July 2, 1963 D. W. HARLING 3,096,030

LUMINAIRE FOR DIRECTIONAL LIGHTING

Filed Nov. 4, 1960

Fig. 1.

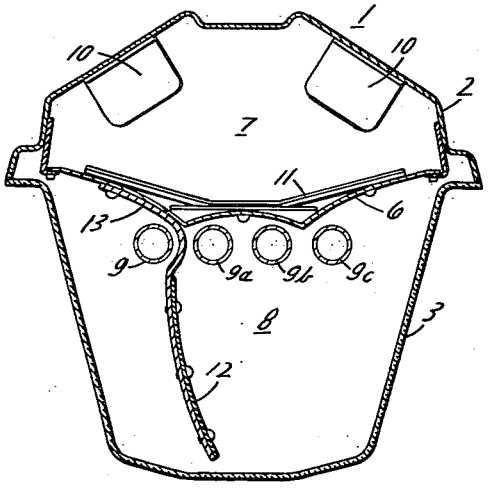


Fig. 3.

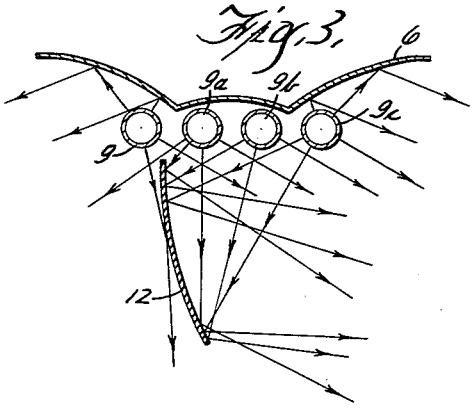


Fig. 2.

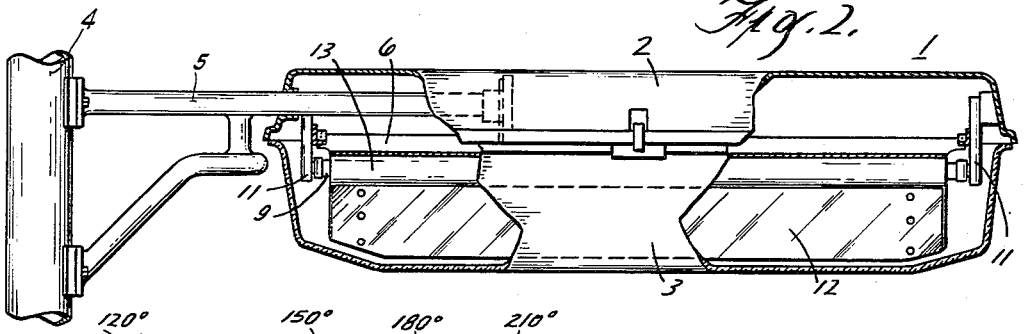
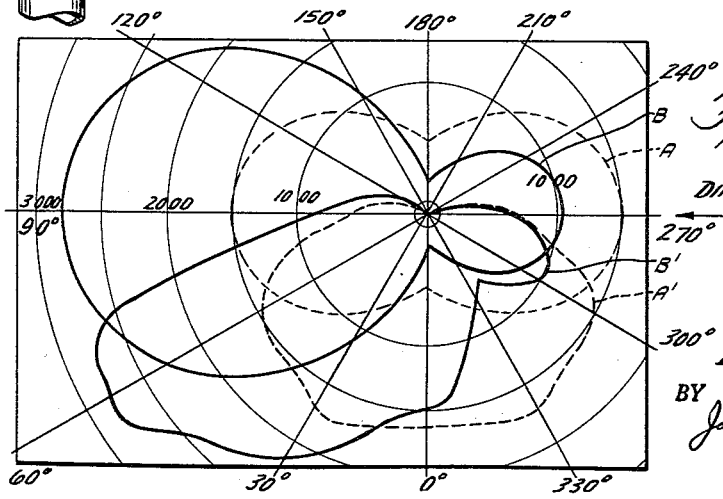


Fig. 4.



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LUMINAIRE FOR DIRECTIONAL LIGHTING

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This invention relates to luminaires and more particularly to luminaires for street or roadway lighting.

Heretofore the practice in street lighting has been to position luminaires at regular intervals along the roadway. The luminaires extend over the roadway and direct light downwardly and laterally to either side of the luminaire. Objects on the roadway are then made visible to a driver in two very different manners; first, as the driver approaches a particular luminaire, the luminaire is behind objects on the roadway and such objects are seen in silhouette; and secondly, as the driver is going away from the luminaire, objects on that side of the luminaire are illuminated by direct light and are seen by reflection.

Two major disadvantages of this type of street lighting are (1) the laterally directed light is of equal intensity on either side of the luminaire and the luminaire has a very high glare factor to an approaching driver, and (2) the driver's eyes must be continually adjusting from seeing in silhouette to seeing by reflection which places a greater strain on his eyes and fatigue occurs more quickly.

Accordingly, it is an object of my invention to provide a street lighting luminaire which reduces the amount of glare on the approach side thereof.

Another object of this invention is to provide a luminaire which transmits light in such a manner that users of a roadway see substantially only by reflection.

A more specific object of this invention is to provide a street lighting installation which produces a minimum of glare, lights objects on the roadway primarily only by reflection, and wherein there are no marked transitions from dark to brightly lighted areas.

To accomplish these objects my invention contemplates the provision within a luminaire of means so positioned with relation to the luminaire's light source that it will intercept substantially all of the light directed to one side of the luminaire and reflect the intercepted light to the other side of the luminaire.

These and other objects and advantages of my invention will be more readily apparent from a reading of the following description in connection with the drawings in which:

FIG. 1 is a transverse cross sectional view of a luminaire embodying my invention;

FIG. 2 is a side elevation of the luminaire with portions of the housing and light transmitting member broken away;

FIG. 3 is a light reflection drawing for the luminaire; and,

FIG. 4 illustrates the light distribution curves for both a standard luminaire and the luminaire embodying my invention.

A luminaire **1** is supported from a vertical pole **4**, at any desired height above a roadway or area to be lighted, by support means **5**. The luminaire **1** includes an upper housing **2** and a lower light transmitting member **3** which is suitably connected to the housing **2**. The luminaire **1** also includes a reflector **6** suitably mounted within the luminaire and dividing the interior thereof into two chambers **7** and **8**. The chamber **7**, above the reflector **6**, usually contains ballasts **10** and electrical terminals (not shown) for wiring the luminaire.

The luminaire light source is disposed immediately below the reflector **6** and preferably consists of four elongated lamps **9**, **9***a*, **9***b* and **9***c* which are supported by light sockets **11** located at opposed ends of the luminaires. As can be seen in the drawing the lamps are disposed substantially in horizontal alignment.

The reflector **6** can be of any desired configuration and the position of the lamps relative thereto may be varied in accordance with the desired light pattern to be achieved by the luminaire **1**. Also, the light transmitting member **3** may be provided with exterior and/or interior light refracting prisms (not shown) to further control the light emitted from the lamps.

The lamps emit light downwardly and laterally on either side of the luminaire **1**. The reflector **6** intercepts upwardly directed light from the lamps, which light would ordinarily be wasted, and redirects it so that it can be utilized in lighting the roadway.

I have provided within the chamber **8** of the luminaire **1** an auxiliary reflector **12** which is suitably supported from the reflector **6** by a pair of brackets **13**. The brackets **13** are located at either end of the reflector **12** and are fixedly connected to the reflector **6** to support the reflector **12**. The auxiliary reflector **12** is so poistioned within the chamber **8** and relative to the lamps as to intercept substantially all of the light directed to one side of the luminaire **1** and reflect the intercepted light to the other side of the luminaire.

The reflector **12** is preferably positioned with three of lamps **9***a*, **9***b* and **9***c* on one side thereof and the fourth lamp **9** on the other side thereof.

It is desirable to direct a limited amount of light on the approaching traffic side of the luminaire **1** so that illumination produced by an installation is softened and there will be no sharp transition from dark areas to brightly ligthed areas. Hence, one lamp is positioned on the approach side of the luminaire **1**. Substantially all of the light directed to the left of the luminaire **1**, as viewed in FIGS. 1 and 3, is intercepted by the auxiliary reflector **12** and reflected to the right of the luminaire **1**. In this manner, the amount of light directed to the right side of the luminaire **1** is substantially increased, while at the same time the amount of light directed to the left of the luminaire is substantially reduced. Also, the auxiliary reflector **12** is positioned in spaced relation from the main reflector **6** so that an opening is left therebetween. A portion of the light emitted from the lamp **9***a* will be directed to the left side of the luminaire and contribute to the softening effect of the installation. The light directed to the left of the luminaire then consists only of the light from the lamp **9** and a portion of the light from lamp **9***a*.

It should be noted that the auxiliary reflector **12** is provided with a concave-convex configuration with the lamp **9** disposed on the convex side thereof and the remainder of the lamps disposed on the concave side. Reflected light from the lamp **9** is directed, due to the convex configuration of the auxiliary reflector, downwardly at a low vertical angle to nadir so that this reflected light will not add to the glare on the approaching traffic side of the luminaire.

Candle power distribution curves for a standard luminaire and a luminaire incorporating my invention are illustrated in FIG. 4. Curves A and A' illustrate the lateral and vertical distribution, respectively, of a standard luminaire. Curves B and B' illustrate the lateral and vertical distribution, respectively, of a luminaire incorporating my invention. As illustrated, a standard luminaire emits light of equal intensity on either side of the luminaire whereas, a luminaire in accordance with my invention directs high intensity light to only one side of the luminaire. Substantially all of the light produced by the luminaire is directed to only one side of the luminaire, that side being in the direction of traffic, illustrated by the arrow in FIG. 4.

Thus a driver sees objects on the roadway primarily and almost exclusively by reflection and his eyes do not have to be continually adjusting to see first in silhouette and then by reflection. Further, by practically eliminating all of the light directed into the direction of traffic the glare factor is substantially reduced. A minor portion only of the generated light is directed into traffic so that the installation is softened and there are no sharp transitional areas of light.

Although my invention has been discussed in relation to a particular preferred embodiment, it is not intended that it be limited thereto and it is intended in the appended claims to cover all modifications and embodiments as fall within the true spirit and scope of my invention.

I claim:

1. An elongated street lighting luminaire for use above a roadway having unidirectional travel thereon defining a forward and rearward direction, said luminaire having an elongated housing, a bracket arm engaging said housing and supporting said luminaire above the roadway with its longitudinal axis extending transversely of said roadway, an elongated light source supported by said housing and extending longitudinally thereof, means including a generally horizontally disposed reflecting surface positioned above said light source for reflecting light rays from said source downwardly in a substantially balanced pattern, with said rays extending vertically and also at an angle forwardly and rearwardly of said luminaire, and means including a secondary reflector having a forwardly directed reflecting surface positioned below said light source and spaced therefrom, the upper edge of said reflector terminating below said light source, said secondary reflector intercepting the greater portion but not all of said rearwardly directed rays and redirecting said greater portion forwardly of said luminaire in the direction of travel on the roadway, the space above said reflector permitting the smaller portion of said rays to be emitted in a rearward direction.

2. A structure as set forth in claim 1, wherein said forwardly directed reflecting surface of said secondary reflector is concave whereby the intercepted rays are focused as well as redirected.

3. A structure as set forth in claim 1, wherein said elongated light source comprises at least three elongated tubes, the greater number of said tubes being positioined on the forward side of said secondary reflector and the smaller number said tubes being positioned on the rearward side of said reflector.

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