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HEAD LAMP

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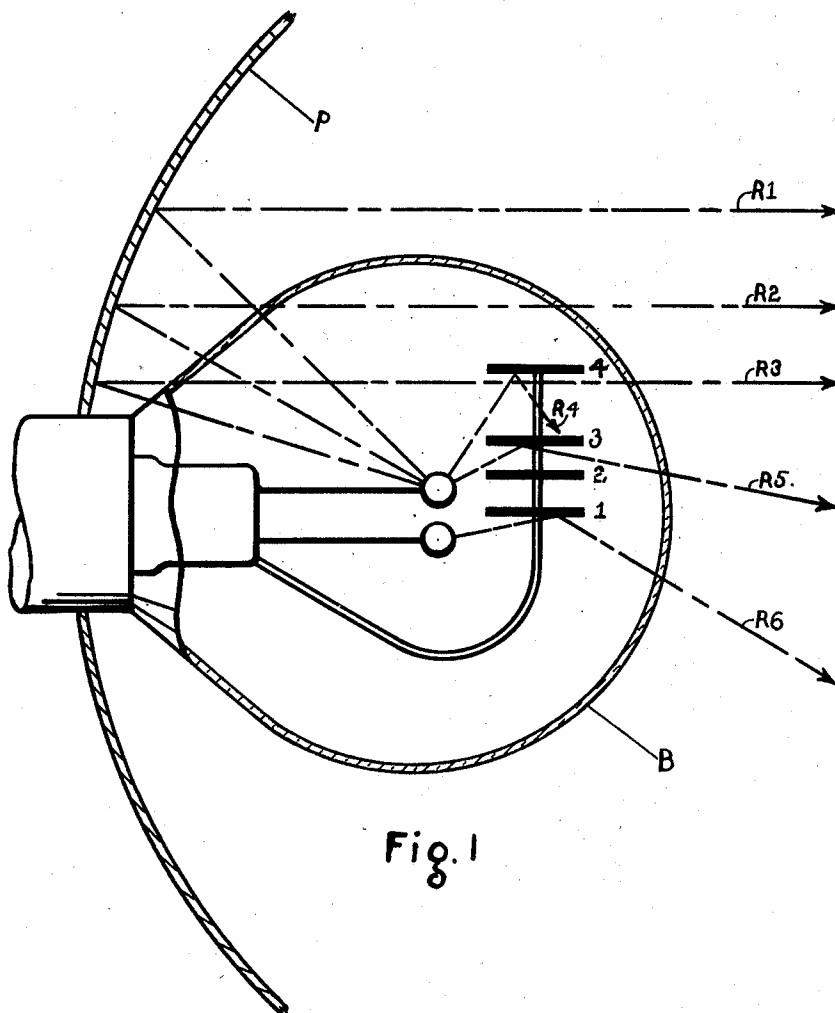


Fig. 1

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HEAD LAMP

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This invention relates to light control systems, and more particularly to incandescent lamp systems designed to efficiently illuminate a given region separated by a considerable distance from a light source to the particular exclusion of a region adjacent thereto, especially with reference to the case of a vehicle incandescent lamp where it is desired to illuminate a stretch of roadway without casting any stray light into the eyes of drivers or pedestrians coming toward the vehicle.

Such stray light if it causes the sensation of brightness to an oncoming observer is called glare. The sensation of glare is proportional to the maximum intensity of light received by the observer's eyes.

In incandescent lamps of this class constructed according to the prior art, it has been common to utilize light-shielding members disposed in front of the filament for the purpose of preventing light from passing directly from the source to the observer's eyes. In every case in which glare has been appreciably reduced, however, a large percentage of the total light has been wastefully intercepted by these shields.

This invention utilizes a plurality of light shades which do not intercept light rays by reason of being always either parallel to or outside of the direct beam, but diffuse or minimize the rays passing from the light source to points above the region illuminated by the beam.

It is one object of this invention to provide means for reducing the maximum intensity of light impressed upon an observer's eyes by a vehicle lamp while still operating the lamp at maximum efficiency.

It is another object of this invention to provide means to illuminate the side of the road removed from an oncoming vehicle more strongly than that side on which said vehicle is approaching, in order to show the driver his edge of the road for his own guidance and for the protection of pedestrians there.

Another object of this invention is to make a compact assembly of a light source with glare-preventing means constructed according to the principles of this invention by placing said glare prevention means inside the bulb of an incandescent lamp in closely spaced relationship to one or more filaments.

The principal ways in which light shields may be mounted according to this invention in front of a parabolic reflector with their surfaces all substantially parallel to the beam therefrom are illustrated in the drawings, in which:

Fig. 1 is a sectional view of an incandescent lamp inside of which a plurality of glare preventing shells has been mounted.

Fig. 2 is a side elevation of an incandescent lamp bulb inside of which a curved light shield has been mounted;

Fig. 3 is a front elevation of the incandescent lamp bulb shown in Fig. 2;

Fig. 4 is a side elevation of a double filament incandescent bulb using a plurality of flat light intercepting shields;

Fig. 5 is a front elevation of the bulb shown in Fig. 4;

Fig. 6 is a side elevation of an incandescent lamp having a curved, and a straight intercepting shield;

Fig. 7 is a front elevation of the lamp in Fig. 6;

Fig. 8 is a side elevation of an incandescent lamp having flat light intercepting shields; and

Fig. 9 is a front view of the lamp shown in Fig. 8.

Fundamental structure

The arrangement of shells shown in the upper half of Fig. 1 comprises the structure fundamental to the principles of this invention for preventing glare to any observers located above the top of a horizontally projected beam.

All the embodiments of my invention are shown in the drawings as modifications of a standard type of headlamp comprised of a lamp bulb B, mounted at the focus of a parabolic reflector P.

Principles of optical action

The optical action of this device as shown in Fig. 1 is as follows: Rays R1, R2 and R3 emanating from the light source by their reflection from the parabolic reflector P are caused to assume a direction parallel to the axis of the reflector. The aggregate of these rays comprises the direct beam of the headlamp, which is not a source of glare except when thrown directly into the observer's eyes by an upward tilting movement such as might be caused by undulations in a highway.

Assuming that the parabolic reflector is accurately made and properly focussed, the only rays which cause glare to an observer located outside the main beam are those which pass directly from the light source to the observer without reflection from the parabolic reflector. This invention eliminates this glare without reducing the intensity of the main beam by intercepting all the directly radiated rays. These intercepted

rays may be reflected to the surface of the road as shown by providing the bottom of each shield with a reflecting surface. The top of each shield should if opaque in the preferred embodiment of this invention be provided with a dead black finish in order to prevent reflection from the top surfaces thereof to the observer's eyes.

It may be noted that the shells near the axis of the reflector such as 1 and 2 are more closely spaced than those at the top such as 4 and 5. The reason for this may be seen by observing that in Fig. 1 the shell 2 intercepts the ray R6 when it has passed approximately half way through, while the shell 5 intercepts the ray R4 when it also has passed half way through the shell assembly, in spite of the fact that shell 5 is much farther from the adjacent shell 4 than shell 2 is from shell 1.

It thus follows that the solid angle of light rays intercepted by any shell is substantially proportional to the distance of said shell from the axis of the reflector P, so that they must be more closely spaced near the axis.

Overhead illumination

While a set of shells used according to the principles of this invention greatly reduces the glare, illumination of overhead objects is not entirely eliminated since there is a certain amount of diffusion of rays even in a plain glass lens, and a certain amount of light is reflected from the tops of the shells unless the surface is made very rough as well as black.

The illumination of overhead objects is improved without adding much to the glare by making the upper shells translucent. For best results this translucency is introduced only on the side of the filament remote from the approaching driver in order to secure increased illumination of overhead objects on the right without throwing any glare toward an oncoming driver.

Application to spotlight

In the case that it is desired to use a lamp as a spotlight, not necessarily pointed down at the road, and to minimize the radiation of stray light toward a vehicle approaching on the left, one side of the lamp may be equipped with shields as shown at 24 and 25 in Fig. 10. All surfaces of these shells should be made dead black.

A spotlight equipped with shells in this manner should be mounted on that side of a vehicle which is remote from opposing vehicles.

Side illumination

Figs. 2, 3, 6 and 7 show modifications of the shields in which one side of each shield 16, 21 is curved downward around the axis of the reflector to minimize glare to an approaching driver while the other side is made horizontal in order to allow as much light as possible to be thrown to the right of each vehicle.

Another embodiment of this invention is shown in Figures 1, 4, 5, 8 and 9 in which all of the shields are extended horizontally across the lamp in order to throw more light to both sides of the road than in the other constructions.

It may be seen that the fundamental principle is the proper utilization of shells disposed in spaced relationship around the axis of said reflector, every part of each surface being geometrically generated by lines substantially parallel to the central axis of the lamp.

The shields of Figs. 4 and 5 may be tilted so as to make the axis V—V vertical if it is desired to throw more light to the right side of the road than to the left.

Mounting of shells inside bulb

The shells are for compactness mounted inside the bulb. In case a single filament incandescent lamp is used as a light source, as shown in Figs. 2 and 3 the shell 16 may be mounted so close to the filament 17 that satisfactory reduction of glare may be effected with only one or two shields. The shells 12 to 16 may be mounted in the press 19 by means of the elongated members 18 and 20.

Another embodiment of my invention utilizes a plurality of shells such as 21 and 21' mounted inside a double filament lamp bulb, as shown in Figs. 6 and 7. The lower filament 22 is turned on for driving when no other vehicles are approaching, and in order to provide the optimum illumination on both sides of the highway the shell 21' which is immediately above said lower filament 22 is not curved around the side of this filament. The upper filament 23 is turned on while passing other vehicles, and in order to avoid glare on the other driver the upper shell 21 is curved down around this filament 23. One filament may be offset sideways from the other in order that the main beam may be moved towards the right when the upper filament is turned on. For optimum illumination of both sides simultaneously the arrangement of Figs. 1, 4, 5, 8 and 9 may be used.

Number of shells required

In any of these arrangements the number of shells which should be used on any side of the axis is not critical but 3 to 6 give the best results.

It is possible to get excellent reduction of glare with two shells, but if three are used suitably spaced it becomes much less critical to adjust the spacing from the light source. The addition of more shells makes the spacing still less critical, further reduces the glare, but increases the total weight to be carried and provides a slight obstruction in the path of the main light beam due to the thickness of the shells.

In the specification and ensuing claims, "right" and "left" designations will be taken looking forward from behind the lamps in those countries where vehicles keep to the right of the highway, and the converse for the remaining countries.

In the foregoing specification and in the claims, the word "bulb" has been used as in common parlance to mean any hermetically sealed envelope enclosing a light source and adapted to allow light to escape, and is not to be limited to any particular shape resembling a bulb in its botanical sense.

What I claim is:

1. In an incandescent lamp, the combination of a light source and a plurality of light-intercepting shells disposed in spaced relationship extending forward of and above said light source parallel to a common axis and a sealed bulb enclosing all of said parts.

2. In an incandescent lamp, the combination of a light source and a plurality of opaque shells disposed in spaced relationship extending forward from said light source parallel to a common axis passing through the light source, each

shell having its outer surface with respect to the common axis substantially light absorbing and a sealed bulb enclosing all of said parts.

3. In an incandescent lamp, a light source, 5 means for supporting said light source within said lamp, a plurality of shells disposed in spaced relationship extending forward from said light source parallel to a predetermined stem axis on a predetermined side of said light source, and 10 means for supporting said shells within said lamp, those shells near the light source being opaque and those remote therefrom being translucent.

4. In an electric headlamp the combination 15 of an incandescent light source, light intercepting means including a part extending forward of and above said light source and being placed so that direct rays from the filament strike the light intercepting rays at a small angle and a part at one side of the first-named part adapted to intercept light radiated laterally with respect to that intercepted by the first-named part and said light intercepting means having a reflecting surface on its surface exposed to the light source, and a sealed bulb enclosing the other elements of said combination.

5. A double filament incandescent lamp comprising in combination two filaments spaced in a plane transverse to a principal axis, light intercepting means disposed in spaced relationship forward of at least one of said filaments, a lateral portion of said light intercepting means being forward of one side of said filament and a sealed bulb enclosing all of said parts.

6. An electric headlight bulb having an incandescent light source and a plurality of light intercepting shells mounted within the bulb in overlapping spaced relation, each of said light-intercepting shells intercepting a part of the 40 upward forward component of light from the

light source, said shells being substantially parallel to a common axis, thereby allowing the rays parallel to the shells to pass substantially without interference.

7. An electric headlight bulb as described in 5 claim 6, in which the surface of the shells disposed toward the light source are reflecting, and those disposed away from the light source and toward another shell are substantially non-reflecting, whereby to absorb light reflected toward 10 the shell surface by another shell.

8. A double filament incandescent lamp comprising in combination two filaments spaced one above another in a plane transverse to a principal axis, light intercepting means comprised 15 of a plurality of shells disposed in spaced relationship extending forward of and above one of said filaments and parallel to said principal axis but not so low as the level of the lowermost filament, and a sealed bulb enclosing all 20 of said parts, whereby the beam emanating from the lower filament will have unobstructed upward rays for a predetermined angle, but the beam projected by the upper filament will have more of its upward rays intercepted by the shells. 25

9. An electric headlamp bulb as defined in claim 6, in which the shells extend in a light intercepting manner farther to one side of said axis, measured angularly, than to the other side, whereby rays parallel to said principal axis are 30 allowed to pass substantially without interference, and lateral rays beyond a limited divergence from said axis are transmitted without interception only on one side of said axis.

10. An incandescent lamp as described in claim 1, in which the light intercepting shells and the light source are supported by supporting means common to both.

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