June 12, 1934. O. C. GILMORE 1,962,501

PROJECTION ATTACHMENT

Original Filed March 24, 1930 3 Sheets-Sheet 1

Fig. 1.

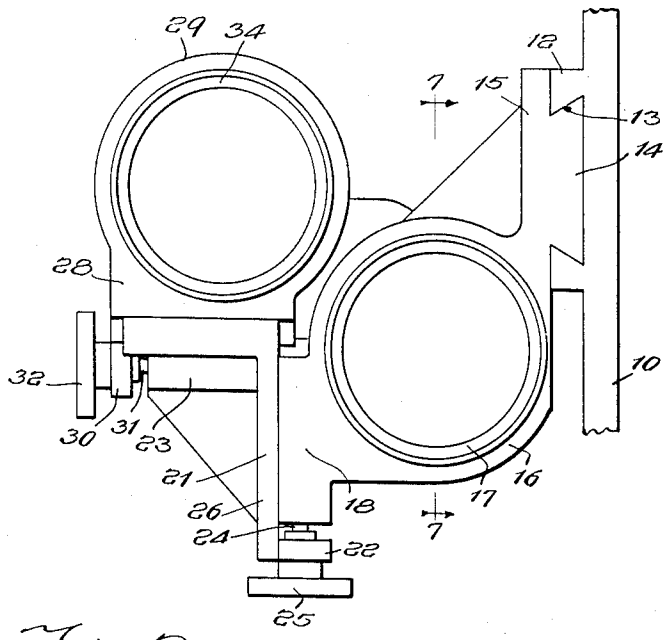
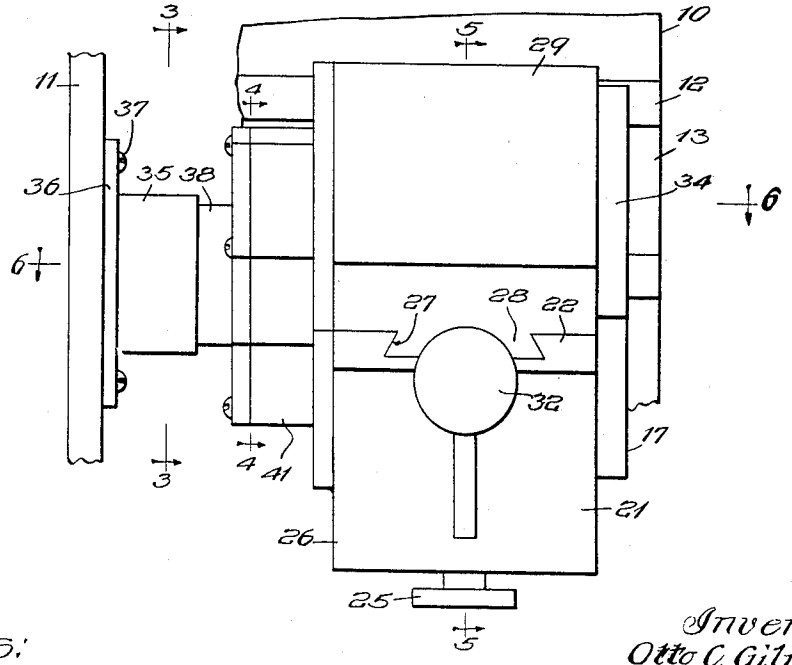


Fig. 2.



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Fig. 3.

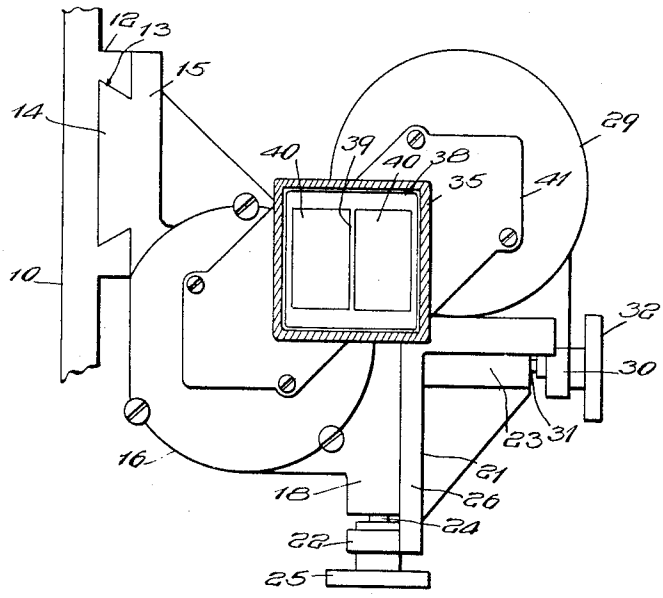


Fig. 4.

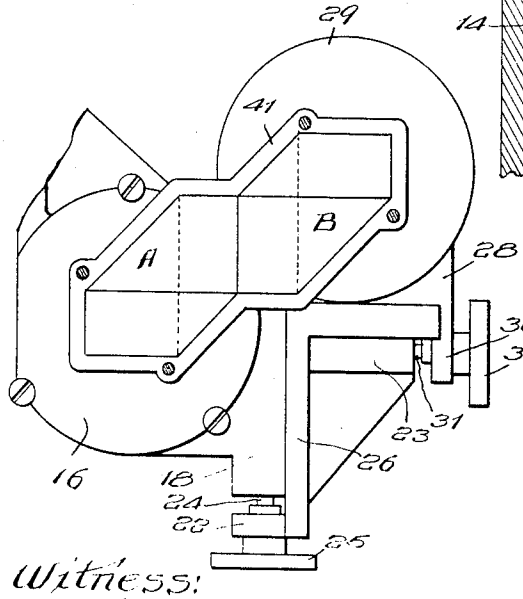
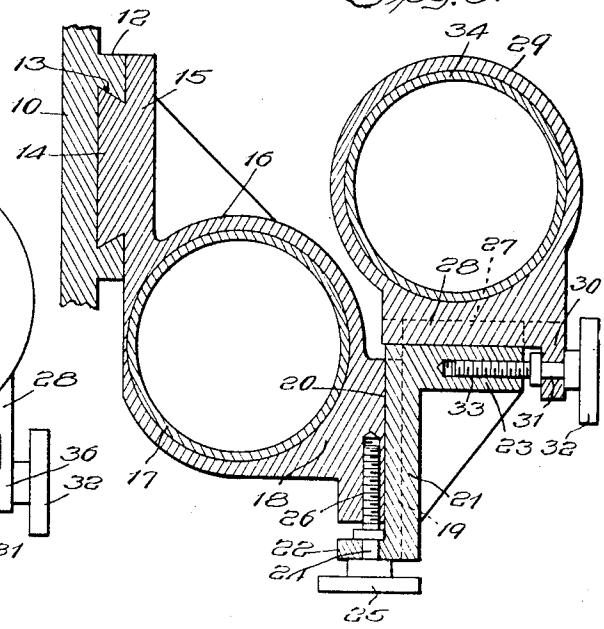


Fig. 5.



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Fig. 6.

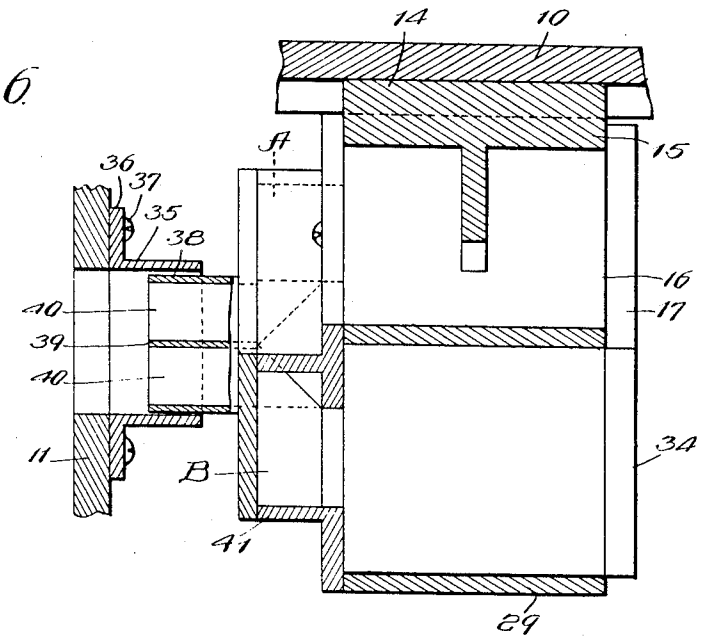


Fig. 7.

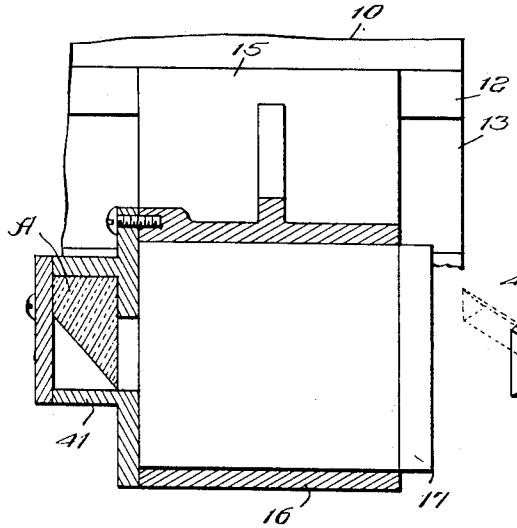
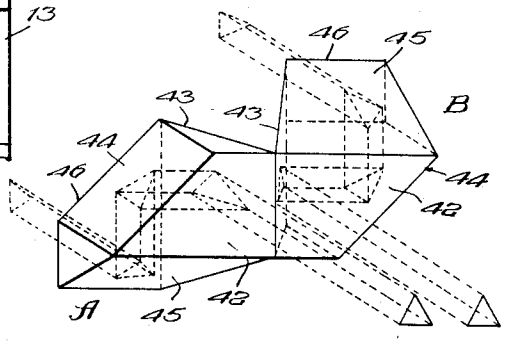


Fig. 8.



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1,962,501

UNITED STATES PATENT OFFICE

1,962,501

PROJECTION ATTACHMENT

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Application March 24, 1930, Serial No. 438,342
Renewed November 7, 1933

10 Claims. (Cl. 88—1)

This invention relates to attachments for motion picture projection machines for the projection of motion pictures in natural colors and has for its object the elimination and control of reflection, the increase and clarity of detail and the general shortening of the focal length.

With the above and other objects in view, as will be apparent, this invention consists in the construction, combination and arrangement of parts all as hereinafter more fully described, claimed and illustrated in the accompanying drawings, wherein:—

Fig. 1 is a front elevation of the present attachment;

Fig. 2 is a side elevation thereof;

Fig. 3 is a vertical section taken along line 3—3 of Fig. 2 illustrating passages leading from the film and film gate to the attachment and showing a rear elevation of the attachment;

Fig. 4 is a vertical section taken along line 4—4 of Fig. 2 illustrating the position and mounting of the turning prisms;

Fig. 5 is a vertical section taken along line 5—5 of Fig. 2 and illustrates the relative adjustment of the lens sets.

Fig. 6 is a longitudinal horizontal section taken along line 6—6 of Fig. 2;

Fig. 7 is a vertical section taken along line 7—7 of Fig. 1; and

Fig. 8 is a perspective view of the double turning prisms.

Heretofore the production of motion pictures in natural colors has been accomplished by placing on the positive film in the frame normally occupied by a single image two or more images, each of which represents a distinctive color record. That is to say, one of the images is taken through a red-orange filter while the other is taken through a blue-green filter. These images are placed on the film by turning the images through 90 degrees so that they occupy positions upon their sides with the tops and bottoms thereof adjoining or parallel to the longitudinal edges of the film. Thus in the space normally occupied by a single black and white image there has been placed upon the film two distinct images, each constituting a separate color record, resting upon their sides with their tops and bottoms parallel to the longitudinal edges of the film. The present invention is designed to constitute an attachment coacting with a standard motion picture projecting machine for the projection of these multiple images through corresponding and appropriate color filters so that the images may be superimposed and blended upon the screen to constitute a single projected image in natural colors. This invention also contemplates the use of full size lenses in such projection and to that end separates the images one from the other so that a lens of full diameter rather than part diameter may be used. It is also the object of the present invention to shorten the length of the light path through the turning prisms, thus giving more intensity in the projected image and to eliminate reflection as well as increase the clarity and detail of the projected image.

Reference being had more particularly to the drawings 10 designates a portion of the frame of a standard motion picture machine having a standard film gate 11. While the present invention may be attached to the projecting machine in any suitable manner it is here shown suspended from a projection 12 upon the interior of the frame 10. This projection has a dove-tailed groove 13 therein in which is received a similarly formed projection 14 carried by a plate 15 resting flush against the outer surface of the projection 12 on the frame 10. The plate 15 may be adjusted relatively to the frame 10 of the camera and maintained in its adjusted position in any suitable manner, not shown. In this manner the entire attachment, which is supported by the plate 15 may be adjusted for focusing. A lens housing 16 is carried rigidly with the plate 15 and in fact may be formed integrally therewith and contains therein the shell 17 wherein is a full diameter lens set (not shown).

Diagonally and diametrically opposed to the plate 15 the lens housing 16 is provided with an extension 18, the outer face of which is vertical and rests substantially parallel to the plate 15. This extension in its outer face is provided with a dovetailed groove 19 in which is slidably mounted the dovetailed tongue 20 of a bracket 21. At its lower end this bracket 21 is provided with a horizontal arm 22 which rests beneath and substantially parallel to the lower horizontal face of the extension 18 of the housing 16. At its upper end the bracket 21 is provided with a second horizontal arm 23 resting in a plane parallel to the plane of the lower arm 22 and projecting from the opposite side of the bracket 21 to said arm 22. An adjusting screw 24, having a manipulating head 25 is mounted for free rotation in and is carried by the arm 22 of the bracket 21. The threaded extremity 26 of this screw is received in an interiorally threaded socket formed in the extension 18 of the housing 16. As the tongue 20 of the bracket 21 is slidable in the groove 19 in the extension 18 the manipulation

of the screw 24 by means of the head 25 will, by means of the threaded connection 26 between said screw and the extension 18, cause the bracket 21 to move vertically with respect to said extension 18. Thus by turning the screw 24 in one direction the bracket 21 will be elevated and by turning said screw in the reverse direction the bracket 21 will be lowered.

The horizontal arm 23 of the bracket 21 has a dove-tailed groove 27 formed longitudinally in the upper outer face thereof. A dovetailed tongue 28 carried by a lens housing 29, in which is mounted a full lens set 34, is slidably mounted in this groove 27. The tongue 28 at its outer end is provided with an ear 30 which rests substantially parallel to the outer end of the arm 23 of the bracket 21. An adjusting screw 31 is loosely mounted in and carried by the ear 30 of the lens housing 29 and is provided with a head 32 for the manipulation thereof. The threaded end 33 of this screw 31 is received in an interiorally threaded socket longitudinally situated in the arm 23 of the bracket 21. Thus by adjusting the screw 31 by means of the head 32, the lens housing 29 may be moved longitudinally of the arm 23 and relatively to the housing 16. Thus by moving the screw 31 in one direction the housing 29 is moved toward the housing 16 and by moving the screw 31 in the opposite direction the housing 29 is moved away from the housing 16. It is to be observed from the drawings that the groove 27 and the tongue 28 and the groove 19 and the tongue 20 are respectively dove-tailed, one within the other, so that there is a solid and substantial connection between the bracket 21 and the extension 18 of the housing 16 and the housing 29 and the arm 23 of the bracket 20. Thus any play between these various elements is entirely eliminated and the only movement that is possible is by means of the adjusting screws 24 and 31.

From the foregoing it will be apparent that by adjusting the plate 15 relatively to the frame 10 of the projection machine the entire mounting of the lenses as hereinbefore described may be moved as a unit for focusing purposes. It is also apparent that by the adjustment above described the two lens housings 16—29 may be relatively adjusted by means of the screws 24 and 31, the former adjusting the lens housing 29 vertically with respect to the housing 16 and the latter adjusting the housing 29 horizontally with respect to the housing 16. By this adjustment the exact registration upon the screen of the separate and distinct images projected from the housings 16 and 29 is accomplished to produce a single unitary projected image.

The foregoing attachment is mounted in advance of the film gate 11 and this film gate carries a light shield 35 secured thereto by means of the flange 36 resting flush against the gate and pierced by the screws 37. Coacting with the light shield and telescoped therewith is a shell 38 for conducting the light paths to the prisms to be hereinafter described. This shell is divided by the partition 39 into the passages 40, one passage being provided for each light path. As the light to the rear of the gate 11 passes through the film at least two paths of light are created, each carrying an image, one of these images constituting one color record and the other a distinct color record. These two light paths enter the passages 40 and by these passages are delivered to the prism shell 41 mounted upon and carried by the housing 16. Within this shell 41 is contained the double turning prism or prisms illustrated in detail in Fig. 8. It will be observed from Fig. 3 that the light paths through the passages 40 coact with the housings 16 and 29 at adjacent points between or adjoining the portions of the housings where the peripheries adjoin. Therefore, if the light paths were not acted upon by the prisms illustrated in Fig. 8 the light would not be delivered to the housings 16 and 29 for passage directly through the film thereof. Hence, one portion of the prism illustrated in Fig. 8, not only turns the image carried by one of the light paths through 90 degrees to cause it to occupy a normal or vertical position, but it also reflects said light path downwardly and outwardly to pass centrally through the housing 16. Likewise the prism acting upon the other light path will not only turn the image through 90 degrees to cause it to occupy a normal and vertical position, but it will also reflect said light path upwardly and outwardly to cause it to pass centrally through the housing 29. In effect there are two prisms, one for each light path through the passages 40. Each of these prisms comprises a light transmitting surface 42, a reflecting surface 43, a second reflecting surface 44 and a third reflecting surface 45 and a light transmitting surface 46. The passage 40 delivers the light path to the transmitting surface 42, through which the light passes to be reflected at right angles by the reflecting surface 43 to the reflecting surface 44, which in turn reflects the light at right angles to the reflecting surface 45. The light reflecting surface 45 again reflects the light at an angle of 45 degrees to and through the transmitting surface 46 from which the light passes directly through the center of the coacting lens housing 16 or 29.

Thus the section A of the prism illustrated in Fig. 8 coacts with the lens housing 16, while section B of the prism coacts with the lens housing 29 to direct their respective light paths through the center of the lens sets 17 and 34 of said housings.

From the foregoing it is apparent that the prisms or prism sections A and B not only act upon the images to turn them through 90 degrees but also act upon the light paths to separate the same so that it is possible to provide full diameter and complete lenses for the projection of said images. In this manner the size of the prism or prism sections A and B will greatly reduce the length of the light path through it and thereby increase the detail in the projected image and eliminate reflection. By the provision of the light shield 35 and the shell 38 the light paths are kept entirely distinct and separate until projected upon the screen and one light path is not in any way affected by the other.

What is claimed is:

1. The combination with a support, of a bracket adjustably carried thereby, a lens housing secured to said bracket having an extension thereon provided with a groove, a plate mounted for adjustment on said extension having a tongue engaged in said groove, a horizontal arm carried at each end of said plate, one of said arms being positioned below said extension and the other said arm being provided with a longitudinal groove and extending oppositely thereto, a set screw swiveled to the arm located below said extension and threaded into said extension, a second lens housing mounted on the grooved horizontal arm of said plate and provided with a tongue engaged by the groove of said plate, said second housing being provided with a stud posi-

tioned opposite to the end of said horizontal arm, and a set screw swiveled in said stud and threaded into said grooved horizontal arm.

2. The combination with a support, of a bracket adjustably carried thereby, a lens housing secured to said bracket having an extension thereon provided with a groove, a plate mounted for adjustment on said extension having a tongue engaged in said groove, a horizontal arm carried at each end of said plate, one of said arms being positioned below said extension and the other said arm being provided with a longitudinal groove and extending oppositely thereto, a set screw swiveled to the arm located below said extension and threaded into said extension, a second lens housing mounted on the grooved horizontal arm carried by the plate and provided with a tongue engaged in the groove of said arm, said housing being provided with a stud positioned opposite to the end of said grooved horizontal arm and means cooperating with the stud and arm for adjusting the second housing, means for projecting individual light paths toward said housings, and combined light reflecting and transmitting surfaces coacting for delivering an individual light path to each of said housings.

3. The combination with a support, of a bracket adjustably carried thereby, a lens housing secured to said bracket having an extension thereon provided with a groove, a plate mounted for adjustment on said extension having a tongue engaged in said groove, a horizontal arm carried at each end of said plate, one of said arms being positioned below said extension and the other said arm being provided with a longitudinal groove and extending oppositely thereto, a set screw swiveled to the arm located below said extension and threaded into said extension, a second lens housing mounted on the grooved horizontal arm carried by the plate and provided with a tongue engaged in the groove of said housing being provided with a stud positioned opposite to the end of said horizontal arm, a set screw swiveled in said stud and threaded into said arm, and a series of combined light reflecting and transmitting surfaces coacting with each housing for directing a path of light therethrough.

4. The combination with a support, of a bracket adjustably carried thereby, a lens housing secured to said bracket having an extension thereon provided with a groove, a plate mounted for adjustment on said extension having a tongue engaged in said groove, a horizontal arm carried at each end of said plate, one of said arms being positioned below said extension and the other said arm being provided with a longitudinal groove and extending oppositely thereto, a set screw swiveled to the arm located below said extension and threaded into said extension, a second lens housing mounted on the grooved horizontal arm carried by the plate, and provided with a tongue extending into the groove of said plate, said housing being provided with a stud positioned opposite to the end of said horizontal arm, a screw swiveled in said stud and threaded into said arm, and a series of light reflecting and transmitting surfaces coacting with each housing for directing a light path therethrough and turning the image thereof through 90 degrees.

5. The combination with a support, of a bracket adjustably carried thereby, a lens housing secured to said bracket having an extension thereon provided with a groove, a plate mounted for adjustment on said extension having a tongue engaged in said groove, a horizontal arm carried at each end of said plate, one of said arms being positioned below said extension and the other said arm being provided with a longitudinal groove and extending oppositely thereto, a set screw swiveled to the arm located below said extension and threaded into said extension, a second lens housing mounted on the grooved horizontal arm carried by the plate and provided with a tongue engaged in the groove of said plate, said housing being provided with a stud positioned opposite to the end of said horizontal arm, a screw swiveled in said stud and threaded into the arm, a film gate, a light shield coacting therewith and having a plurality of passages each of which is adapted to conduct a light path toward said lens housings, and a prism cooperating with each light passage for directing the light path thereof to and through the cooperating lens housing.

6. The combination with a support, of a bracket adjustably carried thereby, a lens housing secured to said bracket having an extension thereon provided with a groove, a plate mounted for adjustment on said extension having a tongue engaged in said groove, a horizontal arm carried at each end of said plate, one of said arms being positioned below said extension and the other said arm being provided with a longitudinal groove and extending oppositely thereto, a set screw swiveled to the arm located below said extension and threaded into said extension, a second lens housing mounted on the grooved horizontal arm carried by the plate and provided with a tongue engaged in the groove of said plate, said housing being provided with a stud positioned opposite to the end of said horizontal arm, a set screw swiveled in said stud and threaded in said grooved horizontal arm, a film gate, a light shield coacting therewith and having a plurality of passages each of which is adapted to conduct a light path toward said lens housings, and a prism cooperating with each light passage and lens housing for directing the light path thereof to and through the cooperating lens housing, and in so doing turn the image of said light path through 90 degrees.

7. The combination with a support, of a lens housing adjustably mounted on said support, a second lens housing adjustably mounted on said first housing and parallel thereto, a prism casing secured to the first housing and coacting with the second housing and having a central aperture therein, means for delivering parallel light rays to said aperture, and a pair of prisms within said casing, each adapted to receive and reflect one of said light rays to and through one of the lens housings.

8. The combination with a support, of a lens housing adjustably mounted thereon, a second lens housing adjustably mounted on said first housing and in spaced relation thereto, a prism casing secured to the first of said housings and coacting with the second housing, having a central aperture in one side thereof, and apertures at ends of opposite sides thereof, a shell coacting with said aperture having a partition therein whereby two indeepndent light paths may be delivered to said aperture, and a pair of prisms within said casing, one coacting with each side of said partition to reflect the coacting light path through one of the end apertures to and through one of said housings.

9. The combination with a support, of a lens housing adjustably mounted on said support, a second lens housing adjustably mounted on said first housing and parallel thereto, a prism casing secured to the first housing and coacting with the second housing and having a central aperture therein, means for delivering parallel light rays to said aperture, each ray carrying an image on its side, and a pair of prisms within said casing, each adapted to simultaneously receive and reflect one of said light rays to and through one of the lens housings and turn the image thereof to its upright position.

10. The combination with a support, of a lens housing adjustably mounted thereon, a second lens housing adjustably mounted on said first housing and in spaced relation thereto, a prism casing secured to the first of said housings and coacting with the second housing and having a central aperture in one side thereof and apertures at ends of opposite sides thereof, a shell coacting with said aperture having a partition therein whereby two independent light paths may be delivered to said aperture, and a pair of prisms within said casing, one coacting with each side of said partition to reflect the coacting light path through one of the end apertures to and through one of said housings and simultaneously turn the image of said light path.

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