Feb. 16, 1965 I. GOODBAR 3,169,709

LIGHTING FIXTURE

Filed May 10, 1963

FIG. 1.

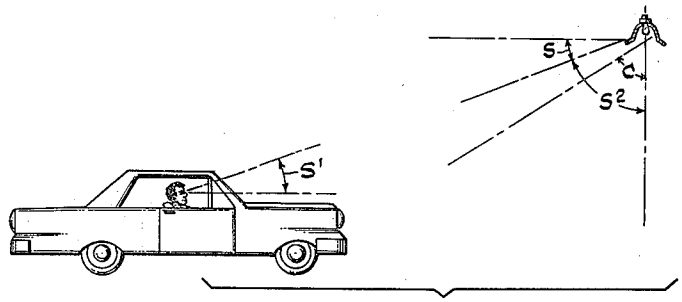


FIG. 2.

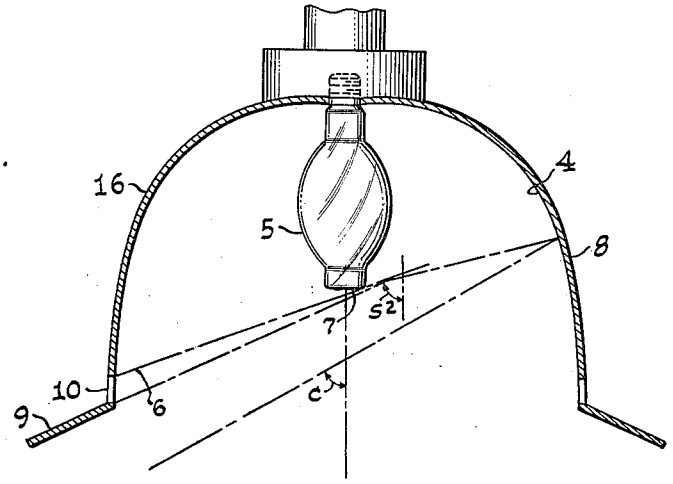
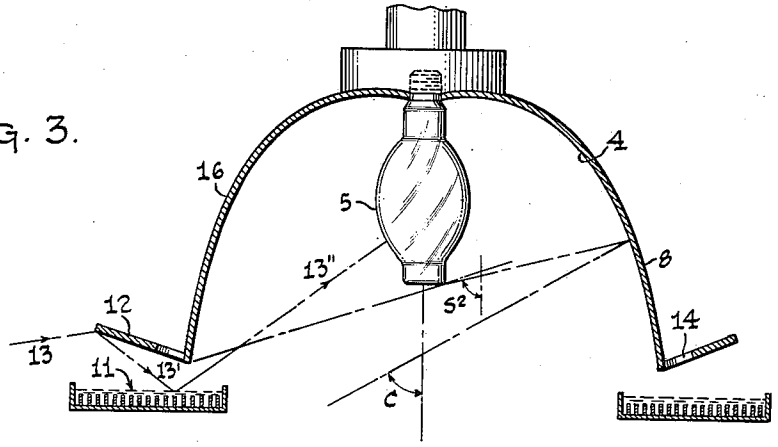


FIG. 3.



INVENTOR

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LIGHTING FIXTURE

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5 Claims. (Cl. 240—25)

The invention relates to lighting fixtures for streets, thruways and other types of highways or roadways.

The reflecting characteristics from a dry pavement are very different from those of the same pavement when wet. When the pavement is dry, the best lighting fixture would be one in which the luminous source is shielded in such a way that drivers of approaching vehicles can see neither the luminous source itself nor any light rays reflected directly from the shield. However, when the pavement is wet, such a fixture would not be at all satisfactory. In this case pavement reflections become specular, and if the light emitted by the fixture is restricted as I have described, the light images reflected on the wet pavement would be seen only after approaching vehicles have come within the immediate environs of the lighting fixture. Hence obstacles on the road will be seen against a dark background and their visibility will then be very poor, with inadequate "discernment by silhouette." The importance of discernment by silhouette is well understood in the art to which the present invention appertains and is recognized, for example, in "Fundamentals of Rural Highway Lighting," Sweet, Transactions of the Illuminating Engineering Society, May 1936. This problem of illumination of roadways in bad weather has led to the general adoption of fixtures emitting light up to and even above the horizontal. Such fixtures are seen reflected on the wet pavement and show the road brightly outlined for a great distance ahead of the driver. However it will be appreciated that such fixtures also shine directly into the eyes of drivers and, being angularly very near the lines of vision, produce undesirable glare.

Summary

The object of my invention is to provide an improved form of lighting fixture which will do a better job of meeting the requirements for proper lighting of both wet and dry pavements, and which therefore will be less of a compromise between fixtures which would be best just for one condition or the other.

According to my invention there is provided a lighting fixture comprising a shielding, or shielding and reflecting, element having an effective shielding angle which obscures the luminous source from the view of drivers of oncoming vehicles, and normally matte black surfaces which, when wet become specular.

These surfaces are disposed so as to deflect upwardly the light rays above the range of the aforesaid effective shielding angle and thus to reveal the luminous source when the roadway is wet. These surfaces may be integral with the shielding element or may be separate elements.

In this manner I provide what might be described as a weather-controlled lighting fixture having one kind of lighting characteristics when the pavement is dry and another kind of lighting characteristics when it is raining or snowing and the pavement is wet. This makes it possible to design the fixture to more nearly ideal performance under the different weather conditions.

Description

With reference to the accompanying drawings, I shall now describe two of the best modes contemplated by me for carrying out my invention, another such mode was described by me in the copending application Serial No. 62,187, filed October 12, 1960, now U.S. Patent No. 3,130,923 issued April 28, 1964.

FIG. 1 is a schematic view to illustrate the relationship between the normal shielding angle of the top of an automobile and the effective shielding angle of a fixture embodying my invention.

FIG. 2 is a vertical transverse sectional view of one form of my improved fixture.

FIG. 3 is a vertical transverse sectional view of another form of improved fixture.

It is possible as described in the copending application of Edison Price and Isaac Goodbar, Serial No. 857,641, filed September 18, 1958, now U.S. Patent No. 3,098,612 issued July 23, 1963, to construct a light fixture which when viewed from positions exceeding a given angle to a vertical plane containing the luminous source will appear very low in the scale of brightness. When such a fixture is used for lighting roadways and the like, it is possible to select an effective shielding angle which when properly related to the shielding angle of the top of an automobile will have the result of obscuring the entire luminous source from the vision of the driver. Under these conditions direct glare from the luminous source and from its reflecting shield would be eliminated. This condition is illustrated in FIG. 1, wherein angle s represents the angle below the horizontal of the highest light rays projected from the luminous source below the nearest edge of the reflecting shield of the fixture, and s' is the angle above the horizontal of the highest line of vision of the driver below the shield afforded by the top of the automobile. When s equals s', it will be impossible for the driver to see the luminous source at any time because at the very moment that the forward progress of his car would begin to reveal the luminous source to him, the shield afforded by the top of his car will cut off his view. By making s somewhat greater than s', a similar result is achieved and the angle s preferably is selected so as to be accommodated to the minimum shielding afforded by any standard make automobile when driven from the lowest driver's seat position by a person of average height. Even in the absence of any shielding afforded by the top or visor of an automobile, my improved fixture will reduce glare and can entirely eliminate direct glare from all but the nearest fixture or fixtures with reduced glare from the latter. Similarly, the fixture will be designed so that the farther portion of its reflecting shield will project no direct or indirect image of the luminous source at an angle c from the vertical plane containing the luminous source that is greater than 90° minus s. Otherwise stated, angle c will be no greater than angle s^2.

Referring now to FIG. 2, I shall describe one of the preferred constructions of my arrangement for altering the optical distribution of the light according to the condition of the weather. In dry weather all of the light will be confined below angle s so that all glare will be avoided. When it is raining or when it is snowing under temperature conditions which result in a wet roadway, the accumulation of water in certain parts of the fixture will change the distribution so that light will be emitted up to the horizontal or even higher. This will make the road well visible for a requisite distance ahead and make possible a satisfactory discernment by silhouette of obstacles in the driver's path.

Still referring to FIG. 2, my lighting fixture comprises a reflecting element or shield 4 having an effective shielding angle which obscures in the luminous source 5 from the view of drivers of oncoming vehicles. By "effective shielding angle" I refer to the angle s, this angle being determined by a line drawn through the lowest point 6 of the nearest edge of shield 4 to a point of tangency 7

at the lower end of the luminous source 5, angle *s* then being the angle which such line makes with the horizontal. The defined expression also implies that angle *c* will not be greater than 90° minus *s*, so that direct reflections of the luminous source from a point such as 8 in the reflecting shield will not be visible above the line 6, 7. My fixture comprises further a lid 9 extending below said reflecting shield element 4 disposed to receive and be wetted by precipitation and having a matte black upper wall.

The lid 9 may be integral with part 8 properly bent, as shown, or can be a separate part. In any case, there is an open window 10 separating 8 and 9.

The inclination of 9 is such that, if it were a specular surface, it would send the light from the source 5 at angles above, up to and even above the horizontal.

Normally, when this surface is dry, it is black matte and, therefore, appears of low brightness at all angles.

When surface 9 is wet by water falling on it from 8, it becomes specular and, therefore, sends light at high angles, above the shielding angle *s* and thus reveals the luminous source when the roadway is wet.

When the road dries, surface 9 also dries and the shielding is reestablished.

Surface 9 may be flat or may be curved in one or two directions so as to spread the reflected light as desired.

FIGURE 3 shows another arrangement to obtain similar results.

In this figure the lower surface of the lid 12 is specular and the tray 11 (the supports of which are not shown) is matte black (it may have black louvers on its bottom).

Water from 16 and 12 will flow through the holes 14 and fill the tray 11. When 11 has received some water, a visual such as 13 will be reflected into 13' and 13'', reaching the source 5, as shown in FIG. 3. When the water in 11 evaporates 13' will end in 11 and will not be reflected up again, the shielding is therefore reestablished. The lower surface of 12 may be flat or curved in one or both directions, so as to spread the reflected light as desired.

If desired the reservoir 11 may be provided with means, such as apertures for draining off the accumulated water at a predetermined rate, so as to reestablish shielding when the roadway dries.

The invention is applicable to fixtures of differing shapes, elongated, circular and other forms.

For simplicity the fixture selected to illustrate the invention in its preferred form is designed to control the shielding angle only lengthwise along the roadway. Similar shielding and reflecting surfaces may be arranged at the ends of the fixture to control the shielding angle transversely of the roadway. However, since the distribution of light across the roadway does not need to change in accordance with the weather, I consider that the particular forms I have described represent the best mode known to me for carrying out my invention.

The light distribution in rainy weather being modified by the reflecting characteristics of the water, it will be understood that these characteristics can be controlled in accordance with the respective angular disposition of the reflecting surfaces. When the reflecting surfaces, such as 9 or 12 are formed with convolutions the entire element 9 or 12 will be visible with controlled brightness. These elements when seen along the lower edges

of the elongated fixture shown will be reflected on the wet pavement so as to appear in the form of wide streaks which will be particularly effective in delineating the pavement and in making any obstacle visible by a silhouette. When the rain is over, and the pavement dries and the water evaporates the illumination again becomes glareless.

Other dispositions of the reflecting surfaces may be possible without departing from the concepts of my invention.

The terms and expressions which I have employed are used in a descriptive and not a limiting sense, and I have no intention of excluding such equivalents of the invention described as fall within the scope of the claims.

I claim:

1. A lighting fixture mounted above a roadway, comprising a shielding element having a hollow interior open at the bottom thereof to project light downwardly, a lamp, means for mounting said lamp within said element in a position located above a lower edge of said shielding element to produce an effective shielding angle which in clear weather normally obscures the lamp from the view of the drivers of oncoming cars and plate members spaced below said shielding element and leaving a light passage between the lower edge of the said shielding element and the upper edge of said plate members, said plate members extending downwardly and outwardly from the outer peripheral edge of said shielding element, the upper surface of said plate being matte, said surfaces being disposed so as to receive and be wet by precipitation, thus becoming specular, said surfaces being disposed at an angle to light rays from said lamp to reflect, when wet, the light rays upwardly above the range of such shielding angles and thus reveal at least part of the image of the lamp when the road is wet.

2. A lighting fixture according to claim 1 in which said reflecting surfaces are constituted by lids extending along the lower edge of said shielding element to receive the run-off from the upper surfaces of the fixture.

3. A lighting fixture according to claim 1 in which said reflecting surface is a horizontal trough located below the said shielding element to receive the run-off from the upper surface for rapid build up of a temporary water reflector.

4. A lighting fixture according to claim 1 in which said reflecting surface is a horizontal trough located below the said shielding element to receive the run-off from the upper surface for rapid build up of a temporary water reflector and means for draining off the accumulated water at a predetermined rate.

5. A lighting fixture according to claim 1 in which the said reflecting surfaces have convolutions to spread the light rays transversely to the roadways.

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NORTON ANSHER, *Primary Examiner.*