. (10%)	Stock, 1; water, 4.

To make fixer containing (per 20 ozs.) any of the quantities of hypo named in Col. 1, mix the stock solution with water in the proportion stated on right, *e.g.*, for a fixer of 4 ozs. hypo, mix 2 parts of stock with 3 parts of water.

In fixing plates or films, three rules should invariably be observed:—

1. Let plates remain in fixer as long again as it takes for the white emulsion to dissolve away.

2. Always rinse fingers under tap or in a dish of water after touching hypo, not simply wipe on a towel.

3. Avoid letting hypo droppings dry up on table or floor. If hypo solution drops or is splashed or spilt, mop it up and leave all clean.

## Acid Fixing Baths.

Hypo ... ..	4 to 6 ozs.
	(182 to 275 gms.)
Potass. metabisulphite ...	$\frac{1}{2}$ oz.
	(22.7 gms.)
Water, to make	20 ozs.
	(1,000 c.c.s.)

Metabisulphite should not be added to hot hypo solution.

This is the best formula we know for an acid fixing bath for plates or papers. It keeps clear and stainless to the last, and does not throw down sulphur with use.

## Extra-rapid Fixing.

Hypo ... ..	4 ozs.
	(182 gms.)
Ammonium chloride ...	$\frac{1}{2}$ to 1 oz.
	(22.7 to 45.5 gms.)
Water, to make	20 ozs.
	(1,000 c.c.s.)

The ammonium chloride is the commercial sal ammoniac as used for batteries. The bath fixes in about half the usual time but is not recommended for regular use.

## Hardening-Fixing Baths.

No. 1.

A. Hypo ... ..	5 ozs.
	(227 gms.)
Water, to make	20 ozs.
	(1,000 c.c.s.)
B. Soda sulphite, ...	4 ozs.
cryst.	(182 gms.)
Acetic acid	3 ozs. (fl.)
glacial	(150 c.c.s.)
Alum ... ..	2 ozs.
	(91 gms.)
Water (warm),	
to make ...	20 ozs.
	(1,000 c.c.s.)

To make the fixing-hardening bath, 2 parts of the B (hardener-solution) are added to 20 parts of the A (hypo) solution.

**No. 2.**

Hypo ... ..	8 ozs.
	(364 gms.)
Potass. metabi- sulphite	120 grs.
	(12.5 gms.)
Water, to make	20 ozs.
	(1,000 c.c.s.)

To this add :—

Chrome alum ...	240 grs.
	(250 gms.)
Water ... ..	20 ozs.
	(1,000 c.c.s.)

**No. 3.**

Hypo ... ..	5½ ozs.
	(239 gms.)
Sodium acetate	230 grs.
	(24 gms.)
Chrome alum ...	70 grains
	(7.28 gms.)
Water, to make	20 ozs.
	(1,000 c.c.s.)

Dissolve hypo in 16/18 ozs. of water, and add the sodium acetate. When this is in solution, add the chrome alum previously dissolved in the balance of the water.

In compounding all hardening-fixing baths, alum should be dissolved by itself in water; the sulphite likewise, and any acid added to the sulphite, the alum solution being then added to the acid-sulphite solution, and the whole mixture thus formed finally added to the hypo.

**For Extra Hardening.**

For use at temperatures up to 95° F. (35° C.), the following fixing bath may be used. It is well to make it up fresh each week.

Hypo ... ..	5 ozs.
	(227 gms.)
Soda sulphite ...	1 oz.
dry	(45.5 gms.)

Formaline ...	2½ ozs. (fl.)
	(125 c.c.s.)
Water, to make	20 ozs.
	(1,000 c.c.s.)

Dissolve the hypo first, then the sulphite, and finally add the formaline.

**Hypo-Eliminator.**

Wash the negative for one minute under the tap, and transfer to a shallow dish containing very weak (clear pink) potass. permanganate solution.

Remove the negative as soon as the colour goes (which will be in a second or two if hypo is present), and keep on treating in the very weak permanganate baths until the colour is not quickly discharged.

The water itself will destroy the permanganate colour, but not quickly as hypo does.

The above is a satisfactory process which allows of a negative being ready for drying within three minutes of fixation

**Rapid Drying.**

Method I.—Rinse from the hypo-bath, place in 1 : 50 formaline for ten minutes, wash by pouring nearly boiling water six times over the negative and dry by heat. To get rid of the relief which is produced by this process, the negative is rubbed with a piece of wash-leather moistened with alcohol.

Method II.—Soak in two successive baths of methylated spirit, and place in a current of air. Ordinary commercial spirit, owing to the mineral naphtha in it, causes a whitish scum on the surface of the film, and is not favourable to clean work.

# HARDENING AND CLEARING.

## Hardening Baths.

1. Formaline (40%) 1 oz. fluid.  
(50 c.c.s.)  
Water, to ... 10 to 20 ozs.  
(500-1,000 c.c.s.)
2. Alum ... 1 oz.  
(45.5 gms.)  
Water, to ... 20 ozs.  
(1,000 c.c.s.)
3. Chrome alum 1 oz.  
(45.5 gms.)  
Water, to ... 20 ozs.  
(1,000 c.c.s.)

Whichever bath is used, allow it to act for 15 or 20 minutes.

In making up the chrome alum bath, use cold or warm, not hot water.

## Clearing Solutions.

### ACID ALUM.

- |                 |                   |                |
|-----------------|-------------------|----------------|
| Alum ...        | 1 oz.             | (45.5 gms.)    |
| Citric acid ... | $\frac{1}{2}$ oz. | (22.7 gms.)    |
| Water, to ...   | 20 ozs.           | (1,000 c.c.s.) |

Wash well after fixing, and immerse the negative in the above. This bath is also useful for removing white scum from negatives developed with ferrous oxalate if rubbed on with cotton wool.

### CHROME ALUM.

1. Chrome alum  $\frac{1}{2}$  oz.  
(22.7 gms.)  
Hydrochloric acid  $\frac{1}{2}$  oz.  
(22.7 c.c.s.)  
Water, to ... 20 ozs.  
(1,000 c.c.s.)
2. Citric acid ... 1 oz.  
(45.5 gms.)  
Water, to ... 20 ozs.  
(1,000 c.c.s.)

We prefer bath No. 2 for obtaining a clean smooth film.

## Stain Removers.

### ALUM-IRON.

The following solution acts on the yellowish stain in a pyro-developed negative, and yields a negative of much quicker printing quality. The solution is slow in action, requiring about 20 minutes.

- |                  |         |                |
|------------------|---------|----------------|
| Alum ...         | 1 oz.   | (45.5 gms.)    |
| Ferrous sulphate | 3 ozs.  | (136.5 gms.)   |
| Citric acid ...  | 1 oz.   | (45.5 gms.)    |
| Water, to ...    | 20 ozs. | (1,000 c.c.s.) |

In place of the citric acid half a dram of strong sulphuric acid can be used.

### THIOCARBAMIDE.

- |                 |         |                |
|-----------------|---------|----------------|
| Thiocarbamide   | 90 grs. | (9.36 gms.)    |
| Citric acid ... | 90 grs. | (9.36 gms.)    |
| Water, to ...   | 20 ozs. | (1,000 c.c.s.) |

### SODIUM HYPOCHLORITE.

#### (Eau de Javelle.)

This bath need only be resorted to in cases of severe stain, particularly on old negatives.

- |                          |                    |           |
|--------------------------|--------------------|-----------|
| Bleaching powder         | 1 oz.              | (30 gms.) |
| Sodium carbonate, cryst. | $1\frac{1}{2}$ oz. | (45 gms.) |

Shake up the bleaching powder with a solution of the carbonate in a little water (6 ozs. or 180 c.c.s.), and filter. Stir up the residue with plain water, and again filter. The filtrate (solution of sodium hypochlorite) forms an active stain remover.

It can be acidified with oxalic acid, and then discharges yellow stain still more vigorously, but with risk to the silver image.

N.B.—In either state (alkaline or acid) the solution has a strong softening action on gelatine. Negatives should not be left to soak longer than necessary (10 to 15 minutes) and should be carefully watched while in the reducer.

#### BLEACH AND RE-DEVELOPER.

(Ilford Formula.)

For negatives which are very heavily stained by developer the following method of the Ilford Co. is often the only one which will entirely remove the stain. The negative is treated in a solution which simultaneously removes the stain and bleaches the silver image. This solution is:—

Potassium permanganate	50 grs. (5.2 gms.)
Common salt ...	$\frac{1}{2}$ oz. (11.4 gms.)
Acetic acid (glacial)	1 oz. (50 c.c.s.)
Water, to ...	20 ozs. (1,000 c.c.s.)

If the negative is one freshly made, it is as well to pass it through a weak bath of chrome alum (about 50 grains in 10 ounces of water, *i.e.*, 10.4 gms. per litre) before applying the bleacher.

The bleacher is allowed to act for ten minutes, rocking all the time. It cannot harm the gradations of the negative, and this full time makes sure of the removal of the stain, and avoids a repetition of the process. After a brief rinse, the negative is left in a solution of potass meta bisulphite (1 ounce in

20 ounces of water) until white everywhere to the back of the film, and is then re-developed in any non-staining developer.

#### Silver Stains.

Most silver stains (due to dampness of paper or negative while the two are in contact) will readily yield to the following simple treatment first suggested by Mr. Harold Baker:—

Rub the dry negative with Globe metal polish (or other similar abrading preparation) for a minute or two. This is done by applying the polishing paste on a tuft of cotton wool. Then place negative in very strong hypo solution. Here the stain disappears; the time may be minutes or hours according to the depth and age of the stain.

In very severe cases the following method may be necessary:—

Soak the negative in:—

A. Potass. iodide...	400 grs. (41.6 gms.)
Water ...	20 ozs. (1,000 c.c.s.)

and after washing transfer to—

B. Potass. cyanide	600 grs. (62.4 gms.)
Water ...	20 ozs. (1,000 c.c.s.)

in which rub the stained part of the film with a pledget of cotton wool.

If the stain does not yield to this treatment a solution of iodine (in potass. iodide) may be used in place of solution A, but it must be handled with very great care, since the iodine acts more powerfully and it is not at all an easy matter to remove the silver stain without affecting the silver image.



## NEGATIVE INTENSIFIERS.

### Which to Use.

Negatives which are too thin (and as a rule yield flat prints) may be greatly improved by intensification.

If the negative is thin through under-exposure, that is, has not attained good density even on long development, the best intensifier is the uranium. For this, as for most intensifiers, the plate should be both thoroughly fixed and washed—one is as important as the other.

If the plate is simply under-developed—clear and bright, but thin—the chromium or the mercury intensifier with alkaline development (applied more than once if necessary) or the Wellington silver intensifier is very suitable.

If the plate is over-exposed, thin but veiled and flat, the mercury and ammonia intensifier is a good remedy; or it may be well first to reduce carefully with Farmer's reducer, and then (after a second thorough wash) to intensify with chromium, mercury or Wellington's, or, if plate is very flat, with Monckhoven's or the mercury and ammonia formula. Results with the two last-named are of doubtful permanence.

The copper and lead intensifiers give great density, and are suited only for negatives of line drawings, etc., in which great general opacity and, at the same time, great clearness of the lines are required.

### Mercury Intensifiers.

The negative is bleached in the following saturated solution of mercury bichloride:—

Mercury bichloride	1½ oz. (57 gms.)
Hot water	... 20 ozs. (1,000 c.c.s.)

After cooling this solution and pouring off from the white feathery crystals thrown down, add—

Hydrochloric acid	37½ mins. (3·9 c.c.s.)
-------------------	---------------------------

After *well washing*, the bleached negative is blackened in one or other of the following:—

A. Ammonia	... 20 drops. (0·880)
Water	... 1 oz. (35 c.c.s.)

Gives great intensification and good black colour.

B. Soda sulphite, 10 per cent. solution, made slightly acid with citric acid. Very slightly strengthens a negative.

C. A non-staining alkaline developer, metol-hydroquinone, etc. This gives considerably more intensification than B, and the process can be repeated several times in succession if desired.

D. Ferrous oxalate developer, made as directed under "Developers." This process can be repeated as many times as desired, and gives absolutely permanent results; it acts proportionately on the tones in the negative.

**Mercuric Iodide.***Edwards's formula modified by  
W. B. Shaw.*

One of the best general-purpose intensifiers, as the action takes place in one operation, and can be seen and stopped at any stage.

Mercuric iodide...	180 grs.
	(18.7 gms.)
Potass iodide ...	180 grs.
	(18.7 gms.)
Hypo ... ..	180 grs.
	(18.7 gms.)
Water ... ..	20 ozs.
	(1,000 c.c.s.)

Dissolve ingredients together in a very little water and dilute to the full amount afterwards.

The solution keeps well in the dark but soon spoils in the light.

For more gradual intensification, 1 part of the above solution may be mixed with 1 part of water.

The negative should be washed for 5 minutes on removal from the fixing bath before intensifying and for 15 minutes after intensification.

If required, the intensification may be entirely removed in a 40 per cent. solution of hypo.

Negatives intensified as above are not fully permanent but may be made so by treating in a 1 per cent. solution of soda sulphide until the image has been wholly changed—when viewed from the back—from grey to brown-black. Negatives so treated cannot be reduced with hypo solution.

*Lumière Formula.*

Sodium sulphite	4 ozs.
cryst.	(182 gms.)
Mercuric iodide	90 grs.
	(9.4 gms.)
Water ... ..	20 ozs.
	(1,000 c.c.s.)

The sulphite must be dissolved first. The solution keeps well in the dark.

This is a very convenient intensifier, as plates need only be rinsed for a few minutes in water on coming out of the hypo bath to be ready for intensification.

When intensified they are simply washed for a few minutes; the negative is then liable to yellow in time, but if the negative is placed for a few minutes in any non-staining developer the results are quite permanent.

If mercuric iodide is not available the following may be used:—

Mercuric chloride	50 grs.
	(5.2 gms.)
Water, to make	10 ozs.
	(500 c.c.s.)

Add 10 per cent. potass. iodide solution until precipitate first formed is redissolved. About 1½ oz. (75 c.c.s.) will be required and when clear add—

Sodium sulphite,	
cryst. ... ..	4 ozs.
	(182 gms.)
Water, to make	20 ozs.
	(1,000 c.c.s.)

**Monckhoven's.**

Gives very great intensification and contrast, especially useful for negatives of line subjects.

A. Bromide of po-	200 grs.
tassium ...	(20.8 gms.)
Bichloride of	200 grs.
mercury ...	(20.8 gms.)
Water ... ..	20 ozs.
	(1,000 c.c.s.)
B. Pure cyanide of	200 grs.
potass. ...	(20.8 gms.)
Nitrate of silver	200 grs.
	(20.8 gms.)
Water ... ..	20 ozs.
	(1,000 c.c.s.)

The silver nitrate and cyanide are dissolved in separate lots of water, and the former added to

the latter until a permanent precipitate is produced. The mixture is allowed to stand 15 minutes, and, after filtering, forms Solution B.

Place the negative in A till it is white, then rinse and transfer it to Solution B. If the intensification has been carried too far, it may be reduced by treatment with a weak solution of hyposulphite of soda.

### Chromium Intensifier.

An excellent and convenient intensifier for general work. Results are permanent.

The bleaching bath is best made up from the two following stock solutions:—

A. Potass. bichromate	1 oz.
	(45.5 gms.)
Water, to make	20 ozs.
	(1,000 c.c.s.)
B. Hydrochloric acid	1 oz. (fl.)
	(100 c.c.s.)
Water, to make	10 ozs.
	(1,000 c.c.s.)

The hydrochloric acid is that sold as "commercial pure" of sp. gr. 1.160.

#### Bleaching Baths.

	No. 1.	No. 2.	No. 3.
A ...	1 part	1 part	1 part
B ...	$\frac{1}{2}$ part	1 part	2 parts
Water	6 parts	6 parts	6 parts

Bleach in No. 1, 2 or 3 mixture, wash until yellow stain is removed and then develop with amidol.

If another developer is used, it may be necessary to expose for a short time to diffused daylight (not sunlight) during development in order to get full density. Excessive exposure before development may make it difficult to obtain density.

No. 1 gives intensification about equal to mercury and development; No. 2, intermediate between Nos. 1 and 3 and No. 3, equal to mercury and sodium sulphite.

The process may be safely applied after fixation if the plate is simply washed for 10 minutes.

It may be repeated several times if the first application does not give enough density.

The No. 3 formula for the chromium intensifier, namely, that giving the least intensification, is a very useful means of improving bromide prints which are a trifle weak and particularly which are of poor colour. The redeveloped black image is usually a finer black than can be obtained by direct development.

### Silver Intensifiers.

#### ACID SILVER.

A. Pyro ...	30 grs.
	(3.12 gms.)
Citric acid ...	10-20 grs
	(1.2 gms.)
Water, to make	20 ozs.
	(1,000 c.c.s.)
B. Silver nitrate ...	200 grs.
	(20.8 gms.)
Water, to make	20 ozs.
	(1,000 c.c.s.)

About 1 oz. (35 c.c.s.) of A is poured over the plate once or twice, about 15 drops of B solution added, and the mixture again applied. Intensification now takes place, and the solution is poured off and on until sufficient. If intensifier becomes very thick and turbid, fresh should be mixed up. When dense enough the negative is rinsed, fixed and washed. Negatives (on gelatine plates)

are best hardened with alum or formaline before using this intensifier, otherwise it is difficult to avoid stains.

#### WELLINGTON'S FORMULA.

First harden the film in:—  
Formaline, 1 part; water, 10 parts, for five minutes. Rinse for a few minutes, and then place for *exactly one minute* in:—

Potass.ferricyanide	20 grs.	(2.08 grms.)
Potass. bromide	20 grs.	(2.08 grms.)
Water, to make	20 ozs.	(1,000 c.c.s.)

This causes no apparent change in the negative; if used too long it will bleach the negative and alter its gradation. Rinse again for a few minutes and intensify.

#### Stock Solutions.

A. Silver nitrate ...	800 grs.	(83.2 grms.)
Water (distilled), to make	20 ozs.	(1,000 c.c.s.)
B. Amm. sulpho- cyanide	1,400 grs.	(145 grms.)
Hypo ...	1,400 grs.	(145 grms.)
Water, to make	20 ozs.	(1,000 c.c.s.)

Take A,  $\frac{1}{2}$  oz. (100 c.c.s.), and add slowly to  $\frac{1}{2}$  oz. B (100 c.c.s.), stirring vigorously (mixture should be clear); then add 10% pyro solution (preserved with sulphite), 1 dram (25 c.c.s.), and 10% ammonia solution, 2 drams (50 c.c.s.).

Place negative in chemically clean dish, best of glass, and pour solution over it. Silver begins to deposit in a minute or two. When intensified enough, place in acid fixer and wash well. Flat negatives may be over-intensified, and then treated with Farmer's reducer.

#### Copper Intensifier.

Gives great intensification and is best suited for line subjects.

A. Copper sulphate	100 grs.	(208 grms.)
Water, to make	1 oz.	(1,000 c.c.s.)
B. Potass. bromide	100 grs.	(208 grms.)
Water, to make	1 oz.	(1,000 c.c.s.)

A and B are separately made up with hot water, mixed, and allowed to cool. The negative is bleached in the mixture, and washed for a minute or two. It is then blackened in:—

Silver nitrate ...	45 grs.	(93.6 grms.)
Water (distilled), to make	1 oz.	(1,000 c.c.s.)

For still greater density the negative is well washed from silver and an ordinary developer applied.

If too dense, after the silver, it can be placed in weak hypo solution (about 10 grs. per oz.—20.8 grms./litre) or weak potass. cyanide (about 2 grs. per oz.—4.0 grms./litre).

#### Uranium Intensifier.

A. Uranium ...	200 grs.	(20.8 grms.)
nitrate	200 grs.	(20.8 grms.)
Water, to make	20 ozs.	(1,000 c.c.s.)
B. Potass. ferri- cyanide	200 grs.	(20.8 grms.)
Water, to make	20 ozs.	(1,000 c.c.s.)

The intensifier is prepared from:—A sol., 1 oz. (100 c.c.s.); B sol., 1 oz. (100 c.c.s.); acetic acid, 2 drachms (25 c.c.s.).

The plate must be perfectly free from hypo, and after intensification be washed in several changes of *still* water until the yellow stain is gone. A 10-gr.-per-oz. (20.8-grms./litre) solution of ammonium sulpho-

cyanide removes any yellow stain, and weak ammonia or sodium carbonate removes the intensification altogether, restoring the negative to its original state. A weak acetic acid bath should then be applied to the negative if the intensifier is to be again applied.

### Lead Intensifier.

The lead intensifier gives very great intensification, and is suited only for line subjects.

Lead nitrate ...	400 grs.
	(41.6 gms.)
Potass. ferri- ...	600 grs.
cyanide	(62.4 gms.)
Acetic acid ...	3 drachms
	(18.8 c.c.s.)
Water, to make	20 ozs.
	(1,000 c.c.s.)

This stock solution will keep for a long time in the dark. The negative is bleached in it, washed once *very carefully* in 10 per cent. nitric acid—the acid makes the film very tender—then in water, and then darkened in:—

A. Sodium sul- phite	1 oz.
	(45.5 gms.)
Water, to make	20 ozs.
	(1,000 c.c.s.)
or in—	
B. Schlippe's salt ...	90 grs.
	(9.36 gms.)
Ammonia	6 drachms
(0.880)	(37.5 c.c.s.)
Water, to make	20 ozs.
	(1,000 c.c.s.)

or in—	
C. Potass. bichromate	2 ozs.
	(91 gms.)
Ammonia	1 oz.
(0.880)	(50 c.c.s.)
Water, to make	20 ozs.
	(1,000 c.c.s.)

Any of the above darkening solutions gives great intensification.

### Callier Formula.

This formula is specially suitable for gelatine plates.

Potassium ferri- cyanide	360 grs.
	(37.5 gms.)
Lead nitrate ...	520 grs.
	(54.1 gms.)
Acetic acid, glacial	3 drms.
...	(18.7 c.c.s.)
Water, to make	20 ozs.
	(1,000 c.c.s.)

The negative is bleached in the above and then passed through three or four baths of:—Hydrochloric acid,  $4\frac{1}{2}$  drams (30 c.c.s.); water, 20 ozs. (1,000 c.c.s.), remaining in each for about 5 minutes. Then wash until image is white and darken in weak solution of ammonium sulphide.

### For Weak Negatives.

An intensifier suitable for dealing with ghosts of images is the following, due to M. G. Zelger of the Pathe-Cinema Laboratories. The negative is bleached in a mixture of 2 parts of A and 1 part of B.

A. Copper sul- phate	90 grs.
	(9.36 gms.)
Acetic acid, glacial	1 oz. 1 dram
	(56 c.c.s.)
Water, to make	20 ozs.
	(1,000 c.c.s.)
B. Potass. iodide	180 grs.
	(18.7 gms.)
Ammonia (22° Baumé)	3j ozs.
	(156 c.c.s.)
Water, to make	20 ozs.
	(1,000 c.c.s.)

Negative bleaches to a yellowish colour and is then washed for about 20 minutes in running water. It is then darkened with:—Silver nitrate, 22 grs. (2.3 gms.); sodium acetate, 90 grs. (9.36 gms.); water, 20 ozs. (1,000 c.c.s.). To avoid stain, it is well to treat the negative with a solution of alum before using the darkening bath.

## NEGATIVE REDUCERS.

Reduction is useful if the negative is so dense (black) that it takes long to print. Also, apart from reducing time of printing, reduction is used to improve the gradation of negatives.

For those which are too hard, usually as the result of under-exposure and too long development, the best reducer is the "proportionate" one of permanganate and persulphate.

For those which, though dense, yield prints which are too flat—this is the result of great over-exposure and long development—the best is Farmer's. Belitski's is similar.

Even when density is not excessive, it is usually well, in the case of flat negatives, to reduce a little in "Farmer's," and then intensify.

The other reducers—Eder's and iodine-cyanide—are used chiefly when it is desired to carry out a little reduction of negatives of good gradation.

### Farmer's.

This reducer tends to remove detail in the shadows whilst leaving untouched the dense high-lights. Hence it increases contrast, "brightens up" a negative.

Hypo solution...	5 ozs.
(1:5)	(150 c.c.s.)
Potass. ferri-...	add as
cyanide ...	directed
(10% sol.)	below.

The quantity of ferricyanide solution to be added is best judged by the colour of the

mixture, which as a rule should be pale yellow, not orange, and should be used weak rather than strong, since its selective action on the shadows of a negative is then less.

Yellow stain is due usually to the use of an acid fixing bath, or an old fixing bath, instead of clean plain hypo solution. It is not easy to remove.

If the reduction is required as "even" as possible, that is, less pronounced on the shadows of the subject in the negative, use the reducer very weak, viz., largely diluted with water.

When seeking to retain contrast, use a strong reducer, applying it with cotton wool, not too wet with reducer. Very useful for line negatives, where quite clear lines on a dense ground are wanted.

### Belitski's.

Potass. ferric	428 grs.
oxalate	(44.5 gms.)
Sodium sulphite,	358 grs.
cryst.	(37.25 gms.)
Water, to make	20 ozs.
	(1,100 c.c.s.)

Dissolve and add:—

Oxalic acid	115 to 130 grs.
	(12 to 13.5 gms.)

and shake until the solution turns green. Then pour off from undissolved crystals and add:—

Hypo ...	5 oz.
	(227 gms.)

This reducer is stainless, and keeps well in the dark. Its action on the shadow detail of the negative is similar to that of Farmer's. It varies

somewhat with the strength of the solution.

Instead of the ferric oxalate the following more easily obtainable chemicals can be used in the formula:—

Ferric chloride ...	285 grs.
cryst.	(29.6 grms.)
Potass. oxalate...	543 grs.
	(567 grms.)

### Proportionate Reducer.

A mixed reducer of permanganate and persulphate, originally suggested by N. C. Deck, is found to act proportionately on the densities of a negative, thus reducing contrast. The following formula is that worked out by Kenneth Huse and Adolph H. Nietz, of the Eastman Research Laboratory.

A. Potass. per-	2.2 grs.
manganate	(0.23 gm.)
Sulphuric acid	130 minims
	(13.5 c.c.s.)
Water, to make	20 ozs.
	(1,000 c.c.s.)

The sulphuric acid is a 10 per cent. solution by volume of the 1.84 strong acid.

B. Ammonium	220 grs.
persulphate	(23 grms.)
Water, to make	20 ozs.
	(1,000 c.c.s.)

These stock solutions keep well separately; they are mixed together at the time of use in the proportion of 1 volume of A to 3 volumes of B to form the working reducer. Reduction takes from 1 to 3 minutes.

After reduction, soak the negative for 5 minutes in a solution of 90 grs. (9.36 grms.) potass. metabisulphite in 20 ozs. (1,000 c.c.s.) of water, and then wash for a short time.

### Persulphate.

The persulphate reducer acts first on the heavy high-light densities of the negatives, reducing these without affecting

shadow detail. It thus "softens" a hard negative.

Ammonium	200-400 grs.
persulphate	(21 to 42 grms.)
Water ...	20 oz.
	(1,000 c.c.s.)

A fresh solution is made at time of use. A drop of sulphuric acid per 2 ozs. (70 c.c.s.) makes the action more regular. A contributor, Mr. A. H. Hall, recommends the following method of using it as infallible. Dry the negative, wet it well, give it a rinse in hypo-eliminator, wash for a few minutes. Make up fresh persulphate solution in water previously acidulated with a drop or two of sulphuric acid, pour on the reducer and rock the whole time. When the milky deposit begins to appear, note the time and continue for 20-30 seconds, for slight reduction, increasing the time for heavier reduction.

If no action is seen in two minutes, throw the solution away, wash the negative, and repeat. If much reduction is required—when the solution appears opalescent, throw it away and pour on fresh.

### H. W. Bennett's Formula.

Ammonium persul-	500 grs.
phate ...	(52 grms.)
Sodium sulphite,	100 grs.
cryst. ...	(10.4 grms.)
Sulphuric acid	1 oz.
(10% sol'n)	(50 c.c.s.)
Water, to make ...	20 ozs.
	(1,000 c.c.s.)

This is a stock solution which will keep in good working condition for a long time. For use, equal parts of the stock solution and water should be mixed.

It is essential that the plate to be reduced should be soaked in water for at least an hour

before reduction is commenced. Reduction should not be continued after the solution becomes slightly milky.

As soon as the negative is sufficiently reduced, it should be rinsed rapidly and placed for one minute—not longer—in a weak hypo bath (1 oz. of hypo to 20 ozs.) and then washed.

### Iodine-Cyanide.

A very clean-acting (but intensely poisonous) reducer. Very suitable, when used with the further addition of water, for bromide prints, as it leaves no stain.

Iodine (10% sol.)	150 minims.
	(15.6 c.c.s.)
Potass. cyanide solution	100 minims.
	(10 c.c.)
Water, to make	20 oz.
	(1,000 c.c.s.)

To make the iodine solution mix about 150 grs. (33 grms.) potass. iodide with just enough water to dissolve it, add 45 grs. (9.9 grms.) iodine flakes, which will dissolve in an instant on stirring, and add water to make 20 fluid ozs. (1,000 c.c.s.).

The cyanide solution is one of 10 per cent. strength.

### Permanganate.

Potass. perman- ganate, sol'n	2 drs.
	(10 c.c.s.)
Sulphuric acid solution	10 drs.
	(50 c.c.s.)
Water, to make	20 ozs.
	(1,000 c.c.s.)

The permanganate is 5 per cent. solution. The sulphuric acid is a 10 per cent. solution by volume of the 1.84 strong acid.

Applied to a wet negative, gives even reduction. A dry negative receives greater reduction in the high lights. Any brown stains are removed with a 10 per cent. solution of sodium sulphite containing 2 per cent. oxalic acid.

### Hypochlor. and Alum.

Chrome alum	40 grs.
	(41.6 grms.)
Eau de Javelle	2 oz.
	(100 c.c.s.)
Water, to make	20 ozs.
	(1,000 c.c.s.)

Immerse the negative and gently rub the surface with a piece of cotton wool. By confining friction with the wool to certain parts, extra reduction can be obtained.

For Eau de Javelle, see under *Clearing Solutions*.

### Baskett's (Local) Reducer.

Globe metal polish	... 2½ d. tin
Terebene	... 2 ozs.
Salad oil	... 2 ozs.

The ingredients are to be well mixed, and strained through fine muslin two or three times to remove any coarse particles. Dense parts of a negative are rubbed down with the reducer applied by the finger-tip or with a bit of chamois leather.

### Reducing Harsh Negatives.

A very valuable and safe method of reducing harsh negatives consists in re-halogenising and re-developing.

The negative is first bleached in a solution consisting of 1 part of a 5 per cent. solution of potassium bichromate, 1 part of a 10 per cent. solution of hydrochloric acid and 6 parts of water. It is then washed until the yellow staining disappears, which will require about twenty minutes, and then re-developed. Any non-staining developer may be used, but it should be weak, not more than half a grain of the developing substance to each ounce of water; that is, an ordinary negative developer



diluted to about one-fourth of its normal strength. Even in this weak solution development is fairly rapid, and it should be stopped at an early stage if a moderate degree of reduction is

required. If taken too far the plate will not be reduced at all. The degree of development can only be determined by inspection and judgment is not easy without experience of the process.

## NEGATIVE VARNISHES.

### How to Varnish.

#### Using Cold Varnish.

First place negatives where they will become perfectly dry,



Fig. 1.

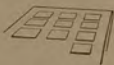


Fig. 2.

e.g., near a fire (fig. 1) or on a bath hot water tank.

Next lay out to get quite cold (fig. 2).

Dust negatives with a strip of cotton plush or camel's hair brush (fig. 3).



Fig. 3.



Fig. 4.

Poise negative on tips of fingers, steady with thumb and pour pool of cold varnish on to centre of the negative (fig. 4). Use plenty of varnish.

Let pool spread of itself (fig. 5).



Fig. 5.



Fig. 6.

Now incline plate so as to cause the varnish to flow into

right-hand corner (fig. 6).

Then into the left-hand far corner (fig. 7).



Fig. 7.



Fig. 8.

Then into the left-hand near corner (fig. 8).

Finally raise the negative so as to let the excess of varnish flow back into the bottle (fig. 9).



Fig. 9.



Fig. 10.

In tilting the negative to distribute the varnish, return the plate to the level position *a little before* varnish has reached the corner; the wave of varnish will carry the coating into the corner, and you will avoid getting varnish on the glass side or up your sleeve.

As last drops of varnish run into the bottle, rock negative to and fro (fig. 10), so as to avoid a streaky coating. Then stand the negative on edge on blotting paper to dry.

**Cold Varnishes.**

Celluloid	... 1 oz.
	(10 gms.)
Amyl acetate	... 50 ozs.
	(500 c.c.s.)

To counteract the sickly odour of amyl acetate, add a small proportion of oil of lavender.

This may be flowed over or applied with a brush to the cold negative.

Zanzibar copal	6 ozs.
	(30 gms.)
Amber (fused)	... 1 oz.
	(5 gms.)
Ether	... 60 ozs.
	(300 c.c.s.)
Acetone	... 40 ozs.
	(200 c.c.s.)
Chloroform	... 4 ozs.
	(20 c.c.s.)
20% shellac solution	2 ozs.
	(160 c.c.s.)
Ammonia (0-880)	3 drs.
	(30 c.c.s.)
Methylated spirit	4 ozs.
	(320 c.c.s.)

A mixture of Japanese gold size (1 part) and benzole (2 parts) forms a rather slow-drying though otherwise excellent cold varnish. The surface takes the pencil well.

**Water Varnish.**

Shellac	... 3 ozs.
	(100 gms.)
Sodium carbonate (saturated sol.)	24 ozs.
	(800 c.c.s.)

The shellac is allowed to soak in the liquid for twenty-four hours; the liquor is then poured away and replaced by an equal quantity of water, and the mixture boiled until the shellac dissolves. After standing some time the liquid becomes perfectly clear and bright.

**Hot Varnishes.**

1. Sandarac	... 1 oz.
	(55 gms.)
Seed lac	... 1½ oz.
	(83 gms.)
Castor oil	... 3 drs.
	(20 c.c.s.)
Oil of lavender	... 1½ dr.
	(10 c.c.s.)
Alcohol	... 18 ozs. (fl.)
	(1,000 c.c.s.)

This varnish is somewhat dark in colour.

2. Best orange shellac	2½ ozs.
	(125 gms.)
Oil of lavender	... ¼ oz.
	(13 c.c.s.)
Methylated alcohol	20 ozs.
	(1,000 c.c.s.)

Instead of oil of lavender, oil of turpentine (pure) can be used.

Keep in a warm place until dissolved; then add a large teaspoonful of whitening or prepared chalk; shake, set aside to clear, and then decant. This is specially recommended for gelatine negatives.

3. White hard varnish	15 ozs.
	(150 c.c.s.)
Rectified spirit	20 to 30 ozs.
	(200 to 300 c.c.s.)

Methylated spirit should not be used. This will be found a good varnish if durability is not required, as it is easily rubbed up for retouching upon and easily cleaned off.

4. Seed lac	... 2 ozs.
	(45.5 gms.)
Sandarac	... 2 ozs.
	(45.5 gms.)
Oil of lavender	... ½ oz.
	(12.5 c.c.s.)
Castor oil	... 1 oz.
	(25 c.c.s.)
Alcohol	... 40 ozs.
	(1,000 c.c.s.)

To prepare a good surface for the retouching pencil, the negative after varnishing is dusted

over with fine resin powder and rubbed up with the fingers.

5. Sandarac	...	4 ozs.	(113 gms.)
Alcohol	...	28 ozs.	(800 c.c.s.)
Oil of lavender	...	3 ozs.	(85 c.c.s.)

This is a good varnish for retouching upon, and a tooth is easily obtained by rubbing.

### For Film Negatives.

#### Water Varnish.

Borax	...	300 grs.	(31.2 gms.)
Glycerine	...	300 minims	(30 c.c.s.)
Shellac	...	600 grs.	(62.4 gms.)
Water	...	20 ozs.	(1,000 c.c.s.)

Boil together for about half-an-hour, then add—

Methylated spirit	5 ozs.	(250 c.c.s.)
-------------------	--------	--------------

and filter.

#### Dammar Varnish.

Dammar	...	1 oz.	(100 gms.)
Benzole, 90%	...	10 ozs.	(1,000 c.c.s.)

Filter. Benzole (*viz.*, benzene, not "benzoline") must be of the 90% strength.

### Retouching Medium.

Pale gum resin	200 grs.	(208 gms.)
Gum dammar	90 grs.	(93.6 gms.)
Gum mastic	20 grs.	(20.8 gms.)
Oil of juniper	1 dram	(60 c.c.s.)
Oil of turpentine	2-4 ozs.	(1,000-2,000 c.c.s.)

The gums are powdered and added to the oils, and finally enough pure asphaltum is added to give the mixture a dark amber colour when viewed through the depth of an inch.

This formula is strongly recommended by Whiting in his "Retouching" as not liable to pick, rub off, or come off on after-varnishing. It takes a great deal of work.

### Ground-Glass Varnish.

Sandarac	...	90 grs.	(93.6 gms.)
Mastic	...	20 grs.	(20.8 gms.)
Ether (0.720)	...	2 ozs.	(1,000 c.c.s.)

Dissolve the resins in the ether and afterwards add—

Benzole	...	$\frac{1}{2}$ to $1\frac{1}{2}$ ozs.	(250-750 c.c.s.)
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The proportion of the benzole added determines the nature of the matt obtained.

This varnish must be applied to the cold negative or the coating will not be matt.

### Tinted Varnish.

Malachite green, aurantia, or asphaltum is used for tinting the above matt varnish green, yellow, or brown respectively (for handwork on the back of a glass negative).

For the occasions, however, when a tinted matt varnish is required only in small quantity, *e.g.*, for equalising the printing density of a negative, as convenient a means as any is to add a little ordinary iodine (flakes) to the ground glass varnish made in accordance with the above formula.

**Spotting Medium.**

Indian ink—Water colour chalk.  
Payne's grey—Water colour chalk.

Grind together with water only on a palette to match the colour of the negative.

Another spotting medium may be very readily compounded by thinning down ordinary sepia moist water-colour with black writing ink to the consistency of cream.

**Blocking-Out Mixtures.**

1.—Indian red water-colour (student's quality in tubes) is a good mixture for blocking out. It should be thinned down sufficiently to work freely. It does not crack or peel off.

2.—Commercial "Brunswick black" forms an excellent blocking-out mixture for large work, and is quickly applied with a brush.

3.—When printing on development papers, yellow or orange dye (*e.g.*, Vanguard yellow) is a convenient blocking-out medium which is easier in use owing to its transparency. First go over the film with ox-gall on wet cotton wool; the dye then diffuses slightly beyond the edge of the brush work and avoids harsh lines.

In the case of subjects containing detail such as ladies' hair, or drapery, a weak dye application over the outline will add the necessary density to the background without clogging the hair. Then proceed as usual with a stronger wash, when stray bits not wanted to print can be taken off without leaving a sharp edge.

**Titles on Negatives.**

The usual method is to have the words forming the title set up in type and photographed on a "process" plate. The subject negative having been made with a clear margin round it, a strip of the title negative is laid down on this margin by stripping and the clear margin then filled up with "Photopake" or other blocking out mixture except over the strip of title, which is made dense enough, in the first instance, to print white. If a clear portion in a landscape negative cannot be found (in cases where the title has to appear on the view), a piece must be cut out with a sharp knife.

An alternative method is to cut away part of the negative film (round the subject), lay on the title strip and then fill in with opaque except over the title strip.

A plan frequently adopted consists in drawing the lettering, *reversed*, in opaque water-colour on a medium or dense part of the negative. This necessitates a capacity for drawing small letters neatly and correctly and reversing them in drawing.

A very fine mapping pen is the best tool, and it must be used lightly so as not to scratch the gelatine film. A pencil line may be drawn on the film so as to keep the line of letters perfectly straight. Indian red is the best colour to use; it is very opaque and it is more easily seen in working than a black colour.

## STRIPPING.

### Glass Negatives.

The following process (of Middleton and Holcroft) is a very reliable one for stripping the film from a glass negative and transferring it (with or without reversal) to a second glass plate or other support.

The materials are:—

Stock solution, made by mixing methylated spirit, 25 ozs. (250 c.c.s.); water, 1 oz. (10 c.c.s.); glycerine, 1 oz. (10 c.c.s.).

Some commercial hydrofluoric acid. Must be kept in a gutta percha bottle.

Some waxed paper, made by soaking thin note paper in hot melted paraffin wax for about half an hour.

A bow of thin cane fitted with a waxed silk thread.

Wooden window wedges, weak gum solution and a sharp penknife.



Fig. 1.



Fig. 2.

Cut through the film all round the negative at a distance of about one-eighth of an inch (3 mm.) from the edge (fig. 1).



Fig. 3.



Fig. 4.

Place the negative level on three wooden wedges (fig. 2).

Pour on "stripping solution" made by adding from 6 to 30 drops of hydrofluoric acid to 1 oz. (30 c.c.s.) of the stock solution (fig. 3).

Spread the mixture with an end of paper (fig. 4).



Fig. 5.



Fig. 6.

After a minute or so try (with the finger) if the edgings of film are loose, and remove them as soon as they come away without any pull whatever (fig. 5).



Fig. 7.



Fig. 8.

Now test if the whole film is loose by passing the waxed silk thread underneath (fig. 6).



Fig. 9.



Fig. 10.

If all is free, pour on some plain stock solution (fig. 7), and apply a sheet of waxed paper (fig. 8).

Squeegee down the waxed paper lightly (fig. 9).

Then remove paper and negative film together in contact by slipping the blade of a penknife under the film (fig. 10).

Now apply the paper, with the negative film on its under side, to a glass plate previously coated with very weak gum solution, dried and flowed over with stock solution (fig. 11).



Fig. 11.



Fig. 12.

Then squeegee down (fig. 9) and remove the waxed sheet, using the blade of the penknife to keep the corner of the film to the glass (fig. 12).

If it is desired to reverse the negative (as regards right and left), the film is transferred from the first sheet of waxed paper (fig. 10) to a second sheet of the same material. Sheet No. 1 is then pulled off and the negative film applied to a glass plate prepared with gum, etc., as already described.

#### FOR OLD NEGATIVES.

A less rapid solution, but one which will be safe in the case of an old or hardened negative, is:—

Methylated spirit	1 oz.
	(100 c.c.s.)
Water ... ..	2 ozs.
	(200 c.c.s.)
Hydrofluoric acid	60 mins.
	(12·5 c.c.s.)

These proportions may be slightly altered for different commercial spirits and acids.

It is better to use this formula for negatives which may have become hard or horny with age.

## Dry Stripping.

A useful and speedy method of stripping the film off glass plates in a dry condition for carbon printing, etc., is the following:—The negative is thoroughly well washed after fixing.

Then immerse for five minutes in a solution of potassium carbonate (9 ozs. potass. carbonate in 8 ozs. of water). Remove from the solution and blot off surplus moisture with a soft cloth, rub dry with another cloth, and then cut through the film with a penknife at the top edge.

When thoroughly dry, *i.e.*, in about 10 minutes, insert a needle under the film at the top corner and pull steadily, when the film will be found to leave the glass with perfect ease and certainty. This method appears to have no deleterious effect on the film at all.

## Sterry Process.

The following is also for stripping films from glass negatives, especially when the negatives are to be permanently kept in the film form.

The negatives are immersed for thirty minutes in:—

Potass. carbonate	2ozs. (20 c.c.s.)
saturated solution	
Glycerine	... 1 oz. (10 c.c.s.)
Formaline	... 1 oz. (10 c.c.s.)
Tap water	... 50 ozs. (500 c.c.s.)

This mixture is cloudy soon after making, and must be either filtered or decanted from the sediment. The plates, after immersion, are stood to drain for a few moments, and the solution mopped off them with an old soft handkerchief made into a pad. They are then put aside, where they will dry slowly

and uniformly, requiring, as a rule, at least six hours, and better twelve or more.

To strip them, all that is then necessary is to cut round with a sharp knife about  $\frac{1}{8}$ th in. from the edge of the plate, when, on lifting one corner, the film will separate easily, and lie perfectly flat. Longer immersion in the mixture or more formaline added causes the edges of the films to separate and curl up.

A greater proportion of formaline so hardens the film that it splits on drying. Artificial heat makes the stripping irregular, or the film may refuse to leave the glass. The remedy is to allow the plates to stand where they can absorb moisture before stripping.

The process is of no use for stripping negatives on celluloid film.

### Film Negatives.

In the case of negatives on celluloid cut or roll-film the following is a suitable method:—

Caustic soda	... 200 grs.
	(20.8 grms.)
Formaline	... 200 minims
	(20 c.c.s.)
Water	... 20 oz.
	(1,000 c.c.s.)

The celluloid negative is immersed in this solution until the film shows signs of detachment, and can be rolled back with the finger. It is then placed in—

Hydrochloric acid	25 minims
	(50 c.c.s.)
Glycerine	... 25 minims
	(50 c.c.s.)
Water	... 1 oz.
	(1,000 c.c.)

in which it is removed from its original support to a glass or other base.

### Wet-Collodion Negatives.

When the negative is thoroughly dry and cool, flow over with thin solution of rubber in benzole, 2 parts pure rubber to 100 parts benzole, or ordinary cycle tyre repairing solution thinned down to about the consistency of collodion will do.

When this is dry, the negative is flowed over with "leather" collodion. This is prepared by adding a small quantity of castor oil to plain collodion. A good formula is as follows:—

Collodion	... $\frac{1}{2}$ oz.
	(5 grms.)
Ether	... 5 ozs.
	(50 c.c.s.)
Alcohol	... 5 ozs.
	(50 c.c.s.)
Castor oil	... $\frac{1}{2}$ oz.
	(5 c.c.s.)

When the collodion on the negative is dry (the drying can be hastened by heat), the negative is cut round the edges with a knife, and placed in a dish of cold water. The film should soon begin to loosen at the edges; if it does not, a little acetic acid (up to 10 per cent.) may be added to the water.

The film is now transferred to a piece of paper, and thence to the new support. If the negative is to be reversed it is transferred to another piece of paper before being placed on its final support.

## PLAIN AND ALBUMEN PAPERS.

The following are formulæ for "salting" and sensitising papers such as Whatman's drawing papers.

Formulæ such as these, which were largely used in the days before the industrial manufacture of printing papers, yield sensitive coatings which keep in good condition only for a few days. Moreover, they require a negative of very considerable vigour; a negative which prints well in P.O.P. is not nearly vigorous enough. In addition to this, it is necessary to over-print to an appreciable extent, since prints lose depth in the toning and fixing baths. Despite these drawbacks, the formulæ are deserving of more notice than they now receive, especially for the sensitising of fabrics such as silk, satin, cotton.

First prepare the plain paper with—

Ammonium chloride	120	160 grs.	(12.5 to 16.5 gms.)
Sodium citrate ...	200	grs.	(20.8 gms.)
Sodium chloride	40-60	grs.	(4.1 to 6.2 gms.)
Gelatine... ..	20	grs.	(2.08 gms.)
Distilled water ...	20	ozs.	(1,000 c.c.s.)

or—

Ammonium chloride	200	grs.	(20.8 gms.)
Gelatine... ..	20	grs.	(2.08 gms.)
Water ... ..	20	ozs.	(1,000 c.c.s.)

The gelatine is first swelled in cold water and then dissolved in hot water, and the remaining components of the formula are

added. The solution is filtered, and, when still warm, the paper floated upon it for three minutes and dried.

The salted paper is sensitised upon a neutral 45-grain silver bath.

### PLATINUM TONING BATH.

Potass. chloro-platinite ...	9	grs.	(.94 gm.)
Water ... ..	20	ozs.	(1,000 c.c.s.)
Nitric acid ... ..	4-6	drops	(7-10 drops)

### Albumen Paper.

Albumenised paper (now very little used) is sensitised on the following silver solution —

Silver nitrate ...	1,200	grs.	(125 gms.)
Distilled water ...	20	ozs.	(1,000 c.c.s.)

The bath is made just acid with nitric acid, requiring 6-8 drops per 20 ozs. (8-15 drops per litre).

### TONING BATH.

Gold chloride ...	15	grs.	(1 gm.)
Water ... ..	4	ozs.	(120 c.c.s.)

Add lime water until a piece of red litmus paper, placed in the solution, is turned blue. Then add—

Calcium chloride, fused	120	grs.	(7.8 gms.)
Water to make...	7½	ozs.	(225 c.c.s.)

This solution is diluted with 15 times its volume of water to make the toning bath; it can be used over and over again by addition of stock solution.



## SELF-TONING PAPERS.

Self-toning papers are made with both collodion and gelatine emulsions. Generally speaking the gelatine papers yield a greater variety of tones according to the strength of the hypo fixing bath, and the time of immersion of the print. On the other hand the collodion papers exhibit greater certainty in the tone which they yield by simple fixation in hypo.

### Printing.

The paper should be exposed under the negative until the picture is considerably darker than the finished print is required to be. With many papers the printing should be continued until the shadows of the picture show a species of metallic bronze, while at the same time the lightest parts of the subject, usually the sky, are quite perceptibly darker than the unexposed paper.

The more rapidly the paper is printed the greater the degree of over-printing which is necessary; prints which require a very long exposure, owing to the great density of the negative or the weakness of the light, need very little over-printing.

### Washing.

Although some makers do not advise it, it is better to wash prints before toning, since this conduces to greater permanency of the results. Prints are washed

in running water or in four or five changes of clean water, keeping them on the move.

Collodion prints are very liable to curl up in the wash water to an awkward extent. This can be avoided by placing them in the first instance in very little water—only enough to cover one or two prints. Several prints are laid face down in this water one after the other, placing each one in as soon as the preceding one has been wetted all over, and before it has had time to curl. The upper prints thus keep those below them fairly flat, and the prints show much less curl during the further washing, etc., in a greater depth of water or fixing solution.

### Fixing-Toning.

The prints are fixed and at the same time toned to a rich sepia colour by immersion in a plain solution of hypo. The makers' instructions should be followed. A very usual strength is:

Hypo ... ..	4 ozs.
	(182 gms.)
Water ... ..	20 ozs.
	(1,000 c.c.s.)

With some papers it is an advantage to add a pinch or two of bicarbonate of soda to the fixing bath. This is especially so in the case of papers which it is directed should not be washed before fixing.

### Purple Tones.

In place of the first washing in water, prints are soaked for about 5 minutes in:—

Common salt ...	2 ozs.
	(91 gms.)
Water ...	20 ozs.
	(1,000 c.c.s.)

They are then washed in two changes of water and then fixed as directed above.

### Two-Colour Prints.

Very pleasing colour effects can be obtained by painting

parts of the dry print with the above salt solution, using a camel hair brush. On then fixing the whole print in the ordinary way, the parts which have been treated with the salt will tone to a purple, whilst the untreated parts will come out a warm brown. Especially with portraits, this process yields some very pleasing results.

## GELATINE P.O.P.

### Emulsion.

Gelatine...	700 grs.
	(72.8 gms.)
Ammonium chloride	72 grs.
	(7.49 gms.)
Rochelle salts ...	200 grs.
	(20.8 gms.)
Silver nitrate ...	300 grs.
	(31.2 gms.)
Alcohol ...	2 ozs.
	(100 c.c.s.)
Water ...	20 ozs.
	(1,000 c.c.s.)

The gelatine in the formula is a mixture of equal parts of Nelson's No. 1 and Coignet's.

Heat to 100° F. (38° C.) and allow to remain at this temperature after all is dissolved for ten minutes, after which proceed in the usual way.

### P.O.P. Procedure.

Wash prints in several changes of water until wash water ceases to show milkiness when poured into clean glass measure (time, 10 to 15 minutes). Tone in gold bath (5 to 10 minutes). Again wash as thoroughly as before toning. Fix in:—Hypo, 2 to 3 ozs.; water, 20 ozs. (50.75 gms. per litre), for 10 minutes. Finally wash in running water or frequent changes (every 5 or 10 minutes) for 1 to 2 hours.

Prints can be toned in a

platinum bath instead of in one of gold (see formula below). The other manipulations remain the same as above. Platinum tones are best suited to matt surface paper.

Prints can be toned and fixed at the same time in a "combined" bath (see formula below). With some baths and papers it is best to wash before toning; with others it is not necessary. The tones by the "combined" method are almost always warmer than by separate toning and fixing. Also they are somewhat inferior in permanence.

### Gold Toning Bath.

The following is the best and most generally used toning bath for P.O.P., and yields fine purplish tones.

Gold chloride ...	2½ grs.
	(0.26 gm.)
Ammonium sulphocyanide	30 grs.
	(3.12 gms.)
Water ...	20 ozs.
	(1,000 c.c.s.)

It is necessary for this and all sulphocyanide baths to ripen. The best method of mixing is to boil the water and to dissolve the gold in one half and the sulphocyanide in the other—

both scalding hot. Then pour the gold into the sulphocyanide in small doses, stirring all the time; use when cool. If cold water is used, the mixture should be allowed to stand 12 hours.

#### STOP FOR GOLD TONING.

A weak solution of soda sulphite (5 grs. per oz.) (11 gms. per litre) at once stops the action of a gold toning bath.

#### SALT BATH.

A short immersion of prints in the following bath prior to the first washing favours even toning and prevents spots and stains from rusty tap water:—

Salt ... ..	2 ozs.	(91 gms.)
Sodium carbon- ate, cryst	1 oz.	(45.5 gms.)
Water ... ..	20 ozs.	(1,000 c.c.s.)

If prints are to be toned in the platinum bath the carbonate should be omitted.

#### Combined Baths.

##### ALKALINE TONE-FIXING BATH.

Gold chloride ...	2 grs.	(0.21 gm.)
Lead nitrate ...	10 grs.	(1.04 gm.)
Chalk ... ..	$\frac{1}{2}$ oz.	(22.7 gms.)
Hypo ... ..	4 ozs.	(182 gms.)
Water, to make	20 ozs.	(1,000 c.c.s.)

Shake the solution well, allow to settle, and use the clear portion. If prints tone too quickly, under 10 minutes, in the combined bath it is best to pass them afterwards through a plain fixing bath of: hypo, 3 ozs.; water, 20 ozs. (150 gms. per litre). This ensures prints receiving ample fixation, which otherwise they might not get whilst in the combined toning and fixing bath.

#### VALENTA'S.

Hypo ... ..	8 ozs.	(364 gms.)
Ammonium sul- phocyanide	1 oz.	(45.5 gms.)
Lead nitrate ...	175 grs.	(18.2 gms.)
Alum ... ..	350 grs.	(38.4 gms.)
Water, to make...	20 ozs.	(1,000 c.c.s.)

Dissolve the hypo in the water, add the sulphocyanide, then add the alum dissolved in a little water, and also the lead, and add to the hypo. Heat the mixture to 120 deg. F. for ten minutes; allow to cool. For use take—

Stock solution ...	10 ozs.	(100 c.c.s.)
(as above)		
Water ... ..	10 ozs.	(100 c.c.s.)
Gold chloride ...	$3\frac{1}{2}$ grs.	(0.08 gm.)
(from stock sol.)		

#### Reducer for Dark P.O.P.'s.

The best reducer for over-printed P.O.P.'s is one made up at the time of use from 10 per cent. stock solutions of (A) ammonium sulphocyanide and (B) potass. ferricyanide. The reducing solution consists of:—

A solution ...	5 ozs.	(10 c.c.s.)
B solution ...	$\frac{1}{2}$ oz.	(1 c.c.)
Water, to make...	24 ozs.	(50 c.c.s.)

This is used on the prints after toning, fixing and well washing out the hypo in the usual way.

This reducer acts perfectly on P.O.P. prints, even after gold toning. If anything, it improves the tone of the print by rendering it somewhat cooler.

**Platinum Toning.****PHOSPHORIC ACID.**

Potass. chloro-	4 grs.
platinite	(0.42 gm.)
Phosphoric acid	$\frac{3}{4}$ oz. (fl.)
(sp. gr. 1.12)	(35 c.c.s.)
Water, to make...	20 ozs.
	(1,000 c.c.s.)

**CITRIC ACID.**

Potass. chloro-	4 grs.
platinite	(0.42 gm.)
Sodium chloride	40 grs.
(salt)	(4.16 gms.)
Citric acid	50 grs.
	(5.2 gms.)
Water, to make...	20 ozs.
	(1,000 c.c.s.)

**HADDON'S FORMULA.**

Platinum per-	$1\frac{1}{2}$ grs.
chloride	(0.18 gm.)
Sodium formate	57 grs.
	(5.9 gms.)
Formic acid ...	17 minims
	(1.7 c.c.)
Water, to make...	20 ozs.
	(1,000 c.c.s.)

**STOP FOR PLATINUM TONING.**

A weak solution of sodium carbonate (10 grs. per oz.—21 gms. per litre) instantly arrests the toning action of a platinum bath.

**Developing P.O.P.****PAGET BROMIDE PROCESS.**

The prints are immersed in 10 per cent. potass. bromide solution for five or ten minutes, washed and developed with the following:—

A. Hydroquinone	40 grs.
	(4.16 gms.)
Sodium sul-	160 grs.
phite ...	(16.7 gms.)
Water, to make	20 ozs.
	(1,000 c.c.s.)
B. Potass. bro-	$2\frac{1}{2}$ ozs.
midide	(114 gms.)

Sodium car-	2 ozs.
bonate	(91 gms.)
Water, to make	20 ozs.
	(1,000 c.c.s.)
C. Potass. cyanide	$\frac{1}{2}$ oz.
	(22.7 gms.)
Water, to make	20 ozs.
	(1,000 c.c.s.)

For average negatives, mix:—  
A, 50 parts; B, 100 parts;  
C, 4 parts; water, 150 parts.

For flat negatives (greater contrast), A, 3 parts; B, 8 parts; water, 5 parts.

For hard negatives (soft results), A, 7 parts; B, 8 parts; water, 1 part.

The cyanide solution is used as above in quantity sufficient to keep the backs of prints clean.

**ACID DEVELOPER.**

A stock solution is made of:—

Pyro ...	200 grs.
	(20.8 gms.)
Metol ...	200 grs.
	(20.8 gms.)
Acetic acid ...	5 drs.
	(30 c.c.s.)
Water, to make...	20 ozs.
	(1,000 c.c.s.)

The working developer is made by mixing 1 part of this stock solution with 32 parts of water at the time of use.

The developer should be used in a perfectly clean glass dish and kept moving over the print until the required depth is reached. This usually takes from 1 to 2 minutes. Plenty of the developer should be used, and it should be discarded as soon as it becomes turbid or muddy.

Without rinsing, the prints should be transferred to a fixing bath composed of:—

Hypo ...	2 ozs.
	(91 gms.)
Soda sulphite ...	$\frac{1}{2}$ oz.
	(22.7 gms.)
Water, to make...	20 ozs.
	(1,000 c.c.s.)

## BROMIDE AND GASLIGHT PAPERS.

### Amidol Developer.

Soda sulphite	480 grs.
cryst.	(50 grms.)
Potass bromide...	10 grs.
	(1·04 grms.)
Water, to make	20 ozs.
	(1,000 c.c.s.)

When dissolved add—

Amidol ...	50 grs.
	(5·2 grms.)

For gaslight paper the bromide should be reduced to 4 grs. (0·41 gm.)

This developer will not keep in good condition for more than 2 or 3 days.

### Metol-Hydroquinone.

*One solution.*

Metol ...	10 grs.
	(1·04 grms.)
Soda sulphite	320 grs.
cryst.	(33·3 grms.)
Hydroquinone ...	30 grs.
	(3·12 grms.)
Soda carbonate	320 grs.
cryst.	(33·3 grms.)
Potass bromide...	10 grs.
	(1·04 grms.)
Water, to make	20 ozs.
	(1,000 c.c.s.)

For gaslight prints the bromide should be reduced to 4 grs. (·41 gram.)

Dissolve the chemicals in warm water and use when cold.

This developer will remain in good working condition for several weeks in well-corked bottles filled to the neck. It may be used so long as it remains clear and colourless.

*Two-solution.*

No. 1.

Soda sulphite	960 grs.
cryst.	(100 grms.)
Potass metabi-	160 grs.
sulphite	(16·7 grms.)
Metol ...	40 grs.
	(4·16 grms.)
Hydroquinone ...	120 grs.
	(12·5 grms.)
Potass bromide...	40 grs.
	(4·16 grms.)
Water, to make	20 ozs.
	(1,000 c.c.s.)

No. 2.

Soda carbonate	1,280 grs.
cryst.	(133 grms.)
Water, to make	20 ozs.
	(1,000 c.c.s.)

These solutions will keep for a very long time in well-corked bottles, even if the bottles are only partially full.

For use, take No. 1, 1 part; No. 2, 1 part; water, 2 parts.

### Chlorquinol.

*(For Chloro-bromide Papers.)*

Soda sulphite	$\frac{1}{2}$ oz.
cryst.	(22·7 grms.)
Soda carbonate	$\frac{1}{2}$ oz.
cryst.	(22·7 grms.)
Potass bromide...	5 grs.
	(0·52 gm.)
Chlorquinol ...	60 grs.
	(6·25 grms.)
Water ...	20 ozs.
	(1,000 c.c.s.)

Time of development, 2 to 3 minutes at 65° F. For warmer tones, dilute with an equal bulk of water, and increase the exposure.

**Reducers for Bromides.****OVER-DEVELOPED PRINTS.**

Over-developed prints are best treated in a *weak* iodine-cyanide reducer made from (A) 10% solution of iodine in potass. iodide and (B) 10% potass. cyanide solution.

Take :—

A solution	...	30 minims (2 c.c.s.)
B solution	...	10 minims (0.6 c.c.)
Water	...	2 ounces (60 c.c.s.)

adding more of A and B solutions if necessary.

For making the iodine solution see under "Negative Reducers" earlier in this section.

**OVER-EXPOSED PRINTS.**

Harden the print well, wash and dry. Re-soak in water till limp and apply a reducer made from the following two stock solutions :—

A. Potass. perman- ganate	2 grs. (1.66 grms.)
Water, to make	2 drms. (100 c.c.s.)
B. Common table salt	80 grs. (8.3 grms.)
Sulphuric acid	20 minims (2 c.c.s.)
Water, to make	20 ozs. (1,000 c.c.s.)

Immediately before use, mix A solution 2 drms. (12.5 c.c.s.), B solution 10 ozs. (500 c.c.s.), and dilute, if necessary, to slow the action conveniently.

When sufficiently reduced, the print is thoroughly rinsed, and fixed for 10 mins. in a 10 per cent. fixing bath, preferably one of the acid kind, *s.g.*, hypo. plus potass. metabisulphite.

Any residual brownish permanganate stain is removed from the well washed print by the following bath :—

Hydrochloric acid, 200 minims (20 c.c.s.) ; Common salt, 25 grs. (2.6 grms.) ; Soda sulphite (anhydrous) 25 grs. (2.6 grms.) ; Water to make 20 ozs. (1,000 c.c.s.). A final wash completes the treatment.

**Clearing Bath.**

To remove yellow stain from bromide prints, the following is a suitable solution :—

Alum (satur- ated solution)	20 ozs. (1,000 c.c.s.)
Hydrochloric acid	6 drs. (37.5 c.c.s.)

**Prints from Flat Negatives.**

Prints of good contrast can be made as follows : The paper is fully exposed and over-developed, fixed and washed. The prints are then placed in the following iodine bath until whites are strongly blue, and then fixed for five minutes.

**IODINE BATH.**

Potass. iodide	...	60 grs. (6.2 grms.)
Iodine	...	6 grs. (0.62 gm.)
Water, to make	20 ozs. (1,000 c.c.s.)	

If not sufficiently lightened, the print may be washed and the process with bleaching bath and hypo repeated.

**Stress Marks on Bromides.**

Avoid rubbing paper against other sheets in boxes or packet and against negative or mask. In cutting up large sheets, use shears on open sheet, not knife, etc., which rubs on emulsion surface. Have developer water-clear, free from sediment and any floating dirt. Use plenty of developer.

Addition of from 40 to 60 minims of 10 per cent. solution of potass. cyanide to each 10 ozs. of developer (8-12 c.c.s. per litre) will avoid stress marks in many cases, or a developer may be made up according to the formula:—

Soda sulphite	1 oz.
cryst.	(45.5 gms.)
Potass. bromide	2 grs.
	(0.208 gm.)
Amidol ... ..	35 grs.
	(3.65 gms.)
Potass. cyanide...	2 grs.
	(0.208 gm.)
Water, to make	20 ozs.
	(1,000 c.c.s.)

If stress marks occur, they can usually be removed by gently rubbing each print with a soft rag as soon as it has had a minute or so in the wash-water. A further aid to removal is a solution of borax,  $\frac{1}{2}$  oz. (5 gms.), water, 20 ozs. (200 c.c.s.); methylated spirit, 5 ozs. (50 c.c.s.), rubbed over with soft rag or cotton wool.

### Sulphide Toning.

Of the many methods of producing sepia to warm brown tones on bromide or gaslight the following is the best and most reliable. The prints are bleached in a bath of ferricyanide and bromide, briefly washed and darkened or toned in a solution of soda sulphide. Prints require to be well washed from hypo before being put into the bleacher. In summer, or in places where the water supply has a softening action on prints, it is well to fix them in a fixing hardening bath. (See "Fixing.")

#### BLEACHER.

Ammonium bromide	100 grs.
	(10.4 gms.)
Potass. ferri-cyanide	300 grs.
	(31.2 gms.)
Water, to make	20 ozs.
	(1,000 c.c.s.)

### SULPHIDE BATH.

It is best to keep the soda sulphide in strong 20 per cent. solution; a weak solution does not keep well. Use the pure *white* sodium sulphide, dissolving 4 ozs. in water and making up to 20 ozs. with water (200 gms. per litre).

To make the working sulphide bath, mix:—

Stock 20% sulphide soln.	... 3 parts
Water, to make	20 parts

The prints are treated for two or three minutes in the bleacher—that is, until the picture becomes faint brown in colour. If any black is left at the end of two minutes it is a sign that the bleacher (which may be used repeatedly) is becoming exhausted.

Rinse in clean water for half-a-minute to one minute. Longer washing at this stage does no good and may impair the tone.

Transfer to sulphide bath, where prints should darken to the full brown or sepia in a second or two.

Throw away the sulphide bath after the day's use. Stale spoiled sulphide solution is the most frequent cause of bad tones or of refusal of prints to darken in the sulphide bath.

Finally wash for half-an-hour in running water.

The results by the sulphide process are quite permanent.

Blue stains, in spots and patches, on sulphide-toned prints are due to iron, either as rust in the tap-water or as impurity in alum. Fit a flannel filter to the tap and use pure alum.

Dilute hydrochloric acid applied to the blue spots, after the print is thoroughly dry, will

remove the spots without injury to the print. Washing is then necessary to remove the acid.

Sulphide-toned prints of bad colour or insufficient depth can be re-treated, *e.g.*, by bleaching in:—copper bromide, 260 grs. (27 gms.); sodium bromide, 5 ozs. (222 gms.); water, 20 ozs. (1,000 c.c.s.). This is used in the dark room, the bleached print taken into daylight and re-developed with amidol or other clean developer, after which it may be re-toned. Over-dark sulphide-toned prints of light subjects, *e.g.*, sketch portraits or enlargements which are afterwards to be worked up, may be reduced by putting back into the ferricyanide-bromide bleach after washing out the sulphide darkening bath.

### Silver-Mercury Sulphide.

(*H. W. Bennett's process.*)

By this process any colour from warm brown to brown black can be produced with certainty, provided that the development of the print has been full.

The bleaching bath is compounded from two stock solutions, according to the colour desired.

A. Potass. ferricyanide	2 ozs. (91 gms.)
Potass. bromide	1 oz. (45.5 gms.)
Water, to make	20 ozs. (1,000 c.c.s.)
B. Mercuric chloride	$\frac{1}{2}$ oz. (22.7 gms.)
Water, to make	20 ozs. (1,000 c.c.s.)

To prepare the bleaching bath, take the various quantities of A and B specified for each

ounce of working solution, according to the colour desired.

A. 60 parts ...	Rich warm brown
A. 60 parts ...	} Cool brown
B. 30 parts ...	
A. 40 parts ...	} Very deep brown
B. 40 parts ...	
A. 40 parts ...	} Brown-black
B. 80 parts ...	

Different proportions may be used for obtaining intermediate tones.

Whenever solution B is used in compounding the bleaching bath, an acid bath must be used between bleaching and sulphiding.

Hydrochloric acid (pure)	100 minims (10 c.c.s.)
Water, to make	20 ozs. (1,000 c.c.s.)

After five minutes' washing from the bleaching solution, two or three changes of this acid bath must be given, and then a few minutes' washing before placing the prints in the sulphide solution. (This is the ordinary sulphide bath described in the preceding formula.)

When the bleaching bath contains a proportion of solution B the print is intensified as well as toned, the degree of strengthening depending on the proportion of B used. Allowance must be made for this in printing by decreasing the exposure, not by shortening the development. When the full quantity of the mercuric solution B is used, three-fourths of the normal exposure will be correct in making the print, which should be developed normally.



### Hypo-Alum Toning.

The following is the method (much used on the commercial scale) for toning bromide and gaslight prints to a warm purplish sepia. Prints must be fixed in a hardening-fixing bath. They are then toned in a hot mixture of hypo, alum, etc., made as follows:—

Hypo ... ..	1 lb.
	(364 gms.)
Hot water ... ..	80 ozs
	(2,000 c.c.s.)
Dissolve, and then add—	
Alum ... ..	3½ ozs.
	(80 gms.)

Stir well, boil for 2 or 3 minutes, cool to about 150 F. (65 C.), and then add the Silver Ripener, made as below:

Stir well again and add:	
Potass. iodide ...	40 grs.
	(2½ gms.)

The whole mixture is thoroughly well stirred.

#### Silver Ripener.

Silver nitrate	20 grs
	(1.3 gm.)
Water ... ..	1 oz.
	(30 c.c.s.)

To this add drop by drop, strong (880) ammonia, until the precipitate first formed is just re-dissolved. Stir vigorously while adding the ammonia.

The toning bath can be used repeatedly, keeping up the bulk by occasional addition of fresh solution. The best results are obtained by keeping the bath hot, or as warm as the emulsion will stand, say 100° to 120° F. (38° to 50° C.). At this temperature prints will tone in from 20 to 30 minutes. The bath can be used cold, in which case toning takes about 24 hours, the prints requiring to be turned over every little while.

After using the hot bath, it is well, after toning, to pass the prints through a solution of:

Alum ... ..	250 grs.
	(26 gms.)
Water ... ..	20 ozs.
	(1,000 c.c.s.)

Prints are finally washed thoroughly in water.

### Liver of Sulphur Toning.

Liver of sulphur	15 grs.
	(1.56 gms.)
Water ... ..	20 ozs.
	(1,000 c.c.s.)

This bath is used at about 80 deg. F., and tones in about 30 minutes, yielding results very similar to those with hypo-alum. Commercial papers are not, however, all equally suitable for "liver" toning.

### Nitro-Sulphide Toning.

(W. B. Shaw's Process.)

This process is based on the fact that sulphide solutions of a suitable oxidising agent tone directly, thus obviating the necessity for an intermediate bleaching bath.

The nitro-sulphide process will yield more pleasing results on "gaslight" papers than the bleach and sulphide method, the colours resembling those obtained by hypo-alum toning.

Stock solutions:

#### Solution A.

A saturated solution of barium sulphide. To prepare this, ¼ oz. (11.4 gms.) of barium sulphide is shaken up with 20 ozs. (1 litre) of warm water and the undissolved portion allowed to settle. The clear liquid is poured off for use. The bottle must be kept tightly closed.

**Solution B.**

A 10 per cent. solution of sodium meta-nitro-benzene sulphionate.

For use take: A. 4 ozs. (100 c.c.s.) and B. 2 drams (6.25 c.c.s.).

The best results are obtained by giving prints a generous exposure and developing with M.Q. The final tones vary considerably with different brands of paper, ranging from purple to warm brown. As the progress of toning is under direct observation, intermediate colours can be secured with ease.

With slow bromide and chlorobromide papers toning may be too rapid for convenient control. In such cases, the solution should be largely diluted with water.

If toning is carried to completion, fast contrasty papers usually give cold tones and slow normal papers warm ones.

The temperature of the toning bath should not be below 60° F. (16° C.).

Prints for this process need not be completely washed after fixing, but it is just as well to wash for a few minutes before toning.

**Copper Toning.**

A. Copper sulphate	60 grs. (6.25 grms.)
Potass. citrate	240 grs. (25 grms.)
Water ...	20 ozs. (1,000 c.c.s.)
B. Potass. ferricyanide	50 grs. (5.2 grms.)
Potass. citrate	240 grs. (25 grms.)
Water ...	20 ozs. (1,000 c.c.s.)

The citrate in this formula is the neutral salt.

Use equal parts of each. If prints are pinkish in the high-lights use more citrate in the A or B solution.

The copper toning process gives a range of tones from warm brown to bright red, according to the time of action of the solution. Toned prints last fairly well but are inferior in permanence to those made by the sulphide-toning method. The toning has scarcely any perceptible effect on the depth of prints.

In this mixture which must be used soon after making, prints gradually tone and pass through the stages of purplish black and brown to a decided red. Prints should be well washed from hypo before toning.

**Uranium Toning.**

This old method yields brown to reddish tones. It intensifies the prints, but the results often prove impermanent.

A. Uranium nitrate	90 grs. (9.36 grms.)
Water ...	20 ozs. (1,000 c.c.s.)
B. Potass. ferricyanide	90 grs. (9.36 grms.)
Water ...	20 ozs. (1,000 c.c.s.)

Use equal parts of A and B and add 20 minims of glacial acetic acid to each ounce of mixture (40 c.c.s. per litre). The prints must be free from hypo. After toning wash in several changes of *still* water till the high-lights are clear. Washing in running water will remove the toning in patches. Citric acid (10 grs. per oz.—22 grms. per litre) or oxalic acid (5 grs. per oz.—11 grms. per litre) instead of acetic is an aid to pure whites.

As a means of rendering uranium-toned prints permanent it is recommended to fix the toned prints for five minutes in hypo,  $\frac{1}{2}$  oz. (22.7 gms.); potass. metabisulphite, 70 grs. (7.25 gms.); water, 20 ozs. (1,000 c.c.s.).

### Blue Tones.

A. Potass. ferri-cyanide	15 grs. (1.56 gms.)
Sulphuric acid, conc.	30 minims (3 c.c.s.)
Water ... ..	20 ozs. (1,000 c.c.s.)
B. Ferric ammonia citrate	15 grs. (1.56 gms.)
Sulphuric acid, conc.	30 minims (3 c.c.s.)
Water ... ..	20 ozs. (1,000 c.c.s.)

Mix equal parts of A and B at time of use. Prints should be light, as the toning also intensifies. When toned, wash to remove all yellow colour.

### Gold Toning.

For improving the colour of greenish or rusty black prints, and for bluish tones.

Ammonium sulphocyanide	150 grs. (15.6 gms.)
Chloride of gold	10 grs. (1.04 gms.)
Boiling water ...	20 ozs. (1,000 c.c.s.)

Use as soon as cool. Place the wet print face upwards on a sheet of glass, squeegee into contact, blot off superfluous moisture, and paint the above bath on with a broad flat brush; when the desired tone is reached wash well and dry.

### Glazing Prints.

#### GLAZING SOLUTION.

(For Gelatine Prints only.)

In glazing prints by stripping

from glass plates or ferrotype sheets, the best means for avoidance of sticking of prints is the use of a so-called "glazing" or "stripping" solution. In the use of rotary drying-glazing machines, a glazing solution may be of advantage in dealing with prints on a paper which does not strip easily. The glazing solution may be bought ready made or prepared from:—

Ox-gall, prepared	1 oz. (12 c.c.s.)
Water ... ..	80-160 ozs. (1,000 to 2,000 c.c.s.)

The prints are soaked in this solution for a minute or two and laid on the glasses without intermediate washing.

Those who do not object to the mess (and smell), may prepare ox-gall by buying gall-bladders from a butcher or slaughter-house, and mixing the fluid from a bladder with formaline in the proportion of about 2 ozs. formaline per gallon or gall. (12.5 c.c.s. per litre). The mixture is filtered through several thicknesses of butter muslin, after which it is bottled and will keep for a long time.

A polishing medium to be applied to glass or ferrotype before squeegeeing the print is—

Beeswax ...	20 grs. (45 gms.)
Turpentine ...	1 oz. (1,000 c.c.s.)
or	
Spermaceti wax	20 grs. (45 gms.)
Benzole ... ..	1 oz. (1,000 c.c.s.)

a few drops of which are rubbed on with a piece of flannel, and the glass afterwards polished with silk rag or chamois leather.

## ENAMEL COLLODION.

(For Glazing both Gelatine and Collodion Prints).

Soluble gun	125 grs.
cotton	(13 grs.)
Alcohol ... ..	10 ozs.
	(500 c.c.s.)
Sulphuric ether	10 ozs.
	(500 c.c.s.)

Glass plates cleaned with French chalk are coated with the above, and, as soon as coating has set, slipped under prints which are waiting face down in water. Prints are withdrawn and squeegeed. When they are half dry, a stout backing paper is pasted on with good thick photo-mountant, the prints then allowed to dry. The object of the backing paper is to prevent penetration of moisture when the prints are mounted. They are finally stripped off.

## Drawings from Ink or Prints.

The following process can be used with prints on bromide, gaslight or P.O.P. paper.

After outlining the subject in waterproof Indian ink, bleach out the image in—

Thiocarbamide ...	240 grs.
	(25 grs.)
Nitric acid ...	4 drs. (fl.)
	(25 c.c.s.)
Water ... ..	20 ozs.
	(1,000 c.c.s.)

Or the following bleaching solution may be used:—

Iodine soln. ...	30 minims
	(6 c.c.s.)
Potass. cyanide	5 minims
	(1 c.c.)
Water ... ..	1 oz.
	(100 c.c.s.)

The iodine and cyanide solutions are each of 10 per cent. strength. The iodine is dissolved with aid of potass. iodide; the cyanide in plain water.

## THE CARBON PROCESS.

*Procedure.*—Tissue, *i.e.*, paper coated with a mixture of gelatine and pigment colour, is made sensitive by immersion in bichromate solution, dried, and printed under the negative by daylight. As the colour of the tissue hides the effect of light, the printing is done by aid of an actinometer.

The effect of the light is to render the gelatine insoluble—the greater the action, the deeper down into the tissue. "Development" consists in dissolving out in warm water the tissue which remains soluble.

As a skin of insoluble tissue is formed over the whole top

surface of the print, the coating is first transferred (face down) on to a fresh support.

To do this, the exposed tissue is soaked in cold water along with a sheet of (gelatine-coated) transfer paper, the two squeegeed together, put under pressure for about 20 minutes, and then placed in hot water.

The original support of the sensitive surface is stripped off leaving the tissue with its face (the insoluble side) on the transfer paper. The soluble gelatine can be then dissolved away (development), carrying the pigment with it, and the prints are finally passed through

an alum bath, washed and dried.

As this transference of the print to a new support causes the picture to appear reversed as regards right and left, it is necessary (where this is an objection) to transfer first on to a "temporary support" for development, and from this again on to the "final support."

### Sensitising Solutions.

Potass. bichromate	1 oz.
	(45.5 gms.)
Water ... ..	20 ozs.
	(1,000 c.c.s.)
Liquor ammonia,	60 minims
0.880	(6 c.c.s.)

A longer immersion in the weaker solution is practically equal to a shorter one in the stronger bath.

If the tissue is squeegeed on a glass plate after sensitising, the degree of squeegeeing (light or heavy) also modifies its sensitiveness by removing more or less of the solution.

If the tissue be squeegeed on to a ferrotype plate, and allowed to dry upon it, the drying may be done in the light of an ordinary room. The face of the tissue is then protected from light, dust, and injurious vapours.

### FIXING OR HARDENING BATH.

Alum ... ..	1 oz.
	(45.5 gms.)
Water ... ..	20 ozs.
	(1,000 c.c.s.)
<i>H. W. Bennett's formula</i> :—	
Potass. bichromate	240 grs.
	(25 gms.)
Citric acid ... ..	60 grs.
	(6.25 gms.)
Water ... ..	20 ozs.
	(1,000 c.c.s.)

To this, add liquor ammonia sufficient to change the orange-red colour to lemon yellow.

This bath is suitable for negatives which will yield good prints in contact bromide printing. Tissue sensitised in it will keep longer than that sensitised in the former solution, but it is much less sensitive. It is not suited for the very strong negatives usual in carbon printing.

### Bichromate Stains, Etc.

To remove bichromate stains from fingers, nails, etc., apply dilute ammonia to the parts until the stains disappear, then well wash the hands with warm water and soap.

### Waxing Solutions.

No. 1 formula is for carbon prints or for removing collodion films.

1. Beeswax ... ..	100 grs.
	(10.4 gms.)
Benzole rect.	20 ozs.
No. 1	(1,000 c.c.s.)

No. 2 formula is for flexible supports.

2. Yellow resin	360 grs.
	(37.5 gms.)
Yellow beeswax	120 grs.
	(12.5 gms.)
Rect. spirit	20 ozs.
of turpentine	(1,000 c.c.s.)

### Carbon Transparencies.

The following is a substratum for use in making carbon transparencies.

Nelson's No. 1	$\frac{3}{4}$ oz.
gelatine	(34.1 gms.)
Water ... ..	20 ozs.
	(1,000 c.c.s.)
Potass. bichromate	12 grs.
	(1.25 gms.)

Well cleaned plates are coated with this and dried, when they

are fully exposed to light, which will render the coating insoluble.

### Gelatine Solutions.

For transferring carbon pictures from flexible support to ivory opal, glass, &c.

Nelson's No. 1	1 oz.
gelatine	(45.5 grms.)
Water ... ..	20 ozs.
	(1,000 c.c.s.)
Chrome alum ...	12 grs.
	(1.25 gm.)

The chrome alum is previously dissolved in 2 ozs. (100 c.c.s.) of water and the solution added to that of the gelatine.

For coating, drawing-papers for the single transfer process.

Nelson's No. 1	1 oz.
gelatine	(45.5 grms.)
Water ... ..	20 ozs.
	(1,000 c.c.s.)
Chrome alum ...	20 grs.
	(2.08 grms.)

Apply with a brush.

The chrome alum is previously dissolved in 2 ozs (100 c.c.s.) of water and the solution added to that of the gelatine.

In adding a solution of chrome alum to one of gelatine, both solutions should be at a fairly high temperature, 130° to 160°F.

## THE CARBRO PROCESS.

In this process a carbon print is made from a bromide print or enlargement without the aid of daylight.

A good bromide print must first be prepared, care being necessary to ensure correct exposure and full development. Weak, flat bromides give unsatisfactory results.

The print, which has been thoroughly washed and dried, is placed in a dish of clean water, and should remain in this until quite limp or until required.

A piece of carbon tissue of the required size, which must be about  $\frac{1}{4}$  in. larger each way than the bromide print, is "sensitised" by immersion for three minutes in the "sensitising bath" given below containing potassium bichromate, ferricyanide and bromide.

During this time the bromide print should be removed from the water and laid face upwards on a sheet of stout glass.

When the tissue has been in the "sensitising" bath for the requisite time it is removed, and allowed to drain for 15 seconds. It is then placed in the acid-formaline bath. The time of immersion in this solution varies according to the brilliancy desired in the resulting print, and may be from 15 to 25 seconds, the longer immersion giving greater softness.

### STOCK SOLUTION No. 1.

(For making Sensitising Bath.)

Potass. bichromate	1 oz.
	(45.5 grms.)
Potass. ferricyanide	1 oz.
	(45.5 grms.)
Potass. bromide	1 oz.
	(45.5 grms.)
Water ... ..	20 ozs.
	(1,000 c.c.s.)

### Sensitising Bath for Use.

Stock solution No.1	6 ozs.
	(100 c.c.s.)
Water ... ..	18 ozs.
	(300 c.c.s.)

This bath may be used repeatedly, but should be strained

through fine muslin or cotton wool after use.

STOCK SOLUTION No. 2.  
(For Acid-Formaline Bath.)

Acetic acid, glacial	1 oz.	(10 c.c.s.)
Hydrochloric acid, pure	1 oz.	(10 c.c.s.)
Formaline	... 22 ozs.	(220 c.c.s.)
Water	... 1½ ozs.	(15 c.c.s.)

The formaline is the commercial 40 per cent. solution of formaldehyde.

*Acid-Formaline Bath for Use.*

Stock solution No. 2	1 oz.	(10 c.c.s.)
Water	... 32 ozs.	(320 c.c.s.)

Renew this bath frequently as contamination with "sensitiser" lessens its activity.

The tissue is now laid face downwards upon the bromide print, and the two squeegeed into contact. A flat squeegee is used, and particular care taken that the tissue does not move on the surface of the bromide during the early stages of squeegeeing.

Both print and tissue are now lifted from the glass, and placed between greaseproof paper, where they are allowed to remain for 15 minutes. During this time a piece of transfer paper, similar to that used in carbon printing and larger in size than the tissue in use, is selected and placed in a dish of water.

If a thin transfer paper is used, allow it to soak for 5 minutes, while, if thick, 10 minutes will be necessary.

The transfer paper is then laid face upwards upon a sheet of glass, and is ready to receive the carbon tissue.

The bromide print and its adhering tissue should now be taken from between the greaseproof paper, and the two carefully separated by lifting one corner of the print and gently but decisively pulling the two surfaces apart. The bromide print should be dropped into a dish of water, and the tissue placed film down upon the transfer paper.

The tissue is then squeegeed to the support transfer paper, and the two placed between blotting paper for from 20 to 40 minutes. The bromide print, after well washing, may be re-developed for future use.

When the tissue and final support have been in contact for the required time they are placed in a deep dish of water at a temperature of 95° to 100° F. In a few minutes the pigmented gelatine begins to dissolve: colour oozes out at the edges of the tissue.

The two papers are now separated by taking a corner of the tissue and gently pulling the two apart under the water. The majority of the pigmented gelatine will now be found upon the transfer paper, and development of the image is proceeded with by pouring warm water over the surface of the print. The image is very tender at this stage, and care should be taken that nothing touches its surface. When development is complete the print is transferred to a 3 per cent. solution of alum, and when all signs of yellowness in the high-lights have disappeared, is washed for a few minutes in water, and then hung up to dry.

## GUM-BICHROMATE.

The following (greatly abridged) are working instructions in this now little-used process according to perhaps the most accomplished exponent of it, M. Robert Demachy.

The gum solution is one of ordinary gum arabic of 50 per cent. strength in cold water.

The sensitiser is a saturated solution of potass. bichromate.

To make the sensitive solution 1 part of bichromate solution and 2 parts of gum solution are mixed, and then moist water-colour tube pigment added in sufficient quantity, as ascertained by trial.

The paper is coated by applying the mixture with a flat hog's hair brush, afterwards smoothing the coating with two wide, flat hog's hair brushes.

Exposure under a quick-printing negative ranges from 10 minutes (in the shade on a bright summer day) to much longer.

Prints are developed either by simply soaking in cold or tepid water, by pouring water over the print supported on a glass plate, or by delicate friction with a wet brush or sponge.

## THE BROMOIL PROCESS.

In this form of the oil process a bromide print or enlargement is treated so as to bleach the image and at the same time bring the print into a condition similar to that produced by exposure of sensitised paper in the oil process.

The bleach is made from the two following stock solutions:—

- A. Copper chloride 160 grs.  
(33.3 gms.)  
Sodium chloride 2oz. 290 grs.  
(common salt) (245 gms.)  
Hydrochloric acid 3 minims  
(0.6 c.c.)  
Water... .. 10 ozs.  
(1,000 c.c.s.)
- B. Potass. bichromate 55 grs.  
(11.5 gms.)  
Water... .. 10 ozs.  
(1,000 c.c.s.)

The bleach is made up by mixing 1 part of A, 1 part of B, and 2 parts of water.

The bromide print is soaked in water for about 5 minutes until limp, drained from surface moisture and placed in the bleacher. Within from 3½ to 4½ minutes the picture is converted into a faint brownish image. When thus fully bleached the print is washed in running water for about 15 minutes to free it from yellow stain and is then fixed in a hypo bath containing 1 oz. of hypo in 20 ozs. of water (50 gms. per litre). It is then again washed for about half an hour.

Before pigmenting the print is soaked in warm water, the temperature of this water requiring to be adjusted to the quality of the bromide paper. Average temperatures are those from 70 to 80° F. (21-27° C.). The print is soaked for a time



which may range from 15 to 45 minutes and is then ready for pigmenting.

### Separate Bleaching.

#### *Venn Method.*

Bromide prints, developed to a Watkins factor of 8 in the maker's amidol developer, used at half strength, are transferred directly after draining to a 10 per cent. hypo solution for 5 minutes. They are then thoroughly washed and dried.

After soaking for 5 minutes, the print is bleached in:—

Copper sulphate	95 parts
(10% soln.)	
Potass. bromide	5 parts
(10% soln.)	

After remaining here half a minute after the bleaching appears complete, the print is

drained and put directly in:—

Potass. bromide	4 ozs.
(10% soln.)	(200 c.c.s.)
Potass. bichromate	2 ozs.
(1% soln.)	(100 c.c.s.)
Water to make...	20 ozs.
	(1,000 c.c.s.)

for four minutes.

After washing for five minutes in several changes of water, it is fixed for two minutes in 10 per cent. hypo, washed for fifteen minutes in one or two changes of water and dried. A temperature of 60-65° F. (15.5-19° C.) should be maintained through these operations.

Before inking up, the dried prints are soaked for times ranging from 30 to 45 minutes.

To dry a Bromoil quickly, soak in methylated spirit and hang up.

## THE OIL PROCESS.

Gelatine-coated paper is sensitised with bichromate, printed under the negative, and treated in cold water. The faint image has the power of fixing greasy ink.

#### SPIRIT SENSITISER (*Demachy*).

Prepare 6 per cent. ammonium bichromate stock solution by dissolving 1½ ozs. of this salt in 25 ozs. of water.

To make the sensitiser mix at time of use:—

Stock bichromate solution	1 part.
Alcohol, pure 90°	2 parts.

The sensitiser is applied with a flat hog-hair brush, about ¾ oz. (25 c.c.s.) serving for six 10 × 8 sheets of transfer paper.

The paper dries in about 18 minutes, and is printed under

the negative until it shows a brown image as in the platinum printing process. The detail should show in the high-lights.

It is then soaked in several changes of water to remove the yellow bichromate (about 20 minutes), and then soaked for a further time (in a dish of water), depending on the thickness of the gelatine coating. An average time is 30 minutes; 2 to 3 hours, for more heavily coated papers. The temperature of the water should be between 65° and 70° F.

The print can be pigmented forthwith, or dried for pigmenting later on. If it is dried it requires about an hour's soaking in water at 65° to 70° F. to bring it into the best condition for pigmenting.

## PALLADIOTYPE.

In the Palladiotype process, which was introduced some years ago by the Platinotype Company, the stable metal palladium replaces platinum. With the exception that the solutions employed are different from those used for Platinotype the procedure is exactly the same. Palladiotypes afford by cold development rich warm-black prints, free from double tones, or inclination to greenish hue, and closely resemble Platinotype prints.

### DEVELOPER.

Sodium citrate	3½ ozs.	(159 grs.)
Citric acid ...	95 grs.	(9.9 grs.)
Water ... ..	20 ozs.	(1,000 c.c.s.)

To be used without dilution at 65° to 70° F. (18° to 21° C).

The prints should be developed as soon after printing as feasible and, at least, one minute allowed for full development. They are then transferred direct to the first clearing bath.

The addition of small quantities of potass. bichromate to the developer gives added contrast without loss of quality. From one grain to 4 grains to 20 ozs. (0.1-0.2 grs. per litre) may be used according to the effect desired. Printing should be slightly longer than the normal.

### CLEARING BATH.

#### Stock Solution.

Sodium citrate	4½ ozs.	(210 grs.)
Citric acid ...	843 grs.	(87.8 grs.)
Water ... ..	20 ozs.	(1,000 c.c.s.)

For use mix one part of stock solution with 7 parts of water.

Three baths are required, the times of immersion being not less than 5, 10 and 20 minutes respectively. These periods may be prolonged, within reason, without detriment. The prints are then washed for not less than 20 minutes (in several changes of water) and suspended to dry.

## PLATINUM PRINTING.

In the platinum process the paper is coated with a sensitive iron (ferric) salt, and a salt of platinum. On exposure to daylight, or equivalent, the iron salt is reduced to the ferrous state, the change being accompanied by a darkening which enables the depth of printing

to be judged. Printing should be continued until all details, except in the highest lights, are visible in the preliminary image.

Development is done by either floating on, or immersing in, a solution the principal ingredient of which is potassium

oxalate. The ferrous salt is soluble in this solution, and in the act of dissolving reduces the platinum salt *in situ* in extent corresponding with the reduction of the ferric salt by light, the permanent picture in finely divided platinum appearing simultaneously. To secure the full beauty of the process, correct exposure and full development are essential. Correctly exposed prints cannot be over-developed; the action automatically ceases when all the ferrous salt has been dissolved. Not less than one minute should be allowed for cold development; with hot solutions a few seconds suffice.

No fixing is required, but to eliminate iron and other salts remaining after development, the prints must first be washed in dilute hydrochloric acid solution. This is the operation known as "clearing." The acid is essential, for if omitted, basic compounds will form and the paper will discolour with age. Accordingly, the prints are transferred direct from the developer to the first clearing bath, in which they should remain for about 5 minutes. They are then removed to a second bath for 10 minutes, and again to a third bath for about 15 minutes.

The clearing solution for "black" prints should contain 1 oz. of pure hydrochloric acid to 60 ozs. of water (16.5 c.c.s. per litre) for "sepia" papers the quantity of water may be increased to 80 ozs. (1,350 c.c.s.) with advantage.

After clearing, the prints are washed for about 15 minutes (four or five changes of water are sufficient) and suspended to dry. Drying between blotters is a frequent cause of stains.

The following are the developers recommended by the Platinotype Company, the original patentees and manufacturers of the papers. Purity of the chemicals is of the utmost importance. Those supplied by the Company are tested, and can be relied upon.

### Cold-Bath Developer.

To be used for all grades of "Black" Platinotype paper at a temperature of 65° to 70° F. (18° to 21° C.)

#### Stock Solution.

Potass. oxalate	2 ozs.	405 grs.	(133.3 grms.)
Potass. biphosphate		182 grs.	(19 grms.)
Oxalic acid	...	43½ grs.	(4.55 grms.)
Water	...	20 ozs.	(1,000 c.c.s.)

For use dilute with equal bulk of water.

### Hot-Bath Developer.

To be used for Sepia Japine Papers only, at temperature 160° to 170° F. (71° to 77° C.)

Formula for Stock Solution as the foregoing, but with water reduced to 80 ozs.

For use dilute with equal bulk of water.

To be used for matt-surface Sepia papers at temperature 160° to 170° F. (71° to 77° C.)

Potass. oxalate	...	5 ozs.	(227 grms.)
Oxalic acid	...	62½ grs.	(6.5 grms.)
Water	...	20 ozs.	(1,000 c.c.s.)

To be used without dilution.

During heating and when not in use the hot-bath developers should be kept covered with a sheet of glass, cut only a shade larger than the top of the dish.

## IRON PRINTING PROCESSES.

### Ferro-Prussiate Sensitiser.

The following is a sensitising solution for paper to be used for printing by daylight and to be kept in good condition for a considerable time (months):—

- |                   |                |
|-------------------|----------------|
| A. Ferric ammonia | 5 ozs.         |
| citrate (green)   | (227 grms.)    |
| Water, to make    | 20 ozs.        |
|                   | (1,000 c.c.s.) |
| B. Potass. ferri- | 800 grs.       |
| cyanide           | (83·2 grms.)   |
| Water, to make    | 20 oz.         |
|                   | (1,000 c.c.s.) |

Mix in equal parts, keep in the dark, and filter just before use.

If the ordinary brown citrate be used, the formula should contain  $3\frac{1}{2}$  ozs. (187 grms.), and the ferricyanide should be increased to  $2\frac{1}{2}$  ozs. (130 grms.)

The sensitiser is applied with a brush or sponge. The paper is printed until the shadows bronze, and is "developed" simply by soaking in one or two changes of plain water.

The following is a sensitising solution yielding a very much more rapid paper but of inferior keeping qualities, *i.e.*, keeping in condition for about 60 days:—

- |                                       |              |
|---------------------------------------|--------------|
| Ferric ammonium citrate, 26% solution | ... 6 parts. |
| Ferric ammonium oxalate 10% solution  | ... 2 "      |
| Ferric sodium oxalate, 10% solution   | ... 2 "      |
| Ferric chloride, 7% solution          | ... 2 "      |
| Oxalic acid, 10% solution             | ... 2 "      |
| Potass. ferricyanide, 10% solution    | ... 1 part.  |

*Solution for Writing Titles on.*—removing blue lines from blue prints, etc.—Potass. oxalate, 75 grs. per oz.; 165 grms. per 1,000 c.c.s.

*Brightening the Colour.*—Blue prints are improved in colour by a final bath of  $2\frac{1}{2}$  per cent. alum solution, 3 per cent. oxalic acid or 1 per cent. hydrochloric acid.

### The Kallitype Process.

Paper, sensitised as below, is printed to a semi-visible image, like platinum paper. It yields prints from black to sepia, according to the developer. If prints are fixed in a mixture of hypo and ammonia the results are reasonably permanent.

The sensitiser is made from the following stock solutions with addition of silver nitrate:—

- |  |
|--|
| A.—Ferric oxalate (pure and fresh), 20% solution.  |
| B.—Ferric potass. oxalate, 1 : 16 solution.  |
| C.—Potass. bichromate, 1 : 16 solution.  |
| D.—Oxalic-ammonia solution, consisting of:—Oxalic acid, 240 grs. (125 grms.); ammonia (.880) 100 minims (50 c.c.s.); water, 4 ozs. (1,000 c.c.s.). |

### Sensitiser.

- |                         |                 |
|-------------------------|-----------------|
| A ... 1 oz.             | C ... 4 drops.  |
| (28 c.c.s.)             |                 |
| B ... $\frac{1}{2}$ oz. | D ... 30 minims |
| (14 c.c.s.)             | (1·8 c.c.s.)    |

To the above mixture of A, B, C and D is added silver nitrate cryst., 36 grs. (2·3 grms.)

Paper thus sensitised yields prints of full gradation and half-tone from ordinary negatives, such as print well in P.O.P.

For flat negatives further bi-chromate solution may be used in the developer.

#### DEVELOPERS.

##### For Black Tones.

Borax	...	...	2 ozs. (91 gms.)
Rochelle salt	...	...	1½ ozs. (68.2 gms.)
Water, to make	...	...	20 ozs. (1,000 c.c.s.)
Potass. bichromate sol. (1%)	...	...	15-18 drs. (90-115 c.c.s.)

##### For Purple Tones.

Borax	...	...	½ oz. (22.7 gms.)
Rochelle salt	...	...	2 ozs. (91 gms.)
Water, to make	...	...	20 ozs. (1,000 c.c.s.)
Potass. bichromate sol. (1%)	...	...	15-18 drs. (90-115 c.c.s.)

##### For Sepia Tones.

Rochelle salt	...	...	1 oz. (45.5 gms.)
Water, to make	...	...	20 ozs. (1,000 c.c.s.)
Potass. bichromate sol. (1%)	...	...	8-10 drs. (50-60 c.c.s.)

Prints are allowed to remain in either of the above developers for from 15 to 30 minutes. They are then fixed for at least 10 minutes.

#### FIXING SOLUTION.

Hypo	...	...	1 oz. (45.5 gms.)
Ammonia (0.880)	...	...	120 minims. (12.5 c.c.s.)
Water, to make	...	...	20 ozs. (1,000 c.c.s.)

#### Sepia Paper.

This process and the single-solution sensitiser given below may be used for printing from ordinary negatives, but the results are deficient in gradation. Both are excellent for making duplicates of plans, etc., and give a copy in white lines on a

brown ground from an ordinary tracing. This copy may be used as a negative for preparing further "positive" copies.

A. Ferric ammonia citrate (green)	5 oz. (227 gms.)
Water, to make	20 oz. (1,000 c.c.s.)
B. Tartaric acid	360 grs. (37.5 gms.)
Water, to make	20 oz. (1,000 c.c.s.)
C. Silver nitrate	900 grs. (93.6 gms.)
Water, to make	20 oz. (1,000 c.c.s.)
D. Gelatine	600 grs. (62.4 gms.)
Water ... ..	20 ozs. (1,000 c.c.s.)

Equal parts (say 1 oz. of each) of these solutions are mixed as follows:—D is rendered just fluid on a water bath, A and B added, and lastly C, a few drops at a time. Fix in 1:50 hypo.

#### Pellet Process.

The Pellet process is for copies of line drawings only. From an ordinary tracing it gives a copy in blue lines on a white ground.

A. Pure gum arabic	4 ozs. (182 gms.)
Water ... ..	20 ozs. (1,000 c.c.s.)
B. Ferric ammonia citrate	10 ozs. (455 gms.)
Water ... ..	20 ozs. (1,000 c.c.s.)
C. Ferric chloride (crystallised)	10 ozs. (455 gms.)
Water ... ..	20 ozs. (1,000 c.c.s.)

Add 8 vols. of B, then 5 vols. of C to 20 vols. of A, in small doses with constant stirring.

The prints are developed on 10 per cent. solution of potass. ferrocyanide and "fixed" in

1 : 25 sulphuric acid (specific gravity 1.84).

### Ferro-Gallic Process.

This process is for line drawings only. It gives a copy in bluish-black lines on a white ground from an ordinary tracing.

Gum arabic ...	2½ ozs.	(125 gms.)
Warm water ...	20 ozs.	(1,000 c.c.s.)

When dissolved add the following in the order given:—

Tartaric acid ...	160 grs.	(16.6 gms.)
Salt ...	720 grs.	(74.9 gms.)
Ferric sulphate	800 grs.	(83.2 gms.)
Ferric chloride...	2½ ozs.	(125 gms.)

The developer for the prints is:—Alum and gallic acid, 1 part of each; water 80 parts.

## MOUNTANTS.

### Starch Paste.

Mix pure starch powder with a very small proportion of cold water to form a very stiff mass. It should be so stiff that it is stirred with difficulty

Perfectly boiling water is then poured in, about 12 ozs. for every ounce (12 c.c.s. per gram) of starch.

On stirring, the mixture will jellyfy without being boiled; but if it does not it is brought to the boil, cooled, the skin taken off, and the paste used on day of making.

### Dextrine Paste.

Dextrine, best white	2½ lbs.	(1,200 gms.)
Water at 160° F.	64 ozs.	(1,720 c.c.s.)
Oil of wintergreen	15 minims	(1 c.c.)
Oil of cloves ...	15 minims	(1 c.c.)

Place the water in a vessel standing in a larger vessel of water kept to within 1° of 160° F. Stir in the dextrine slowly, and when it has all dissolved add the two preservative oils, stirring all the time.

Then allow to cool, pour into bottles, and cork. Put aside in a cool place for a week or two for the mixture to congeal to a firm white smooth paste.

### Liquid Gelatine.

Gelatine...	1 oz.	(100 gms.)
Water ...	6 ozs.	(600 c.c.s.)
Chloral hydrate	1 oz.	(100 gms.)

The gelatine is dissolved in the water by aid of heat, and the chloral hydrate added. After digesting for a short time the adhesive liquid is neutralised with a little sodium carbonate solution.

### Gelatine.

Nelson's No. 1 gelatine	4 ozs.	(50 gms.)
Water ...	16 ozs.	(200 c.c.s.)

Soften the gelatine in the water, liquefy on a water bath, and add (a little at a time and stirring rapidly):—

Methylated spirit	5 ozs.	(60 c.c.s.)
Glycerine ...	1 oz.	(12 c.c.s.)

The mountant is used hot. A piece of ground glass is dipped in hot water, drained, and the mountant brushed over it. The print is then laid face up on the pasted surface and rubbed gently in contact with a piece of paper, being then removed and pressed down on its mount.

### Starch-Gelatine.

A. Bermuda arrow-root	8 ozs. (200 grms.)
Water ... ..	4 ozs. (100 c.c.s.)
B. Nelson's No. 1 soft gelatine	360 grs. (20 grms.)
Water ... ..	64 ozs. (1,600 c.c.s.)

The gelatine is first softened in the water, and A and B are then mixed together and boiled for a few minutes. To the cold mixture are stirred in—

Methylated spirit	5 ozs. (125 c.c.s.)
Carbolic acid (liquid)	25 minims (1.3 c.c.s.)

This is a good cold paste, which sticks and keeps fairly well.

### Starch-Dextrine.

Water (cold) ...	5 ozs. (1,000 c.c.s.)
Starch ... ..	60 grs. (25 grms.)
Dextrine, best white	2 ozs. (400 grms.)
Sodium carbonate, cryst	6 grs. (2.5 grms.)
Oil of cloves ...	8 minims (3 c.c.s.)

The ingredients are dissolved and well mixed together in the order given, so as to form a milk like fluid quite free from lumps. This is gradually brought to the boil (stirring all the time) and then poured into suitable jars, which it

should nearly fill. When cool the surface skin is taken off and the jars well stoppered. In one or two days' time the mixture should have set to a smooth white paste, of excellent keeping quality. The sodium carbonate is required principally to neutralise any residual acid in the dextrine. Less than the quantity indicated may be found sufficient. When set, the paste should be either neutral or slightly alkaline to litmus paper.

### Shellac Mountant.

A strong solution of shellac in methylated spirit, or better, rectified spirit, is thinly applied to both mount and print, and the two coated surfaces quickly rubbed into contact. This is a good method of fixing prints to thin mounts in albums, etc.

### Fixing Paper to Metal.

Tragacanth ...	3 ozs. (60 grms.)
Gum arabic ...	12 ozs. (240 grms.)
Water ... ..	50 ozs. (1,000 c.c.s.)

### Mounting on Glass.

Prints on gelatine printing paper may be mounted face down on glass with a solution of gelatine. (See below.) Prints mounted in this way were formerly largely sold as "opalines."

Nelson's No. 2 soft gelatine	2 ozs. (30 grms.)
Water ... ..	20 ozs. (300 c.c.s.)

The gelatine is soaked in the water, and liquified by standing the vessel in hot water. The solution is thinned down until nearly as thin as water. Print and glass are immersed, removed together, and squeezed together.

### Dry Mounting.

In this process a sheet of specially prepared dry mounting tissue paper is placed between the photograph and the mount and pressed together in a heated press. It is emphatically the best mounting method because it not only avoids stretch or distortion of a print and cockling of the mount, but also provides a waterproof protective skin between the print and the mount, thus preventing the possibility of any impurities in the mount attacking the photographic image.

Tissue is obtainable commercially in large sheets 24 × 20 ins., or in cut sizes. It is manufactured by impregnating tissue with shellac, gum, resin, etc., and requires a temperature of about 150° to 180°F., on the pressure plate to ensure perfect adhesion. The first operation consists of partially attaching a piece of tissue (slightly larger than the print) to the back of the print by stroking it locally with a heated metal fixing-iron

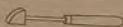


Fig. 1.



Fig. 2.

(figs. 1 and 2). The print with its tissue partially attached should then be trimmed together in a desk-trimmer (fig. 3), or by using a sheet of glass or zinc as a bedplate, a celluloid



Fig. 3.

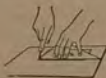


Fig. 4.

set-square as a straight-edge and a sharply pointed knife as a cutter (fig. 4). The trimmed print is placed in position on the mount, held firmly with the fingers of the left hand, lifting with the thumb one corner of the print only (not the tissue), and stroking the corner of the tissue with the hot fixing-iron (fig. 5). This operation is repeated near another corner in order to hold the print in position for pressing.



Fig. 5.

### MOUNTING BY SPECIAL PRESS.

The mount, with its print loosely attached, is placed face up on a sliding cardboard carrier bed, a sheet of metal (called the cover plate) laid on top, the carrier slid under a special press heated to about 150° to 180°F., and pressed for a dwell of a few seconds from 5 to 20 seconds according to thickness of the print (fig. 6). The carrier



Fig. 6.

is then withdrawn, the mount picked up quickly and while



still hot should be bent slightly outwards, so that when cool there is no cockling (fig. 7).



Fig. 7.



Fig. 8.

#### MOUNTING BY HAND IRON.

An electrically - heated domestic iron can be used as an alternative to the press, and is particularly suitable for amateur or occasional use. There is available, a special box-shape mounting iron which has provision for inserting and heating the fixing-iron. (fig. 8.)

The print is tissued, trimmed and "touched down" to the mount in the usual way, and a piece of plain paper a trifle larger than the picture is placed on top. The iron is then heated to 150° to 180°F., and drawn slowly across the surface of the paper with a firm pressing action (fig. 9). This should be



Fig. 9.

repeated several times until the print is evenly mounted. A sheet of thin metal, or an uncreased piece of aluminium foil can also be used as a "buffer" between the print and the mounting iron.

#### MOUNTING WITH BORDER TINTS.

A photograph can be dry-mounted on a plain mount

showing a surround tint by "touching down" the tissued and trimmed print to a piece of paper of suitable colour which has already been tissued on the back. The tint is then trimmed all round, leaving the required border surround, touched down to the mount (see fig. 10), and



Fig. 10.

hot pressed all together, giving about double the time of "dwell" than with a singly-mounted print. Border paper tints of great variety of colour, coated on the back with dry-mounting adhesive, are obtainable commercially from all tissue manufacturers. Two or more border tints can be built up on a mount by the use of these tints.

If, after mounting, the tissue sticks to the mount but comes away from the print, the heat is too great. If the tissue sticks to the print, but not to the mount, it means that the pressing heat is insufficient or that the "dwell" time is not long enough. If the print sticks to the mounting cover-plate, it means that the print or mount contained moisture before mounting.

If, when mounting a print of the same size as the heating plate of the press, the corners or edges refuse to stick it means that the plate is not heated evenly, and it is necessary to apply two separate pressures one to each half of the print.

## WORKING UP, COLOURING, ETC.

### Lubricant for Prints.

This lubricant is used when burnishing prints with a steel roller.

Powdered Castile soap	20 grs.
Alcohol	(5 grs.)
	10 ozs.
	(1,000 c.c.s.)

### Encaustic Paste.

Purified beeswax	50 parts
Oil of lavender	30 parts
Benzole	30 parts
Gum elemi	1 part

### BASKETT'S FORMULA.

To the contents of a 2½d. tin of Globe polish add 1 oz. best olive oil and 1 oz. terebine. Apply with soft cloth and polish.

For reducing bromide prints, use in exactly the same way as for negatives.

### Finishing Materials.

- Conté Black Stumping Chalk (Velours à Sauce).
- Conté Sepia Stumping Chalk (Velours à Sauce).
- Conté Powdered Black Lead.
- Conté Powdered Charcoal.
- Velvet Black or Intense Black Pastel (finest soft).

Prepare the bromide print by first rubbing over with pumice flour with a tuft of wool or flannel in a circular manner, and remove with another piece of wool or duster.

Mix the chosen powder with pumice flour to the tint required and apply with a stump or tortillon. For picking out lights use putty rubber. For sharp lines, use conté crayons in cedar. Special pencils are sold for

sulphide-toned prints. If the finish is slight and the powder lightly applied it can be fixed by steaming the print.

### GLOSSY BROMIDES.

For invisible finishing on glossy paper apply a few grains of spirit nigrosine black, dissolved in "methylated finish," with a rag or brush. In order to match a print, tone the black with Bismarck Brown.

### Preparing for Colouring.

#### GLOSSY BROMIDE AND P.O.P.

Rub the prints lightly with a tuft of wool slightly moistened with artists' purified ox-gall. If they have been lubricated before burnishing apply previously a little alcohol in the same way.

#### COLLODION PRINTS.

Fluid extract of quillaia	of 1 dram
	(5 c.c.s.)
Water	1 oz.
	(40 c.c.s.)
Alcohol	1 oz.
	(40 c.c.s.)

#### BROMIDES.

##### For Water Colouring.

Apply ox-gall as directed for P.O.P., or prepare as directed below for chalk work.

##### For Oil Colouring.

If the surface is clean no preparation is needed; if otherwise, give a wash of gum, starch, or gelatine, or prepare with pumice powder. Also light drying oil (from the artists' colourman) may be rubbed over with a tuft of wool or the fingers. It dries in about twenty-four hours,

and leaves the surface of the bromide ready for painting.

### Fixative (Crayon and Pastel).

A. Mastic ..	... 24 grs.
	(1.55 grms.)
Amyl acetate ...	3 ozs.
	(85 c.c.s.)

Dissolve by agitation, and allow to stand for some hours before use.

B. Celluloid ...	7 grs.
	(0.45 gm.)
Amyl acetate ...	3 ozs.
	(85 c.c.s.)

Dissolve by agitation. Mix A and B when both are clear, and keep in tightly-corked bottle. Apply with spray diffuser.

### Colouring in Oils.

(Lantern Slides.)

Canada Balsam thinned with turpentine is a very useful medium for colouring slides in conjunction with transparent oil colours, those indicated \* below being suitable.

### Spotting Bromide Prints.

Mix together Payne's grey and Indian ink (the colour should match that of the film). For sepia, Indian ink and burnt sienna.

### Spotting P.O.P. Prints.

Add a little carmine to the above. When mixture is dry (on the palette), work in a strong solution of gum, rubbing the brush one way only, to avoid making air-bells. If the prints are to be enamelled or glazed by stripping after spotting, then artists' oil colours with benzole in which gum dammar has been dissolved, or water colours, may be used with shellac water varnish. (See "Negative Varnishes.")

### Crystoleum.

The print (which should be on albumenised paper on account of its thin substance and fine texture) is mounted with a warm solution of:—

Hard gelatine ...	20 grs.
	(44 grms.)
Water ...	1 oz.
	(1,000 c.c.s.)

containing a little salicylic acid to keep it. Or with a cold mountant made by mixing the above with an equal amount of starch paste.

### VARNISH FOR "TRANSLUCING."

Canada balsam...	5 ozs.
	(100 grms.)
Solid paraffin ...	2 ozs.
	(40 grms.)
White wax ...	2 ozs.
	(40 grms.)

This is melted, the picture immersed, and the whole kept as cool as possible consistent with remaining fluid.

### Artists' Water Colours.

The following are suitable colours for bromide enlargements, platinum, and carbon prints. The colours in ordinary type are permanent; those in italics are more or less doubtful except under special precautions against exposure. Those marked \* are transparent.

\*Alizarin Scarlet. *Flesh Tint*, No. 1. *Flesh Tint*, No. 2. *Flesh Tint*, No. 3.

Indian Red. \*Rose Madder. Venetian Red. Vermilion.

\*Antwerp Blue. Cobalt Blue.

\*French Ultramarine\* Indigo.

\*Prussian Blue. \*Brown Pink.

\*Burnt Sienna. C a d m i u m Yellow.

*Chrome Lemon*. *Chrome Orange*. \*Indian Yellow. Naples Yellow.

\*Raw Sienna. Roman Ochre.

Yellow Ochre. Emerald Green.  
 \*Hooker's Green, No. 2. Terre  
 Verte. \*Brown Madder. Payne's  
 Grey.

Raw Umber. Sepia. \*Van-

dyke Brown. \*Ivory Black,  
 Lamp Black. Chinese White.

The above colours are also  
 made specially, in small pots,  
 for air-brush work.

## LANTERN SLIDES.

Lantern plates fall into three  
 main groups, viz.:

### Rapid (Black-tone).

These require to be handled  
 in the dark room by bright  
 yellow safelight. In general  
 they give black tones. Some  
 varieties, however, allow warm  
 tones to be obtained with ease.  
 Especially suitable for printing  
 by reduction, and when the  
 closest tone reproduction is  
 desired.

For a cold black tone and  
 with a normal, correctly exposed  
 negative, an exposure of about  
 5 secs. will be required at three  
 feet from a 16 c.p. bulb. Any  
 standard plate developer (*e.g.*,  
 amidol, hydroquinone, metol-  
 hydroquinone, *etc.*) may be used.  
 For warmer tones pyro-ammonia  
 or dilute ortol developers are  
 the most suitable.

### Slow (Warm-tone).

Of slower speed, but still  
 preferably used in the dark  
 room. These plates give a  
 rather stronger contrast and are  
 particularly adapted for making  
 slides of warm colour, ranging  
 from brown to red. The ex-  
 posure requires to be about four  
 times that for a black-tone  
 plate. When warm black,  
 brown or red tones are desired,  
 the exposure is increased and  
 development carried out in a

caustic soda-hydroquinone de-  
 veloper heavily restrained with  
 bromide, or in a much diluted  
 M.Q. developer.

### Gaslight, etc.

Plates of slow speed, for use  
 in ordinary rooms under con-  
 ditions as for gaslight-paper  
 printing, giving vigorous con-  
 trast and allowing of a wide  
 range of warm tones by direct  
 development. Suitable for  
 printing (by contact) negatives  
 which are excessively soft in  
 contrast. At six inches from a  
 32 c.p. bulb the exposure  
 required to give a normal (cool-  
 black) tone with a correctly  
 exposed negative will be in the  
 neighbourhood of 45 seconds;  
 and with an appropriate M.Q.  
 or amidol developer (as com-  
 pounded for gaslight paper),  
 development takes only about  
 30 seconds at 65° F.

When an M.Q. solution con-  
 taining ammonium bromide and  
 carbonate is employed to obtain  
 warm tones, the exposure is  
 increased up to about five times,  
 development then requiring  
 about 2½ minutes.

In addition to the above,  
 there are a few special varieties,  
 notably the Ilford "Alpha"  
 lantern plate, which gives a very  
 wide range of tones by develop-  
 ment and toning.

**Pyro-Caustic.***For Rapid Plates.*

Soda sulphite	360 grs.
cryst.	(37.5 gms.)
Ammonium	120 grs.
carbonate	(12.5 gms.)
Ammonium	60 grs.
bromide	(6.25 gms.)
Caustic potash	100 grs.
(10.4 gms.)	(10.4 gms.)
Water, to make	20 ozs.
	(1000 c.c.s.)

Add, at time of use, either dry or as 10 per cent. solution:—

Pyrogallic	60 grs.
acid	(6.25 gms.)

**Hydroquinone-Rodinal.***For Slow Plates.*

Specially recommended by J. W. Shaw for soft, brown-black tones of great richness on warm-tone plates.

A. Hydroquinone	160 grs.
(16.7 gms.)	(16.7 gms.)
Soda sulphite	2 ozs.
(91 gms.)	(91 gms.)
Citric acid ...	60 grs.
(6.25 gms.)	(6.25 gms.)
Potass. bro-	30 grs.
mide	(3.12 gms.)
Water, to make	20 ozs.
	(1,000 c.c.s.)
B. Sodium hy-	160 grs.
drate	(16.7 gms.)
Water, to make	20 ozs.
	(1,000 c.c.s.)

For use, mix as follows:—

Solution A ...	120 minims
	(24 c.c.s.)
Solution B ...	120 minims
	(24 c.c.s.)
Rodinal (con-	5 minims
centrated)	(1 c.c.)
Potass. bromide	60 minims
(10% soln.)	(12 c.c.s.)
Water ...	1 oz.
	(100 c.c.s.)

Development 2-2½ mins. at 60° F. (15.5° C.)

**Chlorquinol.***For Slow Plates.*

An excellent developer for warm tones is as follows:—

Soda sulphite,	½ oz.
cryst.	(22.7 gms.)
Soda carbonate,	½ oz.
cryst.	(22.7 gms.)
Potass bromide,	50 minims
10% solution	(5 c.c.s.)
Chlorquinol ...	60 grs.
	(6.25 gms.)
Water ...	20 ozs.
	(1,000 c.c.s.)

Development should take from 2½ to 4 minutes at 65° Fahr.

For warm-brown tones add ½ ounce of 10% potass bromide solution to each ounce of the above Chlorquinol developer (50 c.c.s. to every 100 c.c.s.) and give three times the normal exposure.

For reddish tones add ½ ounce of 10% ammon. bromide solution to each ounce of the above Chlorquinol developer (25 c.c.s. to every 100 c.c.s.) and give 12 times the normal exposure.

With these restrained developers, the time of development must be increased in order to obtain satisfactory contrast.

**Metol-Hydroquinone.***For Gaslight Plates.*

Brown-tone slides are also given by an M.Q. developer used by Dudley Johnston as follows:—

Metol ...	50 grs.
	(5.2 gms.)
Hydroquinone	35 grs.
	(3.64 gms.)
Soda sulphite	240 grs.
anhydrous	(25 gms.)
Soda carbonate,	240 grs.
anhydrous	(25 gms.)
Water, to make	20 ozs.
	(1,000 c.c.s.)

For use, take 3 parts of the above, add 1 part of ammonium carbonate (10 per cent. soln.),

1 part of ammonium bromide 10 per cent. soln.), add 4 parts of water and use at 75 deg. F. (24° C.).

For fine sepia tones, add 15 minims of 10 per cent. hypo solution per ounce of mixed developer (30 c.c.s. per litre); for cold sepias, double this amount of hypo.

### Thiocarbamide.

The thiocarbamide developer for lantern slides is one which yields a wide range of colours by simple development, ranging from magenta red through purple to blue and bluish-grey and on to neutral grey and black. Brown tones even are obtainable. The colours and the quality of the image are very fine. The warmer colours are obtained by greatly increased exposure in conjunction with the necessary modification in the composition of the developer. The method was worked out by Dr. C. E. K. Mees for Messrs. Wratten & Wainwright in 1908.

#### Stock Solutions.

A. Metol ...	44 grs. (4.6 gms.)
Hydroquinone	22 grs. (2.3 gms.)
Soda sulphite cryst.	1 oz. (45.5 gms.)
Soda carbon- ate, cryst.	1 oz. (45.5 gms.)
Water, to make	20 ozs. (1,000 c.c.s.)
B. Ammonium carbonate	2 ozs. (91 gms.)
Ammonium bromide	2 ozs. (91 gms.)
Water, to make	20 ozs. (1,000 c.c.s.)
C. Thiocarbamide	66 grs. (6.9 gms.)
Ammonium bromide	22 grs. (2.3 gms.)
Water, to make	20 ozs. (1,000 c.c.s.)

The chief difficulties in thiocarbamide development are (1) judging the correct density, (2) obtaining the desired colour. It is not difficult to obtain either of these separately, but it is not easy to get both together, as both depend upon the same factor, viz., length of time of development.

The slide passes through a regular sequence of colour changes, beginning with yellow and passing thence to red, purple, blue-grey and ultimately black, although it is impossible to follow these changes with the eye during development. The problem thus becomes one of so adjusting exposure and developer that the correct density is reached at the same time as the desired colour.

This would appear to be impossible unless the contrast of the negative were just correct for the purpose, and Dr. B. T. J. Glover (B.J., March, 1923) says the negative must be adjusted to that end by reduction or intensification. This is correct for a given temperature, but experience shows that by alterations of temperature a compensating factor can be introduced.

The best way to use this developer is the factorial method, a factor of 6 being about correct for 70° F.; but density is obtained more readily at higher temperatures and the factor will therefore become less as temperature is increased. The developer is extremely sensitive to slight changes of temperature and success depends upon maintaining the developer at an even temperature with the aid of a water bath or other means.

Working developers: For warm-brown tones use A, 14 parts; B, 1 part; C, 1 part. For blue-grey tones, use A, 12 parts; B, 3 parts; C, 1 part. For warm black tones, use A, 10 parts; B, 5 parts, C, 1 part.

### Toning.

(1) For a fine brown tone, bleach in mercuric chloride solution (as used for intensification), wash and dry.

(2) Bleach in one of the following solutions, rinse, remove the bichromate stain with weak potass. metabisulphite solution, wash and dry.

A. Potass. bichromate 200 grs.  
(20.8 grms.)  
Hydrochloric acid 1 dr. 26 mins.  
(9 c.c.s.)  
Water, to make 20 ozs.  
(1,000 c.c.s.)

B. Potass. bichromate 200 grs.  
(20.8 grms.)  
Potass. bromide 100 grs.  
(10.4 grms.)  
Nitric acid 1 dr. 26 mins.  
(9 c.c.s.)  
Water, to make 20 ozs.  
(1,000 c.c.s.)

C.—Same as above, save that potassium iodide is used in place of bromide.

On exposure to bright daylight, the bleached slide gradually darkens. A slide bleached in A tends to warm brown; one bleached in B becomes cool, grey; and one bleached in C, brown in colour.

### Dye-Toning.

Basic dye may be used in the preparation of lantern slides in colour by treating the finished positive in the following mordanting bath (Eastman Kodak formula):—

Uranium nitrate	14.6 grs. (1.52 grms.)
Oxalic acid ...	7.3 grs. (0.76 gm.)
Potass. ferri-cyanide	7.3 grs. (0.76 gm.)
Water, to make...	20 ozs. (1,000 c.c.s.)

The immersion should not be prolonged beyond the first perceptible turn towards brownness in tone, which with a new bath will appear in  $1\frac{1}{2}$ -2 mins.

Wash until free from stain (10-15 mins.) and dye by immersion in a dye solution of:—

Dye ...	1.82 grs. (.19 gm.)
Acetic acid, glacial	5 minims (0.15 c.c.)
Water, to make	20 ozs. (1,000 c.c.s.)

Suitable dyes are chrysoidine (brown), auramine (yellow), malachite green, victoria blue and methyl violet (the latter used in half the amount quoted).

### Masking.

Prepare strips of black "needle" paper  $3\frac{1}{4}$  ins. long and of various widths from  $\frac{3}{4}$  in. to 1 in.

One edge at least must be perfectly clean cut.

Lay the slide, film side up, on white paper, moisten the surface of a suitable strip with the tongue and affix it on the slide so as to mask off to the desired margin.

A sheet of ruled paper laid under the slide helps in placing the strips squarely.

Apply other strips to the remaining three slides and trim off projecting edges with scissors.

Finally affix a white spot or disc on the two upper corners proceed to the binding.

## Binding.

Select a brand of binding strips of thin, tough paper, coated with strong adhesive, and use the strips in one full length ( $13\frac{1}{2}$  ins.).

Lay the strip out, gummed side down and moisten the back.

When the strip is limp, turn it over, just moisten the gummed side and lay the strip, face up, on a yielding surface, e.g., two thicknesses of blotting paper.



Fig. 1.



Fig. 2.

Cover the slide with a thin and carefully cleaned cover-glass, place one corner on the gummed strip (Fig. 1) and press it firmly down.

Turn the slide over on edge (Fig. 2) and over again (Fig. 3).



Fig. 3.



Fig. 4.

At each movement press the slide firmly down on the strip and run the finger *along the edge only* of the strip, to cause it to adhere to the slide (Fig. 4).



Fig. 5.



Fig. 6.

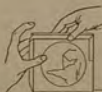


Fig. 7.



Fig. 8.

Now press the sides of the strip firmly against the glass, pushing the top end of the upright strip away from the glass (Fig. 5).

Then press down the corner to make a neat join (Fig. 6). Then turn the slide over once more into position (Fig. 7) and repeat operations 5 and 6.

Again turn, so as to join the ends of the binder, and repeat 5 and 6.

The slide completely bound in this way is seen in Fig. 8.

## COLOUR PHOTOGRAPHY.

The following are the official working instructions for the screen plates on the market at the time of sending this portion of the ALMANAC to press (Nov. 15, 1934):—

### Lumière

#### “Filmcolor Films”

A guide to exposure is: Give 60 times the exposure necessary for a plate of 250 H. & D.



Ample exposure should always be given, as there is no remedy for under-exposure, whereas over-exposed films can be easily intensified; in practice many workers prefer to over-expose films and intensify them, as the results are more brilliant. The special filters supplied by Lumière *must* be used.

Two solutions only are used—developer (used also for re-development) and reversing solution. There is no need to fix.

In making the developer stock solution, dissolve the Quinomet in warm water (about 100° F.), add the sulphite, and then, when cold, the ammonia.

Working developer: Stock solution, 1 part; water, 4 parts.

*Developer—Stock Solution.*

A. Water, distilled	35 ozs.
	(1,000 c.c.s.)
Metoquinone ...	$\frac{1}{2}$ oz.
(Quinomet)	(15 gms.)
Soda sulphite,	3 $\frac{1}{2}$ ozs.
anhydrous	(100 gms.)
Liquor am-	9 drs.
monia, -920	(32 c.c.s.)
Potass. bromide	240 grs.
	(16 gms.)

For half-plate, place in developing dish the following solution:—

Stock solution A	1 oz.
above	(20 c.c.s.)
Water ... ..	4 ozs
	(80 c.c.s.)

Place the film therein, and count the number of seconds from the moment of entering until the appearance of the first outlines of the image (the sky should not be taken into consideration). As soon as the outlines appear, note the number of seconds, multiply it by 10 and you will get the total duration of development.

The development must begin

out of reach of the light of the lantern which must be fitted with Virida paper; but after 10 or 12 seconds, the film may be rapidly examined.

*Reversal of the Image*

Following the development and after a short washing in running water, immerse the film in a dish containing 3 ozs. of the reversing solution and take the dish out in full light. The film which was opaque, clears, and the colours become more and more visible by transmitted light. After half to one-and-a-half minutes, when the plate bears no more trace of a negative image, take it out of the dish and wash it for about 30 seconds in running water.

REVERSING SOLUTION.

C. Potassium	30 grs.
permanganate*	(2 gms.)
Sulphuric acid	3 drams
	(10 c.c.s.)
Water... ..	35 ozs.
	(1,000 c.c.s.)

\* Or Potass. bichromate.

This solution will keep for a short time, but should not be used if cloudy.

Immediately the film is covered by the C solution daylight may be used.

Second Development.—The film is then re-developed in full daylight, using the solution which has served for the first development (kept in the dish without special precautions). When the high-lights are completely darkened (about 3 or 4 minutes) the film is washed for 3 or 4 minutes, and immediately placed to dry. Fixing is unnecessary unless the film is intensified.

## Agfacolor Plates and Agfa Ultra Films.

As a guide to exposure, the Agfacolor plate should be given 30 times the exposure required by a normal plate of speed 18° Scheiner, while the Agfa Ultra film should receive 4 times the exposure of a plate of speed 18° Scheiner.

Development is undertaken in a Metol formula of the following composition:—

### *Concentrated Stock Solution.*

Metol (Agfa) ...	115 grs.	(13 gms.)
Sodium Sulphite (Anhydrous)	2 ozs.	(100 gms.)
Potass. bromide	48 grs.	(5.5 gms.)
Ammonia (sp. gr. 0.91)	4½ drams.	(30 c.c.s.)
Water ... ..	18 ozs.	(900 c.c.s.)

In making up, dissolve in the order given at a temperature of 110° Fahrenheit (35° C.) and allow to cool. The ammonia is then added, and before use, the solution should be filtered. The working solution for each exposure should be made up of 1 part of stock solution to 3 parts of water.

The working developer is used for the re-development, but must not be used again. The temperature of the working developer must not be higher than 65° F. If it is too warm, it is liable to cause softening and frilling of the film. With correct exposure, development is complete in 3 minutes for plates and 4 minutes for Ultra films.

Development having been completed, the plate is rinsed for about one minute (not

longer) in running water, not under the tap. It is then put in the reversing bath.

### *Stock Solution for Reversing Bath.*

Potass. bichromate	1 oz.	(50 gms.)
Sulphuric acid,	2 ozs.	(100 c.c.s.)
strong ... ..	...	(100 c.c.s.)
Water ... ..	20 ozs.	(1,000 c.c.s.)

One part of this stock solution is mixed with 10 parts of water to form the reversing bath, which must not be warmer than 65° F. After one minute in this bath, the light may be turned on, and as soon as it is seen, by transmitted light, that the black silver image has been removed, the plate is taken out and at once put to wash for about 3 minutes in running water. It is then re-developed in strong light in the same developing solution as used in the first instance, and is then well rinsed and put aside to dry.

### *Desensitising.*

This is best carried out in a bath of Pinacryptol Yellow, of a strength of 1:2,000. The plate must remain in this solution for 2 minutes in darkness. It is then transferred to the developer without intermediate washing and development continued in the usual manner, by red light, but for one minute longer than the usual time.

### **Finlay Colour Process.**

This is a screen-plate process on the principle of the Joly process. The process was formerly known as the Paget, and at a later date was marketed under the name of Duplex. But the Finlay colour plate is a great advance in manufacture and allows of much shorter

exposures than any other known colour processes.

The exposure is made on one of a variety of special panchromatic plates of varying speeds, according to the selected make of plate which is placed in the dark slide behind the Finlay taking screen with a Finlay compensating filter on the lens. The speed of each selected panchromatic plate when exposed through the Finlay screen and the Compensating filter is reduced approximately five times that of black-and-white. Therefore exposures in the neighbourhood of 1/100 of a second at  $f/4.5$  inland, and 1/200 of a second at  $f/4.5$  by the sea, may be obtained in bright sunshine.

Panchromatic plates should be developed in a soft working developer, such as:—Metol. The following formula works well. When developed the plate is fixed in the usual way.

*Metol One-Solution Developer.*

Metol ... ..	1½ ozs.
Soda sulphite cryst. ... ..	5 ozs.
Soda carbonate cryst. ... ..	7 ozs.
Potass. bromide	32 grains.
Water, hot ... ..	80 ozs.

For use, take equal parts of above stock solution and water. Development is complete in 2 minutes at 65° F. In printing, a Finlay positive plate is placed in contact with the finished negative in an ordinary printing frame and exposed to a bare (not diffused) half-watt lamp. At 6 ft. from an ordinary 16 c.p. half-watt lamp, exposure is 5 seconds. In developing the positive plate a more contrasty developer should be used, *e.g.*, metol-hydroquinone, or the following:—

A. Metabisulphite	1 oz.
Hydroquinone	1 oz.
Potass. bromide	1 oz.
Water ... ..	40 ozs.
B. Caustic potash	2 ozs.
Water (cold) ... ..	40 ozs.

For use, take equal parts of A and B.

Development is complete in 1 minute. Fix in the usual way.

When the positive plate is dry, it is brought into correct register with the Finlay viewing screen, the picture appearing in its correct colours. The two plates are then bound together.

*Finlay Non-Parallax Colour Screen.*

This screen is a further refinement in the process, allowing of the making of colour transparencies which do not change colour according to the angle from which they are viewed.

The screens are coated with an emulsion of the gaslight kind and require to be handled in yellow or light green light. In printing the screen is registered with the negative as follows:—The sensitive colour screen is placed emulsion side in contact with the negative, and, by means of the registering edges at each end of the negative, the negative and positive plate are gently moved until the colours are seen to be complementary when viewed by the printing light. The screen and negative are clipped together on all four sides with bull-dog clips, placed on a piece of black board (negative upwards) and exposed to a bare metal-filament half-watt bulb of 100 watts at about 3 ft. distance. With average negatives the exposure is about one minute. Under exposure should be avoided.

# TABLES

## EXPOSURE.

In all latitudes on roll-film.

The following tables, based on those of Burton, give a rough idea of the exposures for various subjects and stops with:

1. Best lighting, such as mid-day sunshine in May, June and July, in Northern Europe.
2. Sensitive material of the speed of the *more rapid* roll-film (not the ordinary, nor the films of extreme speed).

TABLE I.

<i>f</i> /No.	Average Subject with objects in Fore-ground. Street Scenes. Outdoor Figure Studies.	Landscapes with Light Foreground. Lake, River and Beach Scenes.	Sea Clouds and Sky.	Subjects with Extra Heavy Foreground, e.g., Dark Trees, Doorways, Groups.	Under Trees, Woods, Avenues, Glades, etc.	Portrait in Average Well-lighted Room
<i>f</i> /2.7	1/1000	—	—	1/500	1/80	1/60
<i>f</i> /3.5	1/600	1/700	—	1/350	1/50	1/25
<i>f</i> /4.5	1/400	1/800	—	1/200	1/30	1/15
<i>f</i> /6.3	1/200	1/400	—	1/100	1/15	1/8
<i>f</i> /8	1/100	1/200	1/1000	1/60	1/10	1/4
<i>f</i> /11	1/50	1/100	1/600	1/30	1/5	$\frac{1}{2}$
<i>f</i> /16	1/25	1/50	1/300	1/15	1/2	1

NOTE.—Owing to the great number of films of different speeds the above table can only be a rough indication, and the user should particularly bear in mind that roll-films as now made, while of greater speed, also resist the effect of over-exposure to a much greater extent than those of a few years ago. When in doubt, a longer exposure may therefore be given, and that is a good rule, especially for beginners, among whom there is a tendency to give exposures which are too short.

In weather other than bright sunshine the above exposures are multiplied as follows :—

Bright diffused light, the sun behind a cloud ...	} $\times 1\frac{1}{2}$	Heavy clouds over the whole sky. Absence of distinct shadows...	} $\times 3$
Light clouds over the whole sky, but light able to cast a visible shadow ... ..	} $\times 2$	Very dull. Whole sky covered by still heavier clouds ... ..	} $\times 4$ to 5

TABLE II.

## Daily Variation in Light for different Latitudes.

At other hours of the day and times of the year the above exposures are multiplied by the numbers in Table II. of daylight variation. The figure 1 in Table II. indicates times for which Table I. suffices by itself. Table II. has been worked out for the ALMANAC by R de B. Adamson, B.Sc., of Christchurch, N.Z.

Latitude.	North Hemisphere.	MORNING.								South Hemisphere.	
		12	11	10	9	8	7	6	5		4
60°	June	1	1	1	1½	1½	2	3	4	8	December.
	May, July	1	1	1½	1½	1½	2	3	6	10	Jan., Nov.
	April, Aug.	1½	1½	1½	1½	2	3	6	—	—	Feb., Oct.
	Mar., Sept.	1½	1½	2	2	3	6	—	—	—	Mar., Sept.
	Feb., Oct.	3	3	3	6	—	—	—	—	—	April, Aug.
	Jan., Nov.	4	6	8	—	—	—	—	—	—	May, July.
	December	6	8	—	—	—	—	—	—	—	June.
55°	June	1	1	1	1	1½	2	3	4	—	December.
	May, July	1	1	1	1	1½	2	3	6	—	Jan., Nov.
	April, Aug.	1	1½	1½	1½	2	3	6	—	—	Feb., Oct.
	Mar., Sept.	1½	1½	1½	2	3	6	—	—	—	Mar., Sept.
	Feb., Oct.	2	2	3	4	8	—	—	—	—	April, Aug.
	Jan., Nov.	3	3	4	8	—	—	—	—	—	May, July.
	December	4	4	6	—	—	—	—	—	—	June.
50°	June	1	1	1	1	1½	2	3	6	—	December
	May, July	1	1	1	1	1½	2	3	8	—	Jan., Nov.
	April, Aug.	1	1	1½	1½	2	3	6	—	—	Feb., Oct.
	Mar., Sept.	1½	1½	1½	1½	3	6	—	—	—	Mar., Sept.
	Feb., Oct.	2	2	2	3	6	—	—	—	—	April, Aug.
	Jan., Nov.	3	3	3	6	—	—	—	—	—	May, July.
	December	3	4	6	—	—	—	—	—	—	June.
40°	June	1	1	1	1	1½	2	3	—	—	December.
	May, July	1	1	1	1	1½	2	4	—	—	Jan., Nov.
	April, Aug.	1	1	1	1	1½	3	6	—	—	Feb., Oct.
	Mar., Sept.	1	1	1½	1½	2	4	—	—	—	Mar., Sept.
	Feb., Oct.	1½	1½	1½	2	4	—	—	—	—	April, Aug.
	Jan., Nov.	1½	2	2	3	6	—	—	—	—	May, July.
	December	2	2	3	4	8	—	—	—	—	June.
		12	1	2	3	4	5	6	7	8	
		AFTERNOON.									

TABLE II. (continued.)

Latitude.	North Hemisphere.	MORNING.								South Hemisphere	
		12	11	10	9	8	7	6	5		4
30°	June	1	1	1	1	1	2	4	—	—	December.
	May, July	1	1	1	1	1	2	6	—	—	Jan., Nov.
	April, Aug.	1	1	1	1	1	3	8	—	—	Feb., Oct.
	Mar., Sept.	1	1	1	1	2	4	—	—	—	Mar., Sept.
	Feb., Oct.	1	1	1	1	3	6	—	—	—	April, Aug.
	Jan., Nov.	1	1	1	2	4	—	—	—	—	May, July.
	December	1	1	1	2	4	—	—	—	—	June.
1° 5	June	1	1	1	1	1	3	8	—	—	December.
	May, July	1	1	1	1	1	3	—	—	—	Jan., Nov.
	April, Aug.	1	1	1	1	1	3	—	—	—	Feb., Oct.
	Mar., Sept.	1	1	1	1	1	3	—	—	—	Mar., Sept.
	Feb., Oct.	1	1	1	1	2	4	—	—	—	April, Aug.
	Jan., Nov.	1	1	1	1	2	6	—	—	—	May, July.
	December	1	1	1	1	3	6	—	—	—	June.
0°	May, June July, Nov., Dec., Jan.	1	1	1	1	2	4	—	—	—	May, June, July, Nov., Dec., Jan.
	Other months	1	1	1	1	1	3	—	—	—	Other months
		12	11	10	9	8	7	6	5	4	
AFTERNOON.											

All the above factors are for atmospheric conditions as on a clear day in England. Extreme N. of Scotland, Lat. 60°; S. of Scotland, N. of England, N. of Ireland, Lat. 55°; S. of England, S. of Ireland, Lat. 50°.




## Shutter Speeds for Moving Objects.

*From the "Wellcome Exposure Calculator and Diary."*

The following table on the next page gives in round figures the shutter speeds necessary for various moving objects, using the ordinary quarter-plate lens of about 5 inches focus. Column D is for objects moving towards or away from the operator, O is for objects moving obliquely towards or from the camera, that marked A, for objects moving directly across the field of view.

The table indicates the shutter speeds necessary to secure negatives sufficiently sharp for direct printing. For enlarging it is better to give  $\frac{1}{2}$  to  $\frac{1}{3}$  these exposures, or to work further from the object. *The figures are no guide to what is the correct exposure for the plate.*

Except where stated, objects are supposed to be 25 ft. from camera. If 50 ft. from camera, exposure may be double that at 25 ft.; if 100 ft., exposure may be double that at 50 ft.

Distance of Object, 25 ft., unless otherwise stated.	 D	 O	 A
Pedestrians (four miles per hour) ...	1/40	1/80	1/120
Vehicles (six miles per hour)...	1/60	1/120	1/180
Vehicles (eight miles per hour) ...	1/80	1/150	1/250
Cyclists and trotting horses ...	1/160	1/300	1/500
Foot races and sports... ..	1/240	1/500	1/700
Divers ... ..	—	1/600	1/800
Cycle races, horse galloping... ..	1/300	1/750	1/900
Yachts (10 knots) at 50 ft. ...	1/60	1/120	1/180
Steamers (20 knots) at 50 ft....	1/120	1/240	1/360
Trains (30 miles per hour) at 50 ft. ...	1/150	1/300	1/450
Trains (60 miles per hour) at 50 ft. ...	1/300	1/600	1/900

### Scheiner & H. & D. Speed Nos.

Owing to the difference in method there is no regular equivalence between Scheiner and H. & D. speed Nos. The Nos. in the following table must be regarded as only rough indications, applying, *in each case, to one and the same emulsion.* (See B.J., 1932, September 9, pp. 542-3.)

Scheiner No.	Relative Sensitivity.	H. & D. No.	Scheiner No.	Relative Sensitivity.	H. & D. No.
1	1.0	6	19	78.48	500
2	1.27	8	20	100	636
4	2.07	13	21	127	800
6	3.36	22	22	162	1050
8	5.46	35	23	207	1300
10	8.86	56	24	264	1700
14	23.36	150	25	336	2100
15	29.76	190	26	428	2700
16	37.93	240	27	546	3500
17	48.33	308	28	695	4400
18	61.58	390	29	886	5600

## WEIGHTS AND MEASURES.

## Inches and Millimetres.

INCHES INTO MILLIMETRES.

MILLIMETRES INTO INCHES.

Inches.	Milli- metres.	Inches.	Milli- metres.	Milli- metres.	Inches.	Milli- metres.	Inches.
1	25.4	$\frac{1}{8}$	9.5	1	0.04	15	0.59
$\frac{1}{8}$	23.8	$\frac{1}{16}$	8.7	2	0.08	16	0.63
$\frac{1}{16}$	23.0	$\frac{3}{16}$	7.9	3	0.12	17	0.67
$\frac{1}{8}$	22.2	$\frac{1}{4}$	7.1	4	0.16	18	0.71
$\frac{1}{4}$	20.6	$\frac{5}{16}$	6.4	5	0.20	19	0.75
$\frac{3}{8}$	19.1	$\frac{3}{8}$	5.6	6	0.24	20	0.79
$\frac{1}{2}$	17.5	$\frac{7}{16}$	4.8	7	0.28	21	0.83
$\frac{5}{8}$	15.9	$\frac{1}{2}$	3.2	8	0.31	22	0.87
$\frac{3}{4}$	14.3	$\frac{5}{8}$	2.4	9	0.35	23	0.90
$\frac{7}{8}$	12.7	$\frac{3}{4}$	1.6	10	0.39	24	0.94
$\frac{1}{2}$	11.1	$\frac{1}{2}$	0.8	11	0.43	25	0.98
		$\frac{1}{4}$		12	0.47	25.4	1.0

## English Sizes of Plates.

Inches.	Cm.	Inches.	Cm.
$3\frac{1}{2} \times 2\frac{1}{2}$	8.9 × 6.4	7 × 5	17.8 × 12.7
$3\frac{1}{4} \times 3\frac{1}{4}$	8.25 × 8.25	$8\frac{1}{2} \times 6\frac{1}{2}$	21.5 × 16.5
$4\frac{1}{4} \times 3\frac{1}{4}$	10.8 × 8.25	10 × 8	25.4 × 20.3
$5 \times 4$	12.7 × 10.1	12 × 10	30.4 × 25.4
$6\frac{1}{2} \times 4\frac{1}{2}$	16.5 × 12.0	15 × 12	38.1 × 30.4

## Continental Sizes of Plates (or Roll-film or Film-pack).

Cm.	Inches.	Cm.	Inches.
3 × 4	$1\frac{1}{8} \times 1\frac{1}{4}$	10 × 15	3.92 × 5.9
4.5 × 6.0	$1\frac{1}{2} \times 2\frac{3}{8}$	12 × 16	4.72 × 6.30
6 × 9	$3\frac{1}{4} \times 2\frac{1}{4}$	13 × 18	5.12 × 7.08
9 × 12	$3\frac{1}{2} \times 4\frac{1}{4}$	18 × 24	7.08 × 9.44



### Sizes of Lantern Slides (Various Countries).

The standard size of English lantern slides is  $3\frac{1}{4} \times 3\frac{1}{4}$  inches. The standard French size for lantern slides is  $85 \times 100$  mm. (the longer side horizontal). The American size is 4 (base)  $\times$   $3\frac{1}{4}$  (height) inches, though some makers use  $4\frac{1}{4} \times 3\frac{1}{4}$  inches.

### British Weights and Measures.

The formulæ in the editorial pages of this ALMANAC are given, in almost all cases, in both British and metric measures, and in adopting this course we have had the desire to impress upon photographers the simplicity and facility of the latter system. As a rule, the British formulæ are expressed in grains or ounces per 20 ozs. of solution, and the metric formulæ in grammes per 1000 c.c.s. In regard to the total bulk of solution, our formulæ are mostly drawn up on the basis that the total bulk after the solution of the solids is that stated in the formula—20 ozs. or 1000 c.c.s. as a rule.

### What are Percentage Solutions?

The usual practice in making a solution to a specified percentage strength is to consider the weight of the substance to be dissolved in relation to the volume of the completed solution. Thus, to make a 10 per cent. solution, we dissolve 1 ounce avoirdupois in enough water to make the volume of the solution 10 fluid ounces. If, however, the object is to make a solution of which some sub-division of a fluid ounce will contain a grain or an exact number of grains, then the number of minims or drachms of the completed solution must be an exact multiple of the number of grains dissolved. Thus if 1 oz. Av. of 437.5 grains be dissolved in enough water to make the volume of the solution 4,375 minims (approximately 9 ozs. 1 drachm) every 10 minims of the solution will contain 1 grain of the substance.

### Formulæ Stated in Parts.

Formulæ given, as many are, in "parts," may be made up by writing gms. for the solid and c.c.s. for the fluid "parts," and converting them into the British measures by any of the tables in this section. Thus: Pyro, 10 parts; sodium sulphite 100 parts; water, 1000 parts, becomes Pyro, 154 grs.; sodium sulphite, 3 ozs. 230 grs.; water, 35 ozs.

#### 1. APOTHECARIES WEIGHT.

20 Grains	=	1 Scruple.	
3 Scruples	=	1 Drachm	= 60 Grains.
8 Drachms	=	1 Ounce	= 480 Grains.

It is now customary in formulæ to employ the avoirdupois ounce ( $437\frac{1}{2}$  grains), but where "drachms" are given the apothecaries drachm of 60 grains is meant.

## 2. AVOIRDUPOIS WEIGHT.

437½ Grains	=	1 Ounce.
16 Ounces	=	1 Pound = 7,000 Grains.
¼ ounce	=	109 grains ; ½ ounce = 219 grains ; ¾ ounce = 328 grains.

## 3. FLUID MEASURE.

60 Minims	=	1 Drachm.
8 Drachms	=	1 Ounce = 480 Minims.
20 Ounces	=	1 Pint = 160 Drachms = 9,600 Minims.
2 Pints	=	1 Quart = 40 Ounces = 320 Drachms.
4 Quarts	=	1 Gallon = 160 Ounces = 1,280 Drachms.

1 fluid ounce of water weighs 437½ grains, therefore every minim weighs 0·91 grain.

In the United States the pint is of 16 ozs., the quart of 32 ozs., and the gallon of 128 ozs.

## Metric Weights and Measures.

The unit of weight is the gramme, written "gm.;" the subdivisions are the "deci-" (1/10th), "centi-" (1/100th), and "milligramme" (1/1,000th); the multiples are the "deka-" (10 gm.) and "hectogramme" (100 gm.), but in practice it is usual to write these quantities as: 0·1 or 0·01 and 10 or 100 grammes, and the abbreviation "kilo." for 1,000 gms.

The following are the equivalents of Metric Weights and Measures in terms of Imperial Weights and Measures:—

## LINEAR MEASURE.

1 Millimetre (mm.) (1/1,000th M.)	=	0·03937 inch.
1 Centimetre (1/100th M.)	... =	0·3937 "
1 Metre (M.)	... .. =	{ 39·370113 inches. 3·280843 feet. 1·0936143 yard.
Kilometre (1,000 M.)	... .. =	·62137 mile.

## SQUARE MEASURE.

1 Square Centimetre	... .. =	·155 square inch.
1 Square Metre (100 square decimetres)	... .. =	{ 10·7639 square feet. 1·196 square yards.

## WEIGHT.

		<i>Avoirdupois.</i>
1 Milligramme (1/1,000th gm.)	=	0·015 grain.
1 Gramme (1 gm.)	... .. =	15·432 "
1 Kilogramme (1,000 gm.)	... .. =	{ 2·2046223 lbs. or 35·273957 ozs.

## FLUID MEASURE.

1 Cubic centimetre (c.c.) (1·1,000th litre)	=	16·9 minims
1 Litre (1 L.)	=	35 ozs. 94 m. = 16894·1 minims.
20 standard drops 1 c.c. (at 15° C.) (Standard drops are 3 mm. in diameter).		

## Grammes Into Grains and Ounces (Avoirdupois).

Gms.	Ozs.	Grs.	Gms.	Ozs.	Grs.	Gms.	Ozs.	Grs.
0·1		1·5	16	$\frac{1}{16}$	28·1	130	$4\frac{1}{2}$	37
0·2		3·1	17	$\frac{1}{8}$	43·5	140	$4\frac{3}{4}$	82
0·3		4·6	18	$\frac{3}{16}$	59·0	150	$5\frac{1}{4}$	18
0·4		6·2	19	$\frac{1}{4}$	74·4	160	$5\frac{1}{2}$	61
0·5		7·7	20	$\frac{5}{16}$	89·8	170	6	0
0·6		9·2	25	$\frac{3}{8}$	57·0	175	6	76
0·7		10·8	30	1	25	180	$6\frac{1}{4}$	44
0·8		12·4	35	1	103	190	$6\frac{1}{2}$	88
0·9		13·9	40	$1\frac{1}{4}$	71	200	7	24
1		15·4	45	$1\frac{1}{2}$	38	250	$8\frac{3}{4}$	32
2		30·9	50	$1\frac{3}{4}$	6	300	$10\frac{1}{2}$	31
3		46·3	55	$1\frac{3}{4}$	83	350	$12\frac{1}{4}$	41
4		61·7	60	2	51	400	14	50
5		77·2	65	$2\frac{1}{4}$	19	450	$15\frac{3}{4}$	52
6		92·6	70	$2\frac{1}{2}$	94	500	$17\frac{1}{2}$	61
7		108·0	75	$2\frac{1}{2}$	64	550	$19\frac{1}{4}$	66
8	$\frac{1}{4}$	14·1	80	$2\frac{3}{4}$	32	600	21	70
9	$\frac{1}{4}$	29·5	85	3	0	650	$22\frac{3}{4}$	72
10	$\frac{1}{4}$	44·9	90	3	76	700	$24\frac{1}{2}$	81
11	$\frac{1}{4}$	60·4	95	$3\frac{1}{4}$	44	750	$26\frac{1}{4}$	90
12	$\frac{1}{4}$	75·8	100	$3\frac{1}{2}$	11	800	28	95
13	$\frac{1}{4}$	91·2	110	$3\frac{3}{4}$	56	850	$29\frac{3}{4}$	102
14	$\frac{1}{4}$	106·7	120	4	102	900	$31\frac{1}{2}$	106
15	$\frac{1}{4}$	12·7	125	$4\frac{1}{4}$	70	1,000	$35\frac{1}{4}$	11

## Number of Grains in Ozs. (Avoirdupois).

In making calculations the following equivalents of ounces and quarter-ounces in grains will be found useful, fractions of grains are omitted.

$\frac{1}{4}$ oz. = 109 grs.	$2\frac{1}{4}$ ozs. = 984 grs.	$4\frac{1}{4}$ ozs. = 1,859 grs.
$\frac{1}{2}$ oz. = 219 grs.	$2\frac{1}{2}$ ozs. = 1,094 grs.	$4\frac{1}{2}$ ozs. = 1,969 grs.
$\frac{3}{4}$ oz. = 328 grs.	$2\frac{3}{4}$ ozs. = 1,203 grs.	$4\frac{3}{4}$ ozs. = 2,078 grs.
1 oz. = 437 grs.	3 ozs. = 1,312 grs.	$5\frac{1}{4}$ ozs. = 2,296 grs.
$1\frac{1}{4}$ oz. = 546 grs.	$3\frac{1}{4}$ ozs. = 1,421 grs.	$5\frac{1}{2}$ ozs. = 2,406 grs.
$1\frac{1}{2}$ oz. = 656 grs.	$3\frac{1}{2}$ ozs. = 1,531 grs.	6 ozs. = 2,625 grs.
$1\frac{3}{4}$ oz. = 765 grs.	$3\frac{3}{4}$ ozs. = 1,640 grs.	$6\frac{1}{4}$ ozs. = 2,734 grs.
2 ozs. = 875 grs.	4 ozs. = 1,750 grs.	$6\frac{1}{2}$ ozs. = 2,844 grs.

## Grammes. per Litre to Grains. per 20 ozs.

Gms. per litre.	Grs. per 20 ozs.	Gms. per litre.	Grs. per 20 ozs.	Gms. per litre.	Grs. per 20 ozs.	Gms. per litre.	Grs. per 20 ozs.
0.1	0.96	1	9.6	10	96	55	528
0.2	1.92	2	19.2	15	144	60	576
0.3	2.88	3	28.8	20	192	65	624
0.4	3.84	4	38.4	25	240	70	672
0.5	4.8	5	48	30	288	75	720
0.6	5.8	6	58	35	336	80	768
0.7	6.7	7	67	40	384	85	816
0.8	7.7	8	77	45	432	90	864
0.9	8.6	9	86	50	480	95	912

100 grs./20 ozs. = 10.4 gms. per litre.

Conversion of British into Metric Measures.  
Grains into Grammes.

Grs.	Gms.	Grs.	Gms.	Grs.	Gms.
1	0.065	16	1.037	35	2.268
2	0.13	17	1.102	40	2.592
3	0.194	18	1.166	45	2.916
4	0.259	19	1.232	50	3.240
5	0.324	20	1.296	55	3.564
6	0.389	21	1.361	60	3.888
7	0.454	22	1.426	65	4.212
8	0.518	23	1.490	70	4.536
9	0.583	24	1.555	75	4.860
10	0.648	25	1.620	80	5.184
11	0.713	26	1.685	85	5.508
12	0.777	27	1.750	90	5.832
13	0.842	28	1.814	95	6.156
14	0.907	29	1.880	100	6.480
15	0.972	30	1.944		

## Ounces (Avoirdupois) to Grammes.

Ozs.	Gms.	Ozs.	Gms.	Ozs.	Gms.
$\frac{1}{4}$	7.09	4	113.40	13	368.54
$\frac{1}{2}$	14.17	5	141.75	14	396.89
$\frac{3}{4}$	21.26	6	170.10	15	425.24
1	28.35	7	198.45	16	453.59
$1\frac{1}{2}$	42.5	8	226.80	17	481.94
2	56.70	9	255.15	18	510.29
$2\frac{1}{2}$	70.87	11	311.8	19	538.64
3	85.05	12	340.19	20	566.99

## Cubic Centimetres to Fluid Ounces and Minims.

C.c.	Fl. oz.	minims.	C.c.	Fl. ozs.	Minims.
1	—	16·9	60	2	54
2	—	33·8	70	2	223
3	—	50·7	80	2	391
4	—	67·6	90	3	80
5	—	84·5	100	3	249
6	—	101	200	7	19
7	—	118	300	10	268
8	—	138	400	14	37
9	—	152	500	17	287
10	—	169	600	21	56
20	—	338	700	24	305
30	1	27	800	28	75
40	1	196	900	31	324
50	1	365	1,000 (1 litre)	35	94

One Gallon (English) of 160 ounces is 4 Litres 546 c.c. (4·546 Litres).

## Factors for Conversion of Metric Figures to Grains and Ounces.

**C.c.s. to Minims and Ozs.**—It is near enough to use the table on page 410, reckoning gms. as c.c.s. and grains as minims. Example, 35 c.c.s. equal 1 oz. (fluid) + 103 minims.

**Conversion Rules—Gms. per litre into grains per oz.**—Multiply the grammes by 0·44.

**C.c.s. per litre into minims per ounce.**—Divide the c.c.s. by 2 (more exactly, multiply by 0·48).

**Grains per ounce into grammes per litre.**—Multiply the grains by 2·08. Thus 50 grs. per oz. = 104 gms. per litre.

**Minims per ounce into c.c.s. per litre.**—Multiply the minims by 2.

## Tables in Past Almanacs.

The following is a list of tables which have appeared in past issues of the "Almanac," but are not included among those in the present volume.

The reference in brackets after each is to the most recent issue of the "Almanac" in which the table has appeared: in most cases it will be found included for several years prior to the date of this reference.

## CHEMICAL.

*Simplification of Emulsion Calculations (Equivalence of Alkaline Haloid Salts).* (1903, p. 1160.)

*Solubility of the Silver Haloids.*—Valenta. (1907, p. 1109.)

*Freezing Mixtures.* (1907, p. 1116.)

*Developing Equivalence of the Alkalis.* (1903, p. 1159.)

*Chemical Reactions of the known Developing Agents (Tests of Developers).* (1904, p. 1010.)

*Pyro Developers recommended for various Plates by Makers.* (1890, p. 666.)

*Tables of Developers (in grains per oz.) for various Commercial Plates.* (1912, p. 761.)

*Formulae of Chemicals.* (1924, p. 483.)

*Solubilities of Chemicals.* (1924, p. 489.)

*Poisons and Antidotes.* (1927, p. 449.)

## LIGHT AND EXPOSURE.

*Variation in the Sun's Position at Different Seasons of the Year.*—J. A. C. Branfil. (1903, p. 1176.)

*Points of the Compass at which the Sun rises for London, Edinburgh and Dublin.* (1869, p. 147.)

*Sun's Altitude for various Latitudes.* (1898, p. 1063.)

*Exposure and Lens Aperture.* (1910, p. 893.)

*Actinograph Exposure Table.* (1901, p. 702.)

*Comparative Exposures.*—W. K. Burton (1887, p. 341.)

*Comparative Plate-Speed Numbers.* (1912, p. 897.)

## ORTHOCHROMATIC.

*Speeds and Colour Sensitiveness of various Plates to Different Lights.*—Eder. (1907, p. 1115.)

*Wave-Lengths of the Principal Fraunhofer Spectrum Lines, and the Elements that give them.* (1905, p. 1144.)

*Reflection of Light from various Surfaces.* (1900, p. 1016.)

## OPTICAL.

*Equations relating to Foci, etc.*—Branfil. (1907, p. 1120.)

*Combining Lenses.*—Formulae. (1910, p. 893.)

*Perspective—Factors.* (1910, p. 895.)

*Correction of Convergent Distortion.*—Formulae. (1910, p. 896.)

*Scale of Image.* (1910, p. 893.)

*Conjugate Foci.* (1910, p. 892.)

*Royal Photographic Society's Standard Diaphragms.* (1903, p. 1178; 1905, p. 1149 and 1907, p. 1093.)

*Uniform System Numbers for Stops from  $f/11$  to  $f/100$ .* (1905, p. 1147.)

*Continental Stops and their U.S. Equivalents.* (1907, p. 1127.)

*Correction for Inconstancy of Aperture.* (1910, p. 895.)

*Angles and Foci of the Telephoto Lens.* (1894, p. 949.)

*Steinheil's Tables of Camera Extensions, etc., corresponding to a given Magnification of the Telephoto Lens.* (1902, p. 732.)

*Focussing with Pinhole Apertures.* (1896, p. 954.)

*Aperture Markings of Old Lenses.* (1927, p. 457.)

*View Angles.* (1927, p. 458—459.)

## OPTICAL CALCULATIONS.

### Finding Focal Length.

The focal length of a lens, may readily be found as follows: Focus carefully on some very distant object, such as a church spire, and mark the position of any convenient part of the moving lens front on the fixed baseboard of the camera. Then focus sharply on an object of known size, *e.g.*, a graduated rule, placed as close to the camera as the available bellows extension will permit. When this has been carefully focussed, mark the position of the part of the lens front previously chosen, and then photograph the object. After development measure the length of its image.

If  $L$  is the length of the object and  $l$  the length of its image on the plate and  $d$  the distance between the two marks made on the baseboard, then the focal length of the lens is given by  $d \times L \div l$ .

This method is theoretically sound and only requires care to give accurate results.

If there is available a camera of extension somewhat greater than twice the focal length which is to be measured a similar method may be used. In this case the procedure is to focus as before on a distant object, marking the position of any convenient part of the moving lens front on the fixed camera baseboard. Then any small object is focussed so that the image is exactly the same size as the object, and the baseboard again marked. The distance between the two marks is the focal length of the lens.

### Focal Distances, etc.

Throughout the formulæ, on the next page, the following symbols are used as follows:—

$f$  = the focal length or "focus" of the lens.

$u$  = the distance of the *object* from the lens.

$v$  = the distance of the *image* from the lens, *e.g.*, camera extension in copying, lens-easel distance in enlarging.

$D$  = distance from object to image, neglecting nodal space, which in most lenses, is small compared with  $D$ .

$R$  = number of times that the size (linear) of the object divides into that of the image, *i.e.*, No. of times of enlargement.

$r$  = number of times that the size (linear) of the image divides into that of the object, *i.e.*, No. of times of reduction.

The distances  $u$  and  $v$  are reckoned respectively from the admission and exit nodes of a lens. For practical purposes (except with telephoto lenses) it is near enough to take these as situated at the diaphragm of a compound lens or at the surfaces of a single lens.

All the formulæ are derived from the parent formula:

$$\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$$

which, in its various forms, allows of practically any calculation of image or object size, scale of enlargement or reduction, camera extension, etc., being readily made.

**Scale of Reproduction.**

$R = \frac{\text{size of image}}{\text{size of object}}$ (linear)	$r = \frac{\text{size of object}}{\text{size of image}}$ (linear)
$R$ is No. of times of enlargement.	$r$ is No. of times of reduction.
$R = \frac{v}{u} \dots \dots \dots (1)$	$r = \frac{u}{v} \dots \dots \dots (5)$
$R = \frac{f}{u-f} \dots \dots \dots (2)$	$r = \frac{u-f}{f} = \frac{u}{f} - 1 \dots \dots (6)$
$R = \frac{v-f}{f} \dots \dots \dots (3)$	$r = \frac{f}{v-f} \dots \dots \dots (7)$
$R = \frac{D-2f}{f}$ (approx.) $\dots \dots (4)$	$r = \frac{D-2f}{f}$ (approx.) $\dots \dots (8)$

**Focal Length.**

$$f = \frac{u \times R}{R+1} = \frac{u}{r+1} \dots (9) \quad f = \frac{D \times R}{(R+1)^2} = \frac{D \times r}{(r+1)^2} \dots (11)$$

$$f = \frac{v}{R+1} = \frac{v \times r}{r+1} \dots (10) \quad f = \frac{D}{R+2} = \frac{D}{r+2} \dots (12)$$

(approx.)

$$f = \frac{u \times v}{D} \dots \dots (13)$$

**Distance of Object from Lens.**

$$u = \frac{v}{R} = v \times r \dots \dots (14) \quad u = \frac{f \times v}{v-f} \dots \dots (16)$$

$$u = \frac{f}{R} + f = (r+1) \times f \dots (15) \quad u = \frac{D}{R+1} = \frac{r \times D}{r+1} \dots (17)$$

**Distance of Image from Lens.**

$$v = u \times R = \frac{u}{r} \dots \dots (18) \quad v = \frac{f \times u}{u-f} \dots \dots (20)$$

$$v = (f \times R) + f = \frac{f}{r} + f \dots (19) \quad v = \frac{R \times D}{R+1} = \frac{D}{r+1} \dots (21)$$

**Object-Image Distance.**

$$D = f \times (R + \frac{1}{R} + 2) = \dots \quad D = \frac{v \times (R+1)}{R} = v \times (r+1) \dots (25)$$

$$f \times (r + \frac{1}{r} + 2) \dots \dots (22) \quad D = u \times (R+1) = \dots$$

$$= \frac{f \times (R+1)^2}{R} = \frac{f \times (r+1)^2}{r} \dots (23) \quad = \frac{u \times (r+1)}{r} \dots (26)$$

$$= f \times (R+2) = f \times (r+2) \dots (24)$$

(approx.)



## Notes on the Formulæ.

No. 2.—If the distance  $u$  of an object is very great relatively to the focal length  $f$ , the latter becomes negligible relatively to  $u$ , so that the formula becomes

$$R = \frac{f}{u} \text{—according to which the}$$

size of the image is directly proportional to  $f$ , and inversely proportional to  $u$ . While theoretically this is never so, the size of image is proportional (within an error of 1 per cent.) to the distance of the object if the distance of the object is at least 100 times the focal length of the lens. (See B.J., 1921, November 18, p. 686.)

Nos. 3, 7, 16.—When the distance  $u$  of the object is very great relatively to the focal length, the distance  $v$  of the image from the lens becomes nearly equal to  $f$ , and, in consequence of depth of focus, actually equal to  $f$ . In these circumstances corresponding with the photography of distant objects, Formulæ 3, 7 and 15 cease to apply.

Nos. 1, 2, 3, 5, 6, 7.—Bearing in mind the definitions of  $R$  and  $r$  these formulæ permit the calculation of the size of image obtained of an object of known size at a given distance with a lens of given focal length and, *vice versa*, the size of an object yielding an image of known size.

Nos. 4, 8, 12, 24.—These approximate formulæ yield results sufficiently near for practical purposes if  $R$  or  $r$  is greater than about 9 or 10.

No. 20.—If  $u$  is very great, compared with  $f$ ,  $u - f$  becomes practically equal to  $u$ , and therefore  $v = f$ .

## Examples.

The following examples will serve to illustrate the use of those of the above formulæ which are chiefly employed for practical purposes:—

A picture 12 × 6 ft., 20 ft. from the lens is photographed with a 10 in. lens. What is the size of the copy? 12 ft. = 144 ins., 20 ft. = 240 ins. From *Formula 2*,  $144 \times 10 \div (240 - 10) = 144 \times 10 \div 230 = 6.26$  ins. The copy therefore measures 6.26 × 3.13 ins.

### Copying to Scale.

In making the copy of a painting on a scale of one-seventh, what focal length is required if the painting is 20 ft. distant. In *Formula 9*,  $u = 20$  ft.,  $r = 7$ ,  $r + 1 = 8$ . The required focal length is therefore  $20 \div 8 = 2\frac{1}{2}$  ft. = 30 ins.

### Enlarging with Camera.

Camera has extension of 14 ins. What is greatest degree of enlargement that can be obtained when using 4-in. lens?  $14 - 4 = 10$  in.  $10 \div 4 = 2\frac{1}{2}$ ; that is, maximum enlargement is  $2\frac{1}{2}$  times (*Formula 3*).

### Maximum Focal Length.

In a camera for copying—enlarging up to 4 times, an extension of 30 ins. (lens to plate) can be obtained. What is the maximum focal length of lens which can be used?  $4 + 1 = 5$ .  $30 \div 5 = 6$ . (*Formula 10*) Maximum focal length is 6 ins.

In copying originals half scale with camera of 9 ins. extension, what is maximum focal length of lens which can be used?  $9 \times 2 = 18$ .  $18 \div 3 = 6$  ins. (*Formula 10*.) Focal length must not be greater than 6 ins.

### Camera Extensions.

What is the required camera extension for copying  $8\frac{1}{2} \times 6\frac{1}{2}$  ins. to  $4\frac{1}{4} \times 3\frac{1}{4}$  ins. with a 12 in. lens? In *Formula 19*, reduction figure = 2.  $12 \div 2 = 6$ .  $6 + 12 = 18$  ins.

What is the required camera extension when enlarging  $4\frac{1}{4} \times 3\frac{1}{4}$  in. plate to  $8\frac{1}{2} \times 6\frac{1}{2}$  ins. (= 2 times enlargement) with 12-in. lens? In *Formula 19*,  $f = 12$ ;  $R = 2$ .  $12 \times 2 = 24$ .  $24 + 12 = 36$  ins. = 3 ft.

### Enlarging Space.

Enlargements up to 10 diameters are to be made with 8-in. lens. What space is required between negative and easel? In *Formula 23*,  $R + 1 = 11$ .  $11 \times 11 = 121$ .  $121 \times 8 = 968$ .  $968 \div 10 = 96.8$  ins. = 8 ft.  $\frac{2}{3}$  in.

### Studio Space.

For making full-length cabinet portraits with 12-in. lens, what distance is required between sitter and focussing screen? If sitter is 70 ins. and figure is 5 ins. on negative,  $r = 14$ . In *Formula 23*,  $r + 1 = 15$ .  $15 \times 15 = 225$  ins.  $225 \times 12 = 2,700$ .  $2,700 \div 14 = 192\frac{3}{4}$  = 16 ft.  $\frac{3}{4}$  ins.

### Magnifiers.

When using a supplementary lens (magnifier) as a means of bringing near objects into focus when employing a camera fitted with a lens adjusted for use at fixed focus, the focal length of the supplementary lens must be equal to the distance of the object. This holds good whatever the focal length of the original lens.

### Altering Focal Length.

The rule (very rough, on account of the impossibility of knowing from which part of a lens mount to measure) for finding the focal length of an extra lens, to reduce or increase the focal length of a given lens is as follows:—

Multiply the focal length to be altered by the final focal length desired, and divide the product by the original focal length less the final focal length.

$$\text{That is: } f_2 = \frac{f_1 \times F}{f_1 - F}$$

where  $f_1$  is the original focal length,

$F$  the final focal length required, and  $f_2$  the focal length of the necessary added lens.

To increase the focal length, use a negative lens.

To reduce the focal length, use a positive lens.

### Telephoto Rules.

$F$  = equivalent focal length of complete lens.

$f_1$  = equivalent focal length of positive.

$f_2$  = equivalent focal length of negative.

$E$  = camera extension, from negative lens to ground glass.

$M$  = magnification, that is, number of times the image given by the complete lens is larger than that given by positive alone.

*Magnification* when working at given extension is found by dividing camera extension by

focal length of negative lens and adding 1.

$$M = \frac{E}{f_2} + 1.$$

Camera extension, necessary for given magnification,—multi-

ply focal length of negative lens by magnification less 1.

$$E = i_2 (M - 1).$$

Focal length of complete lens.—

Multiply focal length of positive by magnification.

## Diaphragm Numbers.

EXPOSURES AT DIFFERENT APERTURES.

F. Numbers ...	1.8	2	2.2	2.5	2.7	2.9	3	3.16	3.4
Rel. Exposure Required—									
Fractions ...	2/3	3/4	1	1 1/4	1 1/2	1 3/4	2	2 1/4	
Decimal ...	0.83	1	1.33	1.66	2	2.33	2.66	3	
Seconds ...	1/1200	1/1000	1/750	1/600	1/500	1/428	1/375	1/325	
<hr/>									
F. Numbers ...	3.5	3.9	4.5	5	5.6	6	6.3	8	
Rel. Exposure—									
Fractions ...	2 1/2	3	4	5	6	7	8	12	
Decimal ...	3.33	4	5.3	6.66	8	9.3	10.6	16	
Seconds ...	1/300	1/250	1/190	1/150	1/125	1/100	1/95	1/60	

The above table gives the relative exposures with lens apertures.

The Fraction line gives a series of F/Nos. each requiring double the exposure of the preceding one. This series is F/2.2, 3.16, 4.5, 6.3. The Decimal line gives a similar series, beginning with  $f/2$ , viz., F/2, 2.7, 4, 5.6, 8. The last line gives the relative Speed of any lens, in comparison with another lens of different aperture.

EQUIVALENT F/- AND UNIFORM SYSTEM NUMBERS.

Rel. Exposure Req'd	1	2	4	8	16	32	64	128
F. Nos. ...	4	5.6	8	11.3	16	22.6	32	45.2
U.S. Nos. ...	1	2	4	8	16	32	64	128

Among Continental opticians at the present time it is usual to adopt a different series of F/Nos. each requiring double the exposure of the preceding one. This series is:—

F/No.	3.16	4.5	6.3	9	12.5	18	25.3	36
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NOTE.—Most lenses are now marked with the F/numbers, according to one or other of the above two series, although the U.S. numbers are used on Kodak lenses. Also the actual diameter of the diaphragm aperture in millimetres is marked on some Continental lenses.



*Extreme care in focussing at ordinary short distances is required if the hyperfocal distance exceeds 100 feet for scale focussing, or 200 feet for reflex work.*

## II. DEPTH FOR VARIOUS HYPERFOCAL DISTANCES.

Table constructed for a number of hyperfocal distances such that, if, with a lens corresponding with one of these hyperfocal distances, sharpest focus is secured on any of the distances given, then the limits of good definition are shown by the number before and the number after the distance focussed on.

Hyper-focal-Distances.	Distances focussed on in feet and decimals of a foot.
200	INF., 200, 100, 67, 50, 40, 33, 28.6, 25, 22.2, 20, 18.2, 16.7, 15.4, 14.3, 13.3, 12.5, 11.8, 11.1, 10.5, 10, 9.5, 9.1, 8.7, 8.3, 8, 7.7, 7.4, 7.1, 6.9, 6.7, 6.5, 6.3, 6.1, 5.9, 5.7, 5.55, 5.4, 5.25, 5.1, 5.
180	INF., 180, 90, 60, 45, 36, 30, 25.7, 22.5, 20, 18, 16.4, 15, 13.9, 12.9, 12, 11.2, 10.6, 10, 9.5, 9, 8.6, 8.2, 7.8, 7.5, 7.2, 6.9, 6.7, 6.4, 6.2, 6, 5.8, 5.6, 5.45, 5.3, 5.15, 5.
160	INF., 160, 80, 53, 40, 32, 26.7, 22.9, 20, 17.8, 16, 14.6, 13.3, 12.3, 11.4, 10.7, 10, 9.4, 8.9, 8.4, 8, 7.6, 7.3, 7, 6.7, 6.4, 6.15, 5.9, 5.7, 5.5, 5.3, 5.15, 5.
140	INF., 140, 70, 47, 35, 28, 23.3, 20, 17.5, 15.5, 14, 12.7, 11.7, 10.8, 10, 9.3, 8.75, 8.25, 7.8, 7.4, 7, 6.65, 6.35, 6.1, 5.8, 5.6, 5.4, 5.2, 5.
120	INF., 120, 60, 40, 30, 24, 20, 17.1, 15, 13.3, 12, 10.9, 10, 9.2, 8.6, 8, 7.5, 7, 6.7, 6.3, 6, 5.7, 5.5, 5.2, 5.
100	INF., 100, 50, 33, 25, 20, 16.7, 14.3, 12.5, 11.1, 10, 9.1, 8.3, 7.7, 7.1, 6.7, 6.3, 5.9, 5.55, 5.25, 5.
90	INF., 90, 45, 30, 22.5, 18, 15, 12.9, 11.2, 10, 9, 8.2, 7.5, 6.9, 6.4, 6, 5.6, 5.3, 5.
80	INF., 80, 40, 26.7, 20, 16, 13.3, 11.4, 10, 8.9, 8, 7.3, 6.7, 6.15, 5.7, 5.3, 5.
70	INF., 70, 35, 23.3, 17.5, 14, 11.7, 10, 8.75, 7.8, 7, 6.35, 5.8, 5.4, 5.
60	INF., 60, 30, 20, 15, 12, 10, 8.6, 7.5, 6.7, 6, 5.5, 5.
50	INF., 50, 25, 16.7, 12.5, 10, 8.3, 7.1, 6.3, 5.55, 5.
45	INF., 45, 22.5, 15, 11.2, 9, 7.5, 6.4, 5.6, 5.
40	INF., 40, 20, 13.3, 10, 8, 6.7, 5.7, 5.
35	INF., 35, 17.5, 11.7, 8.75, 7, 5.8, 5.
30	INF., 30, 15, 10, 7.5, 6, 5.
25	INF., 25, 12.5, 8.3, 6.3, 5.
20	INF., 20, 10, 6.7, 5.

NOTE.—The depth with a long-focus (including telephoto) lens is nearly as great as it would be with a short-focus lens of the same  $f/\text{No.}$ , if the latter were brought close enough to the object to give an image of the same size as that obtained with the long-focus lens.—R de B.A.

Focussing scales constructed on this plan for the hyperfocal distance with the lens at full aperture would be an enormous improvement. With the lens stopped down to an F/No. twice that at full aperture the limits of definition would be the second numbers above and below; to an F/No. four times that of full aperture, the fourth numbers above and below; and to an F/No. eight times that of full aperture, the eighth numbers above and below.

## Lenses for Studios.

### FOCAL LENGTHS OF LENSES FOR STUDIOS OF VARIOUS LENGTHS.

The following table shows the focus of lens which is suitable for comfortable working in studios of various lengths. In each case it is assumed that 5 ft. of the length will be taken up by camera, operator, sitter and background. The figures in column 1 are the full run of the studio, including this 5 ft. In the case of the short studios the focal lengths are about the longest which can be used: in the case of the longer studios somewhat greater focal lengths might be used, but the lenses directed in the table are about the best for general work.

Length of Studio Feet.	C.D.V. full length. Inches.	C.D.V. half length and Cabinet full length. Inches.	C.D.V. head, Cabinet half length. Inches.	Cabinet head and Boudoir full length. Inches.	Boudoir half length, Panel full length. Inches.	Boudoir head, Panel half length. Inches.
12	4*	6½*	8½	9*	12*	14
14	4½*	7½*	9	10*	13*	16
16	5½	8½	10	10½	16	18
18	6	8½	10½	10½	16	18
20	6	10	10½	12	18	20
22	7	10½	12	14	22	22
24	8½	12	14	16	24	24
28	8½	13½	16	16	24	24
30	10	13½	16	18	24	24

\* Full lengths may be obtained with these focal lengths, but the standpoint is so near to the sitter that good perspective cannot be expected.

## Distances When Enlarging and Reducing.

Focus of Lens, inches	TIMES OF ENLARGEMENT AND REDUCTION.							
	1	2	3	4	5	6	7	8
	inches	inches	inches	inches	inches	inches	inches	inches
1	2	3	4	5	6	7	8	9
2	4	6	8	10	12	14	16	18
2½	5	7½	10	12½	15	17½	20	22½
3	6	9	12	15	18	21	24	27
3½	7	10½	14	17½	21	24½	28	31½
4	8	12	16	20	24	28	32	36
4½	9	13½	18	22½	27	31½	36	40½
5	10	15	20	25	30	35	40	45
5½	11	16½	22	27½	33	38½	44	49½
6	12	18	24	30	36	42	48	54
7	14	21	28	35	42	49	56	63
8	16	24	32	40	48	56	64	72
9	18	27	36	45	54	63	72	81
10	20	30	40	50	60	70	80	90
11	22	33	44	55	66	77	88	99

The table is used as follows:—Knowing the focal length of the lens to be used and the degree of (linear) enlargement or reduction, look up the figure for enlargement or reduction in the upper horizontal row, and carry the eye down the column below it until it reaches the horizontal line of figures opposite the focal length of lens in the left-hand column.

When *enlarging*, the greater of the two distances where the two lines join is the distance from lens to the sensitive paper or plate. The lesser is the distance from lens to negative, or picture being enlarged direct in camera.

When *reducing* the distances are *vice-versa*: the greater is the distance from lens to original, the smaller from lens to sensitive plate.

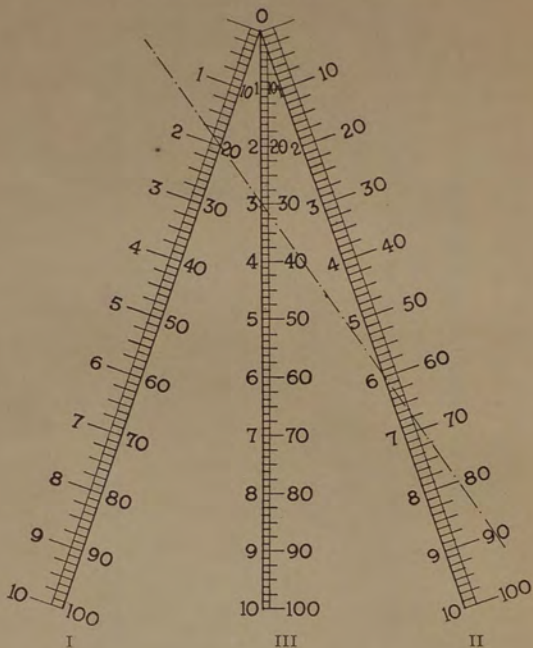
## Depth Table for Amateur Cine Cameras.

CALCULATED FOR A LENS OF 1 INCH (25 mm.) FOCUS AND A DISC OF CONFUSION OF 0.001 INCH.

Distance focussed in feet.	f/1.9	f/2.8	f/3.5	f/4	f/5.6	f/8	f/11	f/16
100	30 - inf.	23 - inf.	19 - inf.	17 - inf.	13 - inf.	9 - inf.	7 - inf.	5 - inf.
50	23 - inf.	18 - inf.	16 - inf.	14 - inf.	11 - inf.	8½ - inf.	6½ - inf.	4½ - inf.
25	16 - 38	13½ - inf.	12 - inf.	11 - inf.	9½ - inf.	7½ - inf.	5½ - inf.	4½ - inf.
15	11 - 22	10 - 30	9 - 40	8 - 55	7½ - inf.	6 - inf.	5 - inf.	3½ - inf.
10	8 - 13	7½ - 15	7 - 17	6½ - 19	6 - 30	5 - inf.	4 - inf.	3½ - inf.
8	6½ - 10	6½ - 11	6 - 12	5½ - 13	5½ - 17	4½ - 36	4 - inf.	3½ - inf.
6	5½ - 7	5 - 7½	4½ - 8	4½ - 8½	4½ - 10	3½ - 14	3½ - inf.	3 - inf.
4	3½ - 4½	3½ - 4½	3½ - 4½	3½ - 5	3 - 5½	2½ - 6½	2½ - 8½	2½ - 18
3	2' 10" - 3' 2"	2' 9" - 3' 4"	2' 8" - 3' 5"	2' 7" - 3' 6"	2' 6" - 3' 9"	2' 4" - 4' 6"	2' 0" - 5' 0"	1½ - 7
2	23" - 25"	22½" - 25½"	22" - 26"	21½" - 27"	21" - 28"	20" - 30"	19" - 33"	17" - 40"



## ABACUS FOR OPTIMUM FOCUSING DISTANCE.



Here, scale I represents the distance of the nearest object to the camera which must be in correct focus, and scale II, the distance from the camera of the farthest object to be in focus.

By joining together the two points on scales I and II, the best distance on which to focus the lens will be found on the central scale III. The distances may be measured in inches, feet or yards, so long as the same unit is used throughout, and if the left hand figures on one scale is used, the left hand figures of the others must also be used, otherwise the result will be incorrect.

## Distances for Cine Projection.

The figures in the vertical columns denote the distances (in ft.) required for projection of pictures of the widths given at the head of each column when using lenses of the focal lengths given in the column on the left-hand side.

### For 9.5mm. Films.

Focal length.	Width of Motion-Picture required (ft.).						
	1	2	3	4	6	8	10
2 cm. . . . .	2½	5	7½	10	15	20	25
1-in. . . . .	3	6	9	12	18	24	30
1½-in. . . . .	4½	9	13½	18	27	36	45
2-in. . . . .	6	12	18	24	36	48	60
3-in. . . . .	9	18	27	36	54	72	90
4-in. . . . .	12	24	36	48	72	96	120

Example:—For 3 ft. picture with 1-in. lens, distance of screen from projector requires to be 9 ft.

### For 16mm. Films.

Focal length.	Width of Motion-Picture required (ft.).							
	1	2	3	4	6	8	15	20
2 cm.	2	3¾	5¾	7¾	11½	13½	29	40
1-in.	2½	5	7¾	9¾	14½	19½	36½	49
1½-in.	3¾	7½	11	14½	22	29	54	72
2-in.	5	9¾	14¾	19	29	39	73	97
3-in.	7½	14½	22	29	43½	58	109	145
4-in.	9½	19	29	39	58	77	145	193

## Relative Exposures When Enlarging.

*(Without a Condenser.)*

New Times of Enlargement	Time of enlargement for which exposure is known.											
	1	1½	2	2½	3	3½	4	5	6	8	10	12
1	1	1½	2	2½	3	3½	4	5	6	8	10	12
1½	1½	1	1½	2	2½	3	3½	4	5	6	8	10
2	2	1½	1	1½	2	2½	3	3½	4	5	6	8
2½	3	2	1½	1	1½	2	2½	3	3½	4	5	6
3	4	2½	2	1½	1	1½	2	2½	3	3½	4	5
3½	5	3	2½	2	1½	1	1½	2	2½	3	3½	4
4	6	4	3	2	1½	1	1½	2	2½	3	3½	4
5	9	6	4	3	2½	2	1½	1	1½	2	2½	3
6	12	8	5	4	3	2½	2	1½	1	1½	2	2½
8	20	13	9	7	5	4	3½	2½	1½	1	1½	2
10	30	19	13	10	7	6	5	3½	2½	1½	1	1½
12	42	27	19	14	11	8	7	4½	3½	2	1½	1

To use this table find in the top horizontal line the number of times of enlargement for which exposure is known. Under this number the relative time of exposure for different degrees of enlargement will be found opposite the new times of enlargement in first vertical column.

## Relative Exposures When Copying.

New Scales of Reduction	Scale of reduction for which exposure is known.											
	1	¾	⅔	½	⅓	¼	⅕	⅙	⅛	1/10	1/12	1/15
1	1	¾	⅔	½	⅓	¼	⅕	⅙	⅛	1/10	1/12	1/15
¾	¾	1	⅔	½	⅓	¼	⅕	⅙	⅛	1/10	1/12	1/15
⅔	1	1	1	⅔	½	¼	⅕	⅙	⅛	1/10	1/12	1/15
½	1½	2	1	1	1	1	⅔	⅔	⅔	⅔	⅔	⅔
⅓	2	3	2	1	1	1	1	1	1	1	1	1
¼	3	4	3	2	1	1	1	1	1	1	1	1
⅕	4	5	4	3	2	1	1	1	1	1	1	1
⅙	5	6	5	4	3	2	1	1	1	1	1	1
⅛	6	8	6	5	4	3	2	1	1	1	1	1
1/10	7	10	7	6	5	4	3	2	1	1	1	1
1/12	8	12	8	7	6	5	4	3	2	1	1	1
1/15	9	15	9	8	7	6	5	4	3	2	1	1

To use this table find in the top horizontal line the scale of reduction for which exposure is known. Under this scale the relative time of exposure for different degrees of reduction will be found opposite the new scales of reduction marked in first vertical column.

## CHEMICALS.

### Properties of Chief Chemicals Used in Photography.

On these pages are given particulars of just those chemicals which are used in everyday photography, with those of a few others not so regularly employed. The facts here collected are those which it is useful to know for the proper making-up of solutions: and they also enable photographers unacquainted with chemistry to identify chemicals by their different names.

**Acetic Acid** ( $\text{CH}_3\text{COOH}$ ).—Sold as "glacial," which is the strength to be used in formulæ unless otherwise directed. The glacial acid is a liquid of sp. gr. 1.055, which strongly blisters the skin. At 50 deg. F. it solidifies to a mass of crystals. Thus in cold weather it may be necessary to melt the contents of a bottle of the acid before use by standing the bottle in warm water. Glacial acid absorbs water strongly from the air and must be kept well stoppered. It mixes in all proportions with water, alcohol, ether, chloroform and glycerine, and dissolves gelatine, celluloid, fat, oils, etc. In United States a No. 8 acid of 1.040 sp. gr. is commonly prescribed in formulæ, it is of 31 per cent. strength, *i.e.*, about one-third the strength of the glacial acid.

**Albumen**.—One of the protein colloid substances which largely compose living tissue, animal and vegetable. Contains nitrogen, sulphur, oxygen, carbon and hydrogen. The typical albumen occurs in white of egg, which is the only animal albumen having any photographic use. Egg albumen is soluble in water and dilute solutions of alkalis and salts. Heated to

about 163° F. it is irreversibly coagulated, becoming then amorphous and insoluble. The same effect is produced by strong alcohol, and by most metallic salts. The solution of egg-albumen is extremely liable to decompose and, if not used at once, requires to be preserved with an antiseptic. Invert albumen, which is soluble in alcohol, is prepared from egg albumen by treating first with acid and then alkali. Its use is now limited to process work, owing to the disuse of albumenised paper and of the albumen processes.

**Alcohol**.—Ordinary alcohol is ethyl alcohol ( $\text{C}_2\text{H}_5\text{OH}$ ) which, when of sp. gr. 0.794, is "absolute alcohol" (=100 per cent.). Alcohol containing 10 per cent. water is "rectified spirit." Methylated spirit consists of rectified spirit plus 10 per cent. crude wood spirit (to render it undrinkable) and one-eighth per cent. mineral naphtha. The naphtha appears as a milkiness when the spirit is mixed with water. Methylated spirit which has taken up water, *e.g.*, from wet negatives or prints, can be largely dried by shaking with dry potassium carbonate. The latter takes up the water

which forms a dense solution of it. The partially dried spirit, which takes up about 0.1 per cent. of the potass carbonate, can afterwards be poured off.

**Alum.**—Double sulphate of aluminium and potassium (or ammonium), i.e. potash alum or ammonia alum  $[\text{Al}_2 (\text{SO}_4)_3 \text{K}_2 \text{SO}_4 \cdot 24\text{H}_2\text{O}$  or  $\text{Al}_2 (\text{SO}_4)_3 (\text{NH}_4)_2 \text{SO}_4 \cdot 24\text{H}_2\text{O}]$ . Potash alum is made in large white crystals, but is more conveniently dissolved if bought in powder form. One part will dissolve in ten parts of cold water; in very much less hot water, which therefore should be used when making a stock solution. Ammonia alum is not quite so soluble. Both alums dissolve in glycerine. Both are acid substances, decomposing hypo, with deposition of sulphur. Alum for photographic use should be free from iron, the presence of traces of which is liable to give rise to bluish stains in sulphide-toned prints which have been hardened in a bath containing such impure alum.

**Amidol**, i.e., diamidophenol hydrochloride of  $\text{C}_6 \text{H}_3 \text{OH} (\text{NH}_2)_2$ . Fine white or bluish grey crystals, very soluble in water, but almost insoluble in alcohol. The solution is acid; addition of soda carbonate produces effervescence. Amidol in the dry state is slowly affected by air and light and should be kept in well stoppered yellow bottles. The solution (with sulphite) for development keeps only a short time, i.e., should be used on the day it is made.

**Ammonia**, i.e., liquor ammonia, strong solution in water of the gas  $\text{NH}_3$ . Ammonia is sold as of sp. gr. 0.880, i.e., strongest liquor ammonia, but is often of somewhat less

strength. The strong solution rapidly loses strength by exposure to the air. When purchasing a few ounces, it is well to mix with an equal bulk of water, using a double quantity of this half strength mixture in making up any formulæ. Full or half strength ammonia solutions should be kept in a cool place.

**Ammonium bichromate**  $(\text{NH}_4)_2 \text{Cr}_2\text{O}_7$ .—Orange crystals, formed by neutralising chromic acid with ammonia. More soluble than the potash salt, one part dissolving in four parts of cold water; far more soluble in warm water, and fairly soluble in absolute alcohol. It can replace potass bichromate in the sensitising of gelatine in the carbon, carbonyl, and oil processes, and is frequently used in preference on account of its stronger action. It is also largely used for sensitising in photo-mechanical process work, particularly in the making of half-tone images on zinc and copper by sensitised fish-glue.

**Ammonium bromide**, i.e., bromide of ammonia,  $\text{NH}_4\text{Br}$ . White crystalline powder dissolving in  $1\frac{1}{2}$  times its weight of cold water; slightly soluble in alcohol. It becomes moist by exposure to the air and should be kept well stoppered.

**Ammonium carbonate**, i.e., carbonate of ammonia, rock ammonia. A mixture of ammonium bicarbonate and ammonium carbamate, sold in hard opaque pieces, smelling strongly of ammonia. Any white powdery crust on the pieces should be scraped off before using. Dissolves in about four times its weight of cold water; should not be dissolved in hot water.

**Ammonium chloride,  $\text{NH}_4\text{Cl}$ .** A commercial quality is the sal ammoniac sold for batteries. One part dissolves in three parts of cold water; in  $1\frac{1}{2}$  parts hot water.

**Ammonium persulphate,  $(\text{NH}_4)_2\text{S}_2\text{O}_8$ .** Small white crystals, dissolving in  $1\frac{1}{2}$  times their weight of cold water. Decomposed by hot water. Persulphate greedily absorbs moisture from the air and must be kept in a well stoppered bottle.

**Ammonium sulphide.**—Sold as deep yellow liquid smelling strongly of rotten eggs. Contains traces of other sulpho compounds with the ammonium sulphide  $(\text{NH}_4)_2\text{S}$ .

**Ammonium sulphocyanide, i.e., ammonium thiocyanate,** sometimes called ammonium sulphocyanate,  $\text{NH}_4\text{CNS}$ . Small white crystals which absorb moisture with great avidity, becoming wet if not well stoppered. Sulphocyanide, which has deteriorated in this manner, should be thrown away; it cannot be dried by heat. The crystals are exceedingly soluble in water and in alcohol.

**Borax, i.e., borate of soda,  $\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}$ .** Pure white crystalline powder, one part of which dissolves in  $12\frac{1}{2}$  parts of cold water—but very much more readily in hot water. Solutions of borax in water are slightly alkaline.

**Bromine,** heavy deep red and intensely corrosive liquid, emitting dense orange fumes, extremely irritating to the eyes. It is the element Br, analogous to iodine. Bromine dissolves in about 30 times its weight of water, forming an orange red solution, which also gives off irritating fumes. In any use of

bromine it is best to buy it as this "bromine water." Further diluted, this latter forms an excellent bleach for sulphide toning.

**Calcium chloride,  $\text{CaCl}_2$ .**—The commercial fused form of this substance is the most active absorbent of moisture, for which purpose, in admixture with asbestos, it is used for preserving platinotype paper in a dry condition. An ample supply of the dried chloride can be used with advantage in containers (preferably metal boxes) of sensitive papers or plates. The lumps of chloride may be put in a holder of perforated zinc, of size sufficient for several pounds. When it becomes visibly damp, the chloride can be restored to its original condition by heating it in an iron shovel over the fire.

**Caustic potash, i.e., potash hydrate, potass hydroxide,  $\text{KOH}$ .** The "strongest" form of alkali, having a powerful corrosive action on the skin. It is usually sold in sticks which quickly become moist to the touch by absorbing water from the air and also in time become encrusted with a powdery deposit due to the formation of carbonate by absorption of carbon dioxide. Caustic potash must be kept in a well corked bottle, not glass stoppered, since the potash acts on the glass and causes the stopper to stick. For the same reason solutions of caustic potash should be rubber-stoppered. A purer form of caustic potash, very suitable for photographic use, is that known as "by alcohol"; the potash is in pieces of fibrous structure. Caustic potash dissolves readily in half its weight of cold water with production of much heat.

A solution quickly cleans greasy bottles; it softens gelatine a weak hot bath being used for the wholesale removal of the films from waste negatives.

**Caustic soda**, *i.e.*, sodium hydrate, sodium hydroxide, NaOH. Except that it is a somewhat less "powerful" alkali and is not so readily soluble in water, caustic soda is similar to caustic potash. It is supplied in the same two forms, stick and "by alcohol" and calls for the same precautions in keeping it in the solid state and in solution.

**Chrome alum**, double sulphate of chromium and potassium,  $\text{Cr}_2\text{K}_2(\text{SO}_4)_4 \cdot 24\text{H}_2\text{O}$ . Violet crystals which are ruby red by transmitted light. Dissolves in about six times its weight of cold water. Hot water should not be used for dissolving it. Chrome alum toughens gelatine somewhat more energetically than do the ordinary white alums, and its tanning action is further increased by addition of a few drops of ammonia, sufficient to render the solution slightly alkaline.

**Chlorquinol** (mono-chlorhydroquinone), a white or slightly tinted crystalline powder, which dissolves readily in water and is also soluble in alcohol and other organic solvents. Much more energetic developer than hydroquinone, which it resembles chemically.

**Citric Acid**, small colourless crystals extremely soluble in water; slightly soluble in alcohol.

**Copper sulphate**, sulphate of copper, blue vitriol,  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ . Blue crystals which dissolve in  $2\frac{1}{2}$  times their weight of cold water; half their weight of hot water; insoluble in alcohol. For its chief photo-

graphic use, namely copper toning, the pure sulphate should be used; commercial sulphate often contains iron. Should be kept well corked to prevent formation of a bluish-green incrustation.

**Dextrine**, fine powder, which for use as a mountant, should be the pure white quality; the yellow is less suitable. Simply dissolved in a little water, dextrine forms a highly adhesive syrup but is best prepared by heating it with about  $1\frac{1}{4}$  times its weight of water to 160 deg. F. and setting it aside in a cool place for the mixture to congeal to a firm smooth paste.

**Ferric ammonium citrate**, double citrate of iron and ammonia. It is obtainable in two forms—(1) brown scales, from any chemist, and (2) fine green crystals from large dealers in chemicals. The green citrate is much more sensitive to light than the brown and is now almost always used in the preparation of sensitive iron-printing papers.

**Ferrous oxalate**, the active substance  $\text{Fe}(\text{COOH})_2 \cdot 2\text{H}_2\text{O}$  of the ferrous oxalate developer. It is itself almost insoluble in water, but is freely soluble in solution of potass oxalate. It is thus formed in solution by mixing solutions of ferrous sulphate and potass oxalate.

**Ferrous sulphate**, sulphate of iron, proto-sulphate of iron, green vitriol,  $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ . Should be in clear emerald green crystals, free from reddish markings. Slowly oxidises in the air and must be kept well stoppered. One part dissolves in about  $1\frac{1}{2}$  parts of cold water, forming a green solution which also gradually oxidises, becoming more yellowish in tint and

slightly turbid. This change can be prevented by making the solution acid with a little sulphuric or tartaric acid, and by keeping a few pieces of iron wire in the mixture. Also the solutions keep better in bright light.

**Formaline**, 40 per cent solution of formaldehyde,  $\text{H.COH}$ . The solution has a characteristic penetrating odour, causing the eyes to water. It mixes with water in all proportions and is slightly acid.

**Gelatine** is not a definite chemical compound, but a mixture of colloid substances. It swells in cold water, dissolves when the swollen mass is heated and sets to a jelly on cooling. A solution of gelatine may be sufficiently weak to be fluid when cold; on addition of alcohol the gelatine is thrown out of solution. Gelatine is dissolved in the cold by oxalic, hydrochloric, acetic and nitric acids. The mixture with the last named forms a liquid glue; that with acetic acid is used as a cement for celluloid. Barium chloride and chloral hydrate also dissolve gelatine in the cold. Alum, formaline and tannic acid harden gelatine, *i.e.*, render it insoluble in, and unswollen by, water.

**Glycerine**, colourless syrupy liquid,  $\text{C}_2\text{H}_5(\text{OH})_2$ , of sp. gr. 1.265. It mixes with water or alcohol in all proportions, 100 parts of glycerine dissolve—lead acetate, 20 parts; alum 15 parts; borax, 60 parts; potass bromide, 25 parts; soda carbonate, 98 parts; potass iodide, 40 parts. Glycerine is entirely non-volatile at the ordinary temperature, that is does not "dry up." A solution of it in water is therefore used as a bath for rendering supple the gelatine coating on papers or film after

drying; the water of the bath evaporates, leaving a small quantity of glycerine in the emulsion coating.

**Glycin**, para-oxy-phenyl-amido-acetic acid. It is a white powder of minute thin plates, very slightly soluble in water but readily soluble in alkaline solutions. Almost insoluble in alcohol.

**Gold Chloride**.—The yellow crystals commonly sold in Great Britain are a compound of gold chloride and sodium chloride of the formula  $\text{NaAuCl}_4 \cdot 2\text{H}_2\text{O}$ . Each 15 grs. thus contains  $7\frac{1}{2}$  grs. of gold metal. Another commercial form of gold chloride is the brown crystals of formula  $\text{HAuCl}_4 \cdot 3\text{H}_2\text{O}$ , likewise containing half their weight of gold metal.

**Hydrochloric acid**, *i.e.*, muriatic acid, a solution in water of the gas  $\text{HCl}$ . The pure commercial acid has sp. gr. of 1.16 and is a strongly fuming corrosive liquid, which acts chemically and dissolves the oxides and carbonates of most of the metals. "Spirits of salt" is a crude form of hydrochloric acid, containing iron, etc., and is a powerful cleanser of glass vessels containing mineral deposits.

**Hydrofluoric acid**, strongly fuming and highly corrosive solution of hydrofluoric acid gas,  $\text{HF}$ . Commercially the acid is sold of strengths 40 per cent. and 55 per cent. It must be kept in gutta-percha bottles, as it attacks glass and thus is used for detaching the gelatine film from glass negatives. All contact of even a weak solution of the acid with the fingers must be avoided.

**Hydroquinone**, *i.e.*, quinol-hydrokinone, hydrochinon, dihydroxy-benzene,  $\text{C}_6\text{H}_4(\text{OH})_2$ ,



Fine white needle crystals, dissolving in about 18 parts of water, in two parts of 90 per cent. alcohol, or in 6 parts of acetone. Hydroquinone, if pure, should dissolve completely in ether.

**Hypo**, hyposulphite of soda, sodium thiosulphate,  $\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$ . Obtainable as small pea crystals or as much larger crystals of hexagon shape. The latter, though cheaper, are a more active form of hypo. Extremely soluble in water, which dissolves nearly twice its weight of hypo. The solution becomes thereby chilled, so that it is better to use warm or hot water in dissolving hypo. Most acids and acid salts decompose hypo, giving rise to sulphurous acid (odour of burning sulphur) and to a yellowish deposit of sulphur in the solution. Sulphurous acid and its acid salts have not this effect on hypo. In photography hypo is used as a chemical solvent of the silver bromide or silver chloride in the emulsions of plates or papers. It is a much less active solvent of silver iodide. Hypo is also obtainable in the dry or anhydrous form, *i.e.*, without the 5 molecules of water of crystallisation. The dry variety is a white powder, which dissolves in water much more rapidly than the crystals. In fixing, 3 parts of the dry are equivalent to about 5 parts of the cryst.

**Iodine**, greyish violet flakes or plates of metallic lustre. It is insoluble in water but dissolves readily in alcohol. It is also readily soluble in a solution of potass iodide. By mixing the iodine flakes with about three times their weight of iodide crystals and adding just enough

water to cover the latter, the iodine dissolves at once, remaining in solution when adding further water. With starch iodine forms an intensely blue compound. Iodine stains on fingers, etc., disappear in hypo or sulphite.

**Lead acetate**, sugar of lead,  $\text{Pb}(\text{C}_2\text{H}_3\text{O}_2)_2 \cdot 3\text{H}_2\text{O}$ . Clear white crystals dissolving in  $1\frac{1}{2}$  times their weight of cold water; hot water should not be used. When using tap water, the solution will be slightly milky from formation of lead chloride, sulphate or carbonate. Slightly soluble in alcohol and soluble in glycerine.

**Liver of sulphur**, Potassa sulphurata, an impure form of potassium sulphide, containing small proportions of sulphate and carbonate of soda, hypo and polysulphide compounds. Sold in pieces of reddish-brown colour, very soluble in water.

**Mercuric iodide**, bi-iodide of mercury,  $\text{HgI}_2$ . Bright red powder insoluble in water, but dissolving readily in solution of potass iodide, hypo or soda sulphite. The solution in sulphite forms the Lumière mercury intensifier. Intensely poisonous.

**Mercury bichloride**, mercuric chloride, corrosive sublimate,  $\text{HgCl}_2$ . Heavy fibrous pieces or crystalline powder. One part requires 16 parts of cold water, but less than 2 parts of boiling water for solution. Much more soluble in cold water if hydrochloric acid or ammonium chloride is added. Very soluble in alcohol; less so in ether. The solutions are intensely poisonous and should on no account be allowed to come in contact with broken skin.

**Metol**, sulphate of methyl-par-amido-phenol. White crystalline

powder, readily soluble in cold water, but almost insoluble in alcohol or ether. Metol dissolves with some difficulty in sulphite solution. Hence, in making up developers, the metol should be dissolved before the sulphite.

**Nitric acid.**—Strongly corrosive and fuming liquid, mixing in all proportions with water. The commercial strong pure acid or 1.42 sp. gr. contains 71 per cent. of real acid,  $\text{HNO}_3$ . Nitric acid acts vigorously on almost all metals and metallic oxides and carbonates, dissolving them with formation of nitrates. It is a powerful oxidiser of organic substances. Burns the skin and clothes.

**Oxalic acid**, white crystals,  $(\text{H}\cdot\text{COOH})_2$ , dissolving in 10 parts their weight of cold water and in one-third their weight of hot water. Solutions made with ordinary tap water are milky from formation of oxalate of lime. On standing, the latter settles as a white deposit from which the almost clear solution can be poured off.

**Paramidophenol** (base).—Yellowish-white crystalline powder,  $\text{C}_6\text{H}_4\text{OHNH}_2$ . Very slightly soluble in cold water; dissolves more freely in hot water. Dissolves in alcohol; less soluble in ether. The hydrochloride of paramidophenol is a crystalline powder readily soluble in 4 or 5 times its weight of water. Its keeping properties are much better than those of the free base. Like the latter, it is used for making concentrated single-solution developers in conjunction with a caustic alkali.

**Potass bichromate**, bichromate of potash, potass dichromate, red chromate of potash,  $\text{K}_2\text{Cr}_2\text{O}_7$ . Large orange-red crystals

dissolving in about 14 parts of cold water; soluble in their own weight of hot water. By addition of ammonia the reddish orange colour of bichromate solution is changed to yellow, due to formation of mono or neutral chromate. Mixed with an acid, bichromate is a powerful oxidising agent. A saturated solution, mixed with about 1-20th of its volume of strong sulphuric acid, is a powerful cleanser of almost all kinds of dirt from bottles. It can be used repeatedly until exhausted.

**Potass bromide**, bromide of potash,  $\text{KBr}$ . Small colourless crystals, dissolving in  $1\frac{1}{2}$  times their weight of cold water; very slightly soluble in alcohol; soluble in 3 to 4 parts of glycerine.

**Potass carbonate**, carbonate of potash,  $\text{K}_2\text{CO}_3$ . Granular white powder which rapidly becomes moist by absorbing water from the air and must be kept closely stoppered. Dissolves in less than its own weight of cold water. The above refers to potass carbonate sold as "dry" or anhydrous. This is the variety to be used in photographic formulæ. The so-called "cryst" potass carbonate is of uncertain composition.

**Potass chloro-platinite**, protochloride of platinum and potassium,  $\text{K}_2\text{PtCl}_4$ . Small red crystals, dissolving in about 6 times their weight of cold water; insoluble in alcohol. The salt should contain nearly half its weight (46 per cent.) of platinum metal. Solutions should be made in distilled water and, with addition of a drop of hydrochloric acid, kept in well stoppered glass bottles.

**Potass cyanide**, cyanide of potash,  $\text{KCN}$ . Sold as white hard

pieces (fused), of qualities equivalent to 30 per cent., 40 per cent., and 90/95 per cent. real cyanide. The last (of highest strength) should be used. It is very soluble in water or alcohol. Cyanide is intensely poisonous, the solution should not be allowed to come into contact with broken skin. A further danger is the production of prussic acid vapour on addition of an acid to cyanide solution. Cyanide is a powerful solvent of silver bromide and silver chloride and also of silver iodide, but its perceptible solvent action on the developed silver image makes it a less desirable fixing agent than hypo.

**Potass ferricyanide**, red prussiate of potash,  $K_3FeC_6N_6$ . Deep ruby red crystals, usually covered with a slight reddish coating. It is best to rinse the crystals in water before dissolving them; they are then seen to be clear ruby red. Ferricyanide dissolves in  $2\frac{1}{2}$  times its weight of cold water, forming a yellowish brown solution if strong; greenish yellow, if weak. The solution does not keep very well; it should be kept in the dark. The keeping quality is improved by dissolving some ordinary salt along with the ferricyanide.

**Potass ferrocyanide**, ferrocyanide of potash, yellow prussiate of potash,  $K_4FeC_6N_6 \cdot 3H_2O$ . Large lemon-yellow crystals, dissolving in  $3\frac{1}{2}$  times their weight of water. Insoluble in alcohol. By addition of an acid, solutions of ferrocyanide slowly give off slight fumes of the intensely poisonous prussic acid gas.

**Potass iodide**, iodide of potash, KI. Small white crystals, dissolving in less than their own

weight of water. Slightly soluble in alcohol. Changes in the light, becoming slightly yellow. This is immaterial for its chief use in photographic work viz., dissolving iodine.

**Potass metabisulphite**,  $K_2S_2O_5$ . White crystals which should be transparent, but usually have a slight incrustation, rendering them opaque. Dissolves fairly readily in cold water forming an acid solution smelling of sulphurous acid. Due to its acid nature, potass metabisulphite neutralises its own weight of cryst soda carbonate, half its weight of caustic potash, one-third its weight of caustic soda, or three-tenths its weight of dry potass carbonate. Is partially decomposed by hot water, which should not be used for dissolving it.

**Potass oxalate**, neutral oxalate of potash,  $K_2C_2O_4 \cdot H_2O$ . Colourless crystals dissolving in three times their weight of cold water; much more soluble in hot water. When dissolved in tap water, containing lime there is a considerable deposit of calcium oxalate. This settles in a few hours, when the almost clear solution can be poured off.

**Potass permanganate**, permanganate of potash,  $K_2Mn_2O_8$ . Small purple red crystals of metallic lustre. About 16 parts of cold water are required to dissolve 1 part of the crystals, but a strong solution is much more quickly made in hot water. The solution stains fingers, etc., a deep brown; the stain can be removed with a solution of metabisulphite or of oxalic acid, or by rubbing with crystals of these substances. A solution of permanganate, especially if made acid with sulphuric acid, instantly removes developer and

other stains from dishes. It leaves its brown stain, which is cleared off with metabisulphite or oxalic acid.

**Pyrogallie acid**, pyrogallol, tri-hydroxy-benzene,  $C_6H_3(OH)_3$ . Obtainable in two forms—(1) sublimed, fine feathery crystals, an ounce by weight of which occupies about 10 ozs. bulk, (2) crystallised, much denser, of about 1-10th the bulk. The properties of the two forms are the same. Extremely soluble in water and alcohol. The solution in water oxidises very rapidly and cannot be kept except with the aid of preservatives, such as sulphites, nitric acid, etc. When making up developers, the pyro should be added *after* these preservatives have been mixed with the water.

**Silver nitrate**, nitrate of silver,  $AgNO_3$ . Transparent or semi-transparent colourless flat crystals, dissolving in less than half their weight of water. To make a clear solution, distilled water must be used; the chlorides in most tap waters cause a milkiness. Solutions should be kept in glass-stoppered bottles in the dark. Silver nitrate causes intense brown or black stains on fingers or clothes; these can be removed by rubbing with tincture of iodine followed by strong solution of hypo.

**Sodium acetate**.—Colourless transparent crystals,  $NaC_2H_3O_2 \cdot 3H_2O$ , dissolving in less than three times their weight of cold water. Much more soluble in hot water.

**Sodium bicarbonate**, bicarbonate of soda,  $NaHCO_3$ . By grocers bicarbonate is sold as "carbonate of soda." Fine white powder requiring about 11 times its weight of cold water for solution. In hot water it is

partially decomposed, forming ordinary soda carbonate. Bicarbonate is very feebly alkaline, but neutralises acids. For this reason it is used in hypo baths for the fixation of self-toning papers; the bicarbonate neutralises the acid from the papers, without, however, making the fixing bath strongly alkaline.

**Sodium bisulphite**,  $NaHSO_3$  is obtainable in the solid state, but more readily as a solution called soda bisulphite lye of average density, 36 deg. Baumé (=1.33 sp. gr.). This is a colourless or pale yellow liquor which can be used instead of soda sulphite. But unlike sulphite it is acid, neutralising a certain proportion of the alkali of a developer.

**Sodium carbonate**, i.e. carbonate of soda, sold in two forms, crystal,  $Na_2CO_3 \cdot 10H_2O$ , and dry or anhydrous,  $Na_2CO_3$ . Washing soda is a somewhat impure form of cryst soda carbonate, which, for photographic use, should be in small clear crystals dissolving in water to a perfectly clear solution. The "dry" carbonate is a coarse powder which actively absorbs water, and must be kept well stoppered. One part of the dry carbonate is equivalent to slightly more than  $2\frac{1}{2}$  parts of the cryst, e.g., in making up a developer .37 oz. (=160 grs.) of the dry is to be used in place of 1 oz. of the cryst and *vice versa*. The dry carbonate dissolves in about 6 times its weight of cold water; the cryst in  $1\frac{1}{2}$  times. In the United States another strength of soda carbonate is commonly used as "monohydrated." It is  $Na_2CO_3 \cdot H_2O$ , containing 85 per cent. dry or anhydrous carbonate. 1 oz. of

this monohydrated carbonate is equivalent to  $2\frac{1}{4}$  ozs. of soda carbonate cryst. or 1 oz. of the latter to .43 oz. (190 grs.) of the desiccated.

**Sodium phosphate**, i.e., phosphate of soda, di-sodium phosphate, neutral phosphate of soda,  $\text{Na}_2\text{HPO}_4 \cdot 12\text{H}_2\text{O}$ . Large clear colourless crystals dissolving in about 7 times their weight of cold water. The solution is faintly alkaline.

**Sodium sulphide**.—The pure substance is in small colourless crystals,  $\text{Na}_2\text{S} \cdot 9\text{H}_2\text{O}$ , which rapidly become moist by exposure to the air. Exceedingly soluble in water. Commercial soda sulphide is similar except that it is yellowish in colour. By many workers the "commercial" and much cheaper sulphide is preferred for the darkening bath in sepia toning. Soda sulphide keeps well in strong solution, e.g., of 20 per cent. strength, but rapidly oxidises in a weak solution. This is why the working bath in sepia toning should be made up at the time of use by mixing a little strong sulphide solution with the required quantity of water.

**Sodium sulphite**, i.e., sulphite of soda,  $\text{Na}_2\text{SO}_3 \cdot 7\text{H}_2\text{O}$ . This cryst sulphite should be in clear crystals, which should be kept well corked, otherwise they become dull and powdery from partial oxidation. Sulphite which has become slightly encrusted may be rinsed for a few seconds in a measure with enough cold water to cover it, the water poured away, and the crystals dried on a clean cloth for weighing out. Cryst sulphite is most soluble in water at about 100 deg. F., about as hot as the hand can comfortably bear.

Dry or anhydrous sulphite.  $\text{Na}_2\text{SO}_3$  is a white powder which dissolves in water more readily than the cryst. One part of it is equivalent to 2 parts of the cryst.

**Starch**.—Fine white powder,  $\text{C}_{10}\text{H}_{10}\text{O}_5$ , which is insoluble in cold water, but in boiling water forms a kind of solution which, if strong, is a fairly stiff jelly or paste (starch mountant). Pure starch powder should be used for making mountant, not the granular laundry starch.

**Sulphuric acid**.—Thick highly corrosive heavy liquid of 1.84 sp. gr., containing 98 per cent. of the real acid,  $\text{H}_2\text{SO}_4$ . This strong acid absorbs water rapidly from the air, becoming thereby weaker. When mixed with water, great heat is developed. The acid should always be added to the water. If water is added to the acid, the great heat may crack the vessel, and throw out part of the contents with almost explosive violence.

**Sulphurous acid**, solution in water of the gas  $\text{SO}_2$ . The saturated solution has sp. gr. of 1.046, equivalent to 9.5 per cent. sulphurous acid,  $\text{H}_2\text{SO}_3$ , but it rapidly loses strength by escape of  $\text{SO}_2$  and by oxidation.

**Tartaric acid**.—Dry white crystals.  $(\text{CH}_2\text{COOH})_2$  soluble in less than their own weight of cold water, sparingly soluble in alcohol or ether, but freely soluble in glycerine.

**Thiocarbamide**, thio-urea, sulpho-carbamide,  $\text{CS}(\text{NH}_2)_2$ . Small colourless crystals requiring about 11 parts of their weight of cold water for solution, very soluble in hot water and in alcohol. In solution with an acid thiocarbamide removes developer stain.

# MISCELLANEOUS INFORMATION.

## Copyright in Photographs.

1. Copyright (the right to copy in any form) subsists in photographs because such right is recognised as a species of property by the law of England (and of most other countries).

In Great Britain, the law is embodied in the Copyright Act of 1911 (H.M. Stationery Office, Kingsway, London, 3d.) which came into force July 1, 1912.

2. The Copyright Act has been adopted (in some cases with alteration) by the Dominions of Canada and New Zealand, Union of South Africa and Commonwealth of Australia. Copies of the Acts may be obtained from the offices of the respective governments in Ottawa, Dunedin, Pretoria and Canberra. The effect of these Acts is that copyright created in Great Britain extends to those parts of the British Empire.

3. Copyright is created by the mere act of taking the photograph. There is nothing else that should or can be done. It is not necessary to mark photographs "Copyright" in order to create or maintain the copyright in them. There must be copyright in every photograph that is taken, and the copyright must belong to some person.

4. Copyright is the "sole right to produce or reproduce the photograph or any substantial part thereof in any material form whatsoever."

5. Copyright in photographs

lasts for 50 years from the making of the original negative.

6. Anything which is not itself copyright may be photographed, and the photograph will be copyright. This applies to people's faces (taken with or without their permission), any scene or landscape, works by the Old Masters of paintings—anything which is *not* a painting, drawing, or other work in which there is copyright. But note:

(a) You may take a photograph from an unusual point of view and of course obtain copyright in your picture. But anyone else may afterwards photograph the scene from the same standpoint, and he obtains copyright in *his* picture.

(b) A photographic copy of an Old Master is itself copyright, if it is made by photographing the original, but a photograph of another photograph of the original would (most probably) be an infringement of the copyright in the latter and, therefore, would not be entitled to copyright.

7. Although there is copyright in "architectural works of art" (buildings), the taking of photographs of such buildings is specially permitted by the Act. The same applies to works of sculpture if "permanently situate in a public place."

8. Copyright in a photograph includes copying in another style, *e.g.*, as a drawing in line or wash or in colours, or as an etching, or larger or smaller.

Moreover, the copy need not be exact to be unlawful. It may be different, but if it is a "colourable imitation," *i.e.*, recognisable as having been made from the photograph, it is unlawful.

9. The copying of part of a photograph, *e.g.*, a face in a group, is also unlawful.

10. Anyone who takes a photograph "on his own," *viz.*, not to the order of anyone, nor as an employee of somebody, automatically becomes the owner of the copyright.

11. But if the photograph is ordered and is made "for valuable consideration" in pursuance of the order, the copyright automatically becomes the property of the person giving the order; or of the employer, if made by an employee in course of his employment.

12. The copyright continues to be the property of the customer, even though he fails to pay. The photographer is not entitled to take the copyright because the customer hasn't paid. The two things are distinct.

13. Although not the subject of copyright law, the negatives which a photographer makes in executing an order, by common law and long trade custom, are his property, unless in the first instance he contracted to surrender them. But they cannot be used for any purpose except as the customer directs or permits.

14. The copyright in a photograph may be sold outright or piecemeal (*i.e.*, for various limited purposes), but any such transfer is not valid unless in writing.

For example, a photographer may tell a sitter who has come

in the usual way that he will charge less if he obtains the copyright. Both parties may agree to this arrangement, but unless a sitter signs a form of words to this effect, he or she is (and continues to be) the owner of the copyright.

15. Any copying or reproduction of a photograph without the permission of the owner of the copyright is an infringement of the latter. It is also an infringement for anyone to sell or show for sale copies that they know to be infringements.

16. When a photograph has been published without permission, the infringer should be asked what compensation he will make—not asked for a particular sum. It is usual to accept twice the fee which would have been charged in the first instance. Anyone concerned in reproducing photographs may be expected to know that there must be copyright in every photograph of recent date. His only defence is that he had permission from someone he thought to be the owner of the copyright.

17. In any action for infringement, the plaintiff is assumed to be the owner of the copyright; it is left to the defendant to show that he is not.

18. Copyright created in Great Britain or in British Dominions also extends to all the countries subscribing to the International Copyright Convention, *viz.*, to the chief countries of the world, with exception of the United States of America and Soviet Russia. According to the Convention, a resident national of any country observes the formalities in his country (none in Great Britain), and obtains in all the other

countries the degree of protection granted to their nationals. As a consequence of this Convention, the rights in photographs by people of almost every nationality must be respected in almost every country.

19. As regards the United States, there are various special reciprocal agreements between the U.S. and a number of countries, according to which those who are not American citizens can obtain copyright in the United States by observing the formalities in force there, *viz.*, registration of the photographs in Washington and marking of prints to show that they are copyright. (Particulars from the U.S. Registrar of Copyrights, Washington). Reciprocally, American citizens obtain copyright in Great Britain and in the other countries which have entered into this arrangement.

### Reproduction Fees.

According to an agreement concluded in June 1929 between associations representing London and provincial newspapers and the Proprietors Association of Press Photographic Agencies the minimum fees payable for the reproduction of photographs are as follows:—

#### LONDON.

Stamp-heads. Up to	
2½ sq. ins. ...	12s. 6d.
Portraits up to 15 sq. ins. ...	15s. 0d.
Any picture up to 30 sq. ins. ...	17s. 6d.
Any picture over 30 up to 50 sq. ins. ...	27s. 6d.
Any picture over 50 up to 80 sq. ins. ...	42s. 0d.
Any picture over 80 sq. ins. ...	90s. 0d.

#### PROVINCES.

The fees for first publication of photographs in Provincial or Scottish morning, evening or Sunday newspapers shall be:—

Stamp-heads. Up to	
2½ sq. ins. ...	7s. 6d.
Any picture other than a stamp-head up to 50 sq. ins. ...	10s. 6d.
Any picture over 50 up to 80 sq. ins. ...	15s. 0d.
Any picture over 80 sq. ins. ...	17s. 6d.

Reprints (for photographs reproduced on or after January 1st, 1929):—

#### LONDON.

Stamp-heads ...	7s. 0d.
Pictures of any larger size ...	8s. 6d.

#### PROVINCES.

Stamp-heads ...	5s. 0d.
Up to 25 sq. ins. ...	6s. 0d.
Over... ..	7s. 6d.

The newspapers have offered similar terms to photographers in general except that *all* photographs supplied previous to and after October 1st, 1929, are subject to above reprint rate.

Weekly newspapers such as the *Sphere* pay a minimum fee of 10s. 6d. not exceeding 3 sq. ins.

14s. 0d. between 3 and 12 sq. ins.	
17s. 6d. .. 12 and 30 .. "	
30s. 0d. .. 30 and 60 .. "	
60s. 0d. .. 60 and 90 .. "	
100s. 0d. over 90 sq. ins.	

Other weekly publications (not trade papers) pay:—

10s. 6d. not exceeding 3 sq. ins.	
14s. 0d. between 3 and 30 sq. ins.	
25s. 0d. .. 30 and 60 .. "	
50s. 0d. .. 60 and 90 .. "	
90s. 0d. over 90 sq. ins.	

Trade papers pay:—

10s. 6d. not exceeding 30 sq. ins.	
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21s. 0d. between 30 and 60 sq. ins.  
 42s. 0d. " 60 and 90 " "  
 84s. 0d. over 90 sq. ins.

Minimum rates for photographs for advertisements, use on calendars, picture postcards, etc.

#### ADVERTISEMENTS IN NEWSPAPERS AND PERIODICALS.

Where a single photograph is supplied to be used in not more than three insertions of an advertisement, a minimum fee of £1 1s. is to be charged per insertion.

Where more than one photograph is supplied by the same firm for use in not more than three insertions of the same advertisement, a minimum fee of 10s. 6d. is to be charged for each insertion of each photograph after the first photograph, the first photograph being charged at a minimum fee of £1 1s. per insertion.

Where a single photograph is supplied to be used in more than three insertions of an advertisement, a minimum fee of £3 3s. to be charged.

Where more than one photograph is supplied by the same firm for use in more than three insertions of the same advertisement, a minimum fee of £1 11s. 6d. is to be charged for each photograph, the first being charged at £3 3s. 0d.

#### USE ON CALENDARS, PICTURE POSTCARDS, CHRISTMAS AND GREETING CARDS AND VALENTINES.

*Calendars.*—A minimum fee of £2 2s. per photograph, with exclusive calendar use for one year. If supplied without exclusivity, a minimum fee of 10s. 6d. to be charged for each photograph.

*Picture Postcards.*—A minimum fee of 10s. 6d. per photograph.

*Christmas and Greeting Cards and Valentines.*—A minimum fee of 10s. 6d. per photograph.

*Cigarette Stiffeners.*—A minimum fee of 10s. 6d. per photograph, up to a minimum of 25 subjects.

*Advertising Posters.*—Up to single crown size, a minimum fee of £2 2s.; double crown, minimum fee of £3 3s.; 16-sheet poster, minimum fee of £10 10s.; 48-sheet poster, minimum fee of £21 0s.

### Factory Acts.

Premises in Great Britain where persons are employed in photographic work come within the regulations of the Factory and Workshops Act, 1901 (H.M. Stationery Office, 2s.). The Act does *not* apply to premises where assistants are *not* employed (one-man businesses).

Premises are classified as "factories" (places where mechanical power, including electric, is used) and "workshops" (places where power is *not* used.) The Act applies to both. Thus dark-rooms, printing-rooms are "workshops" but if fitted with power-driven apparatus (e.g., drying machines, washers) are "factories."

The Act regulates hours and conditions of employment (as regards hygiene and safety) and requires particulars to be kept in a prescribed Register, as to the "young persons" employed and dates of periodical painting or lime-washing. Any accidents must be reported to the Inspector for the district.

H.M. Factory Inspectors are to a large extent technical experts

and it is always well to welcome their inspection and to invite their approval beforehand of new premises or changes in existing workshops.

Although not stated in the Act, the studio of a portrait photographer is *not* regarded administratively as coming under the Act, but studios of commercial photographers and photo-engravers are subject to the Act.

The following are the principal requirements which apply to photographic premises.

*Notices.*—There shall be displayed on the premises, so as to be read by employees, an abstract of the Factories and Workshops Act, name and address of district Inspector and particulars of the day and time of the weekly half-holiday. A General Register must also be kept of the particulars of "young persons" (males and females over 14 and under 18 years of age) employed. Particulars of the painting or lime-washing of workrooms must also be entered in the Register, and also details of any accident occurring to persons employed. The Register must be kept available and produced when demanded by the Inspector.

*Hours of Employment.*—There is no restriction as to the employment of men—including males over 18 years of age. Permissible hours of employment for women and young persons for full days are 6 a.m. to 6 p.m., 7 a.m. to 7 p.m., or 8 a.m. to 8 p.m., with 1½ hours interval for meals, of which at least 1 hour shall be before 3 p.m. On Saturdays (or other day appointed as half-holiday,) 6 a.m. to 2 p.m., 7 a.m. to 3 p.m., or 8 a.m. to 4 p.m.

with half an hour interval for meals. Times of employment and meals must be stated on the abstract affixed in the works.

*Overtime.*—In certain trades, classed as "seasonal," the period of employment of women on full days may be 2 hours longer than stated above on not more than 30 days in the year, with 2 hours interval for meals. At present photography is *not* classed as a seasonal trade under the Act.

*Sundays.*—A woman, young person, or child shall not be employed on Sunday, but there is no restriction for men.

*Young persons* (see above) must be certified (by the certifying surgeon appointed under the Act) as fit for employment. This is done by the Surgeon signing the General Register. The name and address of the Certifying Surgeon are shown on the Abstract of the Act, or may be obtained from the Factory Inspector. A nominal fee is chargeable by the Surgeon.

*Accidents* must be reported to the Inspector if such as to incapacitate an employee from following his ordinary occupation for 5 hours on any one of the three working days next after the occurrence of the accident.

*Hygiene and Safety.*—The Act requires sufficient cubic space, e.g., 250 cub. ft., per employee, reasonable temperature and ventilation and precautions against fire in premises: also the fencing of any moving part of a machine considered dangerous to employees. Precautions against fire apply particularly to the handling of celluloid films and plates, where smoking, use of naked lights, etc., should be prohibited. The possibility of

fire is greatest in the handling of roll-film. Fires from stocks of the thicker cut or portrait film negatives when stored with observance of due precautions (see below) are of rare occurrence.

*Special Regulations.* — In places where celluloid in the form of roll-film or cut film is used the Celluloid Regulations are operative (see below). These include fire-resisting storage, prohibition of naked lights and other sources of ignition unless adequately protected, no smoking in work-rooms and particularly easy means of exit, all workroom doors opening outwards or sliding. The Inspector should be consulted and his advice asked for on these matters. The Cinematograph Film Regulations do not apply to still photographic work nor to the manipulation of non-flam film.

### Storage of Celluloid.

In Great Britain the storage of celluloid in the form of sensitive film or celluloid negatives is subject to the regulations set forth in "Statutory Rules and Orders, 1921, No. 1825" (H.M. Stationery Office, London, Edinburgh, Manchester, Cardiff and Belfast, price 1d.) under Section 79 of the Factory and Workshop Act.

A memorandum prepared specially for the information of professional photographers on the storage of celluloid on premises to which the Factory and Workshops Acts apply is obtainable from the Home Office, Whitehall, London, S.W. 1.

As regards sensitive films kept on premises in quantity which as a rule does not exceed 14 lbs. storage in a drawer or cupboard

in a private office or other room in which no handling of celluloid is done is officially regarded as complying with the requirement for "safe storage."

The regulations in respect to developed negatives will depend to some extent on the amount of such negatives. Where the latter are of considerable weight, they require to be kept in a fire-resisting store, such as a cabinet or cupboard constructed of fireproof material, *e.g.*, sheet metal, asbestos sheeting, or wood effectively treated to resist flame. This store requires to be of sound construction and is to be kept locked. The door or lid needs to be so arranged that there is no naked light or open fire near at hand. The store should not be situated in a work-room where celluloid is handled nor on a stair, nor near a door, nor in a passage through which persons might have to pass to escape in the event of a fire. The nature of the contents should be clearly marked on the outside of the store, and a cautionary notice put up prohibiting the use of naked lights. An adequate supply of buckets of water should be kept always available close outside the store, water being the best extinguisher of celluloid.

The foregoing recommendations are for general guidance and are subject to modification, according to the quantity of celluloid, or on account of the design of the building or nature of the processes, at the discretion of the District Inspector of Factories.

Premises may be exempted from the above regulations on the authority of the Chief Inspector of Factories, Home Office, Whitehall, London, S.W. 1.

## The Shops Acts.

(Great Britain.)

Under the Shops Acts of 1911 and 1912, the parts of a photographer's premises in which goods are sold to the public is a "shop." As such, it must be closed one half-day in each week from 1 p.m. unless exempted on certain grounds.

It has, however, been held that a photographer may admit sitters to his establishment on the weekly half-holiday by previous appointment, but must not keep the "shop" open so that chance passers-by may enter.

In holiday resorts the half-day closing each week may be suspended for the whole or part of the season.

Assistants in a "shop," that is to say receptionists and others who take orders from customers, or despatch goods, are entitled under the Act each week to one half-day holiday beginning not later than 1.30. The half-holiday may be on the half-day closing day or on another day of the week. The employer is required to put up a notice in his shop stating the days when his assistants are to have their half-holiday.

In holiday resorts in which an Order allowing shops to keep open during the holiday season on the weekly half-holiday is in force, an employer who satisfies the local authority that he gives his assistants a holiday on full pay of not less than two weeks during the year and posts a notice to that effect in his shop, need not give his assistants a half-holiday

during the time the Order is in operation.

The Shops Acts are administered by local authorities: applications for information on particular points should be addressed to the town council, urban or rural council in the photographer's district.

## Registration of Business Names.

(Great Britain.)

Under the Registration of Business Names Act, 1916, it is required that persons who carry on a business in Great Britain under a name which is not their true name or the name by which they have always been known shall register the business with the Registrar of Business Names and shall comply with certain regulations prescribed by the Act.

Under the Act it is required that a person or partnership shall register if the "business name" includes any addition to the name of the person or names of partners. Thus Joseph Jones need not register if he trades as "Jones" or as "J. Jones," but if he trades as "Jones & Co." he must register. Similarly two partners, J. Jones and F. Jones, are required to register if trading as "Jones Bros."

The Act applies to those of British nationality as well as to aliens.

Also every individual or firm who, or a member of which, has either before or after the passing of the Act changed his name is required to register. But this provision does not apply to a woman who has changed her name by marriage.

The cost of registration is 5s. Offices of the Registrars are: England and Wales, Princes House, 37 Kingsway, W.C. 2; Scotland, Exchequer Chambers, Parliament Square, Edinburgh; Northern Ireland, 15 Donegal Square West, Belfast; Irish Free State, Coleraine House, Dublin.

Registered firms are required to exhibit the certificate of registration in a conspicuous place in their premises.

Registered firms are also required to state in legible characters in all trade catalogues, trade circulars, show cards and business letters, on which the business name appears, the present christian name, or initial and present surname of the individual proprietor; and those of all partners, in the case of businesses belonging to more than one person.

If the individual 'proprietor' or partners are not of British nationality, the nationality must also be stated on such business stationery; and if there has been a change of nationality, the original nationality must also be stated.

Fines not exceeding £5 may be inflicted for failure to register, or non-observance of the provisions relating to publication of names or nationality.

Photographers who come within the Act are not required to publish their true name on the photographs, postcards, etc., which they supply.

## Passport Photographs.

The space provided for photographs on British passports measures  $2 \times 2\frac{1}{4}$  inches. Photographs require to be unmounted and to be made preferably on paper of thin substance, allowing of ready mounting on the page of the passport.

## Exhibitions.

The chief exhibitions held in England are:—

*Royal Photographic Society.* Pictorial and technical. September-October. Secretary: H. H. Blacklock, 35, Russell Square, London, W.C.

*London Salon.* Pictorial only. September-October. The Secretary, 5A, Pall Mall East, London.

*Northern.* Pictorial and technical. Organized by Bradford P.S. or Manchester A.P.S.

*Scottish Salon.* Pictorial only. January or February. Organized by Scottish Photographic Federation.

*Midland.* Chiefly pictorial. September or October. Organized by Midland Counties Federation.

### *In France.*

*Paris Salon.* Pictorial only. October. Société Française de Photographie.

**Text-Books.**

Those of the books in the following list which are still in print are obtainable by order from all photographic dealers. But a very large number are now out of print, though obtainable, in many cases, from dealers in second-hand books.

**Elementary and General.**

- Photography, Theory and Practice.* L. P. Clerc. Ed. George E. Brown. 35s.  
*The Art of the Photographer.* E. Drummond Young. 21s.  
*First Aid to the Amateur Photographer.* Will R. Rose. 2s. 6d.  
*Amateur Photography.* F. T. Beeson and A. Williams. 2s. 6d.  
*Photography Made Easy.* R. Child Bayley. 3s.  
*Ilford Manual of Photography.* New edition. 2s.  
*Sinclair Handbook of Photography.* 1s. 6d.  
*All about Photography.* P. R. Salmon. 2s. 6d.  
*Barnet Book of Photography.* 3s.  
*The Photographic Instructor.* J. I. Pigg. 4s.  
*A Primer of Photography.* Capt. Owen Wheeler. 3s. 6d.  
*Photographic Technique.* L. G. Hibbert. 2s. 6d.  
*Photography: Principles and Practice.* C. B. Neblette. 30s.  
*Instruction in Photography.* W. de W. Abney. 7s. 6d.  
*Dictionary of Photography.* E. J. Wall. 7s. 6d.  
*The Complete Photographer.* R. Child Bayley. 15s.  
*Photography: Principles and Applications.* A. Watkins. 10s. 6d.  
*History of Photography.* W. Shepperley. 10s. 6d.  
*Photographic Facts and Formulas.* E. J. Wall. 16s.  
*Photography as a Business.* Arthur G. Willis. 5s.

*Photography as a Scientific Implement.* 30s.

*The Camera as Historian.* H. D. Gower, L. Stanley Jast, and W. W. Topley. 6s.

**Optics and Chemistry.**

- Fundamentals of Photography.* C. E. K. Mees. 4s.  
*Camera Lenses.* A. Lockett. 2s. 6d.  
*Photographic Lenses.* Conrad Beckand Herbert Andrews. 1s.  
*The Optics of Photography and Photographic Lenses.* J. Traill Taylor. 3s. 6d.  
*Soft-focus Lenses.* (No. 184 of *Photo-Miniature.*)  
*Modern Telephotography.* Capt. Owen Wheeler. 1s. 6d.  
*Telephotography.* C. F. Landavis. 3s. 6d.  
*Photographic Chemicals and Chemistry.* T. L. J. Bentley and J. Southworth. 3s. 6d.  
*The Chemistry of Photography.* R. Meldola. 6s.  
*Photographic Researches of Hurter and Driffield.* W. B. Ferguson. 25s.

**Special Branches.**

- Studio Portrait Lighting.* Herbert Lambert. 15s.  
*Commercial Photography.* D. Charles. 10s. 6d.  
*Complete Press Photographer.* Bell R. Bell. 6s.  
*Infra-Red Photography.* S. O. Rawling. 3s. 6d.  
*The Real Pictorialism.* F. C. Tilney. 1s.  
*Pictorial Composition in Photography.* Arthur Hammond. 15s.  
*Principles of Photographic Pictorialism.* F. C. Tilney. 25s.  
*Photographic Amusements.* F. R. Fraprie and W. E. Woodbury. 15s.  
*Photography on Tour.* 6d.

- The Portrait Studio. Practicus of the B.J.* 1s.  
*Studio Construction.* (No. 182 of *Photo-Miniature.*)  
*Portraiture, Parts I and II.* F. C. Tilney. 1s. each.  
*Lighting in Photographic Studios.* P. C. Duchochois. 1s. 6d.  
*The Studio, and what to do in it.* H. P. Robinson. 3s. 6d.  
*Flashlight.* J. J. Curtis. 1s.  
*Magnesium Light Photography.* F. J. Mortimer. 1s. 6d.  
*Reflex Cameras.* (No. 151 of *Photo-Miniature.*)  
*Photography of Moving Objects and Hand-camera work for Advanced Workers.* Adolphe Abrahams. 1s. 6d.  
*How to Make Good Pictures.* (Kodak.) 2s.  
*Nature Photography for Beginners.* E. J. Bedford. 7s. 6d.  
*Stereoscopic Photography.* A. W. Judge. 15s.  
*Photo-micrography.* E. J. Spitta. 12s.  
*Aerial Photography.* C. Winchester and F. L. Mills. 25s.  
*Airplane Photography.* H. E. Ives. 18s.  
*Modern Miniature Cameras.* R. M. Fanstone. 3s. 6d.  
*Photographs for the Papers.* John Everard. 2s. 6d.  
*Free-lance Journalism with a Camera.* R. H. Mallinson. 2s. 6d.  
*X-rays.* W. Schell. 7s. 6d.

### Negative Processes.

- The Wet Collodion Process.* Arthur Payne. 3s.  
*Collodion Emulsion.* H. O. Klein. 5s.  
*Photographic Emulsions.* E. J. Wall. 21s.  
*Perfect Negatives.* Dr. B. T. J. Glover. 1s.  
*The Photography of Coloured Objects.* C. E. K. Mees. 2s. 6d.

- Photographic Rendering of Colour in Monochrome.* B. T. J. Glover. 1s.  
*The Watkins Manual (of exposure and development).* Alfred Watkins. 1s. 3d.  
*The Photographic Darkroom.* E. J. Wall. 6s.  
*Intensification and Reduction.* E. J. Wall. \$1.  
*Retouching and Finishing for Photographers.* J. Spencer Adamson. 4s.  
*Art of Retouching.* Robert Johnson. 12s. 6d.

### Printing Processes.

- Pigment Printing.* G. L. Hawkins. 21s.  
*Photographic Printing, Commercial and Professional.* R. R. Rawkins. 3s. 6d.  
*Photographic Printing Processes.* Owen Wheeler. 8s. 6d.  
*Print Perfection.* Dr. B. T. J. Glover. 1s.  
*Toning Bromide Prints.* R. Blake Smith. 1s. 6d.  
*Enlarging for All.* Dr. B. T. J. Glover. 1s.  
*Carbon Printing.* E. J. Wall. 1s. 6d.  
*Bromoil and Bromoil Transfer.* L. G. Gabriel. 7s. 6d.  
*Bromoil Printing and Transfer.* Dr. E. Mayer. \$2.50.  
*Bromoil and Old Prints.* Jas. A. Sinclair. 2s.  
*The Art of Pigmenting.* Bertram Cox and F. C. Tilney. 1s.  
*Oil, Bromoil and Transfer.* Fred Judge and F. C. Tilney. 1s.  
*Expression in Pigmenting.* F. C. Tiiney. 1s.  
*Oil and Bromoil Processes.* F. J. Mortimer and S. L. Coulthurst. 1s. 6d.  
*Oil and Bromoil Printing.* (No. 106 of *Photo-Miniature.*)  
*Perfection in the Pigment Processes.* Chris. J. Symes. 1s.

*Kallitype Processes.* (No. 185 of *Photo-Miniature.*)

*Blue Printing and Modern Plan Copying.* B. J. Hall. 6s.

*Photographic Enamels.* René d'Heliecourt. 1s. 6d.

*Treatise on the Air-brush.* S. W. Frazer and G. F. Stine. 12s. 6d.

### Lantern and Cinematograph.

*Optical Projection.* R. S. Wright. 4s. 6d.

*Lantern Slides.* Dr. B. T. J. Glover. 1s.

*Practical Slide-making.* G. T. Harris. 1s. 6d.

*Living Pictures.* R. B. Foster. B.Sc. 6s.

*Commercial Cinematography.* G. H. Sewell. 7s. 6d.

*The Guide to Kinematography.* Colin N. Bennett. 10s. 6d.

*Amateur Cinematography.* Capt. Owen Wheeler. 6s.

*Cine-Photography for Amateurs.* J. H. Reyner. 10s. 6d.

*Film - Play Production for Amateurs.* G. H. Sewell. 5s.

*Cinematography and Talkies.* J. R. Cameron and J. A. Dubray. \$4.

*Amateur Talking Pictures and Recording.* Bernard Brown. B.Sc. 7s. 6d.

### Process Work.

*Ilford Manual of Process Work.* L. P. Clerc. 7s. 6d.

*Modern Illustration Processes.* Charles W. Gamble. 12s. 6d.

*Horgan's Half-tone and Photo-mechanical Processes.* S. H. Horgan. 12s. 6d.

*Photo-mechanical Processes.* W. T. Wilkinson. 4s.

*Elements of Photogravure.* C. N. Bennett. 5s.

### Colour Photography.

*Colour Photography.* Capt. Owen Wheeler. 12s. 6d.

*Practical Colour Photography.* E. J. Wall. 15s.

*Natural-Colour Photography.* Dr. E. König. 3s.

*Bye-Paths of Colour Photography.* "O. Reg." 5s.

*The Technique of Colour Photography.* F. R. Newens. 4s. 6d.

*The History of Three-Colour Photography.* E. J. Wall. \$15.

### Trade Booklets.

The following booklets of technical information are issued by the under-mentioned firms in the photographic trade. Except where otherwise stated, the booklets are sent post free to any applicant.

#### Adhesive Dry-Mounting Co.

Dry-Mounting.  
Border Tints.

#### Agfa, Ltd.

Flashlight Photography.  
Rodinal Developer.  
Development in Bright Light (Desensitising).  
Roll-films, Flat Films and Film-packs.  
Agfa Colour Plates (Working Instructions).  
Agfa Photo Papers.  
Agfa Photography.  
Agfa Filters.  
Infra-red Photography.  
Agfa Novopan Reversible Film.  
Agfacolor Ciné Film.  
Photographic Materials for Reproduction Work.

#### Aldis Bros.

Aldis Bros. and their Productions.  
Aldis Lenses.

#### Autotype Co., Ltd.

Photo-litho Transfer Papers.  
The Carbon Process.  
The Carbro Process, working instructions.  
The Autotype Photo Stencil Process.  
Trichrome Printing by the Autotype Carbro Process.



**Burroughs Wellcome & Co.**  
 Holiday Photography.  
 Time Tables for Film Tank  
 Development.

Colours on Development  
 Papers and Lantern Slides  
 Colours on Lantern Slides by  
 Development.

Prints in Colour  
 "Tabloid" Photographic  
 Chemicals.

Colour Photography  
 Fine Grain Development.  
 "Tabloid" Densensitiser.

**J. H. Dallmeyer, Ltd.**

The Eye of the Camera.  
 Why a Telephoto?  
 Lenses for Amateur Cinematography.

Dallmeyer Lenses.  
 How Lenses are Made  
 Dallmeyer Lenses and Apparatus  
 for Cinema Work.

What's in a Name?  
 Photography Simplified (The  
 Dallmeyer Snapshot Camera)  
 Dallmeyer Lenses for Leica  
 Cameras.

**Elliott & Sons, Ltd.**

How to make Snapshots that  
 Sell.

**Finlay Processes.**

Finlay Colour Photography (6d).

**Gevaert, Ltd.**

Vittex Paper.  
 X-ray Films.  
 Amateur Cine with Gevaert  
 16-mm. Film.

Graphic Plates and Films.  
 Photographic Papers for the  
 Amateur.

**Grant, Thos. K.**

Autochrome Filmcolor.

**Hewitt Electric Co.**

Studio Lighting.

**Iford, Ltd.**

Iford Exposure Tables.  
 Iford Plates and Films.  
 Iford Panchromatic Plates.  
 Iford Hypersensitive Plates  
 and Films.

Iford Double-X-Press Plates  
 Iford Hyperchromatic Films.  
 Imperial Handbook.

Selo and Selochrome Film.  
 Selo Hypersensitive Roll Films.  
 Selo Fine-Grain Panchromatic  
 Roll Films.

Iford Colour Filters.  
 Iford Bromide and Clorona  
 Papers.

Selo Gaslight Paper.  
 Seltona Papers.  
 Summer Days are Seltona Days.  
 Enitone Printing Paper.

Oleobrom Process.  
 Development in Oleobrom  
 Transfer.

Selo Ciné Films.  
 Iford X-ray Films.  
 X-ray Intensifying Screens.  
 Panchromatism (6d.).

Lantern Slides on Iford Lantern  
 Plates.

Recent Developments in Infra-  
 red Photography.

Infra-red Photography.  
 Photography as an aid to  
 Scientific Work.

Iford Stripping Paper.  
 Toning Iford Bromide and  
 Chlorona.

**Johnson & Sons.**

Time Development (Axol).  
 Flashlight Photography.  
 Home Photography. 1, Deve-  
 loping. 2, Gaslight Printing.  
 3, Flashlight 4, Bromide  
 Printing.

**Kodak, Ltd.**

"No more Dark Darkrooms."  
 Snapshots at Night.  
 Unit Lighting System.  
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 Panatomic Film.  
 Eastman Professional Film.  
 Kodacolor Explained.  
 Transferotype Paper.  
 Kodak Bromide and Bromil  
 Papers.  
 Kodak Printing Papers.  
 Velox (Gaslight) Paper.

Ciné Kodak Film.  
 Ciné-Kodak Booklet (16 mm. or 8 mm.).  
 Kodacolor—A Modern Miracle.  
 Dental Radiography.  
 X-ray Materials and Accessories.  
 Kodak Clinical Camera.  
 Kodak Studio Outfits.  
 Photo-Micrography (6d.).  
 How to make good pictures (1s.).  
 Real Orthochromatism (6d.).  
 The Photography of Coloured Objects (2s. 6d.).  
 Wratten Light Filters (2s.).  
 Elementary Photographic Chemistry (1s.).  
 The Fundamentals of Photography (5s.).  
**Kosmos Photographies, Ltd.**  
 Kosmos Photographic Materials.  
**Modern Traders, Ltd.**  
 Picture Making with the Matelux.

**Sashalite, Ltd.**  
 Sashalite Photoflash Bulbs.

**Soho, Ltd.**  
 Soho Reflex Cameras.

### Vanguard Co.

Varnishing Negatives Made Easy  
 Firelight Portraits by Daylight.  
 Colouring Prints and Slides.  
 Intensification and Reduction.  
 Saving Over-printed Bromides.

### Zeiss, Carl.

Zeiss Photo Lenses (On the Choice of a Lens).  
 Lenses and How They are Made.  
 The Eagle Eye of a Camera.  
 Telephoto Lenses and Tele-Tessar.  
 Proxar and Distar Lenses.  
 Universal Tessar.  
 Zeiss Biotessar.  
 The New Tessar for Small Film Cameras.  
 Zeiss Yellow (Glass) Filters.  
 Optical Equipment for Process Work.

### Zeiss Ikon, Ltd.

Connoisseur and Contax.  
 Accessories for Contax Photography.  
 The Ten Contax Lenses.

## Photographic Periodicals.

**Agfa-Photoblatter**, 65-67, Lohmuhlenstrasse, Berlin, S.O. 36.

**Allgemeine Photographische Zeitung**, Verlag, Jos. A. Detoni, Vienna VI., Mollardgasse 40.

**Amateur Photographer and Cinematographer**, Dorset House, Stamford Street, London, S.E.

**American Annual of Photography**, 428, Newbury Street, Boston 17, Mass.

**American Cinematographer**, 1222, Guaranty Building, Hollywood, Cal., U.S.A.

**American Photography**, 428, Newbury Street, Boston 17, Mass., U.S.A.

**Atelier**, W. Knapp, Mühlweg, 19, Halle a/Saale, Germany.

**Australasian Photo-Review**, Kodak (Australasia), Ltd., 379, George Street, Sydney, Australia.

**British Journal of Photography**, Henry Greenwood & Co., Ltd., 24, Wellington Street, Strand, London, W.C. 2.

**British Journal Photographic Almanac**, Henry Greenwood & Co., Ltd., 24, Wellington Street, Strand, London, W.C.

**Bulletin de l'Association Belge de Photographie**, 230, Avenue Albert, Brussels.

**Bulletin de la Société Française de Photographie**, 51, Rue de Clichy, Paris, IX.

**Bulletin de Photogrammetrie**, 51, Rue de Clichy, Paris, IXe.

**Bulletin of Photography**, 636, Franklin Square (Cor. 7th and Race Streets), Philadelphia, U.S.A.

**Camera**, 636, Franklin Square (Cor. 7th and Race Streets), Philadelphia, U.S.A.

**Camera**, C. J. Bucher, A.-G., Lucerne, Switzerland.

**Camera**, 2, Crow Street, Dublin.

**Camera Craft**, 413/415, Claus Spreckels Building, San Francisco, Cal., U.S.A.

**Le Ciné Amateur**, 94, Rue St. Lazare, Paris, IXe.

- Civil Service Photographer**, 38 Manor Road, Richmond, Surrey.
- Commercial Photographer**, Abel's Publishing Co., 515, Caxton Building, Cleveland, Ohio, U.S.A.
- Correo Fotografico**, Maipn 231, Buenos Aires, Argentine Republic.
- Corriere Fotografico**, 6, Via Stampatori, Turin, Italy.
- Film für Alle**, Krausenstrasse 35/36, Berlin, S.W. 19.
- Foto Revista**, Aisina 974, Buenos Aires, Argentine Republic.
- Fotographische Rundschau**, 19, Mühlweg, Halle, a/S., Germany.
- Fotokunst**, Dambruggestreet 265, Antwerp.
- Focus**, Bloemendaal, Holland.
- Fotograph Polski**, Ul. Czackiego 3/5, Warsaw.
- Gallery, (The)**, 27, Battenhall Road, Worcester.
- Home Photographer**, 8/11, Southampton Street, London, W.C. 2.
- Home Movies and Home Talks**, 8/11, Southampton Street, London.
- Jahrbuch für Photographie und Reproduktionstechnik**, W. Knapp Halle a/S., Germany.
- Kodak Magazine**, Kodak, Ltd., Kingsway, London, W.C. 2.
- Lichtbild**, Verlag Josef F. Rimpler, Haida-Böhmen, Czechoslovakia.
- Linse**, Derflingstrasse, 23, Berlin Lankwitz.
- L'Instantané**, 60, Rue Thomond, Paris V.
- Miniature Camera, The**, Fenwick G. Small, 1124, Myrtle Avenue, Brooklyn, N.Y., U.S.A.
- Monthly Abstract Bulletin**, Research Laboratory, Eastman Kodak Co., Rochester, N.Y., U.S.A.
- Movie Makers**, 105, West 40th Street, New York, U.S.A.
- Nordisk Tidskrift för Fotografi**, Stockholm.
- Oesterr. Schmalfilmer**, Neubaugasse 40, Vienna VII.
- P.P.A. Record**, Professional Photographers' Association, 357, Euston Road London, N.W. 1.
- Photo-Art Monthly**, Monadnock Building, San Francisco, Cal., U.S.A.
- Photo-Ciné-Graphie**, 18 Rue Séguier, Paris, VIe.
- Photo-Markt**, Mariahilferstrasse 31, Vienna.
- Photo-Miniature**, 70, Fifth Avenue, New York, U.S.A.
- Photo Olzer**, Prague.
- Photo Pour Tous**, 37, Rue Lafayette, Paris-Opera.
- Photo-Revue**, 118, Rue d'Assas, Paris VI.
- Photo-Woche**, Lindenstrasse, 26, Berlin.
- Photofreund**, 33, Stallschreiberstrasse, Berlin, S. 14.
- Photograph**, L. Fernbach, Bunzlau.
- Photographe**, 189, Rue St. Jacques, Paris V.
- Photographic Abstracts**, Royal Photographic Society, 35, Russell Square, London, W.C. 1.
- Photographic Dealer**, Sicilian House, Southampton Row, London, W.C.
- Photographic Journal**, 35, Russell Square, London, W.C. 1.
- Photographische Chronik**, W. Knapp, Halle a/Saale, Germany.
- Photographische Industrie**, Krausenstr. 35/36, Berlin, S.W.19, Germany.
- Photographische Korrespondenz**, Schottengasse 4, Vienna I., Austria.
- Photographie für Alle**, Krausenstrasse 35/36, Berlin, S.W. 19.
- Polski Przegląd, Fotograficzny**, Kasimierz Greger, ul 27, Grudnia 20, Poznan, Poland.
- Procédé**, 10, Boulevard de la Bastille, Paris, XIIe.
- Process Engravers' Monthly**, 12, Farringdon Avenue, London, E.C. 4.
- The Professional Photographer** (formerly Abel's Photographic Weekly), 515, Caxton Building, Cleveland, Ohio, U.S.A.
- Progreso Fotografico**, Molins de Ray 9, Apartado 678, Barcelona, Spain.
- Revue de Photo (Phototidschrift) pour Amateurs**, Cyngel No. 2, Bruges (Belgium).
- Revue Française de Photographie**, 189, Rue St. Jacques, Paris, V.
- Science et Industries Photographiques**, Revue d'Optique, 189, Rue de Sèvres, Paris, XVIe.
- Valokuvaus Aleksanterinkatu**, 38, Helsinki, Suomi, Finland.
- Zeitschrift für Wissenschaftliche Photographie**, J. A. Barth, 16, Dörrienstrasse, Leipzig, Germany.

While this list has been revised at the time of going to press (November 15th, 1934) it cannot be taken as either complete or entirely accurate regarding addresses. Postal authorities, however, will usually forward letters to the new address, except in cases where a periodical has stopped publication.

**Permits to Photograph.****London Area.**

**Westminster Abbey.**—From the Chapter Clerk, the Sanctuary, Westminster. Permission is rarely given. A fee of 5s. is required for each photograph.

**St. Paul's Cathedral.**—From the Dean's Verger. Fee, 2s. 6d. per day.

**Tower of London.**—From the Resident Governor.

**Houses of Parliament.**—From the Secretary, Lord Chamberlain's Office, House of Lords

**Guildhall.**—From the City Surveyor, Guildhall, E.C. 2.

**Picture Galleries** (National Gallery, Tate Gallery).—Permission given only to professional photographers.

**British Museum.**—Special permission granted for use of stand cameras only by application in writing to the Director.

**Victoria and Albert Museum.**—From the Director and Secretary, South Kensington, S.W. 7. There are special restrictions.

**Zoological Gardens.** (Regent's Park and Whipsnade).—A fee of 2s. 6d. (on each occasion) is charged for permission to use a stand camera. Hand-cameras of any size may be used without permit. Ciné hand cameras for sub-standard film may be used by bona-fide amateurs without permit. A fee of £12 is charged for permission to take commercial ciné films. Application to the Secretary, Zoological Society, Regent's Park, London, N.W.

**Royal Parks.**—No permission required for use of hand cameras, provided that portraits or groups are not taken. For stand cameras, permission requires to be obtained from the Secretary, H.M. Office of Works, Storey's Gate, Westminster, S.W. 1. This applies to Hyde Park, Green Park, St. James' Park, Primrose Hill, Regent's Park, Greenwich Park, Richmond Park, Bushey Park and Hampton Court Park, Gardens and Green.

**Other Parks.**—Almost all other Parks in the London area are under the control of the L.C.C. Permits to use stand cameras on application to the Chief Officer, Parks Department, The County Hall, Westminster Bridge, S.E. 1.

**Kew Gardens.**—On payment of 3d. in addition to charge for admission.

**Burnham Beeches.**—From the Town Clerk, Guildhall, E.C. 2.

**Epping Forest and Wanstead Park.**—From the Town Clerk, Guildhall, E.C. 2.

**Castles.**—In most cases on application personally. At Raglan Castle the fee for amateurs is 1s., professionals 10s. Stokesay Castle: amateurs free, professionals £1 1s. In England and Scotland a great many historic buildings are in the charge of H.M. Office of Works.

**Provinces.**

**Cathedrals.**—Permission to use a camera in English Cathedrals is obtainable on application, in the great majority of cases, to the Dean. In some few instances no fee is charged.

## Contractions.

The following is a list of the contracted descriptions most commonly occurring in photographic literature, catalogues of photographic requisites and advertisements in photographic journals. Especially to those in foreign countries it is thought that the meaning of these various contracted descriptions will be of service.

- B.**—mark on exposure shutters, signifying "bulb," that is, setting of the shutter at which shutter remains open as long as the release is pressed.
- B. & W.**—black and white. Used in description of photographs worked up (in black) with drayon, air-brush, or other method.
- B.P.**—British Pharmacopœia. Indicates standard of strength and purity of chemicals.
- C.**—Centigrade. Degree of temperature.
- C.C.**—collodio-chloride printing paper.
- c.c.**—cubic centimetre, metric measure of volume. About 17 minims.
- C. de V.**—carte de visite, an early size—about  $3\frac{1}{4} \times 2\frac{1}{2}$  inches—of portrait photograph.
- Cent.**—Centigrade. See C. above.
- c.p.**—candle power.
- C.P.**—chemically pure. Trade description of chemicals.
- cryst.**—crystallised. Indicates the crystallised form of any chemical as distinguished from the dry or anhydrous.
- D.**—dauer. Marking on German shutters equivalent to B, which see.
- D. & E.**—day and electric. Used in reference to portrait studios.
- D.O.P.**—Developing-out paper. Term used in United States for gaslight papers.
- D. & P.**—developing and printing. The term is understood to mean the commercial quantity development of roll-film and the making of prints from the resulting negatives. In United States the corresponding description is "Photo Finishing."
- E.H.**—Eder-Hecht. Designation of plate speed used in Germany.
- F.**—Fahr. or Farenheit. Degree of temperature.
- F.P.**—focal-plane (shutter).
- F.P.A.**—film-pack adapter. Frame for using a film-pack on a plate camera.
- H. & D.**—Hurter and Driffield. Designation of speed of plates.
- I.**—instantaneous. Marking on shutters indicating that at this setting the shutter gives one or other of the instantaneous (snapshot) exposures.
- M.**—moment. Marking on shutters of German manufacture, indicating that at this setting the shutter gives one or other of the instantaneous exposures.
- mm.**—millimetre. 100 mm. equal 4 inches, very nearly.
- M.Q.**—metol-hydroquinone.
- O.**—offen. Marking on shutters of German make equivalent to B, which see.
- P.C.**—postcard. In reference to cameras, plates and printing papers denotes a size of  $3\frac{1}{2} \times 5\frac{1}{2}$  inches.
- P.O.P.**—printing-out paper. Contraction first used (in Britain) for gelatino-chloride print-out paper.
- P.S.**—plate sunk (mounts).
- q.s.**—quant. suff. In formulae, denotes that sufficient of the chemical is to be used to produce a particular effect.
- sp. gr.**—specific gravity. Weight in comparison with an equal bulk of water.
- T.**—time. Marking on shutters denoting that at this setting the shutter opens on pressing the release and remains open until the release is again pressed.
- U.S.**—uniform system. A system of diaphragm markings according to which  $f/4$  is 1,  $f/5.6$  is 2,  $f/8$  is 4, and so on.
- V.P.**—vest pocket. Size of camera. Generally understood to indicate a camera taking a picture  $45 \times 60$  mm. in size =  $1\frac{1}{2} \times 2\frac{1}{2}$  inches.
- W.A.**—wide angle (lens).
- W.Y.W.**—while-you-wait. Applied to portrait studios and also to cameras such as those used in beach photography for making ferrotype and similar portraits.
- Z.**—zeit. Marking on shutters of German manufacture. It is equivalent to T. which see.

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A Special Department is conducted for Foreign and Colonial Orders under the personal supervision of our Export Manager, who has over forty years' experience with the firm and is fully acquainted with the class of apparatus suitable for use in the varying climates of different parts of the world. Plates, Papers, and Films are procured specially from the makers packed in suitable manner with due regard to their destination.

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Orders from abroad may be sent to us direct, and should be accompanied by remittance; or with reference to London Agents or Bankers, who will guarantee payment on delivery of Bills of Lading; or if of over £10 value, with a deposit of one-half the value (minimum deposit £6) and the balance collected through a local Bank against Bills of Lading.

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**Our Service.** The name of Sinclair is synonymous with quality, and we are always ready to help and advise our friends concerning apparatus and materials of our own or other manufacturers. All goods advertised in this Almanac may be purchased from us.

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**Developing and Printing Service.** Our works at Brixton are in delightful surroundings, and we aim at the best work at the lowest possible price. The Sinclair Service in this department has always been recognised as the best.

**Ophthalmic Department.** We have a special department for eye-glasses and spectacle fitting, and stock all the latest aids to perfect vision. Oculists' prescriptions have every care and attention, for we realise that a perfect fitting frame is as important as the lenses it contains.

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*The British Journal of Photography*

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The Revolving Back of the Sinclair "Una."

**THE SINCLAIR "UNA" REVOLVING BACK.** This very important improvement permits the plate or film being changed from the vertical to the horizontal position without removing the back of the camera, which revolves on a light-tight turntable.

**The "UNA" DOUBLE PLATE HOLDERS.** The "Una" plate Holders differ materially from other plate holders apparently similar in design and we have no hesitation in stating that for all but colour work they are far superior to the best book-form slides. For colour plates we supply specially designed book-form slides fitted with improved light-tight valves and draw-out shut-

ters. The features of the "Una" Slide are:—

1. The quality of the pull-out shutters, which are of the finest hard rubber. It is very rarely these shutters break, and they can be recommended for tropical use.
2. The valves in the plate holders where the shutters enter are made with the greatest care and ensure a more light-tight fitting than is possible with book-form slides.
3. Each plate holder is fitted with Auto-Safety Catches to obviate double exposure.

**THE LEVELS.** All cameras are fitted with Levels, the position selected being near the finder and focussing scale.

**THE GROUND GLASS SCREEN** is covered with a Focussing Hood, so arranged that it can be removed in a moment should a focussing cloth or focussing magnifier be preferred.

**THE FINDER.** An important part of the "Una" Outfit is the Sinclair Tilting Finder. With most hand cameras the finder is quite worthless when the rising front is in action, and without the rising front it is impossible satisfactorily to photograph subjects in which buildings appear. Our contention is that as good work should be done in the hand as can be done on a tripod, and this is only possible with such a finder as ours. When taking a picture the camera is held level as judged by the spirit level, the finder is then tilted to get the view desired, after which the scale on the rising front is adjusted to agree with the scale on the finder. The exposure is then made.

J. A. Smith, Esq., of the Sarawak Government Offices, writes:—"The best little camera I have ever had."

**SINCLAIR  
LONDON**

**LENSES.** The best camera needs the best lens, and the best lens is of little value without a perfect camera. The late war proved that the boasted superiority of some foreign lenses was an idle myth, and we use those British-made lenses whose worth has been proved.

**SHUTTERS.** On the smaller size cameras we use the "N.S." Perfect Shutter (see page 470). The "N.S." Shutter has not the aggravating jump in speed which is such a feature of most diaphragmatic shutters, but is at present only made in small sizes. With other makes, as fitted to the larger lenses and cameras, we advise having the speeds tested at the National Physical Laboratory.

## THE TROPICAL STANDARD "UNA"

THE TROPICAL STANDARD "UNA" is exactly the same design as the regular pattern, but it is made of selected mahogany, brass screwed or bound, and polished on the outside instead of being leather covered. We do not make our cameras in teak, because our experience is that teak is quite unsuited for hot and dry climates.

### DETAILS OF STANDARD MODELS

	Size closed without hood	Exten- sion	Weight with screen but without hood	Extent of rising front	Thickness of hood	Weight of hood
$3\frac{1}{2} \times 2\frac{1}{2}$ in., or						
$9 \times 6\frac{1}{2}$ cm.	$4\frac{1}{2} \times 3\frac{1}{2} \times 5$	$9\frac{1}{2}$ in.	1 lb. 10 oz.	$1\frac{1}{2}$ in.	$\frac{1}{4}$ in.	$1\frac{1}{2}$ oz.
$4\frac{1}{4} \times 3\frac{1}{4}$ in.	$5\frac{1}{2} \times 3\frac{1}{2} \times 6$	$11\frac{1}{2}$ "	2 " 6 "	$2\frac{1}{2}$ "	"	$2\frac{1}{2}$ "
$5 \times 4$ "	$6\frac{1}{2} \times 4\frac{1}{2} \times 6\frac{1}{2}$	$12\frac{1}{2}$ "	2 " 15 "	$2\frac{1}{2}$ "	"	3 "
$5\frac{1}{2} \times 3\frac{1}{2}$ "	$7 \times 4\frac{1}{2} \times 7\frac{1}{2}$	$13\frac{1}{2}$ "	3 " 12 "	3 "	"	3 "
$10 \times 15$ cm.	$7\frac{1}{2} \times 4\frac{1}{2} \times 7\frac{1}{2}$	$13\frac{1}{2}$ "	4 " 2 "	3 "	"	$3\frac{1}{2}$ "
$6\frac{1}{2} \times 4\frac{1}{2}$ "	$8 \times 4\frac{1}{2} \times 8\frac{1}{2}$	$15\frac{1}{2}$ "	4 " 8 "	$3\frac{1}{2}$ "	"	4 "
$7 \times 5$ in. or						
$18 \times 13$ cm.	$8\frac{1}{2} \times 5 \times 9$	17 "	4 " 12 "	4 "	$\frac{1}{2}$ "	$4\frac{1}{2}$ "

## The "UNA" for High-Power Tele-photography

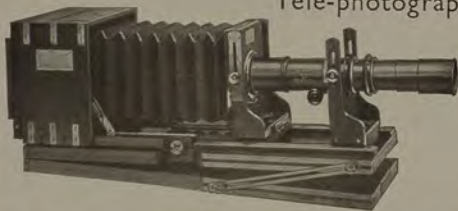


Illustration of Standard Tropical Model "Una" Camera, supplied to H.M. Government, complete with Atkin-Swan Tilting Table and Telephoto Lens.

Otho Webb, Esq., of Queensland, Australia, writes:—"The Everest 'Una' is a beauty—it is so perfectly built. Everyone has fallen in love with it."

**SINCLAIR  
LONDON**

## PRICES

**STANDARD MODEL "UNA" CAMERA**, with "Una" Tilting Finder scaled to agree with rising front on camera, Level, Focussing and Depth of Focus Scales. Three Double Plate Holders, "N.S." Perfect or other suitable diaphragmatic Shutter and fitted with lenses as follows:—

Lenses	$3\frac{1}{2} \times 2\frac{1}{2}$ and $9 \times 6\frac{1}{2}$ cm.	$\frac{1}{2}$ -plate	$5 \times 4$ or $9 \times 12$ cm.	$10 \times 15$ cm. or $5\frac{1}{2} \times 3\frac{1}{2}$	$\frac{1}{2}$ -plate	$7 \times 5$ and $13 \times 18$ cm.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Ross Homocentric F/6.8	21 10 0	23 0 0	26 10 0	27 0 0	32 10 0	36 10 0
Ross Xpres, F/4.5 ...	23 10 0	26 10 0	29 0 0	32 0 0	36 10 0	41 10 0
*Ross Combinable, 2 foci F/5.5&F/11	28 0 0	31 10 0	34 10 0	37 10 0	42 0 0	46 10 0

\* These prices include Cameras with Triple Extension.

**TROPICAL MODELS.** Extra on above prices.

£3 10 0   £3 10 0   £4 0 0   £4 0 0   £4 0 0   £4 0 0

Triple Extension on Standard and Tropical Models, £2 0 0 extra on all sizes

## ACCESSORIES FOR "UNA" CAMERAS

	$3\frac{1}{2} \times 2\frac{1}{2}$ and $\frac{1}{2}$ -plate	$5 \times 4$ and $9 \times 12$ cm.	$10 \times 15$ cm. and $5\frac{1}{2} \times 3\frac{1}{2}$	$\frac{1}{2}$ -plate	$7 \times 5$ and $13 \times 18$ cm.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Extra Double Plate Holders each	1 2 6	1 8 0	1 11 6	1 17 6	2 2 0
Extra Tropical Spanish Mahogany Plate Holders each	1 7 6	1 13 0	1 16 6	2 2 6	2 7 6
Special Book-form Plate Holders, suitable for Autochrome, Agfa, or ordinary Plates ... ..	2 2 0	2 7 6	2 10 0	2 15 0	3 0 0
Ditto, Tropical Model ... ..	2 7 0	2 12 6	2 15 0	3 0 0	3 5 6
Leather covered Film Pack Adapter ... .. each	2 5 0	2 10 0	2 15 0	3 0 0	3 10 0
Ditto, Tropical Model ... ..	2 15 0	3 0 0	3 5 0	3 10 0	4 0 0
Hand-sewn Leather Case, with lock and key, to hold Camera and three Slides	3 5 0	3 15 0	4 0 0	4 15 0	5 5 0
Ditto, for Camera and six Slides ... ..	3 15 0	4 5 0	4 15 0	5 10 0	6 0 0
Web-sling Shoulder Strap for Camera Case	0 10 6	0 10 6	0 10 6	0 10 6	0 10 6
Graflex Roll Holder, including fitting ... ..	4 15 0	$5 \times 4$ 5 5 0	$5\frac{1}{2} \times 3\frac{1}{2}$ 5 5 0	—	6 2 6
Ditto, Tropical Model ... ..	6 6 0	6 16 0	6 16 0	—	7 15 0

Atkin-Swan Tilting Table, for use with high power Telephoto Lenses

Price, for all sizes (illustrated on page 464) ... .. £7 10 0

**SINCLAIR  
LONDON**

# The SINCLAIR

## "TRAVELLER UNA"

is a  
**Metal Camera of  
 the Highest Class.**  
 $3\frac{1}{2} \times 2\frac{1}{2}$  ( $9 \times 6\frac{1}{2}$  cm.)  
 with  
**Ross Combinable  
 Lens (2 foci)  
 and "N.S."  
 Perfect Shutter.**



The "Traveller Una" with normal extension as used with the combined lens.

"A joy to look upon, and stands in a class by itself ready for work in any habitable (or practically uninhabitable) part of the globe."—*Photographic Journal*.

The "TRAVELLER UNA" is built on the same lines as our Standard and Tropical Models, and is particularly suited for Explorers and Scientists who require an instrument to stand the roughest wear and tear. It is made of Duralumin—a metal nearly as light as aluminium but without any of its drawbacks, and is very beautifully finished. It is as well adapted for hand as for stand use, and the lens fitted is perhaps the most generally useful lens made for the practical worker, because not only is it very rapid (F/5.5) but the single elements working at F/11 give a very practical telephoto effect when photographing distant objects such as mountains, etc.

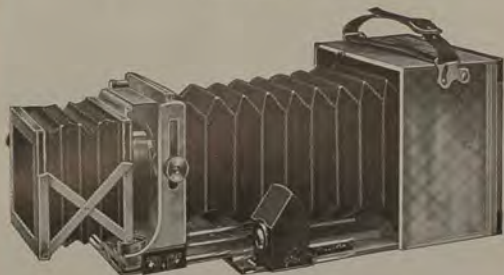
In this camera we have not hesitated to add a little extra weight, so that perfect rigidity is secured when fully extended, either when copying objects the same size or if used for telephoto work. The camera is fitted with two scales, one for the combined lens working at F/5.5, and the other for the single lens working at F/11. It has a tilting finder marked down to show the view given by the combined and single lens. This finder is scaled to show the amount of foreground cut off when the rising front of the camera is in use, and a level is also fitted.

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# The SINCLAIR "TRAVELLER UNA"

(continued)



The "Traveller Una" with double extension and with Sinclair Lens Hood on front.

The shutter is the "N.S." PERFECT Shutter, giving the speeds required by the practical worker, viz. : from  $\frac{1}{2}$ -second to  $\frac{1}{1000}$  second, as well as "Time" exposures.

The "TRAVELLER UNA" with its shutter and optical equipment is only sold as a complete unit, and it cannot be supplied without lens or shutter, although other supplementary and Telephoto Lenses can be added to the outfit when desired.

The "TRAVELLER UNA" measures  $4\frac{1}{2} \times 3\frac{1}{2} \times 4\frac{1}{2}$  in. (11.7  $\times$  8  $\times$  11.7 cm.). The extension is 10 in. (25 cm.) and the weight, including lens and shutter, is 3 lb. (1.36 kilos.).

**The Price of the Outfit complete, including Lens and Shutter as described, and three Tropical Model "UNA" Plate Holders** **£35**

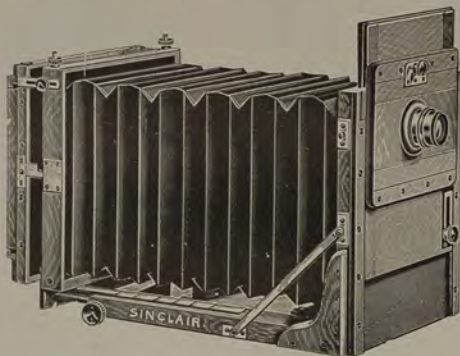
Extra for Sinclair Lens Hood as illustrated, 25/-

Film Pack Adapters and other Accessories can be fitted as listed on page 465.

**SINCLAIR  
LONDON**

# THE SINCLAIR "TECHNICAL" CAMERA

As supplied to The War Department, His Majesty's Indian Government; The New South Wales Government; The Crown Agents for the Colonies; Southern Rhodesia; The Siamese Government; The Egyptian Government; Engineering Works and Scientific Institutions.



This Camera in its general character is of the square bellows long-focus type but has a number of improvements in design, making it the most efficient of its class and particularly suitable for Professional, Technical and Scientific work. It is made of the best seasoned Spanish Mahogany, and great care is taken to ensure parallelism between front and back, an important matter with modern anastigmat lenses.

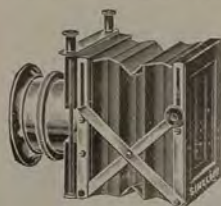
**THE RISING AND FALLING FRONT.** As will be seen from the illustration there is a very **great rising front movement**, and there is an **equally great falling movement**. This is attained by means of a moving panel at the back of the rising front, and which may be adjusted so that either a great rise or a great fall is secured.

**THE SWING BACK.** A central swing is provided, and the arms are as long as possible, so that the greatest range of movement may be obtained. By means of the clamping screws on the top of the camera a side swing can also be obtained for special work.

	6½ × 4½	8½ × 6½	12 × 10	15 × 12
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Camera and 3 Double Dark Slides	24 0 0	30 0 0	40 0 0	50 0 0
Ditto, Brass Bound ... ..	27 10 0	34 0 0	45 10 0	56 10 0
Extra Double Slides ... each	2 10 0	2 15 0	4 10 0	6 0 0
Extra Brass Bound Double Slides each	3 0 0	3 5 0	5 5 0	6 17 6

**SINCLAIR  
LONDON**

## THE "SINCLAIR" ADJUSTABLE LENS HOOD AND SCREEN HOLDER



Lens Hood open.



Closed

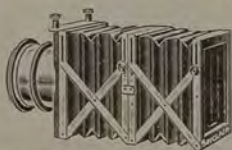
**PREVENTS  
FOGGY NEGATIVES**

**A Typical Testimonial.**

Sheffield.

Lens Hood to hand. It is a beautiful piece of workmanship and very efficient. I have already used it with great success.

W. F. A.



Hood with Extension for Tele-photography.

"The practical photographer will be wise in regarding this accessory as an indispensable part of his equipment."

*British Journal of Photography.*

No one who has once used the bellows hood of this form is likely to expose another plate without it. It enormously increases the brilliancy of the result and permits of photographs being taken against the sun, which would otherwise be impossible. This new type of Sinclair Lens Hood is not only adjustable as regards the extension, but also in its range for fitting to the hoods of lenses, and consequently the same lens hood will fit a large number of lenses, and the vice grip permits of it being securely held in position. Each hood is also fitted with a spring screen holder, permitting screens to be instantly changed or removed. The same screen will therefore suffice for any lenses which the hood will fit, and the necessity for special caps or screw-in cells is obviated. In cases where lenses are fitted to shutters or are in sunk mounts, a small metal hood to screw into the front cell of the lens may be necessary, which we, or any maker or dealer, would supply.

Size	Adjustable to fit Hood of Lenses from	Extension up to	Size closed	Price	K1, K2, X1 or X2 Screen to fit
No. 00	1 to 1½ in.	2½ in.	3 × 2½ × 1	25/-	8/-
No. 1	1½ to 2 in.	2½ in.	3½ × 3 × 1½	30/-	10/-
No. 2	2 to 2½ in.	3 in.	4 × 3½ × 1½	35/-	12/9
No. 3	2½ to 3 in.	4 in.	5 × 4½ × 1½	57/6	18/6
Large Hood	Opening 5½ × 4 in.	5½ in.	5½ × 7 × 1½	60/-	—

For Studio and Kine' Cameras.

Collapsible Extensions may be had for Nos. 1 and 2, and these increase the lengths when open to 4½ and 6 inches respectively. Such extensions cost for No. 1, 20/-; and No. 2, 25/-. They are very advisable for Tele-photography

**SINCLAIR  
LONDON**

THE 

# SHUTTER

**NO VARIATION  
GREAT EFFICIENCY  
SMOOTH IN ACTION**

The "N.S." Shutter gives the speeds most useful to the practical photographer and those that work conveniently with the lens apertures, viz.,  $\frac{1}{2}$ ,  $\frac{1}{4}$ ,  $\frac{1}{8}$ ,  $\frac{1}{32}$ ,  $\frac{1}{64}$  and  $\frac{1}{100}$ th second.



No. o Size ...	Iris Aperture	Tube Diameter for Lenses	Price
...	$\frac{7}{8}$ in.	1-1 $\frac{1}{16}$ in.	£4 0 0
No. 1 Size ...	1 in.	1-3 $\frac{1}{8}$ in.	4 0 0

When Lenses are ordered from us fitted to this Shutter there is no extra charge for fitting. The charges for fitting customers' own lenses range from 17/6 to 30/-

## THE "SINCLAIR" FOLDING COPPER LAMP



This is a thoroughly well made lamp, constructed of copper in such a way that it will take safelights  $8\frac{1}{2} \times 6\frac{1}{2}$  in., and arranged with "bayonet" or "screw" adapter for attachment to electric light fittings. Where there is no electricity, the aperture which takes the electric light fitting is closed by a screw cap, and either "Sinclair Devolights" or Fairy Night lights may be used for illumination. Folding flat and being non-rustable it will be welcomed by travellers.

Price, complete with 6 ft. of flexible wire and lampholder, together with one $8\frac{1}{2} \times 6\frac{1}{2}$ in. Wratten Safelight of any grade, is	35/-
Extra Adapter so that the Lamp can be used with either "bayonet" or "screw" fitting	5/6
Extra Safelights	5/6 each

Tropical "Devolights" for use with this Lamp, if electricity is not available per doz. 2/6  
When ordering, state whether Lamp is required with "bayonet" or "screw" fitting.

**SINCLAIR  
LONDON**

# THE SINCLAIR FRAME FINDER AND VIEW METER

## Saves Plates, Films and Disappointment

The unreliability of many camera finders has led to our designing new types of frame finders, which have many advantages over those previously placed upon the market.



**THE SINCLAIR FRAME FINDER** can be kept on or removed from the camera as desired.

**THE SINCLAIR FRAME FINDER** is collapsible and goes into a very small space.

**THE SINCLAIR FRAME FINDER** can be accurately adjusted to show the picture taken by any camera with a large range of lenses.

**THE SINCLAIR FRAME FINDER** is equally suitable for the professional with a large stand camera, as for the amateur with a Vest Pocket Kodak.

**THE SINCLAIR FRAME FINDER** permits of the camera being used at the eye level—the natural position.

**THE SINCLAIR FRAME FINDER** consists of a collapsible frame made of brass, attached to a base in the form of a lazy tong that has at the other end a folding sighting plate. When closed, it measures 3 in.  $\times$  1½ in.  $\times$  ¼ in. and weighs only 2 oz.

The finder is designed to slide into a variety of fittings that are made for all types of camera. When not in use, the folded finder can be kept on the camera or, if more convenient, carried in the waistcoat pocket.



No. 1

No. 2

No. 3

**THE SINCLAIR FRAME FINDERS** are made in two types and each type can be had with 3 kinds of fitting.

**Type 1.** For plates and films of the normal proportions, such as 1-plate, 5  $\times$  4 in., 1-plate, etc.

**No. 1.** Standard fitting, for cameras with wooden bodies to which the fitting can be screwed, and into which the Finder fits.

**No. 3.** Special fitting for use on the original Vest Pocket Kodak, no screwing being necessary.

**Type 2.** For long, narrow pictures such as given by the V.P.K., No. 1A and 2C Kodaks and postcard size.

**No. 2.** Spring fitting, for attachment to metal cameras such as Folding Brownies, Carabines, Ensigns and V.P.K. Models B and III.

### Price:

Either type of Finder with one fitting of either number ... .. 6/-  
Extra fittings Nos. 1 and 3 ... each 9d. Extra spring fittings No. 2 each 1/6

**SINCLAIR  
LONDON**

## THE SINCLAIR DARK ROOM BLINDS

AT ONCE CONVERT ANY ROOM INTO  
A DARK ROOM

"One of the things which we all at times make, or get made for ourselves, usually in a rather unsatisfactory way, has been done very well indeed by Mr. J. A. Sinclair's firm."—*British Journal of Photography*.



This consists of a well-made varnished wood frame with two grooves, in which red and black blinds travel, and when both are down no trace of white light is admitted. We make the fitting to any measurements, and we shall be pleased to give quotations on application. Screws are supplied with the blind, and all that is necessary is to screw it to the window frame.

### Specimen Size and Price :

Size about 5 ft. x 4 ft. ... ..	£9 0 0
" " 7 ft. x 4 ft. ... ..	10 0 0

Quotations given for any size,

## DARK ROOM RADIANT TIMER

Panchromatic and Colour Plate workers in particular will appreciate this new kind of luminous watch. The large figures on the outer edge indicate the seconds, and on the inner scale from 0 to 10 indicating minutes, as well as points for each second, are made of a very radio-active compound which shows clearly in the dark. A pressure of the knob at top starts the two luminous hands from zero, a second pressure stops them, and a further pressure returns them to zero again. The luminosity is greatly intensified if the Timer is held near an electric light bulb before commencing work.

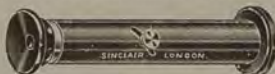


Price .. £3 12 6

**SINCLAIR  
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## THE "SINCLAIR" HIGH POWER FOCUSING MAGNIFIER X.4

Will be appreciated by those doing copying work or in subjects where very critical focussing is essential. Glasses with great magnifying power are usually so short that it is difficult to get the head sufficiently close to the ground glass focussing screen. In the case of the "Sinclair" Magnifier the tube is 6½ in. long, and the end which is placed into contact with the ground glass is sufficiently large to keep the glass steady when moving it over the surface. It reverses the image, and consequently the picture on the screen is seen the right way up.



It is sold in a leather covered carrying case measuring 6½ x 1½ in., and the weight, complete with case, is 6½ oz.

Price, in case complete ... .. £2 2 0

## THE "SINCLAIR" MAP READER

This Reader consists of a solid block of glass, which stands on the map, photograph, postage stamp or other article which it may be desired to examine. No special focussing is necessary, and motorists can examine details of their maps without stopping their cars. Curio collectors will appreciate the ease with which they can examine details of the signature, etc.

The Reader is sold in a leather covered case, measuring 1½ x 1½ in. (45 x 45 mm.) and the weight is 4½ ozs.

Price, in case complete ... 7/6



## PEN MICROSCOPE

These Microscopes have the great advantage that they possess high power in a small space, and are wonderfully convenient to use. The No. 1 pattern is like a fountain pen in appearance and magnifies 25 times. The No. 2 pattern as illustrated is rather larger in size and is fitted with achromatic lenses giving a larger



field and magnification 40 to 60 times. The end of the microscope is placed on the surface to be magnified, and a sliding stud enables sharp focus to be secured. They are invaluable for examining signatures, botanical specimens and any fine detail.

No. 1.	25 times ... ..	4 6 each	
No. 2.	40 to 60 times ... ..	17/-	with pocket case, 20/-
No. 2A.	Ditto, Screw focussing	20/-	with pocket case, 22 6
No. 3.	40 to 120 times, with stand	65/-	

**SINCLAIR  
LONDON**

## SINCLAIR BROMOIL REQUISITES

- BOOKS.**—All photographic handbooks are supplied.
- "Bromoil and Transfer," by L. G. Gabriel .. 7/6
- "Pigment Printing," The Bromoil Process from the negative to the transfer. 37 Photogravure illustrations and numerous half-tones, by G. L. Hawkins, M.C., F.R.P.S. .. 21/-
- "The Art of Pigmenting," by Bertram Cox and F. C. Tilney .. 1/-
- "Expression in Pigmenting," by F. C. Tilney .. 1/-
- "Perfection in the Pigment Processes," by Chris. J. Symes .. 1/-
- "How to Make a Bromoil Print," concise instructions by James A. Sinclair, F.R.P.S. .. Post free on application.



## SINCLAIR TRIAL OUTFITS

Containing the essential requisites for beginners with Bromoil.

Boxed complete.

Price, 10/6

Postage in U.K., 9d. extra.

## PAPERS FOR THE BROMOIL PROCESS

Double Weight : White, Smooth or Rough : and Cream, Smooth or Rough.

6½ × 4½	8½ × 6½	10 × 8	12 × 10	15 × 12
7 pieces	6 pieces	10 × 8	12 × 10	15 × 12
1/3	12 pieces	1/6	2/2	3/3
		3/-	4/2	6/4
				9/6
				per doz.

### ACCESSORIES.

- Slabs—for pigmenting, 10 × 8, 2/-; 12 × 10, 3/-; 15 × 12 .. 4/6
- "Clairo"—a non-inflammable fluid for cleaning oil pigment brushes—per bottle, 1/6 and 2/6
- Pigmenting Palettes—plate glass, ground surface and edges. This is the best palette .. each 3/-
- Palette Knives .. each 2/-
- Blotting Boards—special thick, fluffless, 25 × 20, 5d. per sheet; per doz. 4/-
- Retouching Lancets—for removing defects or scraping up lights in prints (see page 478) .. per box 2/-
- Oil Stumps—for retouching and putting lights in wet prints, per doz. No. 1 5d. No. 2, specially fine .. per doz. 6d.
- Spirit Sensitizer—for Oil prints, including Blanchard brush, per bottle 1/9
- Flat Hog Hair Brushes—for use with Spirit Sensitizer .. each 3/-
- Tabloid Sensitizer—(B.W. & Co.) .. per carton 1/-
- Metal Clips—for hanging up prints to dry .. per doz. 2/3
- Varnish for Oil Prints .. per bottle 2/3
- Plastic Rubber—This may be moulded to any shape and is most useful for working on wet prints .. per piece 4d.
- SINCLAIR FINISHING RUBBER**—For strengthening lights on any prints. Almost magical in its effect .. per piece 6d.

**SINCLAIR  
LONDON**



# SINCLAIR'S IMPROVED BROMOIL PIGMENTS ARE THE EASIEST TO USE



## Colours.

BLACK	BURNT SIENNA
BROWN	ZINC WHITE
BROWN BLACK	VERIDIAN GREEN
SEPIA	FOLIAGE GREEN
WARM SEPIA	CADMIUM YELLOW
BURNT UMBER	LIGHT YELLOW
COBALT BLUE	RED CHALK
ULTRAMARINE	VERMILION
INDIGO	CRIMSON LAKE

**ENCRE MACHINE.** A hard warm black ink.  
**ENCRE TAILLE DOUCE.** A soft ink to mix with Encre Machine.

These two last are the inks used by Messrs. Demachy, Puyo, Read, etc.

All above colours, 1/3 per tube.

Special Colours for Three-Colour Work, 2/6 per Tube.

**MEDIUMS** for thinning the Colours.

**The Roberson Medium**—For quick drying. 6d. per Tube.

**The Sinclair Bromoil Medium**—A slow drying medium especially useful in the Transfer Process. 2/3 per large tube.



## THE SINCLAIR BROMOIL BLEACHER

**Needs no Acid Bath and  
makes Pigmenting a pleasure.**

The Sinclair Bleacher is made from our improved formula, which enables a Bromoil to be made from a more delicate print than is usual with work of the published recipes.

It is used by many leading experts.  
10 oz. concentrated solution ... 2/-  
Post Free in U.K., 2/6

**SINCLAIR  
LONDON**

# SINCLAIR BROMOIL BRUSHES

**Genuine Pole-cat Fitch Brushes.**—These are undoubtedly the best brushes for Oil and Bromoil work and will last for years if carefully used.

No. 1, 1/6	*No. 5, 2/6	No. 12, 7/6	No. 18, 16/-
No. 2, 1/7	*No. 8, 4/6	No. 14, 9/6	No. 20, 22/6
*No. 3, 1/10	*No. 10, 6/-	No. 16, 12/6	No. 24, 31/6
	No. 28 ...	50/-	

Small size for detail work, B, 8d.; C, 9d.; D, 10d. each.

\* Nos. 3, 5, 8 and 10 are also supplied "straight cut" instead of bevel shape, and are for use with a "Hopper."

**"B" Series Bromoil Brushes.**—These Brushes were introduced by us when pole-cat hair was practically unobtainable and are of excellent quality but have less resiliency.

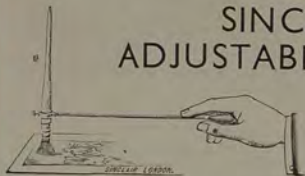
No. 0, 1/-	*No. 5, 1/6	No. 14, 3/6	No. 24, 9/-
No. 2, 1/3	*No. 8, 2/-	No. 18, 6/-	No. 28, 10/6

**"Mortimer" Brush.**—This Brush is made of long and fine hog hair, shaped like our Fitch Brushes, and will be appreciated by those who desire broad effects. It is used by the Editor of the "Amateur Photographer."

No. 1, 3/4 in. ...	3/6	No. 3, 1 1/4 in. ...	6/9
No. 2, 1 in. ...	5/-	No. 4, 1 1/2 in. ...	7/6



## SINCLAIR ADJUSTABLE HOPPER



A valuable adjunct for increasing contrast over small areas and for working clouds into the sky.

Price, 2/6 each.



## A NON-FLAM CLEANING FLUID

For Cleaning Oil Pigment Brushes, Invaluable for Cleaning and Restoring Cine Films, and the Best Cleanser and Cleaner for the Home. Cleans without injuring Silks, Satins, Woollens, Linens, Kid Gloves and Shoes, Gramophone Records or Typewriters.

Bottles, 1/6 and 2/6 each.

**SINCLAIR  
LONDON**

# BROMOIL TRANSFER PRESS



The beauty of the transfer process appeals to everyone. By its means is obtained a peculiar quality very similar to that of photo-gravure. This Press is specially designed for the process, its features being:—

Perfect alignment of rollers, eliminating the need of a blanket, and ensuring a clear cut impression without creep.

Simple and effective pressure loading device, giving the finest adjustments by the single motion of the hand wheel.

Ease and evenness of operation through the reduction gearing of ratio 3 to 1, giving easy turning with one hand.

**Dimensions:** Roller Diameters  $3\frac{1}{2}$  inches. Effective Width of Rollers 20 inches. Table  $23 \times 23$  inches. Approximate Weight 100 lb.

**Price, inclusive of Zinc Sheets** . . . . . £11 15 0

## THE "REVELLE" BROMOIL TRANSFER DESK



This Desk was designed by Mr. A. Hamilton Revelle, a very clever and artistic worker, and it is particularly adapted for those who work in the smaller sizes, say up to  $8\frac{1}{2}$  by  $6\frac{1}{2}$  in., or who wish for further power of control when transferring.

It consists of a drawing board 16 in. by  $11\frac{1}{2}$  in. in which is framed a piece of plate glass. Two zinc squares are adjustable to hold the reversed Bromoil print, and these, as well as the transfer paper, are firmly held in position by a clamping board at one end of the desk.

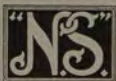
The transfer is made by pressing a "tool" on the back of the transfer paper. With this desk re-inking is unnecessary. The progress of the print can be repeatedly examined, and continued action of the "tool" on the back of it will gradually increase the strength in that part. It is evident that this desk affords scope for much selective treatment in pictorial work. Price, 25/-

Postage and packing in the U.K. 1/-.

Transfer Tools, 3/- each.

**SINCLAIR  
LONDON**

THE



UNIPOD



Invaluable for users of clockwork driven Kiné Cameras and greatly appreciated by hand-camera workers who wish to give the slower exposures satisfactorily.

It is impossible to do justice to this well-designed Unipod in our illustration. In appearance it is like a walking-stick when closed, beautifully finished with black enamel, and is  $37\frac{1}{2}$  inches long. It extends to 68 inches and is absolutely rigid. It is constructed of drawn steel tube, and the inner section is nickel-plated with dull finish as a protection against rust. The black wooden knob is removed for use, and it can be supplied with  $\frac{1}{4}$ -inch Whitworth or Continental screw thread. When a camera is on this Unipod it can easily be held rigidly for exposures of  $\frac{1}{2}$ ,  $\frac{1}{3}$  and  $\frac{1}{4}$  second.

Weight,  $1\frac{1}{2}$  lb.

HERBERT G. PONTING, Esq., F.R.G.S., writes: "I am delighted with the Unipod. It will be indispensable to me in the future."

Price . . 35/-

Adapter, so that Unipod can be used with both $\frac{1}{4}$ Whitworth and Continental thread	.. ..	7/6
Leather Sling Handle	.. ..	1/9

## THE PEN PRINT TRIMMER and RETOUCHING LANCET



This admirable little instrument should be kept in every photographer's pocket, or on the workroom table. For trimming prints, scraping out defects, or inserting a high light it is the best tool available, and being made of the finest steel it can be sharpened to a keen edge.

Nickel Boxes containing 20 Lancets

Price, including Holder .. per box 2/-

**SINCLAIR  
LONDON**



# THE "SINCLAIR" RANGE FINDER

IS THE PERFECT ONE-MAN  
INSTRUMENT

Some advantages and uses of  
the "Sinclair" Range Finder

## MILITARY

It can be used for taking ranges and dimensions of any distant object with great exactness by one man.

It registers the ratio of distance to base, and makes the base at the point observed.

It will measure the distance of an object without the observer having to move in a lateral position.

It may be used as a Depression Range Finder, without the necessity for a pedestal or levelling.

It can be used during attack, when, owing to enemy's fire, only a momentary observation is possible and will give the range without the necessity for leaving cover.

## NAVAL

It may be used as a Range Finder from a fighting top.

It may be used from sea level when attacking permanent land fortifications.

It is the best instrument for Station Keeping and Coast Navigation.

It is unrivalled for rapid sextant work when it is advantageous to avoid the delay of consulting mathematical tables.

## SURVEYING

It is the best instrument for Rapid and Accurate Survey Work, used in conjunction with a Plane Table.

**The "Sinclair" Range Finder does not need a definite Base, Mathematical Tables or Difficult Calculation.**

Weight in case complete, 2 lb.

Price, including leather sling case . . . . . £7 10 0

*Send for Descriptive Booklet.*

**SINCLAIR  
LONDON**

WE STOCK  
MOVING PICTURE  
CAMERAS AND PROJECTORS  
FOR AMATEUR AND PROFESSIONAL USE

AGFA  
BELL & HOWELL  
BOLEX  
DE VRY  
ENSIGN

NEWMAN-SINCLAIR  
PATHE  
SIEMENS & HALSKE  
VICTOR  
ZEISS

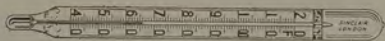
KODAK

MINIATURE CAMERAS OF ALL  
THE LEADING MAKES

We hold a full stock of Leica Cameras and Accessories and specialise in Developing, Printing and making Lantern Slides from Leica films.

THE "SINCLAIR" LEGIBLE  
THERMOMETER

This Thermometer will be found of great value when working with red and green safe lights, the scale being a very open one, and the figures of a large size.



The former has a range of from 40° to 120° F. and the scale is of opal contained in a glass tube and consequently unaffected by chemicals. The mercury tube has a magnifying lens front. The thermometer is sent out in a cardboard case and is 8½ in. long.

Price .. 6/6

**SINCLAIR  
LONDON**



# AUTO KINE' CAMERAS

(Newman and Sinclair's Patents)

REGULAR, STUDIO and  
SLOW MOTION MODELS



Mr. Robert J. Flaherty filming "Man of Aran" with the "N.S." Auto Kine' Camera.—by courtesy of the Gaumont-British Picture Corporation Ltd.

**THE MOST MARVELLOUS CLOCKWORK-DRIVEN CAMERAS  
IN THE WORLD.**

Amongst notable users may be mentioned:—

- H.M. Admiralty.
- H.M. Air Board.
- H.M. Post Office.
- The Empire Marketing Board.
- The London County Council.

**SINCLAIR  
LONDON**

## THE "N.S." AUTO KINE' CAMERA—Regular Model—cont.

The "N.S." Auto Kine' Camera is the only instrument capable of exposing 200 ft. 35 mm. film with one winding and at a practically constant speed throughout the run within a variation of only 4 per cent. The speed can be varied from 10 to 24 frames per second. The starting and stopping are instantaneous, and no film is wasted in getting up speed. No tripod is necessary when using normal focus lenses, and the camera can be used as easily as a hand camera.

The addition of a Unipod relieves the operator from supporting the weight of the camera and does not detract from its portability or the facility with which it can be directed and operated. With the "N.S." Auto Kine' Camera one may photograph from the ground level or from the top of a ladder, in a crowded sports ground, or from an aeroplane. It may be pointed directly upward or directly down, or the camera can be inverted for taking reverse action pictures. Separate film reservoirs are used, and a new film can be placed in the camera in 10 seconds.

Almost any focus lens can be fitted, and the method of changing lenses is simple and expeditious. Each lens in its mount carries its own focussing scale.

### SPECIFICATION.

#### ITS CONSTRUCTION

The "N.S." Auto Kine' Camera is made entirely of metal, Duralumin being used. The box-like shape makes it a very convenient instrument to handle and carry.

#### THE FILM BOX

This box is made of Duralumin. It is rectangular in form, without projecting mechanism. It holds 200 ft. of film, and into the same box the film is automatically wound after exposure. At any time the box can be removed from the camera in daylight and another box of film inserted in its place in from 10 to 15 seconds.

#### THE FINDER

The Finder is self-contained, and is viewed by looking through the instrument. It shows the image the right way up and the right way round, and is adjusted to show the screen picture. Supplementary Finder Lenses are provided to suit the different foci of the camera lenses so that the real size of the finder picture remains constant although the angle of view is altered. This relates to lenses up to 4 in. (100 mm.) focus. Where longer focus lenses are supplied masks may be used, and in the case of very long focus lenses telescopic sight finders can be fitted. The film measuring index is visible in the finder, and the operator at all times can see the amount of film used.

#### LEVEL

A level is placed under the measuring index in the finder and can be seen at the same time as the picture.

#### LENSES

The lenses normally fitted are the 2 in. (50 mm.) F/1.9 or F/3.5 Ross "Xpres" Lenses, and extra lenses can be supplied 10 any focus mounted on "N.S." Focussing Mounts. These mounts can be expeditiously removed from the camera, and are perfectly light tight.

#### THE MECHANISM

The camera is driven by two springs, both of which are wound to the full at starting, but either spring can be wound at any time, even when the camera is in action or running.

**Absolutely silent ratches are employed, so that no attention is drawn to the camera whilst winding.**

A regulator permits the film to be driven at any desired rate from 10 to 24 frames a second, and provided the camera is loaded with fresh and properly perforated film, it will drive the whole 200 ft. with one wind of the mechanism. The camera is provided with a punch to record the end of a picture and this is situated at the front of the instrument. The gate is designed to eliminate scratching or "static" markings and holds the film rigid while each picture is taken. It is easily removed when cleaning is necessary. The camera is loaded in a few seconds. There is no threading up.

#### SUPPLEMENTARY FITTINGS FOR SPECIAL WORK

A Reflex Focussing Finder can be had which magnifies the image, and by its use close-up pictures and those given with Tele-photo Lenses can be correctly focussed. For scientific work, extension tubes can be supplied so that full-sized or enlarged images may be obtained. Special means for releasing the camera from a distance, apparatus for delayed action, and focussing apparatus, to be used in almost any position can be added. Means for focussing and setting the iris from the back of the camera can be supplied, and these can be operated, if desired when the camera is in action. The camera may be used on an ordinary tripod, its automatic action leaving the operator with both hands free.

**SINCLAIR  
LONDON**



## THE "N.S." AUTO KINE' CAMERA—Regular Model—cont.

## SPECIFICATION—continued.

Captain Roger Hillsman, United States Army, writes from Manila :

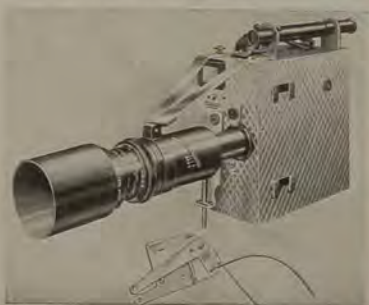
"You may refer anyone to me regarding the Auto Kine' Camera and it will be my pleasure to recommend it above all makes of clockwork-driven motion picture cameras. You have in me a living advertisement for your excellent product."

From BRITISH INSTRUCTIONAL FILMS LTD.,

Welwyn Garden City, Herts :

"You will be interested to get a report on the two clockwork cameras supplied. These proved an unqualified success. They never jammed and the pictures taken with them are rock steady.

With regard to the distant release fittings, we found these of the utmost use. Dangerous animals can be allowed to walk right up to the camera, which was hardly advisable with a camera which had to be cranked by hand. Under the very roughest conditions they never gave us a moment's anxiety."



The "N.S." Auto Kine' Camera fitted with 17 in. Telephoto Lens, special Telescopic Finder and Court-Treatt Starting and Stopping Device.

Yours faithfully,

For and on behalf of

BRITISH INSTRUCTIONAL FILMS LTD.,  
(Signed) C. COURT-TREATT.

**NET CASH PRICES in LONDON of the "N.S." AUTO KINE' CAMERA and ACCESSORIES (REGULAR MODEL)**

Size, 9½ × 4½ × 9½ in. (24 × 12 × 24 cm.)	Net Cash Prices	Code Word
Weight, 17 lbs. (7.8 kilos.)	£ s. d.	
"N.S." Auto Kine' Camera, complete with film box as described and 2 in. (50 mm.) F/3.5 Ross "Xpres" Lens ... ..	120 0 0	SPEEDED
Ditto, with 1½ in. (37 mm.) F/3.5 Ross "Special Xpres" Lens ... ..	120 0 0	SPEDIEREN
Ditto, with 2 in. (50 mm.) F/2.9 Dallmeyer "Pentac" Lens ... ..	122 5 0	SPEDITIVO
Ditto, with 2 in. (50 mm.) F/1.9 Ross "Xpres" Lens ... ..	124 10 0	SPEECHFUL
Best Hand-Sewn Solid Leather Case with lock and key and sling strap ... ..	4 15 0	SPEEDING
Extra Film Boxes for 200 ft. 35 mm. film each	8 10 0	SPEEDWELL

**SINCLAIR  
LONDON**

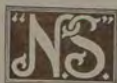
## THE "N.S." AUTO KINE' CAMERA—Regular Model—cont.

	Net Cash Prices		Code
	£	s. d.	Word
Best Hand-Sewn Solid Leather Case for two extra film boxes and extra lenses ...	4	10 0	SPEELGOED
Filter Holder for front of lens mount, to take 2 inch square filters ...	1	17 6	SPELTVELD
"K" or "X" Filters for above ...	0	10 0	
Extra Cost of Reflex Focussing Device, if ordered with camera ...	10	0 0	SPEEKJES
Devices for focussing, and altering Iris Diaphragm from back of the Camera; with Filter Holder ...	15	0 0	SPEELOCH
Court-Treatt Starting and Stopping Device ...	8	10 0	SPEIDEL
"N.S." Kine' Tripod with Revolving Top only ...	33	0 0	SPELFONT
"N.S." Kine' Tripod with Universal Revolving and Tilting Top ...	55	0 0	SPELLFUL
Set of two Cases for Kine' Tripod and Top ...	4	10 0	SPELLASSI
"N.S." Unipod (page 478) ...	1	15 0	STABILIFY

## SUPPLEMENTARY LENSES :

The price in each case includes the "N.S." Special Focussing Mount, Hood for Lens where necessary, and Finder Correcting Lens in frame fitting, for placing at the front of the regular finder lens, so that the view given by the finder will coincide with that given when using the supplementary lens. In the case of lenses longer in focus than 9 in. this finder lens is not supplied, but sighting pointers are fixed on the camera, and the Reflex Device for accurate focussing on near distances is recommended.

	Net Cash Prices		Code
	£	s. d.	Word
1½-in. F/1.9 Ross "Xpres" Lens and fittings as described ...	14	10 0	SPEELBORD
1½-in. F/3.5 Ross "Special Xpres" and fittings as described ...	10	10 0	SPEELHOL
2-in. F/1.9 Ross "Xpres" Lens and fittings as described ...	15	0 0	SPEGNENDO
2-in. F/3.5 Ross "Xpres" Lens and fittings as described ...	10	10 0	SPEGNIATE
3-in. F/1.9 Ross "Xpres" Lens and fittings as described ...	17	0 0	SPELTLAND
3-in. F/3.5 Ross "Xpres" Lens and fittings as described ...	11	10 0	SPEELKAS
4-in. F/3.5 Ross "Xpres" Lens and fittings as described ...	13	0 0	SPEELMAN
6-in. F/4.5 Ross "Xpres" Lens and fittings as described ...	14	10 0	SPEICHEN
6½-in. F/5.5 Ross "Teleros" Lens and fittings as described ...	14	0 0	SPEELNOOT
9-in. F/5.5 Ross "Teleros" Lens and fittings as described ...	17	10 0	SPEIREES
11-in. F/5.5 Ross "Teleros" Lens and fittings as described ...	20	0 0	SPIESEN
13-in. F/6.3 Ross "Teleros" Lens and fittings as described ...	20	10 0	SPEKMES
17-in. F/6.3 Ross "Teleros" Lens and fittings as described ...	30	0 0	SPEKMUIS
17-in. F/5.5 Ross "Teleros" Lens with special fittings and telescopic finder ...	47	10 0	SPEKNEK
2-in. F/2.9 Dallmeyer "Pentac" Lens and fittings as described ...	12	15 0	SPEELSCH
6-in. F/3.5 Dallmeyer "Dallon" Lens and fittings as described ...	19	0 0	SPEERHAI



## AUTO KINE' CAMERA

IS  
UNSURPASSED  
FOR  
AERIAL WORK

IT IS USED BY THE  
ROYAL AIR FORCE



Revolving turntable in  
floor of Aeroplane

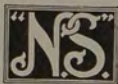
THREE OF THESE  
CAMERAS WERE USED  
BY MESSRS. GAUMONT  
FOR THEIR FILM  
OF THE HOUSTON  
EVEREST FLIGHT.



Underside of Aeroplane  
showing Camera

These illustrations show the value of our mechanical drive for aeroplane work. The two handles, in the upper illustration, serve to rotate the Camera fixed under the Turntable, and to lift it into the plane in order to insert a fresh film.

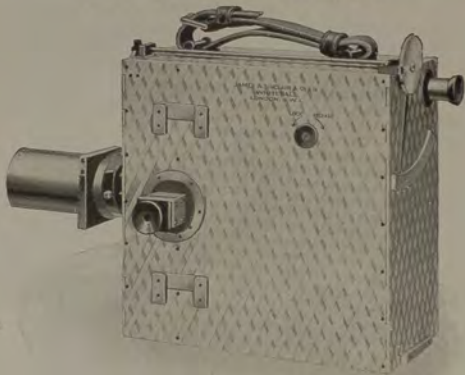
**SINCLAIR  
LONDON**



# AUTO KINE' CAMERA

## STUDIO MODEL

**THIS IS THE AUTOMATIC CAMERA DE LUXE AND HAS ALL THE REFINEMENTS REQUIRED BY THE MOST EXACTING WORKERS.**



The "N.S." Auto Kine' Camera with rear focussing and iris controls, Reflex finder, Filter holder and Lens Hood.

**IT DRIVES NEARLY 200 FT. 35 MM. FILM WITH ONE WIND OF THE MECHANISM.**

**IT HAS FOCUSING AND IRIS CONTROLS ARRANGED TO WORK AT THE BACK OF THE CAMERA AND THEY CAN BE USED WHILE THE INSTRUMENT IS RUNNING.**

**IT CAN BE USED FOR "FADE IN" AND "FADE OUT" EFFECTS.**

**SINCLAIR  
LONDON**

# THE "N.S." AUTO KINE' CAMERA

STUDIO MODEL.—*continued.*

IT CAN BE USED FOR "MIXES."

IT HAS A "ONE TURN ONE PICTURE" HANDLE.

IT CAN BE RUN AT SPEEDS VARYING FROM 10 TO 24 FRAMES A SECOND.

IT HAS A FILTER HOLDER INTO WHICH FILTERS CAN BE INSERTED AND QUICKLY CHANGED.

IT HAS A REFLEX FOCUSING DEVICE PERMITTING OF ACCURATE FOCUSING WHEN TAKING "CLOSE UPS" OR WHEN USING LONG FOCUS LENSES.

This model is in appearance and general construction very similar to our Regular Model but embodies all the additions that have been fitted from time to time. The measurements of the camera body and boxes are the same as those of the Regular instrument, but the boxes differ in construction so that the film may be reversed in them. It drives 180 feet with one wind of the mechanism.

Extra lenses and their fitments cost the same price as those listed for the Regular Model, but the special focussing and iris controls from the back of the camera are not fitted to these extra lenses.

	Net Cash Prices			Code Word
	£	s.	d.	
Price of Studio Model with F/1.9 Ross "Xpres" Lens .. ..	199	10	0	SPEKTRUM
Extra Film Boxes .. .. each	8	10	0	SPELATORE
2 in. square "K" or "X" Filters .. .. each	0	10	0	
Hand-sewn Solid Leather Case to hold camera as above .. ..	5	5	0	SPELAZZO
"N.S." Unipod (page 478) .. ..	1	15	0	STABILIFY
"N.S." Tripod Stand with Universal control for Panoram and Tilting Top .. ..	55	0	0	SPELLFUL

**SINCLAIR  
LONDON**



## AUTO KINE' CAMERA

### SLOW MOTION MODEL

THE FIRST  
AND ONLY  
CLOCKWORK  
DRIVEN  
CAMERA  
FOR  
SLOW  
MOTION  
WORK.



IT REQUIRES NO TRIPOD  
NO WINCH HANDLE  
NO FLEXIBLE DRIVE  
NO MOTOR  
NO ACCUMULATOR  
NO HARD WORK

IT HAS VARIABLE SPEED 40 to 120 FRAMES A SECOND.

IT RUNS 100 FEET WITH ONE WIND OF THE MECHANISM.

IT PASSES ONLY 18 INCHES FILM BEFORE FULL RATE IS OBTAINED.

IT CAN BE STOPPED AND RE-STARTED with a loss of only two feet of under speeded film.

**SINCLAIR  
LONDON**

## THE "N.S." AUTO KINE' CAMERA

### SLOW MOTION MODEL—*continued.*

In general appearance this camera is very similar to our Regular and Professional Models, but somewhat smaller. It is only intended for the special work of analysing the sequence of motion. Pictures taken at a high rate of speed and shown at the normal rate have a great fascination for any observer, quite apart from their scientific value in deciding what actually takes place in a movement that is not seen by the eye. Hitherto cameras for this work have been exceedingly heavy and very costly. Driving the mechanism is generally a toil, and a great quantity of film is wasted before the instruments attain their indicated speed. In the "N.S." Camera the difficulties hitherto characteristic of this work have been surmounted. The camera is light and does not need a tripod. No laborious work is necessary. The mechanism is wound up and only requires a slight pressure on the camera release to set the film running at the rate decided upon, and there is no heavy loss of film when starting up.

Size, 10 × 5 × 8½ in.

Weight, 19 lbs.

	Net Cash Prices	Code Word
	£ s. d.	
"N.S." Slow Motion Auto Kine' Camera with 2 in. F/1.9 Ross "Xpres" Lens . . . . .	170 0 0	SPERNES
Hand-sewn Solid Leather Case with lock and key and sling strap . .	4 15 0	SPERNIMUS
Extra Film Boxes for 100 ft. 35 mm film . . . . .	8 10 0	SPERNETIS
"N.S." Unipod (see page 478) . .	1 15 0	STABILIFY
"N.S." Kine' Tripod with Univer- sal control to Panoram and Tilting Top . . . . .	55 0 0	SPELLFUL

**SINCLAIR  
LONDON**



# KINE' TRIPODS

THEY ARE  
THE BEST  
IN THE  
WORLD

THEY  
COMBINE  
LIGHTNESS  
WITH  
RIGIDITY

MARVELLOUS  
RANGE  
OF  
MOVEMENT



This stand is made entirely of metal, and although weighing only 19 lbs. is the strongest and steadiest stand yet produced. The elevating head is made in two forms, Type I being for the "N.S." Auto Kine' Camera and Type II for the "N.S." Standard Kine' Camera, and which can be fitted to most other cameras.

The novel feature of both types is the method by which the weight of the camera is kept in the centre of the tripod, no matter at what angle the camera is tilted. Type I, as used for the "N.S." Auto Kine' Camera, allows the camera to revolve on its axis so that it can be used pointing directly upwards, or the camera may be inverted for trick work. Type II, as used for other cameras, is illustrated on page 492. This can be lifted or depressed to an angle of 40° from the horizontal. The lever arm controls all the movements so that with both types the cameras can be made to traverse either in a vertical, horizontal, or diagonal direction. The start of the movement in either direction is absolutely without jerk, and can be arrested immediately. The mechanism contains no gearing of any kind, is of great simplicity, and not liable to derangement.

**SINCLAIR  
LONDON**



## "N.S." AUTO KINE' TRIPOD—*continued.*

The legs are quickly detachable for transport and can be fixed instantly.

The height can be altered with great facility, the legs sliding very freely, and the changing being easy and certain. A special fixing is provided for our Auto Camera which allows it to be affixed or detached in two seconds.

	Net Cash Prices			Code Word
	£	s.	d.	
The Stand complete with revolving and tilting top, Type I, for "N.S." Auto Kine' Camera (Page 490) . .	55	0	0	SPELLFUL
Ditto, Type II, for "N.S." Standard Kine' and other makes (Page 492) . . . . .	55	0	0	SPELONCA
The Stand with revolving top only weighing 12 lbs. 10 ozs., costs . .	33	0	0	SPELFONT



For transit we recommend our Mail Canvas Cases. These are strengthened with leather binding. Two cases are supplied, one holding the Tripod Legs and the other the Revolving and Tilting Tops. The weight of Tripod, complete with the two cases, is 26 lbs. (12 kilos.).

Price of the Two Cases . . . . .	Price			Code Word
	£	s.	d.	
	4	10	0	SPELLASSI

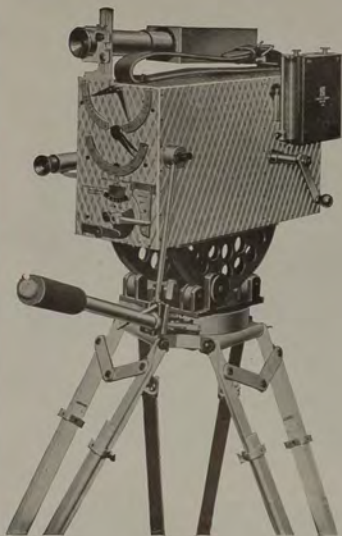
**SINCLAIR  
LONDON**



No. 4 STANDARD  
**KINE' CAMERA**

with HAND and  
ELECTRIC DRIVE

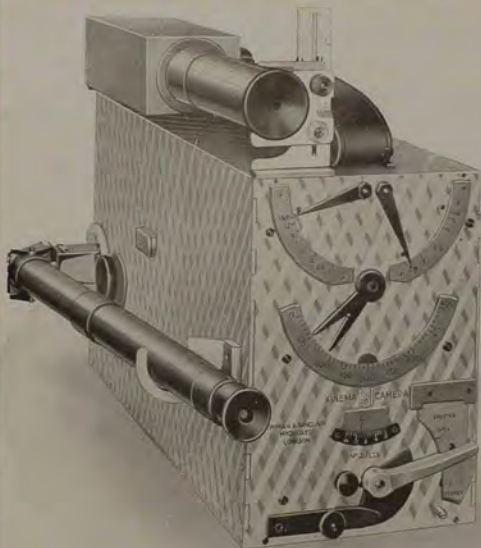
(NEWMAN & SINCLAIR'S PATENTS)



THIS  
CAMERA  
CAN  
BE  
SUPPLIED  
FOR USE  
WITH  
ORDINARY  
ELECTRIC  
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"N.S." No. 4 Standard Kine' Camera with motor, on "N.S."  
Kine' Tripod with Revolving and Tilting Top.

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THE "N.S." STANDARD KINE' CAMERA—*continued*

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## THE "N.S." STANDARD KINE' CAMERA—*continued.*

- We have no hesitation in stating that our No. 4 "N.S." Kine' Camera is the most perfect instrument that has ever been made for the highest class Studio or Topical work, and is equally without peer for the Explorer or Scientist.
- In general form the No. 4 Model is something like the Newman-Sinclair instruments which achieved so much success in the Great War, but the details of construction are such as to meet the demands of advanced modern studios where "effect" studies play a prominent part. The No. 4 "N.S." Kine' Camera greatly simplifies the production of the most elaborate effects, while its accuracy and reliability of construction makes it pre-eminent in this and every other sphere of moving picture photography.

### SPECIFICATION.

**Camera built entirely of metal**, all parts being milled out of the solid, no castings being used. The metal is almost as light as aluminium, but is free from that metal's instability, and in its general characteristics and properties for standing shocks and strains, resembles mild steel. Being light in colour, it reflects heat, and is therefore particularly adapted for tropical climates.

**All works easily visible** when the doors are opened, and every part accessible for cleaning.

**Reversing Action** by merely turning the handle backwards. No bands to be shifted.

**Square Film Boxes (holding 400 ft.)**, entirely without projections which automatically gear when placed in the camera. The absence of projections and the square form make them the most convenient for packing and transport. These boxes are provided with mouths which automatically open when closing the camera, and they entirely obviate electrical markings or "static."

**Film Counter.** This is at the back of the camera, and shows the amount of exposed film in the camera, and the length to a single picture determined at any moment. Each individual picture is recorded, and can be returned to after exposing any length of film.

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## THE "N.S." STANDARD KINE' CAMERA—*continued.*

**Focussing** can be accomplished by three methods. Firstly, by a reflex focussing arrangement which carries a magnifying eye-piece or periscope on the side of the camera. Secondly, by an accurate scale focussing seen from the back of the camera. Thirdly, by a prism eye-piece for magnifying the image through the film itself.

**Iris worked from the back of the Camera**, by the movement of a lever, accurately scaled. The same scale may be adjusted to automatically work with both 2 and 3 in. lenses, without alteration.

**Lenses interchangeable** on interchangeable fittings, which can be attached or detached with one hand only.

**Single picture handle** always in position.

**Brilliant Finder.** Each camera is supplied with a brilliant finder, which is quickly attached or removed from the top of the camera, and this finder is without parallax, and is provided with a scale for accurately setting its frame for close-up work.

**Lever Shutter Fade.** The shutter is nearly 180° when open and this shutter is controlled by a lever at the back of the camera. Depressing this lever closes the shutter, and when the shutter is quite closed a catch holds the lever in position; the mechanism at the same moment is stopped by a brake. A second catch is provided, which, while retaining the shutter in the closed position, allows the mechanism to run freely, so that in "mixes" the film can be worked backwards to the desired amount without exposing it. The opening of the shutter can thus be controlled from the back of the camera. A scale is provided which shows the amount of opening and the setting can be fixed by turning a milled knob. The camera is provided with a clamping non-scratching gate; the film is quite free during its movements and is guided in such a way that neither the back nor the front of the film touches any part except the edges. It is automatically dropped upon a pilot pin and a clamp holds it flat during exposure. The complete gate is easily removed for cleaning.

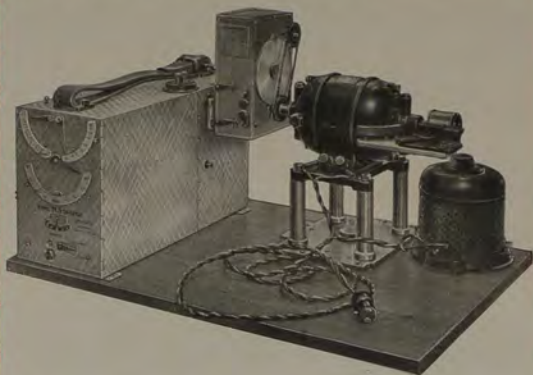
### SUPPLEMENTARY FITTINGS.

**The "N.S." Automatic Electric Drive.** Owing to the extraordinary ease with which the "N.S." Kine' Camera runs, we are able to drive it with a small motor that only weighs 3½ lbs. The power for the motor is obtained either from any ordinary electric supply, or from a battery which, with its containing box, weighs 18 lbs. and will drive 4,000 ft. without recharging. When the camera is used with the ordinary electric supply a Transformer and Rectifier, both light and portable, are then sent with the outfit. For those who require it, we also provide a **Relay Instrument** complete in box, by means of which the camera can be started and stopped at any distance up to 100 yards, and longer distance relays can be made to order. Full particulars will be found in our Kine' Camera Catalogue.

**The "N.S." Vignetting and Dissolving Apparatus.** This apparatus consists of a bellows fitting carrying at the front our improved "N.S." Iris Attachment and Adjustable Card Carrier. This iris can be set to vignette any portion of the picture, and is so constructed that it gradually and **entirely** closes and it can also be set to open or close to any definite point. The front card holder enables a roller blind or curtain effect to be produced. A second attachment forms a complete vignetting device, which enables squares, rectangles, ovals or blind effects to be produced at any part of the picture.

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## THE "N.S." STANDARD KINE' CAMERA—*continued.*



The "N.S." Standard Kine' Camera as supplied to Cambridge Zoological Laboratory, taking pictures at speeds from 10 to 40 per second and with geared control to take pictures at intervals of 1, 2, 4, 8, 16 and 32 seconds, for use with mains current.

Concerning the tour of H.R.H. The Prince of Wales in South Africa and South America, H. Bruce Wolfe, Esq., of the British Instructional Films, sent the following extract from a report by Mr. Barkas, their chief Operator :—

"I find that it is very handy, light in weight, simple in operation and exceedingly quick off the mark. It is silent. As a machine for this type of work, or for work in the Tropics or in severe cold, I would recommend the Newman-Sinclair."

Mr. Harry Burton, of the Metropolitan Museum of Art, New York, writes :—  
"The Camera acted splendidly, as always."

Captain J. Noel, F.R.G.S., the official photographer to the Mount Everest Expedition, writes :—

"At all times the camera behaved perfectly, and during all my climbs I found the apparatus never a burden but always a pleasure to operate. I could not have got my pictures unless my camera had been so portable and efficient."

The "N.S." Camera is the easiest camera to thread, using a minimum quantity of film and can be threaded as easily backwards as forwards. It is the lightest running camera ever made.

Size of Camera with 2 film boxes, 14 × 5½ × 8 in. (355 × 146 × 204 mm.).  
Weight, 18 lbs. 5 oz. (8.3 kilos.).

THE "N.S." STANDARD KINE' CAMERA—*continued.*

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Relay Instrument complete in box, for driving camera at any distance up to 100 yards ...	20	0	0	SPAIANDO
"N.S." Geared Mechanism for automatically taking slowly moving objects. Taking single pictures in 1, 2, 4, 8 or 12 seconds ... ..	20	0	0	SPAIATE
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<b>Supplementary Lenses</b> with Control adjustments for focussing and altering diaphragms from back of the camera :				
1½ in. (37 mm.) F/3.5 Ross "Xpres" Lens Special ... ..	15	10	0	SPANADER
3 in. (75 mm.) F/3.5 Ross "Xpres" Lens ...	15	10	0	SPADONIES
<b>Supplementary Lenses</b> in "N.S." Special Helical Focussing Mounts, Hoods and finder masks.				
4 in. F/3.5 Ross "Xpres" Lens ... ..	15	0	0	SPANIOPE
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For Telephoto Lenses and other fittings see Kine' Catalogue.

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8/235.	— $\frac{1}{4}$ -Plate Folding Mentor Reflex; Tessar F/4.5; F.P. Shutter $\frac{1}{2}$ sec. to 1/1300th, T. & B.; Focussing Screen; Moving Front; F.P.A.; Graflex R.F. Adapter; Case ... ..	10	12	6
2/291.	— $\frac{1}{4}$ -Plate Goerz Anschütz Focal Plane; Dagor F/6.8; Shutter 1/15th to 1/1200th, T. & B.; Moving Front; Focussing; 8 Slides; Case ... ..	6	10	0
5/305.	—B. & H. "Filmo 70" Double Speed Camera; Dallmeyer F/1.9; Take-up Reel; Telescope View-finder; Spring-driven; Footage Indicator; Case ... ..	20	0	0
5/308.	—Zeiss Ikon K.S.10—16 m/m. Cine Camera; Sonnar F/1.4; Daylight-loading; Clockwork Motor; Scale; Delayed Action; Case ... ..	30	0	0

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The GRANVILLE FREE FILM SCHEME was introduced in England two seasons ago. The response was amazing to what was described as a ridiculous proposition. No less than three hundred finishers are now taking part and results prove that FREE FILMS increase sales tremendously, not only D & P, but all other photographic requirements. Our films are now being marketed in Australia, Belgium, Finland, Holland, India, Newfoundland, Portugal, South Africa and Switzerland. Correspondence is taking place with many other countries, and it appears to be a practicable proposition everywhere, irrespective of prices for D & P. Where low prices are being charged for prints, the scheme offers the advantage of better prices. The films in outward appearance are similar to the usual films, but they are paper base, and printing is done by reflection. The only additional apparatus required is the printing and enlarging machine at a cost of £7 10s. Films are developed in the usual way, except greater care must be taken not to over-develop; washed and dried as ordinary films. They are easier to handle, printed in strip form, and require less time for all processes. Printing is simple and exposure no longer than two seconds with bromide papers. The films are made in three popular sizes, all 8 exposures. They cost very much less and results are equally as good. The average number of prints per 8-exposure spool is 7.4 against 6.8, mainly because they allow more latitude with under-exposure.

*Our advertising slogan—*

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15	5½	4½ × 3½	2	1/s	5 10 0	6 15 0	—
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16A	6	5 × 4	2	2	7 0 0	8 5 0	—
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18	8	6½ × 4½	2½	3	9 5 0	10 10 0	10 5 0
19	9½	8 × 5	2½	—	13 5 0	—	14 5 0
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28	11	15 × 12	2½	—	12 0 0	—	—

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7	7½	6½ × 4½	1½	1	3 0 0	4 5 0	—
8	9	8 × 5	1½	2	4 0 0	5 5 0	—
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
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$3\frac{1}{2} \times 3\frac{1}{2}$	...	5 3	$6\frac{1}{2} \times 4\frac{3}{4}$	...	11 6	6 × 13 cm.	5 9	
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up to $\frac{1}{4}$ -plate	0 9		$8\frac{1}{2} \times 6\frac{1}{2}$	...	2 0	6 × 13 cm.	0 9	
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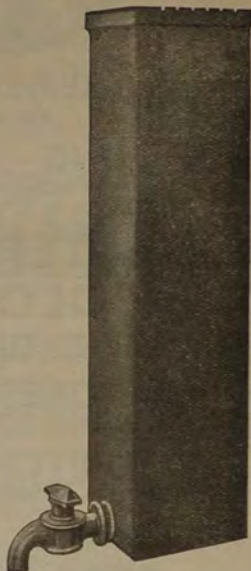
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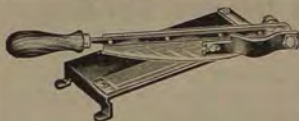
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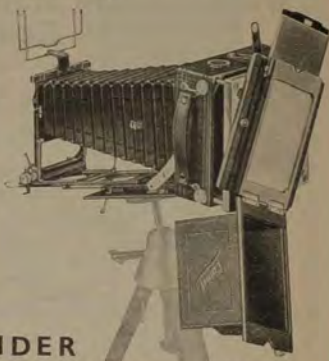
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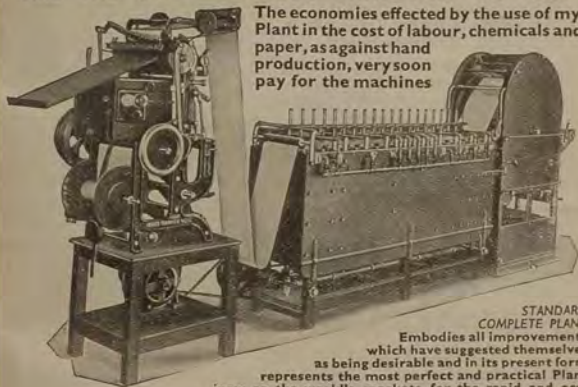
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**EVERY PROJECTOR IN STOCK** by Kodak, Ensign, Bolex, Victor Pathoscope, etc. Our range is most comprehensive and expert advice is given free at any time.



CINE-KODAK SPECIAL

**CINE KODAK SPECIAL.** With removable magazine holding 100 ft. of film. Rotating turret fitted with 1 in. F/1.9 and 3 in. F/4.5 lenses. Magnified prism focussing on gate. Variable speeds, 8 to 64 frames. £155. The "Professional" Camera for the advanced amateur.

**ALL CINE-KODAKS IN STOCK** including Model "BB," 13 Gns.; Model "K," £35, and all Kodascope Projectors.

**SIEMENS PROJECTORS. HOME MODEL,** with a light value of 60 lumens. £36.

**STANDARD** with 200 watt lamp giving 130 lumens screen brilliance by special optical system. £66.

**SUPER LUX,** Siemens finest projector; 750 lumens. £110.



SIEMENS CINE MODEL "B"

**SIEMENS CINE CAMERAS. MODEL "B,"** real daylight loading. 5 speeds. F/2.8 lens, 8, 16 and 64 pictures per second. Single picture device. Direct and reflecting view finders. Image indication, etc. £78.

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MODEL "C," Meyer Plasmat F/1.5 lens. Lamp aperture automatically controlled with speed being used by new differential coupling. Daylight loading and latest refinements. £66.

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# The Best Service in the World

**FOUNDED IN 1839** we have been supplying discriminating photographers for nearly a century. A service with this experience means your safety in dealing.

**OVERSEAS ORDERS.** Special care is taken to ensure that all needs are adequately fulfilled and goods packed to ensure safe transit to any part of the world. Cash with order.

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**CINE DEMONSTRATION ROOMS AND FILM LIBRARY.** You can call at Bond St. for a demonstration of any cine projector. Our film library is the greatest and to some cine entertainment. Latest films at low hire rates.

**COMMERCIAL & CINEPHOTOGRAPHY.** We have an expert staff and studios for commercial photography of every description. Publicity films taken on 16 mm. stock by qualified cinephotographers. Aerial pictures taken—we have our own pilots and planes.

Send for quotations.

**D. & P., LEICA AND OTHER SMALL FILMS.** Latest apparatus for ordinary D. & P. and for contact prints or enlargements from Leica and other small films. Quick quality work.

## BOUQUETS FROM ALL OVER THE WORLD

Amman, Transjordania.  
I was very pleased with the quality and condition of the goods, which leaves nothing to be desired, and it reflects great credit on the way in which your business is conducted. D.W.J./R.A.F.

United Provinces, India.  
I was much impressed with the excellence and up-to-date-ness of your service in London and the fact that it also reaches an out-of-the-way place like this reflects great credit on you. L.W.M.

Norwich.  
I duly received the 1-plate camera, which suits my purpose admirably. I have had a number of dealings with cameras but this is the most amazing value I have ever struck. S.M.

London, W.C. 2.  
Client rang up specially to express appreciation of development of yesterday's films of Queen of Roumania. Please pass on to right quarter.

Macclesfield.  
Although I quite realise the disadvantages of being so far away as regards the picking up of bargains, one never expects to receive such generous treatment, as I have received by you. V.L.

# WALLACE HEATON LTD.

*The Amateur Cine People*

**119, NEW BOND STREET, LONDON, W. 1**

PHONE: MAYFAIR, 0924-5-5

GRAMS: ZODIACARIA, WESDO, LONDON

and at 47, Berkeley St., Piccadilly, W.1



**ZEISS  
IKON**

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- Enquiries from other territories to be addressed:  
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**ZEISS IKON LTD., Mortimer House, Mortimer St., LONDON, W.1.**



# Perfection in Miniature Precision Cameras

The **CONTAX** is the camera of which photographers everywhere have dreamed. It is compact. It is a perfect example of precision work. It has the exact focussing of the reflex, the high speeds of the Press camera, the facility of interchangeability of lenses of the so-called universal camera, and all the convenience of the roll film camera. In fact, the Contax will undertake such a wide range of subjects that some are sceptical of the wide claims made until they see specimens of work actually produced. Subjects as widely differing as high speed sports photography, requiring speeds up to 1/1000th second, and night work at the theatre, dinner parties by artificial light, etc., can be easily tackled if the camera is equipped with either the Tessar  $f/2.8$ , the Sonnar  $f/2$  or the Sonnar  $f/1.5$ . The new all-metal four-group speeded focal plane shutter is

## AN INNOVATION

Controlled by ONE KNOB the Contax Shutter gives

**TIME GROUP**—Time and 1/2 second.

**NIGHT PICTURES GROUP**—1/5th and 1/10th second.

**NORMAL GROUP** (for average subjects), 1/25, 1/50, 1/100th second.

**SPORTS GROUP**—1/100, 1/200, 1/500 and a real 1/1000th second.

### Note the following special Contax features

- 1 All metal construction, even metal focal plane shutter, 1/2 to 1/1000th second and Time.
- 2 Minutely accurate distance meter with 3 1/2" basis; coupled with lens focussing.
- 3 Automatic film transport by which double exposures are avoided.
- 4 Daylight loading is as easy as with ordinary roll film cameras.
- 5 Any film on the market for pictures 24 x 36 mm. (1-3/8 x 15/16") can be used.



- 6 Contax spools are specially recommended; they do not require rewinding.
- 7 Choice of ten ZEISS LENSES; focal lengths from 1-3/16" to 7 1/4". Apertures  $f/8$  to  $f/1.5$ .
- 8 The removable back of the Contax is a great advantage. It not only facilitates loading, but also makes the interior of the camera accessible for cleaning—an important point, especially with miniature negatives, since dust, if allowed to collect inside the camera, will inevitably appear as pinholes in the negative.

Code No.	CONTAX PRICES:	£	s.	d.
540/24L	Zeiss Tessar $f/3.5$	...	...	27 10 0
540/24P	Zeiss Tessar $f/2.8$	...	...	30 0 0
540/24N	Zeiss Sonnar $f/2$	...	...	35 10 0
540/24J	Zeiss Sonnar $f/1.5$	...	...	51 10 0

For further particulars ask for our brochures "The Connoisseur and the Contax," "The Ten Contax Lenses" and "Accessories for Contax Photography," free on application.

# CONTAX

# The Miniature Camera for the Pocket

The **SUPER NETTEL** is a recent Zeiss Ikon introduction and takes pictures  $1\frac{1}{8}'' \times \frac{3}{8}''$  on perforated cine film. It is primarily constructed to take the convenient Contax spool, but any system using perforated cine film for  $24 \times 36$  mm. negatives can be used. The body of the Super Nettel is closed by a hinged baseboard, thus protecting the lens and bellows from dust and damage when the camera is not in use.

The larger model Nettel cameras have been famous throughout the world as Press cameras for their rigidity and reliability, and now the years of experience thus gained, together with the technical improvements made in developing the Contax have been utilised in the construction of the Super Nettel. While it does not provide for the use of a battery of lenses the Super Nettel has in its construction most of the other Contax features. A choice of two lenses is given—the Zeiss Tessar  $f/3.5$  or  $f/2.8$ . The distance meter is an integral part of the instrument, and is coupled with the lens focussing. The focal plane shutter is made entirely of metal, the exposures, from  $1/5$ th to a guaranteed  $1/1000$ th second, are given automatically, as well as time exposures.

The **SUPER NETTEL** slips easily into the pocket, and its shape makes it easy to hold it steadily—a point which cannot be over-stressed when dealing with miniature picture cameras. The large winding head of the focal plane shutter automatically winds on the film for the next exposure, and the shutter release is conveniently placed in the centre of the winding knob. Another advantage is that the shutter can be set to speeds either before or after winding. No external parts move whilst the shutter is being discharged, and the removable back makes it easy to clean the picture aperture—a point of some importance, since if dust cannot be easily removed from any camera pin holes on the negative will almost surely be the result.

The Tessars give critically sharp negatives, and enlargements to any reasonable size, say 12 inches wide, can be made.



## SUPER NETTEL PRICES

Code No.		£	s.	d.
536/24L	With Zeiss Tessar $f/3.5$ , focal length 2"	21	12	6
536/24P	With Zeiss Tessar $f/2.8$ , focal length 2"	23	10	0
Note.—No other lenses can be supplied.				
541/2	Contax Spools, 36 exposures ... ..		3	8
540/1	Cassette, for loading ordinary cine film ...		12	6
1784/2	Ever-ready Case ... ..	1	5	0

Special folder on application.

**SUPER  
NETTEL**

# The Camera which does the Focussing

The Ikonta is already famous throughout the world as the Zeiss Ikon camera that is ready for use in an instant.

The **SUPER IKONTA**, as its name implies, has the constructional ever-ready features of the Ikonta, plus something else, and that something is the

## COUPLED WITH LENS DISTANCE METER

made on entirely new principles, by which the accuracy of the best previous distance meters is combined with immunity from damage never before realised. The Super Ikonta is as quick as lightning in taking good pictures—good because you know beforehand that your pictures will be sharp. You press a button and the self-erecting mechanism automatically opens both camera and finder ready for use. A glance through the distance meter—a turn of the milled wheel—and the picture is automatically sharply focussed. A pressure on the shutter release and the picture is taken.



With Coupled Distance Meter.  
In three sizes.

No. 530.  $2\frac{1}{2}'' \times 1\frac{1}{2}''$  for 16 exposures on usual  $3\frac{1}{2}'' \times 2\frac{1}{2}''$  roll film.

No. 530/2.  $3\frac{1}{2}'' \times 2\frac{1}{2}''$ , 8 exposures, or by using mask 16 exposures  $2\frac{1}{2}'' \times 1\frac{1}{2}''$ .

No. 530/15.  $4\frac{1}{2}'' \times 2\frac{1}{2}''$ , 8 exposures, or by using mask 16 exposures  $2\frac{1}{2}'' \times 2\frac{1}{2}''$ .

## BRIEF SPECIFICATION

All metal body, self-erecting front, focussing by distance meter coupled with lens from Infinity to 5 feet. Optical self-erecting direct vision view finder, with anti-glare shield, best leather bellows and covering. Zeiss Tessar  $f/4.5-f/3.5$  with No. 530—in delayed action Compur shutter, giving exposures of 1 second to  $1/250$ th second and Time. No. 530, owing to its small dimensions, cannot be fitted with the delayed action feature, but the maximum speed is  $1/300$ th second.

## SUPER IKONTA PRICES

Code No.	Picture Size	Optical Equipment	Focal Length	Price £ s. d.
530 ...	$2\frac{1}{2}'' \times 1\frac{1}{2}''$	Zeiss Tessar $f/3.5$	$2\frac{1}{2}''$	16 12 6
530/2	$3\frac{1}{2}'' \times 2\frac{1}{2}''$	Zeiss Tessar $f/4.5$	$4\frac{1}{2}''$	17 0 0
530/15	$4\frac{1}{2}'' \times 2\frac{1}{2}''$	Zeiss Tessar $f/4.5$	$4\frac{1}{2}''$	18 15 0

**SUPER  
IKONTA**

# The Ideal High-class Self-erecting Camera

The **IKONTA** is the best self-erecting high-class camera at a moderate price. It is extremely solidly built, and the many sizes, optical, and shutter equipments enable it to meet the requirements of practically all roll film photographers.

## SPECIFICATION

Metal body.

Front self-erecting. A simple pressure of the opening button erects camera ready for action.

Novar models covered with artificial leather; Tessar models with real fine grain black morocco leather.

Leather Bellows. Tripod Bush.

**FINDERS.** With the Baby model, frame finder, or at an extra cost of 12/6, optical finder.

No. 520, optical direct vision finder; also, at small extra cost, detachable brilliant finder.

Nos. 520/2 and 520/15 have both brilliant finder and the new Albada optical direct vision finder (except No. 520/15E).

**LENSES.** Novar or Zeiss Tessar.

**SHUTTERS.** 3-speed Derval; 3-speed Telma with delayed action release. Compur shutter (with delayed action release for Models No. 520/2 and 520/15 only).

Nos. 520/18 and 520 take 16 pictures on the usual vest pocket and  $3\frac{1}{2} \times 2\frac{1}{4}$  spools respectively. No. 520/2 and 520/15 (except E model) are two-picture cameras, i.e., by using the mask provided 16 pictures can be taken on the usual 8-exposure spool.



No. 520/2 Tessar

Supplied in the following four picture sizes for Roll Film only:

No. 520/18 (Baby size)  $1\frac{1}{8} \times 1\frac{1}{4}$ ".

No. 520,  $2\frac{1}{4} \times 1\frac{3}{4}$ ".

No. 520/2,  $3\frac{1}{2} \times 2\frac{1}{4}$ ".

No. 520/15,  $4\frac{1}{2} \times 2\frac{1}{4}$ ".

## IKONTA PRICES

Code No.	Size	Lens	Shutter	£ s. d.
520/18E	$1\frac{1}{8} \times 1\frac{1}{4}$ "	Novar f/6.3	Derval	3 7 6
520/18I	"	Novar f/4.5	Derval	4 0 0
520/18F	"	Novar f/3.5	Compur	7 10 0
520/18U	"	Tessar f/4.5	Compur	8 17 6
520/18L	"	Tessar f/3.5	Compur	9 7 6
520 ...	$2\frac{1}{4} \times 1\frac{3}{4}$ "	Novar f/6.3	Derval	4 10 0
520I ...	"	Novar f/4.5	Telma	5 15 0
520F ...	"	Novar f/3.5	Compur	8 0 0
520U ...	"	Tessar f/4.5	Compur	10 0 0
520L ...	"	Tessar f/3.5	Compur	10 12 6
520/2I	$3\frac{1}{2} \times 2\frac{1}{4}$ "	Novar f/4.5	Telma	7 10 0
520/2I	"	Novar f/4.5	Compur	9 12 6
520/2U	"	Tessar f/4.5	Compur	11 5 0
520/15E	$4\frac{1}{2} \times 2\frac{1}{4}$ "	Novar f/6.3	Derval	5 2 6
520/15I	"	Novar f/4.5	Compur	11 5 0
520/15U	"	Tessar f/4.5	Compur	12 15 0

Special Ikonta folders giving prices of accessories on application.

# IKONTA

# Everybody's Ever-ready Roll Film Camera

The **NETTAR** simplifies photography and gives the amateur snapshotter so many advantages that it is easy to get good pictures every time.

All who have used box cameras know that with that type, focussing is a simple matter. Unfortunately, simplicity thus obtained is at the expense of optical properties, which reduce the scope of box instruments.

The Nettar, with rapid real anastigmat lenses, makes it possible to take pictures at times when other cameras, metaphorically speaking, have "gone to bed." At the same time the

Zeiss Ikon "Two dot focus setting" makes photography a matter of utmost simplicity for snapshots in a fair light all day long. You simply set the diaphragm to the red dot and the lens focus to its red dot and with shutter working at 1/25th second everything is sharp from 12 feet onwards. With the Nettar (except models with Compur shutter) all settings can be read and adjusted from the top of the camera whilst held in position for taking pictures. (See illustration.)

The Nettar opens automatically by simply pressing release button, and erects itself ready for taking pictures.



For  $3\frac{1}{2}'' \times 2\frac{1}{4}''$   
Roll films  
8 exposure  
spools.

## BRIEF SPECIFICATION

The metal body is covered black leatherette (real leather for Compur shutter model). Metal parts nickel plated; wire release. The camera back is fitted with a spring film pressure plate. Tripod bushes.

**Shutter.** Choice of NETTAR (1/25, 1/50, 1/100th second), TELMA (1/25, 1/50, 1/100th second and delayed action feature) or COMPUR (1 second to 1/250th second and delayed action feature). All give Time and Brief Time exposures.

**Optical Equipment.** Choice of Nettar Anastigmat  $f/6.3$  or  $f/4.5$ , or Tessar  $f/4.5$ . Two view finders. A brilliant view finder for taking pictures at breast level; for eye-level a direct vision finder is provided.

Dimensions:  $6\frac{1}{2}'' \times 3\frac{1}{4}'' \times 2\frac{1}{4}''$ . Weight: 18 ozs.

## NETTAR PRICES

Code No.		£ s. d.
515/2C	With Nettar $f/6.3$ and Nettar Shutter	3 10 0
515/2CS	Nettar $f/6.3$ and Nettar Delayed Action Shutter	4 2 6
515/2DT	Nettar $f/4.5$ and Telma Delayed Action Shutter	5 5 0
515/2DCpr	Nettar $f/4.5$ and Compur Delayed Action Shutter	7 7 0
515/2U	Zeiss Tessar $f/4.5$ and Compur Delayed Action Shutter	10 0 0
—	Leather Case	7 6
B11/8	Zeiss Ikon Perno Film, 8 exposures $3\frac{1}{2}'' \times 2\frac{1}{4}''$	1 2

# NETTAR

# A New Zeiss Ikon Twin-lens Camera

The **IKOFLEX** is a beautifully made twin lens camera. The image is seen on the ground glass screen the right way up, and is shielded from extraneous light by a convenient hood, which springs up on touching a spring bolt. The view finder is the full size of the picture, except that in order to avoid parallax error at close distances the ground glass screen is purposely cut about 1/10th inch shorter both at top and bottom, thus everything seen in the finder must necessarily be recorded on the film. The price is a most compelling one, since for the first time in the history of photography a complete twin lens reflex, with a high class  $f/4.5$  anastigmat, is available for the small sum of £7 10 0.

## IKOFLEX SPECIFICATION

**BODY:** Die cast from aluminium alloy.

**FOCUSING:** Helical lever movement on lens mount, with automatic depth-of focus scale.

**HOOD:** Self-erecting, with magnifier for minute focussing.

**SHUTTER:** Ikoflex 3-speed, 1/25, 1/50th and 1/100th second, as well as Time and Bulb.

**REFLEX ACTION:** The image is reflected to the ground glass by an optically flat mirror, and under the ground glass is a special collective lens which accounts for the extraordinarily brilliant image, and further the falling off in illumination towards the corners experienced as a rule with reflex cameras is not at present in the Ikoflex.

**COVERING:** Black synthetic leather.

**LENS EQUIPMENT:** Novar  $f/6.3$  or Novar  $f/4.5$ .

**AUTOMATIC FILM WINDING ARRANGEMENT.**

**CAPACITY:** 12 exposures  $2\frac{1}{2}'' \times 2\frac{1}{4}''$  on the usual  $3\frac{1}{2}'' \times 2\frac{1}{4}''$  roll film, which may be either metal or wooden spools.

**DIMENSIONS:**  $5\frac{1}{2}'' \times 3\frac{1}{4}'' \times 3\frac{1}{2}''$

**WEIGHT:** 2 lbs. 4 ozs.



## IKOFLEX PRICES:

Code No.		£	s.	d.
850/16E	With Novar $f/6.3$ , focal length $3\frac{1}{4}''$ , Ikoflex Shutter ...	6	10	0
850/16I	With Novar $f/4.5$ , focal length $3\frac{1}{4}''$ , Ikoflex Shutter ...	7	10	0
1785/16	Ever-ready Leather Case ...	1	7	6

Descriptive folder on application.

# IKOFLEX

# Always use Zeiss Ikon Pernox Film

## ZEISS IKON PERNOX FILM

H. & D. 2700. DIN  $\frac{16}{10}^{\circ}$ .

Pernox Film enjoys a high reputation for reliability. In spite of its high speed there is ample latitude in exposure, and also in development. Moreover, the orthochromatic properties are good, the emulsion being specially sensitive to yellow and green, but the Pernox requires no special treatment in development. It may be developed in a safe ruby light without taking any special precautions. The Pernox Film is specially treated for halation, and the Zeiss Ikon feature of a thin coating of gelatine over the sensitive emulsion prevents the latter being spoiled by scratches from minute particles of dust, etc., when passing through the camera.

Pernox Film is supplied in all the usual sizes, both roll films and film packs, at the usual prices for high speed emulsion. Price list on application.

## MOVIKON

It is hoped to place upon the British market in December, a new Zeiss Ikon cine-taking camera to take all makes of 50 ft. or 100 ft. cine spools—the



**MOVIKON** will embody technical perfection and refinements not hitherto obtainable in 16 mm. apparatus. For instance, the distance meter will be coupled with the lens focussing. Compensation for parallax will be automatically provided for. A delayed action release and a special device for predetermining the footage to be used for delayed action shots will prove a very useful feature. The shutter is adjustable, and speeds from  $1/25$ th to  $1/1,200$ th second can be obtained, as well as slow motion shots. The lens will be the famous Zeiss Sonnar  $f/1.4$  in interchangeable mount, and other focal lengths are also in the course of construction.

Full particulars on application.

*All prices quoted in this inset are correct at the time of going to press, but they are liable to alteration without notice.*

November, 1934

# MOVIKON



*The Eagle Eye  
of your Camera*

# ZEISS

## PHOTOGRAPHIC LENSES

BRITISH REPRESENTATIVES:

**Carl Zeiss (London) Ltd.**

Mortimer House, Mortimer St.,

London, W.1. Tel. Mus. 9031-6

ZEISS AGENTS

**New York:** Carl Zeiss, Inc., 485 Fifth Avenue and at **Los Angeles, Cal:** 728 So. Hill Street. **Montreal:** Hughes Owens Co. Ltd., 1440 McGill College Avenue, also at Ottawa, Toronto, Winnipeg, Vancouver. **Calcutta:** Adair, Dutt & Co. Ltd., Stephen House, Dalhousie Square (East). **Bombay:** Embassy House, Sir Phirozshaw Mehta Road. **Madras:** Khaleel Mansions, Mount Road. **Melbourne:** E. C. Heyne Pty., Ltd., Union Building, 100 Flinders Street, also at Sydney. **Johannesburg:** B. Owen Jones Ltd., Beresford House, Corner Main and Simmonds Streets, and at **Paris, Milan, Brussels, Madrid, Buenos Aires, Rio de Janeiro, Wellington, N.Z., Singapore, Bangkok, Cairo, Beyrouth, Shanghai, Tokio, Peking, etc.**





# SURVEY OF ZEISS OBJECTIVES AND ACCESSORIES WITH THEIR PRINCIPAL APPLICATIONS

## UNIVERSAL OBJECTIVES

Tessars F/4.5, F/3.5, F/6.3,  
Tessar F/2.8 for small cameras.

Double Protars F/6.3 to F/7.7 and Protar Sets (the single components may be used as long focus objectives at full aperture).

Dagor F/6.8 (back lens may be used stopped down as a long focus lens).

## SPECIAL OBJECTIVES

### FOR CINEMA WORK

Biotar F/1.4, ultra-rapid objective  
Tessar F/2.7,  
Tessar F/3.5 of short focus,  
Tele Tessar F/6.3 special objective of long focus,  
Kino Tele Tessar F/4 rapid telephoto objective.  
Sonnar F/1.4, ultra-rapid objective.  
Sonnar F/2.8.  
Sonnar F/4, special objective of long focus.

### FOR PORTRAITURE

Tessar F/4.5 }  
Tessar F/3.5 } in the longer foci  
Tessar F/6.3 }  
Tessar F/5,  $f=50$  cm. and  $f=70$  cm.  
Triplets F/4.8,  $f=50$  cm. and F/5,  $f=70$  cm. \*  
Tele Tessar F/6.3.

### FOR SPECIALLY RAPID ACTION WORK

with Press and reflex cameras with focal plane shutters.  
Biotessar F/2.8.  
and for the small size camera  
Biotar F/2.  
Sonnar F/1.5, F/2 and F/4.

### FOR WIDE ANGLE WORK

Dagor F/9,  
Protar F/18,  
Hypergon F/22



## SURVEY OF ZEISS OBJECTIVES AND ACCESSORIES

### WITH THEIR PRINCIPAL APPLICATIONS—*Contd.*

#### FOR AERIAL PHOTOGRAPHY

Tessar F/4.5,

Tessar F/5,  $f = 50$  and  $f = 70$  cm.

Triplets F/4.8,  $f = 50$  cm. and F/5,  $f = 70$  cm.

#### FOR TELEPHOTOGRAPHY and Large Image Pictures,

Tele Tessar F/6.3,

Magnar F/10,  $f = 45$  cm.,

Composite Tele Objectives, particularly for specially long distance work.

#### FOR PHOTOGRAPHY WITH SPECIALLY SHORT WAVE ULTRAVIOLET LIGHT, ABOVE ALL FOR CRIMINOLOGICAL AND SCIENTIFIC WORK,

Quartz Anastigmat F/4.5.

## OPTICAL ACCESSORIES for photographic objectives.

#### DISTARS and PROXARS :

attachment lenses for lengthening and shortening the focus.

#### YELLOW GLASS SCREENS :

filters for neutralising the difference of colour perception between the eye and the Orthochromatic plate.

#### DUCARS and A-DUCARS :

filters for colour photography with Autochrome and Agfa screen plates with lens effect for neutralising the effect of the plate thickness.

## Optical Equipment for PROCESS WORK

Apo Planar,

Apo Tessar,

with reversing prisms and mirrors,

revolving collars,

filter cells,

R-yellow filters and R-colour filters,

Focusing Microscope and Focusing Magnifier.

CARL ZEISS  
JENA

## ZEISS F/2.8 TESSAR

FOR SMALL CAMERAS

A new F/2.8 Tessar which comes under the new Tessar patents granted a few years ago. Angular field over  $50^\circ$  at full aperture. Definition brilliant and uniform as with all Zeiss Tessars.

Both lenses can be fitted into the smallest size Compur Shutter C 24 without loss of aperture, and their design enables them to be fitted to any small size camera which takes an F/3.5 Tessar, of the same focal length, in Compur Shutter.

## ZEISS R-BIOTAR F/0.85

A special objective of unequalled rapidity, designed in the first place for cineradiography, but since applied also to sound-on-film cine and other work. For standard and substandard film. Full details and particulars of standard cine cameras to which it has already been fitted, on application.

## ZEISS BIOTAR F/1.4

CINEMA ANASTIGMAT

Definitely superior at any aperture to any other lens used at the same aperture.

Angular field about  $42^\circ$ . The 4, 5 and 7 cm. lenses amply cover standard film and the 2 and 2.5 cm. lenses narrow film (12.8 mm. diagonal).

## ZEISS APPARATUS FOR PHOTOMICROGRAPHY

covers every requirement, from camera attachments to the microscope, utilizing standard  $4" \times 3"$  roll film, to the

## NEOPHOT LARGE EPI-MICROSCOPE AND CAMERA

equipped for all classes of incident-light photomicrography from full size to more than  $2000 \times$  magnification with vertical and oblique illumination and with polarized light. Full particulars on request.



CARL ZEISS  
JENA

# PATHÉSCOPE

NEW EQUIPMENT SUMMARY OF

9.5mm.

HOME MOVIES

*and now*

HOME TALKIES

17.5mm.

The best entertainment  
that you can provide.

## The "Imp"-roved Model



British Made

Pathéscope now introduce the latest miniature cinema, complete in all details, for every home. The "Imp" provides brilliantly illuminated, steady and correctly centred pictures. Note the easy film threading through the pivoted lamphouse and the compactness of the outfit. The "Imp" for all voltages, for showing 30 ft. and 60 ft. films.

The "Imp" can be fitted with a **MOTOR DRIVE** (£1 15. 0.) and a **SUPER ATTACHMENT** (17/6) for showing 300 ft. of film at one time, or the complete motor-driven outfit for showing 300 ft. of film bought outright for £7. 0. 0.

HAND CRANKED COMPLETE WITH RESISTANCE

# £4.12.6

## 9.5 mm. P R O

## The "Home Movie"

Embodying all the principles of the big motion picture outfits, yet neat, compact and exceptionally strong. Constructed to work off 110 volt circuit, but easily adapted by means of a group resistance for any electricity supply up to 250 volts.

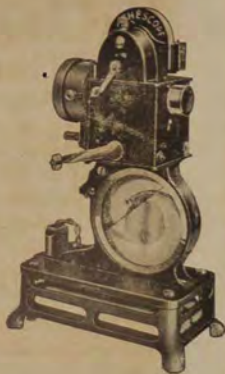
It can be converted to a motor-driven model, and by the addition of a Super Attachment, 300 ft. Super Reels can be shown.

Motor—to eliminate hand-cranking—£3 0. 0.

Super Attachment for 300 ft. reels £2 2. 0.

Resistance for over or under 110 volt electricity supply 10. 0.

# £6.15



## The "200-B"

Fitted with a powerful lamp for direct and brilliant screen illumination. The ideal projector for use on every occasion, especially when large pictures are required. Removal and re-winding of films at will, steady projection, fan-cooled and asbestos-lined lamphouse, sprocket feed. Pictures 8 ft. wide or more are easily obtained. Available in three models—50 volts for use with Transformer, 105 to 130 volts with resistance and 200-250 volts for direct operation from electricity supply.

Resistance with lamp switch and separate terminals for voltages between 200 and 250  
£1. 15. 0.

Transformer for 50 volts projector with high efficiency lamp on all A.C. Mains from 110 to 250 £2. 17. 6.



British Made

# £15

## PROJECTORS

### The Pathéscope 9.5 mm. Film Library

In the Pathéscope Film Library there is a large and most comprehensive selection of films—Comedy, Drama, Travel, General Interest, Farce, and the best of the screen classics by famous producers; in fact, a selection catering for every taste, no matter what requirements may be. New films are added regularly to the hundreds and hundreds already available. All Pathéscope 9.5 mm. Films may be purchased outright—"K" reels for 2/6, 30 ft. reels for 3/6, 60 ft. reels for 6/6, and 300 ft. Super reels for 27/6.

The Library Service is available for the hire of Super reels and membership starts automatically with the purchase of a book of coupons.

# HOME TALKIES

## THE PATHÉSCOPE 17.5 mm. SOUND-ON-FILM HOME TALKIE

(BRITISH MADE)

For first-class sound pictures in the home and elsewhere. Provides perfect synchronisation of sound and picture on 17.5 mm. film with a sound-track of the same width as on 35 mm. film.

The Talkie is portable and can be installed anywhere on A.C. Mains by simply connecting to a lamp socket of the ordinary electricity supply. Large and brilliant pictures are obtainable, anyone being able to operate the outfit with ease and perfection.

The Pathéscope 17.5 mm. Sound-on-Film Home Talkie is supplied complete, including projector, amplifier and loud-speaker.



£60



### Motocameras

Pathéscope 9.5 mm. movie-making outfits are available fitted with  $f/3.5$  lens at £6. 6. 0. There are other models up to the "de Luxe" fitted with End of Film Indicator,  $f/2.5$  lens and Tel-Attachment and Variable Speed Device for £22. All use Pathéscope 9.5 mm. film costing only 2/7 per reel, with developing 2/-.

**PATHÉSCOPE LTD.**  
5, LISLE ST., LONDON, W.C.2.

# MEYER PLASMAT F/1.5



## MEYER LENSES *for* MODERN MINIATURE CAMERAS

Negative size 24×36 mm.

LEICA or CONTAX

The following page gives the full range of MEYER LENSES with interchangeable mounts and automatic coupling.

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WE FIT 9.5 and 16 mm.

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THE COMPLETE COLOUR CORRECTED  
CINE LENS *F/1.5*

*The best lens for Monochrome or Colour Cinematography.*

Interchangeable focussing mountings

for

**BELL, HOWELL  
AUTOKINCAM  
CINE NIZO  
DEKKO**

**VICTOR  
SIEMENS  
PATHE DE LUXE  
ETC.**

and **MEYER TELEPHOTO ANASTIGMATS  
F2.9 INTERCHANGEABLE**

PRICES AND PARTICULARS OVERLEAF

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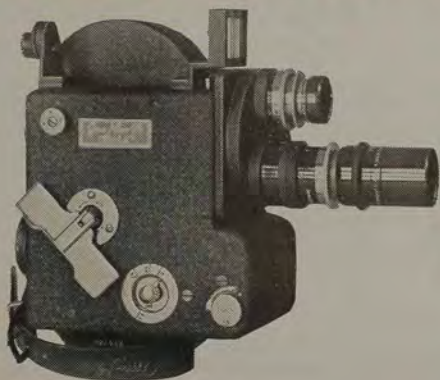
# PRICES for MEYER LENSES

Fitted to 16 mm. CINE CAMERAS

	Bell Howell		Victor		Siemens*		Auto- kincam		Kodak Special	
	£	s. d.	£	s. d.	£	s. d.	£	s. d.	£	s. d.
<b>PLASMAT F/1.5,</b> focus $\frac{3}{8}$ " or $\frac{7}{8}$ " ..	15	0 0	15	0 0	—	—	15	0 0	—	—
Yellow Filters, Light, Medium or Dark	1	2 6	1	2 6	—	—	1	2 6	—	—
<b>PLASMAT F/1.5,</b> focus 1", "Koda- color" Focussing Mount ..	18	2 6	18	2 6	18	2 6	18	2 6	18	2 6
Yellow Filters, Light, Medium or Dark	1	5 0	1	5 0	1	5 0	1	5 0	1	5 0
"Kodacolor" Filter, including special mount and fitting	4	10 0	4	10 0	4	10 0	4	10 0	4	10 0
<b>PLASMAT F/1.5,</b> focus 1 $\frac{1}{8}$ " ..	20	0 0	20	0 0	20	0 0	20	0 0	20	0 0
Yellow Filters, Light, Medium or Dark	1	10 0	1	10 0	1	10 0	1	10 0	1	10 0
<b>PLASMAT F/1.5,</b> focus 1 $\frac{1}{2}$ " ..	23	15 0	23	15 0	23	15 0	23	15 0	23	15 0
Yellow Filters, Light, Medium or Dark	1	12 6	1	12 6	1	12 6	1	12 6	1	12 6
<b>PLASMAT F/1.5,</b> focus 2" ..	26	5 0	26	5 0	26	5 0	26	5 0	26	5 0
Yellow Filters, Light, Medium or Dark	1	15 0	1	15 0	1	15 0	1	15 0	1	15 0
<b>MEYER Telephoto Anastigmat F/2.9</b> including matched finder, focus 2" ..	16	0 0	16	0 0	16	0 0	16	0 0	16	0 0
Yellow Filters, Light, Medium or Dark	1	2 6	1	2 6	1	2 6	1	2 6	1	2 6
<b>MEYER TELE- MEGOR F/4,</b> in- cluding matched finder, focus 3" ..	18	10 0	18	10 0	18	10 0	18	10 0	18	10 0
Yellow Filters, Light, Medium or Dark	1	2 6	1	2 6	1	2 6	1	2 6	1	2 6
<b>Ditto,</b> focus 4" ..	20	10 0	20	10 0	20	10 0	20	10 0	20	10 0
Yellow Filters, Light, Medium or Dark	1	5 0	1	5 0	1	5 0	1	5 0	1	5 0
<b>Ditto,</b> focus 6" ..	24	10 0	24	10 0	24	10 0	24	10 0	24	10 0
Yellow Filters, Light, Medium or Dark	1	10 0	1	10 0	1	10 0	1	10 0	1	10 0

\* A charge of £8 0 0 is made to convert Siemens Model B Camera into an interchangeable model to accommodate the above lenses.

## C. N. 9.5 mm. CINE 100 ft. CAPACITY

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F/1.5

**SPECIFICATION :** Spring motor. Complete winding, sufficient for 22 ft. of film. Adjusting speeds between 8 and 64 frames (slow motion).

Lenses interchangeable.

Film transportation. Claw motion. Sprocket film feeding and take-up movement.

Direct vision view finder. Reflex finder can be supplied as an extra.

Automatic film gauge. Hand drive for titles and trick films.

Turret Head Model (50 ft. or 100 ft. capacity), fitted Meyer	£	s.	d.
Plasmats F/1.5, focus 1" .. .. .	72	5	0
Ditto, fitted Meyer F/2.8 Anastigmat, focus 1" .. .. .	55	15	0
<b>Without</b> Turret Head, fitted Meyer Plasmats F/1.5, focus 1" ..	53	0	0
Ditto, fitted Meyer F/2.8 Anastigmat, focus 1" .. .. .	43	0	0
<b>Model II, for 50 ft. only, without Turret Head, fitted Meyer</b>			
Plasmats F/1.5, focus 20 mm. .. .. .	37	2	6
Ditto, fitted Meyer F/2.8 Anastigmat, focus 1" .. .. .	27	15	0

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# ISOCHROM

## THE FILM FOR ALL WEATHERS AND EVERY TYPE OF PICTURE

Isochrom Film is always reliable and makes certain of good results. Instantaneous exposures in dull light are made possible because of the high sensitivity (28° Scheiner) of the film.



# SUPERPAN

## THE FILM FOR ARTIFICIAL LIGHT

With Superpan Film it is possible to make exposures in the streets at night, pictures of home life with ordinary artificial lighting, and theatre "snapshots" during the performance. On account of the excellent colour sensitivity the rendering of tone values is exceptional.

Superpan Film prevents halation, so that unpleasant effects from this trouble cannot arise.

**AGFACOLOR ULTRA FILM**—For exposures in natural colours. The speed of this new colour material makes instantaneous exposures possible.

# NOT THE CHEAPEST BUT THE FINEST PROJECTION ANASTIGMAT



Gives the most critical definition to the corners of the screen. Brilliant illumination. No stray light, on account of its perfect correction. Perfect rendering of light and shade.

## CRISP SCREEN PICTURES

For:— Focus inches	200B. Pathe or De Luxe Model			Bell Howell			Victor			Siemens			Bolex all models			Ensign*			Kodak*					
	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.			
1 1/2"	5	5	0	5	5	0	5	5	0	5	5	0	5	5	0	5	5	0	5	5	0	5	5	0
1 3/4"	5	5	0	5	5	0	5	5	0	5	5	0	5	5	0	5	5	0	5	5	0	5	5	0
2"	5	5	0	5	5	0	5	5	0	5	5	0	5	5	0	5	5	0	5	5	0	5	5	0
2 1/2"	5	10	0	5	10	0	5	10	0	5	10	0	5	10	0	5	10	0	5	10	0	5	10	0
3"	5	15	0	5	15	0	5	15	0	5	15	0	5	15	0	5	15	0	5	15	0	5	15	0
<b>Meyer Wide Angle Plasm at F/1.5</b>																								
4 1/2"	12	0	0	12	0	0	12	0	0	12	0	0	12	0	0	12	0	0	12	0	0	12	0	0

FOR BEHIND SCREEN PROJECTION OR WHERE AN ENORMOUS PICTURE IS  
REQUIRED AT SHORT THROW.

No Wide Angle Anastigmat on the market can compare with its  
*MAGNIFICENT PERFORMANCE*

\* In cases where Projectors need special adapters for the Meyer Kinon Superior Lens to be mounted, an extra charge is made for the adapter—according to the amount of work entailed.

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Meyer Megoflex

## REFLEX ATTACHMENT

Full size screen view  $24 \times 36$  mm.  
for  
**LEICA and CONTAX**

The **MEGOFLEX** converts either camera immediately into a real reflex camera.

The lens of the Megoflex is a highly correct anastigmat of identical focus (2") to that of the standard lens fitted to the Leica or Contax.

When attached to the camera the MEGOFLEX objective couples automatically with the camera lens, and the two lenses are then synchronised in focus for all distances.

The image is seen full size on the Megoflex screen and critical focus control is over the whole field—not like a coupled range finder where only

the centre focus can be controlled, and difficult to see under poor conditions of light.

The MEGOFLEX is far in advance of any other type of distance measuring instrument.

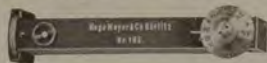
The MEGOFLEX is attached and detached in an instant. It is supplied in a soft leather case.

**PRICE £5 15 0**      **WEIGHT 6 ozs.**      **DIMENSIONS  $1\frac{1}{8}'' \times 1\frac{1}{8}'' \times 3\frac{1}{2}''$**

When ordering the MEGOFLEX it is best to send camera to us for synchronisation of the Megoflex lens to the camera lens. No extra charge, except return postage on camera.

Models for LEICA	1. 11. 111.	Elmar F/3.5	Hektor F/2	Summar F/2
		2"	2"	2"
Models for CONTAX	- -	Tessar F/3.5	Tessar F/2.8	Sonnar F/2
		2"	2"	2"

**Don't guess the distance. Be sure of perfect focus.**



## MEYER ZEROS RANGE FINDER

An extra brilliant secondary image is provided in this new construction, making it possible to focus with ease under the poorest conditions of light.

This is not possible with **ANY OTHER** Range Finder.

A Range Finder plays a most important part with cameras which are only scale controlled (no focussing screen), such as all types of Cine Cameras, Roll Film Cameras, etc., etc.

The Range Finder can be fitted to the Camera by means of a shoe plate and screws, if desired.

**PRICE £2 5 0**      Shoe Plate and Screws 2/3 on request only.



## ROTH UNIPOD for STEADY SHOTS

COMPACT AND LIGHT

The slightest tremor during exposure affects the definition of the camera lens and causes slight blur in the negative.

With the aid of the Unipod no movement is possible.

Many hundreds in use with Reflex, Roll Film and Cine Workers.

Even slow exposures up to 1/5th second are easily possible.

Not so cumbersome as a tripod.

The height of the Unipod can be adjusted to eye level, waist level, or any height down to 12" from the ground.

Cine workers, particularly with the heavier types of cameras, will find a great improvement in the definition of their films.



### MADE IN TWO SIZES

With English tripod screw. (Continental thread,  $\frac{3}{8}$ " , 1/- extra.)

- Size I.** Closed 10" ; Extended 4' 3" approx. Price 15/-  
**Size II.** Closed 13" ; Extended 5' 0" approx. Price 17/6

BOTH SIZES COMPLETE WITH SLING STRAP WITH SOCKET SUPPORT. ANOTHER POSITION FOR STEADY OPERATING.

Miniature Camera Users should NOT be without a Unipod.

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# NEWS BULLETIN New Apparatus for 1935

**PEGGY II.** 36 or 60 Exposures, 24 × 36 mm. negative. Miniature Precision Camera. £ s. d.

Fitted Zeiss Biotar F/2 .. .. .	36 0 0
" Meyer Makro-Plasmat F/2.7 .. .. .	32 10 0
" Zeiss Tessar F/2.8 .. .. .	31 15 0
" Meyer Primotar F/3.5 .. .. .	24 10 0
" Zeiss Tessar F/3.5 .. .. .	24 10 0

**Chromium Plated £2 0 0 extra.**

**MENTORETT.** The Seven-Eye Roll Film Reflex Camera, 6 × 6 cm. (2½" × 2½").

Eye 1. Camera Lens.			
Eye 2. Red Filter Disc—showing shutter is set.			
Eye 3. Red Filter Disc—with "S," meaning "Stop."			
Eye 4. Showing Aperture Figures.			
Eye 5. Showing Speed Figures.			
Eye 6. (a) <b>Yellow</b> Disc—Caution, Film not changed.			
(b) <b>Green</b> Disc—Free. Unexposed film ready for exposure.			
Eye 7. Showing number of exposures. 1-12.			
Lenses—Focus 3"	Zeiss Tessar		
	F/4.5	F/3.8	F/2.8
	£22 10 0	£25 16 0	£28 0 0

**With 1935 Compur Shutter.**

**NEW STUDIO REFLEX CAMERA.** For the Professional and Amateur. Silent Focal Plane Shutter. Swing and tilt front. 'Extra long extension. Front constructed to take modern large aperture lenses. A Particular Feature—Two hoods, one for waist level use and one for eye level use. Image controlled at any height, so important with Studio work.

Sizes 3½" × 2½" to ½ plate (4¾" × 6½")

**MENTOR COMPUR REFLEX CAMERAS.** Reversing back.  
3½" × 2½" only.

**PRIMARETTE ROLL FILM REFLEX CAMERA.** 4½ × 6 cm. For Standard V. P. Film.

**LATEST PATENT PRECISION ENLARGER.** For miniature negatives.  
Takes all sizes—24 × 36 mm. to 4½ × 6 cm. film.

IF YOU ARE LOOKING FOR THE BEST AND LATEST  
PHOTOGRAPHIC APPARATUS AND LENSES  
—CINE OR STILL—COME TO US, OR WRITE

# MEYER PLASMATS

Dr. Rudolph (Patent)

WORLD FAMOUS

PLASMAT PICTURES ARE DISTINCTIVE FOR THEIR NATURAL  
ATMOSPHERE, PERSPECTIVE AND PLASTICITY.

See Photogravure Pages—Picture "Head with Spectacles," by G. Scott Bushe.  
Taken with Meyer Plasmats.

**Sphero-Achromat—Combinable.** The Single Components are fully corrected elements. Plasmats Lenses are suitable for all classes of Photography. In Foci from 2½ in.—19 in.

## PRICES

### DOUBLE PLASMAT F/4

Combined Focus	Single Component	Standard Mount	Sunk Mount	Plate Covered at Full Aperture	Code Word	
					St. Mt.	Sunk Mt.
Inches	Inches	£ s. d.	£ s. d.	Inches		
3½	6	14 7 6	15 0 0	3½ × 2½	Pacos	Pardel
4½	6½	15 0 0	15 12 6	3½ × 2½	Paddy	Pardo
4½	7½	16 17 6	17 10 0	4½ × 3½	Padua	Pari
5½	8½	18 15 0	19 7 6	4½ × 3½	Paga	Parnon
6	9½	20 0 0	20 12 6	4½ × 3½	Page	Paros
6½	10½	20 12 6	21 17 6	5½ × 4	Pagina	Pascha
7	12	26 5 0	27 10 0	6 × 4	Pagus	Papius

### PLASMAT SET F/4.5 (3 Foci)

Combined Focus	Front Component	Back Component	Standard Mount	Plate Covered at Full Aperture	Stopped Down	Code No.
3½	6½	4½	11 17 6	2½ × 1½	4 × 2½	161
4½	9½	6½	14 7 6	3½ × 2½	5½ × 4	162
6	12½	8½	18 15 0	4½ × 3½	7 × 5	163
6½	14½	9½	21 5 0	6 × 4½	7½ × 6½	164
8½	18½	12½	33 15 0	7 × 5	9½ × 8½	165

### DOUBLE PLASMAT F/5.5

Combined Focus	Single Component	Standard Mount	Sunk Mount	Compur Shutter	Plate Covered at full Aperture	Stopped Down	Code No.
Inches	Inches	£ s. d.	£ s. d.	£ s. d.			
3½	6½	10 0 0	10 12 6	13 2 6	3½ × 2½	4½ × 3½	00
4½	7	11 5 0	11 17 6	14 7 6	3½ × 2½	5½ × 4	0a
4½	8½	11 17 6	12 10 0	15 0 0	4½ × 3½	6½ × 4½	0
5½	9½	13 2 6	13 15 0	16 17 6	4½ × 3½	7 × 5	1a
6	10½	14 7 6	15 0 0	18 2 6	4½ × 4½	8½ × 5	1

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**MEYER****TRIOPLAN F/3—F/3.8**

THE SUPREME SPEEDY ANASTIGMAT FOR MODERN PORTRAITURE.

Free from Chromatic Aberration.

THE MOST SUITABLE LENS FOR ADVERTISEMENT POSTERS. A large number of the most well-known Advertisement Posters have been taken with

**THE MEYER TRIOPLAN**

CRITICAL DEFINITION. BEAUTIFUL LIFELIKE MODELLING.

**PRICES**

Focus	Standard Mount	Square Flange	Suitable for	Code Word	Silent Central Shutter for Front
Inches	£ s. d.	£ s. d.	Inches		£ s. d.
10½	31 5 0	0 15 0	7 × 5	Watt	4 5 0
12	36 5 0	1 0 0	8½ × 6½	Wage	4 17 6
14	50 0 0	1 5 0	8½ × 6½	Wagner	5 12 6
16½	72 10 0	1 10 0	10 × 8	Walkure	7 0 0
19	87 10 0	1 15 0	10 × 8	Waffex	8 2 6

By special request the foci from 10½"—16½" can be supplied with soft focus device. A mechanical adjustment incorporated in the mount.

**PRICE £7 10 0 extra**

Silent Before Lens Central Shutters permit of hand controlled speeds from 1/10th to any duration. (Cable release).



Swimming Bath of the Royal Masonic Institute, Rickmansworth.

Photography by Salisbury's Photo Press  
Taken with Meyer Double Anastigmat F/6.8.

## MEYER Double Anastigmat Series F/6.8 (Combinable)

FOR COMMERCIAL PHOTOGRAPHY OF ALL DESCRIPTIONS

Critical Definition. Free from Flare. High Degree of Colour Correction. Correct Perspective Ensured. Supplied in Standard Iris Mount and up to  $9\frac{1}{2}^\circ$  Focus in Compound Shutter.

CEMENTED CONSTRUCTION. SYMMETRICAL DESIGN Angle Approx.  $90^\circ$

The spherical, chromatic and anastigmatic corrections are carried out to the fullest possible degree and coma is completely eliminated.

IN FOCI FROM  $1\frac{1}{8}''$ — $30''$

PRICES. Gold Standard

Focus Inches	Standard Mount		Sunk Mount		Covers Inches	Code Word	
	£	s. d.	£	s. d.		Stand Mt.	Sunk Mt.
$6\frac{1}{2}$	10	12 6	11	5 0	$6\frac{1}{2} \times 4\frac{1}{2}$	Vaida	Dank
8	17	10 0	18	2 6	$8\frac{1}{2} \times 6\frac{1}{2}$	Vallid	Darm
$10\frac{1}{2}$	25	0 0	—	—	$10\frac{1}{2} \times 8\frac{1}{2}$	Vampir	—
12	31	5 0	—	—	$12 \times 10$	Vanad	—
14	38	2 6	—	—	$14 \times 12$	Vanloo	—
$16\frac{1}{2}$	50	0 0	—	—	$16 \times 12$	Vapeur	—
19	65	0 0	—	—	$17\frac{1}{2} \times 16$	Varazze	—
24	87	10 0	—	—	$24 \times 20$	Valpo	—
30	118	15 0	—	—	$28 \times 22$	Varde	—

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## MEYER WIDE ANGLE ARISTOSTIGMAT F/9, angle 100°

THE MOST SPEEDY WIDE ANGLE LENS. Solves the most difficult problems in Professional Photography. Can be used for *any subject* where the normal focus lens does not incorporate sufficient angle.

### PRICES

Equivalent Focus Ins.	At full aperture	Standard Mount		Vario-Shutter		Ibsor Shutter		Compur Shutter		Adapter Ring s. d.
		£ s. d.	Code Word	£ s. d.	Code Word	£ s. d.	Code Word	£ s. d.	Code Word	
3½	4½ × 3½	6 15 0	Zirpe	8 5 0	Wabe	10 10 0	Wallone	12 0 0	Wespe	6 3
4	6 × 4	7 3 9	Zicke	8 13 9	Wache	10 18 9	Walnut	12 8 9	Wette	6 3
4½	7 × 5	7 10 0	Zirkel	9 0 0	Wachtel	11 5 0	Walze	12 15 0	Weste	6 3
5½	8½ × 6½	8 5 0	Zimmer	9 15 0	Waffel	12 0 0	Wange	13 10 0	Wimpel	6 3
6½	9 × 7	9 15 0	Ziege	11 13 9	Wahl	14 5 0	Wanne	15 15 0	Winkel	6 3
7	10 × 8	12 0 0	Ziel	—	—	16 10 0	Warte	18 0 0	Winzer	6 3

### NEW

Meyer Wide Angle Anastigmat F/6.3 only supplied in standard mount. Not available for between-lens shutters. Prices same as F/9 standard mount.

**ROTH SUPERSPEED PRESS CAMERA****9 × 12 cm.** Fitted with**MEYER F/3****ANASTIGMAT**

The fastest lens for general use.

**NO OTHER LENS** of this Speed has the **DEFINITION** and **DEPTH OF FOCUS**

The camera is provided with two distance scales, top and front. The top scaling provides the most convenient method of changing the focus without having to turn the camera round.

**SPECIFICATION :—**

Extrareinforced struts (slotted), ensuring perfect rigidity and parallelism—essential for high class lenses. Quick wind, non-capping, Silent focal plane

shutter, speeds  $1/1000$ th— $1/5$ th, T. & B. Single fold, best quality leather bellows withstand all weather. Finest quality double dark slides, perfect for register and loading. Two finders are provided, one full size frame finder, one brilliant Newton finder. Single metal slides with adapter can be supplied if desired. Film Pack Adapter supplied as an extra. Very convenient as a stand-by if a large amount of sensitive material has to be carried.

**ONLY MADE IN 9 × 12 cm. size.**

THERE IS NO OTHER PRESS CAMERA ON THE MARKET WHICH HAS STOOD AND WILL STAND THE WEAR OF THE ROTH SUPERSPEED PRESS CAMERA. EVERYTHING DESIGNED FOR DURABILITY.

**PRICES (Professional. Not subject to commission).**

	£	s.	d.
<b>ROTH PRESS SUPER SPEED CAMERA</b> , fitted MEYER F/3 Anastigmat Lens focus 6", with three Double Dark Slides and Patent Top Scaling	51	5	0
<b>Ditto</b> , fitted Meyer F/4 Anastigmat	40	3	0
Extra Double Dark Slides		2	5
Automatic Changing Box with twelve Sheaths		9	18
Film Pack Adapter		2	5
Deep Lens Hood		0	18
Single Metal Slides		0	4
Adapter for Single Slides		2	0
Cowhide Leather Case, velvet lined, to take camera and six double dark slides	2	15	0

**Special Size Cases Made to Order.**

Telephone  
Hither  
Green  
2424

**A. O. ROTH****85 Ringstead Rd., Catford, London, S.E.6**

Telegrams  
"Mentorflex  
Catgreen  
London"

# MEYER TELE-MEGOR F/5.5



Taken with Meyer Double Anastigmat. Focus  $5\frac{1}{2}$  in.



Taken with Meyer Tele-Megor F/5.5. Focus 10 in., at the same distance.

is well known for its  
**High Correction,**  
**Critical Definition**  
**and Depth of Focus.**

**SO ESSENTIAL  
 FOR  
 TELEPHOTO  
 WORK.**

For  
**Architecture,**  
**Sports, Botanical**  
**subjects,**  
**Portraiture,**  
**etc.**

Supplied complete  
 in various mount-  
 ings or in separate  
 cells to fit client's  
 own Compur shut-  
 ter, interchange-  
 able with the normal  
 lens equipment.

## PRICES FOR TELE-MEGOR F/5.5

Focus inches	Aperture F:	Stand Mt. or Cells £ s. d.	Compur Shutter £ s. d.	Sunk mount £ s. d.	Focussing mount £ s. d.	Suitable for inches	Infinity inches
$7\frac{1}{2}$	5.5	10 14 0	14 14 0	11 8 0	12 14 0	$3\frac{1}{2} \times 2\frac{1}{2}$	$4\frac{1}{8}$
10	5.5	14 0 0	18 14 0	14 14 0	16 0 0	$9 \times 12$ cm. ( $3\frac{1}{2} \times 4\frac{1}{2}$ )	$5\frac{3}{8}$
12	5.5	19 8 0	24 14 0	20 0 0	21 8 0	$9 \times 12$ cm. or $10 \times 15$ cm.	$6\frac{1}{8}$
16	5.5	24 0 0	29 8 0	25 8 0	26 14 0	$10 \times 15$ or $13 \times 18$ cm.	$9\frac{1}{8}$

Telephone  
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 Green  
 2424

# A. O. ROTH

85 Ringstead Rd., Catford, London, S.E.6

Telegrams  
 "Mentorflex  
 Catgreen  
 London"

# Plaubel

A black and white photograph of a man wearing a dark suit jacket, a white shirt, and a fedora hat. He is holding a vintage camera up to his eye, as if taking a picture. The camera is a boxy, rangefinder-style camera with a prominent lens and various dials and buttons. The man's face is mostly obscured by the camera and his hat.

*Makina*  
**II**



## Plaubel Cameras and Lenses

THE CAMERA WITH THREE FOCAL LENGTHS



For 30 years the Plaubel works have enjoyed a high reputation as makers of precision cameras, combining highest mechanical finish with the greatest efficiency of optical qualities.

### The PLAUBEL MAKINA II 6.5 × 9 (2½ × 3¼ in.)

is recognised all over the world to stand unrivalled in every respect! It is suitable for all purposes; it gives you the best results for all-round photography (groups, landscape, sport, portrait), as well as for very difficult work (instantaneous pictures with artificial light, night photos, etc.). This camera is of the highest optical and mechanical precision and may be termed

#### A real mechanical wonder!

Measurements: 5½ × 4 × 1½ in. (14 × 10 × 4.5 c.m.)

Weight: Just under 2 lbs. without slides

#### SPECIFICATION:

Coupled Focussing Range Finder, Plaubel Anticomar Lens, 10 cm., f/2.9. Delayed Action Compur Shutter. Three first quality Metal Slides.

Price ... .. £37 10 0

#### ACCESSORIES:

	£	s.	d.
Solid Leather Case with lock and key ... ..	1	10	0
Film Pack Adapter ... ..	16	0	0
Makina Roll Holder, for Standard 2½ × 3¼ films ... ..	2	5	0
Dark Slides ... ..	5	0	0

**OPTIME G.m.B.H. Plaubel - Verkaufs - Gesellschaft**  
Frankfurt a. Main-West

Sole Agents for Great Britain and Ireland—GARNER & JONES, LTD.,  
POLEBROOK HOUSE, GOLDEN SQUARE, LONDON, W.1

## Interchangeable Lenses for Plaubel Makina II



	1	2	£	s.	d.
No. 1. Tele-Makinar, f/6.3, 21 cm., in leather case	...	...	12	12	0
No. 2. Rapid Wide-Angle Orthar, f/6.8, 7.3 cm., in leather case	...	...	7	5	0
SUPPLEMENTARY LENSES IN LEATHER CASES.					
T 1.5, for photographs at a distance of about 60 cm.	...	...	•	18	6
R 0.1, for photographs, small objects (stamps, etc.) in natural size	...	...	1	2	6
Yellow Filter, Light, Medium or Dark	...	...	1	7	6
Finder Frame for use with Tele-Makinar Lens	...	...	4	0	0
Ditto, for use with Newton Finder	...	...	4	0	0
Lens Hood	...	...	17	6	6

### PLAUBEL MAKINETTE 3 × 4 cm.

Takes 16 3×4 cm. pictures on V.P. Spool



The miniature sized Makina of the same high mechanical finish as the Makina II.

The smallest and most beautiful camera 3 × 4 cm., fitted with renowned Supracomar and Anticomar, Anastigmat and New Compur Shutter.

An extremely compact and beautiful piece of workmanship, the outside size being 3½ × 2¼ × ¼ in. Weight 13½ ozs.

F/2 Supracomar £25

F/2.7 Anticomar £21

**OPTIME G.m.B.H. Plaubel - Verkaufs - Gesellschaft**  
Frankfurt a. Main-West

Sole Agents for Great Britain and Ireland—**GARNER & JONES, LTD.,**  
**POLEBROOK HOUSE, GOLDEN SQUARE, LONDON, W.1**

# The Plaibel Makina II Camera

IS THE PRESSMAN'S IDEAL



In Bright Sunshine or Fading Light. Speed or Still, the Plaibel Makina II is always the winner that takes the picture.

Automatic focussing coupled with Range Finder.

Takes plates, film packs and roll-film.

Roll-Film Holder with automatic numbering device.

Fitted with High Speed Anticomar F/2.9, 10 cm., focus lens in Compur Shutter with Delayed Action.

Interchangeable Lenses (*not coupled with range finder*).

Tele-Makinar f/6.3, 21 cm. focus.

Rapid Orthar. Wide Angle f/6.8, 7.3 c.m. focus.

**OPTIME G.m.B.H. Plaibel - Verkaufs - Gesellschaft**  
Frankfurt a. Main-West

Sole Agents for Great Britain and Ireland—GARNER & JONES, LTD.  
POLEBROOK HOUSE, GOLDEN SQUARE, LONDON, W.1



## FILMO 1000-WATT PROJECTOR

It's on the way—the most powerful 16 mm. projector yet produced. The New Filmo Model 130, especially designed for its purpose, delivers a flood of illumination adequate for the large auditoriums. With its new optical system it provides 80% greater screen brilliance than 750-watt projectors—and does this with only a 33-1/3% lamp wattage increase! Fully adequate cooling is provided. Filmo Model 130 has a capacity of 1,600 feet of film, and may even be extended for two-hour programmes.

There have been few advances in 16 mm. projection equipment to equal that accomplished in this new Filmo Projector, which leads a remarkable invasion of 16 mm. film into that part of the non-theatrical field hitherto served only by 35 mm. Complete details of the 1,000-watt Filmo Model 130 Projector will be released shortly.

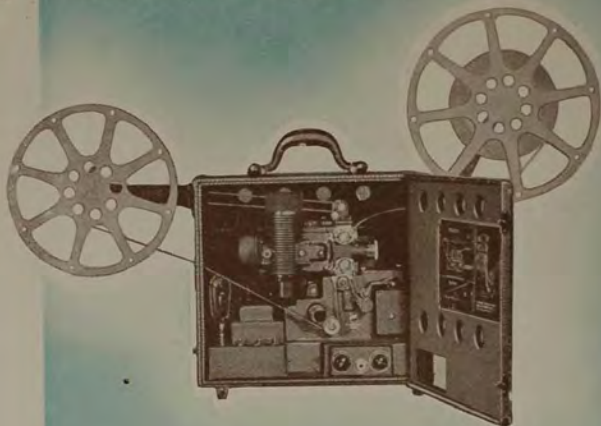
*Taylor Hobson  
Cooke Lenses are  
fitted as standard  
equipment to all  
Bell & Howell  
apparatus.*

**80%**  
GREATER  
SCREEN BRILLIANCE  
THAN 750 WATT  
PROJECTORS

# BELL & HOWELL

COMPANY LIMITED

LONDON - - Head European Offices, 320, Regent Street, W.1  
CHICAGO - Head Office and Factory, 1,801, Larchmont Avenue  
NEW YORK - - 11 West 42nd Street, Near 5th Avenue  
HOLLYWOOD - - 710-724, North La Brea Avenue



BELL AND  
HOWELL

## FILMOSOUND

*For Theatre-Quality Sound Pictures, with True Portability and Operating Simplicity.*

The direct lighting system of the famous Filmo J.S. projector gives 750 watts illumination—with a picture big and bright enough for an auditorium of 2,000. Aero-dual cooling preserves the film and the lamp. Automatic framing. Electric governor ensures constant speed. The incorporation of every refinement known to sound movies guarantees perfect co-ordination of picture and sound. The powerful amplifier delivers 15 watts of undistorted output, providing ample volume.

The film sound track touches nothing, so that it remains clear and free from scratches. All controls are simple and conveniently placed. Further details from the manufacturers below.



B E L L      A N  
COMPANY  
 LONDON      CHICAGO



## FILMO J.S. PROJECTOR

with its 750 watt illumination and its wholly gear driven mechanism, places before the ambitious amateur perfect pictures of his films. Its many unique features include automatic, power-driven rewind; pilot light; lamp-house light trap; reverse pictures and still projection with safety shutter; interchangeable projection lenses; illuminated volt meter dial; radio interference eliminator; and traditional Bell-Howell quality.

## FILMO R PROJECTOR

is built especially for those who want Bell Howell quality in a sturdily built, easily operated projector. A touch of the starting button puts the projector into action. Turning a thumb-screw tilts the projector to place the picture squarely on the screen. A slight turn of the lens and the focus is perfect. Controls are spaced to prevent confusion in manipulation even in the dark. The "R" series possess most of the features which have made the Filmo J.S. famous.



**BELL & HOWELL**  
LIMITED  
NEW YORK                      HOLLYWOOD

*Filmo — the  
Aristocrat of Cine Cameras*

**FILMO  
70 DA CAMERA**

with almost professional flexibility, yet so simple to run that a child can operate it. It has a three lens turret enabling you to switch instantly to different lenses for different uses, a critical focuser, and 7 film speeds for the slowest of slow movies, and for the fastest, too.



**FILMO  
70 E CAMERA**

Equipped with 4 film speeds — 8, 16, 24 and (for slow motion) 64 frames per second. A fast F/1.5 lens gives indoor movies in indifferent light and slow motion pictures out of doors in poor light. Gives perfect colour film results. A first class camera at a moderate price.

**BELL & HOWELL**  
COMPANY LIMITED

LONDON	-	-	-	HEAD EUROPEAN OFFICES, 320, REGENT STREET, W.1
CHICAGO	-	-	-	HEAD OFFICE AND FACTORY, 1801, LARCHMONT AVENUE
NEW YORK	-	-	-	11 WEST 42nd STREET, Nr. 5th AVENUE
HOLLYWOOD	-	-	-	710-724, NORTH LA BREA AVENUE



## SPEEDEX COMPUR

For B.20 Roll Films. The camera for the discerning amateur.

Light, convenient to handle, and possessing all requirements of a modern folding camera.

Picture size: 6 x 9 cm. ( $2\frac{1}{4} \times 3\frac{1}{4}$  inches). Speeds from 1 to 1/250th second. Lens aperture f/4.5.



## SPEEDEX

For A.8 Roll Films. The Ladies' Camera.

So light and compact that it fits conveniently into the handbag. The large lens aperture makes snapshots in dull light possible.

Picture size: 4 x 6½ cm. ( $1\frac{1}{2} \times 2\frac{1}{2}$  inches). Speeds from 1 to 1/300th second. Lens apertures of f/3.9 or f/4.5.

**AGFA RODINAL**—The universal Developer. Gets the best results from your exposures.

**AGFA FLASHPOWDER**—The artificial light for home pictures. Fast and extremely brilliant burning powder, with very little smoke.





# ISOCHROM

## THE FILM FOR ALL WEATHERS AND EVERY TYPE OF PICTURE

Isochrom Film is always reliable and makes certain of good results. Instantaneous exposures in dull light are made possible because of the high sensitivity (28° Scheiner) of the film.



# SUPERPAN

## THE FILM FOR ARTIFICIAL LIGHT

With Superpan Film it is possible to make exposures in the streets at night, pictures of home life with ordinary artificial lighting, and theatre "snapshots" during the performance. On account of the excellent colour sensitivity the rendering of tone values is exceptional.

Superpan Film prevents halation, so that unpleasant effects from this trouble cannot arise.

**AGFACOLOR ULTRA FILM**—For exposures in natural colours. The speed of this new colour material makes instantaneous exposures possible.



### BROVIRA—

The best paper of all for enlargements.

Enlargements from miniature negatives or parts of negatives show to their best advantage on Agfa Brovira. 22 surfaces and four degrees of contrast make it possible to suit every type of negative.



### LUPEX BROWN

The warm brown tone produced on the LupeX Chamois Paper by direct development gives a specially beautiful and particularly pleasing picture.

LupeX Chamois is just as easy to work in exposure and development as a White LupeX Paper.




### VERDEX GREEN—


A printing paper giving green tones by direct development.

Specially suitable for subjects such as pictures of fields and woods, of the sea, lakes and rivers where natural greens are predominant.



USE  PANCHROMATIC

for out-of-door shots; it is speedy and reliable, giving correct tone values, with extreme latitude.

AND  NOVOPAN

in dull and cloudy weather or under artificial light of any description—the super-panchromatic film.

AGFA PHOTO LTD., 1-4 Lawrence Street, High Street, London, W.C.2

E  
X  
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## DRESDEN Striesen 152

Agents for

Great Britain: **GARNER & JONES, Ltd.**, Polebrook House, Golden Square, London, W.1.

New York: G. Gennert Inc., 20 West 22nd Street.

Henry Herbert, 483 Fifth Avenue.

Chas. H. Huesgen & Sons, 22 East 42nd Street.

Alexandria (Egypt): Edward Levi & Co., 5 Rue du Musée. **Bombay**:

Mangalbhoj & Co., Ismail Building, Hornby Road, Fort. **Christchurch**

(New Zealand): Waterworth South Island Limited, 705 Colombo Street.

**Johannesburg**: Carl Gradt Ltd., P.O. Box 4231. **Melbourne**: Herbert

Small Pty. Ltd., 308-310 Collin Street. **Singapore**: Singapore Studio

and Photo Co., 55-3 High Street.



Reflex device for eye level



Light Hood with Magnifier



Exakta for press work



# Exakta

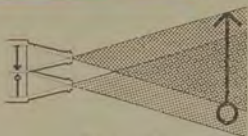
**Size of Pictures.** "Exakta" pictures,  $2\frac{1}{2} \times 1\frac{1}{8}$  in. ( $4 \times 6.5$  cm.) are quite effective even as prints. However, it will be easy to produce enlargements up to  $36 \times 24$  in. ( $60 \times 90$  cm.) and even larger ones.

Compared with square sizes, the rectangular "Exakta" shape affords the great advantage of complying with aesthetic requirements. Possibly 90 per cent. of all exposures require the vertical or horizontal sizes which prevail in the paintings by famous masters.

**Image in View Finder.** Whether the picture is focussed sharply or stopped down to obtain greater depth of definition, or whether the view has been chosen correctly and non-essentials have been omitted; the clear image reflected by the mirror being the exact size of the finished picture, shows everything prior to exposure. Working with a mirror reflex camera is the acme of perfection! No trifling little image in a view finder! No estimating of distances, no time-consuming control of distance meters and tables! The ingenious<sup>ly</sup> designed hood can also be converted into a frame view finder, which is particularly appreciated by Press and Sports photographers.

**Another Important Point.** Only a mirror-reflected image as produced by the "Exakta" lens is always reliable, and absolutely coincides with the picture. Has it not happened to you, in spite of accurate observation through the finder, that, especially in close-up pictures, the body of a person was taken minus the head? Such failures are due to a separate finder and taking lens, and is called the parallax. The two diagrams will convince you of the superiority of the "Exakta" camera in this respect.

**Focussing.** By means of a precision helical mount, focussing to correct sharpness takes place with microscopic accuracy.



This is parallax



"Exakta" is free from parallax

IHAGEE



DRESDEN

A magnifier on the hood may further be relied on in case of ultra critical focussing.

**Shutter.** The self-capping focal plane shutter for instantaneous exposures up to 1/1000th second as well as for short and long Time exposures of 1/10, 1/2, 1 to 12 seconds without delayed action and with delayed action release from 1/1000th to 6 seconds, on which the speeds can be easily read, is reliable and precise, and is more efficient than the usual shutters. Whether you wish to take a picture of everyday life, of a moving car or aeroplane or of a sporting or similar high speed event, your "Exakta" will not fail you!

**Double Exposures are Impossible** with an "Exakta," in which the action of changing the film winds up the shutter and brings the reflex mirror into operation position.

**Range of Usefulness.** There is not a sphere in which its numerous advantages cannot be utilised, including landscape or portrait work, scientific, sport, night or stage photography. The small number of exposures on a spool allows for quick developing without loss of time and money. Scientists and research workers can use tele-photographic or wide angle or employ supplementary lenses. Even in such cases, the mirror-reflected image will be absolutely reliable and the exact picture seen on the top screen. The lens can be changed while the camera is loaded. A Press photographer equipped with an "Exakta" can surmount all obstacles. In a crowd, he can photograph over people's heads and watch the subject from below. Detectives will find that "Exakta" facilitates their work immensely, as vertical pictures are taken at an angle of 90 degrees to the subject, and the photograph can thus be attained unobserved.

**Shape and Weight.** The beautiful form of the "Exakta" attracts at once. Its handy body fits conveniently in your hand. The elegant trapezoid form is not only beautiful but ensures the utmost utilisation of space. Provided with reflex mirror, focal plane shutter, and the most rapid lens, the "Exakta" nevertheless appears to be hardly larger than an ordinary roll film camera.



"Exakta" for sport photos



Stage picture with "Exakta" F/2.8



"Exakta" for detective work

I H A G E E



D R E S D E N

# EQUIPMENT OF THE EXAKTA

Light metal body covered with best leather. Ground glass focussing with self-erecting light hood. Focussing magnifier in light hood to control definition of image. Frame finder with sighter. Lens in precision focussing mount, for close range focussing up to 1 m. Infinity stop.

Dimensions: 15 x 6.5 x 5 cm. Approx. Weight: 750 grs. (26 ozs.).

**Exakta Model A:** Focal plane shutter, self-capping, instantaneous speeds from 1/25th to 1/1,000th second can be read at once, time exposures for any length.

**Exakta Model B:** Self-capping focal plane shutter, but speeded 1/1000th to 1/25th, 1/10th, 1/2, 1, 2 to 12 seconds, and with delayed action release from 1/1000th to 6 seconds.

Exakta Models A and B can be equipped with the following lenses:

Ihagee-Exaktar F/3.5, 7.5 cm. focal length.

Cassar F/3.5 7 cm. Primotar F/3.5 7.5 cm.

Cassar F/2.9 7.5 " Tessar F/3.5 7 "

Xenar F/3.5 7.5 " Tessar F/2.8 7.5 "

Xenar F/2.9 7.5 " Biotar F/2 8 "

### Interchangeable Lenses:

Tele-Tessar F/6.3, 12 cm. focal length.

Tele-Megor F/5.5, 15 cm. focal length.

Ihagee-Anastigmat F/4.5, 10.5-11 cm. focal length.

Wide Angle Tessar F/8, 5.5 cm. focal length.



For Enlargements use  
Exakta-Lumimax

## Exakta and World Opinion

St. John Island (Virgin Islands)

September 17th, 1934.

"I was so impressed by your camera that I ceased to use the others and confined myself exclusively to the 'Exakta.' Since then I have used it in the tropics, in aerial photography, and at sea on small ocean-going yachts. I have sold quantities of photographs to the *New York Times*, which sets a rather high photographic standard. I feel certain that in the 'Exakta' Camera you have an instrument far superior to any other miniature camera on the market."

D. H.

Glasgow, August 25th, 1934

"The writer has got some really 'Tip-top' results with this camera, the 'Exakta,' enlarged to 18 x 15. They are treated in a pictorial manner rather than from the point of sharpness, and he is definitely of the opinion that it is going to take the place of his 4-plate Reflex which he has used for twenty years. In other words, the large type is doomed."

J. B.

Saigon, July 7th, 1934

"We wish to express our entire satisfaction in your new 'Exakta' Reflex camera. To be brief, the 'Exakta' Reflex is the most perfect reflex ever introduced into the photographic world; no expert can find any point dissatisfactory with it, we can say with confidence. Its versatility surpasses any types of reflecting and miniature hand cameras now existing on the market. We congratulate you wholeheartedly for having so successfully provided this little wonder to the amateurs as well as professional photographers at such low prices that almost approach impossibility."

H. P. S.

New York, May 26th, 1934

"Congratulations on wonderful delayed action shutter and improvements in the 'Exakta.'"

H.

IHAGEE



DRESDEN

# Rolleiflex



## FOR 1935 A FASTER LENS AND FASTER SHUTTER WITHOUT INCREASE OF PRICE - - £22 10 0

The 1935 model will be fitted with a Zeiss Tessar F/3.5 instead of F/3.8, with Compur Shutter speeded up to 1/500th sec. instead of 1/300th. Making the Rolleiflex

## THE FASTEST MIRROR REFLEX IN THE WORLD

To work with the Rolleiflex means every shot a perfect picture. The full size picture is shown right way up on the focussing screen. Parallax compensation ensures that no vital parts of your picture are chopped off. The magnifier guarantees hair sharp focussing. A single lever gives tension and release of Compur shutter simultaneously. Film travels from picture to picture controlled by the counter. The Zeiss Tessar lens gives perfect results—indoors or out—at any time of the year. Takes 12 pictures on  $3\frac{1}{2} \times 2\frac{1}{8}$  exp. roll-film for 1/-.

The  $4 \times 4$  cm. Rolleiflex takes 12 pictures on Standard V.P. roll-film. With Zeiss Tessar lenses F/3.5 £20 0 0. F/2.8 £22 10 0. Also fitted with new speeded Compur Shutter without increase of price.

THE ROLLEIFLEX, ROLLEICORD, ROLLEIDOSCOPE AND HEIDOSCOPE

Sole importers for Great Britain  
and Irish Free State:

**R. F. HUNTER, LTD.**  
Celfix House  
51 Gray's Inn Road  
London . . W.C.1



Manufacturers :

**FRANKE & HEIDECKE**  
Salzdahlumerstrasse 196  
Brunswick, Germany





## HEIDOSCOPE

The precision Stereo Camera  
for serious work

The housing is made of light metal, cast in a single piece. This ensures the handiness and precision necessary for stereo cameras with high speed lenses, and keeps the weight down to the lowest possible limit. The shutter is rigidly built into the housing, the two-part shutter is permanently identical. The famous qualities of the Zeiss Tessars guarantee sharpness and plastic brilliance in the pictures at any focal distance. The Heidoscope changing-box is recognized as the most perfect instrument of its kind.

### PRICES :

6 × 13 cm. £55 0 0  
4.5 × 10.7 cm. £49 5 0

## ROLLEIDOSCOPE

For stereo work with Roll Films

The special high speed finder objective throws a clear and bright image on to the focussing screen, so that the exposure can be estimated with confidence.

The Rolleidoscope is as easily and simply operated as the Heidoscope.

### PRICES :

6 × 13 cm. £47 5 0  
4.5 × 10.7 cm. £39 10 0

FULL DESCRIPTIVE CATALOGUE OF THE ABOVE TWO CAMERAS POST FREE ON REQUEST.

The prices quoted on pages 595, 596 and 597 are for Great Britain only. Prices for I.F.S. on application to R. F. Hunter, Ltd. Prices for other countries on application to Franke & Heidecke (For address see Page 595).

# Rolleicord

## THE ROLL-FILM MIRROR REFLEX CAMERA FOR EVERYBODY

Possesses many of the features which have made the Rolleiflex famous. Including a separate finder lens, showing the whole of your picture on the ground glass screen. Compur shutter with one lever for setting and releasing. Full compensation for parallax. Takes 12 pictures on  $3\frac{1}{4} \times 2\frac{1}{8}$  exp. roll film for 1/-. With Zeiss Triotar F/4.5 lens. £10 10 0.

## THE ROLLEICORD EVER-READY PATENTED CASE

Hangs from the camera, while it is in use, by two leather straps. Afterwards Camera slips back easily and quickly. £1.



*In January 1935 the Rolleicord will also be available with Zeiss Triotar F 3.8. Details on application.*

## ACCESSORIES FOR THE ROLLEIFLEX AND ROLLEICORD CAMERAS

including various Filters, Proxar Lenses, (for close-up work, table-top photography etc.) Sunshade, Focussing Hood Extension, Plate Adapter and Dark Slides, Panorama Head, Stereo Fitment, Clip-on Iris stop, Ciné Film Attachment, Angle Mirror.

Write for 22 page accessory booklet, sent post free.





# The **Ebner** CAMERA

*As advanced in Design and Performance  
as the Really Modern Motor Car*



Just as the really modern motor car differs from the models of a decade ago, so has the Ebner advanced in design from ordinary roll film cameras.

Constructed of beautifully finished bakelite, internally reinforced with metal, making it as strong as a steel safe and proof against damp and all variations of temperature—it retains its pristine elegance through years of hard wear.

The well-known Compur Shutter, the high-class lenses available and the precision with which the whole camera is made, stamp the Ebner as a camera of the highest class, as efficient and practical as it is beautiful, and worthy of the highest Hunter tradition—that of selling nothing but the best.



**SIZE  $3\frac{1}{2} \times 2\frac{1}{2}$  WITH  
DELAYED ACTION  
COMPUR SHUTTER**

335. With *Schneider Radionar* F/4.5 £9 15 0

336. With *Schneider Xenar* F/4.5 £10 15 0

337. With *Zeiss Tessar* F/4.5 .. £12 15 0

**SIZE 4.5 x 6 cm.**

304. With *Meyer Trioplan* F/4.5, *Delayed Action Pronto* Shutter £6 0 0

\*307. With *Meyer Primotar* F/3.5, *Compur* Shutter .. £10 15 0

\*308. With *Zeiss Tessar* F/3.8, *Compur* Shutter £12 17 6

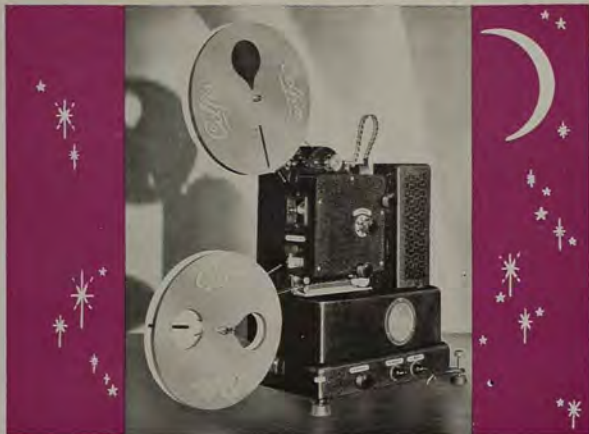
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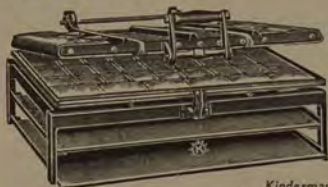
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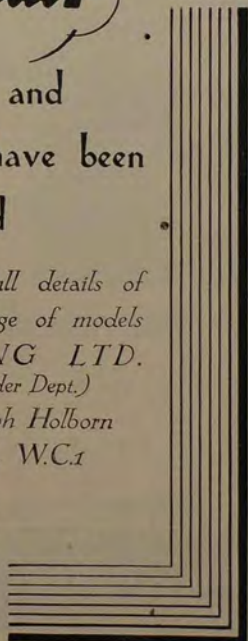
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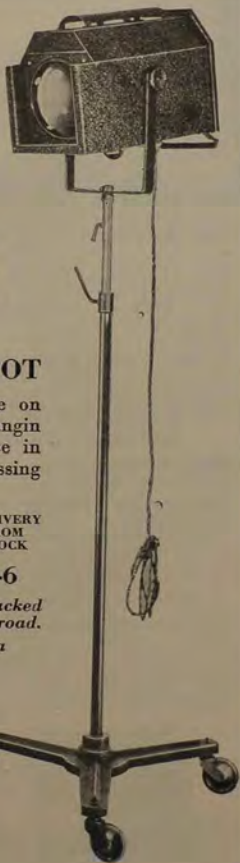
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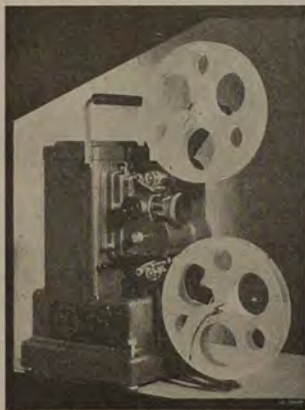
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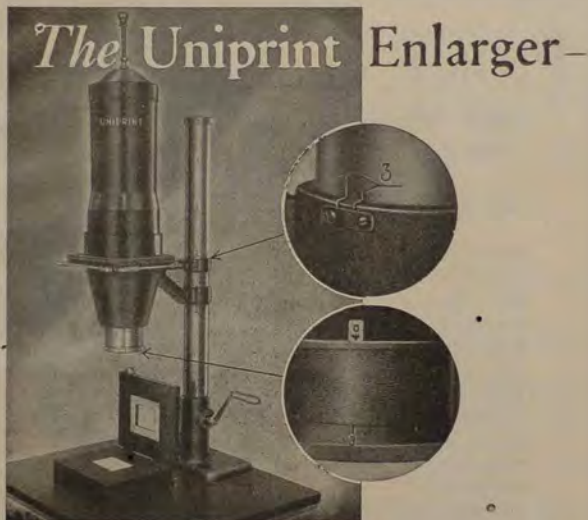
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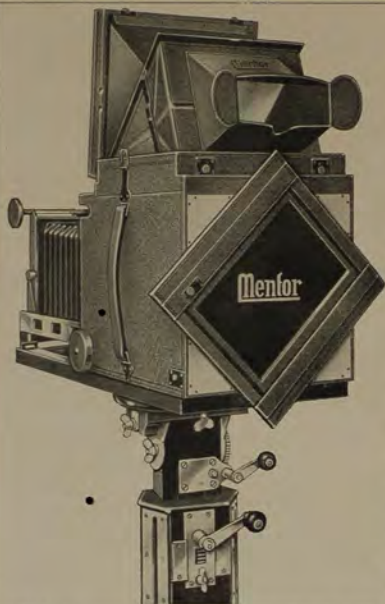
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Inches.	Cm.	Focus.	R.M.	Focus.	R.M.	Focus.	R.M.
2½ × 3¼	6.5 × 9	5½	420	5½	480	5½	570
3¼ × 4¼	8 × 10.5	6½	465	6½	540	6½	630
—	9 × 12	7	480	8½	675	6½	660
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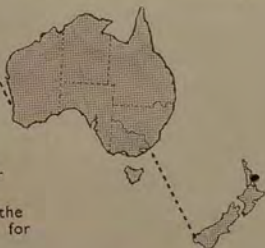


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The editorial work on making up this year's AMERICAN ANNUAL OF PHOTOGRAPHY has been unexpectedly interesting, owing to the high quality and great usefulness of the articles from which we have had to choose. We feel sure that our table of contents offers every advanced photographer a selection of reading matter which will be of the highest permanent value, as well as of great readability. The pictures represent the outstanding work of the past year and the book will be a great advance in typography over any previous issue.

MY METHODS, by Leonard Misonne.

MAKING THE MOST OF EXPOSURE, by Herbert C. McKay.

FOCUS IN CINE WORK, by C. W. Gibbs.

A UNIVERSAL FOCAL SLIDE RULE, by Rudolf von Erhardt.

FILTERS IN PRESS WORK, by James C. Kinkaid.

NOTES ON INFRA-RED PHOTOGRAPHY, by Fred C. Bowditch, Jun.

POSSIBILITIES WITH PHOTOFLASH LAMPS, by Charles W. Seager.

A STANDARD DARKROOM PROCEDURE, by Homer S. Powley.

THE CONTROL OF GRAININESS, by John Lanctot.

SOME AMIDOL FORMULAS—TEASPOON AND OTHERWISE, by E. G. Royer.

A STUDY OF CONTRAST VARIATION OBTAINED WITH THE CHROMIUM INTENSIFIER, by Paul E. Boucher.

LINE AND TONE AS EXPRESSIVE FACTORS IN COMPOSITION, by William S. Davis.

THE NEW GENERATION, by Hans A. Eriksen.

THE PHOTOGRAPHER AFIELD, by Raymond E. Hanson.

THE MAIN PICTORIAL SECTION consists of ninety-six full page illustrations.

HOME PORTRAITURE WITH THE MINIATURE CAMERA, by E. T. Howell.

PICTORIAL POSSIBILITIES IN THE PORTRAIT STUDIO, by J. Vincent Lewis.

NIGHT PHOTOGRAPHY IN NATURAL COLOURS, by F. O'wight Kirsch.

CINEMA EVIDENCE IN COURTS, by Calvin Rutstrum.

AERIAL PHOTOGRAPHY FOR THE AMATEUR, by Philip R. Tarr.

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BROMOIL TRANSFER FOR THE BEGINNER, by L. M. A. Roy.

REFLECTIONS, by Helen T. Farrell.

BUILDING A COURSE OF STUDY IN PHOTOGRAPHY FOR THE TWO-YEAR JUNIOR COLLEGE, by Howard R. Porter.

OUR PICTURES, by Frank R. Fraprie.

WHO'S WHO IN PICTORIAL PHOTOGRAPHY 1933-34.

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- Beresford, F.**, 4, Albert Bridge Road, Battersea, London, S.W. 11.
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- Bowen's Camera Repair Service, Ltd.**, 114/115, Holborn, London, E.C. 1. 'Phone, Holborn 3126.
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- British Camera Manufacturing Co., Ltd.**, 113, Queen's Road, Bayswater, London, W. 2. 'Phone, Bayswater 3636.
- British Journal of Photography**, 24, Wellington Street, Strand, London, W.C. 2. 'Phone, Temple Bar 5330. Telegrams—Photometer, Rand, London.
- British Optical Lens Co.**, Victoria Works, Summer Lane, Birmingham. 'Phone, Aston Cross 1156-1157-1158. Telegrams—Galalith, Birmingham.
- British Photographic Industries, Ltd.**, 88/89, High Holborn, London, W.C. 1. 'Phone, Holborn 6900.
- British Thomson-Houston Co., Ltd.**, Sound Reproducing Department, Rugby 'Phone, 286. Telegrams—Asteroidal, Rugby. Crown House, Aldwych, London, W.C. 2. 'Phone, Temple Bar 8040. Telegrams—Asteroidal, Estrand, London.
- Bruce's, Ltd.**, 28a, Broadway, Ealing, London, W. 5. 'Phone, Ealing 1033.
- Burall Brothers**, Wisbech, Cambs. 'Phone, Wisbech 113. Telegrams—Burall, Wisbech.
- Burr, Charles**, 138, Wakefield Street, East Ham, London, E. 6.
- Burroughs Wellcome & Co.**, Snow Hill Buildings, London, E.C. 1. 'Phone, Central 4000. Telegrams—Tabloid, Cent, London.
- Busch (Emil), Optical Co., Ltd.**, 36-38, Dean Street, London; W. 1. 'Phone, Gerrard 7194-5. Telegrams—Buschop-tik, Rath, London.
- Buzzard, L., Ltd.**, Cotswold Road, Bedminster, Bristol 3. 'Phone, Bristol 63118. Telegrams—Buzzard, Bristol.
- Camera Company**, 320, Vauxhall Bridge Road, London, S.W. 1. 'Phone, Victoria 2977.
- Cameras, Ltd.**, 185, Liverpool Road, Slough, Bucks. 'Phone, Slough 929. Telegrams—Cameras, Slough.
- Camerascopes, Ltd.**, 30, Percy Street, London, W. 1. 'Phone, Museum 8685.
- Canadian Kodak Company, Limited**, Toronto. Telegrams—Kodak, Toronto.
- Cardine Accessories, Ltd.**, 20, High Street, Bath. 'Phone, Bath 8913. Telegrams—Cardine, Bath 3913.
- Cassio Photographic Paper Co., Ltd.**, Cassio Bridge, Watford, Herts. 'Phone, Watford 3482. Telegrams—Cassio, Watford.
- Cellophane Co., Ltd.**, 179, Tottenham Court Road, London, W. 1. 'Phone, Museum 2162. Telegrams—Cellophane, Rath, London.
- Chance Brothers & Co., Ltd.**, Glass Works, Smethwick, near Birmingham. 'Phone, West Bromwich 1306. Telegrams—Chance, Smethwick. Scottish Works, Firhill, Glasgow. 'Phone, Maryhill 98. Telegrams—Brogan, Glasgow.
- Chapman, J. T., Ltd.**, Albert Sq., Manchester, 2. 'Phone, Blackfriars, 8478-9. Telegrams—Camera, Manchester.
- Cinecraft Supplies**, Camera Corner, Palmers Green, London, N. 13. 'Phone, Palmers Green 1277.
- Cinema Traders, Ltd.**, 26, Church Street, Charing Cross Road, London, W. 1. 'Phone, Gerrard 5287 and 5288. Telegrams—Biocinema, Rath, London.
- Cinepro, Ltd.**, 1, New Burlington Street, London, W. 1. 'Phone, Regent 2085. Telegrams—Cinepro, Piccy, London.
- Cinex, Ltd.**, 70, High Holborn, London, W.C. 1. 'Phone, Holborn 4482.
- City Sale and Exchange (1929), Ltd.**, 84, Aldersgate Street, London, E.C. 1. 'Phone, National 0591. Telegrams—Retoucher, Barb, London; 90 to 94, Fleet Street, London, E.C. 4. 'Phone, Cen. 9391. Telegrams—Films, Fleet,

- London; 54, Lime Street, London, E.C. 3. 'Phone, Monument 0180. Telegrams—Phototypic, Led, London; The Arcade, Broad Street, London, E.C. 2. 'Phone, Bishopsgate 6799; 59, Cheap-side, London, E.C.2. 'Phone, City 1124.
- Clay, S. & C.**, 105-107, Fowler Street, South Shields, Co. Durham.
- Colour Photographs (British & Foreign), Ltd.**, Victoria Road, Willesden, London, N.W. 10. 'Phone, Willesden, 7300.
- Construments, Ltd.**, 18, Gray's Inn Road, London, W.C. 1. 'Phone, Holborn 7057.
- Cook, W. T., Ltd.**, Acme Photo Works, Chaldon Road, Upper Caterham, Surrey. 'Phone, Caterham 167. Telegrams—Rotaries, Caterham, Surrey.
- Coronet Camera Co.**, 310, Summer Lane, Birmingham. 'Phone, Aston Cross 5804/5. Telegrams—Coronetcy, Birmingham.
- Criterion, Ltd.**, Criterion Works, Stechford, Warwickshire. 'Phone, Stechford 2007. Telegrams—Criterion, Stechford; 35, Essex Street, Strand, London, W.C.2. 'Phone, Central 2536.
- Croxley Manufacturing Co.**, Dominion House, Bartholomew Close, London, E.C. 1. 'Phone, National 6135.
- Culkin, J.**, 113, North Street, Leeds 7. 'Phone, 27917. Telegrams—Cinelodex, Leeds.
- Dallmeyer, J.H., Ltd.**, 31, Mortimer Street, Oxford Street, London, W. 1. 'Phone, Museum 6022-3; Church End Works, Willesden, London, N.W. 10. 'Phone, Willesden 0176. Telegrams—Dallmeyer, London.
- Dickinson, John, & Co., Ltd.**, Apsley Mills, Hemel Hempstead, Herts. 'Phone, Boxmoor 124. Telegrams—Dickinson, Apsley End.
- Dixon, T. H., & Co., Ltd.**, Letchworth, Herts. 'Phone, Letchworth 165. Telegrams—Theko, Letchworth.
- Dollond & Aitchison, Ltd.**, 192, Tottenham Court Road, London, W. 1. 'Phone, Museum 6402-3. Telegrams—Owl, London.
- Doughtys, Ltd.**, 47-48, Savile Street, Hull. 'Phone, Central 31666. Telegrams—Recreative, Hull; D. & P. Works, 141, Beverley Road, Hull. 'Phone, Central 7618.
- Dowty, E. F., Ltd.**, Walker Street, Blackpool, Lancs. 'Phone, Blackpool 2167. Cross Street, Windermere. 'Phone, Windermere 431.
- Dowty, R.**, Castle Hill, Douglas, I.O.M. 'Phone, Douglas 189.
- D.P. Films, Ltd.**, 40-42, Osnaburgh Street, London, N.W. 1. 'Phone, Museum 1171.
- Drem Products, Ltd.**, 37, Bedford Street, Strand, London, W.C.2. 'Phone, Temple Bar 2340. Telegrams—Dremcorp, Lesquare, London.
- Edgington, John, & Co., Ltd.**, Sardinia House, Sardinia Street, Kingsway, London, W.C.2. 'Phone, Holborn 0734. Telegrams—Abri, Holb, London.
- Electric Fires, Ltd.**, Heatrae Works, Norwich. 'Phone, Norwich 1537. Telegrams—Heatrae Norwich.
- Electric Production Co.**, 90, George Street, Baker Street, London, W. 1. 'Phone, Welbeck 7652.
- Elliott & Sons, Ltd.**, Barnet, Herts. 'Phone, Barnet 0011. Telegrams—Elliott, Barnet.
- Empire Background Co.**, Bury Court Studios, Oswaldtwistle, Accrington, Lancs.
- Ensign, Ltd.**, Ensign House, 88/89, High Holborn, London, W.C. 1. 'Phone, Holborn 6900. Telegrams—Bromide, Phone, London. Works: Walthamstow, E. 17. Branches: Glasgow, Swansea, Birmingham, Canterbury, Cardiff, Belfast, and at Bombay and Calcutta.
- Ensign Snapshot Service**, Victoria Road, Walthamstow, London, E. 17. 'Phone, Larkswood 2233 (2 lines). Telegrams—Ensiopin, Phone, London.
- Epstein, J., & Co., Ltd.**, Mivart Street, Easton, Bristol 5. 'Phone, 57047. Telegrams—Mouldings, Bristol.
- E.S.S. Colour Filter Co.**, 22, Bloomsbury Street, London, W.C. 1. 'Phone, Museum 2161.
- Fallowfield, Jonathan, Ltd.**, 61-62, Newman Street, Oxford Street, London, W. 1. 'Phone, Museum 8318. Telegrams—Fallowfield, Rath, London.
- Farrow, E. H.**, 84, Hazelville Road, Hornsey Rise, London, N19.
- Finlay Colour, Ltd.**, Brettenham House, Lancaster Place, Strand, London, W.C. 2. 'Phone, Temple Bar 2567/8. Telegrams—Fintocess, Rand, London.
- Flatters & Garnett, Ltd.**, 309, Oxford Road, Manchester 13. 'Phone, Ardwick 3533. Telegrams—Slides, Manchester.
- Fordham & Co., Ltd.**, Victoria Works, Victoria Road, Walthamstow, London, E. 17. 'Phone, Walthamstow 0244. Telegrams—Permanent, Phone, London.
- Fotet Camera Co.**, 18, Cross Street, Hatton Garden, London, E.C. 1. 'Phone, Holborn, 2510.
- Fourdrinier, Hunt & Co., Ltd.**, 8, Chingford Mount Road, London, E. 4. 'Phone, Silverthorn 2241.
- Fox Photos**, 6, Tudor Street, London, E.C. 4. 'Phone, Central 7831-5. Telegrams—Foxfotopic, Fleet, London.
- Fry, E. B., Ltd.**, Malden Factory, Malden Crescent, Kentish Town, London, N.W. 1. 'Phone, Gulliver, 2274/5. Telegrams—Frylan, Norwest, London.
- Fry, S. H.**, 5, Highbury Grove, London, N. 5. 'Phone, Canonbury 2400. Telegrams—Fry, Can. 2400.

- Gandolfi, Louis & Sons**, 2, Borland Road, Stuart Road, Peckham Rye, London, S.E. 15.
- Garner & Jones, Ltd.**, Polebrook House, Golden Square, London, W. 1. 'Phone, Gerrard 2300. Telegrams—Gerrard 2300, London.
- Garratt & Atkinson**, Warwick Works, Ealing, London, W. 5. 'Phone, Ealing 1760. Telegrams—Atkingarr, Phone, London.
- G. B. Equipments Limited**, 142-150, Wardour Street, London, W. 1. 'Phone, Gerrard 9292. Telegrams—Gebequip, Rath, London.
- Gear, John H.**, 8, Nottingham Terrace, Marylebone Road, London, N.W. 1. 'Phone, Welbeck 2204.
- General Electric Co., Ltd.**, Magnet House, Kingsway, London, W.C. 2. 'Phone, Temple Bar 8000. Telegrams—Electricity, Westcent, London.
- Gevaert, Ltd.**, 115, Walmer Road, North Kensington, London, W. 10. 'Phone, Park 4333 (2 lines). Telegrams—Artoveg, Nottarch, London.
- Gibbons, A. O., Ltd.**, 16, Carlisle Street, Dean Street, London, W. 1. 'Phone, Gerrard 2128.
- Gibson, C. M.**, 7, Kirby Street, Hatton Garden, London, E.C. 1. 'Phone, Holborn 0800.
- Glanvill, H. G.**, 256, Balsall Heath Road, Birmingham.
- Glasgow Camera Exchange**, 99, Waterloo Street, Glasgow, C. 2. 'Phone, Central 5447.
- Glazine Pad Co.**, Oughtibridge, Yorkshire.
- Gorse, Edwin**, 86, Accrington Road, Blackburn, Lancs. 'Phone, 6918. Telegrams—Gorse 6918, Blackburn.
- Graber, Ellis**, 16, Newton Road, Tunbridge Wells. Telegrams—Graber, Tunbridge Wells.
- Grant, Thos. K., Ltd.**, Polebrook House, Golden Square, London, W. 1. 'Phone, Gerrard 2300. Telegrams—Gerrard, 2300, London.
- Greiff, R. W., & Co., Ltd.**, Thames House, Great Queen Street, London, E.C. 4. 'Phone, Central 6550. Telegrams—Greiff, Cannon, London.
- Green, A. W.**, 70, High Holborn, London, W.C. 1. 'Phone, Chancery 7004. Telegrams—Green, Chancery 7004.
- Greenwood, Henry, & Co., Ltd.**, 24, Wellington Street, Strand, London, W.C. 2. 'Phone, Temple Bar 5330. Telegrams—Photometer, Rand, London.
- Griffiths Bros. & Co., London, Ltd.**, Macks Road, Bermondsey, London, S.E. 16. 'Phone, Bermondsey 1151. Telegrams—Aqual, Phone, London.
- Griffiths, R.**, 26-31, Eyre Street Hill, Holborn, London, E.C. 1. 'Phone, Clerkenwell 5867. Telegrams—Byragrif, Holb, London.
- Guiterman, S., & Co., Ltd.**, 35 and 36, Aldermanbury, London, E.C. 2. 'Phone, Metropolitan 8074. Telegrams—Guiterman, Phone, London.
- Gulliman, Granville & Co., Ltd.**, 29, Warwick Place, Leamington Spa. 'Phone, 847. Telegrams—Granville, Leamington. 18, Gray's Inn Road, London, W.C. 1. 'Phone, Holborn 5688.
- Halden, J., & Co., Ltd.**, 8, Albert Square, Manchester. 'Phone, Heaton Moor 2241 and 2242. Telegrams—Halden, Manchester.
- Hall, B. J., & Co., Ltd.**, Stourton House, Dacre Street, London, S.W. 1. 'Phone, Vic. 5302-6. Telegrams—Inspect, Sowest, London.
- Halliday & Co.**, Holbeck New Mills, Holbeck Lane, Leeds. 'Phone, Leeds 22251. Telegrams—Halmac, Leeds.
- Hamel, E., & Co.**, Premier Studios, Palmerston Street, Woodborough Road, Nottingham. 'Phone, 41547 (2 lines). Telegrams—Hamel, Nottingham.
- Harbutt's Plasticine, Ltd.**, Bathampton, Bath. 'Phone, 8209. Telegrams—Plasticine, Bath. London Office and Showroom, 56, Ludgate Hill, E.C. 4. 'Phone, City 7362.
- Hardtmuth, L. & C. (Gt. Britain), Ltd.**, Koh-i-noor Factory, Stafford Road, Croydon. 'Phone, Fairfield 5185.
- Harper Automatic Machine Manufacturing Co., Ltd.**, Automatic Works, Stafford Road, Croydon. 'Phone, Fairfield 5571 & 5572. Telegrams—Fairfield 5571.
- Harrap, John, & Son**, 3, Holborn Buildings, Holborn Bars, London, E.C. 1. 'Phone, Holborn 2020. Telegrams—Harrisonart, Smith, London.
- Harringtons, Ltd.**, 386, George Street, Sydney, N.S.W.; also Katoomba, Newcastle, Melbourne, Brisbane, Adelaide, Perth and Hobart, Australia; also Wellington and Auckland, New Zealand. Cables—Harrington, Sydney.
- Haseler, Charles & Son, Ltd.**, 390-395, New John Street West, Birmingham, 19. 'Phone Telegrams—Aston Cross 0631, Birmingham.
- Hathern Station Brick & Terra Cotta Co., Ltd.**, Loughborough, Leicestershire. 'Phone, Hathern 61. Telegrams—Bricks, Loughborough.
- Heaton Ltd., Wallace**, 119, New Bond Street, London, W. 1. 'Phone, Mayfair 0924-5-6; also 47, Berkeley Street, W. 1. 'Phone, Grosvenor 2691. Telegrams—Zodellaria, Wesdo, London. Works and Studios, 28-30, Avery Row, London, W. 1. 'Phone, Mayfair 4484.
- Hewitt Electric Company, Ltd.**, Walton-on-Thames, Surrey. 'Phone, Walton-on-Thames, 762, 763. Telegrams—Hewittic, Walton-on-Thames.

- Higgins, C. M., & Co., Ltd.**, 16-20, Farringdon Avenue, London, E.C. 4. 'Phone, Central 3763. Telegrams—Plicated, Fleet, London.
- Hilger, Adam, Ltd.**, 98, King's Road, Camden Road, London, N.W. 1. 'Phone, Gulliver 5426. Telegrams—Sphericity, Phone, London.
- Hockett, S. W.**, Photographic Works, Potters Road, New Barnet, Herts. 'Phone, Barnet 0158.
- Holmes Brothers (London), Ltd.**, Holbro Works, Billet Road, Walthamstow, London, E. 17. 'Phone, Larkwood 1086 (3 lines). Telegrams—Dogfish, Phone, London.
- Hood & Co., Ltd.**, Sanbride Works, and 97, Albert Road, Middlesbrough. 'Phone, 2518. Telegrams—Sanbride, Middlesbrough.
- Hora, Tudor T.**, 346, York Road, Wandsworth, London, S.W. 18. 'Phone, Battersea 0327. Telegrams—Hora, Chemist, Wandsworth, London.
- Horne's Camera Mart**, 58, Old Broad Street, E.C. 2. 'Phone, London Wall 6336 and 6337; and 32, Gracechurch Street, London, E.C. 3. 'Phone, Mansion House 6880. Telegrams—London Wall 6336.
- Houghton, C.**, 28, Russell Street, Heaton Park, Manchester.
- Houghton - Butcher Manufacturing Co., Ltd.**, Fulbourne Road, Walthamstow, London, E. 17. 'Phone, Larkwood 1089. Telegrams—Rhamnus, Phone, London.
- Howell, Charles**, Owl Works, Bonny Street, Blackpool.
- Howorth, H. E., Ltd.**, 43, Victoria Street, Fleetwood, Lancs. 'Phone, Fleetwood 557. Telegrams—Howorth 557 Fleetwood.
- Hughes, W. C., & Co.**, 132, Englefield Road, Essex Road, London, N. 1. 'Phone, Clissold 1122.
- Hunter, R. S., Ltd.**, Celfix House, 51, Gray's Inn Road, London, W.C. 1. 'Phone, Holborn 7311-2. Telegrams—Buxhunter, Holb., London.
- Hunter-Penrose, Ltd.**, 109, Farringdon Road, London, E.C. 1. 'Phone, Clerkenwell 6626. Telegrams—Huntomatic, Smith, London. 69, Charlotte Street, Birmingham. 'Phone, Central 7427. 45a and 47, Market Street, Manchester, City 2169; 349, Cathedral Street, Glasgow. 'Phone, Bell 1405. 2, Leonard Lane, Bristol. 'Phone 24662.
- Ilford Limited**, Ilford, London. 'Phone, Ilford 3000 (20 lines). Telegrams—Plates, Phone, Ilford.
- Ilford Limited**, Cumberland Avenue, Park Royal, Willesden Junction, London, N.W. 10. 'Phone, Willesden 2384. Telegrams—Squeezee, Phone, London.
- Ilustra Enterprises**, 159, Wardour St., London, W. 1. 'Phone, Gerrard 6889.
- Imperial Chemical Industries, Ltd.**, Millbank, London, S.W. 1. 'Phone, Vic. 4444. Telegrams—Impkemix, Telex., London.
- Imperial Dry Plate Co., Ltd.**, Ilford, London. 'Phone, Ilford 3000 (20 lines). Telegrams—Impeople, London.
- Infallible Exposure Meter Co.**, Wrexham. 'Phone, Coedpoeth 26. Telegrams—Infallible Exposure, Coedpoeth.
- Ipa Photographics**, 8, 10 & 12, Lambeth Palace Road, London, S.E. 1. 'Phone, Hop 5312-3. Telegrams—Barlissoff, Lamb, London.
- Janovitch, M., & Co.**, 19, Broad Street, Golden Square, London, W. 1. 'Phone, Gerrard 2202. Telegrams—Uniplates, Piccy, London.
- Jeffery & Boarder**, 55 and 56, Mattock Lane, West Ealing, London, W. 13. 'Phone, Ealing 0875.
- Jepson, Warren & Co.**, Regent Works, off Hyde Park Road, Leeds. 'Phone, 26294. Telegrams—Jepson, Regent Works, Leeds.
- Johnson & Sons, Manufacturing Chemists, Ltd.**, Hendon, London, N.W. 4. 'Phone, Hendon 8051 (4 lines). Telegrams—Caustic, London. Manchester Office, 12, Queen Street, Deansgate. 'Phone, Blackfriars 0115. Telegrams—Caustic, Manchester.
- Johnson & Sons, Smelting Works, Ltd.**, Creek Works, Brimsdown, Middlesex. 'Phone, Enfield 1677 (3 lines). Telegrams—Cauterism, Enfield.
- Johnson Matthey & Co., Ltd.**, 73/82, Hatton Garden, London, E.C. 1. 'Phone, Holborn 6989. Telegrams—Matthey, Smith, London.
- Johnson, Wm., & Sons (London), Limited**, 18, Union Street, Southwark, London, S.E. 1. 'Phone, Hop 4950.
- Jones, Samuel, & Co., Ltd.**, Bridewell Place, London, E.C. 4. 'Phone, Central 6500. Telegrams—Noncurling, Lud, London.
- Kalton, G.**, 61, Farringdon Road, London, E.C. 1. 'Phone, Holborn 2763. Telegrams—Holborn 2763.
- Kamy, Ltd.**, 22, Bunhill Row, London, E.C. 1. 'Phone, National 1508.
- Kandem Electrical, Ltd.**, 711, Fulham Road, London, S.W. 6. 'Phone, Fulham 2387-8. Telegrams—Kortmath, Walgreen, London.
- Kaufmann, Simon**, Tottenham Mews, Tottenham Street, London, W. 1. 'Phone, Museum 4674.
- Kay Photo Machines, Ltd.**, 22, Bunhill Row, London, E.C. 1. 'Phone, National 1508.
- Keen, Allan P., & Co., Ltd.**, 19, Cannon Hill Road, Coventry.
- Kentmere, Ltd.**, Staveley, Westmorland. 'Phone, Staveley 65. Telegrams—Kentmeres, Staveley, Westmorland.



- Kershaw, A., & Son**, 200, Harehills Lane, Leeds. 'Phone, Chapeltown 41081-2. Telegrams—Science, Leeds.
- Klix, Ltd.**, 131, Regent Street, London, W. 1. 'Phone, Regent 1000. Telegrams—Klix, London.
- Kodak, Limited**, Kingsway, London, W.C. 2. 'Phone, Holborn 7841. Telegrams—Kodak, London. Works, Wealdstone, Middlesex. 'Phone, Harrow 0080. Telegrams—Kodak, Wealdstone; 70, Lord Street, Liverpool. 'Phone, Bank, 3412. Telegrams—Kodak, Liverpool; 46, Buchanan Street, Glasgow. 'Phone, Bell 1060. Telegrams—Kodak, Glasgow; 32, Grainger Street, Newcastle-on-Tyne. Central 21663. Telegrams—Kodak, Newcastle-on-Tyne; 45, Corporation Street, Birmingham. 'Phone Central 9976. Telegrams—Kodak, Birmingham; 89, Grafton Street, Dublin. 'Phone, Ratmines 507. Telegrams—Kodak, Dublin.
- Kodak, Limited**, Kodak House, Hornby Road, Bombay. Telegrams—Kodak Bombay. Branches: Calcutta, Madras and Lahore.
- Kodak, Limited**, 130, Robinson Road, Singapore. Telegrams—Kodak, Singapore.
- Kodak, Limited**, Noordwyk 38, Batavia Centrum, D.E.I.
- Kodak (Australasia) Proprietary, Ltd.**, Melbourne. Telegrams—Kodak, Melbourne. Sydney, Adelaide, Brisbane, Perth, Toowoomba, Townsville and Rockhampton, Australia; Hobart, Tasmania.
- Kodak, New Zealand, Ltd.**, 16-18, Victoria Street, Wellington, N.Z. Telegrams—Kodak, Wellington, N.Z. Branches:—Auckland, Dunedin and Christchurch.
- Kodak (East Africa), Ltd.**, Zebra House, P.O. Box 28, Nairobi. Branches:—Kenya Colony: Kitale, Eldoret, Nakuru and Mombasa; Uganda: Kampala and Jinja; Tanganyika: Dar-es-Salaam, Arusha, Tanga and Moshi.
- Kodak (South Africa), Ltd.**, Kodak House, Corner of Shortmarket and Loop Street, Cape Town. Telegrams—Kodak Cape Town. Branches:—Durban and Johannesburg.
- Kodak (Egypt) S.A.**, Cairo. Branches: Haifa (Palestine), Beirut (Syria), Istanbul (Turkey), Athens (Greece), Alexandria (Egypt).
- Kosmos Photographics, Ltd.**, Letchworth, Herts. 'Phone, 128. Telegrams Kosmos, Letchworth; also 155, Victoria Street, London, S.W. 1. 'Phone, Victoria 2685.
- Lancaster, J., & Son, Ltd.**, 54, Irving Street, Birmingham 15. 'Phone, Central 4255.
- Lechertier, Barbe, Ltd.**, 95, Jermyn Street, London, W. 1. 'Phone, Whitehall, 2938. Telegrams—Lechertier, Piccy, London.
- Leitz, E. (London)**, 20, Mortimer Street, London, W. 1. 'Phone, Museum 3776-7. Telegrams—Microtome, Phone London.
- Lethaby, W., & Co.**, Leda House, 124-132, Clerkenwell Road, London, E.C. 1. 'Phone, Clerkenwell 5004.
- Lizars, J.**, 101-107, Buchanan Street, Glasgow. 'Phone, Central 8062. 381, Sauchiehall Street, Glasgow. 'Phone, Douglas 1669. Telegrams—Lizars, Glasgow; Factory, Glasgow; 6, Shandwick Place, Edinburgh. 'Phone, 22272. Telegrams—Optical, Edinburgh; 118, Union Street, Aberdeen. 'Phone, 2324. Telegrams—Lizars, Optician, Aberdeen; 71, Bold Street, Liverpool. 'Phone, Royal 1882. Telegrams—Lizars, Optician, Liverpool; 27, High Street, Paisley. 'Phone, 2238. Telegrams—Lizars, Optician, Paisley; 14, West Blackhall Street, Greenock. 'Phone, 877. Telegrams—Lizars, Optician, Greenock; 12, Muir Street, Motherwell. 'Phone, 68. Telegrams—Lizars, Optician, Motherwell; 8, Wellington Place, Belfast. 'Phone, 1028. Telegrams—Lizars, Belfast.
- Lockyer, J. E., Ltd.**, 244, Evelyn Street, Deptford, London, S.E. 8. 'Phone, New Cross 0596.
- London Camera Exchange Co., Ltd. (The)**, 20, Bucklersbury, Queen Victoria Street, London, E.C. 4. 'Phone, City 4591. Telegrams—Loncamerex, Cannon, London.
- L.C.C. School of Photo-Engraving and Lithography**, Bolt Court, Fleet Street, London, E.C. 4. 'Phone, Central 4150.
- L.C.C. Trade School (Photographic Department for Women and Girls)**, Queen Square, Bloomsbury, London, W.C. 1. 'Phone, Holborn 4627.
- London Instrument Co. Ltd.**, 51a, Bridge Street, Cambridge. 'Phone, Cambridge 1733. Telegrams—Cambridge 1733.
- London Pharmacists' D. & P. Service, Ltd.**, Nightingale Grove, Hither Green, London, S.E. 13. 'Phone, Lee Green 5023.
- Lord's Camera Works**, Wardleworth, Rochdale. Telegrams—Camera Works, Rochdale.
- Lumex, Ltd.**, Dame Lane, Dublin. 'Phone, Dublin 22736. Telegrams—Lumex, 22736 Dublin.
- McKaig, W. H.**, Meter Works, Friar Street, Hereford. Telegrams—McKaig, Meters, Hereford.
- Mackenzie & Co.**, 212, Old Dumbarton Road, Glasgow. 'Phone, Western 613. Telegrams—Daylight, Glasgow.

- Macleod, Angus M.**, 43, Rathgar Avenue, Ealing, London, W. 13. 'Phone, Ealing 1387.
- Mallinson, Rufus H.**, 7, Rose Crescent, Cambridge.
- Manchester College of Technology (Department of Printing and Photographic Technology)**, Sackville Street, Manchester. 'Phone, City 7225-8. Telegrams—Printing, Technology, Manchester.
- Manistre, H. E.**, 113, Queen's Road, London, W. 2. 'Phone, Bayswater 3636.
- Marion & Foulger (1933), Ltd.**, Magna Works, Bedford. 'Phone, Bedford 3261.
- Marshall & Co.**, Ford Street, Nottingham Road, Nottingham. 'Phone, 75386. Telegrams—Marshall, Photo, Nottingham.
- Masks, A., & Sons**, 12A, Cross Street, Islington, London, N. 1. 'Phone, Canonbury 3130.
- Mason, Thos. H.**, 5-6, Dame Street, Dublin, C. 1. 'Phone, 52191-2 (two lines). Telegrams—Mason, Dublin 52191.
- Master Photo Finishers, Ltd.**, 33, John's Meads, Bloomsbury, London, W.C. 1. 'Phone, Hol 1147.
- Mather, E., & Co., Ltd.**, 7, Victoria Bridge, Manchester. 'Phone, Blackfriars 6133. Telegrams—Sensitised, Manchester.
- Matthews, B.**, 134-140, Idie Road, Bradford, Yorks. 'Phone, 4789. Telegrams—Postcards, Bradford.
- Maurice, N., & Co.**, 28-40, Paradise Street, Liverpool, L. 'Phone, Bank 5181. Telegrams—Maurice, Liverpool.
- Mawson & Swan, Ltd.**, Teams Works, Gateshead, Co. Durham, and 13, Mosley Street, Newcastle-on-Tyne. 'Phone, Dunstou 144. Telegrams—Mands, Newcastle-on-Tyne.
- May & Baker, Ltd.**, Dagenham. 'Phone, Ilford 3060 (10 lines). Telegrams—Bismuth, Phone, London.
- Merrett & Co.**, Trowbridge, Wilts. Telegrams—Merrett, Trowbridge.
- Miller Bros., Hall & Co., Ltd.**, Back Hilton Road, Aberdeen. 'Phone, 1487.
- Miller Cine Co., Ltd.**, Elmbridge Road, Gloucester. 'Phone 2893.
- Miller, F. W., & Co., Ltd.**, 68, Nansen Road, Sparkhill, Birmingham. 'Phone, Springfield 1410. Telegrams—Miller, Springfield 1410, Birmingham.
- Miscellaneous Trading Co., Ltd. (The)**, 13, New Oxford Street, London, W.C. 1. 'Phone, Holborn 4894.
- Modern Traders, Ltd.**, 10, Oxford Circus Avenue, 231, Oxford Street, London, W. 1. 'Phone, Gerrard 2373-4. Telegrams—Modtradlim, Wsdo London.
- Moore & Co.**, 101 and 103, Dale Street, Liverpool. 'Phone, Central 5284. Telegrams—Solutions, Liverpool.
- Mottrix Sales Co.**, 52, Queen Victoria Street, London, E.C. 4. 'Phone, City 7343.
- Munro, R. W., Ltd.**, 103-149, Cornwall Road, South Tottenham, London, N. 15. 'Phone, Stamford Hill 1134. Telegrams—Munrengic, Phone, London.
- Musikon, Ltd.**, 19, Lisle Street, London, W.C. 2. 'Phone, Gerrard 7105. Telegrams—Titles, Lesquare, London.
- Newman & Guardia, Ltd.**, 63, Newman Street, Oxford Street, London, W. 1. 'Phone, Museum 1081. Telegrams—Goniometer, Rath, London.
- Newman & Sinclair, Ltd.**, 2, Salisbury Road, Highgate, London, N. 19. 'Phone, Archway 1013. Telegrams—Oraculum, Westrand, London.
- Newton & Co.**, 72, Wigmore Street, London, W. 1. 'Phone, Welbeck 4131 (2 lines). Telegrams—Newtobar, Wesdo, London.
- Newton & Co., Ltd.**, 43, Museum Street, London, W.C. 1. 'Phone, Holborn 7749. Telegrams—Transopti, Phone, London.
- Norse Trading Co. (London), Ltd.**, 47, Berners Street, London, W. 1. 'Phone, Museum 4142.
- Novobax, Ltd.**, Rickmansworth Road, Watford, Herts. Telegrams—Novobax, Watford.
- Oldfield, J., & R. Ltd.**, Refulgent Works, Warwick Street, Birmingham. 'Phone, Victoria 3019. Telegrams—Dependence, Birmingham.
- Oram and Robinson**, 2, Academy Buildings, Fanshawe Street, Hoxton, London, N. 1. 'Phone, Clerkenwell 8927.
- Ormskirk Photo Services**, Park Road, Ormskirk. 'Phones, Ormskirk 380-381. Telegrams—Photo-Services, Ormskirk.
- Ozalid Co., Ltd.**, 1, Central Buildings, London, S.W. 1. 'Phone, Whitehall 4872 (2 lines). Telegrams—Ozalidcom, Parl, London.
- Page Electrical Equipments**, King Alfred's Place, Broad Street, Birmingham. 'Phone, Midland 4377.
- Palmer, W. E. & Sons**, 32, Leicester Road, New Barnet. 'Phone, Barnet 0257.
- Panora, Ltd.**, 56-58, Eagle Street, London, W.C. 1. 'Phone, Chancery 7779.
- Pathscope, Ltd.**, 5, Lisle Street, Leicester Square, London, W.C. 2. 'Phone, Gerrard 6336. Telegrams—Pathscope, Lesquare, London.
- Pearce, Walter & Co.**, St. George's Press, Brentford, Middlesex. 'Phone, Ealing 4703. Telegrams—St. George's Press, Brentford.
- Pearson, E. T., & Co., Ltd.**, Photographic Department, London Road, Mitcham, Surrey. 'Phone, Mitcham 0882. Telegrams—Pearsonet, Mitcham.

- Peat Products (Sphagnol), Ltd.**, 21, Bush Lane, Upper Thames Street, London, E.C. 4. 'Phone, Mansion House 8494. Telegrams—Bluejacket, Cannon, London.
- Peeling & Van Neck, Ltd.**, 4-6, Holborn Circus, London, E.C. 1. 'Phone, Central 9196. Telegrams—Photopsia, Phone, London.
- Pemberton Bros.**, 60, Hornby Road, Blackpool, Lancs. 'Phone, 1506.
- Perfex Photo Works**, Melksham, Wilts. 'Phone, Melksham 19. Telegrams—Hughes, 19, Melksham.
- Perken, Son & Co., Ltd.**, 94, Hatton Garden, London, E.C. 1. 'Phone, Holborn 0724. Telegrams—Optimus, Smith, London.
- Phillips Lamps, Ltd.**, 145, Charing Cross Road, London, W.C. 2. 'Phone, Gerrard 7777. Telegrams—Phillamps, Westcent, London.
- Phillips, F. G., Ltd.**, 44, Farringdon Street, London, E.C. 4. 'Phone, Holborn 6403-6404. Telegrams—Binocle, Cent, London.
- Photo Finishers (Sheffield), Ltd.**, Union Road, Sheffield, 1. 'Phone, 50791.
- Photographia (Golders Green), Ltd.**, 873, Finchley Road, London, N.W. 11. 'Phone, Speedwell 2200. Telegrams—Photographia, Golders Green.
- Photographic Inventions, Ltd.**, 62, High Street, Tooting, London, S.W. 19. 'Phone, Streatham 5452.
- Photopress, Ltd.**, 10, Johnson's Court, Fleet Street, London, E.C. 4. 'Phone, Central 5335-6. Telegrams—Photopres, Fleet, London.
- Photostat, Ltd.**, Bush House, Aldwych, London, W.C. 2. 'Phone, Temple Bar 7376; and 5-6, Bury Court, St. Mary Axe, E.C. 3. 'Phone, Avenue 7715. Telegrams—Photostat, Bush, London.
- Photo Trading Co., Ltd.**, Change Alley, Sheffield. 'Phone, 28255. Telegrams, Films, Sheffield.
- Photric Products**, 37, Albemarle Street, London, W. 1. 'Phone, Regent 4206. Telegrams—Photric, Regent 4206.
- Pickard, Chas. R. H., & Son**, 9A, Kirkgate, Leeds 1. 'Phone, 24803. Telegrams—Pickard, Photographer, Leeds.
- Pictorial Machinery, Ltd.**, 47, Hatton Garden, London, E.C. 1. 'Phone, Holborn 1848 and 1849. Telegrams—Pictograph, London.
- Pilkington Bros., Ltd.**, Glass-works, St. Helens, Lancs. 'Phone, 4001. Telegrams—Pilkington, Phone, St. Helens. 164, Shepherdess Walk, Hoxton, N. 1. 'Phone, Clerkenwell 0751-0756. Telegrams—Pilkington, Phone, London.
- Platinotype Company**, 66, High Street, Penge, London, S.E. 20. 'Phone, Sydenham 0900. Telegrams—Platinotype, Westnor, London.
- polyfoto Limited**, 141, New Bond Street, London, W. 1. 'Phone, Mayfair 0334. Telegrams—polyfoto, Wesdo, London.
- Polytechnic School of Photography**, 309, Regent Street, London, W. 1. 'Phone, Langham 2020. Telegrams—Polytechnic, Wesdo, London.
- Raines & Co. (Ealing), Ltd.**, The Studios, Ealing, London, W. 5. 'Phone, Ealing 6077 (3 lines). Telegrams—Raines, Ealing.
- RCA Photophone, Ltd.**, Electra House, Victoria Embankment, London, W.C. 2. 'Phone, Temple Bar 2971. Telegrams—Ircapp, Estrand, London.
- Reflex Photo Works, Ltd.**, 178A, Ashley Road, Parkstone, Dorset.
- Robinson & Sons, Ltd.**, Wheat Bridge Mills, Chesterfield. 'Phone, 2105. Telegrams—Boxes, Chesterfield. 168, Old Street, London, E.C. 1. 'Phone, Clerkenwell 8461. Telegrams—Stagint, London.
- Roll Film Co., Ltd.**, Photo Works, Nursery Road, Wimbledon, London, S.W. 19. 'Phone, 5701 Wimbledon. Telegrams—Fotospeed, London.
- Rose, Will R., Ltd.**, 23, Bridge Street Row, Chester. 'Phone, 10. Telegrams—Wilrose, Chester.
- Ross, Ltd.**, 13/14, Great Castle Street, Oxford Circus, London, W. 1. 'Phone, Langham 2240. Telegrams—Rossano, Wesdo, London; Works, 3, North Side, Clapham Common, London, S.W. 4. 'Phone, Macaulay 2472 (2 lines). Telegrams—Rossicaste, 'Phone, London.
- Rotary Photographic Co.**, West Drayton, Middlesex. 'Phone, West Drayton 357 (2 lines). Telegrams—Rotatoria, West Drayton.
- Roth, A. O.**, 85, Ringstead Road, Catford, London, S.E. 6. 'Phone, Hither Green 2424. Telegrams—Mentorflex, Catgreen, London.
- Rowney, George, & Co., Ltd.**, 10-11, Percy Street, London, W. 1. 'Phone, Museum 6220-1. Telegrams—George Rowney, London.
- Royal Photographic Society**, 35, Russell Square, London, W.C. 1. 'Phone Museum 0411.
- Rudowsky and Rudowsky**, 48, London Wall, London, E.C. 2. 'Phone, Metropolitan 1653. Telegrams—Rudowsky, Ave, London.
- Russell, G. & E.**, 7, Westminster Road, Coventry.
- Sands, Hunter & Co., Ltd.**, 37, Bedford Street, Strand, London, W.C. 2. 'Phone, Temple Bar 2340. Telegrams—Sansunter, Lesquare, London.
- Sashalite, Ltd.**, 28, Victoria Street, London, S.W. 1. 'Phone, Victoria 3018. Telegrams—Sashalite, Victoria 3018, London.
- Schering Limited (Voigtlander Dept.)** 188-192, High Holborn, London, W.C. 1. 'Phone, Holborn 9345. Telegrams—Scheropha, Phone, London.

- Schiff, Oskar**, 30, Fairfax Road, London, N.W. 6.
- Schneider, R. E.**, 189, The Grove, London, W. 6. 'Phone, Shepherds Bush 5260. Telegrams—Gekawerke, London.
- School of Commercial and Illustrative Photography** (David Charles), 145, Queen's Road, Wimbledon, London, S.W. 19.
- School of Pictorial and Technical Photography** (John H. Gear), 8, Nottingham Terrace, Regent's Park, London, N.W. 1. 'Phone, Welbeck 2204.
- Scrivens, E. L., & Co., Ltd.**, 60, Queen's Road, Doncaster. 'Phone 559, Telegrams—Scrivens, Doncaster 559.
- Sculpto Art, Ltd.**, 133, Oxford Street, London, W. 1. 'Phone, Gerrard 5381/2. Telegrams—Artsculpto, Rath, London.
- Seffert, R. O.**, 8, Beulah Hill, London, S.E. 19. 'Phone, Livingstone 2878. Telegrams—Livingstone 2878 London.
- Sensitized Fabric Co., Ltd.**, Bush House, Aldwych, London, W.C. 2. 'Phone, Temple Bar 7376. Telegrams—Sensitex, Bush, London.
- Service Co. (London), Ltd.**, 289, High Holborn, London, W.C. 1. 'Phone, Holborn 0664 (3 lines). Telegrams—Admittedly, London.
- Sessions, Wm., Ltd.**, The Ebor Press, York. 'Phone, York 3326. Telegrams—Sessions, 3306, York.
- Sheffield Photo Co., Ltd.**, 6, Norfolk Row, Fargate, Sheffield. 'Phone, 23891. Telegrams—Photo, Sheffield.
- Sichel, O., & Co.**, 52, Bunhill Row, London, E.C. 1. 'Phone, Clerkenwell 1226. Telegrams—Framework, London.
- Simmons, G., & Co., Ltd.**, 17, Wilson Street, Finsbury, London, E.C. 2. 'Phone, National 2801. Telegrams—Jellify, Finsquare, London; Works, New Bedford Road, Luton, Beds. 'Phone, Luton 96. Telegrams—Gelatinous, Luton.
- Sinclair, James A., & Co., Ltd.**, 3, Whitehall, London, S.W. 1. 'Phone, Whitehall 1788. Telegrams—Oraculum, Parl, London.
- Small, Herbert (Proprietary), Ltd.**, 308-310, Collins Street, Melbourne, C. 1. Also Sydney, Australia.
- Smith, G.**, 31, Belle Vue Place, Belle Vue Road, Leeds, 3, Yorks.
- Soho, Ltd.**, 3, Soho Square, London, W. 1. 'Phone, Gerrard 2184 (2 lines). Telegrams—Notram, Rath, London.
- Speedy, D., & P., Ltd.**, Shelford Place, London, N. 16. 'Phone, Clissold 0696.
- Spicer-Dufay (British), Ltd.**, Astor House, Aldwych, London, W.C. 2. 'Phone, Holborn 0011.
- Stafford & Leslie**, Armour House, St. Martins-le-Grand, London, E.C. 1. 'Phone, National 5025.
- Standard Kine Laboratories, Ltd.**, Portsmouth Road, Thames Ditton, 'Phone, Emberbrook 2350-1. Telegrams—Standard, Thames Ditton. London Office, 22, Frith Street, London, W. 1. 'Phone, Gerrard 2781.
- Steuart Films**, 5, Denmark Street, London, W.C. 2.
- Sugg, William & Co., Ltd.**, Ranelagh Works, Chapter Street, Westminster, London, S.W. 1. 'Phone, Victoria 3211. Telegrams—Sugg, Churton, London.
- Sunbeam Tours, Ltd.**, 37, Bedford Street, Strand, London, W.C. 2. 'Phone, Temple Bar 2340.
- Superglaze Co.**, 597, Seven Sisters Road, London, N. 15. 'Phone, Stamford Hill 1879.
- Symex General Products, Ltd.**, 117a, Fore Street, London, N. 18. 'Phone, Tottenham 3873. Telegrams—Rextott, Tottlane.
- Synchrophone, Ltd.**, 24, Berners Street, London, W. 1. 'Phone, Museum 4876. Telegrams—Synchro, Phone, London.
- Taylor, Taylor & Hobson, Ltd.**, Head Office and Works, Leicester. 'Phone, 20134-5. Telegrams—Lenses, Leicester. London Office, 314, Regent Street, W. 1. 'Phone, Langham 1262. Telegrams—Illiquo, London.
- Taylor's Developing and Printing Works, Ltd.**, Hampden Park, Eastbourne. 'Phone, Hampden Park 34.
- Tella Co., Ltd.**, 22, Devonshire Street, Queen Square, London, W.C. 1. 'Phone, Holborn 3708-3709. Telegrams—Tellurato, Holb, London. P.
- Templeman, J.**, 15, Percy Street, Hanley. 'Phone, Hanley 5526 & 4671. Telegrams—Templeman, Photographer, Hanley.
- Thornton-Pickard Manufacturing Co., Ltd.**, Altrincham. 'Phone, Altrincham 69. Telegrams—Pickard, Altrincham.
- Thorsch & Co., Ltd.**, 37, Bedford Street, Strand, London, W.C. 2. 'Phone, Temple Bar 2340. Telegrams—Kawee, Lesquare, London.
- Toone, A. S., & Sons**, Dulwich Road Mills, Nottingham. 'Phone, Nottingham 75570. Telegrams—Permanent, Nottingham.
- Topical Press Agency, Ltd.**, 10 and 11, Red Lion Court, Fleet Street, London, E.C. 4. 'Phone, Central 8982-4. Telegrams—Topicality, Fleet, London.
- Trapp, L., & Co.**, 61, Goldney Road, Paddington, London, W. 9. 'Phone, Abercorn 2096.
- Tripoff Company**, 135, King Street, Aberdeen, Scotland.
- Turner, A. R.**, 50, Sydenham Park, London, S.E. 26.
- Typary & Typon Co., Ltd.**, 1-4, Red Lion Passage, Fleet Street, London, E.C. 4. 'Phone, Central 1376. Telegrams—Typantypo, Fleet, London.

- Ulca Camera Co., Ltd.**, 9, Paper Street, London, E.C. 1. 'Phone, National 3221. Telegrams—Relionuss, London.
- United Photographers, Ltd.**, 72, Miles Street, Liverpool, 8. 'Phone, Royal 956.
- Universal Button Co.**, 13, Surat Street, London, E. 2. 'Phone, Advance 2254. Telegrams—Unibutco, Beth, London.
- Vandyck Printers, Ltd.**, Works—Park Row, Bristol, 'Phone, 23567. Telegrams—Vandyck, Bristol; Sales Office—Imperial Buildings, Kingsway, London, W.C. 2. 'Phone, Holborn 4567. Telegrams—Duresques, Phone, London.
- Vanguard Manufacturing Co.**, Maidenhead, Berks. Telegrams—Vanguard Co., Maidenhead.
- Vickery Bros.**, Photographic Works, Paignton. 'Phone, 5129.
- Vinten, W., Ltd.**, 106, Wardour Street, London, W. 1. 'Phone, Gerrard 4792. Telegrams—Vinten, Gerrard 4792, London.
- V.J.S. Projectors**, 168s, Battersea Bridge Road, London, S.W. 11. 'Phone, Battersea 0846. Telegrams—Filmslides, Batt, London.
- Walter, D., & Co., Ltd.**, 61-63, Lant Street, London, S.E. 1. 'Phone, Hop 6049.
- Walton Photographic Co., Ltd.**, 163, High Street, Hampton Hill, Middlesex. 'Phone, Moseley 1582.
- Watson, W., & Sons, Ltd.**, 313, High Holborn, London, W.C. 1. 'Phone, Holborn 2767. Telegrams—Optics, Holb, London. Works, Bell's Hill, High Barnet, Herts.
- Watson & Sons (Electro-Medical), Ltd.**, Sunic House, Parker Street, Kingsway, London, W.C. 2. 'Phone, Holborn 3881.
- Watts, Matthias & Co., Ltd.**, Moseley Village, Birmingham. 'Phone, South 0848. Telegrams—Repousee, Birmingham.
- Wellington & Ward, Ltd.**, Ilford, London. 'Phone, Ilford 3000 (20 lines). Telegrams—Wellington, Ilford.
- Wenban, A. G.**, 19, Bartlett's Buildings, Holborn Circus, London, E.C. 4. 'Phone, Central 3166.
- Western Electric Co., Ltd.**, Bush House, Aldwych, London, W.C. 2. 'Phone, Temple Bar 1001. Telegrams—Westecol, London.
- Westminster Engineering Co., Ltd.**, Victoria Road, Willesden Junction, London, N.W. 10. 'Phone, Willesden 1700. Telegrams—Regency, Phone, London.
- Westminster Photographic Exchange Ltd.**, 119, Victoria Street, London, S.W. 1. 'Phone and Telegrams—Victoria 0669; also 111, Oxford Street, London, W. 1. 'Phone and Telegrams—Gerrard 1432; 62, Piccadilly, London, W. 1. 'Phone and Telegrams—Regent 1360; and 24, Charing Cross Road, London, W.C. 2. 'Phone and Telegrams—Temple Bar 7165.
- Weston Electrical Instrument Co., Ltd.**, Kingston By-Pass, Surbiton, Surrey. 'Phone, Elmbridge 6400-6401. Telegrams—Pivoted, Surbiton.
- Wheeler, Geo., & Co.**, Acorn Press, Charles Street, Manchester. 'Phone, Ardwick 3968.
- Whitehouse, Willets & Bennion, Ltd.**, Rex Works, Tything, Worcester. 'Phone, Worcester 288. Telegrams—Frames, Worcester. London office, St. Stephens House, 2, Coleman Street, E.C. 2. 'Phone, Metropolitan 7662.
- Wiggins, Teape & Alex. Pirie (Sales), Ltd.**, Glory Mill, Wooburn Green, Bucks. 'Phone, Bourne End 195-196. Telegrams—Teape, Wooburn Green.
- Wilkinson & Co.**, 15, Holmeside, Sunderland. 'Phone 3021. Telegrams—Sunderland 3021.
- Wilkinson, J., & A.**, 6, St. Oswald Street, Manchester, 9. 'Phone, Collyhurst 1475. Telegrams—Jayna, Manchester.
- Williamson Manufacturing Co., Ltd.**, Litchfield Gardens, Willesden Green, London, N.W. 10. 'Phone, Willesden 0073, 0074. Telegrams—Kinetogram, Willroad, London.
- Winsor & Newton, Ltd.**, 37/40, Rathbone Place, Oxford Street, London, W. 1. 'Phone, Museum 7624 (5 lines). Telegrams—Sepia, Rath, London.
- Woolley, J., Sons, & Co., Ltd.**, Victoria Bridge, Manchester. 'Phone, Blackfriars 2323. Telegrams—Pharmacy, Manchester.
- Wray, Ltd.**, Optical Works, Ashgrove, Road, Bromley, Kent. 'Phone, Ravensbourne 1729.
- Xpdo, Ltd.**, Didcot, Berks. 'Phone, Didcot 25. Telegrams—Xpdo, Didcot.
- York & Son**, York House, 3, Emperor's Gate, Gloucester Road, South Kensington, London, S.W. 7. 'Phone, Western 4980.
- Zeiss, Carl (London), Ltd.**, Mortimer House, 37-41, Mortimer Street, London, W. 1. 'Phone, Museum 9031 (6 lines). Telegrams—Zeissag, Wesdo, London.
- Zeiss Ikon, Ltd.**, Mortimer House, 37-41, Mortimer Street, London, W. 1. 'Phone, Museum 9031. Telegrams—Zeissikona.
- Zinco Collotype Co.**, Macdonald Road, Edinburgh. 'Phone, Central 26877.

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 Wiggins, Teape & Alex. Pirie (Sales), Ltd., 68.  
 Williamson Manufacturing Co., Ltd., 511.  
 Wold Air Brush Manufacturing Company, 648.  
 Wray, Ltd., 514, 515.  
 Zeiss, Carl (London), Ltd., 555 to 558.  
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