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T. W. ROLPH

2,352,801

LUMINAIRE

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Fig. 1.

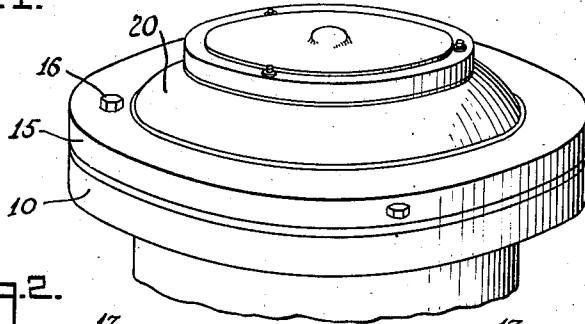


Fig. 2.

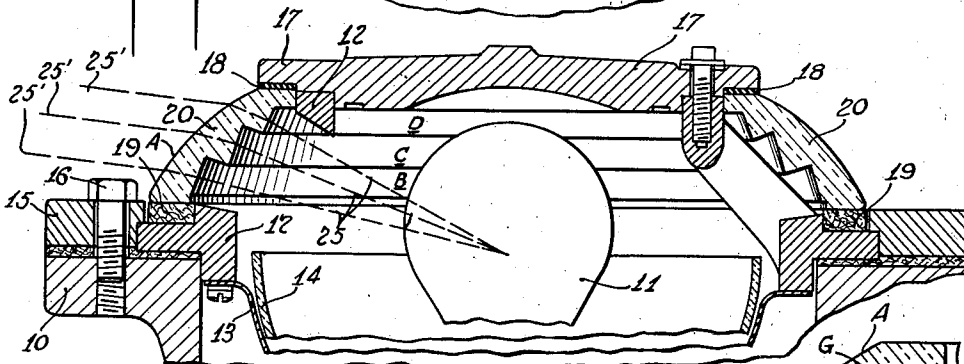
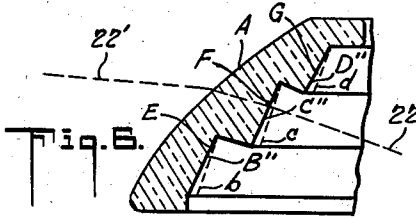
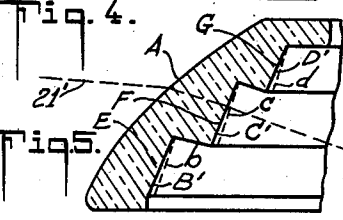
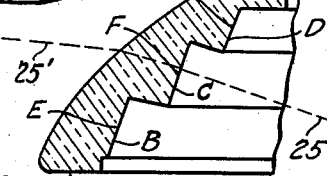
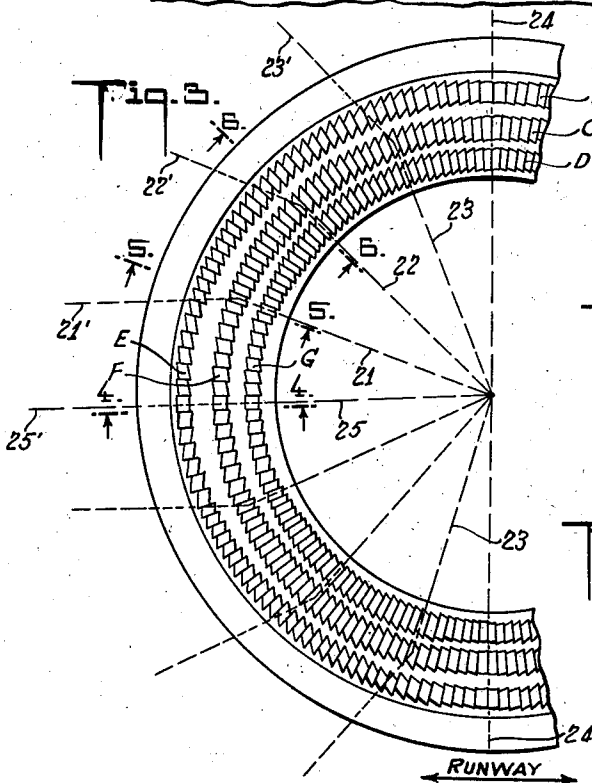


Fig. 3.



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LUMINAIRE

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3 Claims. (Cl. 240-1.2)

The present invention relates to luminaires, and is more particularly directed toward luminaires designed for use as contact lights for air-plane landing fields.

Contact lights for landing fields are placed alongside the runways just above the surface of the ground and are for the purpose of providing two concentrated beams slightly less than 180° to one another and directed at a slight angle above the horizontal, the beams from the opposite sides of the runway being visible to the aviator when locating the runway and landing.

The present invention relates to improvements in such contact lights wherein all the light control from the concentrated filament light source and its reflector is effected by a one-piece annular refractor which is of smaller diameter at the top than at the bottom.

The accompanying drawing shows, for purposes of illustrating the present invention, an embodiment in which the invention may take form, it being understood that the drawing is illustrative of the invention rather than limiting the same.

In the drawing:

Figure 1 is a perspective view of the upper portion of the complete contact lighting unit;

Figure 2 is a vertical sectional view through the lighting unit;

Figure 3 is an inverted plan view of the refractor; and

Figures 4, 5 and 6 are fragmentary vertical sectional views through the refractor and taken on the planes 4-4, 5-5 and 6-6, respectively, of Figure 3.

The metal base of the contact lighting unit is indicated at 10. It supports in a manner not shown a concentrated filament lamp 11. An astragal ring 12 carries straps 13 supporting a spherical reflector 14. The astragal ring 12 is clamped in place by an upper ring 15 and bolts 16. The astragal ring carries a cover plate 17 and between the cover plate 17 and the top of the ring 12 are carried suitable gaskets 18, 19 and a refractor 20.

The outer surface A of the refractor, as indicated in the vertical sections of Figures 2, 4, 5 and 6, is externally convex. The inner surface of the refractor is here shown as being divided into three annular steps B, C and D, and each of the steps B, C and D is provided with radial prisms E, F and G.

The refracting power of the prisms E, F and G increases on each side of the median plane 4-4, so that light rays, such as 21, 22 and 23, will be

refracted toward the median plane 4-4, as indicated by the rays 21', 22', and 23' of Figure 3. The increase in refracting power of the prisms E, F and G continues each side of the plane 4-4 to approximately the position of ray 23. Beyond the rays 23 and the radial planes 24 the refracting power decreases. Beyond the planes 24-24 the prisms are reversed and meet at a point slightly displaced from the plane 4-4.

In the plane 4-4, as illustrated in Figure 4 of the drawing, the inner surfaces of the prisms B, C and D are in planes at right angles to the plane 4-4, so that light rays passing through this narrow area are not deviated horizontally. As the radial prisms E, F and G increase in refracting power away from the plane 4-4 the slope of the surface of the annular prisms B, C and D also changes. The new slopes at typical planes, such as 5-5 and 6-6, are indicated at B', C' and D', and B'', C'' and D'', respectively. In order to visualize this circumferential variation in slope of the inner surfaces of the refractor dotted lines are drawn in Figures 5 and 6 at the slope of the prisms in the plane 4-4 and are designated by reference characters b, c, d.

In the plane 4-4 the annular prisms act to bring the divergent light received from the source and reflector into parallelism and emit it at a slight angle above the horizontal, as indicated by the rays 25, 25' in Figures 2, 3 and 4. These rays suffer no lateral deviation. When the more and more divergent rays from the source, such as rays 21, 22, 23, are bent toward the plane 4-4 by the laterally refracting prisms superposed on the surface of the annular prisms and emitted by the sloping outer surface of the refractor, the lateral deviation tends to exaggerate the vertical deviation of the annular prisms so that the light rays tend to be bent toward the ground. In order to compensate for this the vertical angles of the inner surfaces of the annular prisms B, C and D are changed, as indicated in Figures 5 and 6. For example, the ray 21 of Figures 3 and 5 is at the same angle above the horizontal as the corresponding ray in Figures 2 and 4, but owing to the difference in slope of the surface C' the vertical angle of the ray in glass is different and this ray strikes the external surface at still a different angle. The variation in these angles is such that the emergent ray 21' is still at the same angle above the horizontal as the emergent rays 25', even though it is no longer in the original radial plane as indicated by the ray 21' in Figure 3. Similarly the ray 22 suffers a vertical deviation at the first surface of the refractor and

a different vertical deviation at the outer surface, so that the emergent ray 22' is also at substantially the same vertical angle as the rays 25'.

It will thus be seen that the collecting of the light through the dominant part of a semicircle about the unit into a beam projected in a median direction and with substantially all the light at the same angle above the horizontal is accomplished by a single refractor, which in the present instance is externally smooth and convex and has annular prisms to produce vertical concentration and radial prisms superposed on the inner surface of the annular prisms and having circumferential variation in refracting power to produce concentration in circumferential directions, and the annular prisms vary in depth circumferentially with the greatest depth where the radial prisms have the least refracting power and with the least depth where the radial prisms have the greatest refracting power. The laterally acting prisms may be on the outer surface.

Since it is obvious that the invention may be embodied in other forms and constructions within the scope of the claims, I wish it to be understood that the particular form shown is but one of these forms, and various modifications and changes being possible, I do not otherwise limit myself in any way with respect thereto.

What is claimed is:

1. A luminaire comprising a substantially point light source, an annular one-piece refractor accepting a sector of an annular zone of divergent light from the source and having annular prisms to produce concentration in vertical directions and radial prisms superposed on the surfaces of the annular prisms and having circumferential variation in refracting power to produce concentration in circumferential directions, the annular prisms varying in depth circumferentially with

the greatest depth where the radial prisms have the least refracting power and with the least depth where the radial prisms have the greatest refracting power, so as to maintain substantially uniform, for all of said prisms, the vertical angle of the emergent light.

2. A luminaire comprising a substantially point light source, an annular one-piece refractor accepting a sector of an annular zone of divergent light from the source and having annular prisms to produce concentration in vertical directions and radial prisms superposed on the inner surfaces of the annular prisms and having circumferential variation in refracting power to produce concentration in circumferential directions, the annular prisms varying in depth circumferentially with the greatest depth where the radial prisms have the least refracting power and with the least depth where the radial prisms have the greatest refracting power, so as to maintain substantially uniform, for all of said prisms, the vertical angle of the emergent light.

3. An externally smooth refractor annular about a normally vertical axis of smaller diameter at its top than at its bottom and externally convex in vertical planes, the inner surface of the refractor having a plurality of annular steps of decreasing steepness toward the top and of decreasing circumferential variation in steepness on opposite sides of a median vertical plane, said steps forming vertically acting prisms which depress rays from an axially disposed source below the bottom of the refractor and having formed thereon prismatic ridges of circumferentially varying refracting power which effect concentration toward said median plane of light originating in said source.

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