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COMPLETE SPECIFICATION.

“Improvements in and relating to Photographic Three-lens Objectives.”

We, OPTISCHE ANSTALT C. P. GOERZ AKTIENGESELLSCHAFT, of 44—46 Rhein-  
strasse, Friedenau, near Berlin, in the German Empire, Manufacturing Opti-  
cians, and WALTHER ZSCHOKKE, of 1 Belfortstrasse, Steglitz, near Berlin afore-  
said, Engineer, do hereby declare the nature of this invention and in what  
5 manner the same is to be performed, to be particularly described and ascertained  
in and by the following statement;—

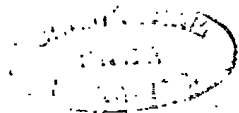
This invention relates to photographic three-lens objectives comprising a  
negative lens between and in contact with a biconvex lens of low dispersive  
10 dispersive and refractive power on one side and a positive meniscus on the other side, having lower  
particularly consists in a construction of objectives of the said class in such a  
manner that the biconvex lens is formed of a kind of glass which has a higher  
refractive power than hitherto used, such refractive power resulting in a  
refractive index  $n_D$  of at least 1.615.

15 The effect obtained by such increase of the refractive power of the biconvex  
lens of the objective is due to the fact that the curvature of the contact surface  
between the negative lens of the objective and the biconvex lens is reduced in  
consequence of the increased difference between the values of the refractive indices  
20 of the negative and the biconvex lenses. The advantage of the reduction of the  
curvature of the said contact surface consists therein that the astigmatic aberration  
if eliminated for a certain inclination of rays entering the objective is at  
the same time eliminated to a higher degree for varying inclinations of rays  
than in the case of greater curvature of said contact surface of the negative and  
25 the biconvex lenses, such as is found in former constructions for instance as  
described in the Specifications of British Patents 3041/99 and 29447/06.

The high refractive power of the biconvex lens of the objective is preferably  
combined with a low refractive power of the positive meniscus, the refractive  
power of the last named lens being reduced below the value hitherto used, so  
that the refractive index of said positive meniscus does not exceed the value 1.50.  
30 Such reduction of the refractive power of the positive meniscus of the objective  
likewise results in a reduction of the curvature of the contact surface between  
the negative lens and the positive meniscus in consequence of the increased  
difference between the values of the refractive indices of the negative lens and  
the positive meniscus. In this way it becomes possible to construct the objective  
35 so that the spherical aberration is eliminated for a great effective area or opening  
without introducing objectionable high spherical aberrations for intermediate  
zones of the objective.

An objective in accordance with this invention is represented on the accom-  
panying drawing, where the three lenses forming the objective are designated  $a$ ,  
40  $b$  and  $c$  respectively. The thicknesses of said three lenses are designated  $d_1$ ,  $d_2$ ,  $d_3$   
respectively and the radii of curvature of the four lens surfaces are designated  
 $r_1$ ,  $r_2$ ,  $r_3$ ,  $r_4$  respectively.

[Price 8d.]



*Improvements in and relating to Photographic Three-lens Objectives.*

The constructional elements of two embodiments of the new objective for a focal length or distance of  $f = 100$  are given in the following tables;

Radii	Thicknesses	Kinds of Glass	
$r_1 = -12,289$ mm		$n_D = 1,5102$	$n_{G1} = 1,5202$
$r_2 = -4,989$ "	$d_1 = 1,343$	$n_D = 1,5477$	$n_{G1} = 1,5609$
$r_3 = +22,111$ "	$d_2 = 0,584$	$n_D = 1,6169$	$n_{G1} = 1,6316$
$r_4 = -12,174$ "	$d_3 = 1,751$		
$r_1 = -13,889$ mm		$n_D = 1,4649$	$n_{G1} = 1,4738$
$r_2 = -6,250$ "	$d_1 = 2,0$	$n_D = 1,5164$	$n_{G1} = 1,5286$
$r_3 = -38,911$ "	$d_2 = 0,8$	$n_D = 1,6210$	$n_{G1} = 1,6349$
$r_4 = -14,117$ "	$d_3 = 2,1$		

The improved objective can be used either as a single objective or as a double objective, as is well known to those skilled in the art. The conditions in this regard are absolutely the same as in connection with the three lens objective of United States Patent 528155 on which this invention is an improvement.

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:—

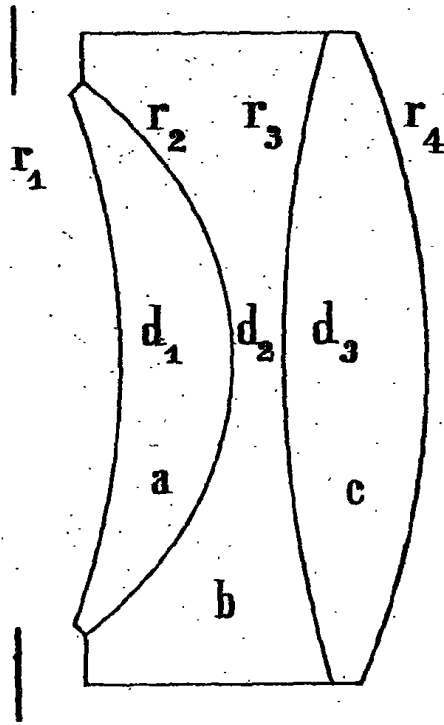
1. A photographic three-lens objective comprising a negative lens between and in contact with a biconvex lens and a positive meniscus, in which the biconvex lens consists of a kind of glass having a low dispersive power and so high a refractive power that the refractive index  $n_D$  exceeds the value of 1,615.

2. A photographic three-lens objective comprising a negative lens between and in contact with a biconvex lens and a positive meniscus, in which the biconvex lens consists of a kind of glass having low dispersive power and so high a refractive power that the refractive index  $n_D$  exceeds the value of 1,615, the positive meniscus at the same time being formed of glass having a dispersive power lower than that of the biconvex lens forming glass and so low a refractive power that the value of the refractive index  $n_D$  is lower than 1,50.

Dated this 30th day of June 1908.

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



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