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SPOT AND FLOOD LIGHT APPARATUS

Filed April 25, 1927

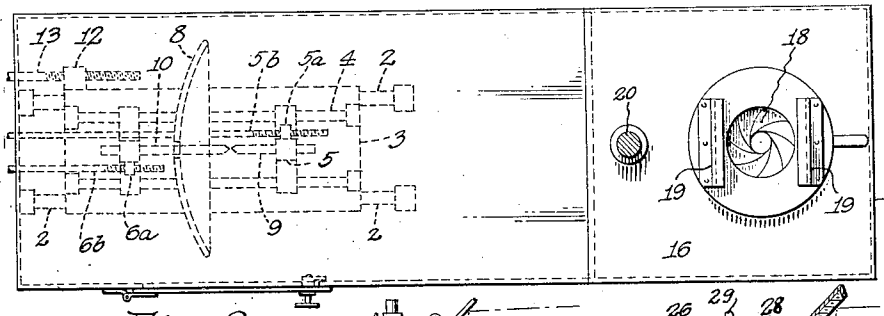


Fig. 2.

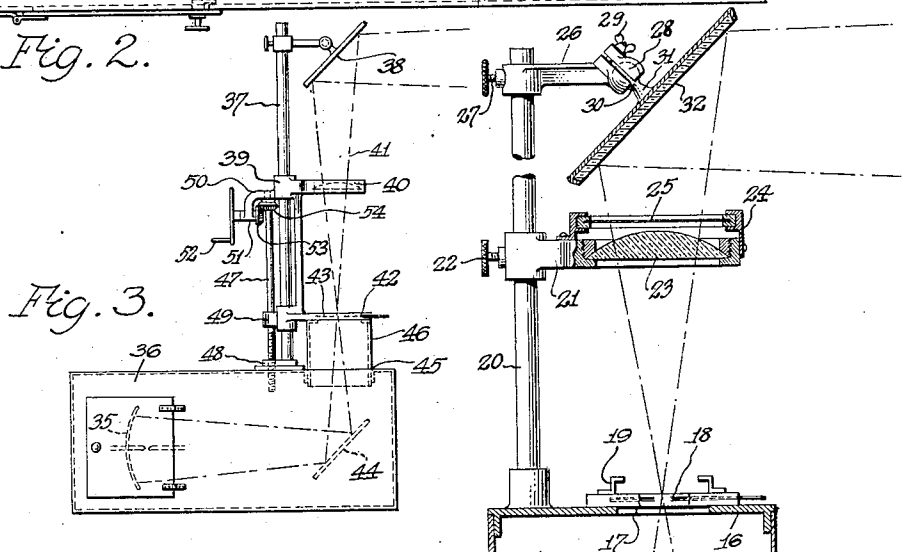


Fig. 3.

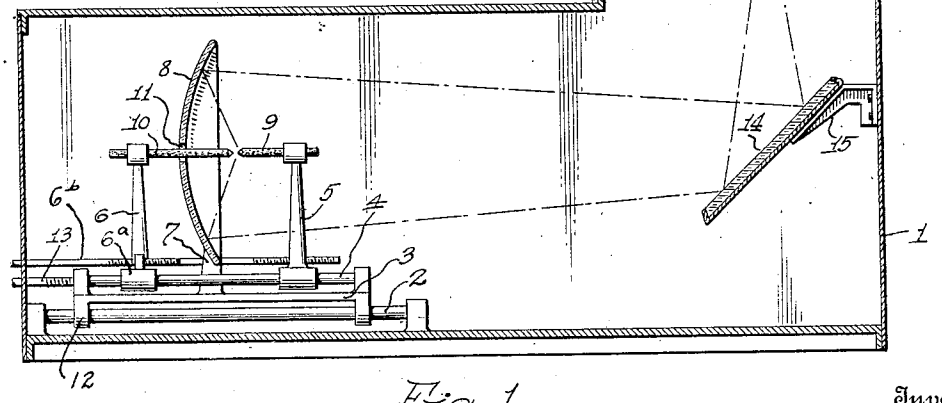


Fig. 1.

Inventor
Karl Brenkert,
Joseph W. Brenkert,
By Bartlett & Bartlett
Attorneys

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UNITED STATES PATENT OFFICE.

KARL BRENKERT AND JOSEPH W. BRENKERT, OF DETROIT, MICHIGAN.

SPOT AND FLOOD LIGHT APPARATUS.

Application filed April 25, 1927. Serial No. 186,205.

The present invention pertains to a novel apparatus for projecting light variable from a spot to a flood upon the stage or screen of a theatre or the like.

It is well known in the art that a mirror reflector at the light source has a desirable high bending power, a large interception angle and low transmission losses, but is inferior to a lens in flexibility of adjustment and uniformity of illumination. The object of the invention is to utilize a mirror reflector for its advantageous qualities and at the same time provide uniform illumination and easy adjustment of the area and location of the light on the stage or screen.

In the accomplishment of this object we make use of the principle that a plano-convex lens produces an image of the body disposed at its focal point. This body may be an area of light, and in such case the area of light on the receiving surface is a function of the area of the beam at the focal point. The means for varying the area of the beam at the focal point in the present invention may be merely an adjustment of the lens longitudinally of a converging beam varying in cross sectional area along its longitudinal axis, but is preferably constituted by adjustment of the light source which delivers the converging beam.

The invention is fully disclosed by way of example in the following description and in the accompanying drawing, in which—

Figure 1 is a longitudinal vertical section of the device;

Fig. 2 is a plan view thereof; and

Fig. 3 is a vertical elevation of a modified construction.

Reference to these views will now be made by use of like characters which are employed to designate corresponding parts throughout.

The device as shown in Figure 1 includes a fixed housing 1 having a track 2 mounted on its base preferably near the rear end thereof. On the track is slidably mounted a carriage 3 carrying a second track 4 on which arms 5 and 6 are slidably mounted. The track 2 further supports the fixed standard 7 supporting a reflector 8 which is preferably elliptical to produce a converging beam of light having a horizontal axis.

The arm 5 carries a carbon stick 9 having its point at the concave side of the reflector, and the member 6 carries a similar carbon 10 extending through a central aperture 11 in the reflector 8 and having its point disposed sufficiently near to the point of the stick 9 to produce a light crater in the usual manner. The carriage 3 is formed at one edge with a nut 12 into which is threaded a screw 13 journaled in the casing 1 as shown more clearly in Figure 2. By rotation of the screw, the light source assembly may be shifted. The arms 5 and 6 are similarly formed with nuts 5^a and 6^a respectively into which are threaded screws 5^b and 6^b journaled in the housing 1. Rotation of these screws modifies the light crater or adjusts it in its distance from the reflector 8.

In the beam emanating from the reflector 8 a plane mirror 14 is provided for changing the direction of the beam and is shown supported on a bracket 15 secured to a wall of the housing 1. The top 16 of the housing has an aperture 17 through which the reflected beam passes, and over this aperture is mounted an iris shutter 18 or similar variable aperture device for defining the edge of the beam, and a guide 19 for accommodating an accessory such as a slide or a framing device that may be inserted in the beam if desired. In the use of the apparatus for spot and floood lighting, no such accessory is ordinarily required in the guide 19.

On the top 16 is also mounted a standard 20 carrying a slidable lens holder 21 which may be fixed in any position on the standard by a set screw 22. The holder contains a lens 23 having its focal point lying in the axis of the beam reflected from the mirror 14. On the holder and above the lens is mounted a guide 24 into which a color screen 25 or other modifying device may be inserted if desired.

The standard 20 carries another arm 26 disposed above the member 21 and adjustable on the standard by a set screw 27. The free end of the arm 26 is provided with a split socket 28 which may be clamped to the desired tightness by a wing nut 29. In the socket is received a ball 30 having a stem 31 carrying a plane mirror 32 intercepting the beam emanating from the lens 23 and adapted to project the beam on a stage or screen. The direction of the beam emanating from the mirror 32 may be varied horizontally and vertically by adjusting the mirror in its universal joint support.

In Figure 1 it is assumed that the focal point of the lens 23 is in the aperture 17.

In this position of the lens, the area of light in the aperture 17 will be projected on the screen or stage as an image of the object in the focal point of the lens. If the lens 23 is lowered or raised, its focal point will be brought into a larger cross sectional area of the beam reflected from the mirror 14, and consequently a larger area of light will be projected on the screen. The principle on which the device operates in this variation of the beam area lying at the focal point of the lens. In lowering or raising the lens in the manner described, there is greater divergence between the lens and the projecting mirror 32, and this mirror would require dimensions sufficiently large to receive the diverged beam. Such a mirror would be too large to be conveniently accommodated and adjusted in a projection room of ordinary size, and a different means is therefore employed to carry out the principle already mentioned.

This means resides merely in the adjustment of the light source assembly by the device already described. To increase the area of projected light on the stage or screen, the light source is brought closer to the reflector 14 to increase the area of light thereon and consequently the area of light at the aperture 17. Since the reflector 14 is fixed in the stationary housing 1, the size of this mirror is limited only by the size of the housing and does not interfere with the ease of adjustability because it is not a movable part. The increased area of light at the aperture 17, which is the focal point of the lens 23, produces a larger area of light on the stage or screen in the manner described. The apparatus is preferably constructed for variation from a spot light five feet in diameter to a flood light fifty feet in diameter by varying the distance between the light source and the mirror 14.

In the modification shown in Figure 3 the light source 35 in the housing 36 is stationary. A standard 37 on the housing carries a projecting mirror 38 which is universally supported in the manner described in connection with Figure 1. A frame 39 is slidably mounted on the standard and carries a holder 40 for a lens 41 and a lower holder 42 for a shutter 43 or similar device. The housing contains a forward direction changing reflector 44 adapted to cast a beam through an aperture 45 in the top of the housing and thence through the device 43. From the holder 42 is suspended a shield or guard 46 slidable against the wall of the aperture 45 and preventing leakage of light between the aperture and the holder 42.

Adjacent the standard 37 is provided a feed screw 47 threaded through a boss 48 fixed on the housing, passing loosely through a bearing 49 at the lower part of the frame 39 and having its upper end journaled in an arm 50 extending from the frame. The arm supports a horizontal stub shaft 51 having at one end a turning wheel 52 and at the other end a bevel pinion 53 meshing with a similar member 54 carried by the shaft 47. It will be obvious that the elevation of the frame 39 may be adjusted by turning the wheel 52, thereby altering the position of the focal point of the lens 41 longitudinally of the beam reflected from the mirror 44 and thereby producing the result already discussed. In this case also the mirror 38 must be sufficiently large to receive the entire beam emanating from the lens 41, but an apparatus of this kind may be suitable for special purposes. As an alternative to a large size mirror, the mirror 38 may be adjusted on the standard 37 and then tilted for direction of projection; but the permissible vertical adjustment of the mirror is limited by the height of the projection port in the projection room, which is ordinarily small, and the same restrictions apply to the device shown in Figure 1 in so far as adjustment of the lens and projecting mirror is concerned.

For general purposes therefore the adjustment of the light source with reference to the direction changing reflector is preferable. The direction of the beam projected on the stage or screen is varied by adjustment of the mirror 32 while the body of the apparatus remains stationary, as distinguished from the present projector which requires that the entire head or body be moved and tilted for moving the beam over the stage or screen.

Although specific embodiments of the invention have been illustrated and described, it will be understood that various alterations in the details of construction may be made without departing from the scope of the invention as indicated by the appended claim.

What we claim is:—

A projector for theatrical use comprising a housing, a light source therein, a mirror reflector adjacent said source and adapted to produce a converging beam of light, means for adjusting said light source and reflector longitudinally of the axis of the latter, another reflector supported by said housing in the axis of the first named reflector, a standard on said housing, and a projecting reflector universally mounted on said standard and adapted to intercept light from said second named reflector.

In testimony whereof we affix our signatures.

KARL BRENKERT.
JOSEPH W. BRENKERT.