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Date of Application, 24th Aug., 1896—Accepted, 26th Sept., 1896

COMPLETE SPECIFICATION.

Improvements relating to Double Objectives for Photographic Purposes.

I, FRIEDRICH RITTER VON VOIGTLÄNDER, of 2 Monumentenstrasse, Brunswick, Germany, Manufacturer, do hereby declare the nature of this invention and in what manner the same is to be performed to be particularly described and ascertained in and by the following statement :—

Since the invention of the unsymmetrical anastigmato-photographic objectives with higher correction of the astigmatic error it has been the desire of the opticians to construct symmetrical anastigmatical objectives of the same perfection. Such a symmetrical anastigmat which has been called collinear and for which Letters Patent were granted in 1894 under No. 21458 consists of two equal systems of three bases cemented together in that way, that one positive meniscus of least refractive power lies between one biconvex lens of highest and one biconcave lens of least refraction. This combination has met with a great success. But however useful it might be yet the highest illuminating power of this construction *i.e.* the highest ratio of clear aperture and length of focus could never be brought above 1 : 6·3, and so it has been the case with all the other constructions of symmetrical anastigmats.

Recent mathematical researches and practical investigations made it likely that only slight alterations of the optical properties of the medium lens in the so-called "collinear" would afford the possibility of attaining a higher illuminating power. Practical experiments and with the finest precision in the performance of the optical surfaces assisted the mathematical researches, so that I finally succeeded in designing and constructing a symmetrical anastigmatic collinear of the relative aperture 1 : 4·5, twice as luminous as the most luminous symmetrical anastigmat hitherto known. Only a slight difference of the optical properties of the medium lens made this success possible, whereas any greater alterations lead to impossible curvatures and impossible forms of lenses. This new construction is therefore a most sensitive one, because it is not possible to neglect the least differences in the optical properties, the curvatures and the thicknesses of the lenses. This sensitiveness undoubtedly is the reason of all the ill successes of the constructing opticians in that direction.

In the accompanying drawing the new spherically chromatically and anastigmatically corrected double-objective of the ratio of aperture 1 : 4·5, is shown in a diagrammatic representation. The precise *data* of the construction are as follows :—

Species of glasses $L_1 : n_D = 1{\cdot}6065$
$L_2 : n_D = 1{\cdot}5150$
$L_3 : n_D = 1{\cdot}53645$

Radii $r_1 = 54{\cdot}58$ mm. Thicknesses : $d_1 = 6{\cdot}4$ mm.
$r_2 = 59{\cdot}273$ mm.
$r_3 = 22{\cdot}5$ mm. $d_2 = 10$ mm.
$r_4 = 59{\cdot}273$ mm. $d_3 = 1$ mm.

Working aperture : 33·6 mm., Length of focus 151 mm.
Relative aperture 1 : 4·5.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed I declare that what I claim is.

1. A spherically, chromatically and astigmatically corrected double-objective of the

[*Price* 8*d.*]

relative aperture 1 : 4·5, consisting of equal systems of the same correction, of which each is composed of a positive meniscus of least refractive power cemented between a biconvex and a biconcave lens of higher refractive power substantially as set forth.

2. The employment of a single system of the kind referred to in the first claim as an independent photographic objective.

Dated this 24th day of August 1896.

JENSEN & SON,
77 Chancery Lane, London, W.C., Patent Agents.

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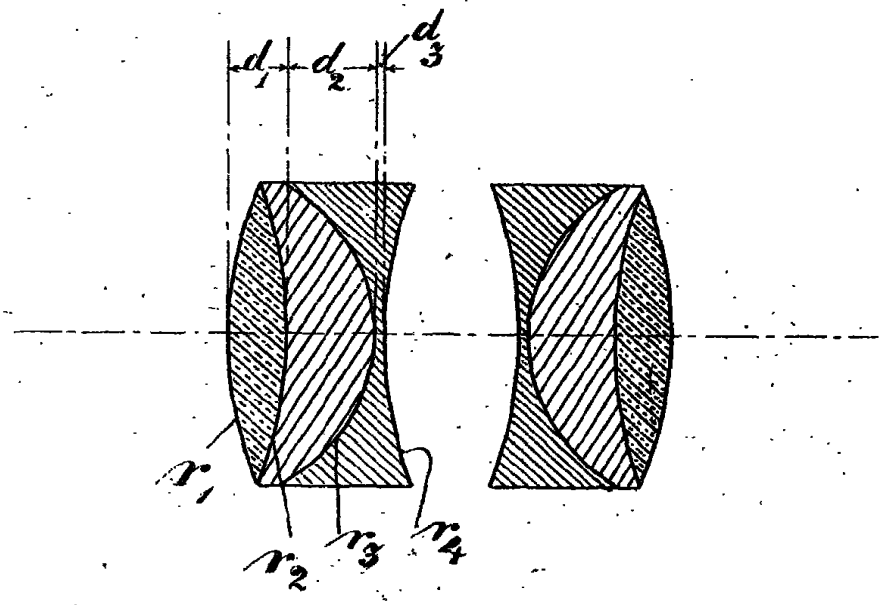
VON VOIGTLANDER'S Complete Specification.

(1 SHEET)



[This Drawing is a full-size reproduction of the Original.]

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