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J. A. TOLBERT

3,257,553

LUMINAIRE

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2 Sheets-Sheet 1

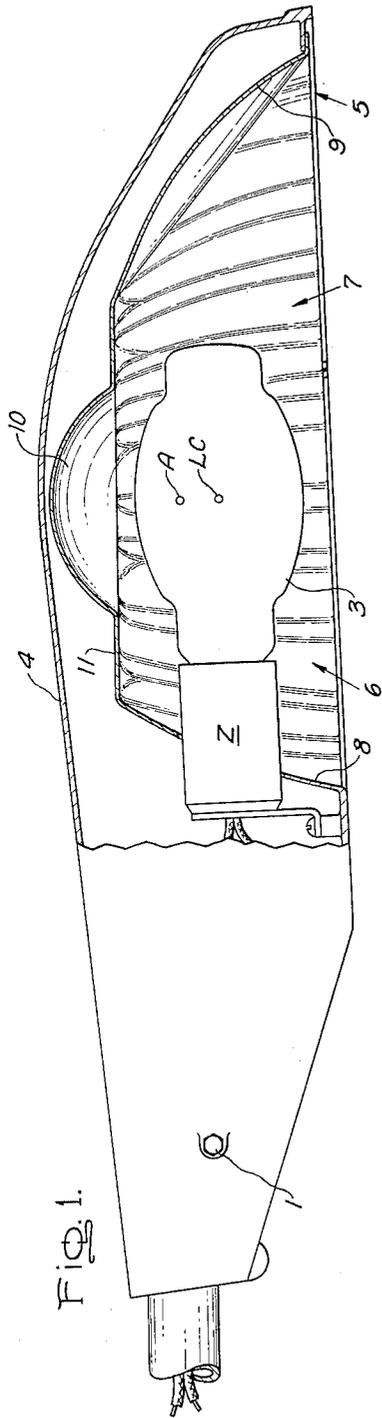


FIG. 1.

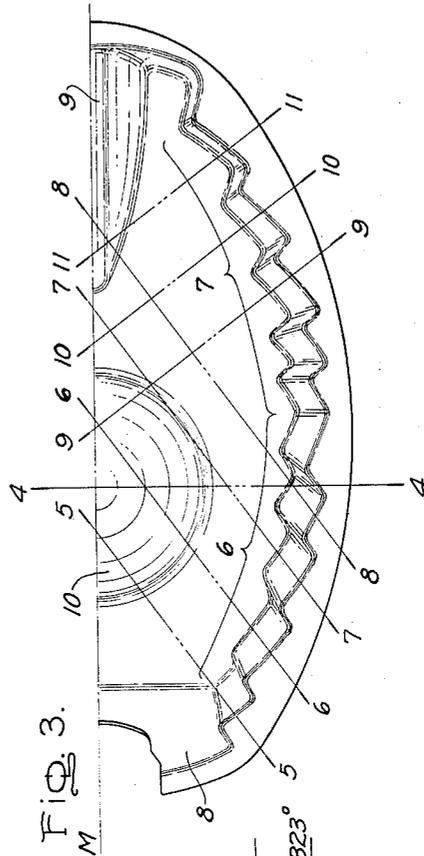


FIG. 3.

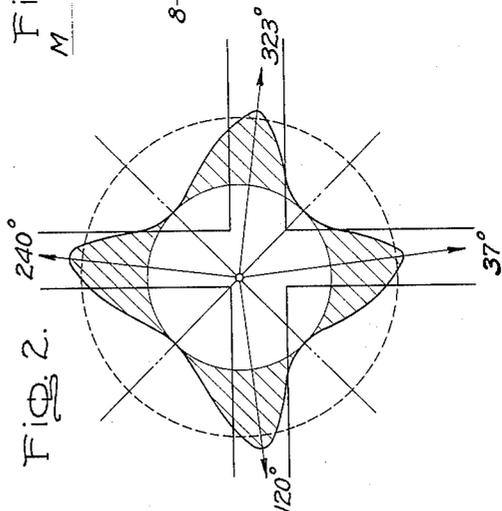


FIG. 2.

Inventor:
 Joseph A. Tolbert
 by *Henry T. Olsen*
 His Attorney

June 21, 1966

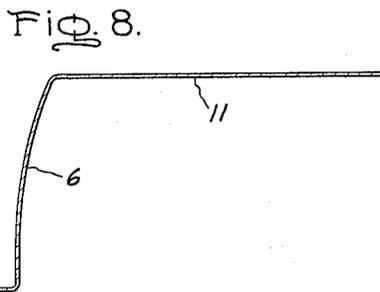
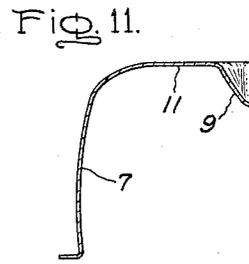
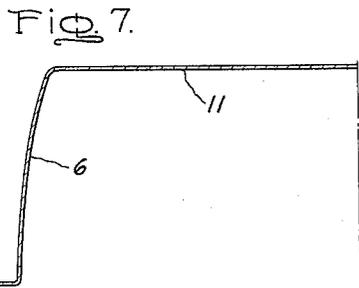
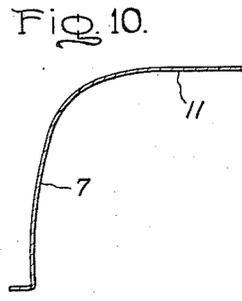
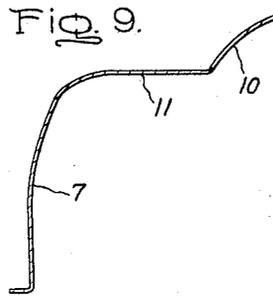
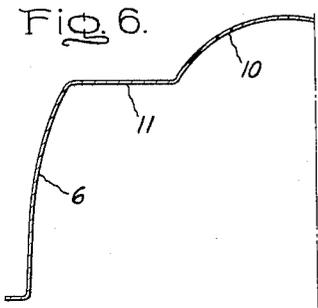
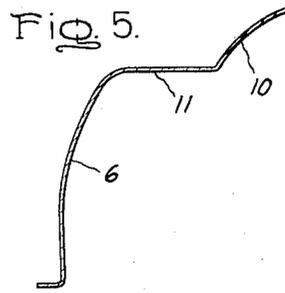
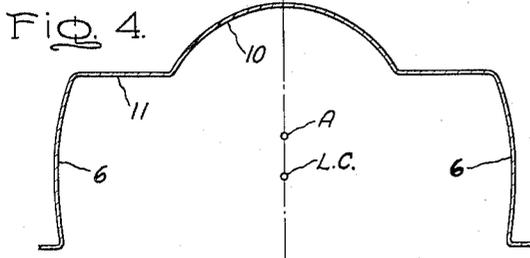
J. A. TOLBERT

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2 Sheets-Sheet 2



Inventor:
Joseph A. Tolbert
by *Henry T. Olsen*
His Attorney

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3,257,553
LUMINAIRE

Joseph A. Tolbert, Flat Rock, N.C., assignor to General Electric Company, a corporation of New York
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3 Claims. (Cl. 240—25)

This invention relates to a luminaire and more particularly to luminaires intended for the lighting of street or highway intersections.

It has become a standard practice to design luminaires for disposition at one side of a roadway. Proper distribution of the light from luminaires in this position is one of the essential factors in efficient roadway lighting. In such luminaires it is necessary to provide a roadway lighting pattern which is asymmetric with respect to a line parallel to the road and passing through the nadir. However, roadside disposition of luminaires presents a problem with respect to the lighting of intersections. It has, in the past, been customary to provide at intersections a luminaire mounted above the center of the intersection which gives a symmetrical distribution about the luminaire, which is known as a type V distribution. It is an object of this invention to provide a luminaire which is particularly advantageous for lighting an intersection from a roadside mounting disposition.

While the above-mentioned object has been met in certain circumstances to some extent by the use of refracting means, it is an object of this invention to provide for intersections directional lighting utilizing a reflector whereby the use of high cost refracting means may be essentially eliminated.

It is a further object of the invention to provide a new and novel intersection type luminaire which provides a high degree of efficiency of light utilization.

A better understanding of the invention and the further appreciation of its various objects and advantages may be had with reference to the following detailed specification, taken in conjunction with the accompanying drawing wherein:

FIG. 1 is a side elevation partly in section of a luminaire embodying the invention;

FIG. 2 is a diagram showing the light distribution of a luminaire embodying the invention;

FIG. 3 is a bottom view of the luminaire shown in FIG. 1, showing one-half of the reflector; and

FIGS. 4 to 11 are sectional views of the reflector taken on lines 4—4, 5—5, 6—6, 7—7, 8—8, 9—9, 10—10 and 11—11 of FIG. 3, respectively.

As shown in FIG. 1, the luminaire includes mounting means 1, electric lampholding means 2 and a lamp 3, such as one of the high pressure mercury types, having a light center LC. An upper inverted U-shaped open bottom housing 4, which as shown, is an integral die cast piece, covers and is a part of the luminaire. It will be understood that the upper housing need not be made as an integral piece. The mounting means 1 is more specifically shown and disclosed in copending application Serial No. 246,560, filed December 21, 1962, now abandoned, and assigned to the same assignee as herein, which disclosure is incorporated by reference herein.

The light output of the lamp 3 is controlled by an inverted bowl-shaped reflector 5 which is secured within the end of the housing 4 by any suitable means so as to generally surround the lamp.

As shown in FIG. 1, the luminaire is positioned with the plane of the bottom opening of the reflector 5 at an acute upward angle of about approximately 2° and with the elongated light source 3 tilted upward toward the roadway to make better use of the candle power and lumen output of mercury arc lamps, which is highest at angles perpendicular to the lamp axis. With the light

source tilted and the reflector opening inclined, more of the direct light falls, and more reflected light can be easily directed into the roadway pattern and a desirable low angle of cut-off is obtained on the house side of the luminaire.

The reflector is of a generally ovate shape in horizontal and vertical cross-section with a plurality of reflecting surfaces to direct the light onto the roadway in a pointed square pattern. As shown in FIG. 2 wherein the luminaire is shown as mounted at the corner of an intersection and four main reflected light beams directed outwardly therefrom, the beams forming the points of the square are directed at horizontal angles of approximately 37°, 120°, 240° and 323°, respectively, laterally. These angles are measured as is customary from a line extending from the light center of the luminaire along the longitudinal center line thereof toward the street side of the luminaire. This is compared with an ordinary type V distribution generally shown in dotted lines which would be symmetrical about the luminaire light center. The four main beams of light are obtained mainly from four groups of reflecting surfaces on the reflector.

The reflector is generally symmetrical about a longitudinal median plane M and, as shown in FIG. 3, has first groups 6 of reflecting surfaces on the house side portion of the reflector on either side of the median plane and second groups 7 of reflecting surfaces on the street side portion of the reflector on either side of the median plane M. All of the reflecting surfaces in these groups are generally of a paraboloidal contour in both vertical (FIGS. 4—11) and horizontal (FIG. 3) section and generally direct the light downwardly at an angle between 70—78° vertical. These vertical angles are measured, as is customary, from a line between the light center and the nadir. In the case of the first groups 6 shown, the light is directed out of the luminaire at approximately 37° laterally while the second group directs the light out at approximately 120°. As has been mentioned, the other half of the reflector is generally similar in nature, with another second group 7 being provided to direct the light at 240° and another first group 6 to direct light at 323°. It will thus be seen, especially with reference to FIGURE 3, that the described reflecting surfaces, which are arranged in steps along the length of reflector 5 on its opposite interior surfaces, are arranged in four groups each comprising a plurality of stepped reflecting surfaces, the groups being located respectively in quadrants defined generally by longitudinal median plane M intersected by a transverse plane along line 4—4 which is normal to plane M and passes through light center LC (see FIG. 4).

The house side 8 (FIG. 1) of the reflector is of paraboloidal contour in vertical section and directs the light from the house end of the lamp downwardly at a lower angle of approximately 60° so as to not direct the light at too great a distance across the intersection. The street end 9 of the reflector is a generally trough-shaped reflecting surface of an involute contour to direct the light at even lower angles of approximately 40°. The lamp being located well up in the reflector, the direct light therefrom will be described on the roadway a generally circular pattern of direct light. To smooth out the transition between the main reflected light beam section provided by the reflector groups 6 and 7 and the direct light from the lamp, a spherical reflector surface 10 is provided at the upper part of the reflector. This surface is radial about a point A located directly above the light center LC so as to spread the light at angles between 50—70° vertical and give an even pattern of light on the roadway intersection. To connect the spherical surface section with the parabolic contoured section, a planar area 11 is provided, which reflects light from the lamp into other areas of the reflector

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for control thereby generally in accordance with the above-stated characteristics thereof.

What is claimed as new and desired to be secured by Letters Patent of the United States is:

1. A luminaire adapted to be mounted adjacent the intersection of four roadways comprising, in combination, an elongated inverted ovate reflector having an open bottom and a rim extending in a plane, a lamp comprising an elongated bulb having a base mounted at one end of said reflector and extending therein toward the other end thereof above the plane of said rim, said lamp having a light center, said reflector being formed on its interior surfaces on opposite sides with a plurality of reflecting surfaces arranged in steps along the length of said reflector, each reflecting surface being elongated from said rim toward the top of said reflector, said stepped reflecting surfaces being arranged in four groups each comprising a plurality of reflecting surfaces and located respectively in quadrants formed by the longitudinal median plane of said reflector intersecting a transverse plane normal thereto passing through said light center, said stepped reflecting surfaces being paraboloidal in both horizontal and vertical cross section, the optical axes of the reflecting surfaces in adjacent groups being approximately at right angles.

2. A luminaire as defined in claim 1, the inner top sur-

face of said reflector above said light center having a concave spherical contour for providing in the roadway light pattern a smooth transition between the direct light from said lamp and the light reflected from said stepped reflecting surfaces.

3. A luminaire as defined in claim 1, said stepped reflecting surfaces directing the light downwardly at vertical angles of approximately 70°-78°, said reflector having at its opposite ends reflecting surfaces which reflect the light downwardly at substantially lower vertical angles than the aforesaid vertical angles for maintaining the light so reflected substantially within the direct light produced by the luminaire.

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NORTON ANSHER, *Primary Examiner.*

C. R. RHODES, *Assistant Examiner.*