March 7, 1933. M. BEREK 1,899,934

ULTRALIGHT INTENSIVE OBJECTIVE

Filed July 20, 1932

Fig. 1

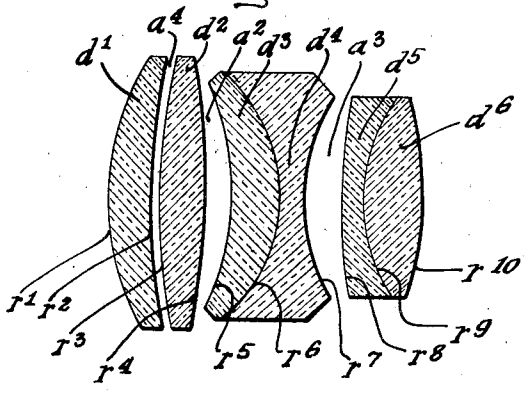
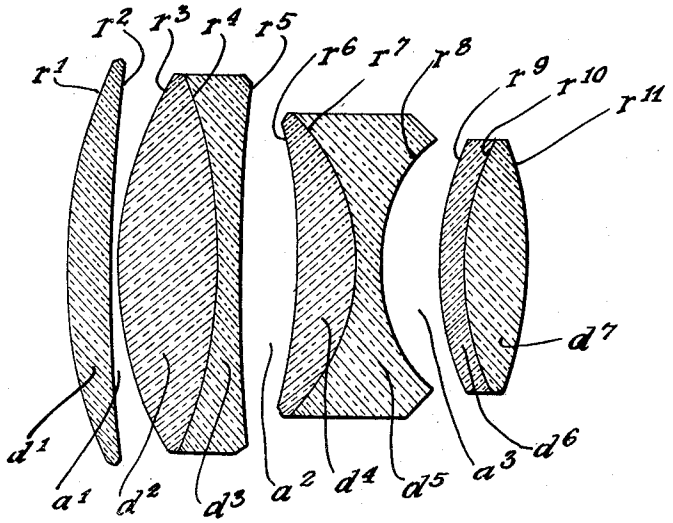


Fig. 2



INVENTOR
Max Berek
BY
Glenn C. Hemingway
ATTORNEY

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UNITED STATES PATENT OFFICE

MAX BEREK, OF WETZLAR, GERMANY, ASSIGNOR TO ERNST LEITZ, OPTISCHE WERKE, G. M. B. H., OF WETZLAR, GERMANY

ULTRALIGHT INTENSIVE OBJECTIVE

Application filed July 20, 1932, Serial No. 623,554, and in Germany June 6, 1931.

This invention relates to improvements in objectives with an ultra-high light intensity.

The known objectives of this kind allow by means of a triplet construction having six faces only exposed to the air the production of an anastigmatically level picture field free of coma and traces of a relatively large extent with great light intensity.

According to my invention I obtain by splitting the front members of the objectives described in above systems, systems of the highest light intensity. In order to avoid simultaneously a stronger vignetting in the required picture angle, the air spaces must fulfill certain conditions for obtaining the results according to the prior construction of objectives, and these conditions together with part of the prior construction of objectives form the object of the present invention.

In the accompanying drawing forming a material part of this disclosure:

Fig. 1 shows the preferred construction of an objective according to my invention.

Fig. 2 is a similar view of a modified form of objective.

As the corresponding data of construction for the objective according to Figure 1 are:

1:2.0

		n_D	ν
$r_1 = +51.193$			
	$d_1 = 9.07$	1.6185	60.5
$r_2 = +148.90$			
	$a_1 = 1.00$	1.0	
$r_3 = +132.0$			
	$d_2 = 8.06$	1.6185	60.5
$r_4 = -153.6$			
	$a_2 = 5.72$	1.0	
$r_5 = -57.46$			
	$d_3 = 9.07$	1.6890	31.2
$r_6 = -30.55$			
	$d_4 = 5.04$	1.6034	38.0
$r_7 = +39.40$			
	$a_3 = 7.56$	1.0	
$r_8 = +120.90$			
	$d_5 = 4.03$	1.6034	38.0
$r_9 = +33.558$			
	$d_6 = 12.09$	1.6580	51.4
$r_{10} = -63.51$			

and for Figure 2:

1:1.3

		n_D	ν
$r_1 = +93.6$			
	$d_1 = 8.91$	1.6240	58.2
$r_2 = +324.07$			
	$a_1 = 0.4457$	1.0	
$r_3 = +71.315$			
	$d_2 = 19.611$	1.6240	58.2
$r_4 = -99.842$			
	$d_3 = 5.348$	1.6219	36.1
$r_5 = +445.72$			
	$a_2 = 11.143$	1.0	
$r_6 = -108.755$			
	$d_4 = 10.697$	1.6242	
$r_7 = -40.828$			
	$d_5 = 5.349$	1.5673	42.8
$r_8 = +33.963$			
	$a_3 = 12.034$	1.0	
$r_9 = +62.846$			
	$d_6 = 4.457$	1.5407	47.2
$r_{10} = +54.734$			
	$d_7 = 12.480$	1.6240	58.2
$r_{11} = -69.71$			

It will be understood that I have disclosed the preferred forms of my invention as examples only of the many possible ways to practically construct the same, and that I may make such changes therein as come within the scope of the appended claim without departure from the spirit of my invention and the principles involved.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

An objective of ultralight intensity with light surfaces exposed to air comprising two positive members in consecutive order separated by an air space, a following negative member and a positive rear member, the negative member consisting of a positive and a negative element which are cemented together, and present collective cement faces, so that the n_D difference at the cement face in the negative member is at least 0.05, and at this cement face the value is

$$\frac{n'-n}{r}f,$$

where $n'-n$ represent the difference of the numbers of refraction, r the curvature radius of the cement face and f the focal distance of the entire system, larger than 0.1 and characterized by the fact that the second air space is at least $\frac{2}{3}$ of the air space between the negative member and the rear member, while the total amount of all air spaces is at best equal to $\frac{1}{3}$ of the entire length of the system construction.

Signed at Frankfort-on-the-Main, Germany, this second day of July, A. D. 1932.

MAX BEREK.