

# WOLLENSAK

## LENSES AND SHUTTERS





## The Product of Specialists

This is the age of the specialist. In professional and commercial life, the man who concentrates his effort and energy achieves the most conspicuous success. For specialization fosters thoroughness and quality.

When this company was organized twenty-two years ago, it was dedicated to the specialized manufacture of photographic lenses and shutters of supreme perfection. We were determined to make nothing else until we had developed a complete line of lenses and shutters of unsurpassed quality.

From a modest beginning, we have developed a plant of 80,000 square feet floor space, the largest in the world today devoted exclusively to the manufacture of photographic lenses and shutters. Our line has progressed to a position of unparalleled completeness. And the good will of the profession and the popularity of our line of merchandise, bespeak the unquestioned quality of our products themselves.

As specialists in these products, we solicit the opportunity of serving your lens and shutter requirements. We assure you that if there is any information we can give you, or any help in the selection of a suitable equipment, our Service Department is at your command.

Wollensak Optical Company  
Rochester, N. Y.

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## A Better Lens will make a Better Picture

The quality of a negative is determined to a very great extent by the quality of the lens used. If fully timed negatives, arrested motion and sparkling clean cut definition are desired, a lens like the Velostigmat, which will give these results, even under unfavorable conditions, should be employed.

The pre-eminence of Wollensak Lenses has been due largely to their ability to do the difficult things,—and do them well. Such satisfactory performance demands exceptional quality of product. In the manufacture of Wollensak lenses, this high quality has been maintained by employing the right men, the best craftsmen available; the right materials, including the finest optical glass procurable; and scientific methods of manufacture.

Velostigmat lenses, leaders in the Wollensak line, are all finely corrected anastigmats. But combined with anastigmatic perfection are other distinctive qualities, which add materially to their practical utility. As anastigmats, they are carefully corrected for spherical and chromatic aberration, coma, distortion and flare, rendering sharp definition to the very corners of the plate for which they are listed.

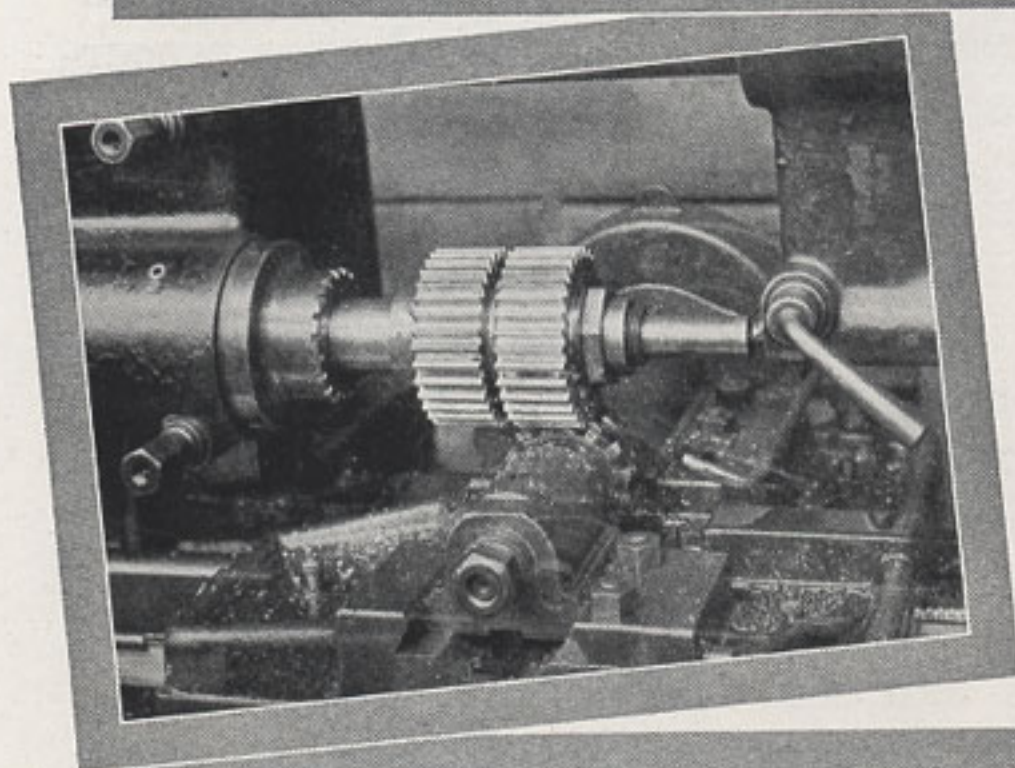
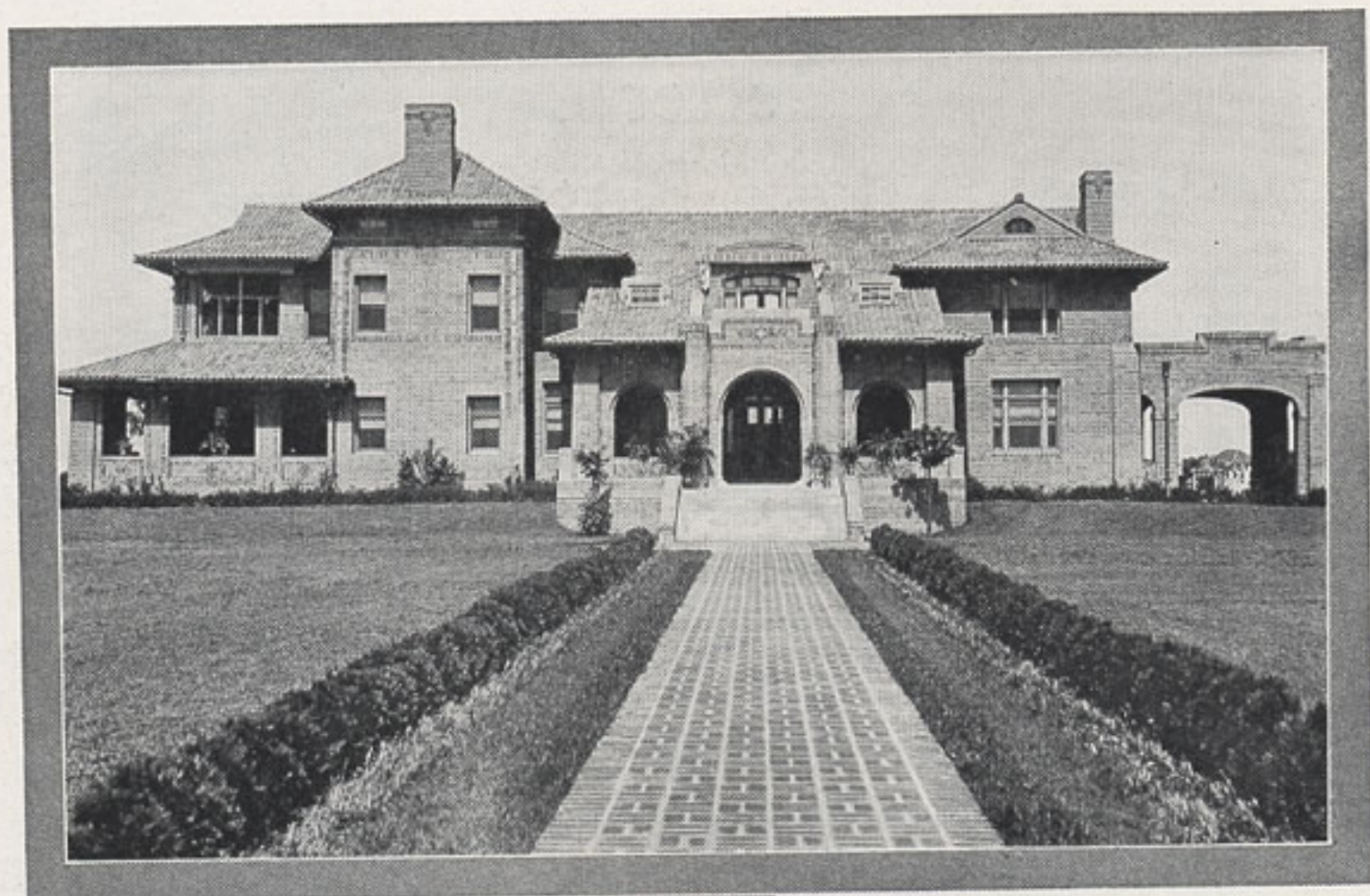
The Vitax Portrait  $f3.8$  and Verito Diffused Focus  $f4$ , like the Velostigmats, are constructed with characteristic Wollensak thoroughness and handsomely finished in keeping with their quality. All lenses mounted in Barrel are supplied with iris diaphragm.

The most exacting test you can give a lens is to compare its performance with the work of similar objectives. To make it easy for you to see the uniformly excellent results that Wollensak lenses produce, we extend a generous trial privilege, outlined on page 32.



*Consider the manifold advantages of Wollensak better lenses—and let them help you make better pictures. For after all, the right lens is an investment paying constant dividends in better negatives and finer workmanship.*

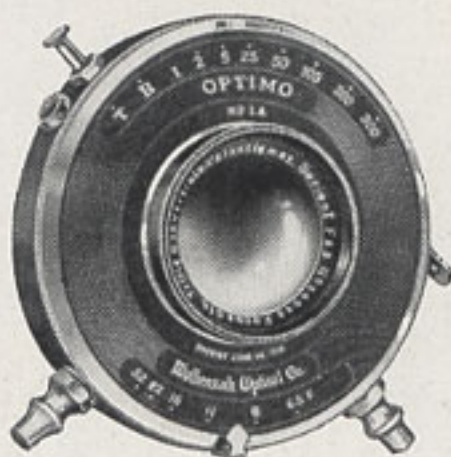




FROM Series 1 Velostigmat negatives (1) Architectural subject by H. H. Coby Co. (2) Mechanical detail by C. H. Staunton. (3) New York skyline from Brooklyn Bridge.







## Series I Velostigmat f6.3

*The rapid, triple-convertible anastigmat for commercial and general use*

In commercial photography, the quality of lens used is very materially reflected in the quality of the finished work. Fine definition, absolute rectilinearity, flatness of field,—these are essential qualities which are most readily obtainable by the use of a fully corrected anastigmat.

The Series I Velostigmat f6.3 admirably answers these exacting demands of the commercial photographer. As a Velostigmat, it is a precision anastigmat, finely corrected and giving sparkling detail to the very corners of the plate for which it is listed. Its high speed is a most valuable asset.

The triple-convertibility of the Series I adds greatly to its usefulness. Either the rear or front combination may be used alone, and as they are of different focal lengths, the user has virtually three lenses in one. The use of the single elements is an advantage where a larger image, better perspective or telephoto effect is desired. However, in using the combinations singly, it is necessary to stop down to secure accurate definition.

For all general purposes, including landscape and view work, copying, enlarging, commercial and architectural photography, the Series I Velostigmat f6.3 is a consistent producer of results.

This lens is made in a variety of sizes to meet the needs of advanced amateurs and professionals.

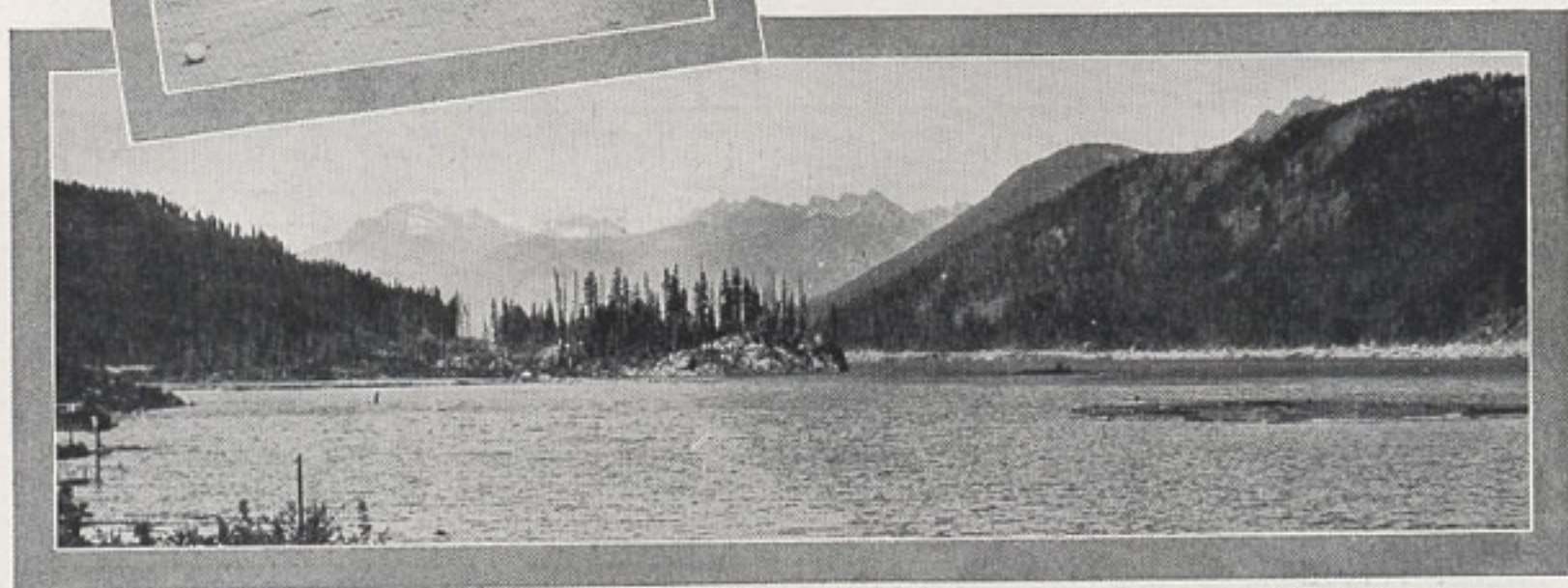
### *Descriptive Price List*

No.	Size	Equi- valent Focus	Diameter		In Barrel	In Betax Shutter	In Optimo Shutter	Focus of Single Combinations	
			of Lens	flange (inside)				Front	Rear
0	2¼ x 3¼	3½ in.	⅞ in.	1⅜ in.	\$30.00	\$34.50	\$41.00	7 in.	7 in.
1	3¼ x 4¼, 2½ x 4¼	5 in.	⅞ in.	1⅜ in.	32.50	37.50	44.50	11¾ in.	8¼ in.
2	4 x 5, 2⅞ x 4⅞	5¾ in.	1 in.	1⅜ in.	35.00	41.00	49.00	13¾ in.	10 in.
2A	3¼ x 5½	6½ in.	1⅜ in.	1⅜ in.	40.00	45.00	53.00	16 in.	10 in.
3	5 x 7	7¼ in.	1⅜ in.	1⅜ in.	47.50	52.50	60.50	17 in.	11 in.
4	6½ x 8½	9½ in.	1⅜ in.	1⅜ in.	75.00	80.00	88.00	21½ in.	16½ in.
5	8 x 10	12½ in.	2 in.	2⅜ in.	95.00	101.00	108.50	28 in.	20 in.
7	11 x 14	16 in.	2⅜ in.	3⅜ in.	160.00	170.00		38 in.	26 in.

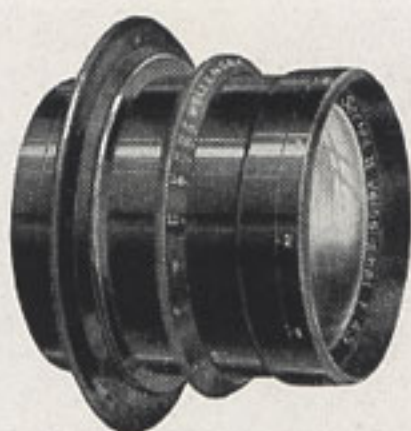




**I**LLUSTRATING the versatility of the Series II Velostigmat. (1) Portrait by D. D. Spellman. (2) Speed photo copyright by Harris & Ewing. (3) Landscape made from moving train by Neils Olsen. See also pages 18 and 21.







## Series II Velostigmat f4.5

*The high-speed anastigmat for all-round professional use and speed photography*

A lens that *actually* combines flatness of field with extreme rapidity, particularly in its larger sizes, is truly exceptional. Such a lens is the modern Series II Velostigmat f4.5, a high-speed anastigmat, rendering at full aperture, a flatness of field and covering power which many so-called anastigmats do not possess.

This extreme speed, flat field and fine anastigmatic correction, make this an ideal lens for general studio use. Standing figures or busts, child portraits or groups;—all are handled with equal facility by the Series II Velostigmat f4.5. A diffusing device on the five largest sizes adds to its usefulness.

Home portraiture requires all of the qualities mentioned above, plus compactness and moderate focal length. The Series II meets these demands. It is compact and of as short a focus as the dictates of good perspective will permit.

The professional and advanced amateur, desiring a lens of even more general utility, will find the Series II admirable for copying, enlarging and even commercial and view work.

In speed photography, when fitted to the Graflex, Reflex or other types of reflecting camera, the Series II Velostigmat f4.5 is at its best. Working at high shutter speeds, often with poor light, it produces fully-timed negatives with sparkling clean-cut definition. When you buy a Graflex, insist on Velostigmat equipment.

This lens in its new compact mounting can be fitted to all studio, plate and Graflex or reflecting type cameras.

### Descriptive Price List

No.	Size	Equivalent Focus	Diameter		In Barrel	In Studio Shutter	In Betax Shutter	In Optimo Shutter
			of Lens	flange (inside)				
0	2¼ x 3¼	3½ in.	¾ in.	1 ⅜ in.	\$33.00		\$38.00	\$44.00
1	3¼ x 4¼, 2½ x 4¼	5 in.	1⅛ in.	1 ⅝ in.	36.00		42.00	50.00
*2	4 x 5, 2⅞ x 4⅞	6 in.	1⅜ in.	1 ⅞ in.	40.00		48.00	53.00
3	5 x 7	7¼ in.	1⅝ in.	1 ¾ in.	50.00		57.00	65.00
3A	5 x 8	8¼ in.	1⅞ in.	2 ⅛ in.	65.00		74.00	81.50
4	6½ x 8½	9½ in.	2 ⅝ in.	2 ⅜ in.	100.00	\$110.00	110.00	117.50
5	8 x 10	12 in.	2¾ in.	3 ⅛ in.	135.00	146.50	147.00	
6	10 x 12	14 in.	3 ⅜ in.	3 ⅝ in.	175.00	187.00		
7	11 x 14	16 in.	3 ⅞ in.	4 ⅛ in.	225.00	236.50		
8	14 x 17	19½ in.	4 ⅞ in.	4 ¾ in.	350.00	358.00		

\* No. 2 can also be furnished in 6½ inch focal length at same price.





*From Series III Velostigmat negatives.*





## Series III Velostigmat $f9.5$

*The exceptional wide angle anastigmat  
of extreme angle and speed*

A wide angle lens is an absolute necessity to the studio or photographic organization endeavoring to maintain a complete photographic service.

Frequently pictures are desired including a greater angle of view than is obtainable with lenses of moderate angle. For interior views, for photos of buildings in narrow streets, for banquet groups and for all work in confined space, the Series III Wide Angle Velostigmat  $f9.5$  is indispensable.

Because of its anastigmatic qualities, the Series III gives excellent definition over the plate for which it is listed, covering an angle of 90 degrees. Stopping down is only necessary to increase the depth of focus.

Practically all wide angle lenses are of comparatively small aperture. The Series III works at the unusual speed of  $f9.5$  which is the largest aperture obtainable in a wide angle anastigmat. This large aperture is of real value for focusing in dimly lighted interiors, for making snapshots out of doors and for flashlight work.

Lenses of wider angle are available. However, the wider the angle, the more violent is the distortion. The Series III has an angle sufficiently great for practically any wide angle work. Yet there is virtually no distortion and the perspective is most pleasing.

Finely corrected and attractively finished, the Series III Wide Angle Velostigmat constitutes a mighty fine investment for the progressive studio or commercial photographer.

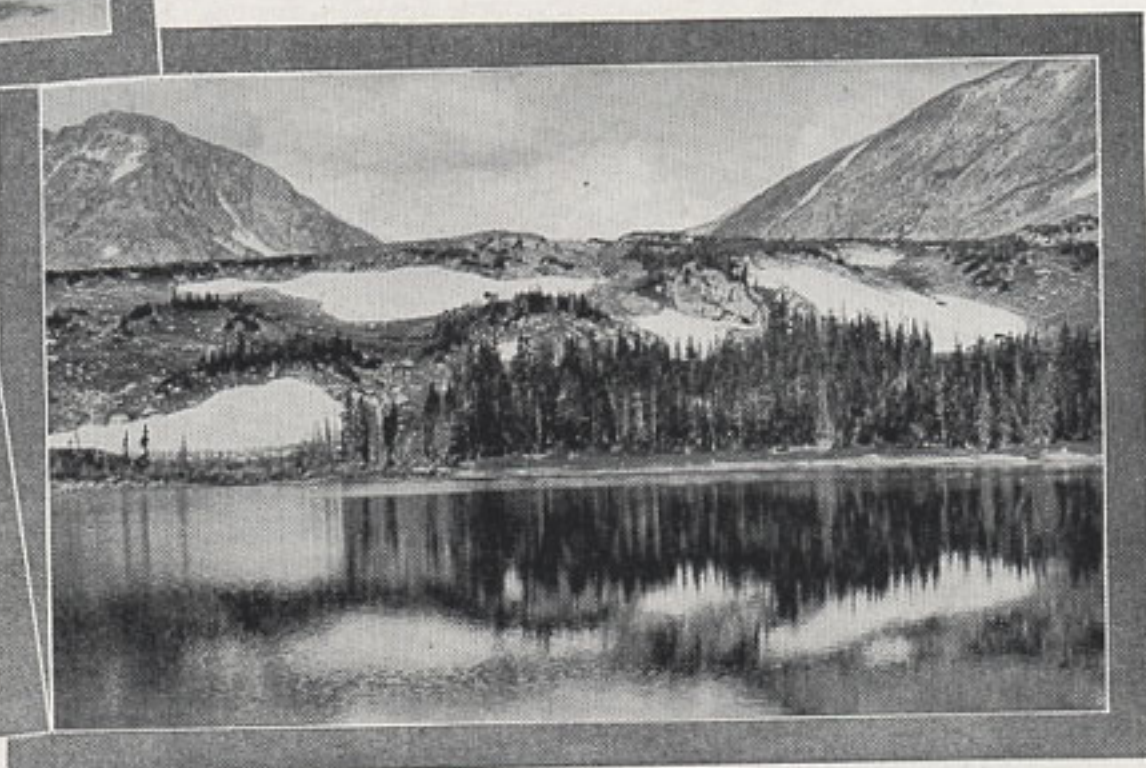
### *Descriptive Price List*

No	Plate Covered at $f9.5$	Equivalent Focus	Diameter		In Barrel	In Betax Shutter	In Optimo Shutter
			of Lens	flange (inside)			
3	5 x 7	4.3 in	$\frac{7}{8}$ in	$1\frac{5}{8}$ in	\$42.50	\$47.50	\$55.50
4	$6\frac{1}{2}$ x $8\frac{1}{2}$	5.4 in	1 in	$1\frac{5}{8}$ in	50.00	54.00	62.00
5	8 x 10	6.25 in	$1\frac{3}{8}$ in	$1\frac{11}{16}$ in	65.00	71.00	79.00
7	11 x 14	9 in	$1\frac{11}{16}$ in	$1\frac{11}{16}$ in	100.00	107.00	115.00





**S**PECIMENS of Series IV and Series V lens work. (1) Speed picture made with Series IV in Optimo. (2) Architectural subject made with Series V by R. J. Robey. (3) Pike's Peak photographed by M. C. Williamson with Series IV. (4) Another speed picture with the Series IV in Optimo. (5) Lost Lake photographed by Oliver Frantz with Series V.







## Series IV Velostigmat $f6.3$

*The fully corrected anastigmat of  
good speed and moderate price*

That we are able to offer as fine a lens as the Series IV so reasonably, is indeed a tribute to modern manufacturing methods.

The Series IV Velostigmat is a perfectly corrected anastigmat, sharply covering the plate for which it is listed at full aperture and working at the high speed of  $f6.3$ . It is suitable for commercial, architectural, landscape and view work, and home portraiture where the lighting is good. In the smaller sizes, mounted in a Wollensak shutter, it is readily adaptable to practically all hand cameras.

The Series IV has proved deservedly popular. We are proud of its quality, its moderate price, and the service it can render.

### *Descriptive Price List*

No	Size	Equi- valent Focus	Diameter		In Cells	In Barrel	In Betax Shutter	In Optimo Shutter
			of Lens	flange (inside)				
0	$2\frac{1}{4} \times 3\frac{1}{4}$ , $1\frac{5}{8} \times 2\frac{1}{2}$	$3\frac{1}{2}$ in.	$2\frac{1}{8}$ in.	$1\frac{3}{8}$ in.	\$15.00	\$16.00	\$22.50	\$29.00
1	$3\frac{1}{4} \times 4\frac{1}{4}$ , $2\frac{1}{2} \times 4\frac{1}{4}$	5 in.	$\frac{7}{8}$ in.	$1\frac{1}{8}$ in.	17.00	18.00	25.00	32.00
2	$4 \times 5$ , $2\frac{7}{8} \times 4\frac{7}{8}$	$5\frac{3}{4}$ in.	1 in.	$1\frac{1}{8}$ in.	17.50	18.50	26.50	34.50
2A	$3\frac{1}{4} \times 5\frac{1}{2}$	$6\frac{1}{2}$ in.	$1\frac{3}{8}$ in.	$1\frac{5}{8}$ in.	18.00	20.00	27.00	35.00
3	$5 \times 7$	$7\frac{1}{4}$ in.	$1\frac{1}{4}$ in.	$1\frac{5}{8}$ in.		32.50	38.50	46.50
4	$6\frac{1}{2} \times 8\frac{1}{2}$	$9\frac{1}{2}$ in.	$1\frac{3}{4}$ in.	$1\frac{3}{4}$ in.		50.00	57.00	65.00
5	$8 \times 10$	12 in.	$1\frac{3}{4}$ in.	$2\frac{3}{4}$ in.		70.00	78.00	85.50

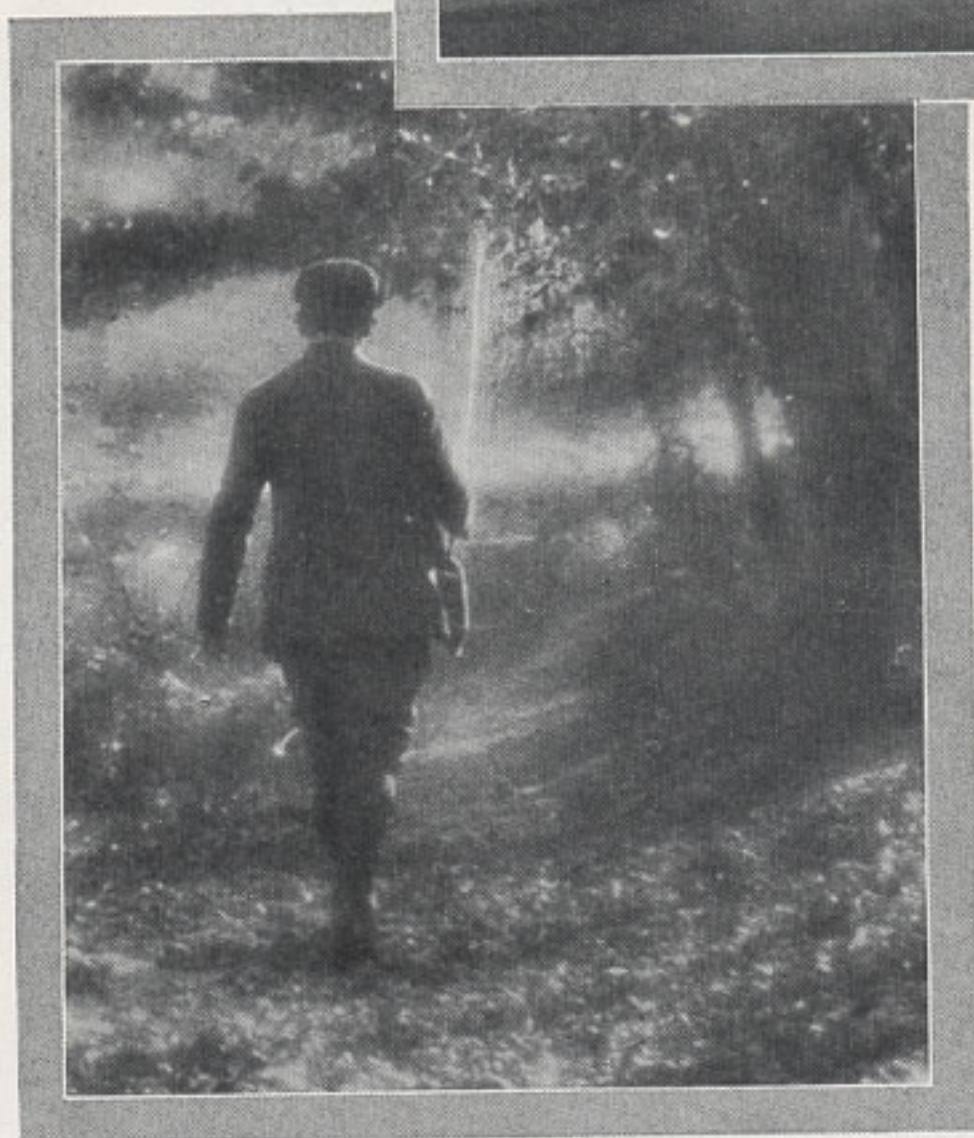
## Series V Anastigmat $f7.5$

The Series V is an anastigmat of popular price, similar to the Series IV but only two-thirds as fast. In the smaller sizes, the Series V in cells or Wollensak shutter can be readily fitted (at no extra cost) to practically all standard hand cameras.

### *Descriptive Price List*

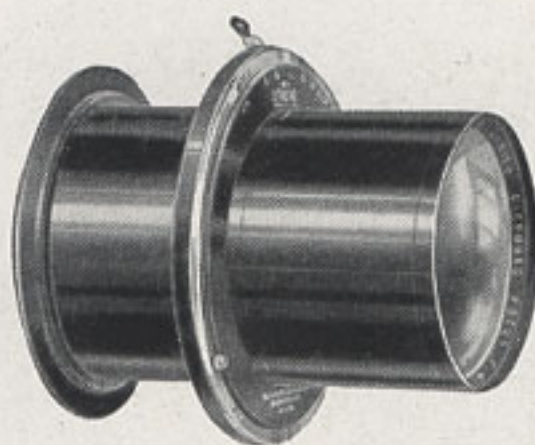
No.	Size	Equi- valent Focus	Diameter		In Cells	* In Gammax † In Barrel	In Betax Shutter	In Optimo Shutter
			of Lens	flange (inside)				
0	$2\frac{1}{4} \times 3\frac{1}{4}$ , $1\frac{5}{8} \times 2\frac{1}{2}$	$3\frac{1}{2}$ in.	$1\frac{5}{8}$ in.	$1\frac{3}{8}$ in.	\$8.00	* 12.00	\$15.50	\$22.00
1	$3\frac{1}{4} \times 4\frac{1}{4}$ , $2\frac{1}{2} \times 4\frac{1}{4}$	5 in.	$\frac{3}{4}$ in.	$1\frac{1}{8}$ in.	9.00	* 14.00	17.00	24.00
2	$4 \times 5$ , $2\frac{7}{8} \times 4\frac{7}{8}$	$5\frac{3}{4}$ in.	$\frac{7}{8}$ in.	$1\frac{1}{8}$ in.	9.50	* 14.50	17.50	24.50
2A	$3\frac{1}{4} \times 5\frac{1}{2}$	$6\frac{1}{2}$ in.	1 in.	$1\frac{1}{8}$ in.	10.00	* 16.00	19.00	27.00
3A	$5 \times 8$	$8\frac{1}{4}$ in.	$1\frac{3}{8}$ in.	$1\frac{5}{8}$ in.		† 25.00	32.00	40.00
4	$6\frac{1}{2} \times 8\frac{1}{2}$	$10\frac{1}{2}$ in.	$1\frac{3}{4}$ in.	$1\frac{3}{4}$ in.		† 40.00	48.00	56.00
5	$8 \times 10$	13 in.	$1\frac{3}{4}$ in.	$2\frac{3}{4}$ in.		† 52.50	62.50	70.00





THESE interesting pictures illustrate the infinite variety of pleasing effects possible with the Verito. The home portrait is by Edward Weston, the well-known pictorialist of the West. The landscape is from a negative by John N. Consdorf.





## Verito Diffused Focus $f4$

*The speedy, convertible, soft focus lens for the  
artist-photographer and pictorialist*

A pioneer among soft-focus lenses, the Verito has contributed immeasurably to the advancement and development of the pictorial phase of photography. Its pre-eminence is unquestioned. It is used the world over and its popularity can be attributed in part to the fact that it possesses over a dozen distinctive qualities.

An unlimited variety of unique and artistic effects is possible with this versatile lens. Working at full aperture, it renders a delightful atmospheric quality of softness, beautifully blending the high-lights, halftones and shadows and suppressing unessential wiry detail. Definition is not destroyed, but pleasingly subdued and softened. Any degree of diffusion is available at will by varying the size of the diaphragm opening.  $f6$  gives a moderate softness and  $f8$  practical sharpness. A slightly different quality is available by interchanging the lens combinations or using the rear element alone.

In the modern studio, the Verito is indispensable. A long time ago, diffused portraits had to be sold but today, discriminating customers frequently demand them. Besides practically eliminating retouching expense, Verito portraits actually bring better prices. From this, it is evident that the Verito quickly pays its own way.

The Verito Diffused Focus  $f4$  is The Lens of the Pictorialist. The majority of the leading workers in this field are now using it.

*Continued on page 20*

### Descriptive Price List

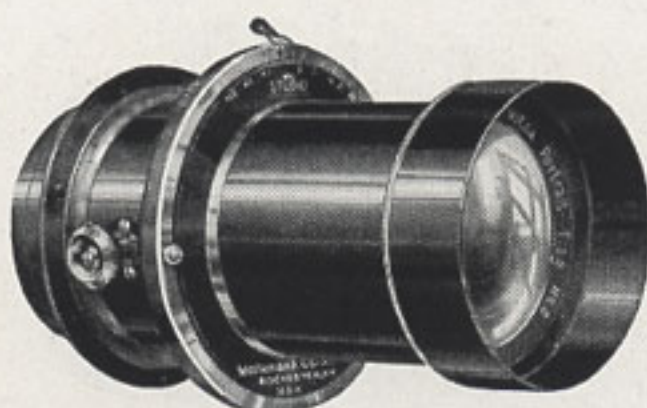
No.	Size	Dia- phragm Focus	Focus Rear Combi- nation	Diameter		In Barrel	In Studio Shutter	In Betax Shutter
				of Lens	flange (inside)			
* A	$3\frac{1}{4} \times 4\frac{1}{4}$	5 in.	10 in.	1 in.	$1\frac{3}{8}$ in.	\$22.50		\$28.50
* B	4 x 5	$6\frac{1}{2}$ in.	14 in.	$1\frac{3}{8}$ in.	$1\frac{5}{8}$ in.	25.00		32.00
1	$3\frac{1}{4} \times 4\frac{1}{4}$	$6\frac{1}{8}$ in.	10 in.	$1\frac{5}{8}$ in.	$1\frac{3}{4}$ in.	28.50	\$41.50	41.50
2	4 x 5	$7\frac{1}{4}$ in.	11 in.	$1\frac{7}{8}$ in.	$2\frac{1}{8}$ in.	32.50	44.50	44.50
3	5 x 7	$8\frac{3}{4}$ in.	14 in.	$2\frac{1}{4}$ in.	$2\frac{3}{8}$ in.	42.50	53.50	56.50
4	$6\frac{1}{2} \times 8\frac{1}{2}$	$11\frac{1}{2}$ in.	20 in.	3 in.	$3\frac{5}{8}$ in.	55.00	70.00	
5	8 x 10	$14\frac{1}{2}$ in.	24 in.	$3\frac{1}{2}$ in.	$4\frac{3}{8}$ in.	77.50	92.50	
7	11 x 14	18 in.	30 in.	$4\frac{1}{8}$ in.	$4\frac{3}{4}$ in.	100.00	120.00	

VERITO EXTENSION LENS to be used with 18" focus, increasing focus to  $22\frac{1}{4}$ ", \$19.50.

Special Speed and focal length, 3 in. or shorter, \$22.50 in barrel; 5 in. or shorter, \$25.00 in barrel.

\* Sizes A and B speed  $f6$ , all others  $f4$ .





## Vitax Portrait $f3.8$

*The ultra-rapid lens for portraiture  
and child photography*

It is generally conceded that one lens is hardly sufficient to cover the many various requirements of the modern studio. For this reason, the Vitax is used in many progressive studios, which also employ a general-purpose lens, like the Series II Velostigmat  $f4.5$ , for groups and home portraiture.

For portraiture, particularly large heads, busts and three-quarter lengths, the Vitax is distinctly superior to the anastigmat type of lens. Because of its improved Petzval formula and slightly curved field, it produces a rounded, stereoscopic effect, which adds greatly to the life-like quality of the portrait. An added convenience is a diffusing device, that renders a certain softness when desired.

In child portraiture, extreme rapidity is all-important. Because of its high speed, the Vitax has proved exceptionally popular for this phase of studio work. The Vitax speed of  $f3.8$ ,—one and one-half times as fast as  $f4.5$ ,—is the fastest practical speed for a portrait lens, permitting snap-shot exposures in the studio.

It is seldom necessary or desirable to use the full aperture of the Vitax on large heads or bust pictures. It is entirely practical, however, to use the extreme speed of  $f3.8$  in child photography, since such portraits are generally made at a greater distance from the camera, with a consequent increase in depth. (See page 29).

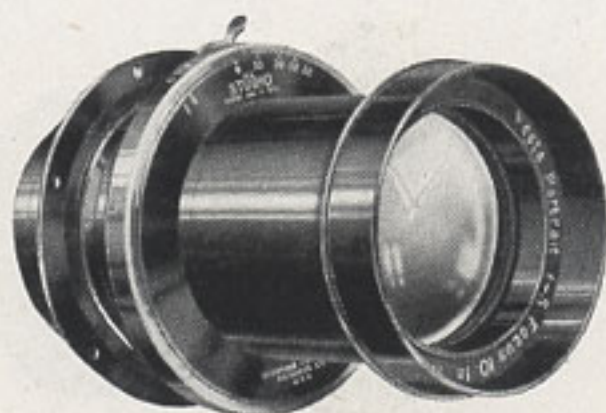
The Vitax is not confined to portraiture and child photography. It will satisfactorily handle standing figures and groups, when slightly stopped down. For the best perspective, Nos. 3, 4 and 5 are recommended for  $5 \times 7$ ,  $6\frac{1}{2} \times 8\frac{1}{2}$  and  $8 \times 10$  plates respectively.

If your light is poor, your negatives undertimed; if you desire a nicer quality in your portraits; if you want certain success in photographing the youngsters,—consider the Vitax Portrait  $f3.8$ .

### *Descriptive Price List*

No.	Diaphragm Focus	Diameter		In Barrel	In Studio Shutter
		of lens	flange (inside)		
3	10 in.	3 in.	$3\frac{5}{8}$ in.	\$105.00	\$120.00
4	$13\frac{1}{2}$ in.	$3\frac{1}{2}$ in.	$4\frac{3}{4}$ in.	135.00	151.00
5	16 in.	$4\frac{1}{8}$ in.	$4\frac{3}{4}$ in.	185.00	201.00





## Vesta Portrait f5

As the name implies, the Vesta is particularly adapted to portraiture, giving a desirable rounded quality. It is also entirely practical for standing figures and small groups, when slightly stopped down. The longer focus front element used alone, in back of the diaphragm, renders an improved perspective.

To the studio that cannot invest in the speedier Vitax or Velostigmat f4.5, we suggest the Vesta,—an unusual, low priced lens.

### Descriptive Price List

No.	Size	Dia- phragm Focus	Focus Front Element	Diameter		In Barrel	In Studio Shutter
				of Lens	flange (inside)		
1	3¼ x 4¼	6 in.	9 in.	1⅝ in.	1⅜ in.	\$20.00	
2	4 x 5	7 in.	11 in.	1⅞ in.	2⅜ in.	27.50	
3	5 x 7	10 in.	14 in.	2¼ in.	2⅝ in.	34.00	\$46.00
4	6½ x 8½	11½ in.	17 in.	2½ in.	3⅜ in.	46.00	60.00
5	8 x 10	14 in.	21 in.	3 in.	3⅝ in.	65.00	79.00

## Versar Enlarging, Portrait and View f6

A general-purpose rectilinear lens of moderate price, the Versar is excellent for enlarging and all-round use where the high speed and fine correction of the Velostigmat f4.5 are not required.

The Versar is suitable for studio and home portrait work such as busts, full lengths and groups; for general view and commercial work, when slightly stopped down; and for all enlarging.

Since the Versar is convertible, the single combinations, twice the equivalent focus, may be used alone. The lens must be slightly stopped down in order to give fine corner definition.

### Descriptive Price List

No.	Size	Equiv- alent Focus	Diameter		In Barrel	In Studio Shutter	In Betax Shutter
			of Lens	flange (inside)			
2	4 x 5	6½ in.	1¼ in.	1⅞ in.	\$23.00		\$33.00
3	5 x 7	8¾ in.	1½ in.	1⅞ in.	27.50		37.50
4	6½ x 8½	9½ in.	1¾ in.	2⅜ in.	36.00	\$48.00	48.00
5	8 x 10	11⅝ in.	2 in.	2⅜ in.	47.00	58.00	58.00
6	10 x 12	15 in.	2½ in.	3⅜ in.	60.00	72.00	72.00
7	11 x 14	16½ in.	2⅞ in.	3⅝ in.	76.50	89.50	
8	14 x 17	18 in.	3 in.	3⅝ in.	100.00	115.00	
9	17 x 20	22½ in.	3⅝ in.	4⅜ in.	128.00	144.00	





## Series IIIa Extreme Wide Angle f12.5

The new Series IIIa with its speed, extreme angle, reserve covering power and moderate price, offers a combination of qualities that should prove of especial interest to the commercial photographer.

On the plate for which it is listed, the Series IIIa includes an angle of view of 90 degrees. Because of its large circle of light, it can be made to cover a plate a size larger by stopping down, thus affording an angle of approximately 100 degrees.

The Series IIIa gives excellent definition wide open, and must be stopped down but little to give wiry detail to the very corners.

### Descriptive Price List

No.	Size	Larger Plates Smaller Stops	Equiv- alent Focus	Diameter		In Barrel	In Betax Shutter
				of Lens	flange (inside)		
3	5 x 7	6½ x 8½	4⅞ in.	2⅞ in.	1⅞ in.	\$22.50	\$29.50
4	6½ x 8½	8 x 10	5⅞ in.	1⅞ in.	1⅞ in.	28.50	35.50
5	8 x 10	10 x 12	6¼ in.	1⅞ in.	1⅞ in.	32.50	41.50
6	10 x 12	11 x 14	7⅞ in.	1⅞ in.	1⅞ in.	40.00	48.00
7	11 x 14	14 x 17	9 in.	1⅞ in.	2⅞ in.	50.00	60.00
8	14 x 17	17 x 20	11 in.	2⅞ in.	3⅞ in.	65.00	74.00

## Voltas f8

Where high speed and fine corrections are not essential, the inexpensive Voltas will adequately serve the purpose. It is an all-round lens, particularly adapted to landscape, view and commercial work. While fair detail is rendered at full opening, the Voltas must be stopped down in order to insure sharp definition to the extreme corners of the plate. As the Voltas is triple-convertible, the single elements may be used alone by employing a small aperture.

### Descriptive Price List

No.	Size	Equiv- alent Focus	Diameter		In Barrel or Betax Shutter	Focus of Single Combinations	
			of Lens	flange (inside)		Rear	Front
1	3¼ x 4¼	5 in.	¾ in.	1⅞ in.	\$12.00	8¼ in.	11½ in.
2	4 x 5	6½ in.	1 in.	1⅞ in.	14.00	11 in.	14½ in.
3	5 x 7	8 in.	1⅞ in.	1⅞ in.	15.00	14 in.	17½ in.
4	6½ x 8½	10½ in.	1⅞ in.	1⅞ in.	25.00	18 in.	23½ in.
5	8 x 10	12½ in.	1⅞ in.	2⅞ in.	32.00	20 in.	28½ in.
6	10 x 12	16 in.	2 in.	2⅞ in.	50.00	26 in.	38 in.
7	11 x 14	18½ in.	2¼ in.	3⅞ in.	57.00	31 in.	43 in.
8	14 x 17	22 in.	2¾ in.	3⅞ in.	* 75.00	37 in.	51 in.
9	17 x 20	26 in.	3¼ in.	4⅞ in.	* 95.00	44 in.	60 in.

\* In barrel only.





Group work with the Series II. Copyright, Harris & Ewing, Washington, D. C.

## Wollensak Ray Filter

The purpose of a ray filter, or color screen as it is sometimes called, is to reproduce colors in their true tonal relations to each other. The sensitized emulsion on a plate or film is much more sensitive to some colors than to others. This difference is rectified by the use of a filter.

For general use, the Wollensak filter is ideal, requiring about three times normal exposure. It will help in producing beautiful results in cloud, landscape and flower studies, and will give sufficient correction for commercial work.

Wollensak filters are made from fine optical glass, ground and highly polished in our own plant. This finish is absolutely essential for best results. They are mounted in hand-spun mounts with three adjusting screws and are offered in the sizes listed below.

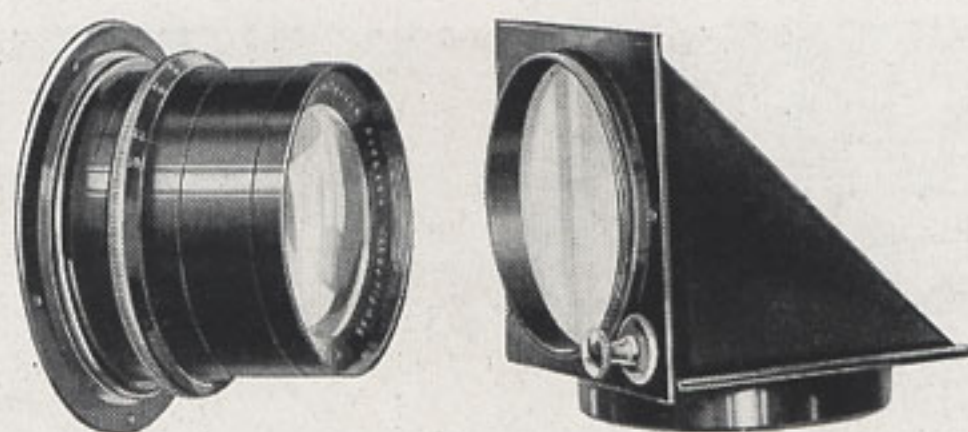
For use on all hand cameras up to  $3\frac{1}{4} \times 5\frac{1}{2}$ , we supply our three time filter in special mounting. The cost is \$1.00 for  $3\frac{1}{4} \times 5\frac{1}{2}$  size, 75c for smaller sizes. In ordering, simply specify outside diameter of the front mount, or diameter of opening, in the case of box cameras.

*Portrait attachments for hand cameras up to  $3\frac{1}{4} \times 5\frac{1}{2}$  size, can be supplied at a cost of 60 cents. Please give same specifications as in preceding paragraph.*

### Descriptive Price List

No.	Will Fit Lens Mounts from	Price	No.	Will Fit Lens Mounts from	Price
1	$1\frac{5}{8}$ in. to $1\frac{11}{16}$ in.	\$2.00	6	$2\frac{3}{8}$ in. to $2\frac{5}{8}$ in.	\$4.50
2	$1\frac{7}{16}$ " " $1\frac{13}{16}$ "	2.25	7	$2\frac{11}{16}$ " " $3$ "	5.25
3	$1\frac{9}{16}$ " " $1\frac{15}{16}$ "	2.50	8	$3\frac{1}{16}$ " " $3\frac{1}{2}$ "	6.75
4	$1\frac{11}{16}$ " " $2$ "	3.00	9	$3\frac{9}{16}$ " " $4\frac{1}{8}$ "	7.50
5	$2\frac{1}{16}$ " " $2\frac{5}{16}$ "	3.75	10	$4\frac{3}{16}$ " " $4\frac{5}{8}$ "	9.00





## Velostigmat Process Lens

*The lens of extreme precision for  
photo-engraving, copying, etc.*

After a long period of experimentation, we have finally perfected our process anastigmat to such a degree of accuracy that we are proud to brand it with the "Velostigmat" trade-name.

While designed primarily for photo-engraving, it should interest commercial photographers because of its extreme precision. The Velostigmat Process Lens is ideal for copying, enlarging, reducing and in fact for any similar work where flatness of field, even illumination and perfect covering are desirable.

Photo-engravers find the Velostigmat Process Lens an excellent instrument for their exacting requirements, as it is well adapted to all line and halftone work. Its exceptional chromatic correction makes it an admirable instrument for three and four-color process work, when used at smaller apertures. All lenses are slotted for Waterhouse stops with revolving ring to cover slot when not in use.

The front lens cell is threaded to receive the Wollensak prism, which is supplied in the sizes and at the prices listed below. These accurately ground prisms can also be fitted to lenses of other manufacture, at an additional charge of \$5.00.

The Velostigmat Process Lens is built on a formula, which has proved most practical for a lens of this type. The fine imported glass used in its manufacture, affords absolute correction for chromatic aberration and other faults which might impair its usefulness.

**SPECIAL NOTE:** All half-tone illustrations reproduced in this catalog were made with a Velostigmat Process Lens. Proofs of three or four color plates made with this lens will be gladly sent to any photo-engravers interested.

### Descriptive Price List

No.	Equi- valent Focus	Diameter		Speed	Plates Covered for Reduction	Plates Covered for full Size Copy	Price	Size of Prism to fit	Price of Prism
		of Lens	flange (inside)						
4	10 $\frac{1}{4}$ in.	1 $\frac{3}{8}$ in.	1 $\frac{9}{16}$ in.	f 10	6 $\frac{1}{2}$ x 8 $\frac{1}{2}$	10 x 12	\$ 84.50	2 in.	\$ 60.00
5	12 $\frac{3}{4}$ in.	1 $\frac{5}{8}$ in.	1 $\frac{11}{16}$ in.	f 10	8 x 10	11 x 14	112.50	2 in.	60.00
6	15 $\frac{1}{2}$ in.	2 in.	2 $\frac{1}{2}$ in.	f 10	10 x 12	12 x 15	135.00	2 $\frac{1}{2}$ in.	67.50
7	18 in.	2 $\frac{1}{8}$ in.	3 $\frac{1}{8}$ in.	f 10	12 x 15	14 x 17	157.50	3 in.	100.00
9	25 in.	3 $\frac{1}{8}$ in.	3 $\frac{5}{8}$ in.	f 10	16 x 20	20 x 24	225.00	3 $\frac{1}{2}$ in.	120.00
10	30 in.	3 $\frac{3}{8}$ in.	4 $\frac{3}{8}$ in.	f 16	20 x 24	24 x 30	326.50	4 in.	175.00
...	.....	.....	.....	.....	.....	.....	.....	4 $\frac{1}{2}$ in.	250.00





VERITO pictures by Wm. Shewell Ellis (left), Thomas H. Ince Studio (center), and Taizo Kato (right).

## Verito Diffused Focus $f4$

(Continued from page 13)

In landscape work, figure studies and wherever a pictorial effect is desired, the Verito will produce a *picture*, not a conglomeration of detail. In deference to this discerning class of users, we offer the Verito in sizes to fit all view, hand, studio and Graflex cameras. See table given below for sizes adaptable to various types of Graflex.

For enlarging, the Verito is ideal because of its high speed and comparatively flat field. When projected through the Verito, the harshest and most wiry negatives are made to breathe a softness of exceptional beauty. In enlarging, as in making negatives, softness is easily controlled by the diaphragm.

The Verito Extension Lens, for use with the 18" focal length, will interest professional users. It is a supplementary front combination, interchanging with the original front element and lengthening the focus to  $22\frac{1}{4}"$ . Although listed for 11 x 14, the 18" focus gives beautiful effects on 8 x 10 plates, and an even more pleasing perspective is obtainable with the Extension Lens, costing \$19.50.

A full realization of the unlimited possibilities that the Verito affords, can only be obtained through its use, and it will be found to be, truly, "The lens that improves on acquaintance." While

### Veritos Accommodated by Graflex Cameras

Graflex	Verito No.	Graflex	Verito No.	Graflex	Verito No.
1A Autographic.....	A	* Auto Junior.....	A	Telescopic R. B. 4 x 5.....	2
3A Autographic.....	2 or B	* R. B. Junior.....	1 or B	R. B. Auto $3\frac{1}{4}$ x $4\frac{1}{4}$ .....	2
Auto $3\frac{1}{4}$ x $4\frac{1}{4}$ .....	A	Compact $3\frac{1}{4}$ x $5\frac{1}{2}$ .....	2 or B	R. B. Auto 4 x 5.....	3
† Auto 4 x 5.....	1 or B	Compact 5 x 7.....	3	Press.....	3
Auto 5 x 7.....	3	Telescopic R. B. $3\frac{1}{4}$ x $4\frac{1}{4}$ .....	1 or B	Home Portrait.....	4

\* When ordering Veritos for these types, please specify cameras as special threads are required.

† Although the No. 1 Verito is classed as a  $3\frac{1}{4}$  x  $4\frac{1}{4}$  size, it will adequately cover a 4 x 5 plate.





**A**CTION pictures with the Series II Velostigmat  $f4.5$ , copyright by Harris & Ewing. Insert by A. R. Brown.

space forbids a more extensive description, let us summarize just a few of its distinctive characteristics: variable quality; absolute controllability; convertibility; rectilinearity, because of its double construction; extreme speed of  $f4$ ; freedom from flare when properly used; proper chromatic correction; suitability for enlarging; saving in retouching; ability to bring better prices; adaptability to all cameras; moderate cost. A round dozen! And you'll discover more as you use it.

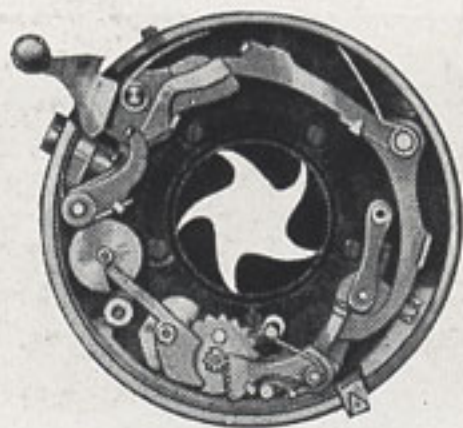
## Special Order Work

It has been our privilege to develop and manufacture special optical units for many concerns for use in various types of machines and instruments. Trench and Battery Commander's Periscopes for government use, of twelve optical units, including prisms; camera finders of various types; taking and projecting lenses for motion picture use; reading glasses; magnifying and reducing lenses of all descriptions; these are typical of the special equipment we have produced in the past or are now manufacturing.

As specialists in the manufacture of lenses, our facilities are exceptionally complete. With our specially designed lens-making machinery and our force of carefully selected, skilled craftsmen, we are in a position to produce optical equipment of standard Wollensak quality, mounted or unmounted, at most reasonable prices. Furthermore, we can handle such special work in any desired quantities efficiently and expeditiously.

To all manufacturers requiring optical equipment of any kind, we proffer our services, with the assurance of willing co-operation in the solution of their problems. We will gladly quote prices and, when desired, will make up sample models, upon receipt of the necessary specifications.





*This scale attached to top of shutters for hand cameras facilitates diaphragm and speed adjustments.*

*The essential mechanical parts of the new gearless, pumpless shutters. Note exceptional simplicity.*

## Wollensak Quality Shutters

Over two decades ago, when this organization was founded, the only product was photographic shutters. While our line of lenses, which followed later, has proved equally popular, we have always been justly proud of our pioneer work in shutter manufacture.

The many basic patents which we hold, protecting our shutters and certain mechanical features, place us at a decided advantage. This is particularly true since we have added to our line the new gearless, pumpless type described in the following pages.

In order that Wollensak shutters might render continuous, reliable service year after year, only the best materials are used in their manufacture. The men who make them are skilled mechanics. The finished product is not only an uncomplicated instrument of absolute reliability and mechanical simplicity, but one of beauty as well,—and a shutter you will be proud to own.

Most of the prominent manufacturers of high grade hand cameras supply Wollensak shutters as standard equipment. They can also be fitted, at little or no charge, to all standard hand cameras. For a satisfactory fitting, it is advisable to send your camera to us. If you want absolute reliability and accuracy in your exposures, insist on a Wollensak quality shutter when buying a lens or camera.

All Wollensak shutters, as listed in the following pages, are supplied with a wire release as standard equipment. When desired, a bulb attachment permitting the use of bulb and hose, can be supplied at the prices given below. Shutter prices include the wire release, iris diaphragm, flange and a set of screws, when desired for plate cameras, or jamb-nut for attaching to hand or film cameras.

Our various models for amateur and professional use, are described and illustrated in the following pages.

### Shutter Accessories

*Bulb Attachments* in sizes to fit every Wollensak shutter, \$1.00 each.

For size required, refer to price list accompanying description of each shutter.

*Wire Release:* 12" or shorter, \$.50; 20", \$1.25; 36", \$2.00.

*Bulb and Tube:* large, 60 cents; medium, 35 cents.

*Special Scales* (diaphragm or focusing): 90 cents each.





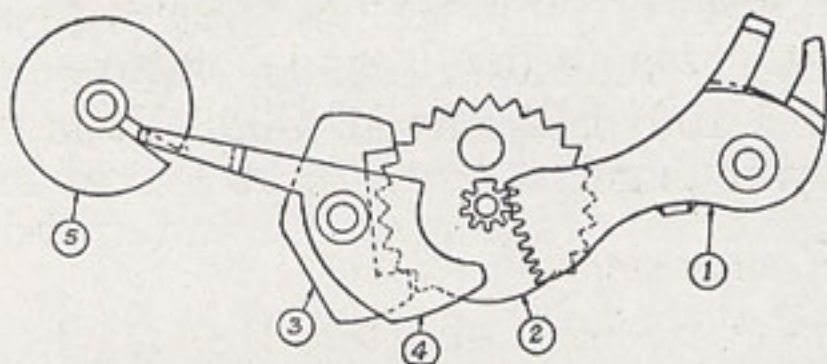
These are the new Wollensak gearless, pumpless shutters, "the line of Xact Xposure" combining accuracy, simplicity, reliability and beauty.

## Betax, Gammax and Deltax

The invention and development of the mechanism incorporated in these new Wollensak shutters mark the advent of a new era in shutter construction. For the Betax, Gammax and Deltax operate on a new principle, and because of their fundamentally different mechanical construction, offer a combination of qualities heretofore unobtainable in a single shutter. Absolute accuracy, sturdy simplicity of design, reliability and beauty of finish,—that is the story in brief of these new gearless, pumpless shutters.

The precision of a shutter depends more on the retarding device than on any other factor entering its construction. This device governs the duration of the shutter exposures and determines the accuracy of the whole shutter mechanism. In the new Wollensak shutters, the retarding device is radically different, operating very much like the escapement in a watch. Because of its positive action, it gives an accuracy that is impossible in a shutter employing uncertain pumps or a complex train of gears. The Wollensak retarding device is illustrated and described below.

Simplicity in a shutter is the keynote to consistent reliability, for in a simple, substantial, non-complex mechanism, there is little to get out of order. However, simplicity and reliability are worthless without *accuracy*. Other shutters are either fairly accurate and complex, or simple and inaccurate. In the Betax, Gammax and Deltax, absolute accuracy, mechanical simplicity and utter reliability are distinguishing characteristics.



### Wollensak Retarding Device

In this speed controlling mechanism, lies the secret of the accuracy of the Betax, Gammax and Deltax shutters. Its simplicity is ideal. The action of all parts is constant, non-variable and positive. With so few bearing surfaces, friction is virtually eliminated.

The speed indicator or cam on the shutter governs the extent of movement of lever (1) which engages pinion on escapement (2). The escapement (2) makes partial revolution controlling absolutely the number of oscillations of pallet (3). Stud in end of pallet lever (4) rides in slot in escapement balance (5) which offers the necessary resistance and contributes to the smooth operation of the other parts. Since the number of oscillations of pallet (3) is always the same at a given speed, the shutter speeds are not subject to variation.



These new shutters are obtainable as standard equipment on Ansco, Seneca, Rexo and other cameras and can be fitted to cameras and lenses of all makes. If your dealer has no camera with this modern shutter equipment in stock, he can order it for you.

These three gearless, pumpless shutters are similar in structure, differing chiefly in the variety of available speeds. The automatic exposures (besides time and bulb) are as follows:

Betax—1/100, (on Nos. 0, 1 and 2), 1/50, 1/25, 1/10, 1/5, 1/2

Gammax—1/100, 1/50, 1/25, 1/10

Deltax—1/100, 1/50, 1/25

While the maximum speed on the three largest Betax shutters is 1/50th, it will seem much faster to the photographer who has used other types. On the new Wollensak shutters, the speeds are indicated with utmost exactness, whereas on practically all others the high speeds are very much over-rated. Accordingly the 1/50th on the Betax is comparable to 1/100th on other medium-priced automatic shutters.

Special attention is called to the fact that intermediate speeds can be obtained by setting the speed control lever at points between the indicated exposures. This feature enables the user to obtain a wide variety of shutter speeds.

### Descriptive Price List

No.	Light Aperture	Bulb Attachment	Betax	Gammax	Deltax
0	$\frac{1}{8}"$	No. 1	\$ 7.50	\$ 4.00	\$ 3.50
1	$\frac{3}{4}"$	No. 1	8.00	5.00	4.50
2	1"	No. 1	9.00	6.00	
*3	$1\frac{3}{8}"$	No. 1	12.00		
4	$1\frac{3}{4}"$	No. 2	15.00		
5	$2\frac{1}{4}"$	No. 3	18.00		

\* Ready September first.

## Optimo High Speed Shutter

The utility of any high-speed anastigmat, such as our Velostigmats, Series I, II and IV, is greatly increased by having it equipped with a shutter that can give the ultra-rapid exposures necessary for speed photography.

In addition to time and bulb exposures, the Optimo has the slow exposures of 1, 1/2, and 1/5 second, the medium 1/25 and 1/50 and the all-important high speeds of 1/100, 1/200 and 1/300. It is a setting type of shutter and the revolving action of the leaves in opening and closing, affords a maximum of illumination and speed.

### Descriptive Price List

No.	Light Aperture	Bulb Attachment	Price	No.	Light Aperture	Bulb Attachment	Price
0	$\frac{1}{16}"$	No. 1	\$14.00	2	1"	not re-	\$17.00
1	$\frac{3}{4}"$	No. 1	15.00	3	$1\frac{3}{8}"$	quired for	20.00
1a	$\frac{1}{16}"$	No. 1	17.00	4	$1\frac{3}{4}"$	these sizes	22.50



# Studio Shutter



As a thoroughly practical outfit for use on any portrait type of lens, the smoothly working Studio Shutter has met with the marked approval of the photographic profession.

A between-the-lens shutter, like the Studio, affords definite advantages. It becomes an integral part of any lens to which it is fitted. Its consequent compactness, as contrasted with behind-the-lens types makes it ideal for home portraiture or studio use.

The ten leaves of the Studio constitute both diaphragm and shutter blades. The diaphragm action of the leaves, in opening and closing, tends to increase appreciably the depth of focus. The diaphragm is set before exposure is made, and the shutter opens only to the aperture desired, in a practically noiseless manner.

A three foot wire release is supplied with the Studio Shutter as standard equipment. Bulb attachments, to permit the use of bulb and hose, can be supplied in the sizes given below at a price of \$1.00 each. These attachments screw readily into the wire release socket.

Exposures of any desired duration longer than one-tenth second, may be had by maintaining pressure on the bulb or release. A convenient lever at the top holds the shutter open for focusing.

Studio Shutters can be fitted to lenses of other makes, and we maintain a separate department to handle this work. It is important that the lens in its original mounting be sent to us, to insure an accurate adjustment. The fitting charges are nominal.

The flange is not attached to the Studio Shutter as on our other shutters. Accordingly, no flange is provided when the shutter is furnished separately unless we handle the fitting.

## Descriptive Price List

No.	Outside Diameter	Light Opening	Lens Opening	Bulb Attachment	Price
1	3 1/2"	2 1/8"	2 1/8"	No. 4	\$ 15.00
2	4 1/4"	2 7/16"	2 1/8"	No. 5	17.50
3	4 7/8"	2 1/2"	3 1/4"	No. 5	20.00
4	5 7/8"	3 1/2"	3 1/4"	No. 6	22.50
5	6 7/8"	4 1/8"	4 1/2"	No. 6	25.00

# Regular Stereoscopic Shutter

For stereoscopic work, a pair of shutters synchronized in their speeds and exposures, is a necessity. Our Stereoscopic Shutter is made for this special purpose and will accommodate any pair of lenses of 6 1/2" focus or shorter, f6.3 speed or slower. In the case of the Series II, 5" is the maximum focus accommodated.

Any Wollensak lenses can be matched for stereoscopic work at a cost of \$4.00. The price of the shutter is \$25.00.



Front Boards will be cut to receive lens, gratis, when supplied by the customer. If the customer has no extra front-board, we will gladly order it for him, if obtainable, when the order specifies the size, type and make of camera with which it is to be used. Front-boards are billed at cost and are non-returnable. To facilitate trial, we recommend that lens be ordered complete with front board.

The hole required in the front-board is in every case a scant 1/8" more than inside diameter of flange, as given in price lists accompanying lens descriptions. When the front-board is larger than the inside diameter of flange, but too small to accommodate entire flange, we can supply a *special metal front-board*, with a hole threaded to receive the lens, at a nominal cost, depending on work involved.

Table No. I

Distance in inches required from lens to subject with Wollensak Portrait Objectives

Heights of image on ground glass for average standing figures of 68 inches					Heights of image on ground glass for average head of 9 inches			
Name and Number of Lens	4 in.	6 in.	8 in.	10 in.	2 in.	4 in.	6 in.	8 in.
<b>Series II Velostigmat</b>								
No. 3.....	130	89	...	...	40	23	18	...
" 3A.....	148	102	78	...	45	27	21	17
" 4.....	171	117	90	...	52	31	24	20
" 5.....	216	148	114	94	66	39	30	25
" 6.....	252	173	133	109	77	45	35	29
" 7.....	279	191	147	121	85	50	39	33
" 8.....	351	240	185	152	107	63	49	41
<b>Vitax</b>								
No. 3.....	180	123	...	...	55	32	25	...
" 4.....	243	166	128	105	74	44	34	29
" 5.....	288	197	152	125	88	52	40	34
<b>Vesta</b>								
No. 2.....	126	86	...	...	38	23	...	...
" 3.....	180	123	...	...	55	32	25	...
" 4.....	207	142	109	90	63	37	29	24
" 5.....	252	173	133	109	77	45	35	29
<b>Versar</b>								
No. 3.....	157	108	...	...	48	28	22	...
" 4.....	171	117	90	...	52	31	24	...
" 5.....	209	143	110	91	64	38	29	25
" 6.....	270	185	142	117	82	49	37	32
" 7.....	297	203	157	129	91	54	41	35
" 8.....	324	222	171	140	99	58	45	38
<b>Verito</b>								
No. 3.....	157	108	...	...	48	28	22	...
" 4.....	207	142	109	...	63	37	29	24
" 5.....	261	179	138	113	80	47	36	31
" 7.....	324	222	171	140	99	58	45	38
Verito Ext. Lens	400	274	211	173	122	72	56	47

Figures given in above table are in inches and are the approximate distance from lens to subject.

Table No. II, Standard Flanges

Thread Diam.	Price	Thread Diam.	Price
1 1/8"	\$ .50	2 1/8"	\$1.35
1 1/16"	.60	2 3/8"	1.50
1 3/16"	.65	3 1/8"	1.60
1 1/2"	.80	3 5/8"	1.75
1 3/4"	1.00	4 3/8"	2.00
2 1/8"	1.25	4 3/4"	2.50

Note—When ordering flanges for Wollensak outfits, specify size, type and mounting. Special flanges can be made to order at an additional cost on receipt of mounting to be fitted.

Table No. III, Lens Caps

Inside Diam.	Price	Inside Diam.	Price
1 1/8"	\$ .50	3"	\$ .95
1 1/2"	.55	3 1/4"	1.00
1 3/4"	.60	3 1/2"	1.20
2"	.65	4"	1.40
2 1/4"	.70	4 1/2"	1.65
2 1/2"	.75	5 3/8"	2.00

Note—In addition to the above, we have intermediate sizes, which are governed in price by the next larger size. When ordering caps, specify outside diameter of lens cell.



## Special Fittings

A separate department is maintained to handle the special fittings that are incidental to our business. This department handles the fitting of lenses of other makes to Wollensak shutters and the fitting of our lenses to the customer's own shutter, when desired.

Any lens having a separation of  $2\frac{1}{2}$  mm. ( $1/8''$ ) or more can be mounted in a Wollensak shutter. If it is the customer's desire to have the lens interchangeable in the old and new mounting, the order should so specify. We reserve the right to alter the original mounting when necessary, unless we receive instructions to the contrary. It is always advisable to send us the lens in its original mounting, when ordering a shutter for it, in order that the correct separation may be accurately maintained.

Tables IV and V will help in determining the size of shutter which will best accommodate the lens. The cost of special fittings depends on the work involved, and, when desired, we will submit an estimate of the charge before proceeding with the work. In every case, it is as moderate as is consistent with good workmanship.

*Table No. IV, Shutter Specifications*  
(Weights in ounces; dimensions in inches.)

Shutter	Weight	Outside Diameter	Light Opening	Lens Opening	Flange Diameter		Overall Length
					Outside	Inside	
No. 0 Betax, Gammax or Deltax	$1\frac{1}{2}$	$1\frac{1}{2}$	$\frac{1}{8}$	$\frac{1}{2}$	$1\frac{1}{2}$	$\frac{1}{8}$	$\frac{3}{4}$
No. 1 Betax, Gammax or Deltax	$2\frac{1}{2}$	$1\frac{3}{4}$	$\frac{3}{4}$	$1\frac{1}{8}$	$1\frac{3}{4}$	$1\frac{1}{8}$	$\frac{3}{4}$
No. 2 Betax or Gammax	$3\frac{1}{2}$	$2\frac{1}{4}$	1	$1\frac{7}{8}$	$1\frac{3}{4}$	$1\frac{5}{8}$	$\frac{3}{4}$
Betax No. 3	$4\frac{1}{2}$	$2\frac{1}{2}$	$1\frac{3}{8}$	$1\frac{3}{4}$	$2\frac{1}{4}$	$1\frac{3}{4}$	$\frac{1}{2}$
Betax No. 4	$10\frac{1}{2}$	$3\frac{1}{4}$	$1\frac{3}{4}$	$2\frac{3}{8}$	$3\frac{1}{4}$	$2\frac{3}{4}$	$1\frac{3}{4}$
Betax No. 5	16	$4\frac{1}{4}$	$2\frac{1}{4}$	$2\frac{3}{4}$	$4\frac{1}{4}$	$3\frac{3}{4}$	$1\frac{3}{4}$
Optimo No. 0	2	$1\frac{1}{8}$	$\frac{1}{8}$	$\frac{3}{4}$	$1\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{2}$
Optimo No. 1	$3\frac{1}{2}$	$2\frac{1}{8}$	$\frac{3}{4}$	$1\frac{1}{8}$	$1\frac{1}{8}$	$1\frac{1}{8}$	$\frac{3}{4}$
Optimo No. 1A	$4\frac{1}{2}$	$2\frac{1}{4}$	$\frac{1}{8}$	$1\frac{3}{4}$	$1\frac{3}{4}$	$1\frac{3}{4}$	$\frac{3}{4}$
Optimo No. 2	6	$2\frac{3}{4}$	1	$1\frac{3}{4}$	$2\frac{3}{8}$	$1\frac{1}{8}$	$\frac{7}{8}$
Optimo No. 3	$10\frac{1}{2}$	$3\frac{3}{4}$	$1\frac{3}{8}$	$1\frac{7}{8}$	$2\frac{1}{4}$	$2\frac{1}{8}$	$\frac{3}{4}$
Optimo No. 4	$16\frac{1}{2}$	$4\frac{1}{8}$	$1\frac{3}{4}$	$2\frac{1}{8}$	$3\frac{3}{4}$	$2\frac{3}{4}$	$\frac{3}{4}$

Note—Wollensak barrels with iris diaphragm interchangeable with all Wollensak shutters.

## Table No. V

Size of Shutter required on popular Wollensak Lenses

(Small figures indicate the number of shutter; capital letters B, O, G and S stand for Betax, Optimo, Gammax and Studio shutters, respectively)

Size of Lens	VELOSTIGMATS				Series V Anastigmat	Versar	*Verito	Series IIIa	Voltas
	Series I	Series II	Series III	Series IV					
$2\frac{1}{4} \times 3\frac{1}{4}$	0B, 0O, 0G	1B, 0O, 1G	.....	0B, 0O, 0G	0B, 0O, 0G	.....	.....	.....	.....
$3\frac{1}{4} \times 4\frac{1}{4}$	1B, 1O, 1G	2B, 1aO, 2G	.....	1B, 1O, 1G	1B, 1O, 1G	.....	3B	.....	1B, 1G
4 x 5	2B, 1aO, 2G	3B, 2O	.....	2B, 1aO, 2G	2B, 1aO, 2G	3B	4B, 1S	.....	2B, 2G
$3\frac{1}{4} \times 5\frac{1}{2}$	2B, 1aO, 2G	3B, 2O	.....	2B, 1aO, 2G	2B, 1aO, 2G	.....	.....	.....	.....
5 x 7	2B, 1aO, 2G	3B, 3O	2B, 1aO, 2G	2B, 1aO, 2G	.....	3B, 1S	5B, 1S	2B, 2G	2B, 2G
5 x 8	.....	4B, 4O	.....	.....	2B, 1aO, 2G	.....	.....	.....	.....
$6\frac{1}{2} \times 8\frac{1}{2}$	3B, 3O	4B, 4O, 1S	2B, 1aO, 2G	3B, 3O	3B, 3O	4B, 1S	3S	3B	3B
8 x 10	4B, 4O	5B, 2S	3B, 3O	4B, 4O	4B, 4O	4B, 1S	4S	3B	4B
10 x 12	.....	3S	.....	.....	.....	5B, 2S	.....	4B	4B
11 x 14	5B	4S	3B, 3O	.....	.....	3S	5S	4B	5B, 2S
14 x 17	.....	5S	.....	.....	.....	3S	.....	5B	3S
17 x 20	.....	.....	.....	.....	.....	4S	.....	.....	4S

\* No. A, 1B; No. B, 2B.





A charming specimen of Verito work by the Thomas H. Ince Studio, Culver City, Cal.

## Table No. VI, The Choice of a Lens

(In using this condensed chart, first note the class of work in which you are interested, then read, in the preceding pages, the descriptions of the lenses recommended. First, second and third choice are indicated by the letters a, b and c, respectively. For brevity, the Velostigmats, the Series V Anastigmat f7.5 and the Series IIIa Ex. W. A., are designated by their Series number.)

Class of Work	Desirable Qualities	The Lens
1. Amateur (general)	See 13 and 18	
2. Architectural	Same as 5	
3. Banquets (medium angle)	Flat field, covering power, depth	(a) Series I (b) Process
3a. Banquets (extreme angle)	Same as 3	(a) Series IIIa (b) Series III
4. Child portraits	Extreme speed	(a) Vitax (b) Series II (c) Vesta
5. Commercial	Perfect correction, (see 22)	(a) Series I (b) Series II (c) Series IV, V
6. Copying, lantern slide making	Perfect correction, fine definition	(a) Process Lens (b) Series I (c) Series II
7. Diffused focus	Atmospheric quality, speed, minimum halation, convertibility	(a) Verito
8. Enlarging	Good speed and flatness of field	For sharpness (a) Series I, II or IV (b) Versar. For diffusion, Verito
9. Flash lights and artificial lighting	See 4, 17 and 20	
10. Full figures	Same as 20	
11. Groups	Flat field, good speed	(a) Series II (b) Series I (c) Series IV, V
12. Home portraiture	Speed, flat field, compactness, moderate focal length	(a) Series II (b) Series I (c) Versar. See also 7
13. Hand cameras	Speed, fine definition, sufficient depth	(a) Series IV (b) Series V
14. Landscapes	See 5 and 7	
15. Nature photography	Long focus and good speed	(a) Versar and Voltas in larger sizes (b) Single elements of Series I
16. Pictorial	See 7	
17. Portraiture	Speed and roundness (see 4, 7 and 20)	(a) Vitax (b) Series II (c) Vesta
18. Speed, Graflex, and Newspaper work	Large aperture, critical definition	(a) Series II (b) Series I, IV
19. Stereoscopic work	Two lenses of identical focus. Cost of matching \$4.00	(a) Series II (b) Series IV, V
20. Studio (general)	High speed, moderate focus, flat field	(a) Series II (see 4, 7, 17)
21. Views	Same as 5	
22. Wide angle	Extreme angle of view, minimum distortion	(a) Series III (b) Series IIIa



# Terms Pertaining to Lenses

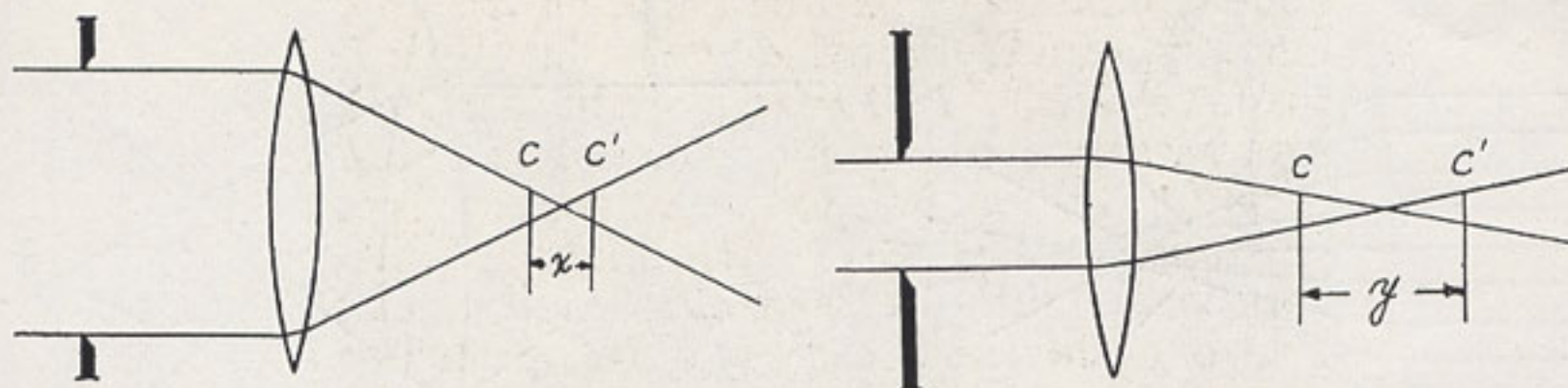


Figure No. 1

**FOCAL LENGTH** or equivalent focal length, is the distance between the nodal point (node of emergence) of the lens and the ground glass, plate or film, when an object at infinity—100 feet or more—is in sharp focus. Generally this “nodal point focus” is practically the same as the diaphragm focus, the distance from the diaphragm to the ground glass.

See Table I, page 26.

**THE SPEED** of a lens, which determines the illumination of the image, is generally expressed in the  $f$  system by the ratio existing between the focal length and the effective aperture. This effective aperture (the clear diameter of outer lens) is approximately the same as the largest diaphragm stop, but is not identical, as it takes into consideration the refraction and dispersion of the light rays. So if the speed of a lens is designated as  $f4$  the focal length is four times as great as the effective aperture. Exposure varies directly as the square of the  $f$  value, so an  $f8$  lens would be given four times the exposure of an  $f4$  lens, since  $8 \times 8$  or 64 is four times as great as  $4 \times 4$  or 16. Focusing on nearby objects increases the distance between lens and ground glass, decreasing the  $f$  value so that the exposure should be proportionately greater.

Diaphragm apertures of lenses are now generally marked in the  $f$  system. This has become standard in all countries, although cheaper types of objectives are still marked in the US system, even at this late date. The relative

stops in the US and  $f$  systems are given herewith:

US	1	2	4	8	16	32	64	128
$f$	4	5.6	8	11	16	22	32	45

**DEPTH OF FOCUS** is a term used to indicate the area or distance—near to far—over which a lens will render sharp definition. Theoretically, there is only one point (where the light rays cross) that is absolutely sharp, but for practical purposes an object-point that is reproduced in the negative as an image-circle not over  $1/250$ th of an inch in diameter will prove satisfactory in definition. This image-circle is termed the “circle of confusion,” indicated by  $c$  and  $c'$  in Figure 1 which is exaggerated for clearness. Depth of focus decreases as the size of aperture or the focal length increases. From the diagram it can be readily seen how the use of a smaller stop narrows the cone of light, thus increasing the distance between  $c$  and  $c'$  from  $x$  to  $y$ . As a greater range of focal planes is included in the greater distance  $y$  than in  $x$ , the depth is proportionately better.

Short-focus lenses, because their images lie in planes closer together, have greater depth. Photographs in which the object is near have not as much depth as those showing the object at a distance. It is a law of optics that all lenses having same speed and focal length have same depth of focus.

To summarize, depth is governed by diaphragm aperture, focal length and distance of object. With a given focus and object distance, the smaller the



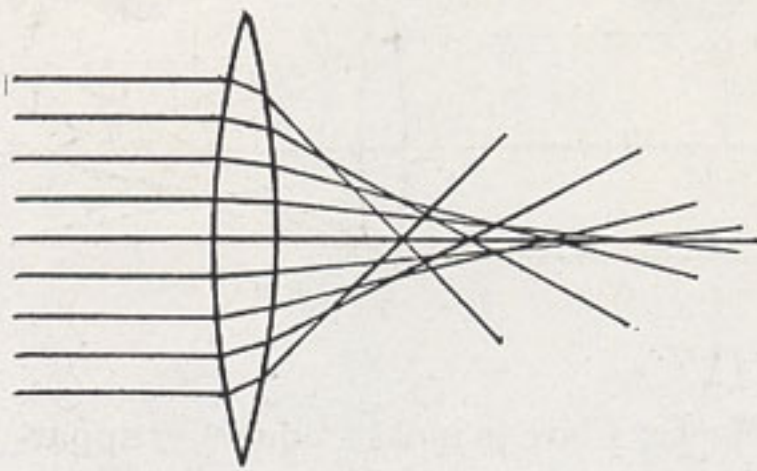


Figure II

stop, the greater the depth. At a given distance and diaphragm opening, the shorter the focus, the greater the depth. With a given focal length and stop, the greater the object distance the greater the depth.

ANGLE OF VIEW, as it is generally construed, is the angle included between the lines drawn from the opposite corners of the plate to the lens (or to the nodal point of emergence.) But a more scientific definition is to specify the angle included between the lines drawn from opposite ends of the diameter of the circular field of a lens to the nodal point of emergence.

All lenses do not utilize the entire circle of light, but only that portion of sharpest definition. Consequently they are lenses of ordinary angle, but can be used on larger plates when stopped down. Those lenses that utilize the entire circle of light with good definition are called wide angle lenses. Our Series III Velostigmat is both wide angle and anastigmatic.

COVERING POWER expresses the ability of a lens to reproduce sharply in the negative an evenly illuminated flat field. Because of their fine corrections Wollensak Velostigmats will "cover" the plates for which they are listed at their widest aperture. Most Wollensak lenses will cover a size larger plate than listed, when stopped down. Covering power depends principally on how well the various aberrations are corrected.

DEFINITION in a negative, that is, sharp sparkling detail, is obtained

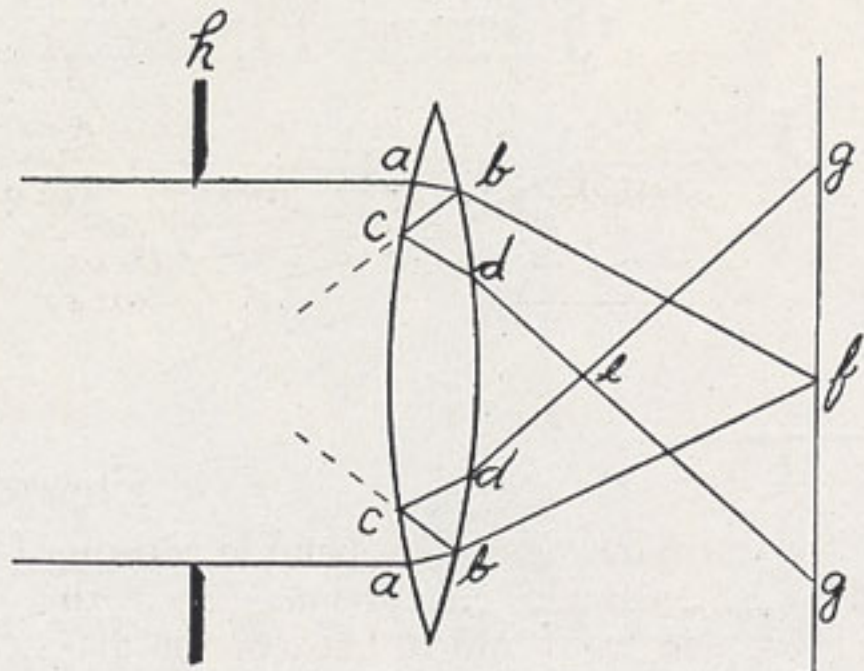


Figure III

by the use of a lens of correct formula constructed by expert workmen. The Velostigmats well illustrate the superior definition obtainable by the use of an anastigmat of quality. Definition in inexpensive lenses is improved by the use of a smaller opening.

DIFFUSION, such as the soft-focus results produced by our Verito, is, for pictorial purposes, often preferable to wiry definition, as it is a means of producing lifelike tonal values in artistic landscapes and portraits. See page 13.

CURVATURE OF FIELD is that quality of a lens that brings a flat object to a focus in a saucer-shaped or convex field. The result is that it is impossible to obtain an image of a flat object in focus at the center and edges of the field at the same time. All of our Velostigmats have a flat field so essential in a high grade anastigmat. However, for strictly studio work, large heads and busts, a slightly curved field is often preferable. In our Vitax and Vesta, it helps in producing a desirable "standing-out" effect.

DISTORTION, more properly termed "curvilinear distortion," is a fault that causes straight lines in the object to be rendered as curved in the negative. It is generally noticeable only on the marginal portions of a plate and is characteristic of Single Achromatic and other cheap lenses. With a single lens in back of the diaphragm, lines are bowed out, causing "barrel-shape" distortion; with the lens in front



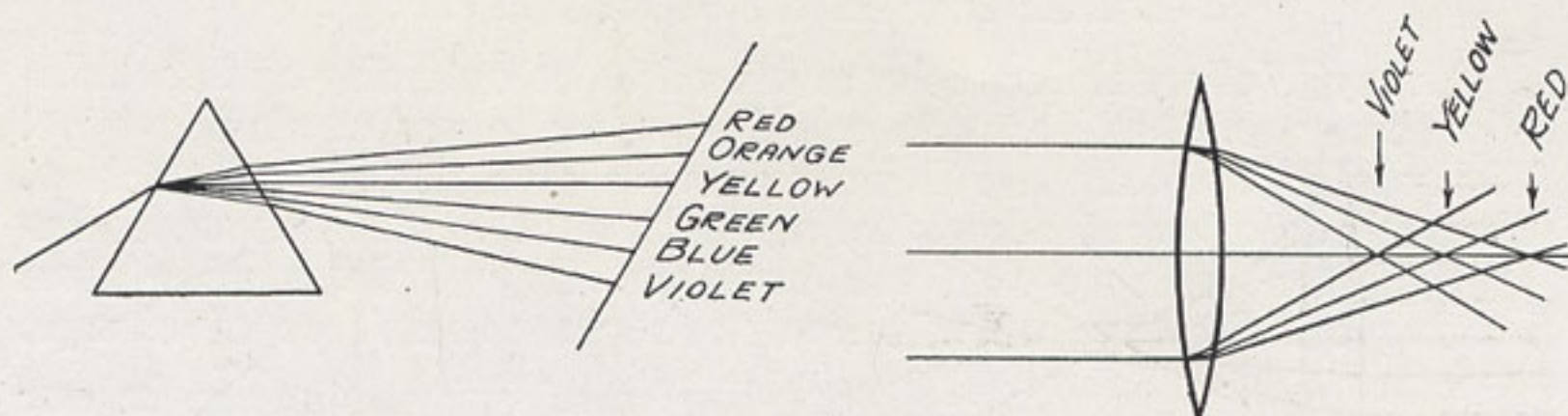


Figure IV

of the diaphragm, lines bend in causing "cushion-shape" distortion. So with lenses in front and in back of the diaphragm, each will nullify the distortion of the other. This is the principle of the Rapid Rectilinear or symmetrical type of lens.

**SPHERICAL ABERRATION** is a defect caused by the fact that rays passing through the marginal portions of a lens focus nearer the lens than do rays passing through the center, as shown in Fig. II. Theoretically, the curves in a lens should be parabolic but for manufacturing reasons, it is only practical to have them conform to spherical surfaces. This causes spherical aberration, corrected by the optician by carefully balancing positive with negative spherical aberration.

**COMA** resembles spherical aberration, but whereas the latter is caused by paraxial rays, coma, is caused by rays passing *obliquely* through the lens and failing to focus at a common plane. It usually causes a pear-shaped blur.

**FLARE.** Flare spot or ghost is the effect produced by the reflection of rays of light from the lens surfaces, forming secondary images and rendering a fogged appearance in the negative. This is clearly shown in Fig. III. Most of the light rays *ab* come to a focus at *f*. A few are reflected back along the path *bc*, most of them emerging at *c*. Part of this reflected ray in turn causes the reflections *cd* emerging and focusing at *e* and spreading over the plate in the circle *gg* which is an image of diaphragm *h*. In many lenses, circle *gg* is of so small a diameter that it would form a noticeable flare spot; but in most high grade objectives whatever reflections are present are so spread out over the negative that they have no noticeable

effect. Flare is most frequently apparent when photographing against the light, or when there is a decided contrast of light and dark.

**CHROMATIC ABERRATION.** Lenses with this fault fail to bring to a focus in the same plane the yellow and green rays to which the eye is most sensitive and the blue and violet rays which most affect the chemical properties of the plate. The result is that while the image may appear sharp on the ground glass, it is out of focus in the negative, as the chemical and visual foci are at different points. As shown in Fig. IV, a lens acts upon the rays of white light in much the same way as does a prism, breaking up the light ray into the colors of the spectrum. Various kinds of glass differ greatly in refractive and dispersive properties, so correction is secured by a proper combination of elements.

**ASTIGMATISM** is the inability of a lens to focus vertical and horizontal lines sharply at the same time. It is most noticeable at the edges of a plate and seriously impairs marginal definition. Lenses corrected for astigmatism are termed anastigmats. Every Velostigmat is an anastigmat.

**AIR BUBBLES** are not, as is often thought, a defect in photographic lenses. In fact, while they are more apparent in the highest type of lens, they seldom appear in the cheaper grades. Bubbles are caused by the necessity of fusing the optical glass, used in making lenses of high quality, at a certain temperature, whether all bubbles have risen to the surface or not, in order to maintain certain optical properties. Such bubbles absolutely do not impair the definition or lessen the efficiency of a lens in the slightest degree.



## Guarantee and Trial Privilege

Every Wollensak lens is guaranteed to be optically and technically correct and at least the equal of other lenses of similar type. Every Wollensak shutter is warranted to give perfect satisfaction. Should any of our products for any reason other than abuse or improper care, fail to perform satisfactorily within a year after leaving our factory, we will repair or replace them free of charge.

Perhaps the most tangible evidence of our confidence in our ability to satisfy the prospective purchaser of Wollensak products, is our liberal trial privilege, which permits a thorough test before buying. When the photographer is undecided between two different types or sizes of lens, we are willing to send both for comparative trial, through any established photographic stock-house or dealer. This trial privilege obligates the customer in no way whatsoever, although, as is customary, he is expected to pay express charges, when product is ordered on memorandum.

## Terms

All Wollensak products are sold only through established photographic stock-houses and dealers. When the customer has no local dealer, we are glad to put him in touch with someone conveniently located who can take care of his requirements. No goods are sent on consignment, but every lens and shutter is subject to our broad guarantee and trial privilege, if desired. Goods are packed and delivered to transportation companies in good order and without charge, and prices are F. O. B. Rochester. In the absence of instructions, we will use our best judgment in routing shipments.

## Advisory Service

To assist users of our own and other makes of lenses in securing the best possible results, to help them in the solution of any problems they might encounter and to assist in the selection of the lens and shutter equipment best suited to their needs, we have established a Service Department. Do not hesitate to call on this department, whenever you think it can help you, and we assure you that each individual problem will be given personal attention. There is absolutely no charge for this service.

