Bausch & Lomb Optical Co.,

MANUFACTURERS OF

PHOTOGRAPHIC

LENSES,

SHUTTERS,

PRISMS, ETC.

BRANCH OFFICE AND WAREROOMS:
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E. R. ANDREWS, PUBLISHER,
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ROCHESTER, N. Y.

PREFACE.

With this issue we

HAVE MADE AND SOLD 33,000 LENSES.

This enormous increase in the demand of our lenses by professional and amateur photographers requires no words to show their general and increasing popularity. We shall continue in the future, as we have in the past, to make our work the synonym of the highest quality and absolute regularity, and utilize every opportunity to make improvements.

We introduce herewith

TWO NEW SERIES OF PORTRAIT LENSES,

which possess unusual merit and to which we call the special attention of professional photographers.

We have also received the computations and material for

A NEW SERIES OF ZEISS-ANASTIGMAT LENSES,

which will be particularly interesting to the amateur and view photographer.

At the same time a very material

REDUCTION IN PRICES OF THE ZEISS-ANASTIGMATS

will take effect. We are particularly pleased to make this announcement, since, with all the advantages which these lenses possess, many who have appreciated and been desirous of possessing one or the other, have been deterred from doing so by the comparatively high prices. We have made strenuous efforts to change this condition, believing that their great popularity will be considerably enhanced. We call particular attention to their various advantages in the pages devoted to them.

We introduce herewith a new series of

IMPROVED IRIS DIAPHRAGMS,

which are now attached to all of our lenses excepting Velox Series at

NO ADVANCE IN PRICE,

except the Rapid Universal and A. G. Clark, in which, however, it is very slight.

We also introduce herewith our new

TELE-PHOTO LENSES,

which we commend for practicability and moderate prices.

We also offer our

STEREOSCOPIC SHUTTER,

which has proven very satisfactory in its work, and which, now that stereoscopic photography is becoming more popular, will be welcomed as an effective aid.

Any of our lenses will be cheerfully sent to responsible parties for examination and comparison.

BAUSCH & LOMB OPTICAL CO.

JUNE, 1894.

THE goods enumerated in this Catalogue can be obtained from any of the Photographic Stock Dealers in this country and in Canada. In cases where there is any difficulty in so obtaining, we will be pleased to supply direct at Catalogue Prices.

They may also be obtained in foreign countries from the following prominent firms, who are our representatives for their respective countries.

CHARLES, REYNOLDS & CO,	London, England.
N. FELLHEIMER,	Stuttgart, Germany.
CARL ZEISS,	Jena, Germany.
CLEMENT & GILMER,	Paris, France.
KARL FRITSCH,	Vienna, Austria.
L. VAN NECK & CO.,	Antwerp, Belgium.
F. KORISTKA,	Milano, Italy.
O. DIRADOUR,	Constantinople, Turkey.
J. LEWELLYN & CO.,	Shanghai, China.
COCKING & CO.,	Yokohama, Japan.
HOLLISTER DRUG CO., LIMITED,	Honolulu, Hawaian Isl.
JULIO LABADIE, Suc'rs y Cia,	Mexico City, Mexico.
CURTIS BROTHERS,	Dublin, Ireland.

We also issue a very complete List of Microscopes, Objectives, and Accessories, which we will be pleased to forward to any person interested in Microscopy.

SELECTION OF LENSES.

To select a lens, suitable for certain purposes, is a matter of considerable difficulty, even for a person adept in photography, and we are sure that a few words from us, which will aid in making proper selections, will not be found amiss.

There are such a variety of claims made for different lenses, that we are not surprised to receive so many inquiries as to the various conditions involved.

While results in photography depend to a great extent upon personal skill and experience, the basis of all good work is always the lens. The camera may be more or less crude, and its adjuncts as well, but that part of it which gives the photographic image, the lens, should be of as high grade as possible, so as to give a correct representation of what it is desired to retain in the form of a picture. From lack of a true understanding of the subject, many persons endeavor to economize by purchasing a cheap and in many cases a useless lens, unmindful of the fact that instead of acquiring what will always be a source of pleasure, they are burdening themselves with what will be a continual cause of annoyance and dissatisfaction. The outcome is, that such lenses are almost always discarded and become a loss, while others of known reliability are purchased. In other cases lenses are purchased wholly unsuited to the purpose to which they are put, with usually the same result.

Achromatism is the first condition in a good objective. It is that quality which brings the chemical rays, or those which produce the photographic image, in exact coincidence with visual rays, or those which make the image apparent to the eye on the ground glass. A slight deviation from perfect achromatism will produce the photographic image either in front or behind the plate and will therefore cause indistinctness. This may sometimes be partially corrected by the use of small stops, but when it exists it is always a serious fault.

Angle of View depends upon the proportion of focal length to the size of plate and is expressed by the angle formed by the extreme rays forming the image. Lenses of the rectilinear type have an angular aperture varying from 40° to 70°. Those giving an angle of from 85° to 110° are termed *Wide Angle.* Owing to the large apertures of the lenses in the ordinary types of these latter, and their inability to combine the rays on the edges of the plate, it is usually necessary to use them with small stops to obtain good results. This involves another quality.

Speed or Rapidity.—It represents the quality of forming a correct image within a given time, and depends upon the proportion of working aperture to length of focus. In addition it depends upon the quality of the lens in design and mechanical execution, and is the principal feature in determining the quality of a lens from an optical standpoint, providing its other qualities are of corresponding perfection. At this day, when instantaneous photography is so generally practiced, it is of the greatest importance, not only as a quality in itself, but of the ability of the lens to give with it a sharp, clearly defined picture. While the rapidity of a lens depends to some extent upon its angle, the aperture through which the light passes, or the size of the stop, determines it. The speed decreases proportionately with the decrease in the size of stop. In this regard the recommendation of the English society is now generally followed, by which each succeeding smaller stop requires double the exposure of the preceding. By this system the stops are designated, 8, 16, 32, etc., but their relative value to focal length is also used. The *f*-8 is one-eight of the equivalent focal length and really expresses the value of the speed. From this it will be seen that the focal length is as great a factor as the aperture.

Depth of Focus is another important quality and represents the degree of sharpness with which objects lying at different distances in front of the camera are shown at the same time on the plate. It depends upon the focal length, angle of view and working aperture, and increases with the decrease of these three factors. As can easily be determined by experiment, an object close to the camera will be found to have a longer posterior focus than one at a distance and no lens can ever be constructed, which with full aperture will bring the two in one plane, so that the advertised claims, which are made for a large number of lenses, of great speed with great depth of focus may be put down as false. The extent to which a lens possesses speed and depth of focus is variable, however, and depends upon the skill of the optician, but it may be added that under the same conditions, the depth increases with the decrease in focus, as there is less variation between the different planes at the back for the different distances at the front of the lens. For this reason it is, that only short focus lenses can have approximately a "Universal focus." If plates could be constructed of such sensitiveness as to admit the use of small apertures, depth of focus would be the result to a much higher degree, but this attainment depends upon the chemist and not the optician. A lens may be made to have approximately a universa lfocus for a $3\frac{1}{4}$ x $4\frac{1}{4}$ inch plate, and even 4 x 5 inch plate, but here it ceases.

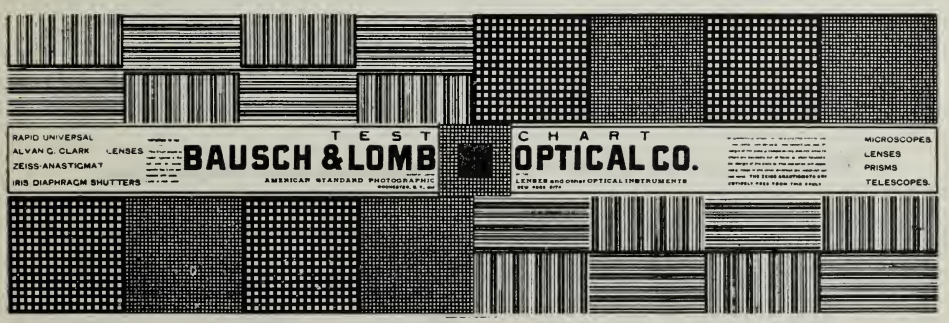
Flatness is the quality of defining an object equally well upon the entire surface of the plate, but can never be wholly accomplished because in the nature of things there is a certain amount of curvature. It depends upon the angle, aperture and focus, but after these conditions entirely upon the skill of the

optician, and in this respect probably the greatest difference is apparent in lenses coming from the hands of different manufacturers. With many lenses it is found necessary to use one intended for a certain plate on one or two sizes smaller to obtain satisfactory results.

Definition is the capacity to concentrate the rays to one point so as to give a sharp, clearly defined image. It is of the greatest importance, as it shows principally the amount of care which has been devoted to the lens during its construction. Any lens not having this property in the highest degree may be put down at once as of inferior quality. The fault is overcome, only partially however, by reducing the aperture, but this is of course, at the sacrifice of speed. When due to non-achromatism it may be determined by observing whether the visual image is sharp, and chemical image or photograph indistinct, although in this case great care should be observed that the ground glass and plate are in exact coincidence, which very often is not the case. When due to faulty construction or workmanship, it can easily be determined by observing the image on the ground glass. The image should be an exact representation of the real object in detail and should be determined by the aid of a magnifier or focusing glass.

Testing lenses is a matter of no small importance, and should be done with the greatest care and regard to the points mentioned above. As speed, depth and flatness are varying qualities in different lenses, we emphatically recommend that they be not judged in a lens by themselves, but in comparison with another lens of about the same proportion, preferably with one of known excellence. A person well experienced in photography may be able to form a correct judgment, but one who is not, cannot do so with security. Care should be taken that comparisons be made under the same conditions as to light, size of stop and time of exposure, and if indefinite, should be repeated.

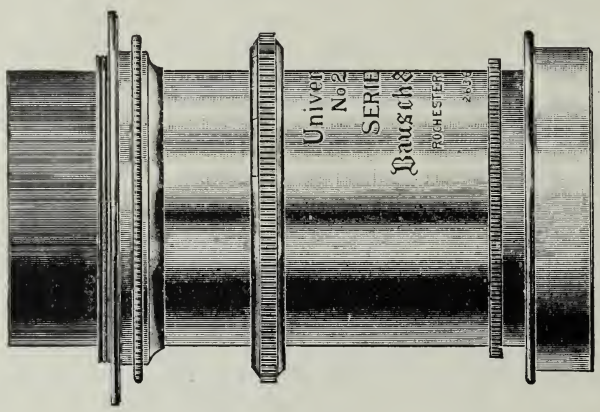
TEST-CHART.



The above is a reduced fac-simile of our Test Chart (16 x 48 inches) which we send with each one of our lenses. We appreciate the value of the ability of the purchaser of a lens to convince himself of its perfection, and put the means in his hands of making comparisons with lenses of different makers.

UNIVERSAL PORTRAIT LENSES.

Series A. F-4.



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QUICK WORKING LENSES FOR GENERAL PORTRAIT WORK.

Although these lenses have been in use in the hands of some of our best known photographers for the purpose of testing their particular qualities, they are herewith introduced for the first time to the general public. The general commendations of their high qualities convince us that after these become more generally known they will be the means of making these the leading lenses with professional photographers. They are quick working and have an unusual delicacy of definition, freedom from distortion, and even illumination. They are **at least** equal to the lenses of the best European makers intended for the same work, and are very materially lower in price than any of these.

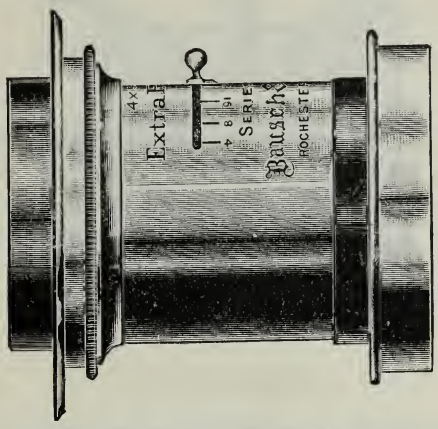
The No. 3 of this series is recommended as the most useful lens for cabinet and whole-plate work in the studio.

They are Supplied only with our Improved Iris Diaphragm.

No.	Size.	Diameter of Lenses.	Back Focus.	Price.	Telegraphic Code.
1	4 x 5	2¾ in.	6½ in.	$ 65.00	Uberty.
2	5 x 8	3½ "	8½ "	90.00	Udal.
3	6½ x 8½	4⅙ "	11½ "	135.00	Udaler.
4	8 x 10	4½ "	13½ "	190.00	Udder.

EXTRA RAPID UNIVERSAL LENSES.

Series D. F-6.



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FOR HEADS, GROUPS, FIGURES AND OUTDOOR WORK OF GREAT SPEED.

The larger lenses of this series will be welcomed as portrait lenses par excellence, having unusually delicate definition with uniform illumination, good depth and speed in all ordinarily lighted studios. It is rare that a lens which is designed to do good portrait work is suited for good landscape work as well, but these qualities are combined to an unusual degree in these lenses. The lower numbers are designed for very quick hand camera work, giving even illumination and possessing perfect definition. The mountings are comparatively short, which overcomes to a considerable extent the inherent astigmatism in lenses of similar construction. These lenses may be had with or without hood, but will be supplied with hood unless otherwise ordered.

By unscrewing the front combination the back only may be used, giving about twice the focus with about one half the speed.

These lenses have an angle of 70 degrees.

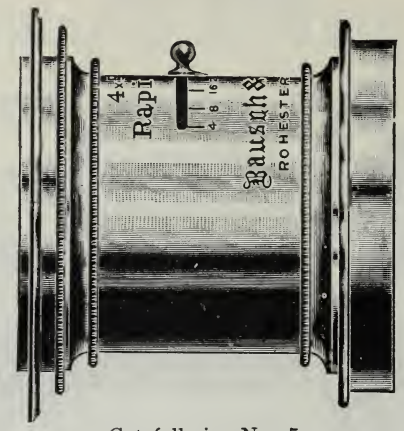
They are Supplied only with our Improved Iris Diaphragm.

No.	Size.	Diameter of Lenses.	Equivalent Focus.	Back Focus.	Brass Mounting. Price.	Aluminum Mounting. Price.	Telegraphic Code.
0	3¼ x 4¼	1 in.	4⅝ in.	3 13/16 in.	$ 24.00	$ 27.00	Ukase.
00	4 x 5	1¼ "	6⅝ "	5 9/16 "	28.00	32.00	Ulaus.
1	5 x 8	1½ "	8 "	7 "	36.00	40.00	Ulcer.
2	6½ x 8½	1⅞ "	9 7/16 "	8¼ "	46.00	50.00	Ulema.
3	8 x 10	2⅛ "	11¼ "	9 13/16 "	58.00	64.00	Ulnim.
4	10 x 12	2⅝ "	14¼ "	12 7/16 "	75.00	82.00	Ulnage.
5	12 x 15	3 5/16 "	17½ "	15¼ "	100.00	108.00	Umbel.
6	16 x 20	3¾ "	22⅝ "	19⅞ "	130.00	139.00	Umber.

Telegraphic code refers to lenses in brass mounting; if desired in aluminum it should be so stated.

RAPID UNIVERSAL LENSES.

F. 8.



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FOR INSTANTANEOUS OUTDOOR WORK, GROUPS AND STANDING FIGURES.

These lenses have enjoyed an unusual popularity since their first introduction. They are of the rectilinear, symmetrical type and have a construction peculiarly their own. The glass is specially manufactured of unusual hardness and brilliancy, involving specially favorable curves. While these lenses do not have the speed of the Extra Rapid Series, they give excellent results in a well lighted studio on groups, figures and large heads having great depth and covering capacity.

For outdoor work they have an unusual crispness of definition with full opening and great covering capacity and depth. The speed is ample for all ordinary instantaneous work without sunlight. While it may be used on architectural subjects and interiors, a wide angle lens is recommended for this purpose. The back combination may be used with good results on twice the size of plate with about one-half the speed. These lenses vary in angle from 70 degrees in the smaller to 60 degrees in the larger sizes.

Our new test chart (copyrighted) accompanies each lens.

They are Supplied only with our Improved Iris Diaphragm.

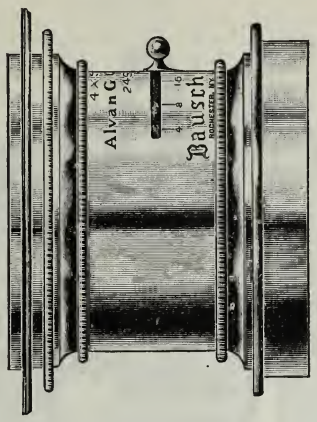
Waterhouse stops in place of Iris at the same prices.

No.	Large Stop Covers.	Diameter of Image Circle.	Diameter of Lenses.	Back Focus.	Equivalent Focus.	Brass Mounting. Price.	Aluminum Mounting. Price.	Telegraphic Code.
4¼	3¼ x 4¼	8 in.	⅞ in.	4⅜ in.	5¼ in.	$ 18.00	$ 21.00	Ucubis.
5	4 x 5	9¼ "	1 1/16 "	5⅜ "	6¾ "	22.00	25.00	Umbria.
8	5 x 8	11 "	1 3/8 "	7⅞ "	8⅞ "	26.00	30.00	Unca.
8½	6½ x 8½	13¼ "	1 5/8 "	10⅜ "	11⅜ "	35.00	39.00	Unelli.
10	8 x 10	15⅝ "	1 7/8 "	12¼ "	13⅞ "	48.00	52.00	Upis.
12	10 x 12	20 "	2 1/8 "	15 "	17 "	60.00	66.00	Uraca.
15	12 x 15	21½ "	2 3/8 "	18 "	20¼ "	75.00	82.00	Uxantis.
18	16 x 18	27½ "	3 1/8 "	22¼ "	24¾ "	95.00	108.00	Utica.
22	20 x 22	36 "	4 1/8 "	28 "	31⅝ "	125.00	139.00	Uzita.

Telegraphic code refers to lenses in brass mounting; if desired in aluminum it should be so stated.

ALVAN G. CLARK LENSES.

F. 8.



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FOR INSTANTANEOUS OUTDOOR WORK, GROUPS, STANDING FIGURES, INTERIORS AND ARCHITECTURE.

These lenses are the invention of Alvan G. Clark, the celebrated manufacturer of telescopes, and are of a construction dissimilar from anything heretofore followed, and are as striking in their results as Mr. Clark's success in the telescope objectives has been. They may be used:

In all work to which the Rapid Rectilinear type may be adapted, when they give an angle of about 55 degrees with stop *f* 8, on size of plate as listed.

As wide angle objectives, giving an aperture of about 90 degrees with stop *f* 45, on larger sizes of plates up to the stated limit of image circle. They are quite free from marginal distortion and magnified perspective, so common to lenses of this class.

The lenses are uncemented, each lens of the combination being mounted for itself, and are therefore free from danger of gradual decrease in speed, so common in many lenses owing to the chemical change in the cement. The crown glass is on the outside, and therefore less liable to become scratched.

They possess less astigmatism than any known lenses of the symmetrical type. The back combination may be used on larger plates at one-half the speed.

These lenses are fully covered by patent.

Our new test chart (copyrighted) accompanies each lens.

They are Supplied only with our Improved Iris Diaphragm.

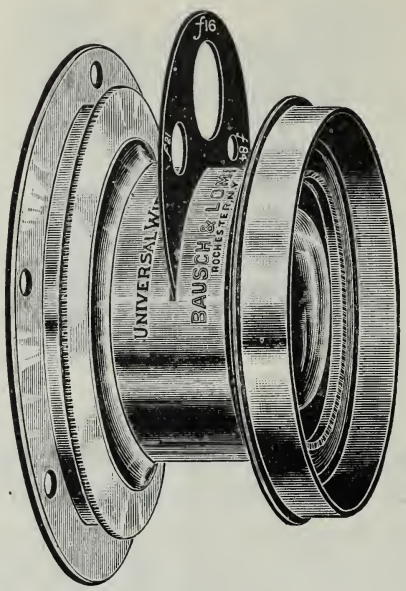
Waterhouse stops in place of Iris at the same prices.

No.	Size of Plate working with Stop F. 8.	Diameter of Image Circle.	Diameter of Lenses.	Back Focus.	Equivalent Focus.	Brass Mounting. Price.	Aluminum Mounting. Price.	Telegraphic Code.
4¼	3¼ x 4¼	8½ in.	⅜ in.	4⅜ in.	5⅛ in.	$ 20.00	$ 23.00	Abel.
5	4 x 5	13 "	⅞ "	5⅜ "	6⅛ "	24.00	27.00	Abner.
8	5 x 8	16 "	1⅛ "	7⅜ "	8¼ "	30.00	34.00	Achan.
8½	6½ x 8½	21½ "	1½ "	10¼ "	11⅛ "	38.00	42.00	Adam.
10	8 x 10	24¾ "	1⅜ "	12 3/16 "	13⅛ "	50.00	54.00	Agate.
12	10 x 12	33 "	2⅛ "	15 "	16 "	64.00	70.00	Alema.
15	12 x 15	38 "	2⅝ "	18 "	19¼ "	82.00	89.00	Amasa.
18	16 x 18	47 "	3 "	22 "	23 7/16 "	105.00	113.00	Arab.
22	20 x 22	64 "	4⅛ "	28 "	30 "	145.00	155.00	Arbah.

Telegraphic code refers to lenses in brass mounting; if desired in aluminum it should be so stated.

UNIVERSAL WIDE ANGLE LENSES

F. 16.



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In these lenses we have sought to combine high efficiency with moderate prices and the results show that this has been accomplished to an unusual degree.

The angular aperture is about 100°. With these wide angles they have rare covering capacity and equality of illumination. Further than this the largest stop gives a speed which will allow of their use in flash light exposures and instantaneous in out-door work under favorable conditions of light.

We quote their capacity in a different manner than is usually the case. While the angular aperture of the lenses is about 100°, we quote them working with largest stop, and in another column with small stops, in each case giving the angular aperture which the lenses have on specified plates.

If a careful comparison is made with other lists it will be found that they are misleading in so far, that while the angular aperture of lenses is given, they fail, and in some cases very considerably, from giving these angles on the plates for which they are quoted.

Sizes up to and including 8 x 10 are fitted with revolving diaphragm, larger sizes with our improved Iris diaphragm.

Our new test chart (copyrighted) accompanies each lens.

No.	Size of Plate covered with Stop *f.* 16. Angle 80°.	Size of Plate covered with Stop *f.* 64. Angle 95°.	Diameter of Image. Circle.	Diameter of Lenses.	Back Focus.	Equivalent Focus.	Price.	Telegraphic Code.
5	4 x 5	5 x 8	8¾ in.	⅝ in.	3½ in.	3½ in.	$16.00	Wade.
8	5 x 8	6½ x 8½	13 "	⅞ "	4⅞ "	5¼ "	20.00	Wait.
8½	6½ x 8½	8 x 10	15 "	⅞ "	6 1/16 "	6½ "	24.00	Walk.
10	8 x 10	11 x 14	18 "	1⅛ "	7½ "	8 "	28.00	Walrus.
14	11 x 14	14 x 17	25½ "	1½ "	9⅞ "	10½ "	36.00	Water.
17	14 x 17	20 x 22	32 "	2 "	13⅛ "	14 "	48.00	Weaver.
22	18 x 22	22 x 27	37 "	2¼ "	16 "	17 "	60.00	Wale.
30	25 x 30	30 x 38	49 "	2½ "	20⅝ "	22 "	90.00	Whistle.

VELOX RECTILINEAR LENSES.

These lenses are of the symmetrical rectilinear type. They are carefully made and while they will not give such results as our Rapid Universal, in definition or covering capacity, they are superior to any of the cheaper grade of lenses now on the market. They are suitable for portraiture, architectural and all kinds of outdoor work, with a speed equal to all shutter work. The back combination may be used separately.

The mountings are of the "black band" type, neatly finished and lacquered, and provided with morocco cap, and a set of diaphragms in morocco case.

Our IMPROVED IRIS DIAPHRAGM may be attached in place of the Waterhouse stops at a slight advance.

No.	Size of Plate.	Diameter of Lenses.	Back Focus.	Price.	Price with Iris Diaphragms.	Telegraphic Code.
1	4 x 5	1 in.	$5\frac{3}{4}$ in.	$10.00	$13.00	Veda.
2	5 x 8	$1\frac{3}{8}$ "	8 "	15.00	18.50	Veer.
3	$6\frac{1}{2}$ x $8\frac{1}{2}$	$1\frac{5}{8}$ "	$10\frac{1}{4}$ "	20.00	23.50	Vell.
4	8 x 10	2 "	13 "	25.00	29.00	Vendee.
5	10 x 12	$2\frac{3}{8}$ "	$15\frac{1}{2}$ "	35.00	39.00	Veneer.
6	12 x 15	$2\frac{5}{8}$ "	18 "	50.00	55.00	Veney.
7	16 x 20	$3\frac{1}{4}$ "	$22\frac{1}{2}$ "	70.00	75.00	Venge.
8	18 x 22	$3\frac{3}{4}$ "	28 "	90.00	96.00	Venit.

VELOX WIDE ANGLE LENSES.

These lenses have an angular aperture of about 80° on the plate for which they are listed, but have an angle of about 90° on the next larger size plate; the largest stop is *f* 16. They give good results when used with suitable stops on interior and architectural work and can be commended for a cheap lens.

No.	Size of Plate.	Back Focus.	Equivalent Focus.	Price.	Telegraphic Code.
1	4 x 5	$3\frac{1}{4}$ in.	$3\frac{1}{2}$ in.	$10.00	Vermil.
2	5 x 8	$4\frac{7}{8}$ "	$5\frac{1}{4}$ "	15.00	Verst.
3	$6\frac{1}{2}$ x $8\frac{1}{2}$	$6\frac{1}{16}$ "	$6\frac{1}{2}$ "	18.00	Vetch.
4	8 x 10	$7\frac{1}{2}$ "	8 "	22.00	Vild.
5	11 x 14	$9\frac{7}{8}$ "	$10\frac{1}{2}$ "	28.00	Villi.
6	14 x 17	$13\frac{1}{8}$ "	14 "	35.00	Vacar.
7	16 x 20	16 "	17 "	45.00	Vade.
8	20 x 24	$20\frac{3}{4}$ "	22 "	60.00	Vague.

Sizes up to and including 8 x 10 are fitted with revolving diaphragm, larger sizes with our improved Iris diaphragm.

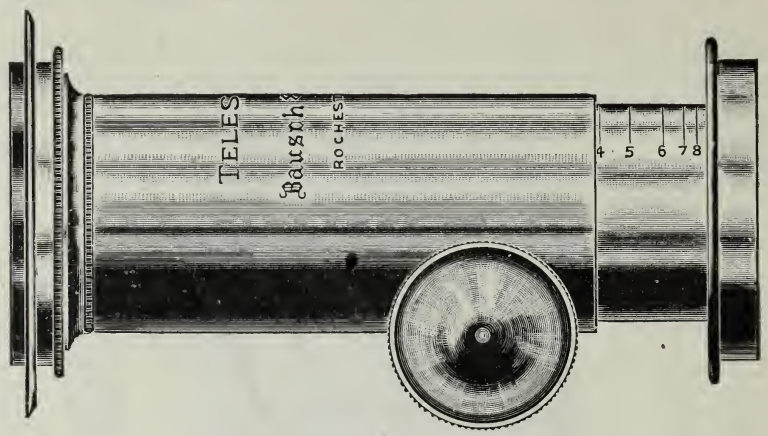
SINGLE ACHROMATIC LENSES.

These lenses are carefully made up of a positive crown and negative flint glass lens. They give the best possible spherical correction of this construction and make the photographic image coincident with the ground glass.

They are also supplied in neat brass mountings, nicely finished and lacquered, which are provided with revolving diaphragms and morocco cap.

No.	Size of Plate.	Diameter of Lens.	Focus.	Price Unmounted.	Telegraphic Code.	Price Mounted.	Telegraphic Code.
1	$3\frac{1}{4}$ x $4\frac{1}{4}$	$\frac{13}{16}$ in.	$5\frac{1}{8}$ in.	$1.20	Singe.	$2.75	Simia.
2	4 x 5	$1\frac{1}{4}$ "	$6\frac{1}{4}$ "	1.50	Sinker.	3.00	Simil.
3	5 x 8	$1\frac{1}{2}$ "	9 "	2.00	Sinter.	4.50	Simoon.
4	$6\frac{1}{2}$ x $8\frac{1}{2}$	$1\frac{1}{2}$ "	11 "	2.50	Sineus.	6.00	Simper.
5	8 x 10	$1\frac{1}{2}$ "	13 "	2.50	Sinure.	7.00	Simu.

TELE-PHOTO LENSES.



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The purpose of Tele-Photo lenses is to give enlarged images of distant objects. Their advantages are that they give detail in the picture not discernible to the naked eye and with a camera extension which is very considerably less than would be required by a single lens of the same power.

While the use to which these lenses may be applied is limited, we have sought to give them not only the best possible optical result, but make them *easily applicable to lenses already in use* with the performance of which the owners are well acquainted and further enhance their value by their easy variability in power. Their advantage over fixed Tele-Photo or long focus lenses are thus manifest.

The Tele-Photo attachment consists of two sliding tubes variable in length by a spiral rack and pinion. The posterior end is supplied with a flange which is fixed to the front board. At this end is also fixed the Tele-Photo lens. The adjustable tube is supplied at its front end with an adapter, made to suit *any regular photographic lens* which it is desired to use for this purpose. The adjustable tube is nickel-plated and has a scale engraved upon it indicating the amount of magnification. An increase in power of eight times may thus be obtained.

The photo lenses to be used in connection with them should be of the highest quality as otherwise the result will be a lack in definition owing to the amplification.

The scales are designed for the prevailing foci, but may be accurately measured for each lens at an extra cost of 75 cents.

Price includes adapter for photographic lens.

DISTANCE FROM THE FRONT BOARD TO THE GROUND GLASS.

Size.	Equivalent Focus.	Power. 3	4	5	6	7	8	Brass Mounting. Price.	Aluminum Mounting. Price.
4 x 5	6½ in.	6⅝ in.	9⅝ in.	12⅞ in.	16⅛ in.	19⅜ in.	22⅝ in.	$16.00	$20.00
5 x 8	8¾ "	8½ "	13 "	17½ "	22 "	26½ "	31 "	18.00	22 00
6½ x 8⅛	11⅓ "	10½ "	16⅓ "	22½ "	28½ "	34½ "	40½ "	20.00	25.00
8 x 10	13½ "	13⅛ "	20½ "	27½ "	34½ "	41½ "	48½ "	24.00	30.00
		CIRCLE OF LIGHT.						Telegraphic Code.	
4 x 5		5¼ in.	7½ in.	9½ in.	12 in.	15 in.	17½ in.	Tab.	
5 x 8		6½ "	9⅜ "	12½ "	16¼ "	19⅜ "	22½ "	Tabby.	
6½ x 8½		8 "	11 "	14¼ "	18 "	22 "	26 "	Tabid.	
8 x 10		9 "	12¾ "	16½ "	20¾ "	26 "	30 "	Table.	

Telegraphic code refers to lenses in brass mounting; if desired in aluminum it should be so stated.

ZEISS-ANASTIGMAT LENSES.

Since our first introduction of these lenses in this country the advantages of their construction have been so well appreciated that they have become very popular, and are now accorded the highest rank in the list of various photographic lenses. Time and experience have shown the desirability of still further increasing the number of varieties, so as to fill every possible demand, and have enabled the inventors to make computations for still

Greater Covering Capacity and a Higher Degree of Anastigmatism.

In connection with these improvements it has also been deemed advisable to make a

Material Reduction in Prices

in order to still more increase their popularity.

While the Photographic literature is replete with the advantages of these lenses, it is but proper that we enumerate them in this connection.

Freedom from Astigmatism.

Extreme Wide Angle Lenses free from Distortion.

Exact Coincidence of Visual and Photographic Image and Equal Magnitude of Both.

Unequalled Covering Capacity. Absolute Uniformity of Illumination.

Unusual Depth to the Proportion of Aperture.

No Variation of Focus with Variation in Diaphragm.

No Flare Spot or Ghost.

Being *sole manufacturers under the American Patents*, we are supplied with all computations, material and information by the inventors, and with our experience and facilities are therefore fully competent to make them of equal perfection. We lay special stress upon this point, as the impression may prevail in some minds that the firm of Carl Zeiss may have one or another slight advantage, which, however, is not in the least degree the case. In fact we may say that the contrary is the case, in as much as having been made sole licensees for this country, it was for the express purpose of meeting all orders promptly under an absolute guarantee of the highest quality and assuming all risks during transportation.

As with all articles of acknowledged superiority, unscrupulous parties have endeavored to mislead the public by the adoption of the name "Anastigmat," or claiming that their lenses possessed the same advantages, we cannot guard the public too strongly to

BEWARE OF IMITATIONS.

All of our lenses are plainly marked **Zeiss-Anastigmat, Bausch & Lomb Opt. Co.,** Date of Patent, Series to which they belong, and size of plate.

The sizes of plates given in the lists represent the covering powers corresponding to the stop indicated at the head of the column of plate-sizes. In supplying these figures it is implied that, as is required for usual work (landscape and instantaneous photography), the focusing produces *perfect sharpness up to the margin* and that the illumination is uniform from the center to the margin.

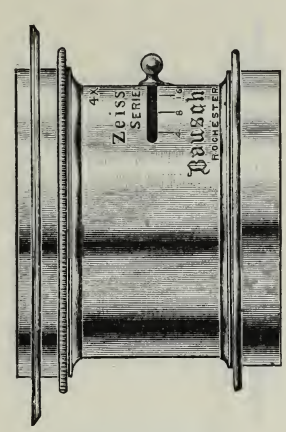
Where these restrictions do not exist, plates of considerably larger sizes may be used.

The diameters of the image circles contained in the third column imply focusing of distant objects; these diameters represent the guaranteed *minimum* in each case and are obtainable with sufficient sharpness with the smallest stops. The actual image circle obtained with a small stop on closer objects is in nearly all cases even larger.

The greatest possible care is taken in construction and no lens is sent out until it has been rigidly tested and found to come up to its standard efficiency.

ZEISS-ANASTIGMAT, 1 : 4.5.

Series I.



(Cut ¾ size No. 1.)

RAPID LENSES FOR PORTRAIT AND GROUP PHOTOGRAPHY IN THE STUDIO.

Lenses of this series are intended for portraits and in this direction give exceedingly fine results. They are quick working and give an exact reproduction of the subject, being wide-angle they are especially suited to figures and groups. On account of the extreme difficulty of producing glass of suitable size, this series is limited to one-half size plate.

These lenses may also be used for all other purposes such as copying, out door and architectural work, and on interiors when not more than an angle of 75° is required.

Our new test chart (copyrighted) accompanies each lens.

They are Supplied with our Improved Iris Diaphragm.

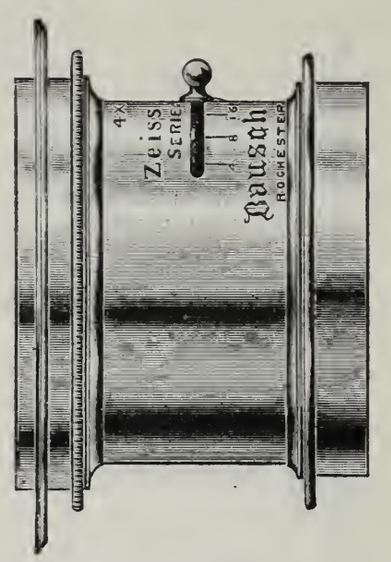
Waterhouse stops in place of Iris at same price.

No.	Size of Plate covered with top *f.* 6.3.	Diagonal of Largest Plate covered with Sm. Stop 70°.	Free Diameter of Largest Lens.	Equivalent Focus.	Brass Mounting. Price.	Aluminum Mounting. Price.	Telegraphic Code.
1	2¾ x 3¼ in.	7 3/16 in.	1 ¼ in.	5 ⅛ in.	$ 47.00	$ 51.00	Zone.
2	3¼ x 4¼ "	8 ¼ "	1 7/16 "	5 5/16 "	60.00	61.00	Zinck.
3	4 x 5 "	10 1/16 "	1 ⅝ "	7 3/16 "	73.00	78.00	Zett.
4	4¼ x 6½ "	12 ⅛ "	2 "	8 11/16 "	101.00	106.00	Zemo
5	5 x 7 "	14 5/16 "	2 ⅜ "	10 ¼ "	140.00	146.00	Zahn.
6	5 x 8 "	16 9/16 "	2 13/16 "	11 13/16 "	179.00	185.00	Zimmer.
7	6½ x 8½ "	19 ½ "	3 ¼ "	13 5/16 "	224.00	232.00	Zuhn.
8	8 x 10 "	22 15/16 "	3 11/16 "	16 ⅜ "	279.00	288.00	Zodel.

Telegraphic code refers to lenses in brass mounting; if desired in aluminum, it should be so stated.
For pairing two lenses for stereoscopic work, extra, $3.00.

ZEISS-ANASTIGMAT, 1 : 6.3.

Series II.



(Cut full size No. 2.)

EXTREMELY RAPID INSTANTANEOUS LENS, ALSO FOR PORTRAITS, GROUPS AND COPYING.

This Series is remarkable for its perfect anastigmatic flatness of field in conjunction with its great relative rapidity. On portraits and groups the larger sizes give unusually fine results, combining speed with delicate definition and depth.

For outdoor work they may be used to the limit of angle 85° without sacrifice of flatness, and the smaller numbers are particularly suitable for universal purposes of the amateur and professional, giving a speed equal to all demands, with unusual depth.

Our new test chart (copyrighted) accompanies each lens.

They are Supplied with our Improved Iris Diaphragm.

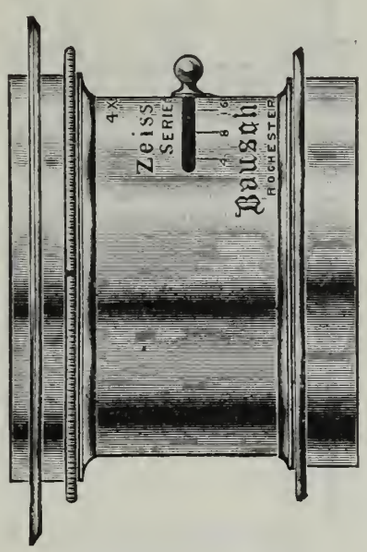
Waterhouse stops in place of Iris at same price.

No.	Size of Plate covered with Stop *f.* 9.	Diagonal of Largest Plate covered with Sm. Stop 80°.	Free Diameter of Largest Lens.	Equivalent Focus.	Brass Mounting. Price.	Aluminum Mounting. Price.	Telegraphic Code.
1	2⅜ x 3¼ in.	5 5/8 in.	5/8 in.	3 3/8 in.	$ 28.00	$ 31.00	Zaffer.
2	3¼ x 4¼ "	6 5/16 "	3/4 "	4 1/8 "	31.00	34.00	Zany.
3	4 x 5 "	9 1/4 "	1 "	5 1/2 "	38.00	41.00	Zealous.
4	4¼ x 6½ "	11 3/8 "	1 1/4 "	6 11/16 "	47.00	51.00	Zedoary.
5	5 x 7 "	13 7/8 "	1 7/16 "	8 1/4 "	60.00	64.00	Zephyr.
6	5 x 8 "	16 1/2 "	1 5/8 "	9 13/16 "	73.00	78.00	Zigzag.
7	6½ x 8½ "	19 13/16 "	2 "	11 13/16 "	101.00	106.00	Zinc.
8	8 x 10 "	23 11/16 "	2 3/8 "	14 3/16 "	140.00	146.00	Zincky.
9	10 x 12 "	28 7/16 "	2 13/16 "	16 15/16 "	179.00	185.00	Zodiac.
10	11 x 14 "	33 11/16 "	3 1/4 "	20 1/16 "	224.00	232.00	Zone.
11	12 x 15 "	35 7/16 "	3 11/16 "	23 1/4 "	279.00	288.00	Zoology.

Telegraphic code refers to lenses in brass mounting; if desired in aluminum, it should be so stated
For pairing two lenses for stereoscopic work, extra, $3.00.

ZEISS-ANASTIGMAT, 1:8.

Series IIa.



(Cut full size No. 2.)

FOR PORTRAITS, GROUPS, INSTANTANEOUS OUTDOOR WORK AND COPYING.

The lenses of this new Series are composed of five lenses and have an angle of 80° and being of relatively slower speed it has been possible to compute them for an absolutely flat image, free from all astigmatism and extremely sharp definition. While the lenses of IIIa Series have up to the present been considered the most desirable outdoor lenses, the lenses of this Series will undoubtedly in most cases be preferred, since they retain all the desirable qualities, except a slightly reduced angle with greater speed. In fact, the speed will be found ample for all ordinary instantaneous exposures, giving an unusual evenness of illumination, flatness and depth. In the studio they are well adapted for large heads, figures and groups.

These lenses are also particularly adapted to copying and half-tone work, giving minutest detail with extreme flatness to the edges.

Our new test chart (copyrighted) accompanies each lens.

They are Supplied with our Improved Iris Diaphragm.

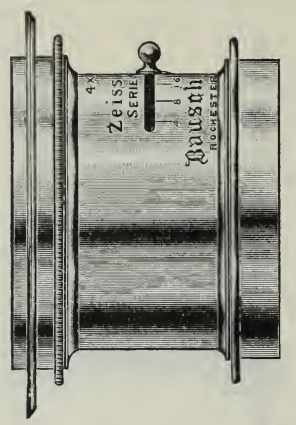
Waterhouse stops in place of Iris at the same prices.

No.	Size of Plate covered with Stop *f.* 12.5.	Diagonal of Largest Plate Covered with Small Stop 72°.	Free Diameter of Largest Lens.	Equivalent Focus.	Brass Mounting. Price.	Aluminum Mounting. Price.	Telegraphic Code.
1	4 x 5 in.	6⅝ in.	⅝ in.	4⅜ in.	$ 28.00	$ 31.00	Zaba.
2	4¼ x 6½ "	8¼ "	¾ "	5⅝ "	31.00	34.00	Zaccho.
3	5 x 8 "	10⅛ "	1 "	6½ "	41.00	44.00	Zapha.
4	6½ x 8½ "	12⅜ "	1 3/16 "	8 "	51.00	54.00	Zamia.
5	8 x 10 "	14¾ "	1 7/16 "	9⅝ "	60.00	63.00	Zapote.
6	10 x 12 "	17¾ "	1⅝ "	11⅝ "	80.00	85.00	Zarmich.
7	11 x 14 "	21⅛ "	2 "	13¾ "	117.00	122.00	Zax.
8	14 x 17 "	26¼ "	2⅜ "	17 "	150.00	156.00	Zayah.

Telegraphic code refers to lenses in brass mounting; if desired in aluminum it should be so stated.
For pairing two lenses for stereoscopic work, extra, $3.00

ZEISS-ANASTIGMAT, 1:7.2.

Series III.



(Cut full size No. 2.)

INSTANTANEOUS LENS FOR STUDIO WORK ON GROUPS, LARGE HEADS, OUTDOOR WORK OF ALL KINDS AND COPYING.

The lenses of this Series are double unsymmetrical combinations, consisting of a front combination of two lenses, and a back system of three lenses. They are placed close together although the space between them is, in all except No. 1, sufficient to admit of the introduction of our Diaphragm Shutter.

The lenses of this Series have an angular aperture from 85° to 90°, and can therefore be used as wide angle lenses if desired. The relative diameter of lenses is about 1 to 6. The largest stop, however, is *f* 7.2. As indicated above, they are intended for use in all kinds of photographic work except in poorly lighted studios. They have a greater speed than almost all rapid lenses now in the market, and for copying particularly, have no equal for the same aperture.

Our new test chart (copyrighted) accompanies each lens.

They are Supplied with our Improved Iris Diaphragm.

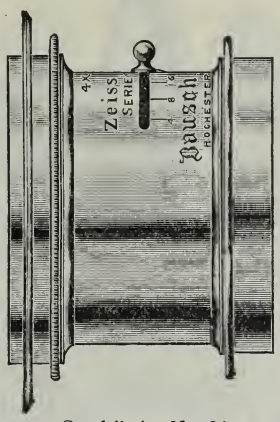
Waterhouse stops in place of Iris at same price.

No.	Size of Plate covered with Stop *f*. 12.5.	Diagonal of Largest Plate Covered with Small Stop 80°.	Free Diameter of Largest Lens.	Equivalent Focus.	Brass Mounting. Price.	Aluminum Mounting. Price.	Telegraphic Code.
1	3¼ x 4¼ in.	6 5/16 in.	5/8 in.	3 3/16 in.	$ 23.00	$ 26.00	Zumic.
2	4 x 5 "	7 7/8 "	3/4 "	4 3/4 "	26.00	30.00	Zurbite.
3	4½ x 6½ "	9 13/16 "	1 "	5 13/16 "	30.00	33.00	Zoonic.
4	5 x 7 "	13 "	1¼ "	7 11/16 "	39.00	43.00	Zoolite.
5	5 x 8 "	14 15/16 "	1 7/16 "	8 11/16 "	49.00	52.00	Zomar.
6	6½ x 8½ "	16 9/16 "	1 5/8 "	9 13/16 "	59.00	64.00	Zode.
7	8 x 10 "	20 7/8 "	2 "	12 5/16 "	78.00	83.00	Zizel.
8	10 x 12 "	29 1/8 "	2 13/16 "	17 3/8 "	124.00	130.00	Zorcon.
9	12 x 15 "	38 9/16 "	3 11/16 "	23 1/16 "	176.00	184.00	Zincode.

Telegraphic code refers to lenses in brass mounting; if desired in aluminum it should be so stated.
For pairing two lenses for stereoscopic work, extra, $3.00.

ZEISS-ANASTIGMAT, 1: 9.

Series IIIa.



(Cut full size No. 2.)

INSTANTANEOUS OUTDOOR LENS, ALSO GROUPS AND LARGE PORTRAITS.

The lenses of this series are composed of five lenses and have an angle of 90°. They have perfect anastigmatic flatness, without distortion, even when used to the full limit of their angle. They have sharp definition, even illumination and unusual depth, which adapts them to all outdoor work and particularly to hand camera work. In this direction they surpass any known lens, their speed being ample for all ordinary instantaneous work. Where very quick exposures are desired the lenses of the Series II or II a should be selected.

While not of sufficient speed for quick exposures in the studio, the larger numbers are well adapted for larger heads and groups. They are also well adapted for copying.

Our new test chart (copyrighted) accompanies each lens.

They are Supplied with our Improved Iris Diaphragm.

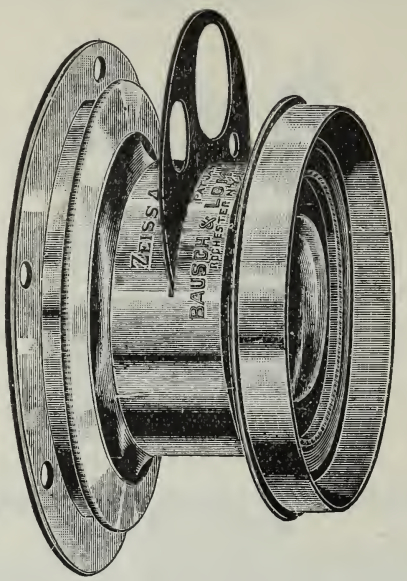
Waterhouse stops in place of Iris at same price.

No.	Size of Plate covered with Stop *f.* 12.5.	Diagonal of Largest Plate Covered with Small Stop 90°.	Free Diameter of Largest Lens.	Equivalent Focus.	Brass Mounting. Price.	Aluminum Mounting. Price.	Telegraphic Code.
0	2¾ x 3¼ in.		7/16 in.	3 in.	$ 20.00	$ ——	Zas.
00	3¼ x 4¼ "		½ "	3 3/4 "	20.00	——	Zif.
1	4 x 5 "	9 7/16 in.	5/8 "	4 5/8 "	21.00	——	Zinn.
2	4¼ x 6½ "	11 13/16 "	3/4 "	5 7/8 "	25.00	——	Zihn.
3	5 x 7 "	13 9/16 "	7/8 "	6 3/4 "	30.00	33.00	Zeguel.
4	5 x 8 "	15 7/16 "	1 "	7 1/16 "	33.00	36 00	Zaddow.
5	6½ x 8½ "	18 1/8 "	1 1/4 "	9 1/16 "	43.00	46.00	Zerial.
6	7 x 9 "	21 7/16 "	1 7/16 "	10 3/4 "	52.00	56.00	Zerious.
7	8 x 10 "	25 "	1 5/8 "	12 1/2 "	65.00	70.00	Zerf.
8	10 x 12 "	32 "	2 "	16 "	98.00	103.00	Zerge.
9	11 x 14 "	39 3/4 "	2 7/16 "	19 7/8 "	130.00	137.00	Zet.
10	12 x 15 "	47 1/4 "	2 13/16 "	23 5/8 "	163.00	169.00	Zeton.
11	14 x 17 "	54 3/8 "	3 1/4 "	27 3/16 "	211.00	219.00	Zetto.
12	16 x 20 "	64 9/16 "	3 11/16 "	32 1/4 "	260.00	268.00	Zeven.

Telegraphic code refers to lenses in brass mounting; if desired in aluminum it should be so stated.
For pairing two lenses for stereoscopic work, extra, $3.00.

ZEISS-ANASTIGMAT, 1:12.5.

Series IV.



Cut full size No. 5.

AN INSTANTANEOUS WIDE ANGLE LENS FOR LANDSCAPES, INTERIORS, ARCHITECTURE AND COPYING.

The lenses of this Series form two unsymmetrical systems, both of which are composed of two cemented lenses, placed close together, although the numbers above No. 5 will admit of the adaptation of Diaphragm Shutter.

The field of the smaller lenses including No. 6 measures an angle of 100°, while in the larger ones it is about 85°. The smaller numbers including No. 6 admit of a pencil of relative aperture 1:10 and the larger ones 1:12. The larger stop has an aperture of *f*. 12.5.

This Series is therefore wide angle and as such may be used for all out-door work with full aperture, which has unusual value in a large variety of work. It is of course understood that they may be used on smaller plates with correspondingly reduced angle.

Our new test chart (copyrighted) accompanies each lens.

The mountings of the smaller numbers, including No. 5, are provided with revolving diaphragms only, and the larger ones are

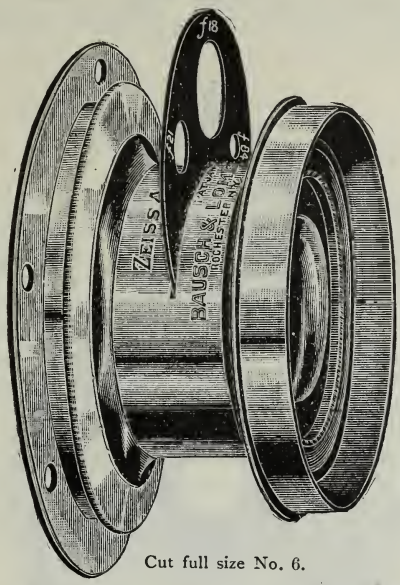
Supplied with our Improved Iris Diaphragm.

No.	Size of Plate covered with Stop *f*. 18.	Diagonal of Largest Plate Covered with Small Stop 96°.	Free Diameter of Largest Lens.	Equivalent Focus.	Brass Mounting. Price.	Aluminum Mounting. Price.	Telegraphic Code.
1	3¼ x 4¼ in.	5¼ in.	¼ in.	2 7/16 in.	$ 17.00	$ ——	Zibet.
2	4 x 5 "	8 1/16 "	3/8 "	3 7/8 "	17.00	——	Zeud.
3	4¼ x 6½ "	10 5/8 "	½ "	4 11/16 "	20.00	——	Zoffer.
4	5 x 8 "	13 3/8 "	5/8 "	6 1/16 "	23.00	——	Zein.
5	8 x 10 "	17 5/16 "	13/16 "	7 11/16 "	30.00	33.00	Zircon.
6	10 x 12 "	22 13/16 "	1 "	10¼ "	44.00	47.00	Zoril.
The following sizes for copying with Stop *f*. 36 at 85°. For Landscape Work larger plates may be used.							
7	12 x 15 "	27 15/16 "	1 5/16 "	15 3/16 "	67.00	70.00	Zennir.
8	16 x 20 "	43 5/16 "	2 "	23 13/16 "	117.00	122.00	Zofil.
9	20 x 24 "	64 3/16 "	2 5/16 "	35 1/16 "	263.00	270.00	Zodic.
10	24 x 30 "	86¼ "	3 7/8 "	48 3/8 "	588.00	596.00	Zunn.

Telegraphic code refers to lenses in brass mounting; if desired in aluminum it should be so stated.
For pairing two lenses for stereoscopic work, extra, $3.00.

ZEISS-ANASTIGMAT, 1:18.

Series V.



Cut full size No. 6.

WIDE ANGLE LENS, PAR EXCELLENCE, FOR INTERIORS, ARCHITECTURE, COPYING AND LANDSCAPES.

The lenses of this Series are similar in construction to those of Series IV, the numbers above No. 5 admit of the fitting of the Diaphragm Shutter.

The field of the smaller numbers, including No. 7, measures 108°, while that of the larger ones is 90° and above.

In the smaller sizes, including No. 7, the ratio of aperture to focus is about 1:13 and the larger ones 1:17. The largest stop has an aperture of *f.* 18.

The smaller numbers of this Series are wide-angle lenses proper, and are, in spite of their very wide angle, sufficiently rapid to be available for instantaneous work with sunlight illumination. Considering the unequalled extent of angle this capacity is unapproached by any known lens. They are therefore useful for many purposes. The entire field is orthoscopic, notwithstanding the dissymmetrical construction of the lens.

The larger lenses, of 18⅛ focus and upwards, are in particular intended for reproductions of charts; they yield a perfectly flat and anastigmatic image, subtending an angle of 60°, and are perfectly free from distortion. Even with stop 1:18 the picture exhibits the sharpness of an engraving.

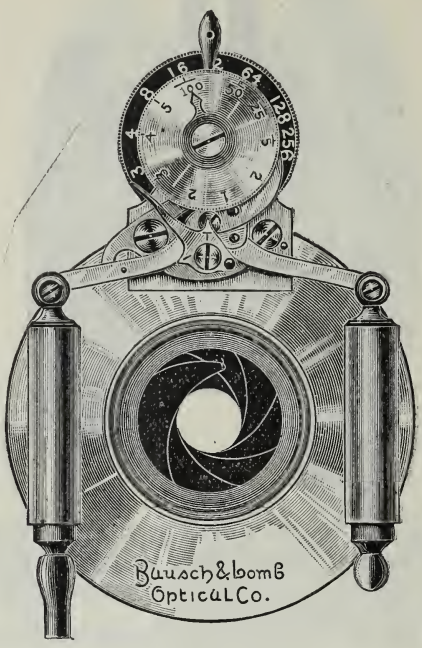
Our new test chart (copyrighted) accompanies each lens.

The mountings are similar in construction to those of Series IV, and have the same general appearance. All the smaller sizes, including No. 6, have revolving diaphragm only, and the larger sizes are supplied with our **Improved Iris Diaphragm.**

No.	Size of Plate covered with Stop *f.* 36.	Diag. of Larg. Pl. Cov. with Sm. Stop 104°-110°.	Free Diameter of Largest Lens.	Equivalent Focus.	Brass. Mounting. Price.	Aluminum. Mounting. Price.	Telegraphic Code.
1	4¼ x 6½ in.	8 11/16 in.	9/32 in.	3⅜ in.	$ 21.00	$ ——	Zambo.
2	5 x 7	11	⅜	4⅜	21.00	——	Zanite.
3	6½ x 8½	14 3/16	½	5 9/16	26.00	——	Zeal.
4	8 x 10	15¾	9/16	7 3/16	33.00	——	Zebra.
5	10 x 12	21¼	11/16	8⅜	41.00	44.00	Zebu.
6	11 x 14	26¾	13/16	10 7/16	51.00	54.00	Zealot.
7	12 x 15	31½	15/16	12 5/16	60.00	64.00	Zenith.
For reproduction of charts and all kinds of copying on large plates when used at an angle of 85°.							
8	12 x 15	33 1/16	1	18⅛	80.00	83.00	Zulo.
9	16 x 18	45 1/16	1⅜	24⅞	117.00	120.00	Zero.
10	20 x 25	68⅛	2⅛	37 5/16	231.00	237.00	Zest.
11	28 x 34	94½	3	51 9/16	393.00	401.00	Zythum.
12	36 x 44	118⅛	3 15/16	65⅝	653.00	662.00	Zimome.

Telegraphic code refers to lenses in brass mounting; if desired in aluminum, it should be so stated.
For pairing two lenses for stereoscopic work, extra, $3.00.

DIAPHRAGM SHUTTER.



Cut full size 4 x 5.

No shutter has ever been introduced, the advantages of which have been so quickly appreciated and which from its first appearance has been conceded to excel all others. It has stood the test of years and is *without a rival.*

It requires little argument to show that the proper place for opening and closing a shutter is in the optical axis of the lens, and in both time and instantaneous photography, it is evident that this shutter, starting its opening with a pin-hole and gradually increasing to the size of stop for which it is set, and returning in the same manner, will give the effect of a small stop, *i. e.*, more depth, flatness and equality of illumination. Comparative tests show that in practice these advantages are obtained to a marked degree.

Furthermore, the quality of workmanship in these shutters is altogether superior to that in other devices. This and the construction enables us to adapt lenses to them under the exact original conditions and truly centered, a fact of the greatest importance, as there is not the slightest depreciation in any of the good qualities which a lens may possess.

This shutter meets every requirement of gallery and out-door work; we disclaim, however, its suitability to so-called "lightning work," although surprising results, such as trains running sixty miles an hour, and trotting horses, show its capacity under suitable management. · For all other work it has no rival, either in its results, advantages, conveniences or workmanship.

While the shutter is easy and delicate in its action, and from its variety of motions comparatively complicated, there is no danger in this fact, as the parts exposed to wear are especially strong. There are *no weak points* and with ordinary care, there is not the slightest deterioration in its operation. Its reputation is not alone confined to this country, but it is used at every point of the globe where photography is practiced.

All the parts to be operated are at the front and easy of access. The upper lever sets the shutter *without making an exposure;* the lower sets for time or instantaneous exposure. The larger black disk sets the size of opening; the smaller for time of exposure, varying *from 3 to 1-100 seconds.* The shutter is very compact and well balanced in its operation so that there is no jar, even at its quickest speed, while making an exposure.

Its advantages over other constructions are:

It gives greater depth, more even illumination, greater covering capacity.
It allows a variation in speed from 1-100 to 3 seconds.
It gives every variation in size of stops from pinhole to full opening.
It does not jar the camera.
Can be operated by rubber bulb or finger release.
Requires the setting of one lever only for each exposure.
Can be easily applied to hand cameras.
Makes no exposure when setting.
Its workmanship is of the highest grade, with lenses true and optically centered.

On account of the variations in size and pitch of threads and varying conditions in the lenses of the same make, we *assume no responsibility* in fitting unless the *complete lenses* are sent us, whether of our or other manufacture.

When fitted to Rapid Universal, Extra Rapid Universal or Velox Lenses with regular barrel and Diaphragm.		Alvan G. Clark.	Zeiss-Anastigmat, Series I.	Zeiss-Anastigmat, Series II.	Zeiss-Anastigmat, Series II*a* and III*a*.	Zeiss-Anastigmat, Series III.
4 x 5	$14.00					
5 x 8	15.00	No. 4¼ No. 5 $15.00 No. 8	No. 1 $15.00	No. 3 $15.00	No. 2 No. 3 $15.00 No. 4	No. 2 $15.00 No. 3
6½ x 8½	16.00			No. 1* No. 2* 16.00 No. 4	No. 0* No. 00* 16.00 No. 1* No. 5	No. 1* No. 4 16.00 No. 5
8 x 10	17.50	No. 8½ 17.50 No. 10	No. 2 No. 3 17.50	No. 5 No. 6 17.50	No. 6 No. 7 17.50 No. 8	No. 6 No. 7 17.50

	Zeiss-Anastigmat, Series IV.	Zeiss-Anastigmat, Series V.	When fitted to lenses of other manufacture leaving barrel intact.	Extra for Aluminum.	Opening of Largest Stop.	Telegraphic Code.
4 x 5			$14.50	$4.00	⅞ in.	Dalphon.
5 x 8			15.50	4.50	1⅛ "	Danites.
6½ x 8½	No. 1* No. 2* No. 3* No. 5 16.00 No. 6 No. 7	No. 1* No. 2* No. 3* No. 6 16.00 No. 7 No. 8	16.50	5.00	1⅜ "	Dara.
8 x 10	No. 4* No. 8 17.50	No. 4* No. 5* 17.50 No. 9	18.00	5.50	1¾ "	Darius.

To graduate disk to correspond with stop accompanying lens, extra, $.50.

Finger release attachment to shutters, ⅝ to $\frac{8}{10}$ size, extra, $1.00. (⅘ is regularly supplied in this way at no additional charge.)

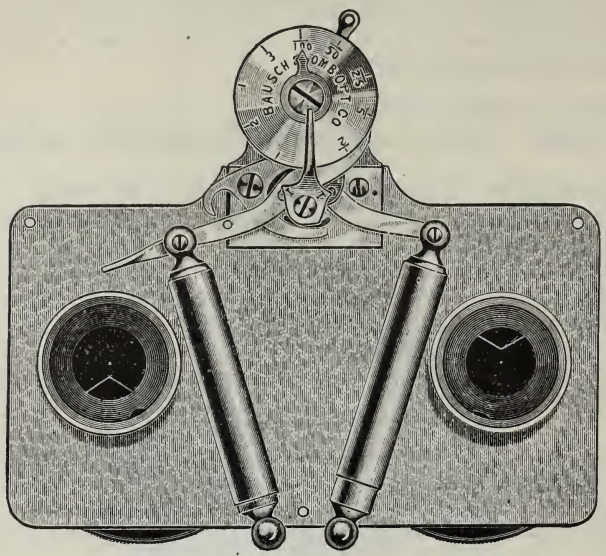
Telegraphic code refers to shutters in brass mounting; if desired in aluminum it should be so stated.

*Indicates shutter being fitted to back of lens; cannot otherwise be adapted on account of combination of lenses being too close together.

SIZE OF SHUTTER OVER ALL IN HEIGHTH AND WIDTH.

Size of Opening, inches.	⅞	1⅛	1⅜	1¾
	2⅝ x 4	3⅛ x 4½	3¾ x 5⅛	4¼ x 5⅝

B. & L. STEREOSCOPIC SHUTTER.



Cut ⅔ actual size.

At this time when stereoscopic photography is becoming more popular and where a suitable shutter for almost all work in photography has become a necessity, a good stereoscopic shutter properly constructed, offering advantages not possessed by others, is important.

In designing this we have as much as possible, applied the desirable features of our Diaphragm Shutter, which, with the balance of the construction makes this unquestionably the best shutter now before the public.

The centers of opening are $3\frac{1}{8}$ inch apart. The action of the leaves is absolutely *synchronous*, thus giving the *same amount of exposure* through both lenses. Revolving diaphragms are provided for stops. The speed regulator of our Diaphragm Shutter is applied, thus giving all variations in speed from $\frac{1}{100}$ to 3 seconds. Release may be made by bulb or finger.

We make these shutters in two forms.

A. Unless otherwise ordered, this is always sent. In this form the openings are made *diamond shape*, starting from a small *square opening*, which is the nearest approach to the diaphragm shutter and gives similar effects.

B. The blades open with a *horizontal parallel* opening over the entire diameter, having a slight wedge form at full opening. This form gives more exposure for the same amount of time and is preferable where it is desired to make *very quick* exposures.

In applying the shutter it is screwed directly on the front board of camera.

In attaching lenses we can *assume no responsibility* in accurately fitting unless lenses are in our possession.

Opening.	Rapid Universal.	A. G. Clark.	Velox Rectilinear.	Zeiss-Anastigmat.				Price.	
				Series II.	Series II*a*.	Series III.	Series III*a*.	Brass.	Aluminum.
¾ in.	No. 5	No. 5	No. 1	No. 2	No. 2 & 3	No. 2 & 3	No. 2 & 3	$18.00	$22.00

IRIS DIAPHRAGM.

After a series of experiments we have devised a new construction which offers manifest advantages over the forms hitherto used. While the desirability of iris diaphragms have been fully appreciated many have been deterred from using them or have discarded them on account of poor workmanship and consequent liability to get out of order, lack of compactness in mounting, and then because the intertwining leaves being made of metal and chemically blackened, have lost their black from friction and created internal reflections which are fatal to good results.

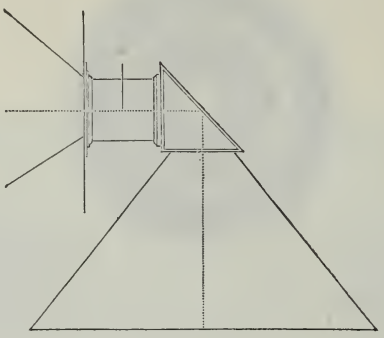
In those of our construction the leaves are made of hard rubber, with mat surfaces which will *always remain black* and furthermore add *no weight* to the mounting. When applied to our lenses, there is *no projecting ring* except in a few of the larger sizes, but the entire iris diaphragm is contained within the tube. Having constructed special machinery, all work is done with the greatest accuracy, effecting a circular opening and a change in size is produced with the utmost delicacy. On some of our lenses we have made *no advance in price* for replacing these diaphragms over the ordinary loose stops, while, where it has been necessary, the extra charge is slight.

We will apply these diaphragms to other lenses than our own; but on account of the differences in sizes of tubes it will be necessary to make the mounting of the diaphragm project beyond the diameter of adapters to which the lens mounts will be fitted. The opening is varied by a milled edge, whereas in the other form it is done by a small lever with pointer.

Prices include Iris Diaphragm and the necessary adapters for receiving the lens mounts.

No.	Diameter of Opening.	Price.	Telegraphic Code.
1	$\frac{13}{16}$ in.	$4.50	Ibex.
2	$1\frac{1}{16}$ "	5.00	Ibid.
3	$1\frac{3}{8}$ "	6.00	Ibis.
4	$1\frac{5}{8}$ "	6.00	Ichor.
5	$2\frac{1}{8}$ "	7.00	Icon.
6	$2\frac{3}{8}$ "	7.00	Idea.
7	$2\frac{3}{4}$ "	8.00	Idem.
8	$3\frac{1}{4}$ "	8.00	Idest.
9	$3\frac{3}{4}$ "	10.00	Idiom.

PRISMS.



These Prisms are intended to be used in all classes of photo-mechanical processes. They invert the image and make stripping of the film unnecessary. The glass is specially made for us, of the highest possible excellence, the surfaces are as accurately ground and polished as the surfaces of a first-class lens, so as to give an absolutely true reflection of the image. The hypothenuse is carefully silvered. These prisms are in lacquered brass mountings and arranged to fit the hood of lens.

In estimating the size of prism which is required for a particular lens, a size should be selected which is at least equal to the diameter of the hood. A size which is larger than this is preferable, but under no condition should a smaller one be selected, as in the work in which these prisms are required, it is of great importance to utilize all the possible light which the lens can transmit.

Full Aperture.	Fitted to Rapid Univ. and Alvan G. Clark Lenses.	Fitted to Zeiss-Anastigmat, Series II. *a.*	Fitted to Zeiss-Anastigmat, Series III.	Fitted to Zeiss-Anastigmat, Ser. III*a.*	Fitted to Zeiss-Anastigmat, Series IV.	Fitted to Zeiss-Anastigmat, Series V.	Price.	Price when fitted to other Lenses.
1½ in.	No. 4¼	Nos. 1 & 2	Nos. 1 & 2	Nos. 1 & 2	Nos. 1 & 2	Nos. 1 & 2	$ 28.00	$ 30.00
2 "	No. 5	No. 3	No. 3	Nos. 3 & 4	No. 3	No. 3	36.00	38.00
2½ "	No. 8	No. 4	No. 4	Nos. 5 & 6	Nos. 4 & 5	Nos. 4 & 5	45.00	47.00
2¾ "	No. 8½	No. 5	No. 5	No. 7	No. 6	Nos. 6 & 7	53.00	55.00
3 "	No. 10	No. 6	No. 6	No. 8	No. 7	No. 8	65.00	67.00
3½ "	No. 12	No. 7	No. 7	No. 9	No. 8	No. 9	78.00	80.00
4 "	No. 15	No. 8		No. 10		No. 10	90.00	93.00
4½ "	No. 18		No. 8	No. 11	No. 9	No. 11	140.00	145.00
5½ "	No. 22		No. 9	No. 12	No. 10	No. 12	180.00	185.00

CONDENSING LENSES.

These lenses we make of the very highest grade and of strong curvature so as to give the greatest concentration of light. They should not be confounded with plano-convex lenses of weak curvature and therefore of insufficient concentrating capacity.

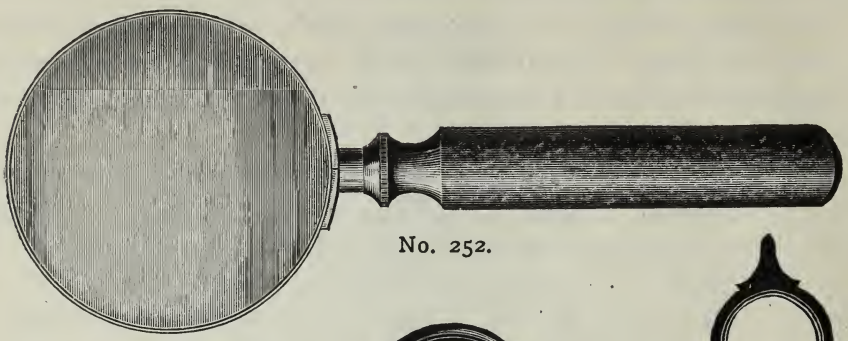
No.	Diameter.	Focus.	Price, Unmounted.	Price, In Brass Mounting.	Telegraphic Code.
1½	1½ in.	2 in.	$ 1.50 each.	$ 4.50 per pair.	Obal.
2¼	2¼ "	2⅜ "	1.75 "	5.00 "	Oboth.
3	3 "	3½ "	2.00 "	6.00 "	Ochill.
3½	3½ "	4¼ "	2.25 "	7.00 "	Ocina.
4	4 "	5 "	2.50 "	8.00 "	Oded.
4½	4½ "	5½ "	3.00 "	10.00 "	Olamus.
5	5 "	6½ "	3.75 "	11.50 "	Oman.
6	6 "	7½ "	6.00 "	17.00 "	Onias.
7	7 "	9 "	10.00 "	25.00 "	Ono.
8	8 "	10 "	15.00 "	36.00 "	Oreb.
9	9 "	11 "	20.00 "	46.00 "	Oseas.
10	10 "	12 "	25.00 "	60.00 "	Ozen.
12	12 "	14 "	38.00 "	95.00 "	Ozoran.
13	13 "	18 "	50.00 "	120.00 "	Ozone.

FINDER LENSES.

These lenses are of first quality and are furnished either double or plano convex, with edges ground or unground.

No.	Diameter.	Focus.	Price with Edges Unground.	Price with Edges Ground.	Telegraphic Code.
1	¼ in.	⅝ to 2 in.	$0.40 each.	$0.60 each.	Idnel.
2	⅜ "	¾ to 2 "	.40 "	.60 "	Igal.
3	½ "	1 to 2 "	.40 "	.60 "	Ivam.
4	⅝ "	1½ to 3 "	.40 "	.60 "	Ishod.
5	¾ "	1½ to 3 "	.50 "	.70 "	Ithai.
6	⅞ "	2 to 3½ "	.50 "	.70 "	Irah.
7	1 "	2 to 4 "	.50 "	.70 "	Isui.

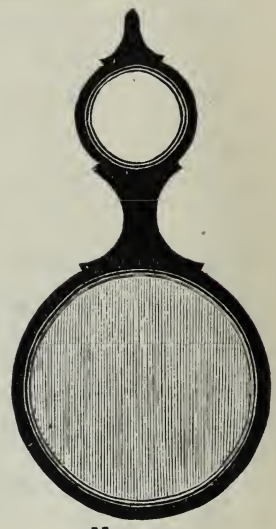
FOCUSING AND RETOUCHING GLASSES.



No. 252.

No. 144.

No. 50.



No. 152.

No.	DESCRIPTION.	Price.	Telegraphic Code.
50	Rubber Case, size of glass, $\frac{3}{4}$ inch diameter,	.30	Raamah.
56	Rubber Case, same as No. 50, size of glass, 1 inch diameter,	.40	Rabbah.
62	" " " " $1\frac{1}{4}$ " "	.60	Rabboni.
68	" " " " $1\frac{1}{2}$ " "	.70	Raca.
74	" " " " $1\frac{3}{4}$ " "	.90	Ragan.
78	" " " " 2 " "	1.15	Ragnel.
144	Watchmaker Glasses, assorted, (three sizes and different focus),	.40	Raftan.
144	L. P., Watchmaker Glasses, with springs, (three sizes, different focus),	.60	Rakem.
152	Rubber Frame; size of glass, 1 inch diameter,	.60	Ramesis.
153	" " $1\frac{1}{4}$ " "	.80	Ramoth.
154	" " $1\frac{3}{4}$ " "	1.00	Ramiah.
155	" " 2 " "	1.50	Raphu.
156	" " $2\frac{1}{4}$ " "	2.00	Reba.
157	" " $2\frac{3}{4}$ " "	2.50	Rechab.
252	Metal Frame, Black Enameled Handle; " 2 " "	.80	Rehum.
253	" " $2\frac{1}{4}$ " "	.90	Resen.
254	" " $2\frac{1}{2}$ " "	1.00	Rezia.
255	" " $2\frac{3}{4}$ " "	1.25	Rhoda.
256	" " 3 " "	1.50	Ribai.
257	" " $3\frac{1}{4}$ " "	1.75	Rufus.
258	" " $3\frac{1}{2}$ " "	2.00	Ruma.
259	" " $3\frac{3}{4}$ " "	2.25	Runen.
260	" " 4 " "	2.50	Ruoti.
261	" " $4\frac{1}{2}$ " "	3.25	Ruti.
262	" " 5 " "	4.00	Ruvo.
263	" " $5\frac{1}{2}$ " "	5.00	Rys.
264	" " 6 " "	6.00	Ryssen.

FLANGES, LEATHER CAPS, AND CASES.

BRASS FLANGES.

No.	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	
Diam.	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3	$3\frac{1}{2}$	4	5	$5\frac{1}{2}$	6	inches.
Price,	$–.50	–.75	1.00	1.25	1.50	1.75	2.00	2.50	3.00	each.

ALUMINUM FLANGES.

No.	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	
Diam.	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3	$3\frac{1}{2}$	4	5	$5\frac{1}{2}$	6	inches.
Price,	$1.00	1.25	1.50	2.00	2.50	3.00	3.50	4.00	4.50	each.

MOROCCO LEATHER CAPS,

For Universal, Clark, and Zeiss Lenses.

No.	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	
Diam.	$1\frac{1}{2}$	$1\frac{3}{4}$	$1\frac{7}{8}$	$2\frac{1}{16}$,	$2\frac{3}{16}$,	$2\frac{1}{2}$	$2\frac{3}{4}$	$3\frac{1}{16}$,	$3\frac{9}{16}$,	$4\frac{1}{16}$,	$4\frac{9}{16}$,	$5\frac{9}{16}$	inches.
Price,	$.60	–.60	–.65	–.70	–.70	–.75	–.80	–.90	1.00	1.10	1.20	1.25	each.

MOROCCO LEATHER DIAPHRAGM CASES,

For Universal, Clark, and Zeiss Lenses.

No.	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	
Size	$1\frac{5}{16}$x$1\frac{1}{2}$,	$1\frac{1}{16}$x$1\frac{3}{8}$,	$1\frac{3}{16}$x$1\frac{7}{8}$,	$1\frac{5}{16}$x$2\frac{1}{16}$,	$1\frac{1}{2}$x$2\frac{1}{4}$,	$1\frac{3}{4}$x$2\frac{1}{2}$,	$1\frac{13}{16}$x$2\frac{3}{4}$,	$2\frac{3}{16}$x$3\frac{1}{16}$,	$2\frac{1}{2}$x$3\frac{9}{16}$,	3x$4\frac{1}{8}$,	$3\frac{5}{16}$x$4\frac{5}{8}$,	4x$5\frac{9}{16}$	in.
	$–.75	–.75	–.80	–.85	–.85	–.90	–.95	1.00	1.15	1.30	1.50	1.75	ea.

LEATHER CAPS For Velox Lenses.

No.	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	
Diam.	$1\frac{3}{8}$,	$1\frac{1}{2}$,	$2\frac{1}{16}$,	$2\frac{11}{32}$,	$2\frac{3}{4}$,	3,	$3\frac{7}{32}$,	$3\frac{9}{16}$,	$4\frac{9}{16}$,	$5\frac{1}{2}$	inches.
Price,	$–.40	–.45	–.50	–.55	–.60	–.65	–.70	–.80	–.90	1.00	each.

LEATHER DIAPHRAGM CASES

For Velox Lenses.

No.	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	
Size,	$1\frac{1}{16}$x$1\frac{5}{8}$,	$1\frac{1}{2}$x$2\frac{1}{4}$,	$1\frac{3}{4}$x$2\frac{1}{2}$,	$2\frac{1}{16}$x$2\frac{15}{16}$,	$2\frac{1}{2}$x$3\frac{1}{2}$,	$2\frac{5}{8}$x$3\frac{3}{4}$,	$3\frac{5}{16}$x$4\frac{5}{8}$,	4x$5\frac{1}{2}$	inches.
Price,	$–.60	–.65	–.70	–.80	–.90	1.00	1.25	1.50	each.

WATERHOUSE STOPS

(Exclusive of Leather Case).

Size,	4x5,	5x8,	$6\frac{1}{2}$x$8\frac{1}{2}$,	8x10,	10x12,	11x14,	12x15	14x17	16x20	20x24
Per set,	$–.75	1.00	1.25	1.50	1.75	2.00	2.25	2.50	2.75	3.00

TABLE FOR FINDING THE MINIMUM LENGTH OF STUDIO FOR A GIVEN LENS.

(From the *American Amateur Photographer*.)

DISTANCES IN INCHES FROM OBJECT TO LENS.

Equivalent Focus of Lens.	3 in. high.	4 in. high.	5 in. high.	6 in. high.	8 in. high.	10 in. high.	12 in. high.	16 in. high.	20 in. high.	24 in. high.	30 in. high.	36 in. high.	48 in. high.	54 in. high.	60 in. high.	72 in. high.
3 inches	75	57														
4 "	100	76	61 3/5	52												
5 "	125	95	77	65	50											
6 "	150	114	92 3/5	78	60	49 1/5										
8 "	200	152	123 1/5	104	80	65 6/10	56									
10 "	250	190	154	130	100	82	70	55								
12 "	300	228	184 4/5	156	120	98 3/5	84	66	55 1/5							
16 "	400	304	246 2/5	208	161	131 1/5	112	88	72 2/5	64	54 2/5	48				
20 "	500	380	308	260	200	164	140	110	90 4/5	80	68	60	50	46 2/3		
24 "	600	456	369 3/5	312	240	196 4/5	168	132	110 2/5	96	81 3/5	72	60	56	52 4/5	48
30 "	750	540	462	390	300	246	210	165	136 1/5	120	102	90	75	70	65	60
36 "	900	684	554 2/5	463	360	307 1/5	252	198	165 3/5	144	122 2/5	108	90	84	79 1/6	72
48 "	1200	912	739 1/5	624	480	393 1/5	336	264	220 3/5	192	163 1/5	144	120	112	105 2/3	96
60 "	1500	1080	1024	780	600	492	420	330	272 1/4	240	204	180	150	140	132	120
72 "	1800	1368	1108 4/5	936	720	614 2/5	504	396	321 1/5	288	244 4/5	216	180	168	158 3/5	144

DISTANCES IN INCHES FROM LENS TO GROUND-GLASS.

Equivalent Focus of Lens.	3 in. high.	4 in. high.	5 in. high.	6 in. high.	8 in. high.	10 in. high.	12 in. high.	16 in. high.	20 in. high.	24 in. high.	30 in. high.	36 in. high.	48 in. high.	54 in. high.	60 in. high.	72 in. high.
3 inches	3 1/8	3 1/8														
4 "	4 1/6	4 8/9	4 5/18	4 1/3												
5 "	5 5/24	5 5/18	5 25/72	5 5/12	5 5/9											
6 "	6 1/6	6 1/3	6 5/12	6 1/2	6 2/3	7 1/9										
8 "	8 1/3	8 4/9	8 5/9	8 2/3	8 8/9	9 1/9	9 1/3									
10 "	10 5/12	10 5/9	10 25/36	10 5/6	11 1/9	11 7/18	11 1/2	12 2/3								
12 "	12 1/2	12 2/3	12 5/6	13	13 1/3	13 2/6	14	14 2/3	15 1/3							
16 "	16 2/3	16 8/9	17 1/9	17 1/3	17 7/9	18 2/9	18 2/3	19 5/9	20 1/6	21 1/3	22 2/3	24				
20 "	20 5/6	21 1/9	21 7/18	21 2/3	22 3/9	22 7/9	23 1/3	24 4/9	25 5/24	26 2/3	28 1/3	30	33 1/3	35		
24 "	25	25 1/3	25 2/3	26	26 2/3	26 5/9	28	29 1/3	30 2/3	32	34	36	40	42	44	48
30 "	31 1/4	31 2/3	32 1/12	32 1/2	33 1/3	34 1/6	35	36 2/3	38 1/3	40	42 1/2	45	50	52 1/2	55	60
36 "	37 1/2	38	38 1/2	39	39 2/3	40	42	44	46	48	51	54	60	63	66	72
48 "	50	50 2/3	51 1/3	52	53 1/3	54 2/3	56	58 2/3	61 1/3	64	68	72	80	84	88	96
60 "	62 1/2	63 1/3	64 1/6	65	66 2/3	68 1/3	70	73 1/3	77 2/3	80	85	90	100	105	110	120
72 "	75	76	77	78	79 1/3	80	84	88	92	96	102	108	120	126	132	144

Suppose the lens used is 24 in. equiv. focus, and you wish to make a full-length portrait of a man six feet high, in which the image will be six inches high. Look at the left-hand column for lens focus, and in the top line for size of image. At the intersection of these columns we find 312 inches = 26 feet, to be the distance the person must stand from the lens. In the next table, using the same lens and size of image as before, at the intersection of the columns we find twenty-six inches, which represents the distance of the ground glass from lens center. And in the same way any lens and size of image may be computed for.

TABLE OF VIEW ANGLES.

DIVIDE THE BASE OF THE PLATE BY THE EQUIVALENT FOCUS OF THE LENS,

If the quotient is	The angle is	If the quotient is	The angle is	If the quotient is	The angle is	If the quotient is	The angle is	If the quotient is	The angle is	If the quotient is	The angle is
	Deg.		Deg.		Deg.		Deg.		Deg.		Deg.
.282	16	.517	29	.768	42	1.041	55	1.36	68	1.7	81
.3	17	.536	30	.788	43	1.063	56	1.375	69	1.739	82
.317	18	.555	31	.808	44	1.086	57	1.4	70	1.769	83
.335	19	.573	32	.828	45	1.108	58	1.427	71	1.8	84
.353	20	.592	33	.849	46	1.132	59	1.45	72	1.833	85
.37	21	.611	34	.87	47	1.155	60	1.48	73	1.865	86
.389	22	.631	35	.89	48	1.178	61	1.5	74	.898	87
.407	23	.65	36	.911	49	1.2	62	1.53	75	1.951	88
.425	24	.67	37	.933	50	1.225	63	1.56	76	1.965	89
.443	25	.689	38	.954	51	1.25	64	1.59	77	2.	90
.462	26	.708	39	.975	52	1.274	65	1.62	78		
.48	27	.728	40	1.	53	1.3	66	1.649	79		
.5	28	.748	41	1.02	54	1.32	67	1.678	80		

This table has been calculated by Dr. Woodman for the use of those who wish to know the precise *angle of view* included by any particular lens on a given size of plate. Its mode of use will be easily seen by inspection.

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FRONT VIEW --- FACING NORTH ST. PAUL ST

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REAR VIEW --- ON THE BANK OF THE GENESEE RIVER.