

PATENT SPECIFICATION

322,801

Application Date : July 16, 1928. No. 20,571 / 28.

” ” Oct. 20, 1928. No. 30,377 / 28.

One Complete Left : May 14, 1929.

Complete Accepted : Dec. 16, 1929.



PROVISIONAL SPECIFICATION.

No. 20,571, A.D. 1928.

Improvements in or relating to Photographic Cameras.

I, REGINALD STRATTEN ALLDRIDGE, 15, Wellington Road, Harrow, Middlesex, (British Subject), do hereby declare the nature of this invention to be as follows:—

5 This invention relates to photographic cameras employing two or more lenses for the simultaneous taking of a picture with two or more images, such images being employed especially for the projection of pictures in colour, the negatives being taken through suitable colour filters and the positive images projected through corresponding filters. When employing 15 two or more lenses for taking pictures simultaneously the subsequent perfect coincidence of the images when projected on a screen is made impossible by the parallax effect due to the separation of the lenses, owing to the greater angle subtended by the lenses at near objects in the picture as compared with the angle at objects at a further distance from the lenses. The chief object of the present 20 invention is to reduce the parallax effect and practically eliminate it with regard to the objects on which the lenses are focussed.

30 According to this invention the camera is provided with means by which the separation of the images on the negative is made variable so as to bring into exactly corresponding position any selected identical points in the images and so to avoid the effect of parallax at the distance from the camera of the objects in the picture on which attention is to be focussed, that is at the distances at which the lenses are focussed.

40 This correction for parallax can be effected either by a mechanical device which varies the actual separation of the lenses moving them further away or closer together as required, or by providing the lenses with an optical correction by the aid of a prism or prisms.

45 The method of correction is more especially intended for use with cinematograph

50 pictures, so that all objects in any particular plane at right angles to the axis of the camera lens system can be made to have the same separation in the various pictures comprising the group. In ordinary practice the separation between identical points of any object situated in a plane between twenty feet and infinity would be selected as the standard distance and objects in the nearer planes would have their image separation brought to the above mentioned distance. The correction may be effected automatically from the focussing mechanism of the camera by means for example, of a rack and pinion motion or a spiral focussing collar acting upon inclined planes to vary the separation between the lens axes, or adjustable prisms behind, in front of or between the components of the lenses can be moved in any suitable direction so as to give the same displacement on the negative as would be produced by adjustment of the lens separation.

65 With the operation of the correcting device from the focussing mechanism any alteration in the focussing of the lenses automatically brings about the corresponding correction for parallax without requiring any attention on the part of the operator.

80 One typical device which may be employed to obtain the desired corrections comprises a cam operated from the focussing axial movement of the lenses to rotate a pair of equal deviation prisms associated with each or one or more of the taking lenses. One lens of the group can, of course, be taken as the standard lens and the other lenses only need have the correcting device. If two lenses only are used one lens therefore can be corrected and the other left unaltered, but the device would usually be applied to a three-lens three-colour system, in which case at least two of the lenses should be corrected.

85 Dated the 16th day of July, 1928.

REGINALD S. ALLDRIDGE.

PROVISIONAL SPECIFICATION.

No. 30,377, A.D. 1928.

Improvements in or relating to Photographic Cameras.

I, REGINALD STRATTEN ALLDRIDGE, 15, Wellington Road, Wealdstone, Harrow, Middlesex, British Subject, do hereby declare the nature of this invention to be as follows:—

5 This invention relates to photographic cameras employing two or more lenses for simultaneous taking of a picture with two or more images, such images being
10 employed especially for the projection of pictures in colour, the negatives being taken through suitable colour filters and the positive images projected through suitable corresponding filters
15 when the colour sensitivity of the film negative is taken into account. When employing two or more lenses for taking pictures simultaneously the subsequent
20 perfect coincidence of the images when projected on a screen is made impossible by the parallax effect due to the separation of the lenses, owing to the greater angle subtended by the lenses at near objects in
25 the picture as compared with the angle at objects at a further distance from the lenses.

The chief object of the present invention is to reduce the parallax effect and practically eliminate it with regard to
30 objects on which the lenses are focussed.

According to this invention the camera is provided with means by which the separation of the images, formed by the
35 lenses on the negative, of any given point in the object is made equal to a certain chosen constant distance, however distant the object may be, and so to avoid the effect of parallax at the distance from the camera, of the objects in the picture on
40 which attention is to be focussed, that is at the distances at which the lenses are focussed.

This correction for parallax can be effected either by a mechanical device
45 which varies the actual separation of the lenses, moving them farther away or closer together as required, or by providing the lenses with an optical correction by the aid of a prism or prisms.

50 The method of correction is more especi-

ally intended for use with cinematograph pictures, so that all objects in various pictures, however near or distant this particular plane may be made to have the same separation in various pictures comprising the group. 55

In ordinary practice the separation between identical points in the images of any object situated in a plane between 20 ft. and infinity when the size of film, foci of lenses, and suitable separation of the lenses are such as to give the maximum size of picture possible, would be selected as the standard distance. The correction may be effected automatically from the
60 focussing mechanism of the camera by means, for example, of a rack and pinion motion or a spiral focussing collar acting upon inclined planes to vary the separation between the lens axes, or adjustable prisms behind, in front of, or between, the components of the lenses can be moved in any suitable direction so as to give the same displacement on the negative as would be produced by adjustment of the
65 lens separation. 70

With the operation of the correcting device from the focussing mechanism any alteration in the focussing of the lenses automatically brings about the corresponding correction for parallax without requiring any attention on the part of the operator. 80

If the adjustable taking lens is used as the projector lens as well, it compensates for parallax in both operations and hence is suitable for home cinematograph cameras. 85

This invention further affords the means of providing stereoscopic pictures in colour if so desired on a nearly true to nature scale, or enhanced stereoscopic effect, the observer of the projected film being provided with spectacles containing colour filters for each eye. The colour filters
90 being similar to those used in the projector and similarly arranged. 95

Dated this 19th day of October, 1928.

R. S. ALLDRIDGE.

COMPLETE SPECIFICATION.

Improvements in or relating to Photographic Cameras.

I, REGINALD STRATTEN ALLDRIDGE, Optical Engineer, of 15, Wellington Road, Harrow, in the County of Middlesex, a 100 subject of the King of Great Britain, 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:—

5 This invention relates to that class of cinematography in which two or more images are formed on different parts of a normal picture-area, such images being taken simultaneously each by a separate lens, and is not concerned with those systems of cinematography in which the several simultaneously-taken images each occupies the whole of one normal picture-area.

15 Difficulties arise in cinematography of the class defined above in that the several lenses have their axes displaced from one another, although by a slight amount only. It will readily be seen that the distance or distances between images on the film of a single point will be a minimum when that point is at infinity and will increase as the distance between the point and the lenses decreases. When the images are made in light of different colours for colour cinematography the result of this is that the positive images do not always come into register on the screen and it has hitherto been necessary for the operator of the projector to correct the resulting "fringing" as far as possible by manipulating prisms or like registering devices during the projection of the film.

20 The present invention aims at minimising the aforesaid lack of register during the taking of the pictures, thereby rendering manipulation during projection unnecessary, by arranging that the separation of the axes of the lenses is automatically varied in accordance with the focussing adjustment of the lenses such variation of separation being brought about by mounting the lenses to slide axially together in a single focussing-sleeve provided with inclined guides so disposed as to constrain the lenses to approach one another in proportion as they are moved forward to bring near objects into focus.

25 It will be appreciated that with a camera having two or more lens systems arranged side by side as above described, on each unit of area of the sensitised material (i.e., the area which is normally occupied by a single picture) there will be a plurality of pictures corresponding in number with the number of lens systems employed and that, in order to prevent the light rays passing through one of the lens systems interfering with those passing through an adjacent lens system, one or more septums are arranged between the lens systems with their planes parallel to the axes of the lenses so that they extend

transversely across the casing in which the lenses are mounted.

In order that the said invention may be clearly understood and readily carried into effect, the same will now be described more fully with reference to the accompanying drawings, in which:—

70 Figure 1 is a longitudinal section through a combined camera lens and focussing sleeve suitable for a camera employing two lens systems;

75 Figure 2 is a side elevation, looking in the direction of the arrow A, of the arrangement illustrated in Figure 1 and

80 Figure 3 is an explanatory view showing the disposition of the images on a piece of cinematograph film.

In Figures 1 and 2 *a* is the lens casing and *b* and *c* are two part or mutilated lens systems, *d* is the septum which may consist of a piece of sheet metal extending parallel to the lens axes so that its rear edge almost touches the film in order to prevent one image overlapping the other. *e* is the focussing sleeve which is rotatably mounted in the rear end of the casing *a* and *f* is the focussing arm by which the sleeve is adapted to be rotated. The focussing arm is arranged so that it passes through an elongated slot *g* formed in the wall of the lens casing and in order that the rotary movement of the sleeve *e* shall be accompanied by a translational movement in a direction parallel to the lens axes, the sleeve is formed with an external screw thread for engagement with a screw thread *h* formed internally in the rear end of the casing *a*. The screw thread *h* is preferably a multiple thread, for instance, a six-start thread, of large pitch. The inner face of the sleeve *e* is formed with a projecting part *i* which is of annular formation and the inner end of which is chamfered or tapered as at *j* for a purpose which will hereinafter appear.

100 Each part lens has the form of a circular lens from which a segment has been removed by a plane extending parallel to the lens axis and the part lenses are arranged within the casing *a* so that the flat faces *k* of the part lenses of one system are parallel to the flat faces *k*¹ of the part lenses of the other system and are on opposite sides of the longitudinal axis of the casing. The lens systems are housed within a pair of substantially half sleeve-like members *l* the outer surfaces of which are of frusto-conical formation. The inner surface of the outer casing *a* is of a similar formation so that when the members *l* are displaced longitudinally of the casing *a* the said members and the lens systems *b* and *c* carried thereby, will be caused to move towards or away from one

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another and the separation m between the systems of lenses varied. In order to prevent the members l from turning about the axis of the casing a they are each provided with a pin l^1 which is slidable longitudinally of the casing a in an elongated slot a^1 formed in the wall of the casing. The rear ends of the inner surfaces of each of the members l are formed with chamfered or tapering seating surfaces engaging with the tapered surface j on the focussing sleeve e and the forward ends of such inner surfaces are similarly formed and bear against a chamfered or tapered part n formed on the rear end of a ring o which is slidably mounted in the bore p formed in the forward end of the lens casing. Between the front face of the ring o and the rear face of another ring q which is screwed into the forward end of the casing a and locked in position therein by a locking ring r , a series of, for instance, six spiral springs s are provided so that the slidable ring o is urged towards the rear of the casing. Lateral movement of the springs is prevented by passing screws t therethrough, the said screws being arranged so that their ends are screwed into the slidable ring o and their heads are adapted to slide in openings u formed in the ring q . v is another ring which is adapted to carry the colour filters. In the arrangement illustrated two filters consisting of two-pieces of different coloured glass of semi-circular shape are employed. The septum d is preferably arranged so that its forward end projects for a short distance into the gap between the two half sleeve-like members l and between the dividing line of the two filters and the forward ends of the members l . another similar septum d^1 is arranged, the rear edge of this septum being connected to the members l by a pair of fins d^2 of flexible material which will permit displacement of the lens systems relatively to the casing a and, at the same time, prevent light rays passing through the gap m .

From the foregoing it will be appreciated that when the focussing arm f is moved so that the sleeve e is caused to move towards the forward end of the casing a , the members l and the slidable ring o will move in the same direction in opposition to the springs s and, owing to the conical characters of the outer surfaces of the members l and the inner surface of the casing a , the members l and the lens systems b and c carried thereby will be caused to move towards one another and the separation m diminished. Conversely when the focussing arm f is moved so that the sleeve e is caused to move towards the rear end of the casing a , the springs s will

cause the members l and the lens systems b and c carried thereby to be moved in the same direction and by reason of the coned surfaces above referred to the separation m will be increased.

In Figure 3 of the drawings the area occupied by a single picture or image in the usual form of cinematograph film is indicated by the rectangle 1, 2, 3, 4, while that occupied by a single picture or image in a film obtained by the employment of a camera lens of the character illustrated in Figures 1 and 2 is indicated by the rectangle 3, 4, 5, 6, it being understood that in the present invention the pictures denoted by the rectangles 3, 4, 5, 6, and 5, 6, 7, 8 are taken simultaneously and not successively as in the case of pictures or images of the usual form of cinematograph film. Thus there are two pictures or images on each of the areas normally occupied by one picture. In cases where more than two systems of lens are employed there will be more than two pictures or images on each unit of area corresponding with the rectangle 1, 2, 3, 4, or 3, 4, 7, 8, the number and relative dispositions of the pictures on the film corresponding with the number and relative dispositions of the lens systems.

If desired, the invention may also be applied to the apparatus or lenses employed for projecting the pictures on to a screen and if the adjustable taking lens is used as the projector lens it compensates for parallax in both operations and hence is suitable for home cinematograph cameras.

The invention further affords a means for obtaining stereoscopic pictures or effects and if desired, stereoscopic pictures in colour may be obtained by providing the observer of a projected film with spectacles containing colour filters for each eye, the colour filters being similar and similarly arranged to those used in the projector.

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 compound cinematograph objective comprising in combination, at least two lenses having their axes spaced apart by a distance less than one of the linear dimensions of a normal picture-space, a supporting sleeve surrounding said lenses, and guides within said sleeve adapted to guide at least one of said lenses in a path inclined to the axes of the lens and converging towards the axis of the sleeve in the forward direction, for the purpose described.

2. A compound cinematograph objective 130

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according to claim 1 wherein the inner surface of the sleeve is of taper form and constitutes the aforesaid guides.

5 3. A compound cinematograph objective according to claim 2 wherein a focussing sleeve (for example *e*) engages the rear ends of the mounts of the lenses and springs (for example *s*) are provided which urge the lens mounts rearwardly and maintain them in contact with the focussing
10 sleeve.

4. The compound cinematograph objective substantially as described with reference to Figures 1 and 2 of the accompanying drawings.

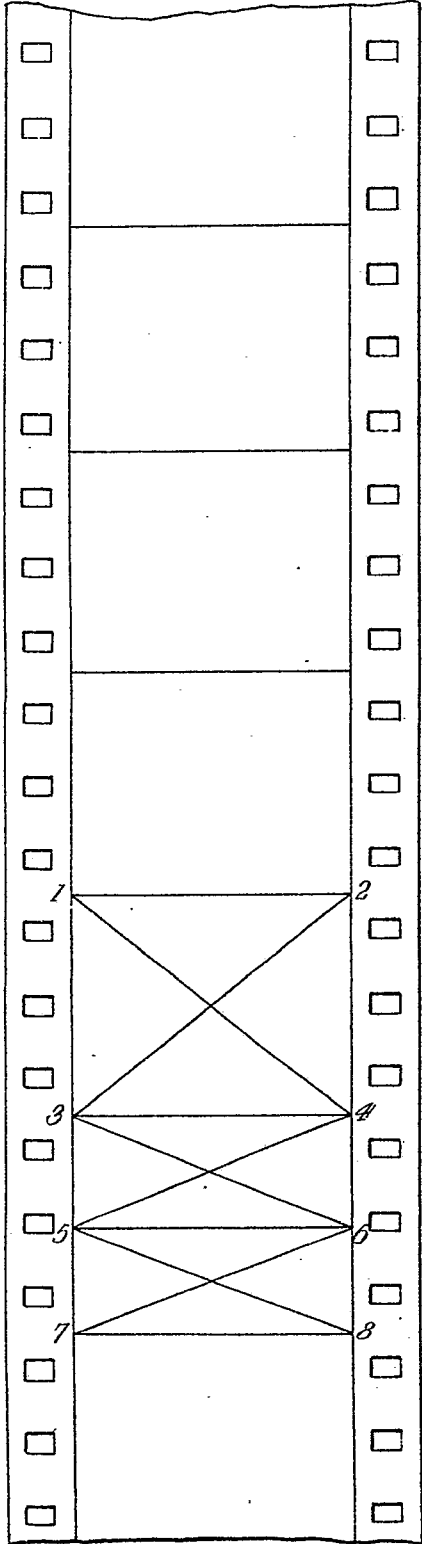
15

Dated this 14th day of May, 1929.

For the Applicant:
H. A. GILL & Co.,
Chartered Patent Agents,
51 /52, Chancery Lane, London, W.C. 2.

2nd Edition

Fig. 3.



[This Drawing is a reproduction of the Original on a reduced scale.]

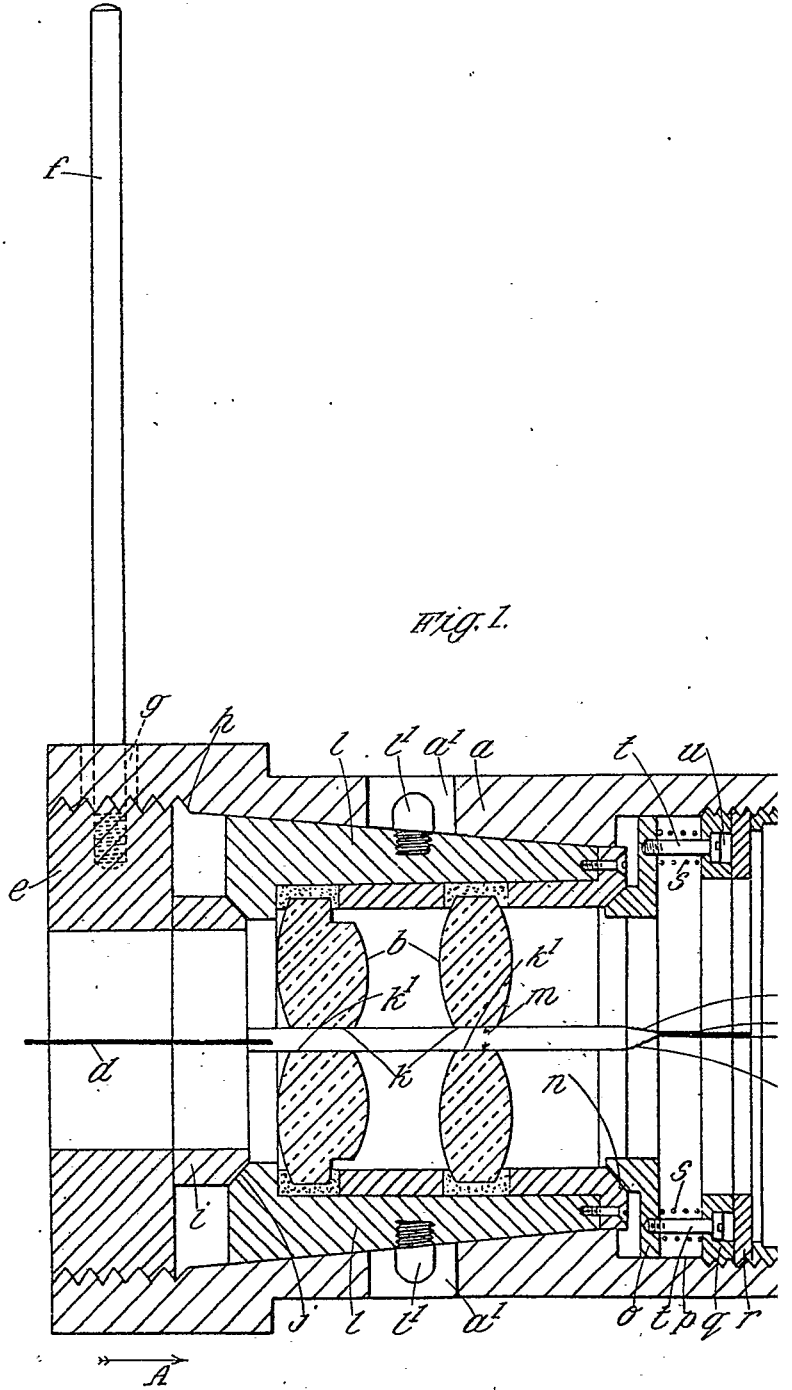


Fig. 1.

Fig. 1.

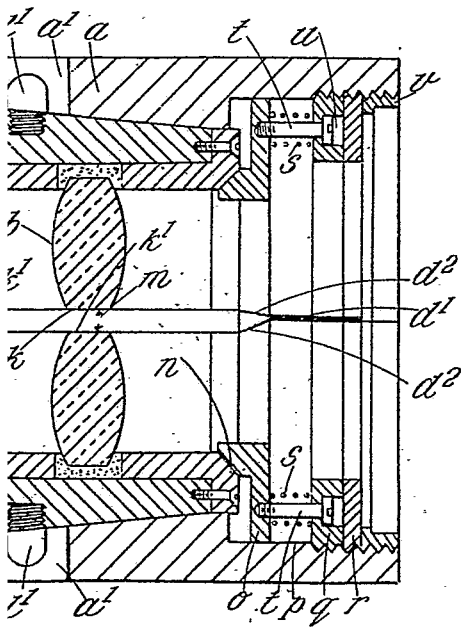


Fig. 2.

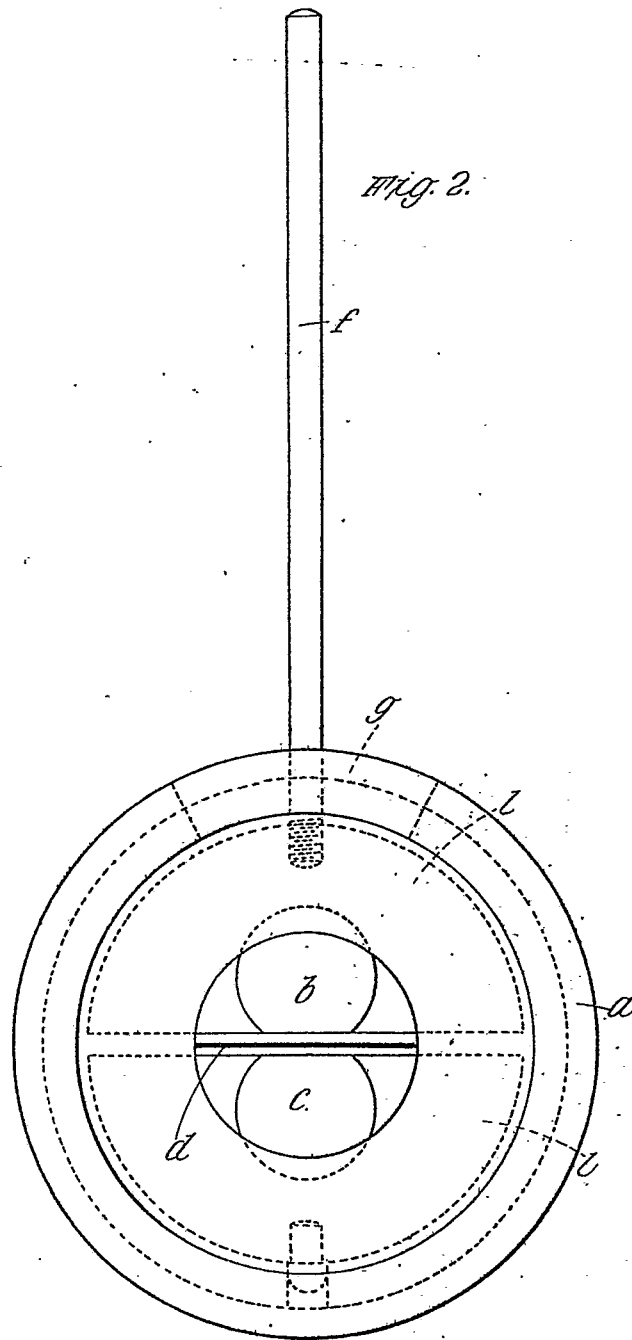


FIG. 8.

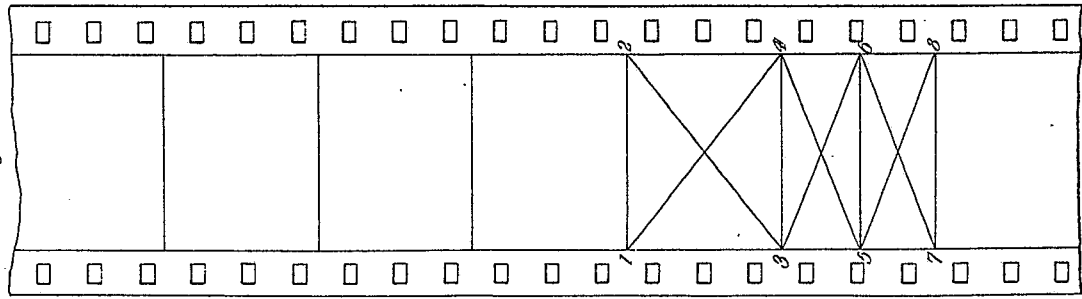
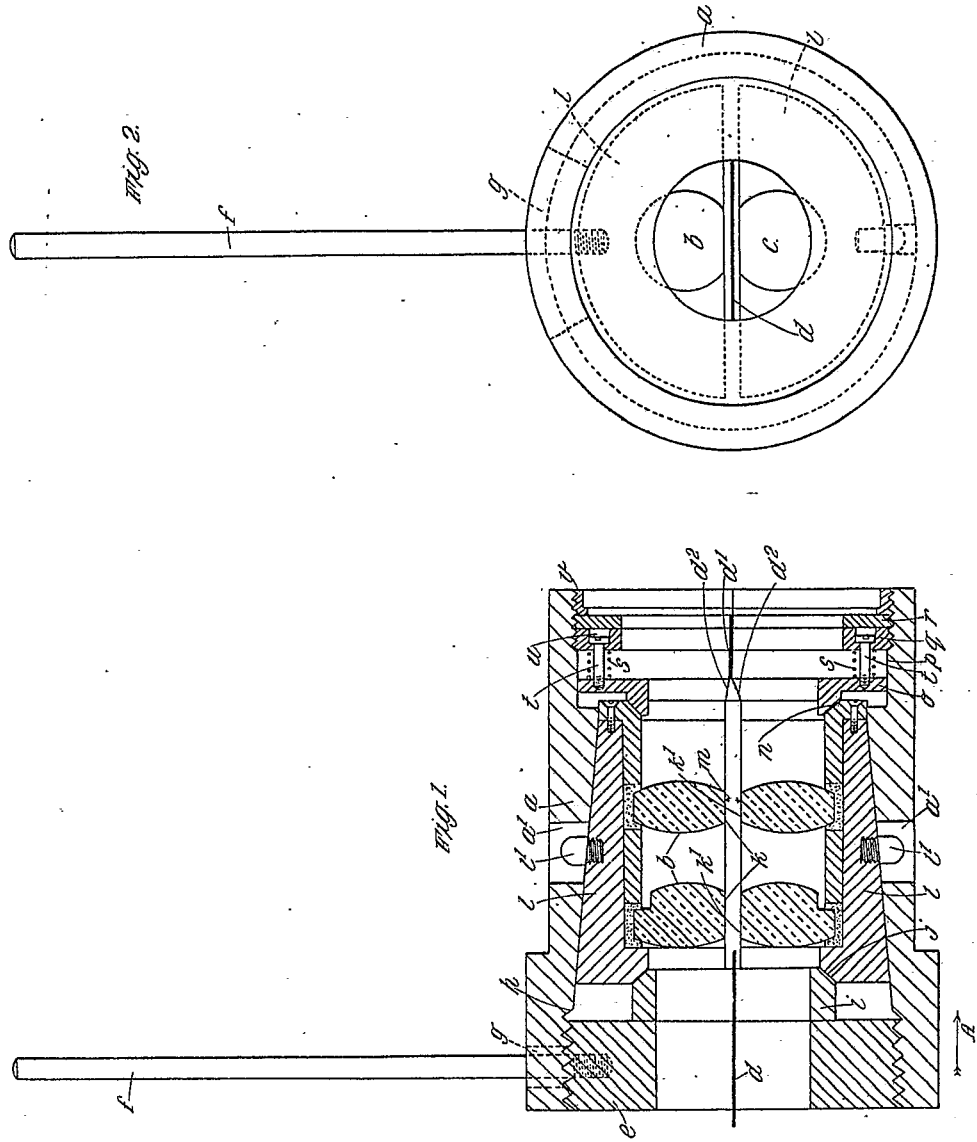


FIG. 1.



[This Drawing is a reproduction of the Original on a reduced scale.]