Feb. 24, 1942. H. J. FLAHERTY 2,274,405

LUMINAIRE

Filed July 9, 1940

Fig. 1.

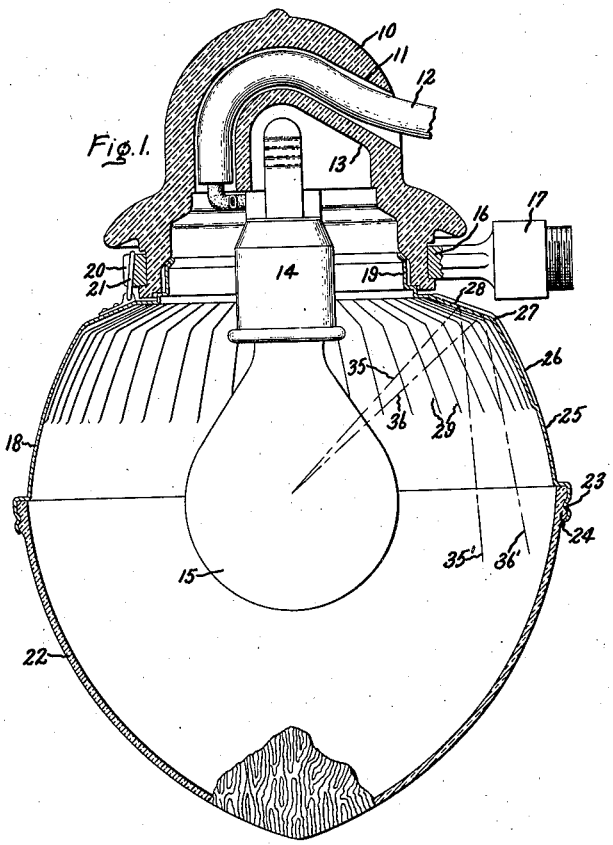
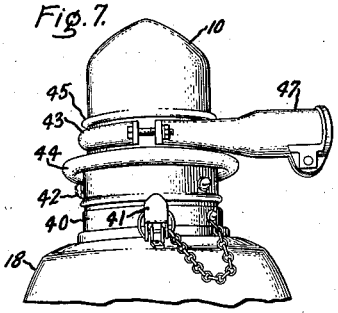


Fig. 7.



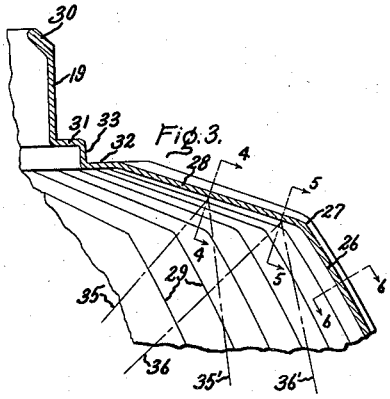


Fig. 3.

Fig. 2.

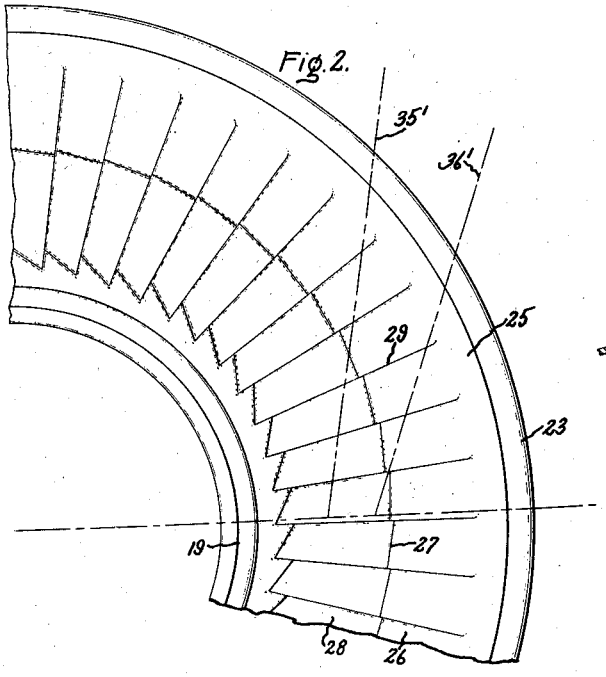


Fig. 4.

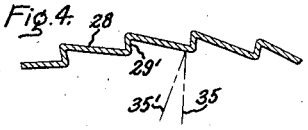


Fig. 5.

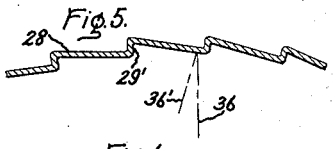
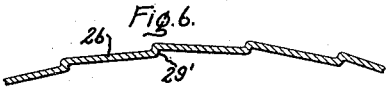


Fig. 6.



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His Attorney.

Patented Feb. 24, 1942 2,274,405

UNITED STATES PATENT OFFICE

2,274,405

LUMINAIRE

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Application July 9, 1940, Serial No. 344,531

1 Claim. (Cl. 240—25)

My invention relates to luminaires and more particularly to an improved reflector for luminaires.

In luminaires, for highway lighting, conoidal reflectors are commonly used to project a beam having an angular spread of less than 180 degrees. The surface contour of such reflectors is a compound curvature necessitating a substantial axial length of the reflector for efficient reflection and distribution of light. For some light sources it is necessary, however, to reduce the axial length of such reflectors and still maintain the distribution and the efficiency of the first structure as nearly as possible. The most obvious modification for adapting a reflector to the shorter axial length is to truncate the conoid and to provide a cone section between the truncated edge and the supporting collar for the reflector. An objectionable result of this change is that the cone section reflects light parallel to the axis of the reflector and, therefore, unduly increases the light intensity near the axis of the beam projected by the reflector.

It is an object of my invention to provide a substantially uniform distribution of light from the type of reflector above described.

For a better understanding of my invention, together with other and further objects thereof, reference is had to the following description taken in connection with the accompanying drawing, and its scope will be pointed out in the appended claim.

Referring to the accompanying drawing Fig. 1 illustrates in cross sectional elevation a luminaire provided with a reflector made in accordance with my invention; Fig. 2 is a fragmental top view of my reflector; Figs. 3 to 6, inclusive, are fragmental sectional views illustrating the structure of my reflector, and Fig. 7 is a fragmental view of a modification of the luminaire.

Referring to the drawing in detail Fig. 1 illustrates a luminaire comprising an insulator member 10 having therein a cable conduit 11 and a cable 12 projecting through the conduit to the inner chamber 13 of the insulator. A lamp socket 14 is supported within this chamber 13 in a convenient manner (not shown) and is connected to the cable 12 to furnish current for a lamp 15 mounted in the socket. The insulator 10 is supported by a collar 16 surrounding the lower end of the insulator and provided with a suitable plug 17 whereby this collar 16 may be attached to a supporting arm.

A reflector 18 is attached to the insulator, said reflector being provided with a collar 19 projecting into the open end of the insulator 10. It is held therein by suitable hooks 20 on the supporting collar 16 and resilient rings 21 attached to the reflector. The reflector is of the conoidal sheet metal type having its open end enclosed by a glass globe 22, the latter being attached to the reflector 18 by a metal flange 23, on the reflector which is spun over a glass flange 24 on the globe.

The structure of the reflector 18 as shown in Fig. 1 is a conoid having a truncated section extending between the flange 23 and an edge 27. This section is generated by a compound curve having a parabolic lower section 25 and an elliptic upper section 26, the two meeting at approximately the midpoint between the flange 23 and the edge 27. A cone section 28 extending between the edge 27 and the cylindrical collar 19 completes the reflector. The surfaces of the paraboloidal section 25 and of the ellipsoidal section 26 are divided into panels as indicated by the lines 29 in Fig. 1. This paneling starts near the upper end of the paraboloidal section 25, extends through the ellipsoidal section 26 and, in accordance with my invention, extends through the cone section 28.

Fig. 2 is a fragmentary top view of the reflector 18 illustrating one quarter of the symmetrical reflector. The surfaces of the reflector sections are herein illustrated as being divided into panels by equally spaced radial planes as illustrated by the straight lines 29.

Fig. 3 is an enlarged fragmental sectional view of the collar 19, the cone sections 28 and a portion of the ellipsoidal section 26. The collar 19 is illustrated as being provided with a flange 30 which is inwardly tapered and engages a similarly tapered shoulder in the insulator 10 when the reflector is attached to the insulator. The collar 19 is joined to the cone section 28 by two disk sections 31 and 32 connected and spaced from each other by a cylindrical section 33. The disk section 31 projects at right angles from the collar 19 and engages a seat or shoulder in the end of the insulator to form a dust-tight closure when the reflector is attached to the collar 16. The cylindrical section 33 spaces the disk section 32 and the cone section 28 from the end surface of the insulator.

The shape of the paneling in the reflector surfaces is illustrated in Figs. 4, 5 and 6 which are fragmental sectional views taken along lines 4—4, 5—5 and 6—6 of Fig. 3 looking in the direction of the arrows. The paneling begins at a point near the upper edge of the parabolic section 25 and extends through the ellipsoidal sec-

tion 26. It consists of displacing each reflector section between the radial planes indicated in Figs. 1 and 2, by pivoting it about one edge. This pivotal displacement causes the panels to reflect the intercepted light beam of each panel aside of the axis, the successive panels being pivoted in the same direction and being joined to each other by radial surfaces 29'. The result of this displacement of the reflected light from the axis of the reflector is the creation of a radiant-energy free space at the axis of the reflector in which the supporting stem for the filament of an incandescent lamp may be placed without the danger of being overheated by the radiant energy which would otherwise concentrate along the axis of the reflector. This construction of the reflector is described in detail and is claimed in U. S. Patent 2,194,431, issued March 19, 1940, to J. A. O'Neil.

In accordance with my invention the paneling of the paraboloidal and ellipsoidal sections 25, 26 is extended into the cone section 28. The angular displacement of this paneling in the cone secton varies, that is, it increases, toward the inner end of each panel. Figs. 4 and 5 illustrate this difference in the paneling, Fig. 5 being taken at the edge 27, or the outer end of a panel, and Fig. 4 being taken at approximately the midpoint of a panel.

The object of this paneling is to project each intercepted beam at an angle to the axis of the reflector thereby to create a cone-shaped beam which combines with the beam projected by the paraboloidal and ellipsoidal sections of the reflector. It is also desirable to make this angular displacement as great as possible without impinging the light upon the lower edge of the reflector. The angular relationship and resultant direction of light beams is illustrated by two beams 35 and 36 projected from the center of the light source 15, in the plane taken through the axis of the luminaire, to the points at which sections Figs. 4 and 5 have been taken (see Fig. 3). The light rays are reflected as rays 35' and 36' respectively. Fig. 1 illustrates the vertical distance from the panel to the edge of the reflector for each of the two rays. Fig. 2 illustrates the horizontal distance, from the plane of origin, to the edge of the reflector. These two figures indicate that the vertical distance from the panel to the reflector edge is practically the same for the two rays and that the horizontal distance for the ray 35' is much greater than the horizontal distance for the ray 36'. The angular displacement from the axis of the reflector may be correspondingly greater for the ray 35' than for the ray 36'. Figs. 4 and 5 indicate the angular displacement of the rays which displacement will project them past the lower edge of the reflector. By properly varying the angular displacement of the panel surface, the reflected beam may be warped so that it becomes substantially parallel to the edge of the reflector in the plane of the reflector opening and at which the beam leaves the reflector.

The resultant total beam from these panels is a cone shaped beam which joins the inner edge of the beam projected from the ellipsoidal and paraboloidal sections of the reflector. This displacement of the light, which would otherwise be projected to the center of the beam where the direct light from the source is greatest, reduces the intensity of the beam projected by the reflector at its center and increases the intensity of the beam in an annular region where the direct light is considerably weaker. This redistribution of the available light produces a substantially uniform intensity throughout the total beam.

Fig. 7 is a side elevation of a modified form of the insulator 10. In this modification the reflector 18 is attached to a metal collar 40 by a suitable latch 41 and the collar is attached to the insulator by screws 42 projecting through the wall of the insulator. A supporting collar 43 surrounds the insulator above the rainshield flange 44 and below a beading 45. The supporting collar 43 is provided with a split sleeve 47 whereby it may be placed over the end of a supporting bar or tube.

What I claim as new and desire to secure by Letters Patent of the United States is:

In a reflector for a highway luminaire, the combination of a conoid generated by a compound curve arranged to project light across the axis of the conoid and below the opposite edge of the reflector, panels in said conoidal surface arranged to deflect the projected light from the axis of the conoid, a conical section adjoining the upper edge of said conoidal section and divided into panels said panels being tangent to the conical surface along one edge of each panel thereby projecting a conical beam adjacent the open edge of the conoidal section of the reflector.

HAROLD J. FLAHERTY.