June 28, 1938. T. W. ROLPH ET AL 2,122,295

LUMINAIR

Filed Oct. 2, 1935

Fig. 3.

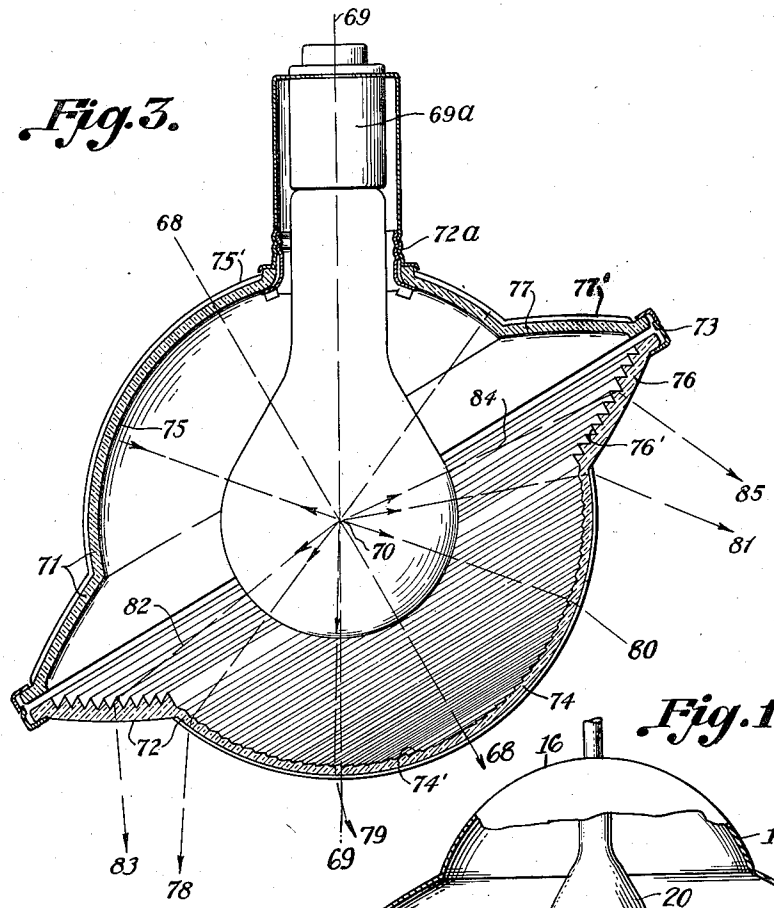


Fig. 1.

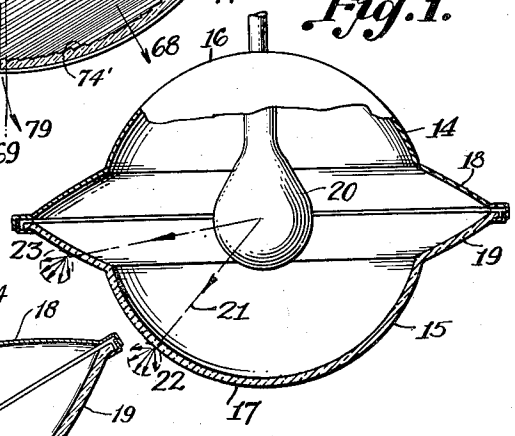
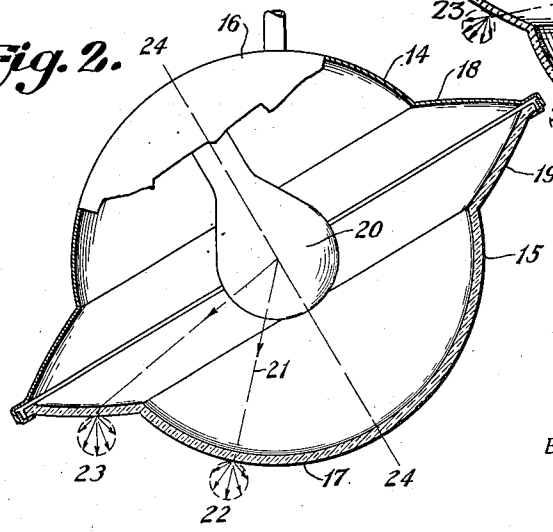


Fig. 2.



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LUMINAIR

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3 Claims. (Cl. 240—93)

The present invention relates to luminairs and is more particularly directed toward luminairs having light-transmitting and redirecting glass globes or bowls designed to direct light rays in a dominant direction.

Owing to advantages of appearance, enclosures for light sources are, in many cases, made spherical. The appearance is the same or substantially the same, irrespective of the direction in which the enclosure is viewed. For direct lighting, the lower part of the enclosure is made of transmitting material. The upper part of the enclosure may be opaque, translucent or substantially transparent, depending upon the way the light in the upper hemisphere is to be utilized.

Where the lower part of the spherical enclosure is made of diffusing glass, light may be scattered in directions where it is not desired, causing glare and light waste. The direction of the rays may, if desired, be controlled by making the enclosure of glass partially diffusing and employing internal reflectors to build up the light rays in the desired direction.

A hemispherical prismatic bowl is not well adapted for concentrating light toward the axis. Owing to the necessity of removing the plunger used in pressing the bowl, the formation which may be given the inside surface is limited, particularly in the large diameter portion of the bowl. Interior annular prisms may be placed near the axis where little deviation is necessary, but cannot be placed near the periphery where the greatest deviation is desired. The high angle direct light from a source at the center falls on the spherical inner surface and is transmitted to the outer surface without deviation. The only deviation available is that which the outer prisms may produce. Where the bowl axis is vertical, the higher light rays are not lowered a sufficient amount to substantially increase the intensity at nadir. Where the prism angles are excessive, there is considerable loss of light, which may cause glare.

The present invention contemplates a luminair wherein the glassware having, in general, the appearance of a sphere, is provided with a zone generally normal to the axis in which the more intense light is desired. This zone increases the projected area of the glass in the direction normal to this axis, and reduces the spread of the more intense light rays. The zone may, if desired, be provided with prisms which supplement the effect of the shape and further concentrate light. These prisms are much more effective for this purpose than the prisms above referred to, for they receive and emit the light at much more favorable angles.

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

In this drawing—

Fig. 1 shows a form of luminair having a generally spherical contour but provided with an enlarged horizontally disposed zone to provide an increased projected area in horizontal planes;

Fig. 2 illustrates the same form of fixture as shown in Fig. 1 with the zone tilted; and

Fig. 3 illustrates a luminair somewhat similar to Fig. 2 except that the enclosure is entirely made of prismatic glass.

In the luminair shown in Fig. 1, a diffusing bowl 15 is employed and may have a cover 14 which is metal or glass. The bowl and cover have, as will be apparent from the drawing, portions of spherical contour as indicated at 16 and 17 and portions of conical or flatly curved contour as indicated at 18 and 19. The light center is at 20.

Light rays such as indicated at 21 pass through the spherical portion of the bowl, and are diffused as indicated at 22, and light rays passing through the outer zone 19 of the bowl are diffused as indicated at 23.

It is apparent that the diffused beam produced by the flat part of the bowl and indicated at 23 does not spread up toward the horizontal but, as is illustrated at 23, is, it is apparent, directed downwardly to a considerable extent so that this light, instead of being wasted by being directed away at high angles, is made more useful by being directed nearer the axis of the fixture. When the luminair of Fig. 1 is mounted with the enlarged zone tilted, as shown in Fig. 2, the optical axis of the fixture is inclined, as indicated at 24, and the light rays emitted from the enlarged zones of the glass are directed more obliquely downward so that the luminair is adapted for lighting vertical surfaces, such as displays.

When the two pieces of the fixture of Fig. 1 or 2 are fastened together, they give the appearance of a sphere surrounded by a band which is either horizontal or tipped at an angle. The optical axis of this luminair is perpendicular to the band, and the slope of the axis is generally

in the direction where the highest candle power is desired.

Fig. 3 is a cross-section of a two part prismatic unit of the general shape of the unit shown in Fig. 2 and indicates a typical prismatic construction. It will be noted that the optical axis of the luminair indicated at 68 passes through the light center 70 but does not correspond to the axis of the lamp 69. The lamp is carried from a socket 69a in a pendant position with its axis vertical, but the optical axis of the luminair coincides with the general direction in which maximum candle power is desired, which is typically, in this construction, about 30° from the vertical. From the mechanical standpoint, this unit comprises two glass pieces 71 and 72 joined in the center by metal band 73 and carried by a support 72a, the details of which form no part of the present invention. From the optical standpoint the luminair may be more conveniently treated as a sphere showing two segments 74 and 75, and circumscribed by a protruding ring of wedge-shaped cross-section, made up of surfaces 76 and 77. The lower portion 74 of the spherical part will typically carry a series of concentric refracting prisms 74' increasing the concentration of light in the direction of the axis 68. This action is indicated by typical light rays 78, 79, 80 and 81. These prisms may be on the inside surface or the outside surface. They will usually be supplemented by a series of radial or parallel prisms on the opposed surface increasing or decreasing the concentration in certain directions so as to build up a high candle power toward the bottom of the wall display area, yet permit lateral spread of light along the wall. On the upper portion of the sphere 75, reflecting prisms 75' are provided which return the light through the light source 70 to supplement the direct light striking the spherical section 74. These reflecting prisms permit some transmission of light to illuminate the ceiling to a low intensity and prevent a gloomy appearance. This luminair may be mounted with the optical axis vertical, if desired.

The flattened curved section 76 may contain concentric refracting prisms 76' or it may contain concentric internal reflecting prisms of the single reflecting type. The latter are indicated in the drawing and the course of typical light rays acted upon by these prisms are indicated at 70—82—83 and 70—84—85. These prisms may be supplemented by prisms on the opposed surface, spreading laterally or otherwise modifying the light distribution obtained from them. This portion of the luminair adds to the concentration of light on the counter and lower portion of the wall display, but also provides some light on the upper portion.

The corresponding section 77 of the upper glass piece will usually carry concentric or radial reflecting prisms 77' cooperating with the prisms on 76. Radial prisms are shown in the figure. However, this section 77 may carry reflecting prisms tending to cooperate with the prisms on section 74. Considerable variation is possible in the types of cooperating prisms used in this general structure. The shape is a desirable one for carrying prismatic formations adapted to concentrate light on the shelving and counters. The transmitted and generally scattered light serves to illuminate the ceiling and the entire room but not to as high an intensity as provided on the counters and wall display.

This shape of luminair may also be made up having one or both pieces in the form of diffusing glass without the use of prisms. In that case the natural distribution of the globe itself will provide a higher candle power in the direction of the optical axis than in other directions. The reason for this is that the projected area in the direction of the optical axis 68 is greater than in other directions, the minimum projected area being in directions perpendicular to the axis 68. When made in diffusing glass the two pieces may be of the same density or the upper half may have greater density than the lower half.

It will be noted that while this general shape is not symmetrical with reference to the vertical axis, the distribution of weight is symmetrical because the downward tipping of the ring on one side is compensated for by similar upward tipping on the other side. Therefore, the center of gravity is at the center of the sphere and the luminair will hang in the correct pendant position, even on a swinging support.

It will be seen from the foregoing specification that luminairs have been provided having a generally spherical appearance, but supplemented with a band or zone shaped to give the optical advantages of a shallow bowl, and that this arrangement has been utilized to build up the light intensity in directions normal to the plane of the zone. The wedge-shaped portion of the enclosure is employed where the greatest deviation of light is necessary, while the spherical section is employed where a lesser degree of deviation is desired.

It is obvious that the invention may be embodied in other forms and constructions not specifically disclosed but which are within the scope of the claims, and we wish it to be understood that the particular forms shown are merely illustrative. Various modifications and changes being possible, we do not otherwise limit ourselves in any way with respect thereto.

The present application is a continuation-in-part of our application Serial No. 655,920, filed February 9, 1933 now Patent No. 2,017,075, of October 15, 1935.

What is claimed is:

1. A luminair comprising a light source and an envelope, the envelope being in the shape of a sphere circumscribed by a protruding ring whose radial cross-section is wedge-shaped, the envelope comprising two pieces, similar in shape and held together at the plane of maximum diameter, the upper piece carrying reflecting prisms and the lower piece carrying refracting prisms, the prisms of the lower piece being adapted to increase the concentration toward the axis of the luminair, the luminair being symmetrical with respect to a diagonal axis.

2. A luminair comprising a light source, a light redirecting and transmitting bowl adapted to intercept the light emitted in a hemisphere, the bowl having a spherical portion surrounded by an annular dished portion to intercept the more widely divergent light and deviate the light toward the bowl axis, and a reflecting cover having a concentric spherical portion occupying a spherical angle of the same extent as the spherical portion of the bowl and disposed opposite thereto for reflecting light to said spherical portion of the bowl for transmission thereby in the same directions as the direct light, the cover also having an annular reflecting portion of the same diameter as the annular dished portion of the bowl for reflecting light toward the same, said light source being positioned at the common

center of the spherical portions and the common maximum diameter of the annular portions.

3. A luminair comprising an envelope formed of two similarly shaped portions, each portion having a central semi-spherical part, and an outwardly flared part, the two flared parts forming an annular enlargement whose radial cross-section is substantially wedge-shaped, means connecting the edges of the flared parts together, the plane passing the edges of the flared parts being tipped from the vertical axis of the envelope, and a light source disposed substantially at the center of the semi-spherical parts and in said plane.

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