Aug. 17, 1943. O. STAM 2,327,144

LIGHT CONTROL DEVICE

Filed Nov. 18, 1940 2 Sheets-Sheet 1

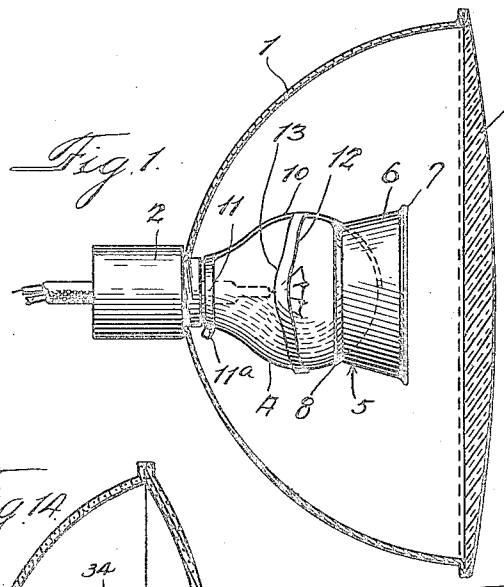


Fig. 1.

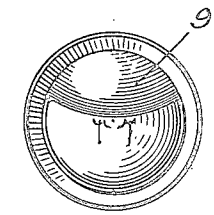


Fig. 3.

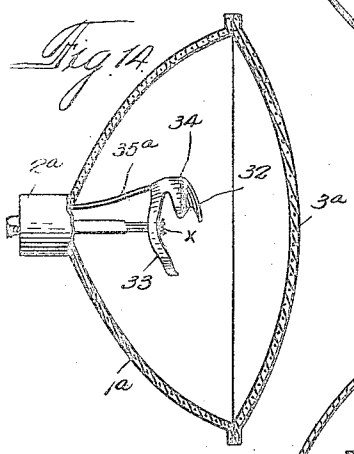


Fig. 1A.

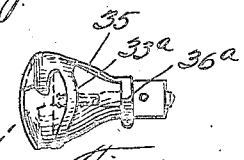


Fig. 16.

Fig. 15.



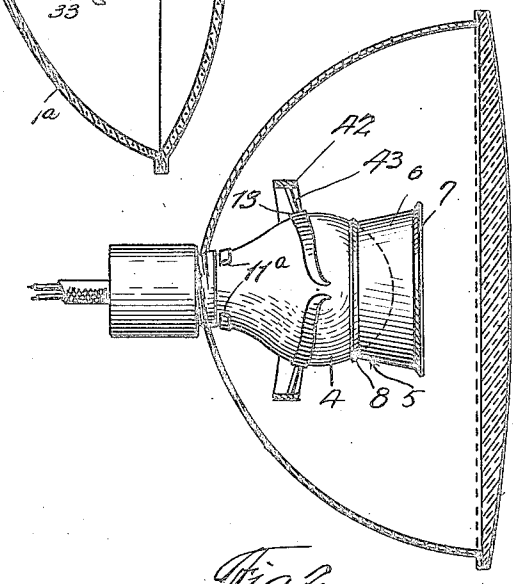


Fig. 2.

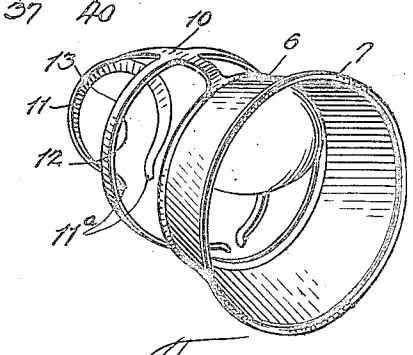


Fig. 4.

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LIGHT CONTROL DEVICE

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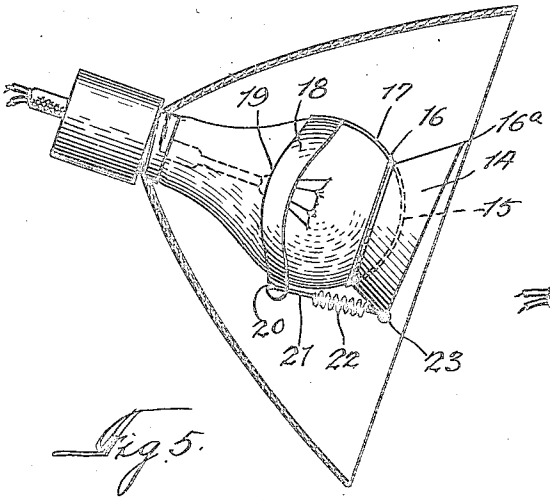


Fig. 5.

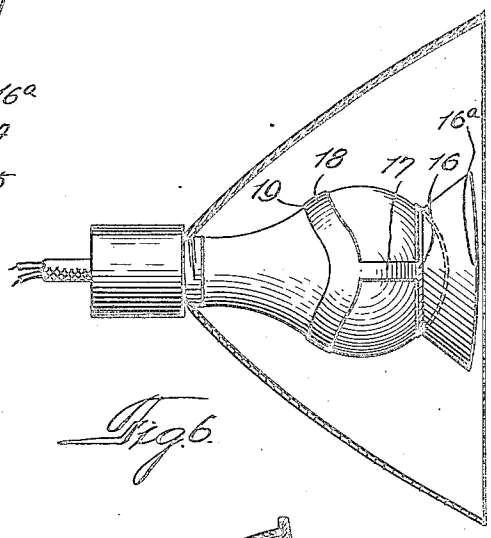


Fig. 6.

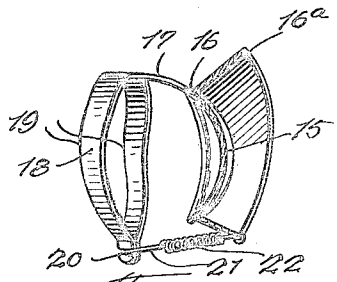


Fig. 7.

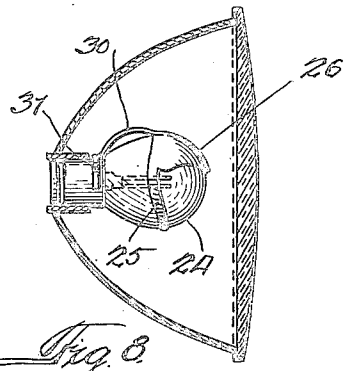


Fig. 8.

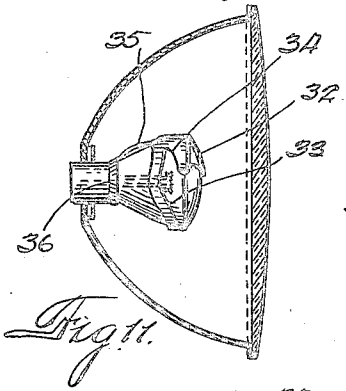


Fig. 11.

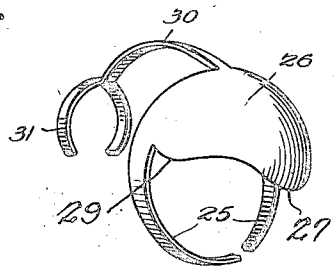


Fig. 9.

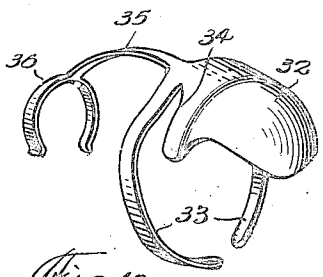


Fig. 12.

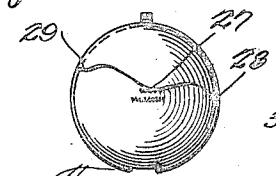


Fig. 10.

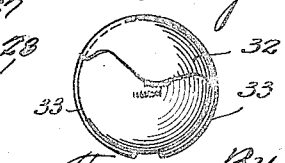


Fig. 13.

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UNITED STATES PATENT OFFICE

2,327,144

LIGHT CONTROL DEVICE

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Application November 18, 1940, Serial No. 366,043

3 Claims. (Cl. 240—48.6)

This invention relates to light-controlling devices, and more particularly to means for substantially eliminating so-called "phantom" light from traffic signals, such, for instance, as commonly used at street intersections and railroad crossings. When used in connection with such lights, the brilliance of the signal when the light is on is not materially reduced, and when the light is "off," light rays from outside sources are not reflected from the signal to produce so-called "phantom" light.

The invention is also adapted for use in connection with spotlights and floodlights used in photography and theatrical work, and effectively prevents glare from the reflector from being directed into the eyes of the subjects.

The invention is also adapted for use in connection with the ordinary automobile headlights, and particularly with so-called sealed beam lights, whereby glare may substantially be eliminated and stray light will be prevented from reflecting rearwardly into the eyes of the driver.

It is an object of the invention to provide means intimately associated with the bulb or with the light source when a bulb is not used, as in the seal beam, whereby certain glare spots on the reflector may be shaded in such a manner as to prevent the projecting of glare therefrom.

The invention is particularly adapted for lighting devices designed to project a more or less restricted beam. However, it may effectively be used in connection with any reflector in which it is desirable to eliminate the usual glare spots.

It is one object of the invention to provide an attachment especially adapted for use in connection with traffic signals and the like, which is so constructed that it may quickly be attached to the usual bulb, and which will be cheap to manufacture, easy to install in standard traffic lights, and will not easily get out of order.

A further object is to provide a similar attachment for controlling glare, which attachment may just as readily be attached and detached from the usual automobile headlight bulb and which will materially reduce the glare and stray light normally projected therefrom.

Although the embodiments shown in the drawings are in the form of attachments supported on the bulb, it is contemplated that the device may be an integral part of the bulb if desired, an important consideration being that the light-intercepting and shading area shall be light absorbing to a sufficient extent to perform the desired functions.

It has been found that, with a substantially perfect parabolic reflector and with the usual filament light source of material dimensions in the focal region, the so-called glare zone or source on the reflector from which filament images are projected has mathematically defined boundary lines and ordinarily comprises a fairly narrow, substantially ring-like zone substantially in or near the focal plane of the reflector. There will be no disturbing filament images projected from outside this zone if the reflecting surface of the reflector is not distorted from a true parabolic curve. It is therefore an object of the present invention to provide a light in which at least a substantial portion of the area within the well defined glare zone is shaded sufficiently to make the light rays, which otherwise would impinge thereon from the light source, ineffective to project disturbing glare images. Also, all direct rays from the light source do not pass through the lens, but are reflected back to the reflector across which they are angularly directed and then pass out as disturbing stray rays. It is therefore an object to intercept and absorb the angular rays within the reflector.

In ordinary traffic lights, a comparatively large bulb is used and a large-diameter, substantially annular filament usually forms the light source. When light is projected into the usual traffic signal from an extraneous source, such as from a brilliant sun or from sunlight reflected from white clouds, the light rays pass through the lens and strike the reflector and are then usually reflected to some point on the opposite side of the reflector and then outwardly through the lens to cause a brilliant "phantom" light. Many accidents are caused by this "phantom" light, as it is often impossible to be sure whether the light is off or on.

Practically all extraneous light rays which enter through the lens and which produce "phantom" light are reflected transversely across the reflector before being directed outwardly. The present invention, therefore, is constructed and arranged to intercept these stray rays within the signal and to absorb these rays so that they do not pass outwardly through the lens in sufficient quantities to cause any disturbing amount of "phantom" light.

In the specification and claims the focal plane of the reflector is for convenience used as a base or reference plane to approximately determine the position of the glare zone, and certain portions of the device or of correspondingly shaded portions of a bulb are definitely related to this focal plane and to the light source.

Further objects will be apparent from the specification and the appended claims.

In the drawings:

Fig. 1 is a somewhat diagrammatic, vertical, sectional view through the usual traffic signal, with the bulb and attachment therefor shown in full lines and the reflector and lens in section.

Fig. 2 is a bottom view of the embodiment shown in Fig. 1, with the lens and reflector in horizontal section.

Fig. 3 is a front view of the bulb and attachment shown in Figs. 1 and 2.

Fig. 4 is a perspective view of the attachment illustrated in Figs. 1, 2, and 3.

Fig. 5 is a vertical sectional view through a floodlight reflector with the usual bulb for photographic or theatrical use, and with the attachment shown in full lines.

Fig. 6 is a top view of the embodiment shown in Fig. 5, with the reflector shown in horizontal section.

Fig. 7 is a perspective view of the attachment illustrated in Figs. 5 and 6.

Fig. 8 illustrates an embodiment particularly adapted for automobile headlights, such, for instance, as the so-called metal sealed beam lights, in which a substantially spherical bulb is used.

Fig. 9 is a perspective view of the attachment illustrated in Fig. 8.

Fig. 10 is a front view of the bulb and attachment shown in Fig. 8.

Fig. 11 is a vertical sectional view similar to that of Fig. 8, showing the so-called metal sealed beam but in which the attachment is adapted for use in connection with the standard non-spherical bulb.

Fig. 12 is a perspective view of the attachment shown in Fig. 11.

Fig. 13 is a front view of the bulb and attachment of Fig. 11.

Fig. 14 is a vertical sectional view through a glass-sealed beam unit having a filament shield permanently mounted therein, the shield being substantially identical with that shown in Fig. 11.

Fig. 15 is a front view of one embodiment of the headlight attachment as used in connection with truck spotlights, and modified so as to prevent direct rays from the bulbs from being directed to the hood of the truck.

Fig. 16 is a side view of one of the attachments shown in Fig. 15.

Referring to the drawings in detail, the embodiment illustrated in Figs. 1 to 4, inclusive, comprises a signal light having the usual reflector 1, socket 2, and lens 3. A bulb 4 is supported in the socket in the usual manner, and a removable attachment 5 is applied to the bulb for the purpose of eliminating "phantom" light. The attachment 5 is preferably made of sheet metal and comprises an outwardly-extending, frusto-conical portion 6, preferably slightly flaring at its outer end to form a narrow flange, as shown at 7, and having its inner end flanged at 8, with the flange having a concave formation for the purpose of fitting the contour of the bulb 4. Within the conical portion 6 is a concave shield 9 preferably closely adjacent the bulb and positioned to prevent angular rays from an extraneous source passing downwardly through the bulb to be reflected outwardly and thereby cause "phantom" light. The lower part of the bulb is not shielded for the reason that ordinarily the extraneous light which causes "phantom" is not low enough to cause disturbing light rays.

A comparatively narrow strap or arm 10 extends rearwardly from the upper edge of the conical portion 6, and is provided at its inner end with downwardly-extending resilient fingers 11 having their lower ends curved outwardly at 11a so that the fingers may be pushed apart as they pass around the stem of the bulb 4. The fingers form a substantially annular split ring, and the material is sufficiently resilient to allow them to be passed over the stem of the bulb and to snugly clasp the glass of the bulb in front of the base and thereby hold the attachment rigidly in position.

The device is also provided with similar arms 12 which embrace the bulb substantially at its maximum diameter. These latter arms also form a resilient split ring and are preferably curved rearwardly at 13, as it has been found that with narrow arms of this shape, a large proportion of the reflected incoming rays which cause "phantom" light strike these bars and are absorbed thereby. Also this position and shape of the arms effectively shade the glare spots of the reflector.

It has been found that with the device as illustrated, and particularly with the conical section 6 of a diameter not much larger than the diameter of the bulb, the outgoing rays, when the bulb is "on," are not materially obstructed and the signal retains substantially its original brilliance. However, with this wide, conical shield portion of comparatively small diameter, a very large proportion of all incoming rays from an extraneous source are obstructed and absorbed as they are reflected transversely within the signal light. They therefore cannot be transmitted outwardly through the lens, and "phantom" light is substantially eliminated.

A further elimination of the "phantom" light is caused by the arms 12 and their peculiar relationship to the reflector, whereby these arms and the conical portion 5 obstruct substantially all of the stray rays and prevent the illusion of an "on" light when the signal is "off."

Figs. 5, 6, and 7 illustrate another embodiment of the invention particularly adapted for use in connection with photographic lights using a so-called photo-flood bulb of high intensity. This embodiment is not for the purpose of preventing "phantom" light, but is for the purpose of preventing glare in the eyes of the subjects. This is accomplished by means of a conical portion 14 having an inner shield 15 entirely covering the end of the bulb which otherwise would be exposed through the conical portion 14. This shield substantially conforms to the contour of the bulb and extends rearwardly to form a small flange 16. The rearwardly projecting arm 17 supports bulb-embracing arms 18, which latter are substantially identical with the arms 12 previously described, but are slightly back of the largest diameter of the bulb.

The arms 18 are also formed rearwardly at 19, and the lower ends of the arms after embracing the bulb are closely adjacent, as illustrated in Fig. 7, and are each provided with a notch 20 adapted to be engaged in the loop 21 of a spring 22, the spring 22 being hinged at 23 to the lower edge of the conical portion 14. The loop 21 releasably ties the ends of the arms together, and the spring retains the attachment snugly on the bulb. The arms 18 form a split ring which is preferably closely adjacent or slightly back of the focal plane of the reflector, substantially as shown. These arms are so disposed as to shade the previously mentioned glare

zone of the reflector, the position of which, as stated, may be accurately determined, and which zone is ordinarily closely adjacent the focal plane. The conical portion 14 may be similar to the portion 6 previously described, with the exception that the upper side is somewhat longer, as at 16a. This more efficiently shields the eyes of the subject from the upper part of the reflector.

As previously stated, the invention is also adapted for use in connection with automobile headlights for the prevention of glare and the control or elimination of stray rays. Figs. 8, 9, and 10 illustrate an embodiment adapted for use in connection with so-called metal sealed beam lights in which a substantially spherical bulb 24 is used and the arms are located adjacent the focal plane. In this embodiment, the same type of split ring arms 25 is used as previously described in connection with Figs. 1 to 5. A metal shield 26 extends from the arms outwardly and downwardly in front of the bulb, and conforms substantially to the contour thereof. The center and the inner side of this shield portion extend substantially to the axis of the bulb, as shown at 27 and 28, respectively, in Fig. 10. The outer side of the shield is considerably higher, as shown at 29, so that the direct rays may pass outwardly toward the side of the road. A right and a left shield are in each pair of headlights. This embodiment is provided with a rearwardly extending strap 30 having at its rearward end resilient arcuate arms 31 also forming a substantially split ring to embrace the stem of the lamp, as shown, and to cooperate with the resilient arms 25 to retain the device in position.

Figs. 11, 12, and 13 illustrate an embodiment adapted for use in the so-called metal sealed beam automobile headlight, using a standard, substantially conical bulb, in which the front end of the bulb is only slightly convex. This embodiment is provided with a shield 32 which covers substantially the same amount of the front of the bulb as shown in Figs. 8 and 10, the lower edge being provided with substantially the same contour as illustrated in Fig. 13. This embodiment is provided with the zone arms 33 which effectually shade the glare zone of the reflector in the same manner as previously described, and the resilient arms also aid in retaining the device on the bulb. In this embodiment the outer side of the attachment is cut away adjacent the arm, as at 34, to enable direct light from the filament to be directed outwardly toward the side of the road in the manner previously described. This attachment is also provided with a rearwardly extending arm 35 similar to the arm 30 previously described, and with the resilient arms 36 extending therefrom for embracing the stem of the light bulb.

Fig. 14 illustrates a glass sealed beam unit having a filament shield permanently mounted therein, the shield being substantially identical with that shown in Fig. 11 and mounted in substantially the same relationship with respect to the light source and reflector. This sealed beam unit comprises a glass reflector portion 1a and lens portion 3a which are secured together to form a sealed envelope having the usual light source X therein which light source is supported from the usual base 2a. The shield is preferably also supported on the base by means of a rearwardly extending arm 35a so that the device functions in substantially the same manner as disclosed in Figs. 8 and 11.

Figs. 15 and 16 illustrate an embodiment adapted particularly for use in connection with truck spotlights. This embodiment is substantially identical with the embodiment illustrated in Figs. 11, 12, and 13, with the exception that the front of the bulb and one side are covered to a materially greater extent than shown in the previous embodiment. Fig. 15 illustrates two oppositely disposed spotlight bulbs 37 and 38 in the position normally used in spotlights of trucks. These spotlights are closely adjacent the windshield and at the rear of the hood. Therefore, if the bulbs are not shaded, direct light strikes the hood and is reflected against fog, dust, and the like, and then back into the eyes of the driver. In this embodiment all of the front of the bulb is covered with a shield 39, except a small portion where the shield is cut away, as at 40, adjacent the lower outside edge and in a position where the direct light from the light source may be directed toward the side of the road away from the truck. All direct rays which otherwise would strike the hood of the truck are obstructed by means of the shield 39.

The attachments used on these two oppositely disposed truck lights are not interchangeable, but must be rights and lefts as shown. The side of the bulb adjacent the hood is covered by the shield 39 which extends rearwardly substantially to the dotted line 41 shown in Fig. 16. That is, on that side the shield extends rearwardly very close to the adjacent zone arm. This attachment is otherwise similar to the attachment shown in Figs. 11 and 12, and is provided with the zone arms 33a, rearwardly extending strap 35, and at its inner end with the resilient arms 36a forming a split ring for engagement over the base of the bulb.

As previously mentioned, a great deal of glare and disturbing stray light rays are caused by back reflection from the inner face of the lens. This inwardly reflected light strikes the reflector and is reflected back and forth transversely across the reflector until it finally emerges as glare or stray disturbing rays. An important feature of the invention is that it provides means in the main transverse path of these rays whereby they are absorbed before they can emerge from the headlight. In order to increase this absorption, annular absorbing rings 42 may be provided as shown in Fig. 2. These rings are preferably of thin sheet metal or the like with the plane of the metal parallel with the axis of the reflector so as not materially to obstruct the beam rays from the reflector, and the entire ring is positioned in the shadow of the zone arms and adjacent portions of the attachment so that additional reflector surface is not shaded. One or more of these rings 42 may be supported on the attachment by means of spaced supporting wires 43 or they may otherwise be held in position. The function of the light absorbing rings 42 is to absorb the stray transverse rays which it has been found normally pass in greatest quantity through the shaded zone outlined before they are emitted from the headlight.

For convenience, the rings have been shown only in Fig. 2. However, they may just as effectively be used in any of the embodiments shown and such use is contemplated.

It is intended, of course, that the invention should not be limited to the specific embodiment or embodiments disclosed herein, since modifications may be made, and it is contemplated, there-

fore, by the appended claims to cover any such modifications as fall within the true spirit and scope of this invention.

Having thus described this invention, what is claimed and desired to be secured by Letters Patent is:

1. In an electric light unit, the combination with a reflector and lens together forming a sealed envelope and having a focal region a light source substantially in the focal region, and a light shield within said envelope in front of said light source and of a contour to intercept the major portion of all angularly upward and forwardly directed rays which otherwise would pass directly from said light source through said lens, of a narrow substantially ring-like shield around said light source adjacent thereto and remote from said reflector and in a position to intercept substantially all direct rays from the light source which otherwise would strike said reflector in a narrow ring-like zone substantially in the focal plane thereof, said ring-like shield being curved adjacent the horizontal plane to extend rearwardly of said focal plane.

2. In an electric light unit having a reflector with a bulb therein, a shield over the front of said bulb and of a contour to intercept the major portion of all angularly upward and forwardly directed rays which would otherwise pass directly from said light source and beyond the front edge of said reflector, and a narrow ring-like shield around said bulb adjacent the transverse plane of said light source, said ring-like shield being offset rearwardly adjacent the horizontal plane to extend rearwardly of said transverse plane.

3. In an electric light unit wherein a reflector and a lense enclose a light source the combination of a shield to intercept a portion of the light rays directed forwardly from said light source, a rearwardly directed arm supporting said shield, said arm being secured at the rear of said light source, and a ring-like shield around said light source and adapted to intercept substantially all direct rays which otherwise would strike said reflector in a narrow ring-like zone substantially in the focal plane thereof, said ring-like shield being curved adjacent the horizontal plane to extend rearwardly of said focal plane.

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