Oct. 5, 1943. T. W. ROLPH 2,330,924

LUMINAIRE

Filed Sept. 25, 1941 2 Sheets-Sheet 1

Fig. 1.

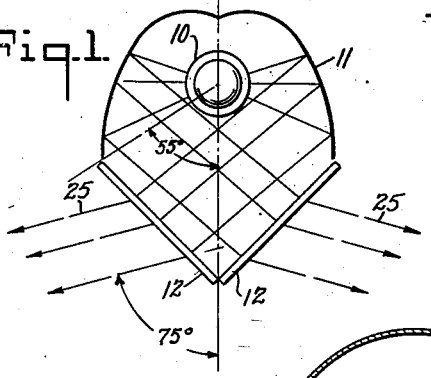

Fig. 2.

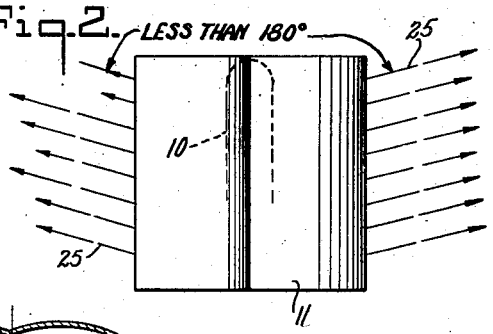

Fig. 3.

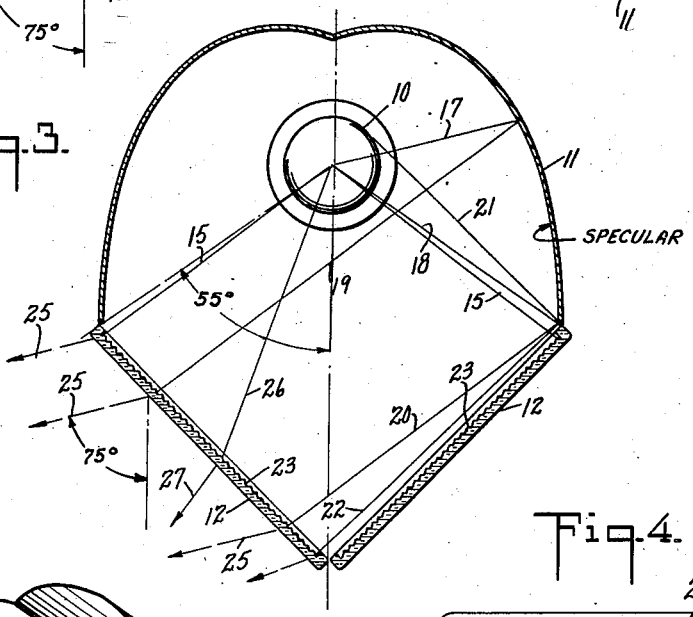

Fig. 5.

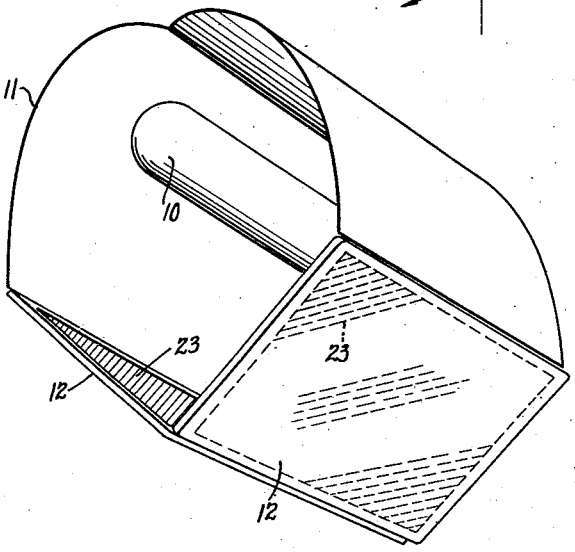

Fig. 4.

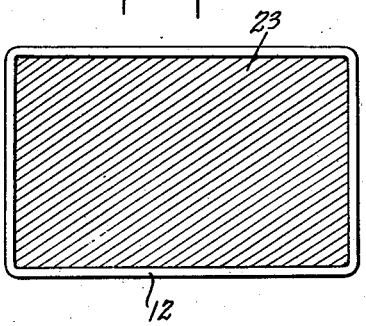

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Fig. 6.

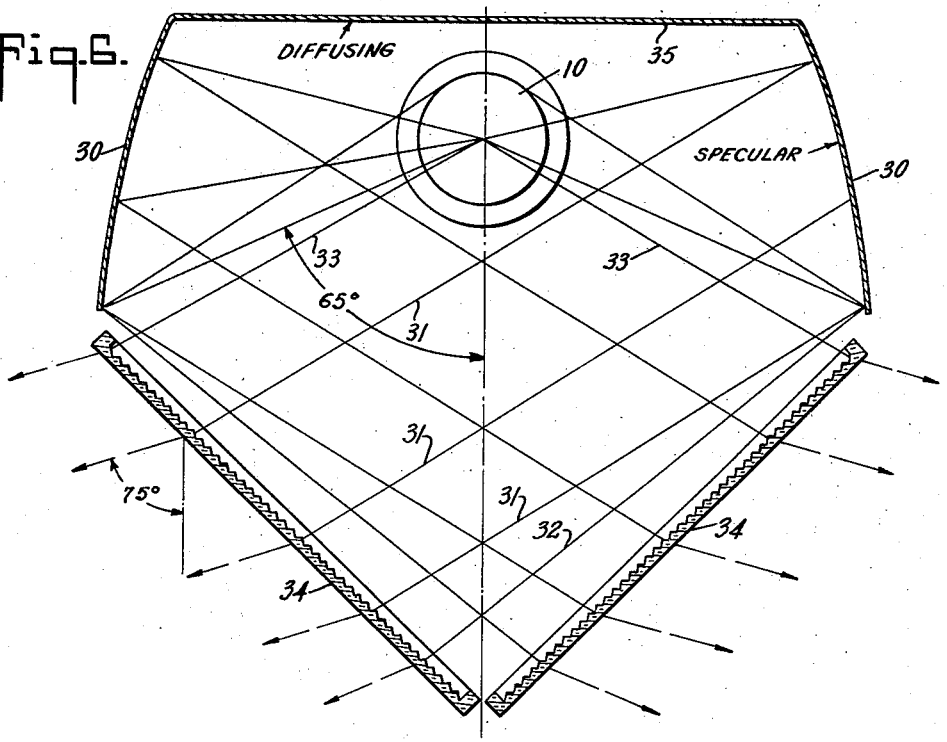
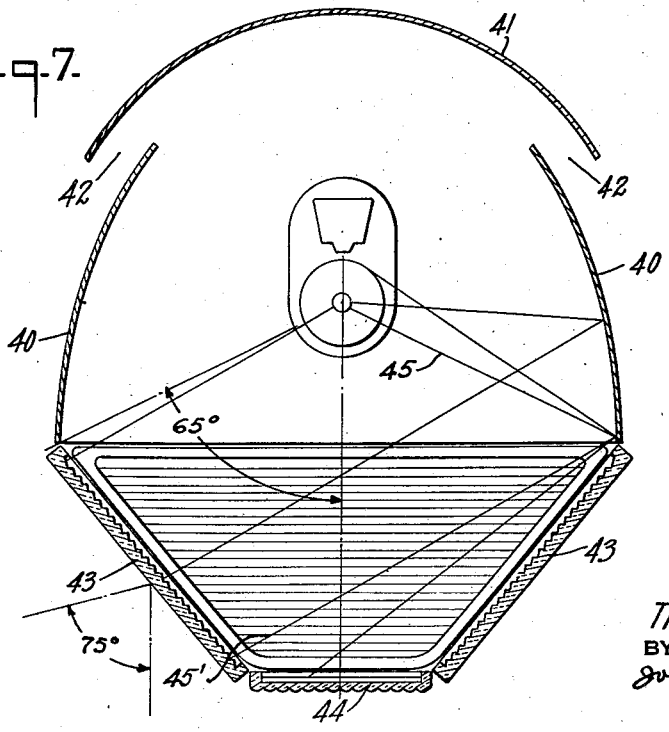


Fig. 7.



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LUMINAIRE

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Application September 25, 1941, Serial No. 412,209

3 Claims. (Cl. 240—25)

The present invention relates to luminaires, and is more particularly directed toward luminaires designed for street and highway lighting, and employing horizontal lamps such as sodium lamps or mercury lamps.

The present invention contemplates luminaires for the above purpose wherein the laterally emitted light from a horizontal sodium lamp is intercepted by the side walls of an inverted specular trough and reflected downwardly across the axis of the trough at angles which are steeper than the angles customarily employed in street and highway lighting, and this relatively steep downwardly emitted light is intercepted by the downwardly converging sides of a refracting trough having prisms arranged to elevate the light to angles above the nadir suitable for street and highway lighting and to deviate the light laterally so that the emitted beams are not opposite one another. With this arrangement the luminaires may be mounted above the surface to be illuminated and to one side of the road or street, and the dominant light rays directed toward the center of the street or road.

The sodium lamp is a source of substantial diameter and a further object of the invention is to make the prismatic refractor of sufficient depth to intercept the lowermost reflected rays originating in the upper part of this lamp.

The annexed drawings and the following description set forth in detail certain apparatus embodying the invention, such disclosed apparatus constituting, however, but three of the various forms in which the principle of the invention may be used.

In these drawings:

Figure 1 is a diagrammatic vertical cross section through the luminaire illustrating the direction of light rays relative to the vertical;

Figure 2 is a top plan view of the luminaire showing the horizontal direction of the light rays;

Figure 3 is a vertical sectional view through one form of construction;

Figure 4 is a side elevational view of one of the prismatic plates shown in Figure 3;

Figure 5 is a diagrammatic perspective view of the luminaire of Figure 3; and

Figures 6 and 7 are cross sectional views similar to Figure 3 showing modified forms of construction.

As shown in the drawings the luminaire has a horizontal light source 10 of substantial length and diameter. This is typically in the form of a sodium lamp and flask.

As shown in Figures 1 to 5, inclusive, the source is received in an inverted reflecting trough 11 which extends a substantial distance below the horizontal plane through the light source. The angle from the center of the light source to the lower edge of the reflector ranges from about 55° in Figure 1 to 65° in Figures 6 and 7 as indicated in the drawings. The bottom of the reflecting trough is closed by two prismatic plates 12, 12 which meet in the vertical plane below the center of the light source so that the unit is symmetrical on opposite sides of this vertical plane. The drawings omit the mechanical details of the structures employed for securing the reflecting plates together and supporting them from the reflector.

The line 15 extending from the center of the source to the upper prism of the refracting plate is at an angle of approximately 55° with the nadir so that the reflector and refractor supports screen off all light above this line 15. The reflecting trough is specular and the side walls are parabolic cylinders with the focus of each parabola at the light source and its axis extending downwardly, substantially parallel with the line 15. The upper part of the reflector is shaped to reflect light generally downward. Light rays 17 and 18 originating at the center of the light source are reflected obliquely downward, as indicated at 19 and 20, in directions substantially parallel with the cut off line 15. Owing to the size of the light source a substantial amount of light comes from points spaced substantially from the axis of the source. The limiting ray 21, for example, coming from the top of the source and striking the bottom edge of the reflector is reflected, as indicated at 22, at an angle substantially below the light ray 20.

The prismatic plates 12, 12 are preferably flat pressed glass plates and of such size as to extend from the lower edge of the reflector down to the median plane of the luminaire and are wide enough to intercept the lowermost specularly reflected ray 22 as indicated. The prismatic panels 12, 12 are provided with refracting prisms 23 which extend obliquely of the plates as will appear more clearly in Figures 4 and 5, and receive the downwardly sloping light rays 19, 20 having an angle of approximately 55° with the nadir. These prisms are calculated to have the proper general slope as well as surfaces of the proper angle to accept these rays and elevate them so that they have an angle of approximately 75°

with the nadir and a horizontal angle somewhat less than 90° with the median plane. The emitted rays are indicated at 25 in Figures 1, 2 and 3 and these angles are shown in Figures 1 and 3. Thus one set of oblique prisms accomplishes both vertical and lateral redirection and the outside of the plates may be smooth instead of uneven as would be the case were crossed prisms used.

The lumniaire will therefore produce two beams of light wherein the dominant rays are at angles of about 75° with the nadir and are somewhat out of 180° in horizontal planes. Owing to the size of the source there will, of course, be considerable spread of the light rays in vertical planes and owing to its length there will be considerable spread in horizontal planes. Direct light rays such as 26 will be deviated in vertical planes so as to be spread away from the nadir, as indicated at 27, but, of course, will not be elevated as high as the reflected light. The lateral deviation will, however, be comparable.

Where the mounting height and spacing of the unit is such as to require a beam slope other than 75°, the lamp may be elevated or lowered from the position indicated.

In the arrangement shown in Figure 6 the light source 10 is received in a reflecting trough 30 with a screening angle of approximately 65°. Its side walls are parabolic and reflect the light obliquely downwardly as indicated at 31. The lowermost reflected rays are indicated at 32 and it will be obvious from the drawings that the specularly reflected light at angles below the cut off line 33 will be acted upon by the plates 34, 34 in the same way as above described. In the construction here shown the reflecting trough is made much shallower than in Figure 3, and its upper wall 35 is provided with a white diffusing finish.

In the arrangement shown in Figure 7 the parabolic reflectors 40, 40 of screening angle of substantially 65° terminate below an upper reflector 41 so as to provide the ventilating space 42. The prismatic closure has two refracting plates 43, 43 similar to the plates above described, and a central fluted, light diffusing plate 44. In this form of construction the plates 43, 43 are steeper than the plates 12 and 34 and light below the specularly reflected ray 45', corresponding to the ray 45 originating at the center of the source, is allowed to fall on the bottom plate 44.

While I have shown three specific constructions for the embodiment of the invention, it should be understood the same is only for the purpose of illustrating preferred embodiments thereof. Changes in the details may be made without departing from the scope of the invention and I do not wish to be understood as limiting myself except as such limitations may appear in the hereinafter contained claims.

What is claimed is:

1. Means for producing from a horizontal cylindrical light source of extended length two beams of parallel light rays directed downwardly at angles of substantially 75° above the nadir and having between them a horizontal angle of substantially less than 180°, comprising an inverted reflecting trough which screens off all light down to angles substantially 10° to 20° less than said beam angle above the nadir and having sides of parabolic contour in vertical section which specularly reflect the intercepted light out of its mouth and across the axial plane thereof at angles substantially parallel with said angle of reflector cut-off, and two prismatic refractors extending downwardly and inwardly from the lower edges of the reflector, each of a depth to receive the light reflected by the other side of the reflector after crossing the axis, and having obliquely disposed parallel light refracting prisms which elevate the light so that it is transmitted at substantially 75° above nadir and deviate it horizontally so that the axes of the beams are substantially less than 180°.

2. In a street lighting luminaire symmetrical on opposite sides of a vertical plane, a horizontal cylindrical light source of extended length in said vertical plane, an inverted reflecting trough having specularly reflecting side walls, and a prismatic light-refracting trough whose side walls converge inwardly from the lower edges of the reflector to said vertical plane, the upper edges of the side walls of the refracting trough being substantially below the source and providing a cut off angle for direct light in the order of 55° to 65° above the nadir, the profile of the sides of the reflecting trough being parabolic with coincident foci at the source and their axial planes of substantially the same slope as the angle of cut off so that the specularly reflected light is directed obliquely downwardly and across the said vertical plane and generally parallel with the cut off angle, the depth of the side walls of the refracting trough being sufficient to permit said reflected light to cross the said axis, the refracting trough walls comprising flat rectangular plates each having parallel obliquely extending refracting prisms which transmit the light at angles measured from the nadir which are higher than those of the reflected light substantially 10° to 20° and deviate it horizontally so that the emitted beams are at less than 180° to one another.

3. A luminaire such as claimed in claim 2, wherein the source is of substantial diameter so that light rays originating in the upper part of the source are reflected downwardly at angles substantially below those originating at the axis of the source, and the refracting trough has additional depth to intercept said lower angle reflected light.

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