

Bausch & Lomb Lenses



Aids
to
Artistic Aims.

THE
ANASTIGMAT LENS
as an aid to
ARTISTIC PHOTOGRAPHY



BAUSCH & LOMB OPTICAL CO.

ROCHESTER, N. Y.

NEW YORK, Broadway and 25th St.

BOSTON, 120 Boylston St.

WASHINGTON, 606 13th St., N. W.

CHICAGO, 156 Wabash Ave.

SAN FRANCISCO, 230 Sutter St

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FRANKFURT a/M, GERMANY.

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BAUSCH & LOMB OPTICAL CO.

Rochester, N. Y.

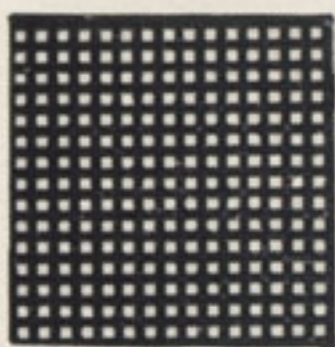
The Anastigmat Lens

The Rectilinear or Symmetrical lenses with which hand cameras are ordinarily equipped are almost all manufactured by us and are the best lenses of their type, but however perfect, they possess one inherent defect impossible to overcome, which necessarily limits their capabilities.

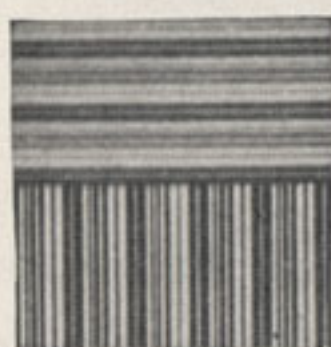
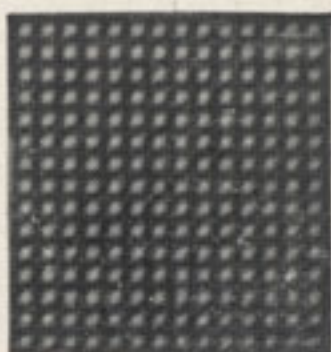
This defect is astigmatism which may be defined as the inability to focus at the same time vertical and horizontal lines lying in the same plane. While this may not be especially important in a lens working at a small aperture (diaphragm or stop) as we increase the aperture the defect becomes more apparent, so that if we desire speed in a lens, it must be as perfectly corrected for astigmatism as is possible. As will be seen from the illustrations on the following page, astigmatism shows itself in increasing distortion and indistinctness of lines towards the margin.

The Anastigmat lens with its superior correction has the following advantages over the older type, the Rectilinear lens, which it is bound to supersede in all cases where the increased cost is no bar to its purchase: it gives greater speed because it may be used with full opening and the resulting

Anastigmat



Rectilinear Lens



This figure shows the work of a first-class Rectilinear lens compared with an Anastigmat on the test chart. The blurring is due to astigmatism in the Rectilinear lens.

image will be brilliant and sharp all over, the sharpness not being confined to one spot as is the case with the Rectilinear lens when used with full opening; it has greater covering power, that is *area* in which the image is sharply defined, and a flatter field permitting the formation of flat images, not curved. Its greater speed and covering power enable it to be used advantageously under conditions where the ordinary lens is valueless.

Is it any wonder that the possessor of an ordinary lens, as he becomes aware of its defects begins to covet a modern Anastigmat? And indeed why should he wait until he discovers for himself the disadvantages of the Rectilinear lens? Why should not the prospective owner of a photographic outfit start out with the very best, and have all the advantages to be derived from the use of the best available means to the ends he seeks to attain? He is bound to have a better lens than the Rectilinear he starts out with, that is certain if he does anything at all in photography. Why pay for the Rectilinear and later the Anastigmat also, when the latter will do all the work of the former and more besides?

The Anastigmats herein set forth are unexcelled, the formulae for all but one having been computed by scientific experts in the Carl Zeiss Works at Jena, which has long led the world in the production of optical instruments and where the first Anastigmat lens was invented and put upon the market. We are the sole licensees for the production of these celebrated lenses in America. They are made of Jena glass of absolutely permanent qualities, after precisely the same formulae, and are subjected to exactly the same critical tests as in the Jena manufactory.

If you are not already the possessor of one of these peerless Anastigmats we trust that a perusal of these pages will convince you of their merits and incite in you a desire to own one.

In addition to the goods herein listed we manufacture other lenses and shutters, telephoto-attachments and ray filters. *This is but an abridged list of Anastigmat lenses of our manufacture and which are especially adapted for use on hand cameras.* Those interested are requested to send for our complete catalog of Photographic Lenses and Shutters (Catalog H).

We publish also a Portrait Lens Catalog and a Catalog for Photo-Engravers, both of which are supplied on demand.

The goods listed herein may be obtained through your photographic dealer.

BAUSCH & LOMB OPTICAL CO.

Rochester, N. Y.

July 1, 1906.



By J. T. Dey.

Bausch & Lomb-Zeiss Unar $f=4.5$

Series Ib.

The Unar is an unsymmetrical doublet (one whose parts can not be used singly) composed of four separated



$\frac{4}{5}$ actual size of 4 x 5 Unar.

lenses. It is very simple in construction and is the fastest lens in the Zeiss series herein listed, having a speed varying from three times as great in the smaller, to four times as great in the larger sizes, as the ordinary lens with which the camera is fitted.

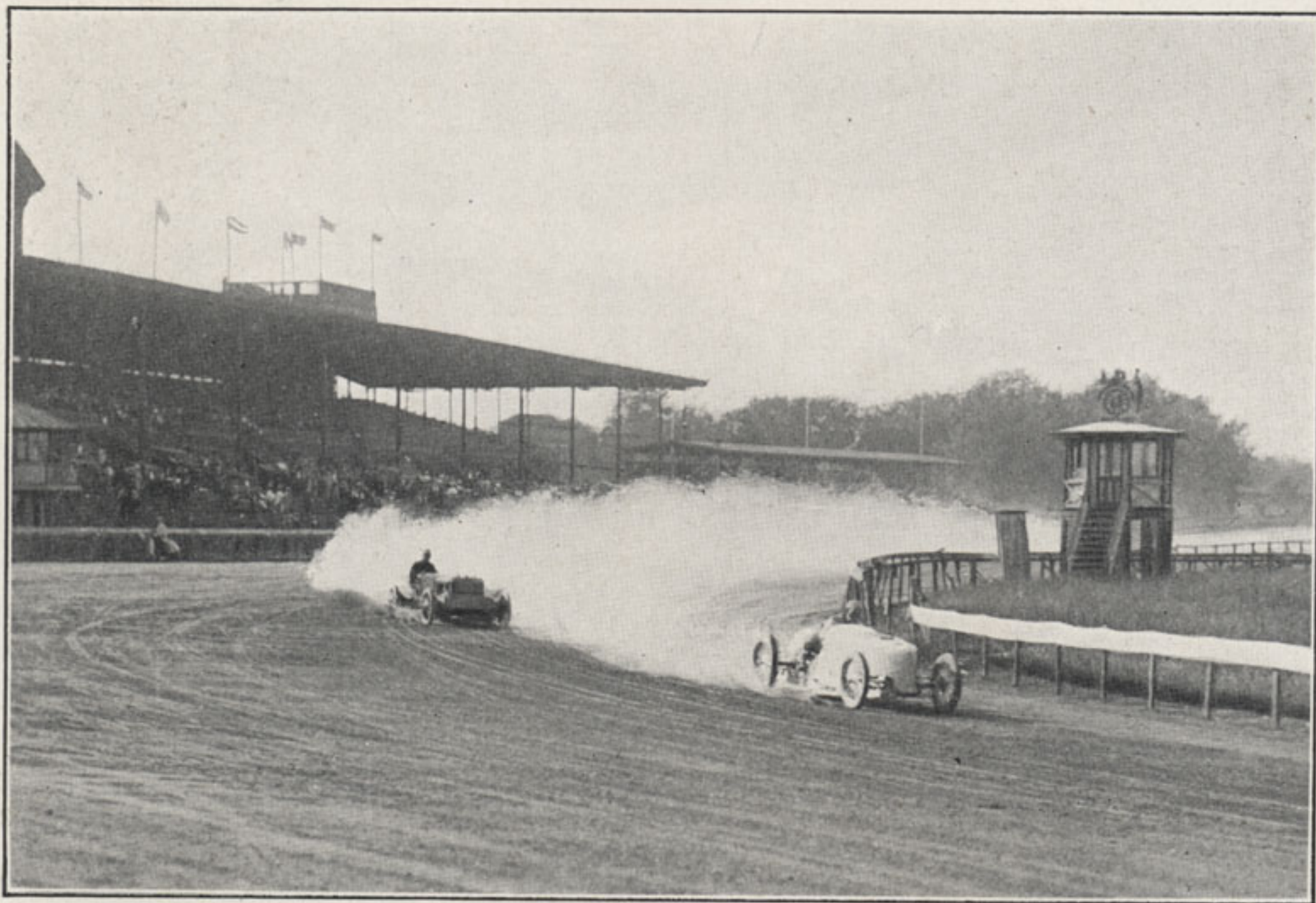
About 48° of the field of view are utilized on the particular plate for which each number is listed. The next larger plate is well covered with intermediate stop.

APPLICATION.

On account of its great speed the lenses are necessarily somewhat large but not sufficiently so to prevent use with almost any one of the present types of hand cameras.

It is the lens to be chosen above all others for depicting rapidly moving objects. It enables one to make quick exposures under unfavorable conditions of light and is, by reason of its speed, particularly adapted to the requirements of portraiture and group work. Home portraiture claims the time and attention of a large growing number who will find the Unar a most admirable lens for that purpose.





By Henry C. Fincke.

The special advantage of speed in no wise detracts from its use in landscape and all-around work, its excellent optical qualities proving highly advantageous there, too.

Telegraphic Code,	No.	Size of Plate Covered with Largest Stop * Inches.	Equivalent Focus. Inches.	Diameter of Lens. Inches.	Speed.	Angle. Degrees.	Price.	
							Lens Only.	Fitted with Aluminum Volute Shutter.
<i>Undine</i>	3	2 $\frac{1}{2}$ x 3 $\frac{1}{2}$	4 $\frac{3}{8}$	1	f-4.5	65	\$31 50	\$48 50
<i>Ungko</i>	4	3 $\frac{1}{4}$ x 4 $\frac{1}{4}$	5 $\frac{3}{8}$	1 $\frac{1}{4}$	f-4.5	65	38 50	57 00
<i>Ungvar</i>	5	4 x 5	6 $\frac{1}{8}$	1 $\frac{1}{4}$	f-5	65	42 00	60 50
<i>Unimak</i>	6	5 x 7	8 $\frac{1}{4}$	1 $\frac{5}{8}$	f-5	65	63 00	83 00
<i>Unit</i>	7	5 x 8	10	2	f-5.5	65	91 00	111 00
<i>Univers</i>	8	6 $\frac{1}{2}$ x 8 $\frac{1}{2}$	12	2 $\frac{3}{8}$	f-5.5	65	125 50

*The next larger plate is well covered with intermediate stop.

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



By W. E. Tefft.



By W. E. Wilmerding.

Bausch & Lomb-Zeiss Tessar $f=6.3$

Series IIb.



$\frac{6}{7}$ actual size of 4 x 5 Tessar.

properly fitted. Since it is unsymmetrical its parts can not be used separately. Tessar's superiority is evidenced by the following predominant characteristics:

Perfect corrections.

Sharp definition extending over a wide field.

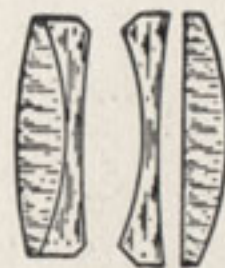
Illumination of unusual uniformity.

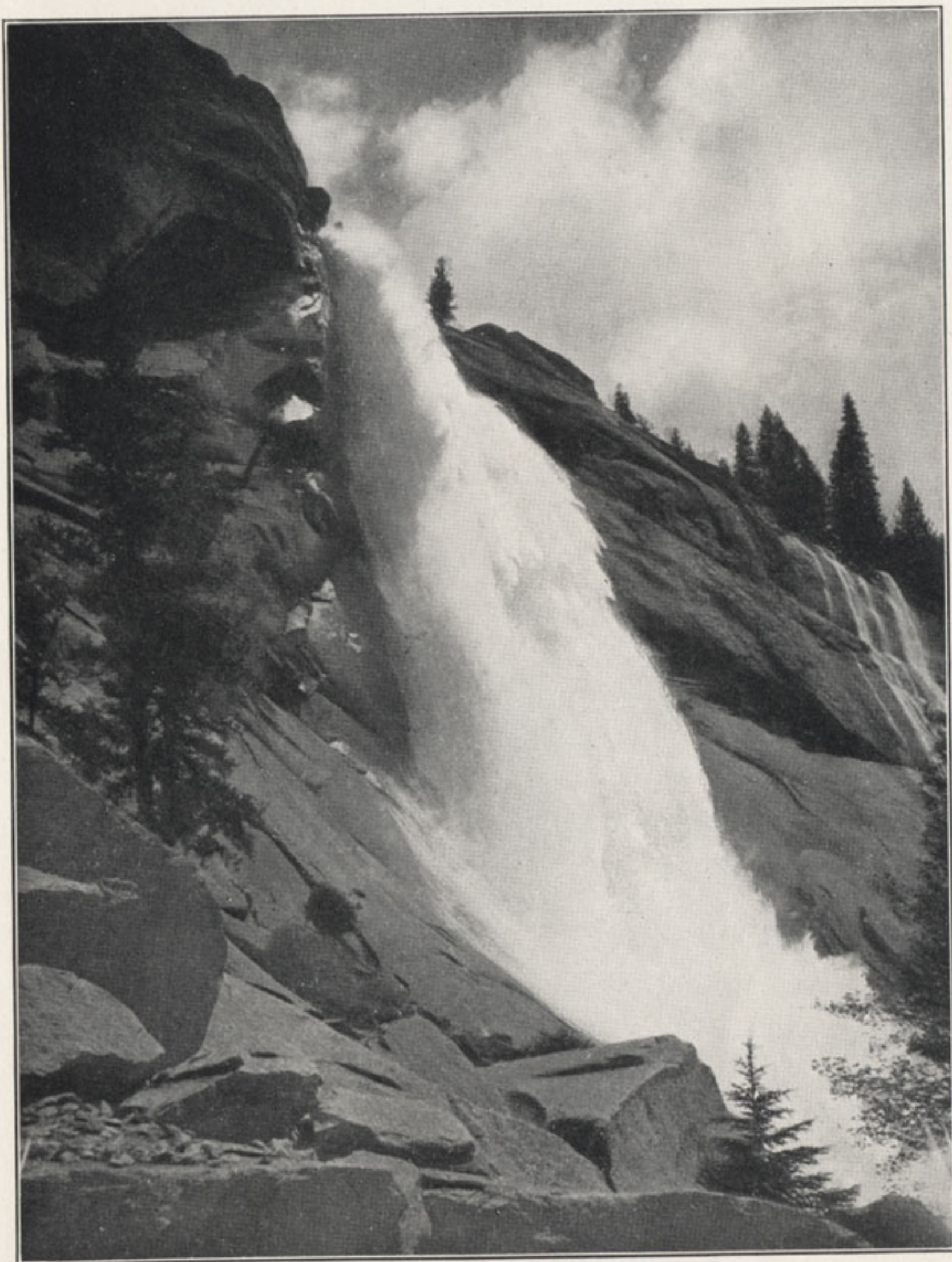
Speed $f=6.3$.

APPLICATION.

The Tessar is the lens par excellence for all ordinary purposes.

It is light and compact and particularly adapted to use with hand cameras of fixed extension for instantaneous work. While its speed is less than the Unar, it is still twice as fast as the ordinary camera lens, hence equal to practically all requirements.





By H. G. Peabody.

Its sharp definition and great covering power favor its use on larger plates and render it specially valuable in cases where it is desired to enlarge the negative.

Telegraphic Code.	No.	Size of Plate Covered with Stop f-6.3. Inches.	Equivalent Focus. Inches.	Diameter of Lens. Inches.	Price.	
					Lens Only.	Fitted with Aluminum Volute Shutter
<i>Tesab</i>	4	$3\frac{1}{4} \times 4\frac{1}{4}$	$5\frac{3}{8}$	$\frac{7}{8}$	\$ 33 50	\$ 50 50
<i>Tesec</i>	5	4×5	$6\frac{1}{8}$	1	40 00	57 00
<i>Tesak</i>	5k	$3\frac{1}{4} \times 5\frac{1}{2}$	$6\frac{7}{8}$	$1\frac{3}{8}$	46 00	63 00
<i>Tesid</i>	5a	$4\frac{1}{4} \times 6\frac{1}{2}$	$7\frac{1}{8}$	$1\frac{1}{4}$	49 00	67 50
<i>Tesog</i>	6	5×7	$8\frac{1}{4}$	$1\frac{3}{8}$	59 50	78 00
<i>Tesux</i>	7	5×8	10	$1\frac{5}{8}$	80 50	99 00
<i>Tesade</i>	8	$6\frac{1}{2} \times 8\frac{1}{2}$	12	2	118 50	138 50

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

Concord, N. H., March 7, 1906.

Bausch & Lomb Optical Co., Boston, Mass.,

Gentlemen : — The IIb Tessar lens, 12 by 15 size, bought of you a short time ago, has proved a very reliable lens in every way.

In school work, foot ball groups, etc., its extreme rapidity is a very great advantage, especially in the dull days of November. We made 14 by 17 negatives with over three hundred boys in the group, and every face was sharp and distinct.

Sincerely yours,

W. G. C. KIMBALL,

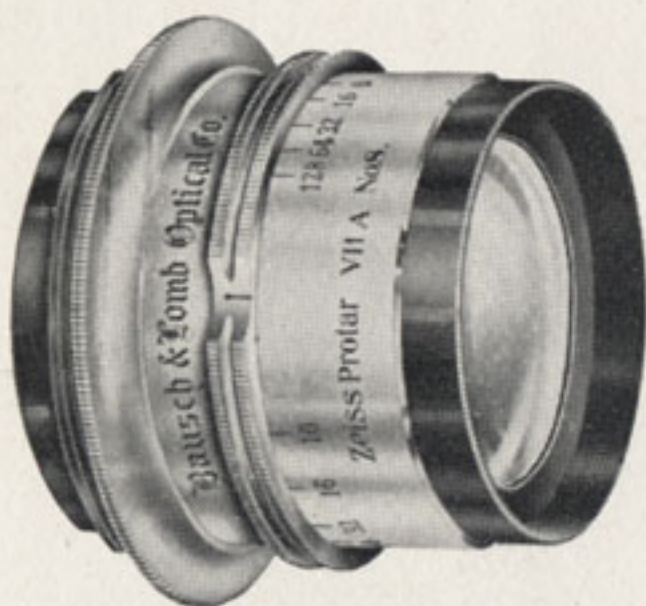


By J. H. McCorkle.

Bausch & Lomb-Zeiss Convertible Protar $f=6.3$

Series VIIa.

These lenses are designed to meet all the conditions of universal photography, being composed of two single,



$\frac{4}{5}$ actual size of 4 x 5 Protar.

perfectly corrected, Anastigmats, of different foci, which may be used singly or in combination. When the single elements have different foci, the lens is convertible into three lenses of different foci, having a speed of $f-7$ or $f-7.7$, which is almost twice that of the ordinary camera

lens. If we examine the "C" set listed on page 21, we find that it is composed of three single combinations of $8\frac{3}{4}"$, $11\frac{3}{16}"$, and $13\frac{3}{4}"$ focus respectively, each having a speed value of $f-12.5$, which is ample for instantaneous work under ordinary conditions. Combining the $8\frac{3}{4}"$ and $11\frac{3}{16}"$ combinations we secure a doublet of $5\frac{3}{4}"$ equivalent focus and a speed of $f-7$; combining $8\frac{3}{4}"$ and $13\frac{3}{4}"$, we secure an equivalent focus of $6\frac{1}{4}"$ and



a speed of $f-7.7$; combining $8\frac{3}{4}"$ and $13\frac{3}{4}"$, we secure an equivalent focus of $6\frac{1}{4}"$ and a speed of $f-7.7$; combining $11\frac{3}{16}"$ and $13\frac{3}{4}"$ we secure an equivalent focus of $7"$ with a speed of $f-7$. These speeds are almost twice that of the ordinary camera lens.



By A. S. Osborn.

While rated to cover perfectly plates of $4\frac{1}{4} \times 6\frac{1}{2}$, 5×7 , and 5×8 , they possess image circles sufficient to cover plates the next size larger. As we secure from three single combinations six perfectly corrected anastigmat lenses, the enormous advantages of this Convertible series are at once apparent. In selecting a lens one must be sure that the back focus of no combination is longer than the greatest extension of which the bellows is capable.

APPLICATION.

The single elements, while not absolutely rectilinear, are unequalled, and being of longer focus than the double combinations may be used for portraits, groups containing large figures, landscapes, all purposes in short requiring long focus, medium speed and narrow angle. Its use in taking landscapes from a considerable distance makes it possible for us to look upon the single combination as in a way a telephoto lens, but while its magnification is less than the telephoto its speed is far greater.

The doublet is an extra rapid lens working at a speed twice as great as the ordinary Rectilinear, hence is adapted for all kinds of instantaneous work, for groups, and for architecture, and all subjects requiring medium angle, good covering power, depth of focus and brilliancy.



By A. S. Osborn

Telegraphic Code.	No.	Size in Inches of Plate Covered with Full Aperture*	Combinations of Single Protars. Focus.		Combined Equivalent Focus. Inches.	Speed.	Price.	
			Front Lens.	Back Lens.			Lens Only.	Fitted with Aluminum Volute Shutter.
<i>Agonie</i>	1	3 $\frac{1}{4}$ x 3 $\frac{1}{4}$	7 $\frac{3}{16}$	7 $\frac{3}{16}$	4 $\frac{1}{8}$	f-6.3	\$51 00	\$68 00
<i>Alabaster</i>	2	3 $\frac{1}{4}$ x 4 $\frac{1}{4}$	8 $\frac{3}{4}$	7 $\frac{3}{16}$	4 $\frac{1}{2}$	f-7	54 50	71 50
<i>Alauda</i>	3	4 x 5	11 $\frac{3}{16}$	7 $\frac{3}{16}$	5	f-7.7	59 50	76 50
<i>Albatros</i>	4	4 x 5	8 $\frac{3}{4}$	8 $\frac{3}{4}$	5 $\frac{1}{16}$	f-6.3	58 00	75 00
<i>Alizarin</i>	5	4 $\frac{1}{4}$ x 6 $\frac{1}{2}$	11 $\frac{3}{16}$	8 $\frac{3}{4}$	5 $\frac{5}{8}$	f-7	63 00	80 00
<i>Alkaloid</i>	6	4 $\frac{1}{4}$ x 6 $\frac{1}{2}$	13 $\frac{3}{4}$	8 $\frac{3}{4}$	6 $\frac{1}{8}$	f-7.7	70 00	88 50
<i>Alkohol</i>	7	4 $\frac{1}{2}$ x 7 $\frac{1}{4}$	11 $\frac{3}{16}$	11 $\frac{3}{16}$	6 $\frac{3}{8}$	f-6.3	68 00	85 00
<i>Amidon</i>	8†	5 x 7 $\frac{1}{2}$	13 $\frac{3}{4}$	11 $\frac{3}{16}$	7	f-7	75 00	93 50
<i>Ananas</i>	9	5 x 8 $\frac{1}{2}$	16 $\frac{1}{8}$	11 $\frac{3}{16}$	7 $\frac{1}{2}$	f-7.7	87 50	106 00
<i>Anchovis</i>	10	5 x 8 $\frac{1}{2}$	13 $\frac{3}{4}$	13 $\frac{3}{4}$	7 $\frac{7}{8}$	f-6.3	82 00	100 50
<i>Anilin</i>	11	6 $\frac{1}{2}$ x 8 $\frac{1}{2}$	16 $\frac{1}{8}$	13 $\frac{3}{4}$	8 $\frac{1}{2}$	f-7	94 50	113 00
<i>Anthracit</i>	12	6 $\frac{1}{2}$ x 8 $\frac{1}{2}$	18 $\frac{7}{8}$	13 $\frac{3}{4}$	9 $\frac{1}{8}$	f-7.7	115 50	135 50
<i>Antimon</i>	13	6 $\frac{1}{2}$ x 8 $\frac{1}{2}$	16 $\frac{1}{8}$	16 $\frac{1}{8}$	9 $\frac{1}{4}$	f-6.3	106 50	125 00

* The next larger plate is covered with smaller stop.

† 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.

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

Denver, Colo., Feb. 9, 1906.

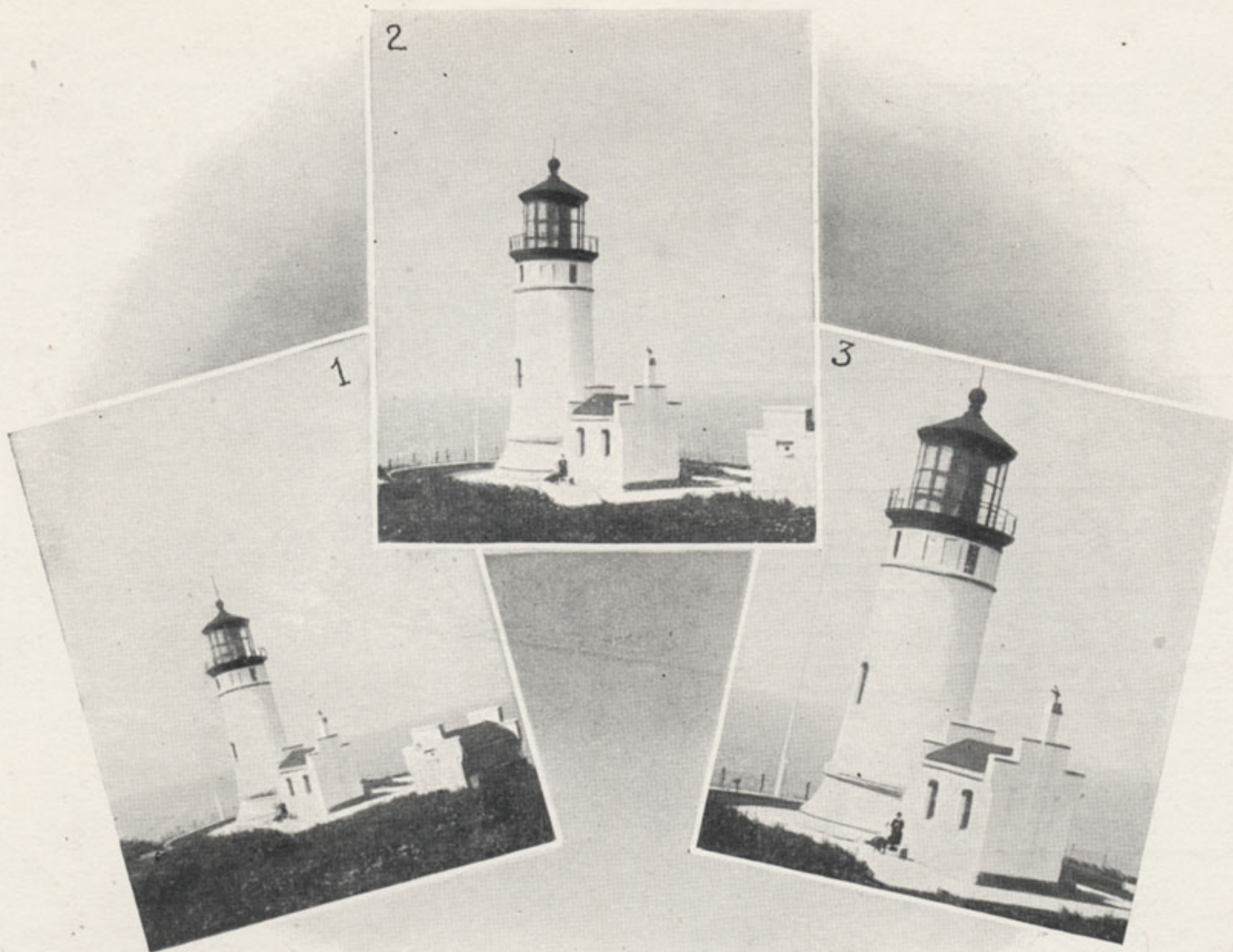
The Bausch & Lomb Optical Co., Rochester, N. Y.

Gentlemen :—Referring to the Zeiss Convertible shipped us recently, we are pleased to advise that this lens was accepted by our customer in preference to three other high grade equipments, which we had ordered for comparison. The work of the lens was most excellent and we are quite certain that it was the finest 4x5 lens which we have had the pleasure of selling.

Yours very truly,

THE DENVER PHOTO MATERIALS CO.,

By E. R. Lunbeck.



Relative size of image in a picture made with a No. 8 Series VIIa
(1) Made with doublet. (2) With rear combination. (3) With front combination.

Bausch & Lomb-Zeiss Convertible Protars.

"C" Set.

The following set of the Single Protars practically covers the entire field. It is offered complete with the lenses mounted interchangeably, the set consisting of one lens mount with Iris diaphragm, cap and flange, the single Protar lenses, and a neat, compact morocco case containing all the parts of the set.

Complete in case, \$103.00. Code word, *Alpha*.

Fitted with Aluminum Volute Shutter, \$121.50.

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

Series.	No.	Size of Plate Covered with Largest Stop.* Inches.	Equivalent Focus of Lenses in Inches.			Largest Stop.	Angle on 5 x 8 Plate. Degrees.
			Front Lens.	Back Lens.	Combined Focus.		
VII.	2	5 x 8		$8\frac{3}{4}$		f-12.5	48
	3	$6\frac{1}{2}$ x $8\frac{1}{2}$		$11\frac{3}{16}$		f-12.5	38
	4	8 x 10		$13\frac{3}{4}$		f-12.5	32
VIIa	5	$4\frac{1}{4}$ x $6\frac{1}{2}$	$11\frac{3}{16}$	$8\frac{3}{4}$	$5\frac{5}{8}$	f- 7.0	70
	6	5 x 7	$13\frac{3}{4}$	$8\frac{3}{4}$	$6\frac{1}{8}$	f- 7.7	65
	8	5 x 8	$13\frac{3}{4}$	$11\frac{3}{16}$	7	f- 7.0	59

* The next larger plate is well covered with small stop.

When using any one of the single combinations it must always be used from the rear of the mount or shutter.



By A. A. Adee.

Bausch & Lomb Plastigmat $f=6.8$.

The Plastigmat lens is our own creation. All the Zeiss lenses are unsymmetrical (the combinations can not be

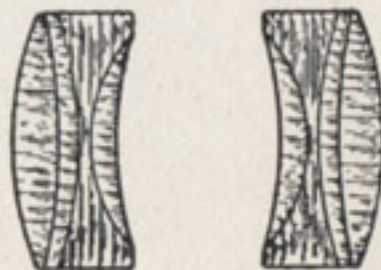


Actual size 4 x 5 Plastigmat.

used singly) with the exception of the Zeiss Convertible, and it was the demand for a symmetrical Anastigmat lower in price than the Zeiss Convertible which prompted us to compute this lens and place it on the market. The lens is produced under precisely the

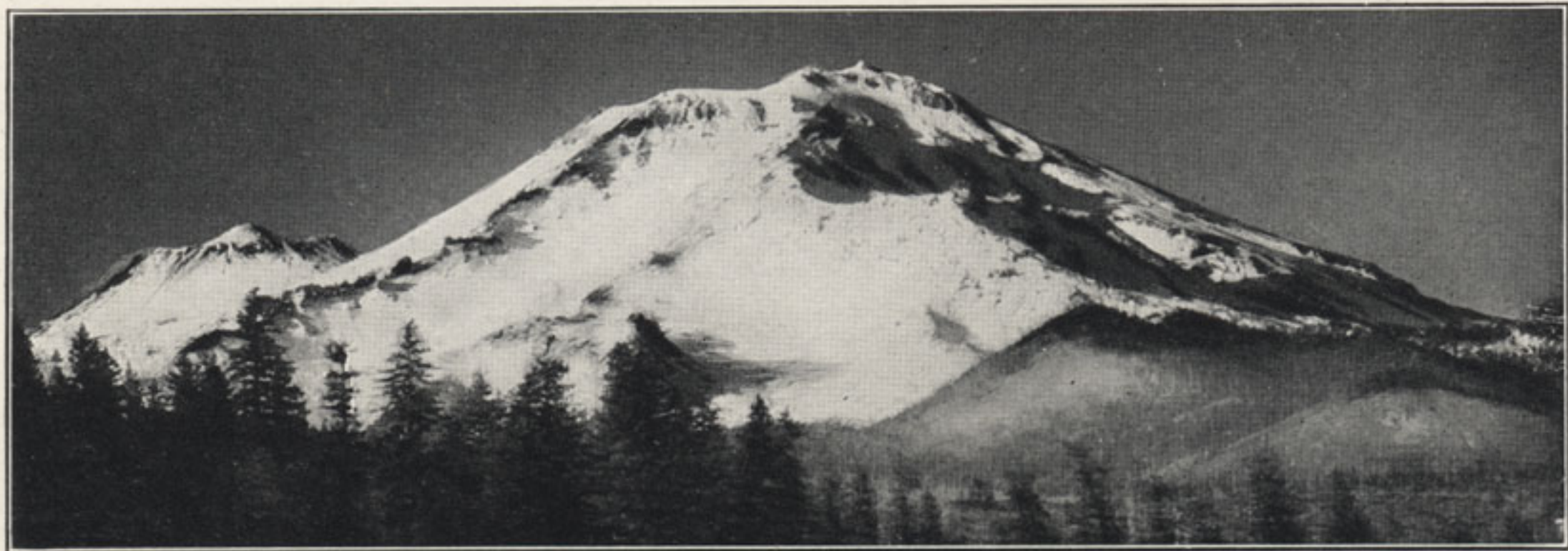
same conditions and is subjected to the very same tests as all our other Anastigmats.

It is a symmetrical lens, the front and back combinations being composed of four lenses each. Its speed is only $\frac{1}{9}$ less than the Tessar and the Convertible Protar, and is almost twice as great as the ordinary Rectilinear. The separate systems show great covering power. The rear combination can be used at a speed of $f-13.5$, one half as great as the ordinary Rectilinear. The focal length is nearly twice that of the lens when used as a doublet so that one can obtain images twice the size at the same distance, or the same size at twice the distance. The two systems are far enough apart to admit our Volute and other between the lens shutters. The plates for which the different numbers are listed are completely covered at full opening.





Mt. Shasta at distance of seven miles, made with doublet Plastigmat by H. H. Derr.



Mt. Shasta from same point as above, made with single combination of Plastigmat by H. H. Derr.

APPLICATION.

The Plastigmat is an admirable lens for general photography. Its excellent optical properties, light weight and compact form, adapt it for use with the hand camera. Its *speed*, not quite so great as Tessar, but sufficient for all except the most rapid work, *crisp definition over a large circle, great covering power and even illumination*, make it highly desirable for all classes of work.

What users of the lens think of it, is evidenced by the following extract from a letter recently received:

"It gives me pleasure to give you an unsolicited testimonial regarding your Plastigmat Lens. Some time ago I was persuaded to purchase also, a lens of foreign make. However, I beg leave to say that the Plastigmat is superior in every way. I came to this conclusion only after long and careful trials, and my testimony is based on actual results thus obtained. The Plastigmat gives better definition, flatter field, more speed, in short, compared point with point, your lens is far superior in my estimation, to this much talked about, widely heralded, but over estimated product of a foreign country.

I wish you all success and prosperity in your efforts to give to America lenses of the highest grade.

Very truly,

C. F. FISHER,

Pastor First Congregational Church, Clinton, Iowa."

Telegraphic Code	No.	Diameter of Lens.	Equivalent Focus of Doublet.	Size of Plate Covered Sharply at			Price.	
				<i>f</i> -6.8.	<i>f</i> -16.	<i>f</i> -62.	Plastigmat Only.	Fitted with Aluminum Volute Shutter.
<i>Plastal</i>	1	$\frac{7}{8}$	$5\frac{1}{4}$	$3\frac{1}{4} \times 4\frac{1}{4}$	4 x 5	5 x 7	\$34 00	\$51 00
<i>Plasteko</i>	2	$1\frac{5}{16}$	$6\frac{1}{4}$	4 x 5	5 x 7	5 x 8	40 00	57 00
<i>Plastica</i>	3	$1\frac{3}{8}$	$7\frac{1}{4}$	5 x 7	5 x 8	7 x 9	48 00	65 00
<i>Plastos</i>	4	$1\frac{3}{8}$	$8\frac{3}{4}$	5 x 8	$6\frac{1}{2} \times 8\frac{1}{2}$	8 x 10	55 00	73 50
<i>Plastum</i>	5	$1\frac{5}{8}$	11	$6\frac{1}{2} \times 8\frac{1}{2}$	8 x 10	10 x 12	75 00	93 50

Focusing scale for any Plastigmat, 50 cents.

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



By Geo. T. Power.

SUMMARY.

To sum up briefly the leading characteristics of the lenses described herein:

The Unar has the greatest speed and hence is necessarily larger than slower lenses with which it might be compared. Its speed adapts it to the most rapid snapshots, instantaneous work of all kinds, portrait and groups, and it gives full exposure under unfavorable conditions, when lenses of less speed would fail. With reduced aperture (diaphragm or stop) and therefore lessened speed it is well suited to landscape work as well as the purposes of the other lenses. It has, therefore, the value of other lenses with the additional advantage of speed.

The Tessar is the lightest and most compact of the lenses. It is slower than the Unar, but twice as fast as the ordinary camera lens. It possesses remarkable definition and covering power which render its use particularly advantageous on large plates and for enlargements.

The Convertible Protar combines in itself nearly all the advantages of all the other lenses. In speed it is equal to Tessar. Its bulk is necessarily greater because of the number of lenses. In its single combinations and as a doublet it is adapted for all classes of work. The rear combination gives an image $1\frac{1}{2}$ times, and the front combination twice, as large as the doublet.

The Plastigmat is not quite so rapid as Tessar, $\frac{1}{9}$ less, and it is not so light. It has however the advantage that



By Geo. D. Pratt.



By J. H. McCorkle.

its rear combination can be used. Where the single combinations of the convertible Protars have a speed of $f/12.5$, those of the Plastigmat work at $f/13.5$, a speed somewhat less but still ample for instantaneous exposures under normal conditions.

It should be remembered that to use the single combinations of the Protar it is necessary to have a bellows draw equal to the focal length of the front combination, while those of the Plastigmat require a bellows draw equal to a little more than twice the focal length of the lens.



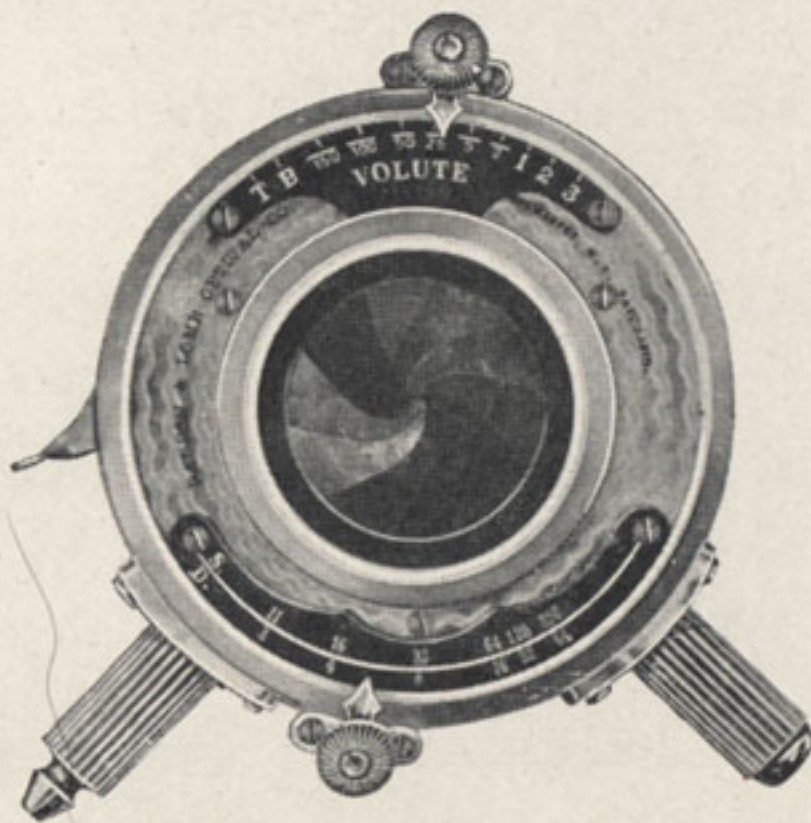
By J. H. McCorkle.



By C. C. Hutchins.

Bausch & Lomb 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. The Volute represents the highest type of diaphragm shutter.

It is rapid, compact, convenient, durable, dust-proof and elegant. It gives bulb and time exposures and works automatically at varying speeds very closely approximating from 3 seconds to $\frac{1}{150}$, $\frac{1}{100}$, and $\frac{1}{75}$ second respectively in Nos. 1, 2 and 3. All speeds are controlled by our patent pneumatic retarding device.

Any size opening from smallest to largest stop is obtained by placing the lower pointer opposite the stop number desired. It does not expose the plate while being set, and can be arranged for use with two or more lenses.

When exposure is made at slow speeds the shutter opens quickly and remains open to the full extent until the exposure is completed, when it closes instantly. The shutter is set by raising the setting lever. Exposure is made either by pneumatic bulb or by depressing the setting lever.

All the working parts are enclosed within the case, protecting them from dust.

The Volute is made in three sizes and can be applied to lenses up to and including those having an aperture of 52 mm. (2 inches). It can be fitted to any lens and is supplied for all makes of cameras.

It is furnished with rubber bulb and hose.

One enthusiastic owner writes: "The crowning glory of the outfit is the Volute shutter. I hesitated a long time before putting so much money in the shutter, but it is genuine economy."

Telegraphic Code.	No.	Will Take Lenses with Opening of	Automatic Exposure.	Price.	
				Fitted to Lenses of Our Manufacture.	Fitted to Lenses of OtherManu'fr
<i>Volu</i>	1	1 in.	3 sec. to $\frac{1}{150}$ sec.	\$17 00	\$18 00
<i>Volaaf</i>	2	1½ in.	3 sec. to $\frac{1}{100}$ sec.	18 50	20 00
<i>Volutar</i>	3	2 in.	3 sec. to $\frac{1}{75}$ sec.	20 00	22 00