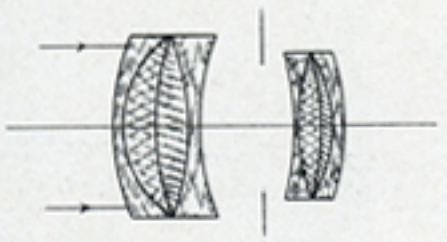


Actual Size

Bausch & Lomb-Zeiss PROTAR

Series VIIa F:6.3

A rapid, convertible lens, adapted for landscapes, architecture, portraits, groups, etc.

THE Series VIIa lens has satisfactorily solved the problem of variety and convenience; for composed as it is of two Series VII single Anastigmats, the doublet resulting from the combined components is simply perfection in all the desired qualities in a photographic lens.

As single Anastigmats, the Series VII lenses have a distinct field of their own. They are perfect single lenses, having a speed of F:12.5, which is ample for instantaneous exposures out of doors under favorable light conditions. So perfect are the spherical and anastigmatic corrections as to make the single lens almost equal to the doublet, and not only equal, but actually superior to many doublet lenses of other makes, for which strong claims to perfection are made. The field has an angle of 40° with full opening and with smaller stops 50°.

While not absolutely rectilinear, for no lens with the diaphragm in front can be, the results obtained from their use are entirely satisfactory. They may be used for a variety of purposes requiring long focus, medium speed and narrow angle, as for instance, landscape work, commercial work, large portraits and groups. They give excellent results where a long focus lens is required for perspective, and where the plate used is small for the covering power of the lens. Landscapes, for example, may be taken with the single Anastigmat from a considerable distance, for this lens, like a telephoto, gives a large image at long range, and while its magnification is less than the telephoto, its speed is far greater.

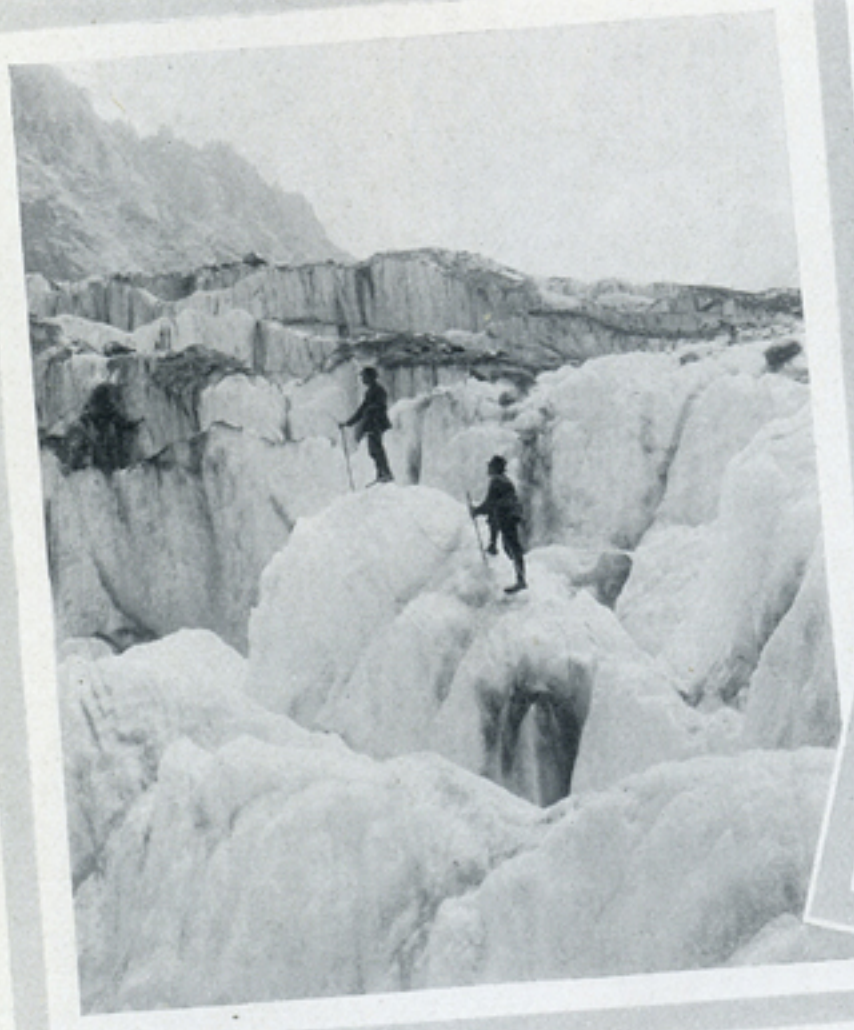
Inasmuch as the component lenses can be used singly or together, it is evident that we have in the VIIa a **convertible lens,** which, as will be shown, is universal in application.

If in forming our Series VIIa doubtlet we select two lenses of equal foci, we get a lens with a speed of F:6.3; if, however, we combine two unequal foci, there results a doublet with a speed of F:7 or F:7.7, according to the relative foci employed. Thus, we have in one and

"PHILADELPHIA BLIND INSTITUTE"
Made with Protar VIIa by J. B. Rich. F:16, ½ Second.

the same lens one or two long focus single lenses adapted for a variety of work and an extra rapid doublet adapted for all kinds of instantaneous work. Although a doublet composed of two lenses of equal foci gives us a larger relative aperture and hence greater speed than one composed of two unequal foci, the latter has the advantage of being convertible into three lenses of different foci, where the former is convertible into two only.

While the single lenses (as has been stated) are adapted for instantaneous outdoor work when light conditions are favorable, for landscape, portraits and groups, the doublet, if composed of two similar lenses, is an extra rapid lens working at a speed twice as great as the ordinary Rectilinear lens, hence is adapted for all kinds of instantaneous work, for groups, for architecture, and all subjects requiring medium angle, good covering power and brilliancy. When stopped down, the available image circle covers an angle of from 85° to 90°.



"GLACIER DU GÉART"

"THE MATTERHORN"
From Riffelalp

Made with a Protar VIIa by H. G. Ponting.

These lenses stand at the head of the list both in optical qualities and their adaptability to the limited space allowed for the lens. When the bellows draw is sufficient to enable the use of a long focus lens the VIIa is especially desirable, because it is not only a doubtlet of moderate focal length, but also one or two long focus single lenses according as the doublet is composed of lenses of equal or unequal foci. In selecting the lens one must be sure that the back focus of no combination selected is longer than the greatest extension of which the bellows is capable.

To illustrate the facility with which sets of Convertible Protars may be made up and the uses to which they may be put, let us start with a Series VIIa doublet No. 8. This lens is listed to cover a 5 x 7 plate, has a focal length of 7 inches and a speed of F:7, which is almost twice as fast as the ordinary camera lens. It is composed of two perfectly corrected single Anastigmats Nos. 3 and 4 of $11\frac{3}{16}$ inches and $13\frac{3}{4}$ inches focus respectively, listed to cover $6\frac{1}{2}$ x $8\frac{1}{2}$ and 8 x 10 plates with an opening of F:12.5, which is sufficient for instantaneous work under normal light conditions. We have, in other words, three Anastigmat lenses in one—two single Anastigmats and a doublet. Now let us add to this equipment a No. 2 Series VII which covers a 5 x 7 plate and has a focal length of $8\frac{3}{4}$ inches. The addition of this lens forms the C set of Convertible Protars listed on page 39. We have now three single lenses which we may combine as follows: our original doublet of 7 inches focus; we can form a doublet with our $13\frac{3}{4}$ inches and $8\frac{3}{4}$ inches with a resulting focal length of $6\frac{1}{8}$ inches covering a $4\frac{1}{4}$ x $6\frac{1}{2}$ plate and a speed of F:7.7; or we can form one of $8\frac{3}{4}$ inches and $11\frac{3}{16}$ inches having $5\frac{5}{8}$ inches focus, covering a $4\frac{1}{4}$ x $6\frac{1}{2}$ plate and having a speed of F:7. In other words, we have three single Anastigmats and three

"JENNIE DICKIE BROOK, DERRY, N. H."
Made with Protar VIIa by John Alden, Lawrence, Mass.

doublets. The cost of these lenses is $101.00 or an average of $16.84 apiece. Is it possible to purchase any other perfect Anastigmat at so low a cost? But this is not all. The addition of another Series VII No. 5 lens gives us three additional lenses, a single Anastigmat and two doublets at the price of a single lens, $49.50, that is, the whole set of nine lenses, four single and five doublets, will cost $150.50 or $16.73 each.

Do we desire a faster lens we need only to match one of our single lenses to form a symmetrical doublet having a speed of F:6.3. The choice of lens is governed by the class of work to be done. This illustration demonstrates the enormous advantage of the Convertible Protars and proves their claim to convertibility, variety and usefulness. Other combinations may be formed by selecting such lenses of the Series VII as can be combined. The lenses which it is practicable to use together, are shown in the list on page 37.

To sum up the advantages of the Series VIIa lenses:

They are perfectly corrected as are all our Anastigmats.

Every doublet is in reality three lenses, each perfectly adapted for a different kind of work.

The addition of one system adds three lenses, making six in all.

The addition of two systems adds seven lenses, making ten in all.

The greatest possible compactness is secured.

The least weight.

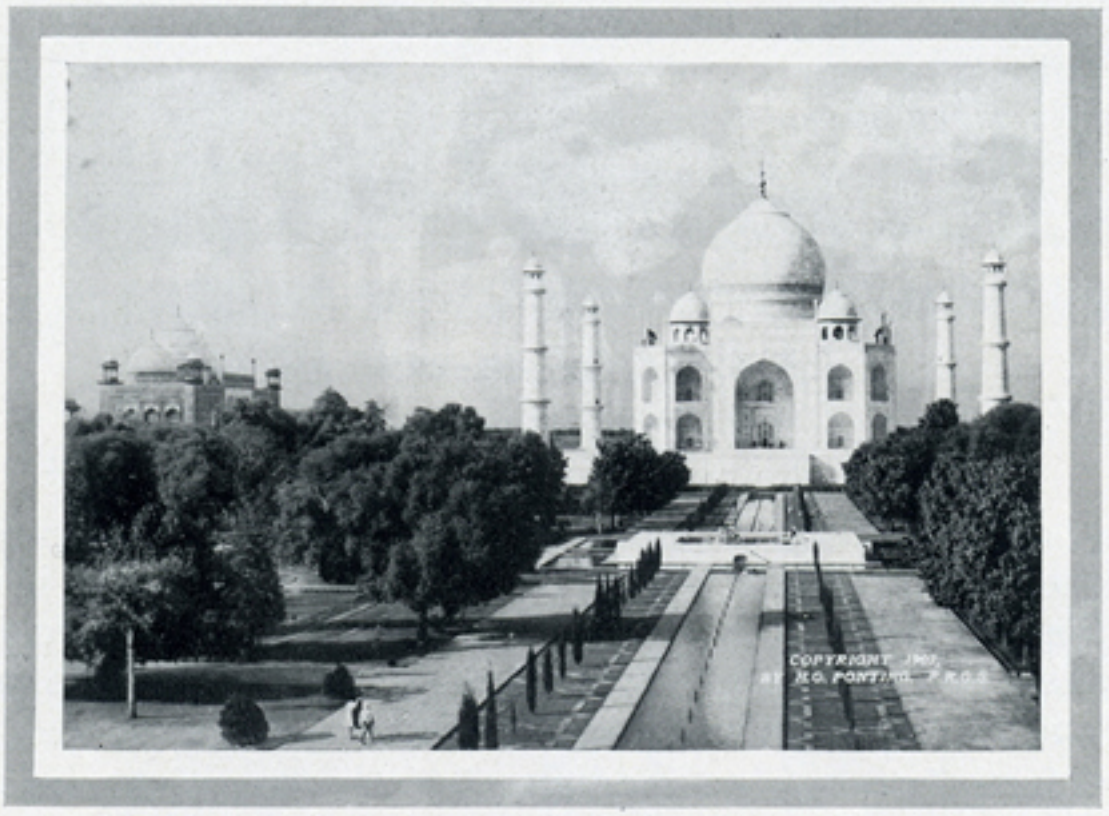
The fewest parts to lose or wear out.

When lenses of unequal foci are combined, the larger focus lens should be used in the front to obtain the largest possible aperture and hence, the greatest speed.

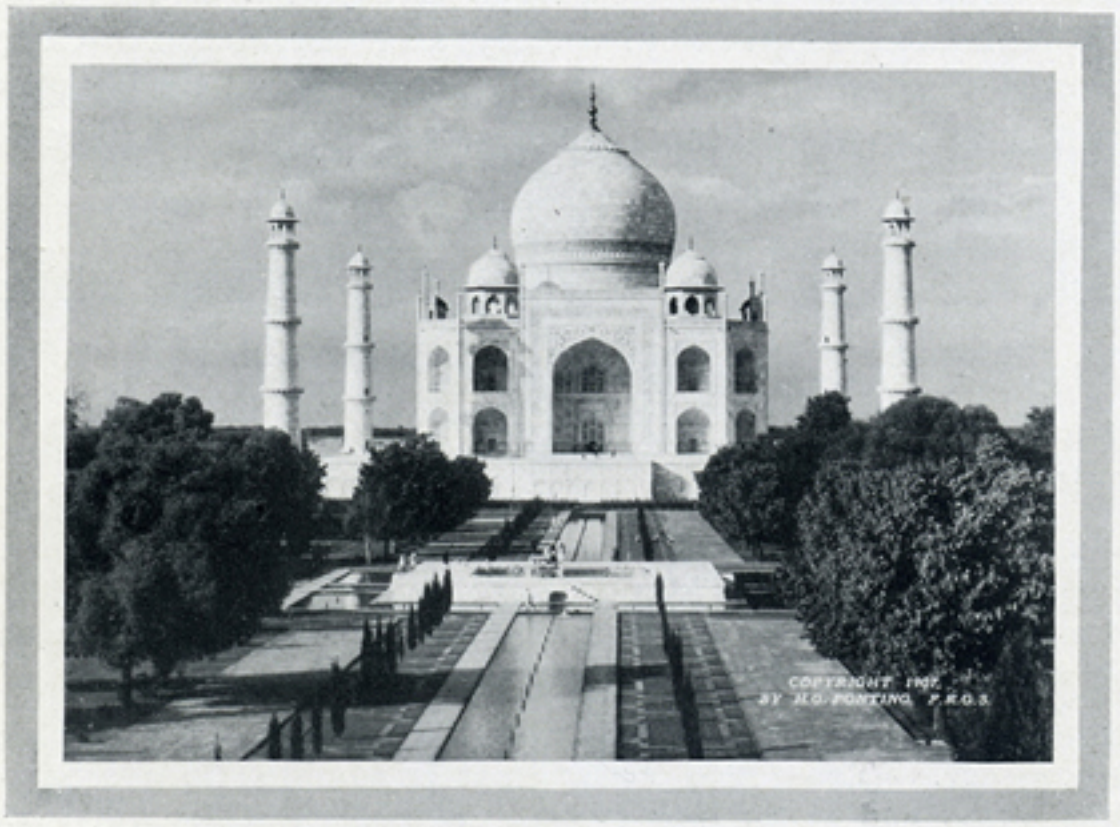
Construction. The Series VIIa is composed of two single Series VII lenses, each of which consists of four elements cemented together. The single Anastigmat is mounted in a separate adapter of standard size which fits into either end of the lens mount. *If used alone, the single lens is screwed in the rear of the lens mount and always has the diaphragm in front.*

THIS series of three negatives of the loveliest and most famous of all the world's buildings, the Taj Mahal at Agra, India, was made on 5x7 plates, with a No. 8 Convertible Protar, Series VIIa, 13¾-inch, 11 3/16-inch, 7-inch, one negative each with the separate combinations

Made with a No. 8 Convertible Protar, Series VIIa, 7-inch Open Lens



Made with Rear Combination of a No. 8 Convertible Protar, Series VIIa, 11 3/16-inch Open Lens



Made with Front Combination of a No. 8 Convertible Protar, Series VIIa, 13¾-inch Open Lens

and the two combined, at the *full opening* of the lens. They give an idea of how pictorial subjects can be got from a certain spot with the different combinations. The camera was not moved from the balcony from which the pictures were in turn taken.

Series VII

PRICE LIST

Code Word	No.	Size of Plate Covered with Stop F:12.5* Inches	Equivalent Focus Inches	Back Focus Inches	Diam. of Lens Inches	PRICE		
						Lens Only	Fitted with Aluminum Volute Shutter	Fitted with Alum. Compound Shutter
Hector	1	4¾ x 6½	7 3/16	8	¾	$ 27.00	$ 44.00	$ 41.50
Hederic	2	5 x 7	8¾	9¾	15/16	30.50	47.50	45.00
Hedonic	3	6½ x 8½	11 3/16	12 7/16	1 3/16	36.00	53.00	50.50
Heelless	4	8 x 10	13¾	15¼	1½	43.50	62.00	59.75
Hegge	5	10 x 12	16⅛	17¾	1¾	56.00	74.50	76.00
Heiress	6	11 x 14	18⅞	20⅝	2	77.50	97.50	97.50
Helena	7	12 x 16	23⅛	25¾	2⅛	99.00	119.00	121.00
Helican	8	13 x 16	27	30	2½	129.50	149.50	
Heliotype	9	16 x 18	30¾	34	2¾	180.00		
Helix	10	16 x 20	33⅞	37½	3¼	234.00		
Helmet	11	18 x 22	39¼	43½	3¾	306.00		

Series VIIa

Code Word	No.	Size of Plate Covered with Full Aperture* Inches	Combinations of Single Protars Focus Inches		Combined Equival't Focus Inches	Speed	PRICE		
			Front Lens	Back Lens			Lens Only	Fitted with Aluminum Volute Shutter	Fitted with Aluminum Compound Shutter
Hem	1	3¼ x 3¼	7 3/16	7 3/16	4⅛	F:6.3	$ 48.50	$ 65.50	$ 63.00
Hematin	2	3¼ x 4¼	8¾	7 3/16	4½	F:7	52.50	69.50	67.00
Hematite	3	4 x 5	11 3/16	7 3/16	5	F:7.7	57.50	74.50	72.00
Hemin	4	4 x 5	8¾	8¾	5 1/16	F:6.3	56.00	73.00	70.50
Hemipter	5	4¼ x 6½	11 3/16	8¾	5⅝	F:7	61.50	78.50	76.00
Hemisect	6	4¼ x 6½	13¾	8¾	6⅛	F:7.7	68.50	87.00	84.75
Hemitone	7	4½ x 7¼	11 3/16	11 3/16	6⅜	F:6.3	66.50	83.50	82.75
Hemlock	8†	5 x 7	13¾	11 3/16	7	F:7	73.50	92.00	89.75
Hempen	9	5 x 8	16⅛	11 3/16	7½	F:7.7	86.00	104.50	106.00
Henbane	10	5 x 8	13¾	13¾	7⅞	F:6.3	80.50	99.00	96.75
Henotic	11	6½ x 8½	16⅛	13¾	8½	F:7	93.00	111.50	113.00
Hepar	12	6½ x 8½	18⅞	13¾	9⅛	F:7.7	114.50	134.50	134.50
Hepatica	13	6½ x 8½	16⅛	16⅛	9¼	F:6.3	105.00	123.50	125.00
Heptad	14	7 x 9	18⅞	16⅛	10	F:7	127.00	147.00	147.00
Heptane	15	7 x 9	23⅛	16⅛	10⅞	F:7.7	148.50	168.50	170.50
Heptoic	16	7 x 9	18⅞	18⅞	10 3/16	F:6.3	147.50	167.50	167.50
Heraldic	17	8 x 10	23⅛	18⅞	11⅞	F:7	169.00	189.00	191.00
Herand	18	8 x 10	27	18⅞	12¾	F:7.7	199.50	219.50	221.50
Herbage	19	8 x 10	23⅛	23⅛	13¼	F:6.3	186.00	206.00	208.00
Herbar	20	10 x 12	27	23⅛	14 5/16	F:7	217.00	237.00	
Herd	22	10 x 12	27	27	15½	F:6.3	243.00	263.00	
Herdic	25	10 x 12	30¾	30¾	18¼	F:6.3	340.50		
Hereon	28	11 x 14	33⅞	33⅞	20¼	F:6.3	444.50		
Heresy	30	12 x 16	39¼	39¼	23⅜	F:6.3	585.00		

*Larger Plates covered with smaller stops.

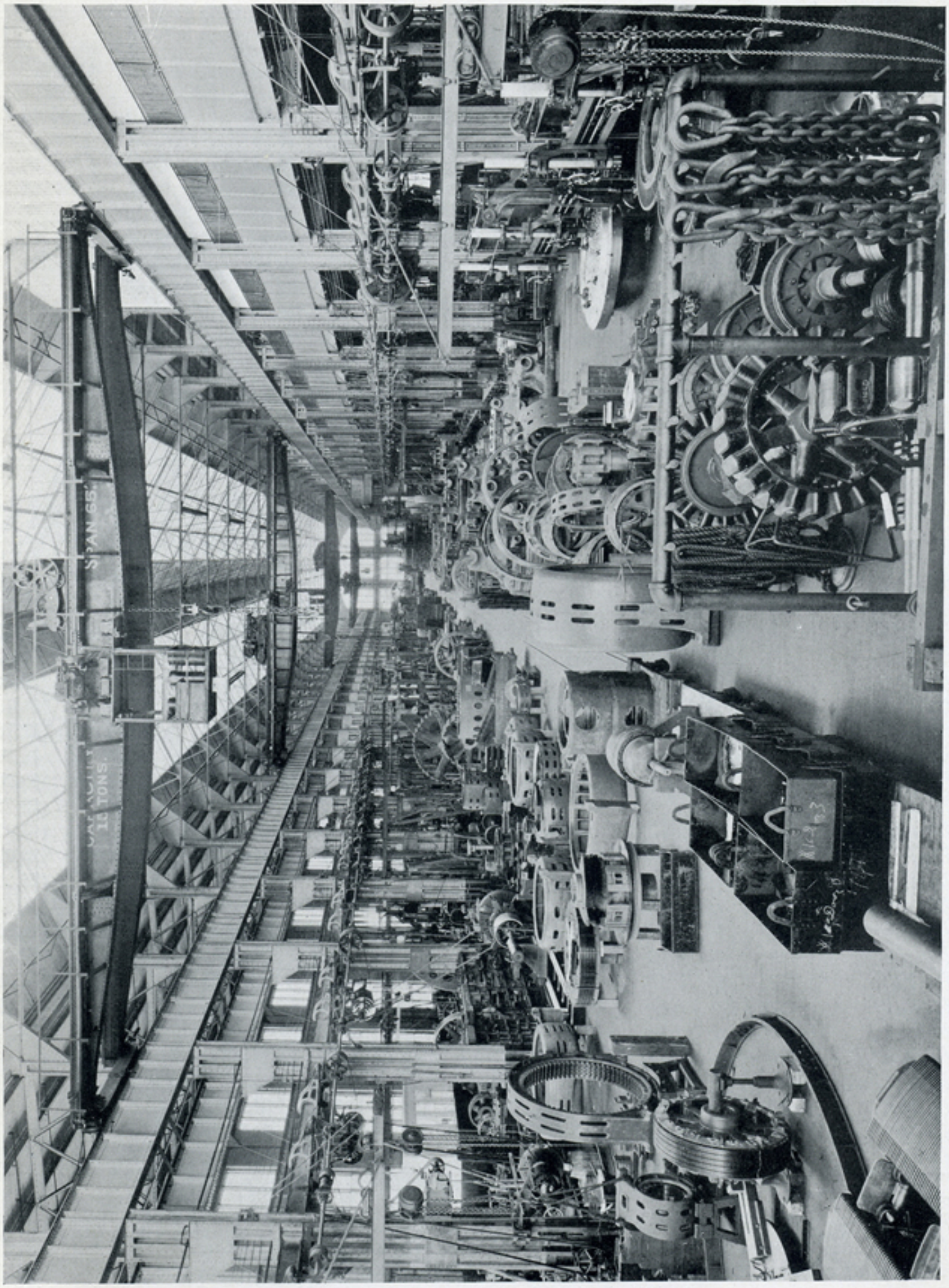
†No. 2 Volute is here regularly supplied. If it is desired to use the lens on a hand camera and No. 2 Volute is not wanted, we can adapt the Volute No. 1 by reducing the diameter of the lens. This in no way affects the speed of the combination. In ordering, kindly specify whether No. 1 or No. 2 Volute is to be furnished.

For matching lenses for stereoscopic work, add $3.00 to the price of the lenses.

When ordering lenses fitted with shutter, by telegraph, specify *Volute* or *Compound*, in addition to the code word for the size of lens.

Each lens is furnished in a case which protects it from injury. Lens cap is included.

The diaphragm scale is graduated for each focal length.



"GENERAL ELECTRIC CO., SCHENECTADY, N. Y."
Made with Protar VIIa.

Bausch & Lomb-Zeiss Convertible Protars

In Sets

WE have listed a large number of doublet combinations, and as has been shown in the description of Series VIIa lenses, any one of them can be added to, thus increasing proportionately the usefulness of the lens. We offer, however, two sets complete with the lenses mounted interchangeably, each set consisting of: one lens mount with iris diaphragm, cap and flange, the single Protar lenses (three or four, as the case may be); a neat and compact morocco case containing all the parts of the set.

C Set—Bausch & Lomb-Zeiss Convertible Protars

Complete in case, $101.00. Code word, *Hermes*.

Fitted with aluminum Volute Shutter, $119.50; fitted with aluminum Compound Shutter, $117.25.

The six lenses which may be formed with the C-set of Protars, together with their covering power and speed, are shown in the accompanying table.

Series	No.	Size of Plate Covered with Largest Stop* Inches	Equivalent Focus of Lenses in Inches			Speed
			Front Lens	Back Lens	Combined Focus	
VII.	2	5 x 8		8¾		F:12.5
	3	6½ x 8½		11 3/16		F:12.5
	4	8 x 10		13¾		F:12.5
VIIa.	5	4¼ x 6½	11 3/16	8¾	5⅝	F:7.0
	6	5 x 7	13¾	8¾	6⅛	F:7.7
	8	5 x 8	13¾	11 3/16	7	F:7.0

*Larger Plates covered with smaller stops.

D Set—Bausch & Lomb-Zeiss Convertible Protars

Complete in case, $197.50. Code word, *Heriot*.

Fitted with aluminum Volute Shutter, $217.50; fitted with aluminum Compound Shutter, $217.50.

The lenses of this set are the numbers 3, 4, 5 and 6 of Series VII.

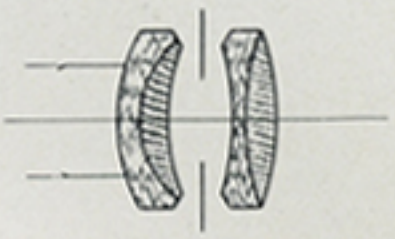
The following table shows the ten lenses which may be formed with this set, together with their covering power and speed.

Series	No.	Size of Plate Covered with Largest Stop* Inches	Equivalent Focus of Lenses in Inches			Speed
			Front Lens	Back Lens	Combined Focus	
VII.	3	6½ x 8½		11 3/16		F:12.5
	4	8 x 10		13¾		F:12.5
	5	10 x 12		16⅛		F:12.5
	6	11 x 14		18⅞		F:12.5
VIIa.	8	5 x 8	13¾	11 3/16	7	F:7.0
	9	5 x 8	16⅛	11 3/16	7½	F:7.7
	9a	5 x 8	18⅞	11 3/16	8	F:7.7
	11	6½ x 8½	16⅛	13¾	8½	F:7.0
	12	6½ x 8½	18⅞	13¾	9⅛	F:7.7
	14	8 x 10	18⅞	16⅛	10	F:7.0

*Larger Plates covered with smaller stops.

Made with Medium Wide Angle, by H. Fuerman, Chicago, Ill.

Actual Size



Bausch & Lomb-Zeiss Medium Wide Angle

Series IV. F:12.5

A rapid, wide angle lens for architectural work, for flashlight interiors and groups.

SERIES IV has two special points of merit—speed and covering power. It works at a speed of F:12.5, which is sufficient for instantaneous exposures out-of-doors, under favorable light conditions. Its large relative aperture makes it an admirable lens for flashlights of interiors and groups, admitting ample light for focusing interiors, and enabling one to obtain sufficient illumination with less flashlight than is possible with lenses of smaller aperture, hence less speed.

The first six numbers cover an angular field of about 80°; the others, of 70°.

We recommend Nos. 1 to 6 inclusive for rapid, wide angle work, for example, architectural or other subjects to be photographed instantly, and where the distance of the object from the camera is such as to necessitate the use of a wide angle lens.

A Series IV lens of moderately short focus will cover a comparatively large plate.

This lens is an unsymmetrical doublet and its components cannot be used separately.

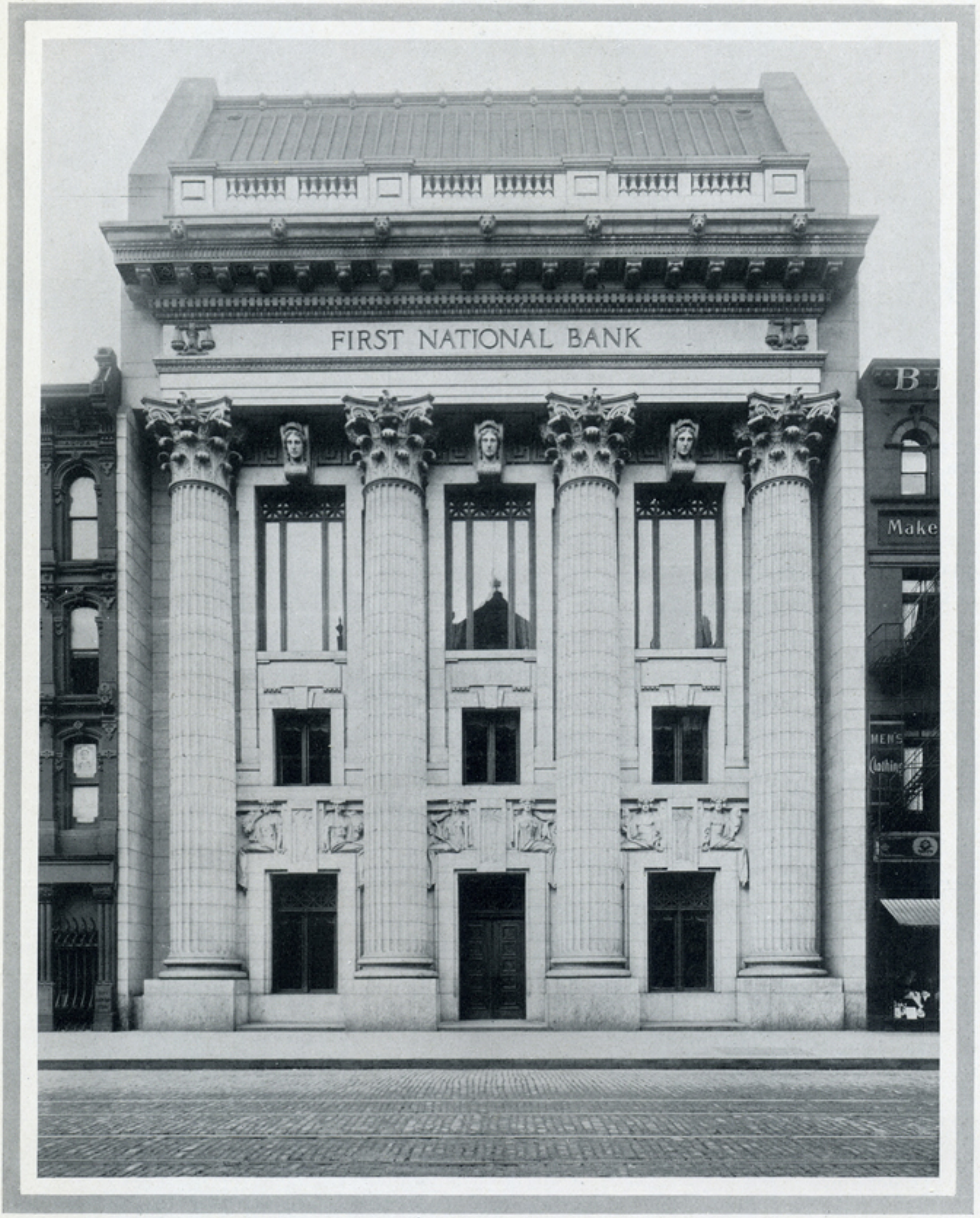
PRICE LIST

Code Word	No.	Size of Plate Covered with Stop F:12.5* Inches	Equivalent Focus Inches	Diameter of Largest Lens Inches	Lens Only	Fitted with Aluminum Volute Shutter
Harden	1	3¼ x 4¼	2 7/16	¼	$ 17.50	
Hardock	2	4 x 5	3⅜	⅜	17.50	$ 34.50
Harem	3	4¼ x 6½	4 11/16	½	21.00	38.00
Hark	4	5 x 8	6 1/16	⅝	24.50	41.50
Harmel	5	8 x 10	7 11/16	13/16	31.50	48.50
Harmonic	6	10 x 12	10¼	1	47.00	64.00
Harness	7	12 x 15	15 3/16	1 5/16	71.50	90.00
Harpoon	8	16 x 20	23 3/16	2	125.50	145.50
Harrow	9	20 x 24	35 11/16	2 5/16	282.50	
Hart	10	24 x 30	48⅜	3⅞	631.00	

*Larger Plates covered with smaller stops.

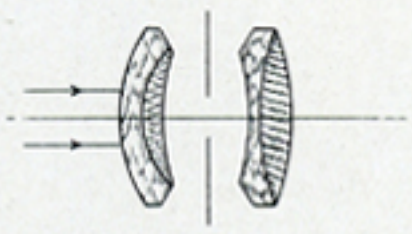
When ordering lenses fitted with shutter, by telegraph, specify *Volute* or *Compound* in addition to the code word for the size of lens.

Each lens is furnished in a case which protects it from injury. Lens cap is included.



"FIRST NATIONAL BANK, CLEVELAND, OHIO"
Made with Extreme Wide Angle Lens, by L'Clifford Norton

Actual Size



Bausch & Lomb-Zeiss Extreme Wide Angle

Series V. F:18

For architectural and interior work requiring an extreme wide angle lens.

THIS series is intended for the most exacting wide angle photography. It is the most desirable lens made for this purpose and should be selected for architectural and interior work wherever an extreme wide angle lens is required. Anastigmatic and spherical corrections are the most perfect yet obtained in a lens of this character. No other extreme wide angle lens has equal speed, covering power and effective angle.

With full opening it covers a field of 75°. In the sizes up to and including 7a, the image circle corresponds to an angle of over 100°, and above that number the full angle utilized is about 90°. Larger plates are well covered when used with smaller stops than as listed. A 6½ x 8½ lens will give a 90° angle on a 6½ x 8½ plate, but on an 8 x 10 plate an angle of 110°, and will cover the plate clear to the edge.

The speed F:18 is sufficient for outdoor instantaneous photography under favorable conditions of light.

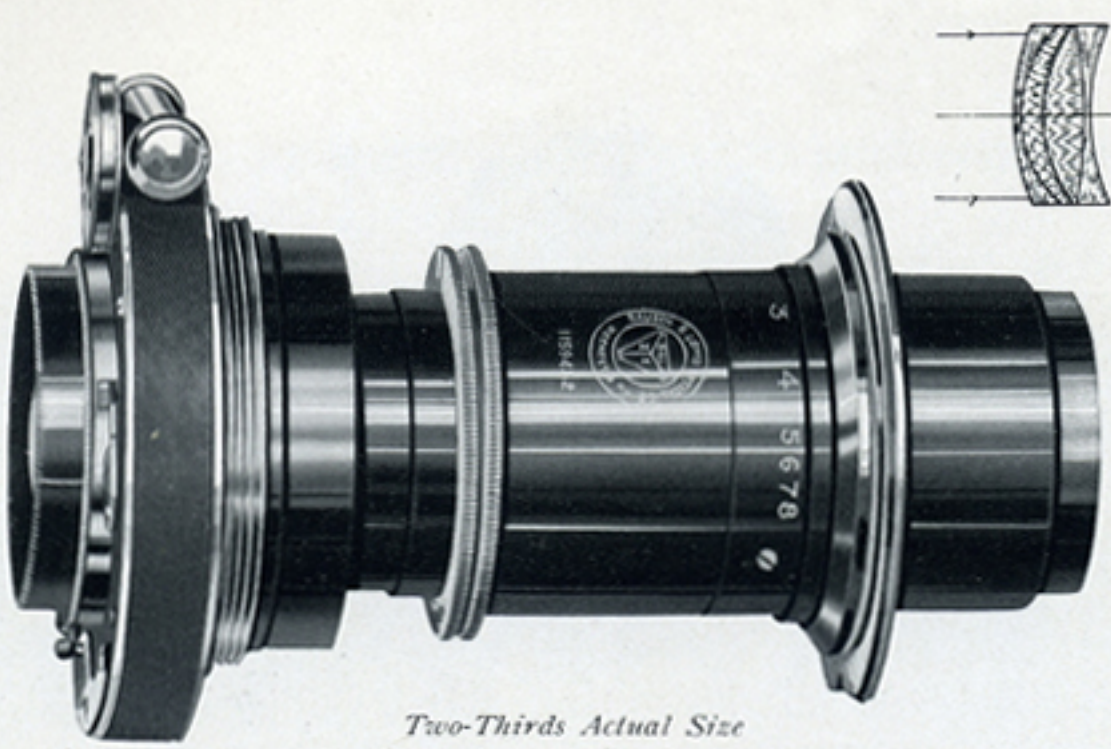
Construction. An unsymmetrical lens and hence can only be used as a doublet.

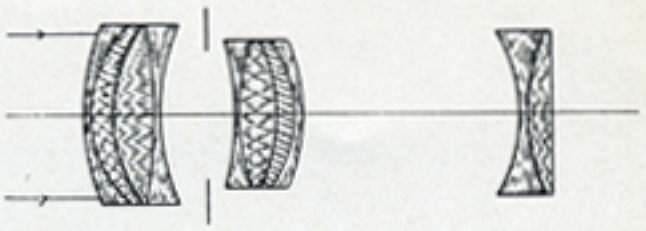
PRICE LIST

Code Word	No.	Size of Plate Covered with Stop F:18* Inches	Equivalent Focus Inches	Diameter of Largest Lens Inches	Lens Only	Fitted with Aluminum Volute Shutter
Hauteur	1	4¼ x 6½	3⅜	5/16	$ 23.00	$ 40.00
Havildar	2	5 x 7	4 7/16	⅜	23.00	40.00
Hawk	3	6½ x 8½	5 9/16	½	29.00	46.00
Haybote	4	8 x 10	7 3/16	9/16	36.00	53.00
Haytian	5	10 x 12	8⅜	11/16	45.00	62.00
Hazle	6	11 x 14	10½	13/16	56.00	73.00
Health	7	12 x 15	12⅜	15/16	66.50	83.50
Heard	7a	16 x 18	15⅜	1	88.50	105.50
Heathen	8	12 x 15	18⅛	1	88.50	105.50
Heave	9	16 x 18	24⅞	1⅜	129.50	148.00
Heben	10	20 x 25	37 5/16	2⅛	255.50	275.50

*Larger Plates covered with smaller stops.

When ordering lenses fitted with shutter, by telegraph, specify *Volute* in addition to code word for the size of lens. Each lens is furnished in a case which protects it from injury. Lens cap included.





Two-Thirds Actual Size

Telephoto Attachment

For distant buildings, mountains, architectural details, otherwise inaccessible views, etc.

A Telephoto lens is a so-called negative element, that is, a dispersive lens and it must be used in connection with a photographic objective, which is the positive element. It is always of shorter focal length than the positive. It magnifies the image produced by the latter, so that it forms a valuable adjunct to a photographic equipment, especially since it makes it possible to get pictures of views otherwise inaccessible by reason of distance or location.

The Telephoto affords a very wide range of focus with ordinary bellows extension, and gives the same good perspective as the long focus lens with the same bellows extension.

Because of the magnification of its image by the Telephoto, the photographic lens should be as perfect as possible, for all defects will be magnified in exactly the same proportion as is the image. With the magnification of the image there is a decrease of illumination, because the same amount of light is distributed over a considerably larger area. Thus, the exposure must be longer and it is, therefore, highly desirable to use a fast lens for this class of work in order that the exposure may not be too prolonged.

Again, the magnification has a direct bearing upon the size of the plate covered. With otherwise equal conditions as to equivalent focus, relative aperture, etc., as the magnification decreases, there will be a proportionate decrease in the area of the field, that is to say, with a higher magnification the plate will be more fully covered than with a lower one. This is due to the fact that in the lower magnifications the mounting cuts off the marginal rays and thus prevents the plate from being fully covered.

Our Telephoto is thoroughly corrected for spherical and chromatic aberrations, so that with proper manipulation, good results are guaranteed. The negative lens (Telephoto) is mounted in a tube adjustable by means of a spiral device. The tube is graduated to indicate the varying magnifications which can be obtained. The photographic objective screws into the front of the inner tube at the end opposite the Telephoto.

We list Telephotos suitable for use with lenses of from 6 to 12 inches equivalent focus.

PRICE LIST

Code Word	Catalog No.	Focus Inches	Fitted to Bausch & Lomb Lenses	Fitted to Lenses of Other Manufacture
Hidden	**2**	2⅜	**$22.00**	**$26.00**
Hieron	**3**	3	**28.00**	**32.00**
Highly	**4**	4	**37.00**	**42.00**

In every instance lenses should be sent to us to secure correct adjustment in fitting Telephoto Attachments. Full directions accompany each attachment.

San Antonio Peake (Old Baldy)

Made with a Tessar IIb, 12-inch focus, from exactly the same point, one of the windows in the Laboratory on Mt. Wilson, Pasadena, Cal. The large one made with Telephoto Attachment, and about two years after the first one.—*By Ferdinand Ellerman.*

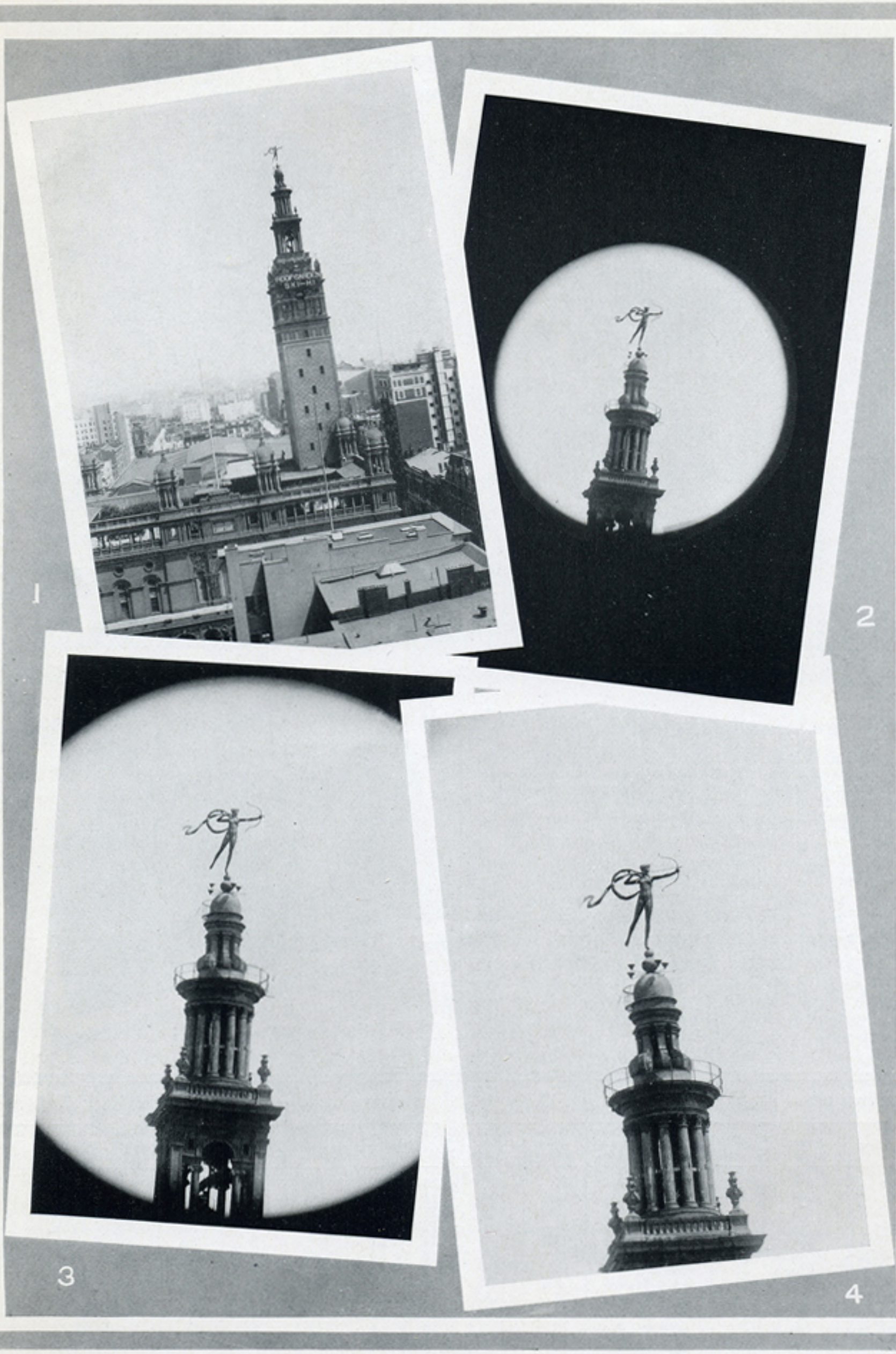
THE time of exposure required for Telephoto combinations can be found by multiplying the time that would be required by the positive element alone, with the square of the magnification.

For instance: the exposure for No. 15 Tessar Ic with stop F:8 may be ½ second; with a magnification 3 x, the exposure would have to be 3 x 3 = 9 times longer, *i. e.*, 4.5 seconds, and with a magnification 8 x, an exposure of 8 x 8 x ½ = 32 seconds.

POSITIVE LENS		TELE-PHOTO	AT THREE MAGNIFICATION		AT EIGHT MAGNIFICATION	
Number	Equival't Focus Inches	Negative Element	Image Circle Inches	Bellows Draw Inches	Image Circle Inches	Bellows Draw Inches
15 Ic . .	6	2	5¼	4⅝	16	16
15a Ic . .	7 1/16	2	5	4⅜	14¼	16
5 IIb . .	6⅛	2	5	4¾	15½	16¼
5a IIb . .	7 1/16	2	4½	4⅜	13	16
5k IIb . .	6⅜	2	5	4⅞	13½	16
6 VIIa .	6⅛	2	4¼	4⅝	15	16¾
7 VIIa .	6⅜	2	4¾	4⅜	16	17¼
8 VIIa .	7	2	4¼	4½	13¼	16⅛
9 VIIa .	7½	2	5	4½	14	16¼
16 Ic . .	8¼	3	6	5¾	18	19¼
17 Ic . .	9⅜	3	6	5½	20	19¾
6 IIb . .	8¼	3	5⅞	5½	16¾	19⅜
7 IIb . .	10	3	5½	5⅝	17	20⅛

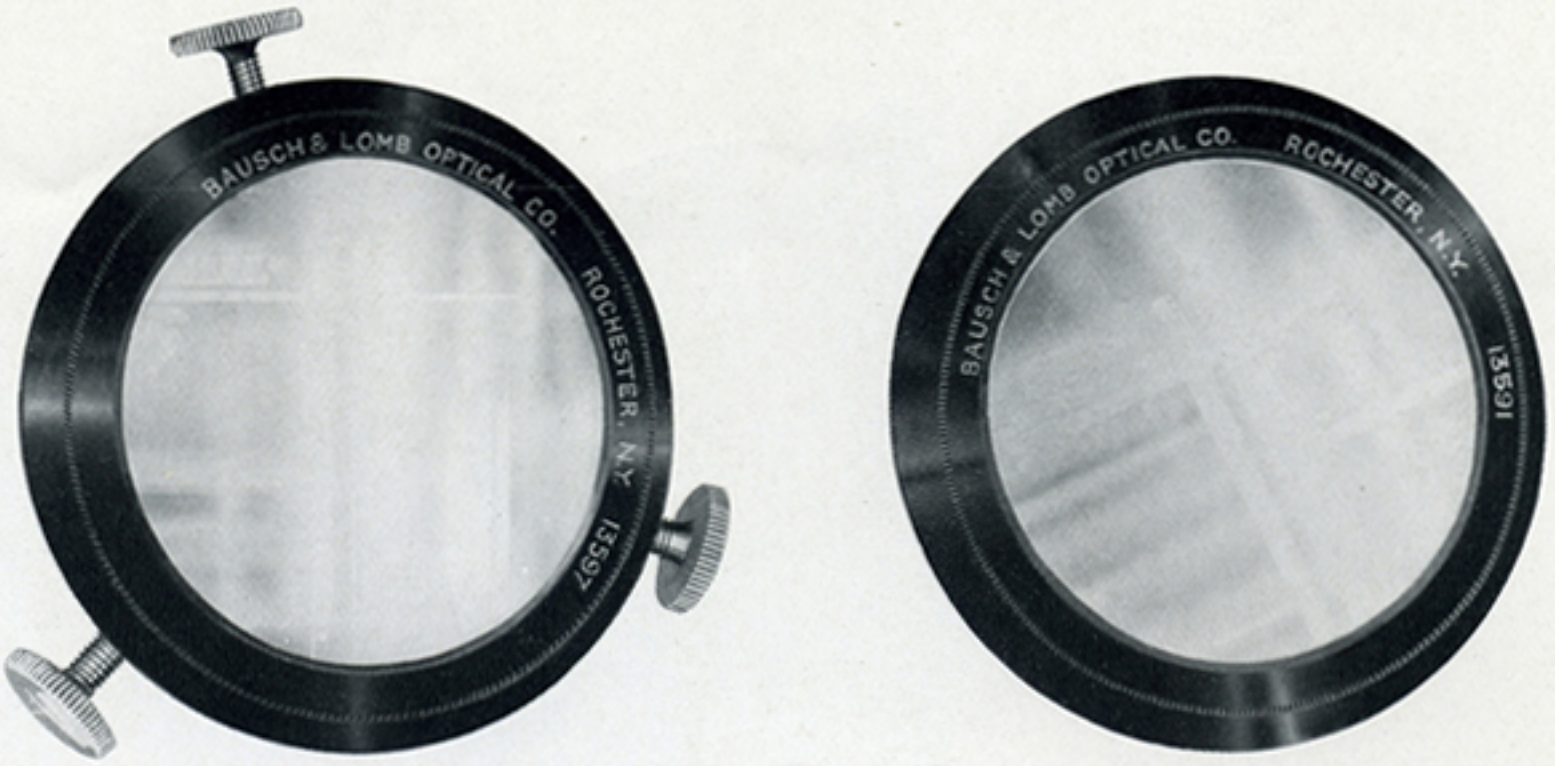
POSITIVE LENS		TELE-PHOTO	AT THREE MAGNIFICATION		AT EIGHT MAGNIFICATION	
Number	Equival't Focus Inches	Negative Element	Image Circle Inches	Bellows Draw Inches	Image Circle Inches	Bellows Draw Inches
10 VIIa .	7⅜	3	5½	5⅝	17½	19⅞
11 VIIa .	8½	3	5½	5½	16	20¼
12 VIIa .	9⅛	3	5¼	5 7/16	15½	19¾
13 VIIa .	9¼	3	5½	5 9/16	17¾	19¾
14 VIIa .	10	3	5¼	5½	16	19⅝
18 Ic . . .	11⅜	4	9	7¼	24	26⅛
8 IIb . .	12	4	8¼	7½	21½	26¼
15 VIIa .	10⅞	4	8½	7⅞	22½	27⅝
16 VIIa .	10 1/2	4	8	7 5/16	21½	26¼
17 VIIa .	11⅜	4	7¾	7⅞	21	26½
18 VIIa .	12¾	4	8	7½	23	27
19 VIIa .	13¼	4	8½	7⅞	22½	28

In the above table will be found the combinations which we recommend, together with the magnification and bellows draw for the two extreme magnifications.



Made with Tessar IIb from Same Postition

No. 1. No Telephoto, F:22, ½ second.
No. 2. Telephoto, 3-Power, F:22, 1½ seconds.
No. 3. Telephoto, 6-Power, F:22, 3 seconds.
No. 4. Telephoto, 8-Power, F:22, 4 seconds.



Three-Fourths Actual Size

Ray Filters

For use in photographing flowers, landscapes, clouds, colored objects, etc.

WHITE light, as is well known, is composed of various colors, which do not all have the same effect upon the photographic plate. The Ray Filter is designed to counteract this by absorbing certain rays of light. The effect is that color values are more accurately reproduced in the monochrome picture. Particularly good results are achieved in landscape and flower pictures. Over-exposure of the sky is prevented and details in clouds reproduced. The blue rays causing halation are absorbed and distant objects appear more distinctly in the image, even when photographed at a distance of miles.

The form of Ray Filter herein presented supersedes the liquid type, which was a source of more or less inconvenience, owing to the leakage or evaporation of the fluid, or its improper preparation. Our new Ray Filter is a glass disc to be used in front of the lens. It is ground and polished from selected spectroscopic Jena glass, which is homogeneous and free from striae. It is very carefully made, for imperfections would render the lens with which it is used, less effective. The use of a Ray Filter necessarily prolongs the time of exposure, which should be approximately five times longer than without.

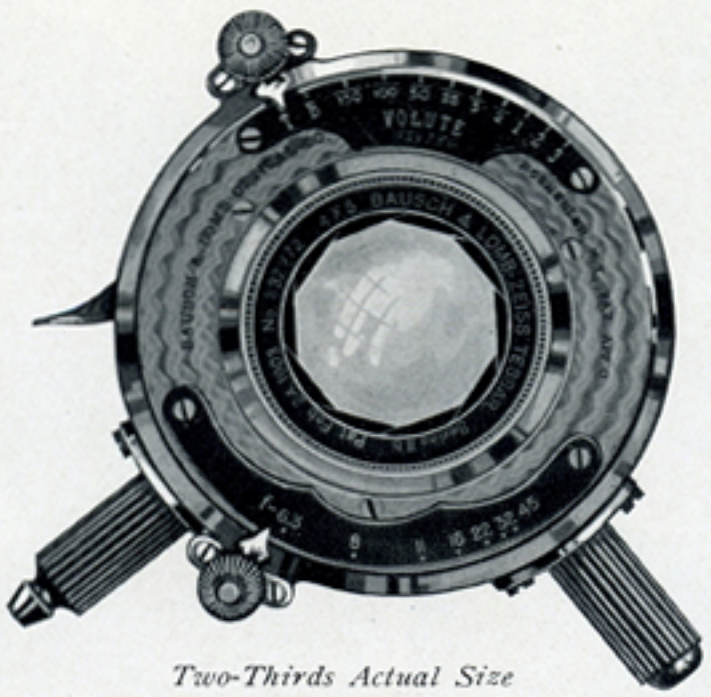
Orthochromatic plates must be used to secure the best results. Style A has a cork lining to fit over the lens mounting. It can be used with any of our regular mounts. Style B has three adjusting screws and can be attached to lenses varying in size from the diameters given to ½ inch smaller.

We furnish a reduced adapter for Ray Filters to be used on hand-cameras fitted with Unicum or Automat shutters, or other models having the pumps attached to the face of the shutter close to the lens. These filters are designated Style 1p, and should be ordered under this catalog number.

When ordering, it is necessary for us to know the outside diameter of the lens mounting. It will be sufficient if a strip of paper just reaching around the hood is sent us.

PRICE LIST

Code Word	Catalog No.	Inside Diameter Inches	Price
Hilt	**A1**	1¼	**$4.00**
Himpne	**A1p**	1¼	**4.00**
Hindoo	**A2**	2	**6.00**
Hinge	**A3**	2¾	**9.00**
Hippa	**B1**	1¼	**4.00**
Hircic	**B2**	2	**6.00**
Hirudo	**B3**	2¾	**9.00**



Two-Thirds Actual Size

Volute Shutter

THEORETICALLY and practically the proper place for a shutter is at the diaphragm point of the lens. An iris diaphragm, opening and closing at that point, gives the maximum illumination with the minimum motion, absolutely uniform exposure, and an increase in the depth of focus, covering power and definition of the lens, with no distortion of the image, the entire picture impressing itself upon the plate from the moment the shutter begins to open until it closes.

It gives bulb and time exposures and works automatically at varying speeds, very closely approximating from 3 seconds to 1/150, 1/100 and 1/75 second respectively in Nos. 1, 2 and 3. All speeds are controlled by our patent pneumatic retarding device. An exposure of 1/150 second is fast enough for athletes, race horses, express trains and the like, in motion, with very good sized images.

The shutter is set by simply moving the pointer at the top. Any size opening, from pin hole to largest stop, is obtained by placing the lower pointer opposite the stop number desired. No extra stops or diaphragms are needed.

Volute cannot open or expose the plate while being set. It can be arranged for use with two or more lenses.

When exposure is made, the shutter opens instantly and remains open to the full extent until the exposure is completed, when it closes instantly, thus giving the greatest possible exposure and correct relative exposures for all speeds.

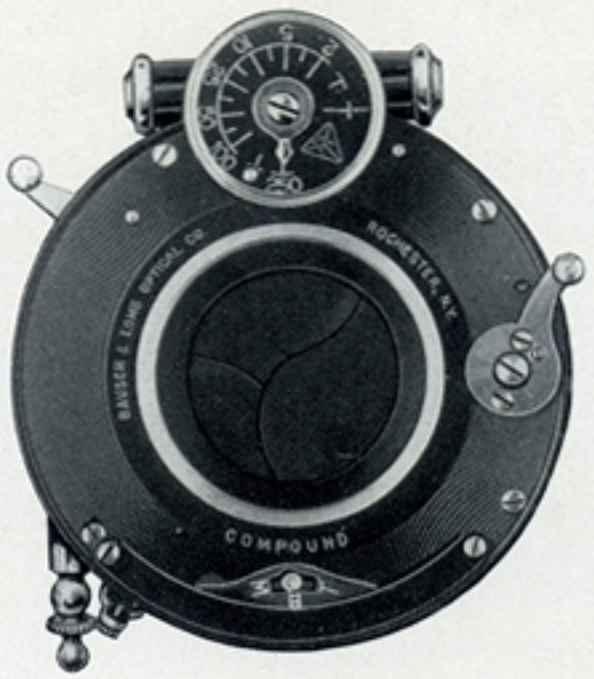
Exposure is made either by pneumatic bulb or by depressing the setting lever.

All working parts are enclosed within the case, protecting them from dust and making the shutter more convenient to use. The actuating mechanism is simple, durable and not liable to get out of repair. The workmanship is the very finest throughout. Volute is made in three sizes and can be applied to lenses up to and including those having an aperture of 52 mm. It can be fitted to any lens and is supplied on all makes of cameras.

PRICE LIST

Code Word	No.	Will Take Lenses with Opening of	Automatic Exposure	Fitted to Lenses of our Manufacture	Fitted to Lenses of other Manufacture
Hitch	**1**	1 in.	1 sec. to $\frac{1}{150}$ sec.	**$17.00**	**$18.00**
Hitter	**2**	$1\frac{7}{16}$ in.	1 sec. to $\frac{1}{100}$ sec.	**18.50**	**20.00**
Hive	**3**	2 in.	1 sec. to $\frac{1}{75}$ sec.	**20.00**	**22.00**

Prices include bulb and hose.



Two-Thirds Actual Size

Compound Shutter

THE Compound Shutter is adapted for use by photographers whose speed-requirements are met by a between-lens shutter. It is an automatic and setting shutter combined, in which the adjustments are prevented from interfering with each other by an ingenious locking device. Both bulb and time exposures can be made automatically, while speeds of from one second to 1/250 second can be given automatically with No. 0 when the shutter is set. In the larger sizes the speeds are somewhat less, as will be seen from the list below.

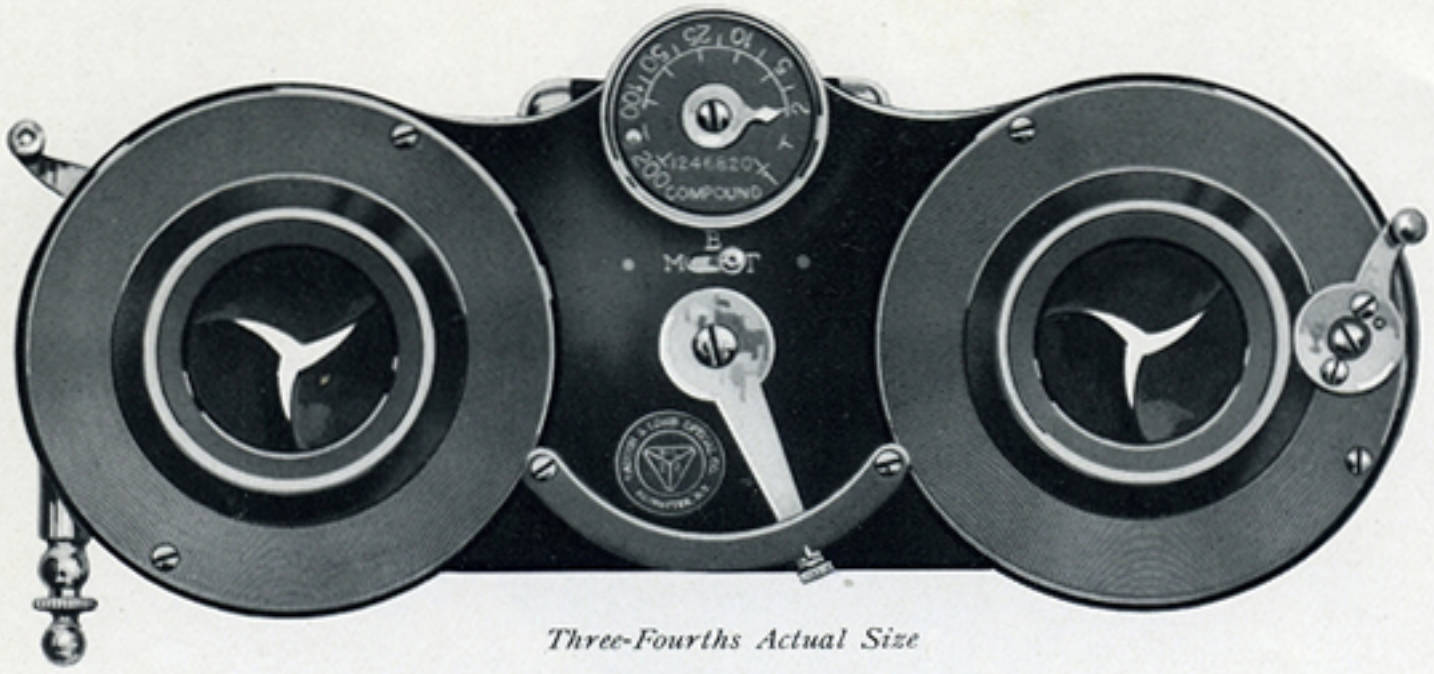
The mechanism is accurate and little liable to derangement. An iris diaphragm is employed for stopping down, and segments of steel form the shutter leaves. The opening of the segments is star-shaped, giving even illumination over the entire plate from the instant the exposure is started. In size 0 there are three segments and in the large sizes proportionately more.

The aluminum case of the shutter is handsomely finished in black, so that the shutter is not only very light in weight, but pleasing in appearance as well. It is dust proof, an important feature; all adjustments can be made with the shutter in position.

PRICE LIST

Code Word	No.	Will Take Lenses with Opening of	Maximum Speed Seconds	Fitted to Bausch & Lomb Lenses	Fitted to Lenses of other Manufacture
Hoard	0	$\frac{13}{16}$ in.	$\frac{1}{250}$	$12.00	$13.00
Hoozin	1	$\frac{15}{16}$ in.	$\frac{1}{200}$	14.50	15.50
Hob	2	$1\frac{3}{8}$ in.	$\frac{1}{150}$	16.25	17.75
Hobble	3	$1\frac{9}{16}$ in.	$\frac{1}{100}$	20.00	22.00
Hobit	4	2 in.	$\frac{1}{100}$	22.00	24.00

Prices include bulb and hose.



Three-Fourths Actual Size

Stereo Compound Shutter

THE Compound Shutter has proven so satisfactory in use that we are making a Stereo Compound for stereoscopic work. What has been said of the Compound applies equally to the Stereo Compound.

PRICE LIST

Code Word	No.	Will take Lenses with Opening of	Maximum Speed Seconds	Fitted to Bausch & Lomb Lenses	Fitted to Lenses of other Manufacture
Hobnail	**0 Stereo**	$\frac{13}{16}$ in.	$\frac{1}{150}$	**$22.00**	**$24.00**
Hobnob	**1 Stereo**	$\frac{15}{16}$ in.	$\frac{1}{100}$	**27.00**	**29.00**

Prices include bulb and hose.

Brass Flanges for Bausch & Lomb Lenses

Number	1	2	3	4	5	6	7	8	9	10	11
Diameter, inches	1½	1¾	2	2¼	2½	3	3½	4	5	5½	6
Price, each	$ .50	.50	.75	1.00	1.00	1.25	1.50	1.75	2.00	2.50	3.00

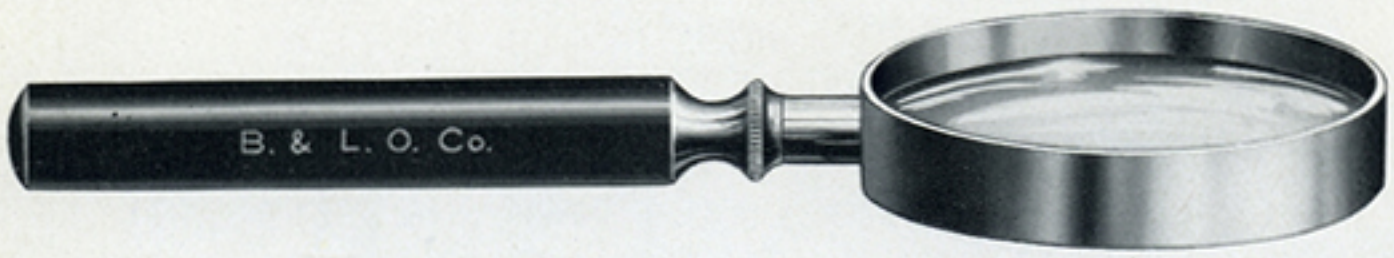
Morocco Caps for Bausch & Lomb Lenses

Number	1	2	3	4	5	6	7	8	9	10	11	12
Diameter, inches	1½	1¾	1⅞	2 1/16	2 3/16	2½	2¾	3 1/16	3 9/16	4 1/16	4 9/16	5 9/16
Price, each	$ .60	.60	.65	.70	.70	.75	.80	.90	1.00	1.10	1.20	1.25

Grained Leather Caps for Bausch & Lomb Lenses

Number	1	2	3	4	5	7	8	9	10
Diameter, inches	1⅜	1½	2 1/16	2 11/32	2¾	3 7/32	3 9/16	4 9/16	5½
Price, each	$ .40	.45	.50	.55	.60	.70	.80	.90	1.00

Focusing and Retouching Glasses

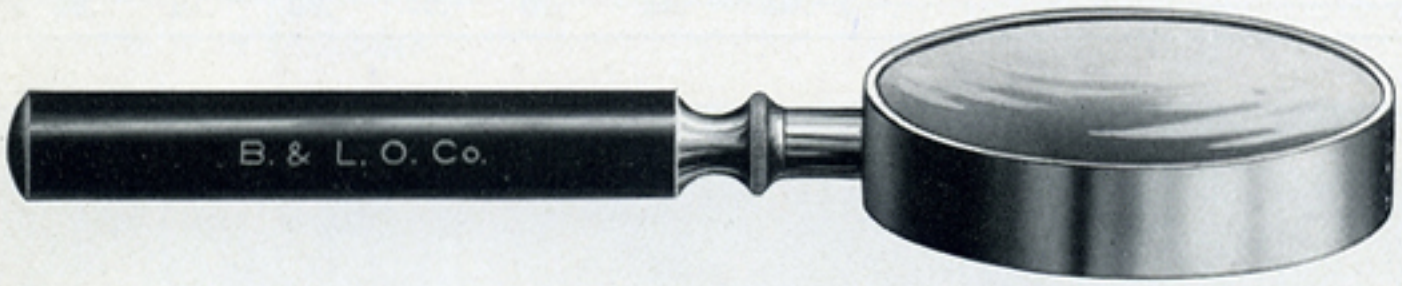


Large field of view and magnifying power particularly adapt these lenses for this class of work. They are our own production in their entirety. The lenses are carefully ground and the mountings are neat and durable, with nickeled rim and ebonized wood handle.

PRICE LIST

Catalog No.	Diameter		Price
	Inches	Millimeters	
200	2	50	**$0.60**
202	2½	62	**.80**
204	3	75	**1.00**
206	3½	87	**1.50**
208	4	100	**2.00**
210	5	125	**2.50**

Reducing Glasses



These glasses are very useful, especially in industrial photography. The lens is double concave and mounted in nickeled rim with ebonized wood handle.

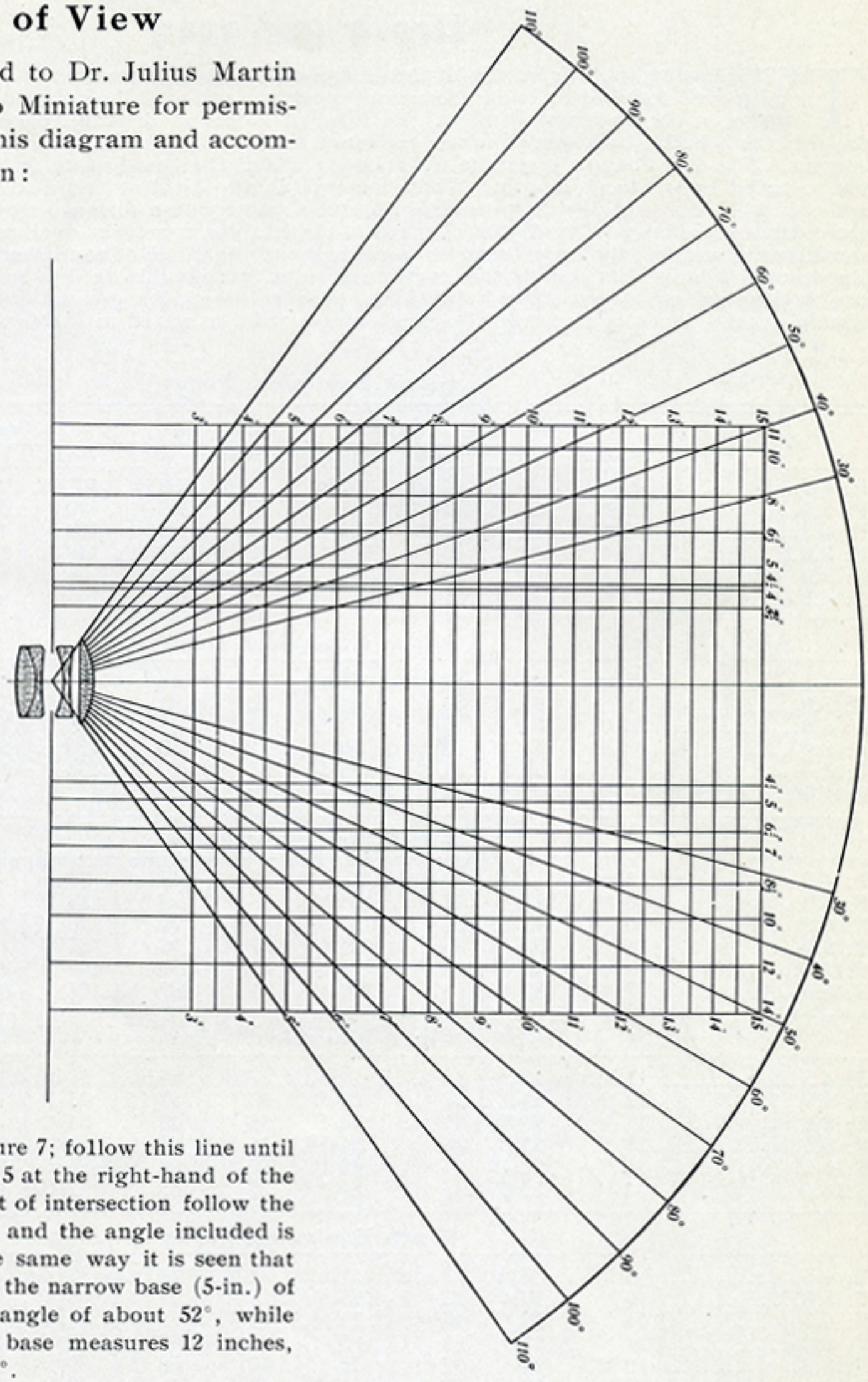
PRICE LIST

Catalog No.	Diameter		Price
	Inches	Millimeters	
200 c. c.	2	50	**$1.00**
202 c. c.	2½	62	**1.50**
204 c. c.	3	75	**2.00**
206 c. c.	3½	87	**3.00**
208 c. c.	4	100	**4.00**
210 c. c.	5	125	**5.00**

Angle of View

WE are indebted to Dr. Julius Martin and the Photo Miniature for permission to reproduce this diagram and accompanying explanation:

A Diagram Showing the Angle of View Included on Plates 3¼ x 4¼ to 11 x 15, by Lenses of Different Focal Lengths from 3 to 15 Inches.



To use the diagram, follow the vertical line, which indicates the base measurement of the plate to be used, until it intersects the horizontal line, which indicates the focal length of the lens used. At this intersection, take the nearest angular line and follow it to the arc at the top of the diagram. Here the angle of view included by the lens upon the plate to be used is expressed in degrees.

Examples: What angle of view will be included by a 5-inch lens upon the longest way of a 5 x 7 plate? On the topmost horizontal line find the figure 7; follow this line until it cuts the line figured 5 at the right-hand of the diagram. At the point of intersection follow the angular line to the arc and the angle included is seen to be 70°. In the same way it is seen that the same lens, used on the narrow base (5-in.) of the plate, includes an angle of about 52°, while used on a plate whose base measures 12 inches, we get an angle of 100°.

Table Showing Angular Field Covered with Different Focal Lengths

Plate Inches	Image Circle = Diagonal of Plate	ANGULAR FIELD WITH FOCUS					Plate Inches	Image Circle = Diagonal of Plate	ANGULAR FIELD WITH FOCUS				
		90°	80°	70°	60°	50°			90°	80°	70°	60°	50°
3¼ x 3¼	4.6	2.3"	2.74"	3.29"	3.98"	4.93"	6½ x 8½	10.7	5.35"	6.38"	7.64"	9.27"	11.47"
3¼ x 4¼	5.3	2.65	3.16	3.78	4.59	5.68	8 x 10	12.4	6.2	7.39	8.85	10.74	13.30
4 x 5	6.4	3.2	3.81	4.57	5.54	6.86	10 x 12	15.6	7.8	9.30	11.14	13.51	16.73
4¼ x 6½	8.0	4.0	4.77	5.71	6.93	8.58	12 x 15	19.4	9.7	11.56	13.85	16.80	20.80
5 x 7	8.6	4.3	5.13	6.14	7.45	9.22							

Depth of Focus

THE following tables give the distances by which an object which is sharply in focus might be moved forward or back from that position and still be imaged sufficiently sharp for vision at the ordinary distance. By forward is meant distance measured from the object towards the camera; by back, distance measured from the object in the direction away from the camera. The last column gives the distances at which the lens has its maximum depth of focus, the so-called hyper focal length. When focused at an object at this distance everything will be sufficiently sharp that lies between infinity and a point whose distance from the lens is given in the column preceding. The depths as given in these tables may seem small as compared with those sometimes given, but they are based on a diameter of the circle of confusion of 0.1 mm or $\frac{1}{250}$ inch. Experiment shows that this is the maximum value permissible in fine lens work. If, however, one is satisfied with less critical definition, thereby allowing a greater diameter of the circle of confusion, the depth of focus will be much larger than as stated in the tables.

4-Inch Equivalent Focus

STOP	15 Feet		18 Feet		24 Feet		30 Feet			Hyper Focus
	Forward	Back	Forward	Back	Forward	Back	Forward	Back	Forward	
F: 4.5	29 in.	44 in.	41 in.	67 in.	53 in.	92 in.	102 in.	236 in.	37.5 ft.	75 ft.
F: 5.0	32 "	50 "	45 "	77 "	57 "	107 "	109 "	283 "	34 "	68 "
F: 6.3	38 "	68 "	53 "	107 "	68 "	152 "	128 "	450 "	27 "	54 "
F: 8.0	46 "	97 "	63 "	157 "	80 "	233 "	148 "	866 "	21 "	42 "
F:11.0	58 "	167 "	78 "	298 "	98 "	498 "	176 "	∞	15 "	30 "
F:16.0	73 "	428 "	97 "	1200 "	120 "	∞	209 "	∞	10.5 "	21 "

5-Inch Equivalent Focus

F: 4.5	16 in.	20 in.	23 in.	29 in.	39 in.	54 in.	59 in.	90 in.	74 ft.	148 ft.
F: 5.0	21 "	29 "	30 "	43 "	52 "	82 "	78 "	139 "	53 "	106 "
F: 6.3	26 "	38 "	37 "	57 "	62 "	112 "	95 "	196 "	42 "	84 "
F: 8.0	32 "	51 "	45 "	78 "	75 "	160 "	110 "	292 "	33 "	66 "
F:11.0	41 "	78 "	57 "	125 "	93 "	279 "	136 "	582 "	24 "	48 "
F:16.0	54 "	143 "	74 "	248 "	118 "	738 "	171 "	∞	15 "	30 "

6-Inch Equivalent Focus

F: 4.5	14 in.	17 in.	20 in.	25 in.	35 in.	47 in.	53 in.	76 in.	84.5 ft.	169 ft.
F: 5.0	16 "	19 "	22 "	28 "	38 "	53 "	58 "	87 "	76 "	152 "
F: 6.3	19 "	25 "	27 "	37 "	47 "	70 "	70 "	117 "	60.5 "	121 "
F: 8.0	24 "	33 "	33 "	49 "	57 "	95 "	85 "	163 "	47.5 "	95 "
F:11.0	31 "	48 "	43 "	74 "	72 "	150 "	107 "	285 "	34.5 "	69 "
F:16.0	42 "	80 "	58 "	128 "	94 "	287 "	137 "	602 "	24 "	48 "

7-Inch Equivalent Focus

F: 4.5	11 in.	12 in.	15 in.	18 in.	27 in.	59 in.	41 in.	53 in.	115 ft.	230 ft.
F: 5.0	12 "	14 "	17 "	20 "	29 "	37 "	45 "	60 "	103.5 "	207 "
F: 6.3	14 "	16 "	21 "	26 "	35 "	48 "	54 "	79 "	82.5 "	165 "
F: 8.0	18 "	23 "	26 "	34 "	44 "	64 "	66 "	106 "	65 "	130 "
F:11.0	24 "	33 "	34 "	49 "	57 "	96 "	85 "	165 "	47 "	94 "
F:16.0	33 "	52 "	45 "	80 "	76 "	165 "	112 "	304 "	32.5 "	65 "

8-Inch Equivalent Focus

F: 4.5	8 in.	9 in.	12 in.	13 in.	21 in.	24 in.	32 in.	39 in.	150 ft.	300 ft.
F: 5.0	9 "	10 "	13 "	15 "	23 "	27 "	35 "	44 "	135 "	270 "
F: 6.3	11 "	13 "	16 "	19 "	28 "	35 "	43 "	57 "	107.5 "	215 "
F: 8.0	14 "	17 "	20 "	25 "	35 "	46 "	53 "	76 "	85 "	170 "
F:11.0	19 "	24 "	27 "	36 "	46 "	68 "	69 "	113 "	61.5 "	123 "
F:16.0	26 "	37 "	36 "	56 "	62 "	111 "	92 "	193 "	42.5 "	85 "

10-Inch Equivalent Focus

F: 4.5	5 in.	6 in.	8 in.	9 in.	14 in.	15 in.	21 in.	24 in.	235 ft.	470 ft.
F: 5.0	6 "	7 "	9 "	10 "	15 "	17 "	24 "	27 "	211.5 "	423 "
F: 6.3	7 "	8 "	11 "	12 "	19 "	22 "	29 "	35 "	168 "	336 "
F: 8.0	9 "	11 "	14 "	16 "	24 "	29 "	36 "	46 "	104.5 "	209 "
F:11.0	13 "	15 "	18 "	22 "	32 "	41 "	48 "	66 "	96 "	192 "
F:16.0	18 "	23 "	25 "	34 "	44 "	64 "	66 "	105 "	85.5 "	171 "

Exposure Tables

(From British Journal Photographic Almanac)

The following table based on that of Burton gives a rough idea of the exposures for various subjects and diaphragms under the following conditions:

(*a*) Best lighting; midday sunshine in May, June and July.

(*b*) With the most rapid commercial plates. See below for factors applying to other conditions.

F No.	Average Subject with Objects in Foreground Street Scenes, Outdoor Figure Studies	Landscapes with Light Foregrounds 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
F:4	1/250	1/300	....	1/120	1/20	1/8
F:4.5	1/200	1/400	....	1/100	1/15	1/6
F:5.6	1/150	1/250	....	1/64	1/10	1/4
F:6.3	1/100	1/200	1/1000	1/50	1/8	1/3
F:7	1/80	1/150	1/800	1/40	1/6	1/3
F:8	1/64	1/120	1/600	1/30	1/5	1/2
F:11	1/30	1/60	1/300	1/15	1/2	1
F:16	1/15	1/30	1/150	1/8	1	2
F:22	1/8	1/15	1/80	1/4	2	4
F:32	1/4	1/8	1/40	1/2	4	8
F:45	1/2	1/4	1/20	1	8	16
F:64	1	1/2	1/10	2	16	30

In weather other than bright sunshine the above exposures are multiplied as follows:

(Bright diffused light, the sun behind a cloud) x 1½. (Light clouds over whole sky, but light able to cast a visible shadow) x 2. (Heavy clouds over whole sky, absence of distinct shadows) x 3. (Very dull, whole sky covered by still heavier clouds) x 4 to 5.

Shutter Speeds for Moving Objects

Distance of Object, 25 Feet	Objects Moving Directly Toward Operator	Objects Moving Obliquely Toward or From Camera	Objects Moving Directly Across the Field
Street group (no rapid motion)	1/5 to 1/10	1/5 to 1/10	1/5 to 1/10
Pedestrians (two miles per hour)	1/20	1/40	1/60
Animals grazing	1/20	1/40	1/60
Pedestrians (three miles per hour)	1/30	1/60	1/90
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 and horses galloping	1/300	1/750	1/900
Yachts (10 knots per hour) at 50 feet	1/60	1/120	1/180
Steamers (20 knots per hour) at 50 feet	1/120	1/240	1/360
Trains (30 miles per hour) at 50 feet	1/150	1/300	1/450
Trains (60 miles per hour) at 50 feet	1/300	1/600	1/900

Table Showing the Sizes of Lenses and Shutters which can be Adapted to Various Cameras

Number	CAMERA	Size Inches	Longest Draw of Camera, In.	Ic Tessar No.	Volute Shutter No.	Compound Shutter No.	IIb Tessar No.	Volute Shutter No.	Compound Shutter No.	VIIa Protar No.	Volute Shutter No.	Compound Shutter No.
1a	Folding Pocket Kodak, Special	2½ x 4¼	5	...	...	...	4	...	0	.....	...	...
3	Folding Pocket Kodak	3¼ x 4¼	5	...	...	...	4	1	0	.....	...	..
3a	" " "	3¼ x 5½	6	...	...	...	5k	1	1	.....	...	...
4	" " "	4 x 5	6	...	...	...	5k	1	1	.....	...	...
4a	Folding Kodak.....	4¼ x 6½	8	...	...	...	6	2	2	.....	...	...
4a	Speed Kodak.....	4¼ x 6½	8	...	...	...	6	...	.....	.....	...	...
1a	" "	.....	...	14	...	...	4	...	.....	.....	..	...
1a	Folding Hawk-Eye, Model No.1	2½ x 4¼	4	...	...	...	3	...	0	.....	...	..
3	" " " No.6	3¼ x 4¼	5	...	...	...	4	1	0	.....	...	...
3a	" " " No.4	3¼ x 5½	6	...	...	...	5	1	1	.....	...	...
4	" " " No.3	4 x 5	6	...	...	...	5	1	1	.....	...	...
4	Stereo Hawk-Eye, Model No.4	3½ x 3½	5	...	...	...	4	...	0 Stereo	.....	...	..
...	Folding Hawk-Eye, Model No.4	4 x 5	13	...	...	...	.....	...	1	7	1	1
...	Century, Model No. 46	4 x 5	11	...	2	2	5	1	2	7	1	2
...	" " No. 46	5 x 7	17	...	2	3	6	2	2	10	2	2
...	" " No. 46	6½ x 8½	21	...	3	4	7	2	3	13	2	3
...	Century Grand Senior	4 x 5	17	...	2	2	5	1	2	7	...	2
...	" " "	5 x 7	23	...	2	3	6	2	2	10	...	2
...	" " "	6½ x 8½	28	...	3	4	7	2	3	13	...	3
...	Petite Grand	3¼ x 5½	13	...	...	...	5	...	2	7	...	2
...	Revolving Back Cycle Graphic	4 x 5	17	15	...	2	.....	...	.....	7	...	2
..	" " " "	5 x 7	22	16	...	4	.....	...	.....	10	..	2
...	" " " "	6½ x 8½	26	17	...	4	.....	...	.....	13	...	3
...	" " " "	8 x 10	30	...	...	...	.....	...	.....	17	...	..
1a	Graflex.....	2¼ x 4¼	6½	14	...	...	4	...	.....	.....	...	..
3a	"	3¼ x 5½	10	15a	...	...	5a	...	.....	7	...	4
...	Auto Graflex	3¼ x 4¼	7	15	...	...	4	...	.....	4	...	...
...	" "	4 x 5	8½	15	...	...	5	...	.....	7	...	..
...	" "	5 x 7	12	16	...	...	6	...	.....	10	...	..
...	Revolving Back Auto Graflex ..	3¼ x 4¼	15	16	...	...	6	...	.....	10	...	...
...	" " " " ..	4 x 5	18	17	...	...	7	...	.....	13	...	...
...	Press Graflex.....	5 x 7	14	16	...	...	6	...	.....	13	...	...
...	Stereo Auto Graflex	3½ x 3½	8	...	...	...	2 of No. 5	...	.....	.....	...	...
...	Naturalists' Graflex	4 x 5	26	...	...	...	.....	...	.....	19	...	...
...	Stereoscopic Graphic	.....	12¾	...	...	...	2 of No. 4	...	.....	2 of No. 7 2 of No. 10	...	...
3	Film Premo	3¼ x 4¼	8	...	...	...	4	1	0	.....	...	...
...	" "	3¼ x 5½	9	...	...	...	5	1	1	.....	...	...
...	" "	4 x 5	8	...	...	...	5	1	1	.....	...	...
...	Filmplate Premo	3¼ x 4¼	7	...	...	...	4	1	0	.....	...	...
...	" "	3¼ x 5½	8	...	...	...	5	1	1	.....	...	...
...	" "	4 x 5	8	...	...	...	5	1	1	.....	...	...
...	" "	5 x 7	12	...	...	...	5a	2	2	.....	...	...
4	Pony Premo	4 x 5	11	...	...	...	5	1	1	3	1	1
...	" "	5 x 7	15	...	...	...	5a	2	2	8	1	2
6	" "	4 x 5	14	...	...	...	5	1	1	3	1	1
...	" "	5 x 7	19	...	...	...	5a	2	2	8	2	2
...	" "	6½ x 8½	24	...	...	...	7	2	3	11	2	3
7	" "	4 x 5	13	...	...	...	5	1	1	3	1	1
...	" "	5 x 7	19	...	...	...	5a	2	2	8	1	2
...	" "	6½ x 8½	22	...	...	...	7	2	3	11	2	3
1	Premoette Special	2¼ x 3¼	5	...	...	...	3	...	0	.....	...	...
1a	" "	2½ x 4¼	6	...	...	...	4	...	0	.....	...	...
4	Stereo Premo.....	5 x 7	15	...	...	...	2 of No. 4	...	.....	2 of No. 2	...	...
6	" "	5 x 7	19	...	...	...	"	...	.....	"	...	...
7	" "	5 x 7	19	...	...	...	"	...	.....	"	...	...

Lenses

CONDENSED PRICE LIST

No.	Tessar Ic	Tessar IIb	Series VII	Series VIIa	Series IV	Series V
1	.....	.....	No. 1 V No. 1 C $27.00	No. 1 V No. 1 C $48.50	$17.50	No. 1 V $23.00
2	.....	.....	No. 1 V No. 1 C 30.50	No. 1 V No. 1 C 52.50	No. 1 V 17.50	No. 1 V 23.00
3	.....	No. 1 V No. 0 C $32.50	No. 1 V No. 1 C 36.00	No. 1 V No. 1 C 57.50	No. 1 V 21.00	No. 1 V 29.00
4	.....	No. 1 V No. 1 C 34.50	No. 2 V No. 2 C 43.50	No. 1 V No. 1 C 56.00	No. 1 V 24.50	No. 1 V 36.00
5	.....	No. 1 V No. 2 C 36.00	No. 2 V No. 3 C 56.00	No. 1 V No. 1 C 61.50	No. 1 V 31.50	No. 1 V 45.00
5a	.....	No. 2 V No. 2 C 50.50	.....	.....	.....	.....
5k	.....	No. 1 V No. 1 C 46.00	.....	.....	.....	.....
6	.....	No. 2 V No. 3 C 61.50	No. 3 V No. 3 C 77.50	No. 2 V No. 2 C 68.50	No. 1 V 47.00	No. 1 V 56.00
7	.....	No. 2 V No. 3 C 83.00	No. 3 V No. 4 C 99.00	No. 1 V No. 2 C 66.50	No. 2 V 71.50	No. 1 V 66.50
7a	.....	.....	.....	.....	.....	No. 1 V 88.50
8	.....	No. 3 V No. 4 C 122.50	129.50	No. 2 V No. 2 C 73.50	No. 3 V 125.50	No. 1 V 88.50
9	.....	158.50	180.00	No. 2 V No. 3 C 86.00	282.50	No. 2 V 129.50
9a	.....	193.00	.....	.....	.....	No. 3 V 255.50
10	.....	252.00	234.00	No. 2 V No. 2 C 80.50	631.00	.....
11	.....	324.00	306.00	No. 2 V No. 3 C 93.00	.....	.....
12	.....	.....	.....	No. 3 V No. 3 C 114.50	.....	.....
13	.....	.....	.....	No. 2 V No. 3 C 105.00	....	.....
14	No. 1 V No. 2 C $ 40.50	.....	.....	No. 3 V No. 3 C 127.00	.....	.....
15	No. 2 V No. 2 C 47.00	.....	.....	No. 3 V No. 4 C 148.50	.....	.....
15a	No. 2 V No. 3 C 57.50	.....	.....	.....	.....	.....
16	No. 3 V No. 3 C 72.00	....	.....	No. 3 V No. 3 C 147.50	.....	.....
17	No. 3 V No. 4 C 115.50	.....	.....	No. 3 V No. 4 C 169.00	.....	.....
18	162.00	.....	.....	No. 3 V No. 4 C 199.50	.....	.....
18a	210.00	.....	.....	.....	.....	.....
19	252.00	.....	.....	No. 3 V No. 4 C 186.50	....	.....
20	360.00	.....	.....	No. 3 V 217.00	.....	.....
22	.....	.....	.....	No. 3 V 243.00	.....	.....
25	.....	.....	.....	340.50	.....	.....
28	....	.....	.....	444.50	.....	.....
30	.....	.....	.....	585.00	.....	....

V and C refer to Volute and Compound Shutters; the number preceding the letter shows the shutter which can be fitted to the lens.

No.	0		1		2		3		4	
	Fitted to B. & L. Lenses	Fitted to Other Lenses	Fitted to B. & L. Lenses	Fitted to Other Lenses	Fitted to B. & L. Lenses	Fitted to Other Lenses	Fitted to B. & L. Lenses	Fitted to Other Lenses	Fitted to B. & L. Lenses	Fitted to Other Lenses
Volute	.....	.....	$17.00	$18.00	$18.50	$20.00	$20.00	$22.00	.....	.....
Compound	$12.00	$13.00	14.50	15.50	16.25	17.75	20.00	22.00	$22.00	$24.00
Stereo-Compound	22.00	24.00	27.00	29.00	.....	.....	.....	.....	.....	.....
Telephoto	.....	.....	.....	.....	22.00	26.00	28.00	32.00	37.00	42.00

	A1	A1p	A2	A3	B1	B2	B3
Ray Filter	$4.00	$4.00	$6.00	$9.00	$4.00	$6.00	$9.00

"HORTICULTURAL HALL, FAIRMOUNT PARK, PHILADELPHIA, PA."
Made with Protar VIIa, by J. B. Rich, Philadelphia, Pa.

Our Products

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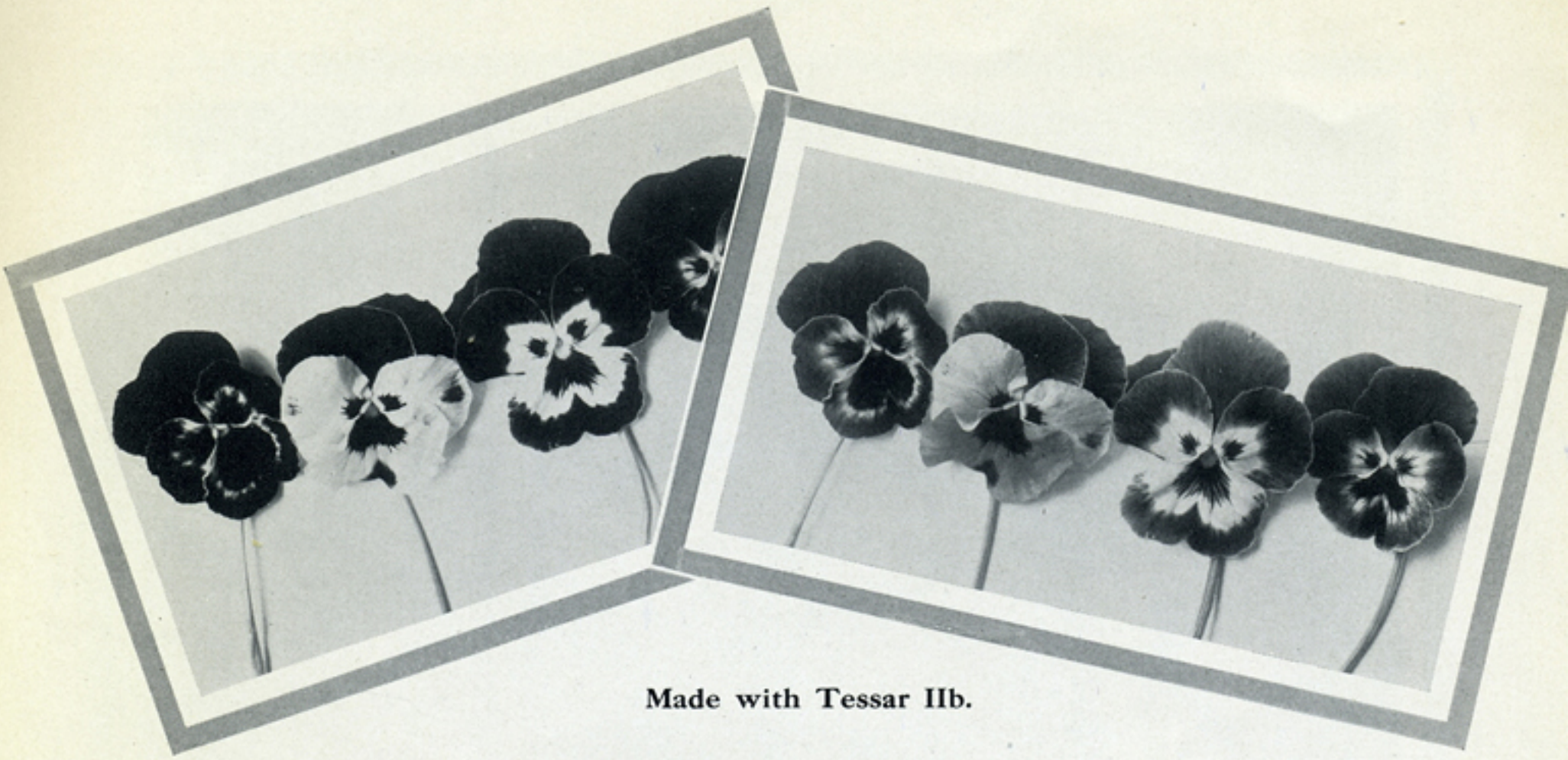
Magnifiers
Measuring Instruments
Microscopes
Microtomes
Observation Telescopes
Photomicrographic Apparatus
Projection Apparatus
Range Finders
Reading Glasses
Reducing Glasses
Searchlight Mirrors
Telescopic Gunsights
Theodolites
Transits
Equipment for Biological, Chemical and Research Laboratories



Made with Tessar IIb.

Without Ray Filter, 15 seconds

With Ray Filter, F:32, 35 seconds

Made with Tessar IIb and Ray Filter, by F. M. Lock, Victor, N. Y.

Made with Tessar Ic, by A. R. Stone, Rochester, N. Y.