

Petzval Portrait Lenses and Their History



Daguerre announced his process to the world on August 19, 1839. The original [Daguerre & Giroux Camera](#) utilized a lens designed and manufactured by Charles Chevalier, celebrated microscope maker and son of Vincent Chevalier who founded their optical business in France.

The Chevalier 16-inch telescope objective was comprised of a cemented doublet and was [achromatic](#). The lens, which covered a whole plate, had a working aperture of $f/17$, and suffered from considerable spherical aberrations. The slow, small aperture, combined with the extremely low sensitivity of the original materials, meant even in bright sunlight, exposures could run 10 minutes or more. This only allowed for fixed objects to be reproduced "faithfully" and prevented the ability to capture the human likeness with any ease.

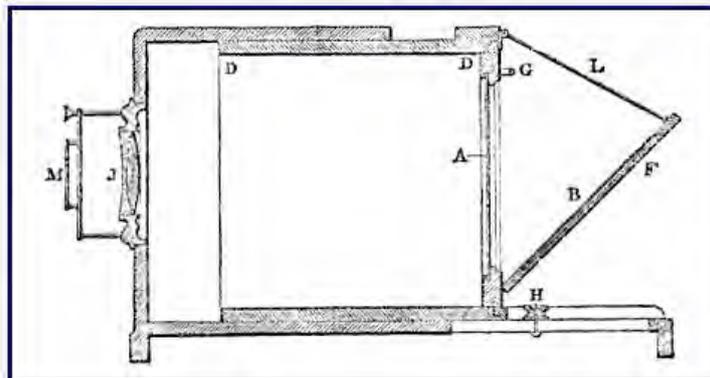


Illustration of Daguerre's camera and Chevalier's lens.

From *Photography* by Robert Hunt, Francis Peabody (Ireland) 1853 Griffin & Co.

The significance of Daguerre's process and how important being able to apply it to capturing people's likenesses was immediately apparent to the scientific community. In fact, once the immediate novelty of the process had been fully explored by 1840, it was the commercial aspect of taking "Sun Portraits" that started a race among opticians, telescope and microscope makers, and other scientists to design a faster lens to allow for faster exposures and enable portrait work. Concurrently, chemists and scientists worked on improving the sensitivity of the plate to also aid in reducing exposure times.

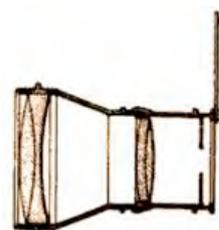
Within short order, in 1840, Charles Chevalier and Joseph Petzval each came up with their own, faster, lens designs.

Charles Chevalier's Design of 1840

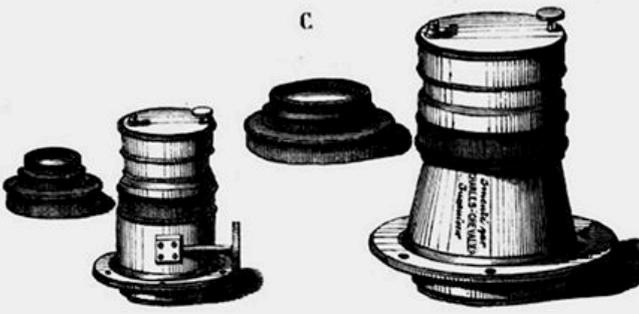
Chevalier designed a lens he called the, "**Photographe a Verres Combine.**"

He combined two cemented achromats that brought speeds down to about $f/5.6$ for portrait work, and, as a bonus, the lens could be converted for use as a landscape lens.

The issue with Chevalier's design was that it suffered from a lack of overall sharpness. Over the years, Chevalier made slight improvements to the lens and frequently advertised that Fox Talbot was a user and fan of the lens. Chevalier sold this lens for sale for over twenty years (as late as 1863), despite its lack of commercial popularity.



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OBJECTIFS DOUBLES A VERRES COMBINÉS
Demi-rapides pour portraits et rapides pour paysages.
 (Inventés par CHARLES CHEVALIER en 1840.)

Ces objectifs, d'un foyer moyen, opèrent moins vite que les objectifs A, mais ils donnent plus de netteté générale et couvrent une surface plus grande. Ils sont composés de deux verres, mais on peut acquérir un troisième verre, afin de pouvoir modifier leur foyer. Ce troisième verre se substitue au verre antérieur. Lorsqu'on nous demande ces objectifs sans désignation spéciale, nous les livrons avec le verre antérieur à foyer court; de la sorte, on peut faire le portrait et le paysage en employant un petit diaphragme. On peut aussi, afin d'avoir le système complet, demander l'objectif à 3 verres, ou encore l'acquérir seulement avec un verre antérieur long foyer, on a ainsi l'objectif le plus parfait pour le paysage, bien préférable à l'objectif simple, car l'objectif double donne plus de perspective, d'harmonie, de profondeur et de finesse.—Nous ferons aussi remarquer qu'à partir du format 30 sur 40, les objectifs ne servent plus pour portraits, mais seulement pour paysages; dans ce cas, le troisième verre s'applique pour modifier le foyer, ce qui peut être utile dans certains cas.

49. Pour 1/6 de plaque (35 millim. de diam.) avec engrenage.	35	•
50. — 1/4 — (48 —) —	45	•
51. — 1/2 — (61 —) —	75	•
52. — plaque entière (80 —) sans engrenage.	160	•
53. — — 27—21 (80 —) —	160	•
54. — — 30—24 (95 —) —	180	•
55. — — 37—28 (108 —) —	350	•
56. — — 30—40 (108 —) —	350	•
57. — — 40—50 (108 —) —	350	•
58. — — 50—60 (135 —) —	500	•
59. — — 60—70 (135 —) —	500	•
60. — — 120—100 (165 —) —	1000	•

PRIX DU TROISIÈME VERRE.

61. Pour 1/6.	10	•
62. — 1/4.	15	•
63. — 1/2.	25	•
64. — plaque entière.	25	•

Advertisement of Chevalier's "PVC" Lens from the catalogue, Instruments Pour La Photographie by Arthur Chevalier (Paris) 1863

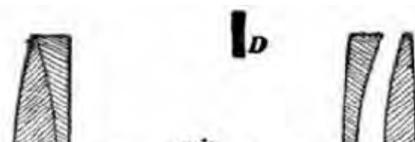
It should be noted that in May of 1842, the Society of Encouragement evaluated Chevalier's lens and Petzval's lens (discussed below). Accounts of the judges decision was that Chevalier's dual purpose lens was a more significant achievement than Petzval's design. History would prove them very wrong.



An example from Westlicht Auctions

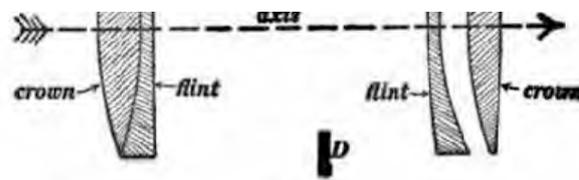
Joseph Petzval's Design of 1840

While Chevalier was presenting his design to the world, Joseph Petzval, a Professor of Mathematics at Vienna University, came up with a lens design that provided for speeds of f/3.6 and had superb sharpness in the center of the image. This design was some twenty times faster than the original Chevalier lens, and about a stop and a half faster than Chevalier's f/5.6 Photographie a Verres Combine

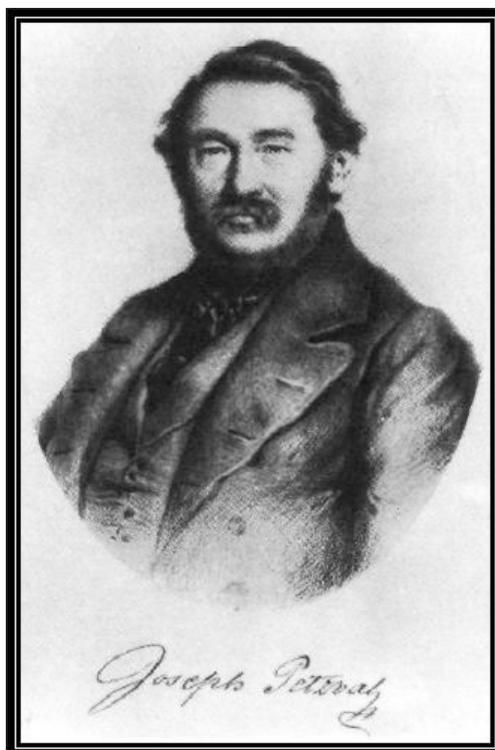


lens. The speed and performance of Petzval's design was nearly perfect for the purpose and literally gave birth to commercial photography, which started with the taking of portraits.

The design was an instant success and due to a lack of patent protection, was quickly copied the world over. The firm of Voigtlander & Sons, who worked closely with Petzval at the time, was the first manufacturer of the Petzval designed lens and was instantly rewarded with international success and a reputation for producing the finest lenses.



Petzval's portrait lens.



From *A Dictionary of Photography* By Thomas Sutton, John Worden 1858 (London):

"PETZVAL'S PORTRAIT COMBINATION. The object of this instrument is to obtain an image well defined in its principal parts, when a large volume of light is admitted. In taking a portrait it is evident that the time of exposure should be reduced as much as possible, because after remaining in a constrained position for a long time the features of the sitter betray an expression of the discomfort felt. A lens of large aperture must therefore be employed in portraiture, so long as photographic processes remain in their present state of insensitiveness. As soon however as the chemist shall discover the means of rendering these processes more sensitive, the optician will be released in a corresponding degree from the necessity of constructing lenses of large aperture, and the defects to which such lenses are liable, and which admit of no remedy, will be avoided by using smaller apertures.

The portrait combination of Professor Petzval is that which has been generally adopted by opticians, and the arrangement of the lenses is..... The front lens A is a compound lens, exactly like the common view-lens, but placed with its convex side to the objects. It is achromatic, but not entirely aplanatic; this defect being remedied by the posterior lens. The posterior lens is composed of two lenses B & C separated by a small space; that next the front lens is of flint glass, convexo-concave, and divergent, being thinner in the middle than at the edges; the other is biconvex, and of crown glass, being placed with its most convex side next to the concavity of the flint, as shown in the figure."

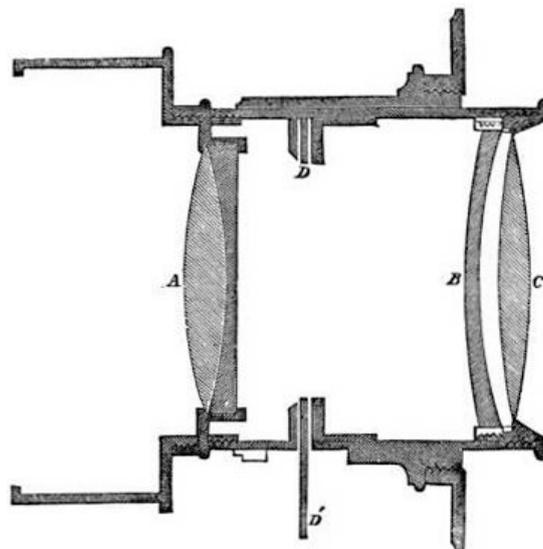
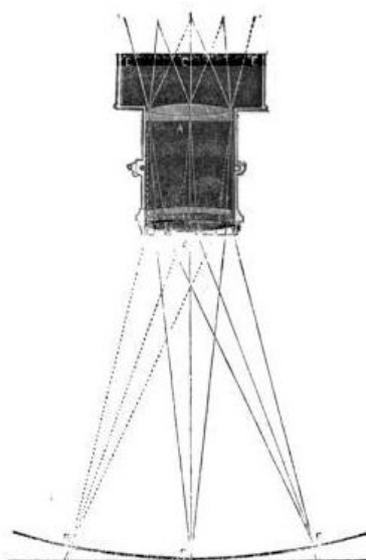


Fig. 64.
Illustration from Optics : Light and Sight. By Edward Nugent (London)
1870.

Optical Signature of a Petzval Lens

The optical signature of the Petzval Portrait lens is crisp central sharpness over a very narrow field (about 15 degrees) with significant curvature of field and vignetting. These design "defects" provided added benefit to the portrait images they produced as the progressive vignetting tended to help focus the viewers attention on the crisp, central image of the plate.

Today, Petzval lenses have come into vogue by users who have come to appreciate the optical effects of the design. Modern users tend to emphasize the design's defects, especially by shooting close up and with lenses of too little coverage, creating images that are unique and display ample amounts of [Bokeh](#). There is a certain mystery to how any older lens will shoot and it appears the Petzval design is currently being explored by many. Here are few distinctive Petzval images found on the web. [Example one](#) and [two](#). Here is a very useful series of [images](#) taken with Petzval lenses at varying apertures. A new site that is featuring Petzval images is [here](#).



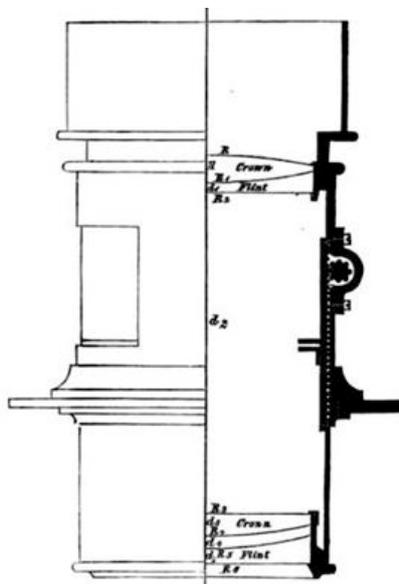
Petzval's design was referred to and advertised under many different names. Some of these include:

Petzval Portrait

Petzval's Portrait Combination

Petzval's Portrait Objective

Double Lens
Double Combination
Double Objective
Compound Lenses
Compound Achromatic Lenses
Double Combination of Achromatic Lenses
German Lens



Cut Away of a Petzval Lens made by Suter c. 1866

Early Makers & Dealers of Petzval type Portrait Lenses

1840's Voigtlander (Austria/Germany); Ross (UK); Lerebours & Secretan (France); Horne & Thornthwaite (UK); Grubb (Ireland); CC Harrison (US)

1850's Jamin (France); Holmes, Booth & Haydens (US); Derogy (France); Hermagis (France); Gasc & Charconnet (France); Busch (Germany); Suter (Switzerland); Dietzler (Austria); Wray (UK)

1860's Darlot (France); Dallmeyer (UK); Steinheil (Germany)

The very first Voigtlander Petzval lens produced was mounted to the famous all-metal [Voigtlander Daguerreotype Camera](#).

[Image of a very early Voigtlander Petzval, Serial # 439](#) which dates to 1841 or 1842.



In the 1840's and most of the 1850's, Voigtlander dominated portrait lens sales both in Europe and, via import, the United States. The Voigtlander lens was generally considered the best available although each country had its own premier maker. Lerebours of France and Ross of England were also very well respected lens makers early on. In the United States in the 1840's, most lenses were made by telescope and microscope makers like John Roach and Henry Fitz, but it was Charles C. Harrison who rose to prominence by 1850. Harrison is considered the first American maker focused entirely on producing photographic objectives. In fact, within a few years, Harrison lenses gained national recognition and were considered excellent performers at a much more modest price than the imports.

Advertisement from "A Treatise on Daguerreotype..." by Levi Hill, NY, 1850; which shows the price differential between American made lenses (with American glass), American made lenses with German glass, and Voigtlander's lenses.

CAMERAS.			
Achromatic American,	German glass,	quarter,	\$20
"	"	half,	35
"	American	quarter,	30
"	"	half,	25
Voightlaender & Sons,	quarter,	- - -	35
"	half,	- - -	55
"	whole,	- - -	150
"	double whole,	- - -	300
Camera Stand,	- - -	- - -	3
Quick working instruments, various prices.			

By the late 1850's the worldwide portrait lens market greatly expanded with newer makers and even more numerous dealers. Many dealers purchased unmarked lenses from makers and relabeled them or sold them as their own.

Portrait Lens Categories and Period Advertisements



1880's Mammoth-Sized Albumen Print of a Photographer

Sellers typically categorized their product lines by lens speed. Each seller had their own marketing terms, but the lenses were commonly offered in three varying speeds.

The basic portrait lens was usually advertised as, "Quick" or "Rapid." These lenses tended to be about $f/4$ in speed from most manufacturers. These lenses had more modest specifications and, correspondingly, more moderate prices.

The premier portrait lens was typically called "Extra-quick" or a "Superior" lens. These were faster lenses, typically about $f/3$ in speed, and correspondingly, were much more expensive and were physically much larger lenses.

The last type were called, "Group" Portrait Lenses, which tended to be about $f/6$ in speed. The smaller aperture provided greater depth of field and more uniform sharpness across the field in order to photograph "groups" of people.

Some Period Petzval Lens advertisements...

PHOTOGRAPHIC APPARATUS,

CHEMICALS, &c,

MANUFACTURED AND SOLD BY

HORNE, THORNTHWAITHE, AND WOOD,

(Successors to E. Palmer,)

Opticians, Mathematical and Philosophical Instrument Makers,

123, NEWGATE STREET, LONDON.

	£.	s.	d.
Photographic Camera, with Brass Sliding Front and meniscus Lens, for obtaining pictures on paper, 4 inches by 3, fig. 7, price	1	1	0
Ditto, of the best construction	1	15	0
Cundell's improved Camera for Calotype drawing, with divided Ivory Scale, fig. 8	3	3	0
Photographic Camera, fitted with a Single Achromatic Lens, Sliding Brass Front, suitable for both the Daguerreotype or Calotype processes 25s. to	1	15	0
Ditto, ditto, of superior construction	2	2	0
Ditto, ditto, with Calotype Chemicals and Apparatus	3	3	0
Ditto, ditto, with Daguerreotype Apparatus and Materials, complete in Case	5	5	0
Ditto, ditto, with Achromatic Lens, and fine rack-work adjustment, front for pictures, 4 inches square, fig. 10	2	10	0
Ditto, of best construction	3	3	0
Ditto, ditto, with Calotype Apparatus and Chemicals . . . 3l. 16s. to	4	4	0
Ditto, ditto, with Daguerreotype Apparatus and Materials, in case 6l. 10s. to	7	7	0
Ditto, ditto, for Pictures, 5 inches square	3	13	6
Ditto, ditto, ditto, 6 ditto,	5	5	0
Ditto, ditto, ditto, 8 ditto	8	8	0
Photographic Camera, with best compound Achromatic Lens, 1½ inch diameter, fig. 11	5	15	6
Ditto, ditto, complete in Case, with every requisite for obtaining Daguerreotype pictures, 2½ inches by 3½	10	10	0
Ditto, ditto, with best compound Lens, 2 inches diameter	8	8	0
Ditto, ditto, complete, with all the necessary Apparatus and Chemicals for obtaining pictures by the Daguerreotype process on plates, 2½ inch by 3½, and 3 inch by 4, in lock-up case	15	15	0
Ditto, ditto, for plates, 8½ inch by 6½	35	0	0
Achromatic Lenses of the best quality, 1½-inch diameter			
Ditto 1½ "			
Ditto 1¾ "			
Ditto 2 "			
Ditto 2¼ "			
Double Achromatic Lenses, 1½ in diameter mounted in Brass front, with rack-work adjustment, fig. 13	3	13	6

A Guide to Photography by Horne Thornthwaite and Wood 1845 (UK)

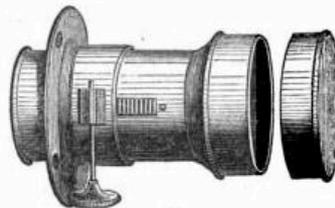
*CAMERAS, (See arts. Camera, pp. 28 & 30, Part I. For convenience, we include under this head the tube and lenses only, although correctly speaking, the camera proper is incomplete without the box.)		
31	_____	‡CHAPMAN'S, New York make, - - - - -
32	_____	_____ " " " - - - - -
33	_____	_____ " " " - - - - -
34	_____	_____ " " " - - - - -
35	_____	_____ " Mammoth, or - - - - -
36	_____	¶CHEVALIER'S, Paris, to order, - - - - -
37	_____	_____ " " " - - - - -
38	_____	_____ " " " - - - - -
39	_____	*HARRISON'S. (Undoubtedly the best now manufactured,) - - - - -
40	_____	HARRISON'S - - - - -
41	_____	_____ " (A very fine article) - - - - -
42	_____	_____ " - - - - -
43	_____	_____ " - - - - -
44	_____	_____ " (Identical with extra ½) - - - - -
45	_____	_____ " - - - - -
46	_____	_____ " Mammoth, or - - - - -
47	_____	†PALMER & LONGKING'S, first quality, - - - - -
48	_____	_____ " " " " - - - - -
49	_____	_____ " " " " - - - - -
50	_____	_____ " " " " - - - - -
51	_____	_____ " " second " - - - - -
52	_____	_____ " " " " - - - - -
53	_____	_____ " " " " - - - - -
54	_____	_____ " " " " - - - - -
55	_____	¶VOIGTLANDER'S, - - - - -
56	_____	_____ " - - - - -
57	_____	_____ " - - - - -
58	_____	_____ " - - - - -
59	_____	_____ " - - - - -

EHT Anthony 1854 Catalogue

DOUBLE COMBINATION OF ACHROMATIC LENSES.

The Double Lenses are adapted for taking portraits, figures, groups, &c., as they admit a great quantity of light, and consequently produce a picture in less time than a single lens.

- 63. A Double Combination of Achromatic Lenses, 1·7 inches in diameter, having a combined focus of about 4 inches, mounted in brass, with rack and pinion adjustment, producing a PICTURE 4¼ in. by 3¼ inches. Price £2.
- 64. A Double Combination of Achromatic Lenses, 2·4 in. in diameter, having a combined focus of about 7 inches, mounted in brass, with rack and pinion adjustment, producing a PICTURE 6½ inches by 4¾ inches. Price £3, 10s.
- 65. A Double Combination of Achromatic Lenses, 3·2 inches in diameter, having a combined focus of about 10 inches, mounted in brass, with rack and pinion adjustment, producing a PICTURE 8½ inches by 6½ inches, £8, 8s.
- 66. A DIAPHRAGM of stops fitted to either of the above sets of Lenses, 15s.



77.

The use of this Diaphragm is given in the explanatory note at page 2.

BLAND & LONG'S COMPOUND ACHROMATIC LENSES FOR PORTRAITS.

These combinations are particularly recommended from the qualities they possess of giving a flat field, and having their optical and chemical foci coincident, producing an image on the sensitive surface in an extremely short space of time.

Combination Achromatic Lenses, mounted in handsome brass fronts, with rackwork adjustment, and adapted for either portraits or views:—

No.	Description	£	s.	d.
1.	For pictures, 4½ by 3½ inches (Fig. 4.)	3	13	6
2.	“ arranged for views, 6 by 5 in., and portraits, 4½ by 3½ in.	4	0	0
3.	“ 5 by 4 in.	4	14	6
4.	“ arranged for views, 7 by 6 in., and portraits, 5 by 4 in.	5	5	0
5.	“ 6 by 5 in.	7	7	0
6.	“ arranged for views, 9 by 7 in., and portraits, 6 by 5 in.	8	0	0
7.	“ 8½ by 6½ in.	15	15	0
8.	“ arranged for views, 12 by 10 in., and portraits, 8½ by 6½ in.	16	16	0

The arrangement of the above Lenses for views, consists in the removal of one lens in the combination, and placing the other in a different position in the sliding tube, with the requisite stops or diaphragms for regulating the amount of light.

COMPOUND ACHROMATIC FOREIGN LENSES FOR PORTRAITS.

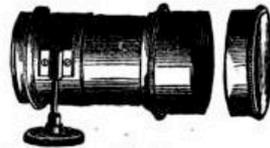
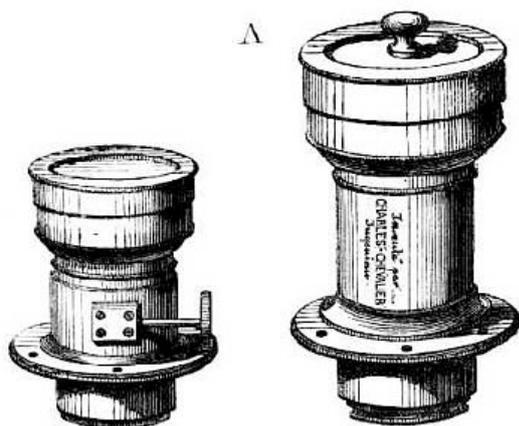


Fig. 5.

No.	Description	£	s.	d.
1.	For pictures, 4½ by 3½ inches (Fig. 5.)	1	7	6
2.	“ 6½ by 4½ “	3	10	0
3.	“ 8½ by 6½ “	8	0	0

Practical photography, on glass and paper By Charles Long 1856 (UK)



Instruments Pour La Photographie by Arthur Chevalier (Paris) 1863

OBJECTIFS DOUBLES A LARGES VERRES. Rapides pour Portraits.

17.	Pour 1/6 de plaque (35 mill. de diam.) avec engrenage	35
18.	— 1/4 — (48 —) —	45
19.	— 1/2 — (61 —) —	75
20.	— plaque entière (80 —) —	180
21.	— — (95 —) —	280
22.	— plaque de 24—30 (108 —) sans —	475
23.	— — 30—40 (135 —) —	750
24.	— — 50—60 (165 —) —	1350
25.	— — 60—70 (225 —) —	4000

OBJECTIFS TRÈS-RAPIDES.

26.	Pour 1/4 de plaque (61 mill. de diam.) avec engrenage	95
27.	— 1/2 — (80 —) —	200

CHAPMAN'S CAMERAS.

I would respectfully call Photographers' attention to my Cameras, which I warrant to be equal in every respect to any made, and which I offer at about half the price of cameras of other manufacture.

In order that the purchaser may have an opportunity, before buying, of thoroughly testing the Camera under his own light, and with his own chemicals, I have adopted the following plan, viz. :—

I send the camera by express, with instructions to the Agent to collect and retain the money for it until it has been tested, when, if it does not prove satisfactory, to refund the money and return the camera to me.

PRICE LIST.

	Plain.	With central stops.
1-9 size Tube and Lens.	\$ 7 50	
1-4 do. do.	18 00	\$23 00
1-3 do. do.	25 00	30 00
1-2 do. do.	33 00	40 00
Extra 1-2 do. do.	40 00	45 00
4-4 do. do.	55 00	65 00
Extra 4-4 do. do.	90 00	110 00
8-4 do. do.	—	150 00

View Attachments for above Tubes.

1-3 size	\$ 4 00
1-2 "	5 00
4-4 "	8 00
Extra 4-4 "	10 00

View Tubes and Lenses.

1-3 size will cut plates 8 x 10.	\$12 00
1-2 " " " 10 x 12.	15 00
4-4 " " " 14 x 17.	28 00
Extra 4-4 " " " 18 x 24.	46 00

Ferrotypes Cameras.

Four 1-9 Tubes and Lenses with Box and Holders for taking sixteen 1-64, eight 1-32, or four 1-12 gem pictures on 1-4 plate, complete, \$40 00.

Four 1-9 Tubes and Lenses with Box and Holders for taking all the gem pictures as above, and by attaching a single tube (for which an extra front is sent), two card pictures on a half plate, and all the regular ambrotypes, from 1-9 to 1-2 inclusive, reverse holders, complete, \$45 00.

GEO. A. CHAPMAN,

MANUFACTURER, IMPORTER, AND DEALER

In every description of

Ambrotype and Photograph Materials,

63 DUANE STREET, NEW YORK

Dry Plate Photography.... By John Towler London/NY 1865

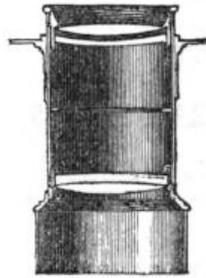


Fig. 3.
Sectional view of Compound Achromatic Lens.

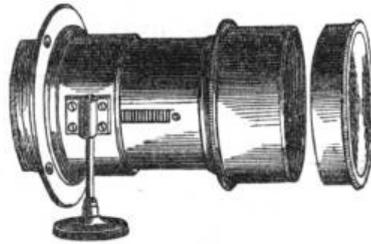


Fig. 4.

**BLAND & CO.'S
COMPOUND ACHROMATIC LENSES FOR PORTRAITS,**
Fitted with set of Waterhouse's Central Diaphragms. (Fig. 5.)

These combinations are particularly recommended for the qualities they possess of giving a flat field, and having their optical and chemical foci coincident, producing an image on the sensitive surface in an extremely short space of time.



Waterhouse's Stops. (Fig. 5.)

Combination Achromatic Lenses, mounted in handsome brass front, with rackwork adjustment, and adapted for either portraits or views:—

	£	s.	d.
FOR PICTURES			
No. 1. $4\frac{1}{2}$ by $3\frac{3}{4}$ in. (Fig. 4.) . . .	2	15	0
2. arranged for views, 6 by 5 in. and portraits, $4\frac{1}{4}$ by $3\frac{1}{4}$ " . . .	3	0	0
3. 5 by 4 in.	4	4	0
4. arranged for views, 7 by 6 " and portraits, 5 by 4 "	4	10	0
5. 6 by 5 in.	5	10	0
6. arranged for views, 9 by 7 " and portraits, 6 by 5 "	6	0	0
7. $8\frac{1}{2}$ by $6\frac{1}{2}$ in.	11	16	0
8. arranged for views, 12 by 10 and portraits, $8\frac{1}{2}$ by $6\frac{1}{2}$ "	12	12	0

The arrangement of the above lenses for views consists in the removal of one lens in the combination, and placing the other in a different position in the sliding tube, with the requisite stops or diaphragms for regulating the amount of light.

Practical photography, on glass and paper. By Charles Long 1864 (UK)

THE
"PEERLESS" PORTRAIT LENS.

"PEERLESS" QUICK-ACTING.

PRICES.

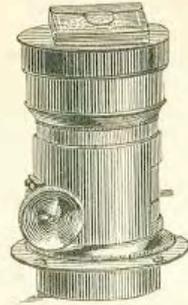
- No. 1 a. 1-4 size, double achromatic lenses, $2\frac{1}{2}$ in. diameter, focal length 4 in., rack and pinion, and fitted with five Waterhouse diaphragms in morocco case. \$25 00
- No. 2 a. 1-2 size, double achromatic lenses, $2\frac{3}{8}$ in. diameter, focal length 7 in., rack and pinion, and fitted with seven Waterhouse diaphragms in morocco case. 40 00
- No. 3 a. 4-4 size, double achromatic lenses, 3 in. diameter, focal length 9 in., rack and pinion, and fitted with eight Waterhouse diaphragms in morocco case. 60 00
- No. 4 a. Ex. 4-4 size, double achromatic lenses, 4 in. diameter, focal length $14\frac{1}{2}$ in., rack and pinion, and fitted with eight Waterhouse diaphragms in morocco case. 150 00

These Lenses are Guaranteed First Class in every respect.

SCOVILL MANUFACTURING CO., NEW YORK.

The Photographic Times 1881

DARLOT LENSES.



Having seen a great many spurious Darlot lenses, and against which we warn the profession, we have "B. F. & Co." engraved on the tubes of all sizes. See that this mark is on them, if you want the genuine Darlot.

DARLOT PORTRAIT-LENSES,

WITH RACK AND PINION, PLAIN.

We have these Lenses made expressly for Magic Lanterns and Stereopticons. Can be had in matched pairs of equal focus.

Size.	Diameter.	Focus.	Price.
1-4	$1\frac{5}{8}$ inch.	$4\frac{1}{2}$ inch.	\$7 00
1-3	$1\frac{7}{8}$ "	$5\frac{1}{2}$ "	12 00
1-2	$2\frac{1}{4}$ "	7 "	14 50
2-3	$2\frac{1}{2}$ "	$8\frac{1}{2}$ "	21 00
4-4	3 "	$10\frac{1}{2}$ "	32 00

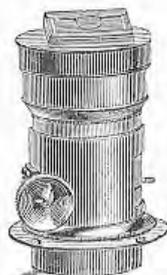
See table of sizes and distances for projection on inside cover.

VOIGTLÄNDER & SON'S

REGULAR

PORTRAIT-LENS,

Exclusively



For Portraits.

"QUICK-WORKERS."

THESE are double-combination lenses; possess the greatest illuminating power consistent with fine definition, and work in less time than any other regular portrait-lens. They are, therefore, very desirable for photographing children and nervous persons, but specially adapted to bust-portraits on cards and cabinets, yielding pictures which excel in roundness (stereoscopic effect) and extreme brilliancy. All are provided with rack and pinion movement (except No. 6 B and No. 7 B, which are mounted in rigid settings) and central stops. Ratio of aperture to focus 1 to $3\frac{1}{6}$ or $\frac{F}{3.16}$.

Number.	Diameter of Lens.	Equivalent Focus.	Size of Plate.	Price.
3B	2 in.	$6\frac{1}{2}$ in.	$3\frac{1}{4} \times 4\frac{1}{4}$	\$57 00
4B	$2\frac{1}{2}$ "	$8\frac{1}{4}$ "	$4\frac{1}{4} \times 6\frac{1}{2}$	78 00
5B	3 "	$9\frac{1}{6}$ "	5×7	90 00
6B	$3\frac{1}{2}$ "	11 "	$6\frac{1}{2} \times 8\frac{1}{2}$	130 00
7B	4 "	14 "	8×10	165 00

1890 Benjamin French & Co. Catalogue (US)

“ Busch ” Lenses.

(F)

Portrait Lenses.

PETZVAL FORMULA.

Especially Suitable for Artistic and General Portraiture.

Series I. has in proportion to the diameter of the objective, the longest focus, least rapidity, greatest definition, and largest picture.

SERIES I. F 4 to 4.5.

No.	Diameter of Lenses.	Equivalent Focus.	Back Focus.	Size of Plate.	Covering Circle, Smallest Diaphragm.	Price.
	Inches.	Inches.	Inches.	Inches.	Inches.	£ s. d.
1 ¹	1 $\frac{1}{8}$	6 $\frac{1}{2}$	4 $\frac{3}{8}$	4 $\frac{1}{4}$ × 3 $\frac{1}{8}$	5 $\frac{1}{2}$	2 10 0
2 ¹	2 $\frac{3}{8}$	8 $\frac{3}{8}$	6 $\frac{1}{4}$	6 $\frac{1}{2}$ × 4 $\frac{1}{2}$	8	4 0 0
3 ¹	2 $\frac{3}{8}$	9 $\frac{1}{4}$	7	6 $\frac{1}{2}$ × 5	8 $\frac{3}{8}$	5 0 0
4 ¹	2 $\frac{1}{2}$	10 $\frac{1}{2}$	8	8 × 6 $\frac{1}{2}$	10	6 5 0
5 ¹	3 $\frac{1}{8}$	12 $\frac{1}{2}$	9 $\frac{1}{2}$	7 $\frac{1}{2}$ × 9 $\frac{1}{2}$	12	8 0 0

Series II. has somewhat shorter focus, a little less marginal definition, greater rapidity, and smaller picture.

SERIES II. F 3.5 to 4.

No.	Diameter of Lenses.	Equivalent Focus.	Back Focus.	Size of Plate.	Covering Circle, Smallest Diaphragm.	Price.
	Inches.	Inches.	Inches.	Inches.	Inches.	£ s. d.
1 ²	1 $\frac{1}{8}$	5 $\frac{1}{2}$	4	4 × 3 $\frac{1}{8}$	5	2 15 0
2 ²	2 $\frac{3}{8}$	7 $\frac{3}{8}$	5 $\frac{1}{2}$	5 × 4	6 $\frac{1}{2}$	4 5 0
3 ²	2 $\frac{3}{8}$	8 $\frac{3}{8}$	6 $\frac{3}{8}$	5 $\frac{1}{2}$ × 4 $\frac{1}{2}$	7	5 5 0
4 ²	2 $\frac{1}{2}$	9	7	6 $\frac{1}{2}$ × 4 $\frac{1}{2}$	8	6 10 0
5 ²	3 $\frac{1}{8}$	11	8 $\frac{1}{4}$	8 × 6 $\frac{1}{2}$	10	8 10 0

1904 Kodak London Catalogue (UK)

Series III. has the shortest focus, greatest rapidity, least marginal definition, and the smallest picture.

SERIES III. F 3 to 3.5.

No.	Diameter of Lenses.	Equivalent Focus.	Back Focus.	Size of Plate.	Covering Circle, Smallest Diaphragm.	Price.
	Inches.	Inches.	Inches.	Inches.	Inches.	£ s. d.
2 ³	2 $\frac{1}{8}$	5 $\frac{1}{2}$	4 $\frac{3}{8}$	4 $\frac{1}{4}$ × 3 $\frac{1}{8}$	5 $\frac{1}{2}$	4 10 0
3 ³	2 $\frac{3}{8}$	6 $\frac{3}{8}$	5	4 $\frac{1}{2}$ × 3 $\frac{1}{2}$	6	5 10 0
4 ³	2 $\frac{1}{2}$	7 $\frac{1}{2}$	6	5 × 4	6 $\frac{1}{2}$	7 0 0
5 ³	3 $\frac{1}{8}$	9	7	6 $\frac{1}{4}$ × 4 $\frac{3}{8}$	8	9 5 0

1904 Kodak London Catalogue (UK)

USENER PORTRAIT LENSES:

9	1-4 size,	-	-	-	-	at \$18 00 each.
4	1-3 "	-	-	-	-	" 20 00 "
6	1-2 "	-	-	-	-	" 25 00 "
1	2-3 "	-	-	-	-	" 40 00 "
1	4-4 "	-	-	-	-	" 45 00 "
8	Ex. 4-4 size,	-	-	-	-	" 100 00 "
1	Triplet,	-	-	-	-	" 50 00 "
2	Rectilinear,	-	-	-	-	" 45 00 "
1	4¼ inch View Tube,	-	-	-	-	" 32 00 "
1	Pair Stereos,	-	-	-	-	" 25 00 "
1	7 inch Condenser,	-	-	-	-	" 12 00 "

The Tubes are nickel-plated and have central stops.
Will send them C. O. D., subject to approval upon trial.

CHAS. COOPER & CO.,

194 Worth Street, New York.

Photographic Optics: A Text Book for the Professional and Amateur By WK Burton
1891 (US)

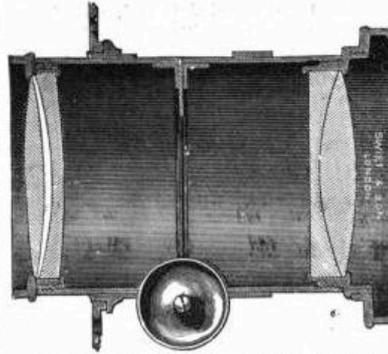
SWIFT & SON'S QUICK-ACTING CABINET LENSES.

The undermentioned Cabinet Lenses work extremely rapidly, and cover the plate to the edge, giving most brilliant and exquisitely defined pictures. J. S. & SON guarantee them equal to the most expensive Cabinet Lenses produced in this country. When the full opening of Lens is used the results are perfect either of standing or sitting figures, but by far the best results are obtained with No. 3 Lens. Waterhouse diaphragms marked as below :

U. S. Nos.	1	2	4	8	16	32	64
	$f/4$	$f/5.657$	$f/8$	$f/11.314$	$f/16$	$f/22.627$	$f/32$
No. 1.—Diameter of Lenses, $2\frac{3}{4}$ in.; focus, 6 in.; requiring 14 ft. between subject and lens.....	Price						
No. 2.—Diameter of Lenses, $3\frac{1}{4}$ in.; focus, 8 in.; requiring 18 ft. between subject and lens.....	Price						
No. 3.—Diameter of Lenses, $3\frac{1}{2}$ in.; focus, 10 in.; requiring 20 ft. between subject and lens.....	Price						

PORTRAIT LENSES.

The undermentioned Portrait Lenses give very fine pictures. It will be found that negatives taken of large heads will possess most beautiful modelings, with great softness of outline. This is a feature only to be obtained when Lenses are perfect from an optical point of view. Enlargements from small negatives may be produced with them, which will be found equal to others of the same size taken direct with larger Lenses. It is well known to every photographer that this is the most severe test for defining powers to which a Lens can be put; it should be borne in mind that no Lens giving diffusion of focus will stand this, absolutely sharp negatives being required when enlargements are wanted. These Lenses give perfect pictures of either vignettes, half-lengths or sitting figures. Waterhouse diaphragms marked as below :



No. 1 PORTRAIT LENS. (One third Actual Size.)

U. S. Nos.	1	2	4	8	16	32	64
	$f/4$	$f/5.657$	$f/8$	$f/11.314$	$f/16$	$f/22.627$	$f/32$
No. 1 PORTRAIT LENS.—Diameter of Lenses, $3\frac{1}{4}$ in.; back focus, 10 in.; for plates $6\frac{1}{2} \times 4\frac{1}{4}$; when a diaphragm is used whole plate portraits may be obtained.....	Price						
2 Ditto.—Diameter of Lenses, 4 in.; 12 in. focal length; for plates $8\frac{1}{4} \times 6\frac{1}{4}$ in. and under.....	Price						
3 Ditto.—Diameter of Lenses, $4\frac{1}{4}$ in.; 15 in. focal length; for plates 10 x 8 in. and under.....	Price						
4 Ditto.—Diameter of Lenses, 5 in.; 20 in. focal length; for plates 18 x 16 in. and under.....	Price						
5 Ditto.—Diameter of Lenses, 6 in.; 24 in. focal length; for plates 22 x 18 in. and under.....	Price						

How to Make Photographs..... By Scovill & Adams Co., New York 1892

E. A. Portrait Lenses. With Rack and Pinion.



THE attention of those who wish to procure a good portrait lens, but do not desire so expensive an instrument as that made by J. H. Dallmeyer, is respectfully invited to the following, which will be found good and uniform, as well as the best for the price. By removing the back combination, and screwing the front combination in its place, an excellent landscape lens is secured.

Back Focus,	Inches,	Each,
I-4 plain,	$4\frac{1}{2}$	\$7.50
I-4 central stop,	$4\frac{1}{2}$	8.75
I-3 " "	5	14.50
I-2 " "	6	17.50
4-4 " "	10	35.50

1891 Anthony Catalogue

Size Matters

The fact that Petzval lenses have large apertures and typically provide coverage of many inches, requires them, by the laws of optics and physics, to be physically large objects. And, since glass objectives were mounted in brass barrels, Petzval Lenses also tend to be quite heavy.

As soon as competition between lens makers began to heat up in the late 1840's, six inch diameter lenses were often touted in photographic journals. By the mid 1850's, makers such as Voigtlander and Harrison were manufacturing nine, and shortly thereafter, twelve inch diameter lenses. All of this, of course, was done for bragging rights, since the physical dimensions and weight of a twelve inch diameter lens would be so massive, just mounting it to a camera would have been hugely problematic, never mind other logistical issues with such a lens. A typical whole plate lens might physically be 20 inches in total length, 5.5 inches in overall diameter and weigh 15 or more pounds.

Below are two examples of some larger Petzvals.



Image Courtesy of Randy Cole

The lens above is an 1863 Voigtlander Petzval Portrait Lens of 16 inch focus and an aperture of $f/3.7$. This would have covered an 11x14 inch plate. Next to it is a lens and shutter of more modest specifications, circa 1920.

Also notice the retaining ring (flange) is clipped at one edge. There is usually one of two reasons for this - either the lens is part of a stereo pair and the flange needs to be clipped where it intersects with the other lens' flange. The other reason - and most likely in the case above, the lens ring was so large in diameter, it would commonly block some feature on the front of the camera, or overhang, so it was frequently clipped.

This massive lens sold for \$ 1,027 USD February 2008 on ebay.com.



Image & text Courtesy of Mr. Sol Hadeef of 'The Rangefinder Montreal'

The Holmes, Booth & Haydens lens above, is also marked "Patented June 7th, 1859." Serial No. 6022.

"The Lens is almost 22" long including the shade. The diameter of the front element is 6". The diameter of the rear element is 7". The Lens weighs 23 lbs and has a focal length of 22.5". Please note that all measurements given are approximate. "

This massive lens sold for \$ 3,300 USD January 2008 on ebay.

Aperture Control

The vast majority of lenses from the 1840-1855 period had no aperture controls. They were meant to be used wide open and didn't provide any means to stop the lens down. There were a few rare exceptions during that period. In those cases, the front lens group was unscrewed and a stop was inserted in the barrel and the front group was then screwed back into the barrel. In the mid-1850's, there were a few individuals* who apparently came up with the idea of inserting stops in the barrel of the lens. However, it is John Waterhouse of Halifax who is commonly credited with the invention, hence the name "Waterhouse stops."

In 1857, CC Harrison and Joseph Schnitzer applied for a patent for what has become the "iris diaphragm." Their patent was granted September 9, 1858; patent number 21,470. To this day, the same basic concept is utilized in almost all photographic lenses as Harrison patented. Harrison's main competitor in America, Holmes, Booth and Haydens, would also patent a form of an adjustable diaphragm on June 7, 1859; patent number 24,356.

It would take some time for the iris diaphragm to become commonplace since Waterhouse stops were simple to manufacture, inexpensive and did their job quite effectively. While the iris diaphragm eliminated the need to carry stops of varying sizes around, the complexity of manufacture and related expense would delay its general popularity until the late 1870's. From that point forward, most makers in Europe and the US, would offer their lenses with either Waterhouse stops or with the more expensive iris diaphragm.

Its important to note that since Waterhouse stops only needed a slit cut in the barrel to perform their function, so many early lenses of the 1840-1855 period may have had their barrels cut after they were originally manufactured.

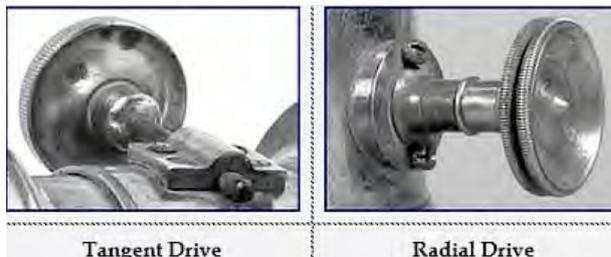
In summary, portrait lenses with a slit for Waterhouse stops typically date no early than the late 1850's. Lenses with an iris diaphragm typically date from the late 1870's on, however, there are exceptions that date back as early as 1857. Photographic lenses with no aperture control would typically have been made from the 1840's to the mid 1850's.

* *Lake Price, HR Smyth, and John Waterhouse all seem to have some claim towards the invention of lens barrel stops.*

Focus Control

Petzval portrait lenses typically featured one of three styles of construction. The first type featured a fixed length barrel with no focusing adjustment. These were typically reserved for the largest lenses where any type of focus adjustment would have been impractical and costly due the shear mass of the lens. The next type, which was the least common, featured an adjustable "slip-focus" barrel, where one half of the barrel slid inside the slightly larger other half of the barrel and was locked down by turning a screw. By far, the most common construction for Petzval lenses featured a rack-and-pinion mechanism, which allowed very fine focusing adjustments.

There were two types rack-and-pinion which collectors have termed "tangent" or "radial" drive. Tangent drive was utilized in Europe from the very first Petzval lens until it was phased out sometime in the early 1920's. Radial drive rack-and-pinion appears to have been mostly an American feature which was utilized over a short period of time - from about 1850 to the mid 1870's. By 1880, American lenses switched over to the more common tangent drive, likely to keep manufacturing costs down.



Tangent Drive

Radial Drive

Petzval Design Variations



Cone Centralisateur Lens by Jamin

The first variation of Petzval's original design was by Jean Jamin (and his protege, Alphonse Darlot) in 1855. The [Cone Centralisateur Lens](#) was a Petzval Portrait lens that had its rear group mounted in a cone shaped cell. This design was to help eliminate internal reflections of the lens, which in turn reduces flare and improves contrast. The front objective could also be removed, reversed, and would replace the rear group, to convert it to a landscape lens.

The next minor Petzval variation was by John H. Dallmeyer who tweaked Petzval's original design to create his "Quick-Acting Portrait Lens," in 1860. The lens was advertised as having improved correction of spherical aberrations and an "intensity of f/3."

Dallmeyer's Quick-Acting Portrait Lenses,

ESPECIALLY CONSTRUCTED FOR
Carte de Visite Portraits.

	Waterhouse Diaphragm.			Iris Diaphragm.		
	£	s.	d.	£	s.	d.
No. 1 B Carte de Visite Lens , with rack and pinion movement, the lenses 2 in. diameter and $4\frac{1}{2}$ in. back focus (6 in. equivalent), for Portraits $4\frac{1}{2} \times 3\frac{1}{2}$ in.	6	0	0	6	15	0
No. 1 B (Long) , with rack and pinion movement, the lenses $2\frac{3}{8}$ in. diameter and $4\frac{3}{8}$ in. back focus ($6\frac{1}{2}$ in. equivalent)*	6	10	0	7	5	0
No. 2 B Carte de Visite Lens , with rack and pinion movement, the lenses $2\frac{3}{8}$ in. diameter, and 6 in. back focus ($8\frac{1}{2}$ in. equivalent), for Portraits 5×4 in.	12	5	0	13	10	0

DESCRIPTION.—These Lenses work, full aperture, at an intensity of F 3. The distance between subject and lens is for the **No. 1 B**, 12 to 13 ft.; for **No. 1 B (Long)**, 14 to 15 ft.; for **No. 2 B**, 18 to 19 ft. With full aperture **Nos. 1 B** and **2 B** require the same exposure. Since, however, **No. 2 B** covers a larger plate, it can be used with a larger aperture for standing figures carte size. Hence, for this purpose, it becomes practically the quicker acting Lens. The increased distance also between Subject and Lens tends to better perspective in the resulting picture. The **1 B (Long)** is a little slower in action than the **1 B**, but for standing figures it produces better results.

* This Lens is constructed to meet the requirements of Photographers who desire to use a longer focus Lens than No. 1 B, but who have not sufficient length of studio for No. 2 B.

About 1861, Dallmeyer again tweaked the Petzval design to produce his "Extra Quick Acting Portrait Lens," which was a super fast f/2.2.

Dallmeyer's Lenses.

"Extra " Quick-Acting Portrait Lenses.

	Waterhouse Diaphragm.			Iris Diaphragm.		
	£	s.	d.	£	s.	d.
No. 2 C Portrait Lens , with rack and pinion movement; the lenses $2\frac{1}{2}$ in. diameter and $4\frac{1}{2}$ in. back focus (6 in. equivalent), for pictures on plates $4\frac{1}{2}$ in. by $3\frac{3}{8}$ in. and under	15	0	0	16	5	0
No. 3 C Portrait Lens , with rack and pinion movement, the lenses $3\frac{1}{2}$ in. diameter, 6 in. back focus (8 in. equivalent), for pictures 5×4 in. and under	25	0	0	26	10	0
Miniature Lens , with rack and pinion movement, the lenses $1\frac{1}{2}$ in. and $1\frac{3}{8}$ in. diameter respectively, and 2 in. back focus (3 in. equivalent), for pictures 2×2 in., and when used with stops for $3\frac{1}{2} \times 2\frac{3}{8}$ in.	5	0	0	5	10	0
Medallion Lens . Diameter of combinations $\frac{3}{4}$ in., 1 in. back focus ($1\frac{1}{2}$ in. equivalent), in a rigid mount, without stops	2	7	6	—	—	—

DESCRIPTION.—No. 2 C and No. 3 C are probably the quickest acting Lenses extant, working full aperture at an intensity of F 2 nearly.

They possess double the rapidity of Nos. 1 B and 2 B Lenses respectively, and are especially suitable for quick portraits of children, or for portraits in the dull light of winter.

When required for *standing* figures, carte size, a stop must be used to obtain sufficient flatness of field. In this condition their performance, as regards time of exposure, definition, and distance from subject, is about equal to that of Nos. 1 B and 2 B lenses.

The **Miniature Lens**, suitable for locket portraits, vignette heads, &c., works in about the same time as the C Lenses. It is also well adapted for taking Cinematograph Negatives.

In 1866, Dallmeyer patented his most significant variation on Petzval's design, with his "Diffusion of Focus Portrait Lens."

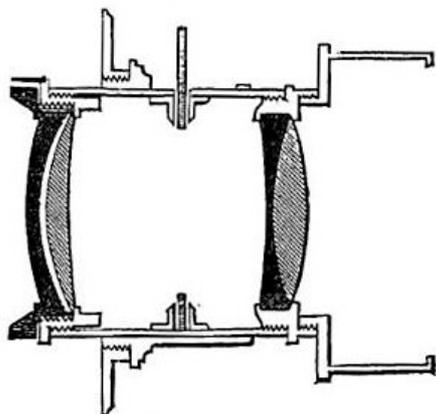
This lens was also called Dallmeyer's "Patent Portrait" Lens. Dallmeyer basically took the rear element group in Petzval's original design, flipped it and re-worked the lens a bit. He marketed the lens as having numerous benefits over Petzval's original design. It claimed better sharpness, reduced flare, and less distortion and vignetting. Additionally, Dallmeyer touted the feature of being able to unscrew the rear element group to introduce spherical aberration to the lens, resulting in image having varying degrees of a soft, dreamy quality. These images would also *appear* to have more of depth of focus ("diffusing" the focus). This feature was to endear the lens to photographers who were creating more soft focus and "artistic" work in the 1860's. In fact, this lens gave birth to intentionally made "soft focus" lenses that would become very popular in the 1880's and beyond.

Dallmeyer's "Diffusion of Focus" claim led to a firestorm within the optical and photographic communities, especially in England. The *Photographic News* and *British Journal of Photography* contained numerous accounts and bitter exchanges between Dallmeyer and challengers to, what they felt, was an erroneous claim that defied the laws of optics.

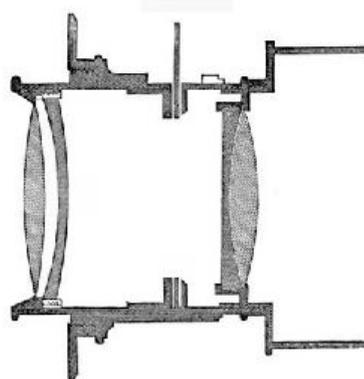
Here is one account from London's, *The Photographic News* from May 2, 1884:

"In the year 1866, the late Mr. J. H. Dallmeyer patented a variation of the Petzval lens. This variation consisted in reversing the

elements of the back combination with such a modification of the curves as this change involves. The particular advantage claimed at the time for this form of lens has since been abandoned. The putting of the negative lens at the back allowed its distance from the positive element to be varied, and thus the perfection of its correction for spherical aberration to be modified. It was stated that by altering the distance of the back lens, so as to re-introduce spherical aberration, and sacrifice definition at the focus, improved definition was obtained upon the planes not in focus. This claim—"diffusion of focus" it was called—was shown to be mistaken, and is no longer made. The lens, however, when employed with the element in the position of best definition, is a useful one, other well-known opticians have for some time past issued a series of lenses of this form. In this case, however, the back lenses are burnished together into their cell, and no shifting or alteration of their position is possible. While on the subject of "diffusion" or "depth" of focus it may be remarked that a delusion on this point is cherished by a vast number of photographers. For this the manufacturing opticians are somewhat to blame. They have been in the habit of advertising lenses as having great "depth of focus," whereas that is a quality that, except as attained by the use of a small aperture or diaphragm involving slowness of action, does not exist at all. Still many photographers -careful, practical men, too, some of them—will tell you that they have, or have had, some particular portrait lens that will give the various parts of a sitter's head, through the background behind him, and generally objects on different planes, with sharper definition than other lenses of similar aperture and focus, that have as fine, or finer definition on any one plane. This is a curious case of mistaken observation; but in photography, unfortunately, mistaken observations may pass current as scientific facts."



Dallmeyer 1866 Design



Original Petzval Design

In the book, *Photographic Optics: A Text Book for the Professional and Amateur* By William Kinninmond Burton 1891 (NY), also discusses the issue:

"An arrangement whereby spherical aberration could be produced at will in a lens was, I believe, first suggested by my esteemed friend, J. Traill Taylor, and the idea was first put into practice by the famous optician Dallmeyer. It is said of a which it is possible to produce spherical aberration at will that it possesses a diffusion of focus arrangement. Such an arrangement is of lens in use only in the cases where it is not possible to get of focus by the introduction of a small stop, as in the case of portrait lenses, where the small stop would, in certain circumstances, depth prolong the exposure to too great an extent. The dispute diffusion of focus is as to whether it does or does not actually increase depth of focus. It does not actually make any part of an about image sharper; on the contrary, it makes every part less therefore, say some, produces no increase in the depth of focus. The opponents of these, on the other hand, argue that as there is sharp; it no actual depth of focus, as the whole question is one of definition as judged by the eye, an arrangement which makes the definition of objects at different distances apparently more equal does actually increase the depth of focus. The question is in reality purely one of terms, and where the terms cannot be strictly defined it is idle to argue one way or the other. I leave the reader free to take what view of the question he likes, a thing which he would probably do whether he were left free or not."

In the 1884 advertisement below, the final paragraph claims that by unscrewing the rear cell, the lens produces **"...the impression of a general distribution or depth of focus; and this is in proportion to the amount of unscrewing."**

DALLMEYER'S PATENT PORTRAIT LENSES.

These are manufactured in three degrees of *intensity* or *rapidity* of action :—

1st. Quick-acting Portrait Lenses,

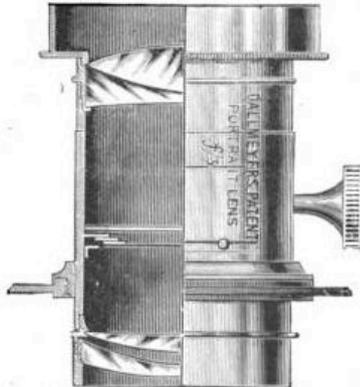
Intensity $f/3$; designated B.

2nd. Portrait Lenses,

Intensity $f/4$; designated A.

3rd. Portrait, Group, & View Lenses,

Intensity $f/6$; designated D.



The denominators of the fractions expressing intensity of the Lenses above mentioned, viz., 3, 4, 6, when *squared*, at once express the relative time of exposure for each Lens. Thus the **B** series require about *one-half* the exposure of **A** and *one-fourth* of **D**.

DESCRIPTION.—These Lenses are constructed on a different principle to the old or Petzval type of Portrait Lenses, and excel them in sharpness of definition, in freedom from distortion and flare, and in equality of illumination ; whilst, in addition to this, they afford the means, by the simple turn of a screw, of obtaining greater equality or depth of definition.

The construction of the Lens is such that, with the posterior cell of the back combination screwed *home*, it produces the sharpest possible picture of objects situated in *one plane*. Then, by unscrewing the posterior cell a turn, or parts of a turn, the previous intensely sharp definition becomes modified, *i.e.*, the contrast of excessive sharpness in one plane, compared with great want of sharpness in other planes, is balanced, producing the impression of a general distribution or depth of focus ; and this in proportion to the amount of unscrewing. Nothing has been sacrificed in securing this *new power*, and it can be used or not at the *will* of the operator.

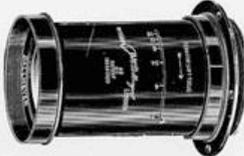
J. H. DALLMEYER, Ltd.,

25 NEWMAN STREET, OXFORD STREET, LONDON, W.



DALLMEYER PATENT PORTRAIT LENSES

Series
A



$f/4$



DALLMEYER Patent Portrait Lenses are recognised the world over as the finest lenses procurable for rendering that exquisite definition and modelling so desirable in portraiture. The advantages of the Patent Portrait Lens are so numerous and generally recognised that we need but mention here a few of the reasons why the most eminent Photographers of the day choose a Dallmeyer Patent Portrait Lens in preference to an anastigmat lens for portraiture.

The definition given by a Dallmeyer Patent Portrait Lens in the centre of the plate (obviously the most important part for the portrait of one person) is far superior to that given by the best modern anastigmat of similar aperture and focal length.

The glass employed in the construction of a Dallmeyer Patent Portrait Lens is much more transparent than any which can be used in an anastigmat lens, consequently the portrait lens has a larger effective aperture.

The modelling, perspective and brilliancy of the negative obtained when using a Patent Portrait Lens is far superior to that obtained with the ordinary anastigmat lens.

The Series A. Patent Portrait Lenses, having an aperture of $f/4$, are suitable for busts, large heads, and three-quarter lengths, and by slightly stopping down, photographs of standing figures and groups are rendered possible.

Supplied in lacquered brass or black aluminium mounts, with iris diaphragm, also if desired in rack and pinion mounts with Waterhouse stops.

Code Name for Lens only	No.	Plate Size		Focal Length		Price Iris Diaphragm		Spare Flange	Flange Diameter	
		in.	mm	in.	mm	£	s. d.		in.	mm
Dabap	1A	5 × 4	10	254	16	0	0	6/-	3.2	81
Dacap	1A Bis	5½ × 3½	12	305	18	0	0	7/-	3.9	89
Dadap	2A	6 × 4	13½	342	22	0	0	8/-	4.2	106
Dafap	3A	8½ × 6½	16	406	30	0	0	9/-	4.6	116
Dagap	4A	10 × 8	18	457	43	0	0	10/-	5.1	129
Dajap	5A	15 × 12	22	559	50	0	0	12/6	6.0	152
Dalap	6A $f/4.8$	20 × 16	30	762	60	0	0	15/-	7.05	179

Add "mm" to Code for Rack and Pinion Mount
Dallmeyer Patent Portrait A



DALLMEYER PATENT PORTRAIT LENSES

Series
D.





f/6

THE Series D. Patent Portrait Lenses are specially suitable for large and small groups, and in cases where great focal length is required, e.g., for Natural History and similar work when critical definition is required over a comparatively small angle.

The distance between sitter and lens for a standing figure for Cabinet size with the 3 D. Patent Portrait Lens is 18 feet (548 cm.). The 2 D. Patent Portrait Lens requires only 14 feet (426 cm.).

These lenses are similar to the A. and B. series as regards soft-focus effects.

Supplied in lacquered brass or black aluminium mounts, with Iris diaphragm, also if desired in rack and pinion mounts with Waterhouse stops.

Code Name for Lens only	No.	Plate Size	Focal Length		Price Iris Diaphragm		Screw Flange	Flange Diameter		
			in.	mm	£	s.		in.	mm	
Fabap	2D	6½ × 4½	9	228	8	0	0	3.6	2.0	50
Facap	3D	8½ × 6½	12½	317	10	0	0	5.-	2.75	69
Fadap	3D Bin	8½ × 6½	14½	374	14	0	0	6.-	3.2	81
Fafap	4D	10 × 8	17	431	16	0	0	6.6	3.4	86
Fagap	5D	12 × 10	19	482	18	0	0	7.-	3.9	98
Fajay	6D	15 × 12	24	609	30	0	0	9.-	4.6	116
Falay	7D	18 × 16	30½	774	43	0	0	12.6	6	152
Famasy	8D	22 × 20	37	940	50	0	0	15.-	7.05	179

Add "ing" to Code for Rack and Pinion Mount.
Dallmeyer Patent Portrait D



DALLMEYER PATENT PORTRAIT LENSES

Series
B.





f/3

THE Series B. Patent Portrait Lenses have been designed for instantaneous work in the studio, such as child studies, etc., where a large aperture is essential.

The No. 3 B. Patent Portrait Lens is well adapted for Cabinet size Portraits, the distance from lens to sitter for a standing figure being about 18 feet (548 cm.).

Dallmeyer Patent Portrait Lenses are constructed on a different principle from the old Petzval type of Portrait Lenses, and excel them in definition, freedom from distortion and flare and in equality of illumination, whilst in addition to this, they afford the means, by a single turn of the mount, of giving soft pictures in which there is evenness of definition without unpleasant out-of-focus effects.

When soft studies are desired, the lens should be rotated in the direction indicated, the required number of turns and then focused in the usual way.

Supplied in lacquered brass or black aluminium mounts, with iris diaphragm, also if desired in rack and pinion mounts with Waterhouse stops.

Code Name of Lens only	No.	Plate Size	Focal Length		Price Iris Diaphragm		Screw Flange	Flange Diameter		
			in.	mm	£	s.		in.	mm	
Bacap	1B	3½ × 3½	6	152	8	0	0	4.6	2.5	63
Badap	2B	5½ × 2½	8½	210	16	0	0	6.-	3.2	81
Bafap	3B	6 × 4	11	279	22	0	0	8.-	4.2	106
Bagap	4B Bin	6 × 4	13½	342	43	0	0	10.-	5.1	129
Bakap	4B /3.8	8½ × 6½	17	431	43	0	0	10.-	5.1	129

Add "ing" to Code for Rack and Pinion Mount.
Dallmeyer Patent Portrait B

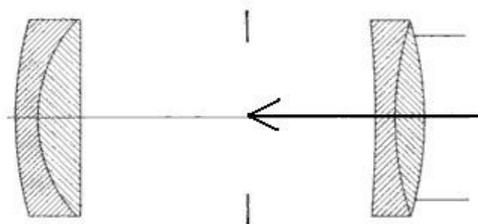


Voigtlander Petzval 7B. Image Courtesy of Eddie Gunks

The next Petzval variation was in 1878 by Voigtlander. This design basically eliminated the air space in the rear group of Petzval's original design. Removing the air space was to help improve contrast and reduce flare, over Petzval's original design, but from actual accounts, the improvements appeared minimal and the lens wasn't quite as sharp as other Petzval lenses.

Hermann Wilhelm Vogel wrote in his book, *The Progress of Photography Since the Year 1879*;

"Voigtlander's new Portrait Lens.—This has a front combination similar to the old Petzval. But the back combination consists of two single lenses cemented, by which the reflection of light occurring in the old form with separated lenses is avoided. The focus of these lenses is relatively shorter than that of the old form with similar opening. For instance, Voigtlander's C lens, by substituting the new back combination, has its focus shortened from 10 inches to 7 1/2 inches, thus increasing the illumination in the proportion 9:16. The new back combinations may be bought separately, so as to be used with any lenses by the same maker. We thus have the power to shorten or lengthen the focus, and correspondingly increase or lessen the light at will, by using the new form of back combination."



The Beginning of the End

By the 1880's, there were many more choices for portrait work available, including Steinheil's Portrait Antiplanet lenses which featured much better correction, as well as the Dallmeyer Rapid Rectilinear (and Steinheil Aplanat) design, which would come to dominate the 1900-1920 period. While Petzval Portrait lenses would continue to be sold for decades more, the slow decline of its sales had begun by 1900. However, Dallmeyer's Patent Portrait did continue to appear in catalogues even after WWII with the option of "Dallcoating."

The Petzval lens is a cornerstone of photographic optics and it is estimated over 90% of all images taken previous to 1880 were taken with a Petzval designed lens.