United States Patent

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[54] **ADJUSTABLY POSITIONABLE REFLECTORS**
4 Claims, 3 Drawing Figs.

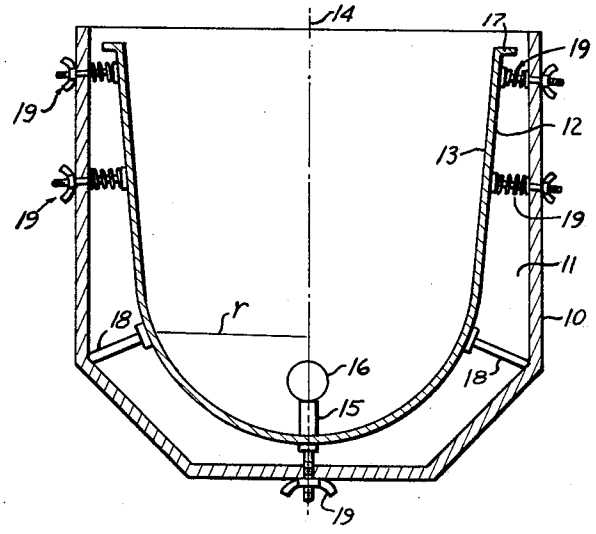
[52] **U.S. Cl.** **350/295,** 240/44.1
[51] **Int. Cl.** **G02b 5/10**
[50] **Field of Search** 350/295; 240/41.35, 36, 37, 44.1, 103

[56] **References Cited**
UNITED STATES PATENTS

2,707,903	5/1955	Trombe	350/295 X
3,229,578	1/1966	Smith	350/295
3,514,776	5/1970	Mulready	350/295 X
3,478,608	11/1969	Met	350/310 X

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ABSTRACT: A reflector assembly in accordance with the present disclosure comprises a deformable reflector mounted within a housing by an adjustablemounting means. The adjusting mounting means is capable of selectively adjusting the configuration and position of the reflector in the housing. Preferably, at least one region of the reflector is fixedly positioned with the housing and other regions of the reflector are independently selectively positioned in the housing to thereby selectively alter the configuration of the reflector.



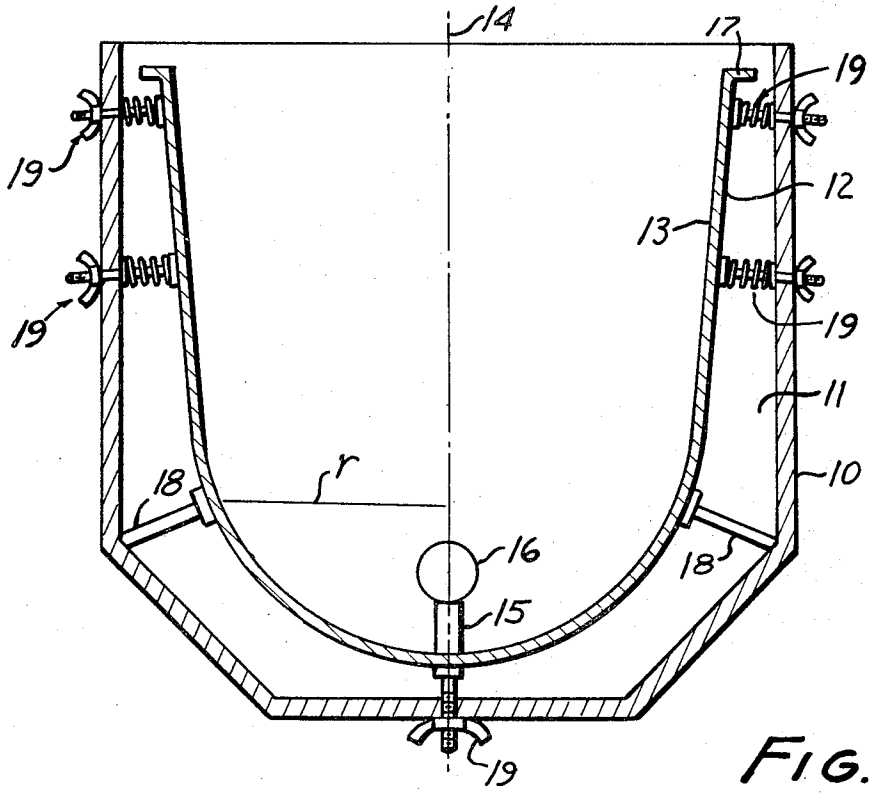


FIG. 1

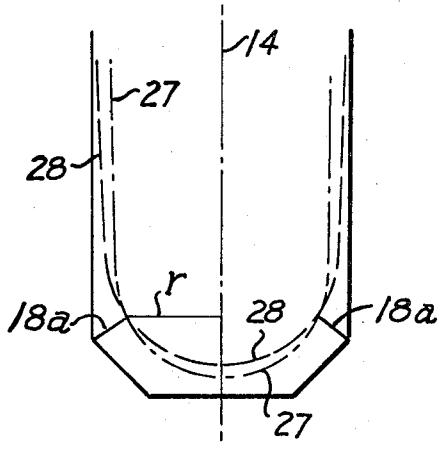


FIG. 3

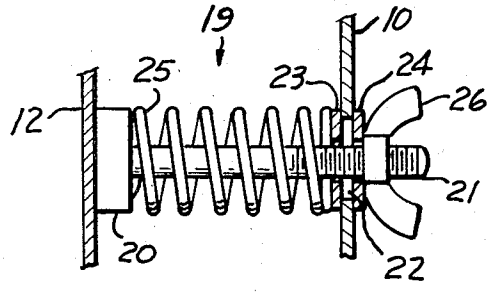


FIG. 2

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ADJUSTABLY POSITIONABLE REFLECTORS

This invention relates to apparatus for changing the orientation of a reflector, and particularly to apparatus for changing the size, shape and/or focal point of a reflector.

Heretofore, reflectors have been constructed in a fixed shape and have not been capable of changing size, shape or focal length. The orientations of prior reflectors have been changed only by moving the entire reflector structure and when it was desirable to change the size, shape or focal length of a reflector, the entire reflector had to be replaced with one of desired size, shape and focal length.

It is an object of the present invention to provide a reflector structure whose size, shape and focal length may be selectively adjusted.

Another object of the present invention is to provide a flexible reflector mounted to adjustable means so that the size, shape or focal length of the reflector may be selectively adjusted.

A reflector in accordance with the present invention comprises a housing supporting a plurality of adjustable positioning means. A deformable reflector is mounted to the adjustable positioning means so that the reflector may be adjustably positioned within the housing by adjusting each positioning means.

In accordance with one feature of the present invention, the position of the reflector is fixed at predetermined locations.

The above and other features of this invention will be more fully understood in the following detailed description and the accompanying drawings, in which:

FIG. 1 is a side view elevation in cutaway cross section of a reflector assembly in accordance with the presently preferred embodiment of the present invention;

FIG. 2 is a side view elevation of adjustable positioning means for use in the reflector assembly illustrated in FIG. 1; and

FIG. 3 is a diagram illustrating the principles of operation of the reflector assembly illustrated in FIG. 1.

Referring to the drawings, and particularly to FIG. 1, there is illustrated a reflector assembly in accordance with the presently preferred embodiment of the present invention. The reflector assembly comprises a housing **10** having an internal cavity **11**. Reflector **12**, which is preferably constructed of a single sheet of distortable metal, such as a thin sheet of aluminum or spring steel, is positioned within cavity **11** and includes reflective surface **13** on the inner surface thereof. By way of example, surface **13** may be a polished surface or may be a thin layer of reflective material fastened or bonded to reflector **12**. Preferably reflector **12** and surface **13** are arranged so that they form an elongated reflector in the form of a trough having an elliptical cross section, the axis of the trough being shown in end view in FIGS. 1 and 3. Reflector **12** is preferably positioned so that its elliptical surface forms a major axis lying in plane **14**, which plane is perpendicular to the sheet of FIGS. 1 and 3. Mount means **15** is independently mounted within reflector **12** and carries source **16** of radiation, such as a radiant heater or lamp. Preferably, radiation source **16** is independently positioned on plane **14** within the reflector so as to direct radiation along the plane and forwardly of the forward end **17** of the reflector.

Reflector **12** is fixedly mounted to housing **10** by and at fixed supports **18**. Adjustable supports **19** are fixed to reflector **12** at various regions about the outer surface of the reflector, at least one such set of adjustable supports preferably lying in plane **14**.

FIG. 2 illustrates the details of adjustable supports **19**. As illustrated in FIG. 2, bracket **20** is fixedly attached to reflector **12**, such as by bonding or welding the bracket directly to the outer surface of the reflector. Bracket **20** carries threaded bolt **21** directed outwardly from the reflector. Bolt **21** passes through slot aperture **22** in the wall of housing **10**, and washers **23** and **24** abut each side of the wall of housing **10**. Compression spring **25** is positioned between bracket **20** and washer **23** and is arranged to urge or bias reflector **12** away from housing **10**. Fastener **26**, such as a Wing nut, is threadably assembled to fastener **21** so that its load bearing surface bears against washer **24** which in turn bears against the wall of housing **10**.

In operation of the adjustable reflector in accordance with the present invention, the reflector is positioned within housing **10**, and each fastener **26** of each adjustable support **19** is independently axially rotated so as to independently selectively position each associated region of the reflector **12** with respect to housing **10**. Fixed supports **18** define the position of at least one region of reflector **12**. The spacing *r* of this region of the reflector from plane **14** (the spacing being measured along the normal to the plane) is constant. It follows that adjustment of supports forwardly of supports **18** (i.e., toward the open end of the reflector) make that part of the reflector wider or narrower, depending on the adjustment made, and the adjustment of the supports located rearwardly of support **18** (i.e., toward the closed end of the reflector, such as the support which lies in the central place) adjust the depth of the reflector. The shape of the curve of the reflector is thereby adjustable over wide ranges. The shape of the curvature of the reflector may be generally characterized as elliptical, but it will be understood that variations from true ellipticity can be caused by the various mounting means. The generally elliptical shape has the plane **14** as its major axis. The reflector region (sometimes called the "elliptical cross section") at the fixed supports is sometimes called a "first region," at the supports forwardly of the fixed supports, a "second region," and rearwardly of the fixed supports, a "third region." Illustrated in FIG. 3, fixed supports are represented by lines **18***a* which define the fixed spacing *r* some distance forwardly of source **16**. As illustrated by dashed lines **27**, reflector **12** may be adjusted to a configuration which is narrow and deep, or the reflector may be adjusted to a configuration which is wide and shallow as indicated by dashed lines **28**. Of course, the illustrations given are by way of example and a wide variety of configurations are available.

One feature of the present invention resides in the fact that fasteners **26** may be connected to suitable control devices, such as electrically operable solenoids, so that the fasteners may be adjusted by remote control, thereby adjusting the configuration of the reflector by remote control. This feature is particularly advantageous where the reflector is positioned in a relatively inaccessible location, such as on a flood lamp standard over a field where it is desirable to selectively alter the shape of the area of the field to be illuminated, or to intensify or reduce the illumination level by reducing or enlarging the area illuminated.

The present invention thus provides an adjustable reflector whose size, shape and/or focal length may be selectively adjusted without changing the reflector and without adjustment operations. The reflector is effective in use and its configuration is easily changed. The reflector is particularly useful for playing fields adaptable for use for several sports. Thus, the reflectors can be adjusted to illuminate an elongated rectangular field, such as a football field, a more square-shaped field, such as a baseball field, or even a relatively small field such as a boxing or wrestling ring. Thus, where a stadium or field is intended to provide various types of events which require various fields of illumination, lamps provided with reflectors in accordance with the present invention can be made to selectively illuminate the various fields merely by adjusting the configuration of the reflector.

This invention is not to be limited by the embodiment shown in the drawings and described in the description which is given by way of example and not of limitation, but only in accordance with the scope of the appended claims.

What is claimed is:

1. An adjustable reflector whose configuration may be selectively adjusted, comprising: deformable reflector means having a reflective surface, said reflector means defining a region having a substantially elliptical cross section, the major axis of the ellipse being substantially coincident with the forward direction of intended propagation of radiation from said reflector; housing means; fixed support means mounted to

said housing means, said fixed support means being fixedly attached to a first region of the outer surface of said reflector means for supporting the same to define a fixed lateral spacing from the major axis of said elliptical cross section; first adjustable support means carried by said housing means and attached to said reflector means for selectively adjusting the lateral spacing from the central axis of said elliptical cross section at a second region of said reflector means where the said lateral spacing of said elliptical cross section is greater than said fixed lateral spacing; and second adjustable support means carried by said housing means and attached to said reflector means for selectively adjusting the configuration of said reflector means at a third region of said reflector means, said third region being located on the opposite side of said first region from said second region and including the intersection of said axis with said reflection surface, whereby the configuration of the second and third regions of said reflector may be selectively adjusted independently of the position of the other and independently of the position of said first region.

2. Apparatus according to claim 1 wherein said second adjustable support means is located on said major axis to adjust the location of the apex of the ellipse with respect to the plane of said fixed lateral spacing.

3. Apparatus according to claim 1 wherein each of said first and second adjustable support means comprises first threaded fastener means fixedly attached to the outer surface of said reflector means, second threaded fastener means threadably assembled to said first threaded fastener means, said second threaded fastener means having a load bearing surface, slot means through said housing means adapted to receive at least one of said threaded fasteners in such a manner that the load bearing surface of said second threaded fasteners bears against said housing means adjacent said slot means, and bias means urging separation of said housing means and said reflector means.

4. Apparatus according to claim 2 wherein each of said first and second adjustable support means comprises first threaded fastener means fixedly attached to the outer surface of said reflector means, second threaded fastener means threadably assembled to said first threaded fastener means, said second threaded fastener means having a load bearing surface, slot means through said housing means adapted to receive at least one of said threaded fasteners in such a manner that the load bearing surface of said housing means adjacent said slot means, and bias means urging separation of said housing means and said reflector means.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,628,852 Dated December 21, 1971

Inventor(s) Alvin A. Snaper et al

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Col. 2, line 17 "place" should read --plane--

Col. 2, line 28 "Illustrated" should read --As illustrated--

Signed and sealed this 17th day of September 1974.

(SEAL)
Attest:

McCOY M. GIBSON JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents

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