PATENT SPECIFICATION

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PROVISIONAL SPECIFICATION

Improved Lens System

We, J. H. DALLMEYER, LIMITED, a British Company, and BERTRAM LANGTON, a British Subject, both of Church End Works, Willesden, London, N.W., do hereby declare the nature of this invention to be as follows:—

This invention relates to objectives corrected for spherical aberration, coma, astigmatism, distortion, curvature of field and chromatic aberration to be used for photography, projection and the like, of the type comprising four components separated by air spaces, the two inner components consisting of compound dispersive meniscal components with their concave surfaces facing one another, and the two outer components consisting of simple collective elements, and its principal object is to provide a very large aperture while retaining the same field and degree of correction obtained at the more usual smaller apertures.

Hitherto this increase in aperture has been obtained by either (a) employing two triple compound negative menisci in place of doublet components (b) replacing the front or back single positive elements by two single positive elements or (c) using glasses of very extreme type, but in the present invention we attain our object by replacing only one negative component by a triple negative component.

Dated the 6th day of March, 1942.

B. LANGTON,
J. H. DALLMEYER, LTD.,
H. A. CARTER,
Managing Director.

COMPLETE SPECIFICATION

Improved Lens System

We, J. H. DALLMEYER, LIMITED, a British Company, and BERTRAM LANGTON, a British Subject, both of Church End Works, High Road, Willesden, London, N.W.10, 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:—

This invention relates to high aperture objectives to be used for photography, cinematography projection and the like corrected for spherical aberration, coma, astigmatism, distortion, curvature of field and chromatic aberration.

A type of lens which is well known to lens designers consists of four components separated by air spaces, the two inner members being compound dispersive and meniscal shaped with their concave surfaces facing each other, and the two outer members being simple collective elements.

Systems of this kind are known in which the dispersive components consist of doublets, but the relative aperture is limited to F/1.9—F/2 owing to the residual aberrations becoming excessive unless one or both of the collective elements are made of glass of very high refractive index and relatively high V value. Such glasses are described in British Patent No. 462,304. To raise the relative aperture, systems have been devised in which both the doublets have been replaced by triplets or either the front or back single elements have been replaced by two single elements.

The aim of the present invention is to secure by means of a system of this type better correction of the spherical aberration or alteraatively a larger relative aperture while still retaining a useful field of approximately 50°.

Calculations show that a biconvex air lens (negative) in either of the doublet components has a very beneficial effect on the spherical aberration and astigmatism, but at the same time it creates undesirable reflexion effects. We have overcome this by replacing the air lens by a biconvex positive glass lens situated between the positive and negative elements of the doublet and made of glass

[*Price* 1/-]

of lower refractive index than either. Preferably this difference is not less than .08 between the two positive lenses and .1 between the intermediate positive and the negative lens.

The accompanying drawing illustrates a preferred form of the invention, numerical data for which are given in the following table in which R1, R2 . . . . indicate the radii of curvature of the individual surfaces counting from the front, the positive sign indicating that the surface is convex to the front and the negative sign that is concave thereto, and D1, D2 . . . . . indicate the axial thicknesses of the various lens elements and S1, S2 . . . . . the axial lengths of the air spaces between the components. The radii, thicknesses and separations are in terms of unit focal length and the glass is specified by the refractive index for the D line and the V value.

F = 1.0 Relative Aperture = F/1.5.

Radius	Thickness or separation	Refractive Index nD	Abbe V number
R_1 + .6607	t_1 = .105	1.6436	48.3.
R_2 + 4.1447	S_1 = .005		
R_3 + .43827	t_2 = .12	1.6436	48.3.
R_4 + .94874	t_3 = .08	1.5100	64.5.
R_5 − 9.505	t_4 = .02	1.7005	30.2.
R_6 + .28096			
R_7 − .33465	S_2 = .215		
R_8 ∞	t_5 = .02	1.6193	36.4.
R_9 − .43123	t_6 = .11	1.6435	48.3.
R_{10} + 1.2269	S_3 = .02		
R_{11} − .9214	t_7 = .11	1.6142	56.3.

Having now particularly described and ascertained the nature of our said invention, and in what manner the same is to be performed, we declare that what we claim is:—

1. A lens system for photography, cinematography, projection and the like corrected for spherical aberration, coma, astigmatism, distortion, curvature of field and chromatic aberration consisting of two inner compound dispersive meniscal components placed between two outer simple positive elements, in which one of the dispersive components consists of three elements, the centre one of which is made of glass of lower refractive index than that of the outside elements.

2. An objective substantially as described herein.

Dated the 22nd day of February, 1943.

B. LANGTON,
J. H. DALLMEYER, LTD.,
H. A. CARTER,
Managing Director.

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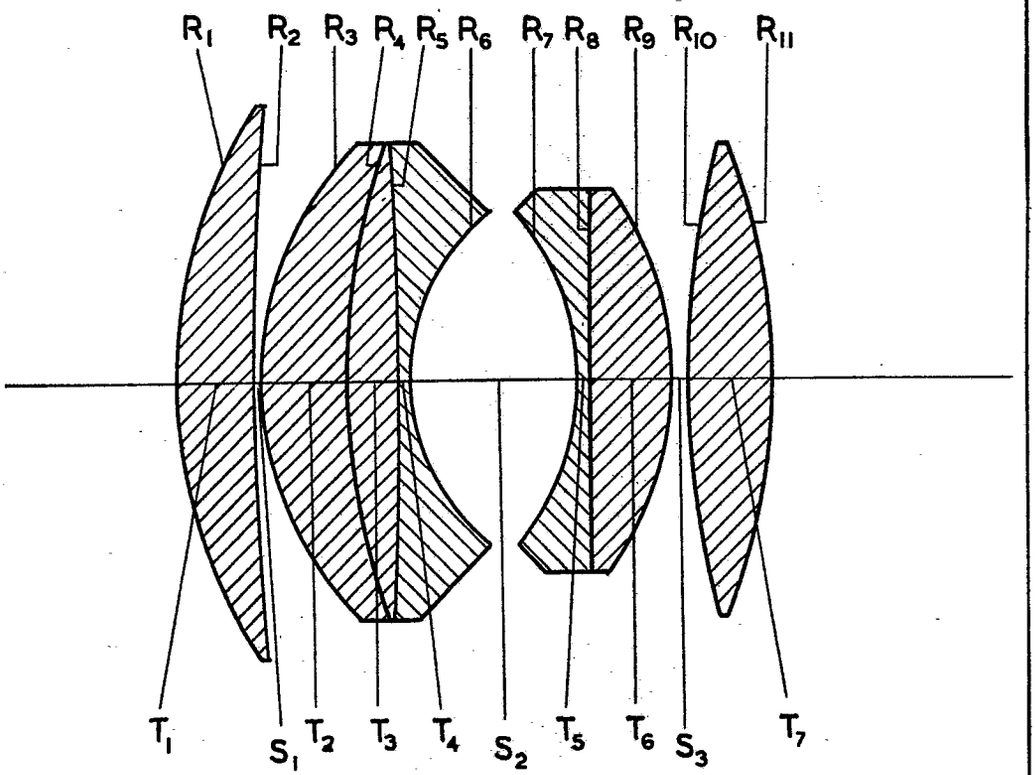

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