

T350 1170

C. J. DRAC.

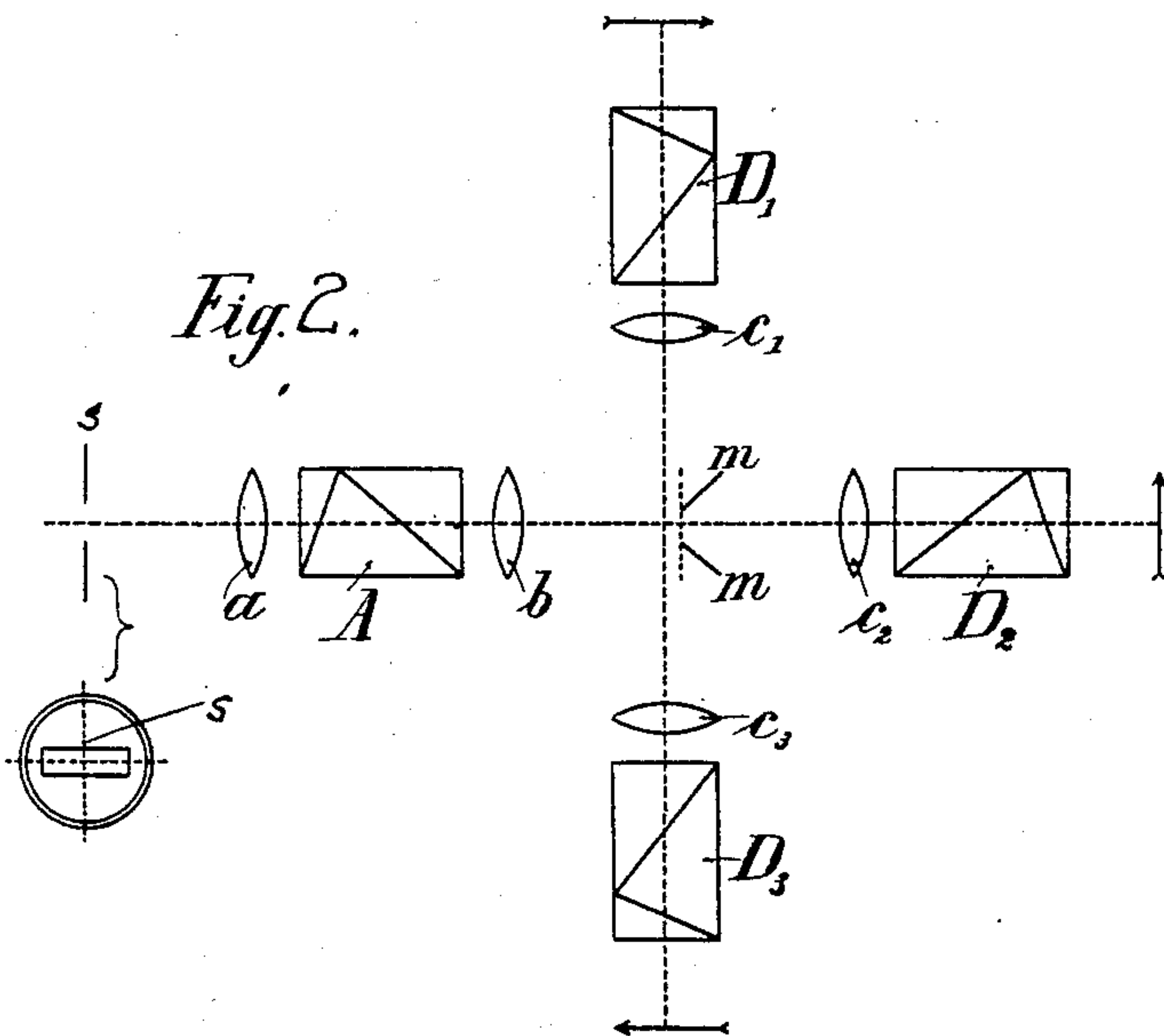
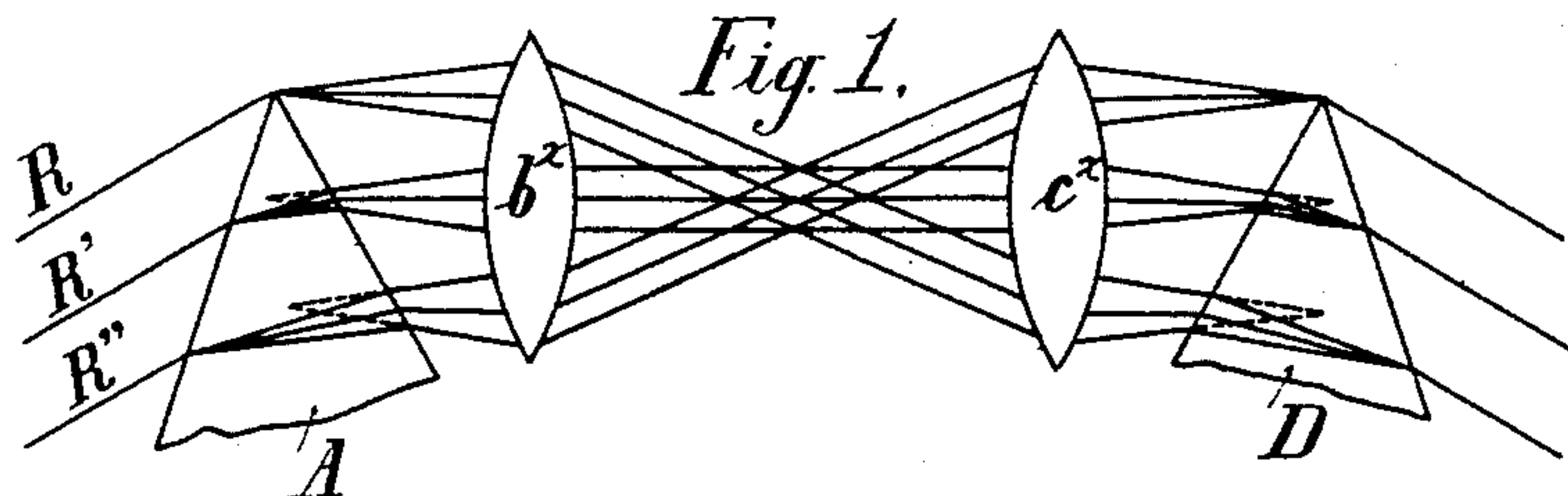
APPARATUS FOR THE PRODUCTION AND EXHIBITION OF COLORED PHOTOGRAPHS.

APPLICATION FILED MAY 25, 1905.

905,802.

Patented Dec. 1, 1908.

2 SHEETS—SHEET 1.



Witness:
 Geo. Heinicke
 F. Dittmar

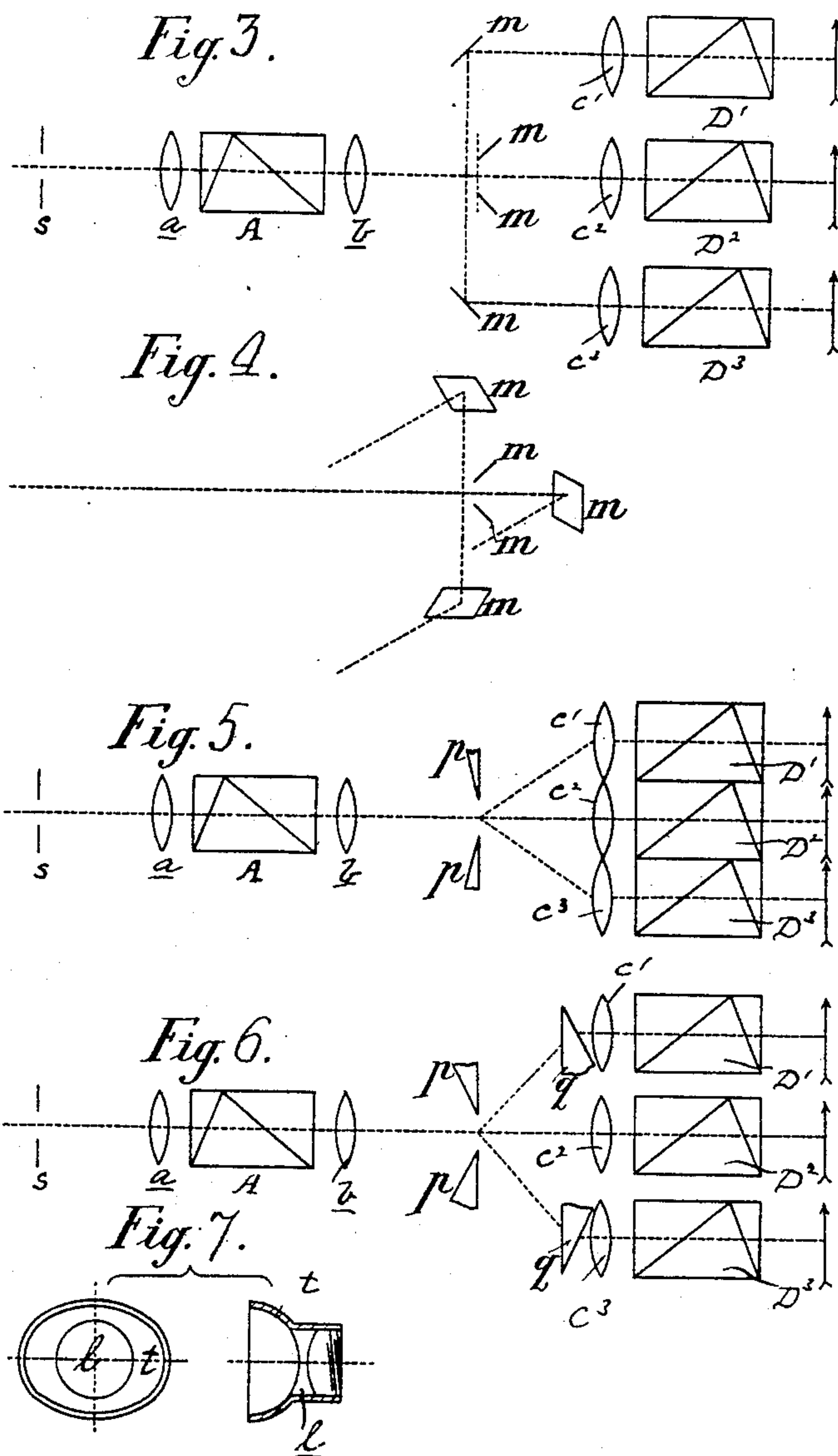
Inventor
 Charles Julius Drac
 by G. Dittmar
 Attorney.

C. J. DRAC.
 APPARATUS FOR THE PRODUCTION AND EXHIBITION OF COLORED PHOTOGRAPHS.
 APPLICATION FILED MAY 25, 1905.

905,802.

Patented Dec. 1, 1908.

2 SHEETS—SHEET 2.



Witnesses:
 Geo. Heinicke
 F. Dittmar

Inventor:
 Charles Julius Drac
 by G. Dittmar
 Attorney

UNITED STATES PATENT OFFICE.

CHARLES JULIUS DRAC, OF WARSAW, RUSSIA.

APPARATUS FOR THE PRODUCTION AND EXHIBITION OF COLORED PHOTOGRAPHS.

No. 905,802.

Specification of Letters Patent.

Patented Dec. 1, 1908.

Application filed May 25, 1905. Serial No. 262,293.

To all whom it may concern:

Be it known that I, CHARLES JULIUS DRAC, a subject of the Emperor of Russia, residing at Warsaw, Russia, have invented certain
5 new and useful Improvements in Apparatus for the Production and Exhibition of Colored Photographs, of which the following is a specification.

This invention relates to improvements
10 over the invention described in my application Serial No. 192,842, filed February 9, 1904 for the production of three pictures of an object in the three primary colors.

The object of the invention is to simplify
15 the arrangement of the camera, more particularly the arrangement of the main part thereof, namely the system of prisms which allows of dispensing with the use of color filters.

The novelty resides in the peculiarities of
20 construction, and the combination and arrangement of parts hereinafter more fully described and claimed.

The invention is clearly illustrated in the
25 accompanying drawings which, with the characters of reference marked thereon, form a part of this specification and in which:

Figure 1 is a view illustrative of the inven-
tion. Fig. 2 is a diagrammatic view of a five
30 lens system. Figs. 3, 4, 5 and 6 show similar views of different arrangement embodying the principle of the invention. Fig. 7 is a detail in end view and longitudinal section.

Like characters of reference indicate like
35 parts in the several views.

The method for simplifying the system, to
which the present invention relates, is based on the fact, that by a special arrangement of
40 the central lens-system *b* and *c* fulfilling certain conditions which will be stated hereinafter, the number of prisms in each branch of the system can be reduced from four to two, the optical correction of the whole being nevertheless preserved.

The apparatus is provided in front of the
45 lens *a* with a diaphragm *s* (Figs. 2 to 6) which renders parallel the main rays *R R' R''* and so on before they enter the prism *A*.

For the purpose indicated the separate
50 parts of the system must have fixed relative positions. The synthesizing prism-sets cannot, therefore, be displaced for the purpose of dividing the beam into three beams of equal actinic power corresponding to the
55 different degree of intensity of the plates, and it is in this case necessary to use auxil-

iary devices such as can also be employed in apparatus comprising four prisms. These devices may consist of small mirrors or prisms producing total reflection *m m* Figs. 60 2, 3 and 4. The purpose of branching off the beams in three directions in the optical system can also be effected by deflecting the rays by means of small refractive prisms *p, p* Fig. 5. Since these small prisms have 65 very small indices of refraction, the aberration due to their use is negligible. For producing larger deflections it is, however desirable to make these small prisms achromatic, or to neutralize the effect of each small 70 prism *p* (Fig. 6) by an opposite effect due to small prisms *q* introduced into the rearward branches of the system (Fig. 6). For the same purpose the refractive index of the fourth prisms *D' D''* Fig. 6 can be increased. 75 With the aid of these devices and by repeatedly deflecting the optical axis of each system, the pictures can be given any desired positions as regards the distances by which they are separated from each other 80 and they can also be brought into one plane for the purpose of being focused on a single panchromatic plate. This latter position is particularly useful when the purpose of the apparatus is reversed, that is to say, 85 when instead of making three complementary negatives of an object, a projected image in natural colors is obtained, by synthesis, from three complementary colorless 90 positives. The fixing of all three pictures on a single panchromatic plate facilitates in this case the obtaining of uniformity in the exposure to a powerful source of light required for the projection, and obviates the 95 inconvenient centering of the separate pictures. This is more particularly important for the projection of a series of successive pictures, for instance when the apparatus is used in combination with a kinematograph.

If the picture in natural colors is not to be 100 thrown on to a distant screen but directly on to the retina of the observer's eye, the latter being placed against the front objective, the optical composition of the picture will not correspond to the normal con- 105 ditions of accommodation, for which the human eye is adapted, that is to say, the picture will not be suitable for unaided sight, since the rays converge on leaving the front objective. To convert the converging 110 rays into diverging rays, a dispersive lens 1 (Fig. 7) can be arranged at the front of the

apparatus, and this lens may be provided with a conical tube *t* to screen the eye from the lateral rays. This arrangement is shown in Fig. 7 in front view and longitudinal section.

Having thus described my invention what I claim is:

1. Means for the production of colored photographs without the employment of color filters, comprising groups of rearward synthesizing prisms a multiple lens system, common to all of the pictures, and the central part of which forms the analyzing prism device, one of said lens systems constructed to direct the ray pencils through said rearward synthesizing prisms.

2. Means for the production of colored photographs without the employment of color filters, comprising groups of rearward synthesizing prisms a multiple lens system, common to all of the pictures and the central part of which forms the analyzing prism device, one of said lens systems constructed to direct the ray pencils through said rearward synthesizing prisms, and separate identical optical systems.

3. Means for the production of colored photographs without the employment of color filters, comprising groups of rearward synthesizing prisms a multiple lens system, common to all of the pictures and the central part of which forms the analyzing prism device one of said lens systems constructed to direct the ray pencils through said rearward synthesizing prism, and means for optical correction independent of the said lenses.

4. In means for the production of colored photographs a telescopic achromatic lens system of multiple lenses having a common inner focal plane, the separate parts of the system having fixed relative positions, and

auxiliary devices for producing total reflection.

5. In means for the production of colored photographs, a telescopic achromatic lens system of multiple lenses having a common inner focal plane, the separate parts of the system having fixed relative positions, and auxiliary devices for producing total reflection and prisms introduced into the rearward branches of the system.

6. In means for the production of colored photographs, a telescopic achromatic lens system of multiple lenses having a common inner focal plane, the separate parts of the system having fixed relative positions, and auxiliary devices for producing total reflection and prisms introduced into the rearward branches of each system.

7. An optical apparatus for producing a plurality of complementary negative images of an object and inversely for the optical synthesis of a projected image in natural colors from a plurality of complementary colorless positives, dispensing with colored media, comprising an optical system common to all the images and consisting of a double system of lenses separated by a highly dispersive analyzing set of prisms, an aperture shutter in the front focal plane of the objective, and three separate identical optical systems, each consisting of a lens, and a set of highly dispersive synthesizing prisms, each set having a symmetrical position to the said analyzing set of prisms.

In testimony whereof I affix my signature in presence of two witnesses.

CHARLES JULIUS DRAC.

Witnesses:

WITHOLD BIADORUKRIEG,
HEINRICH H. KAISER.