Dec. 31, 1929. E. B. GILLINDER 1,741,693

REFLECTOR BOWL FOR ELECTRIC LAMPS

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Fig. 1.

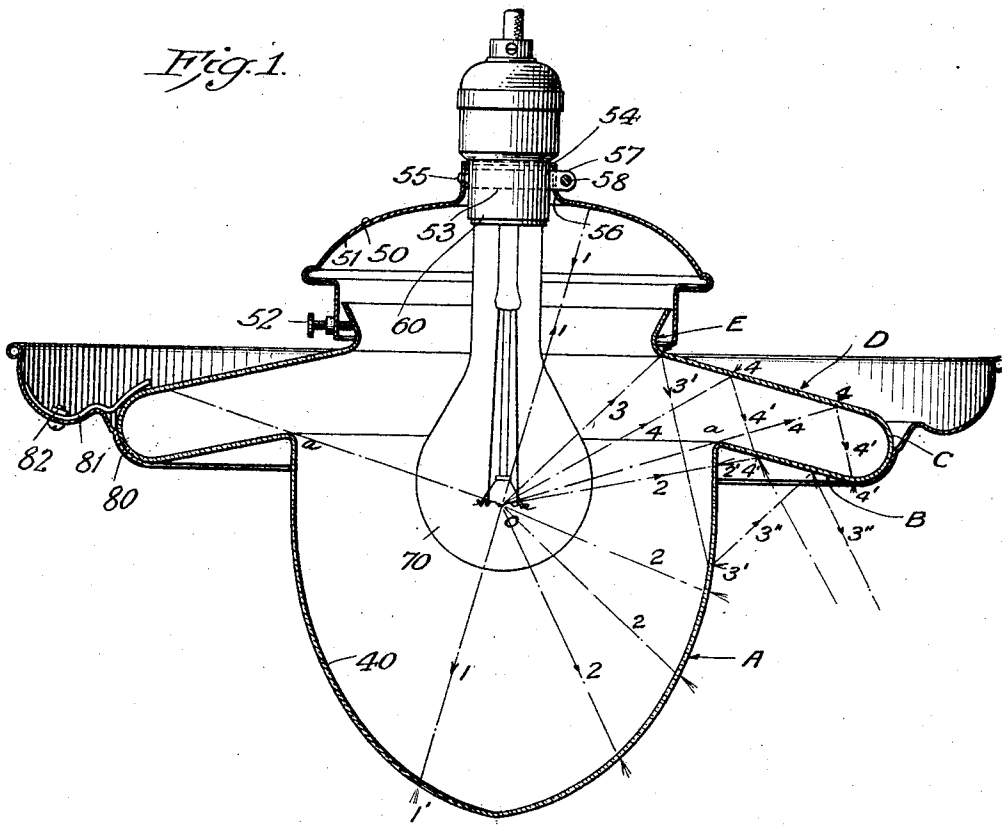

Fig. 2.

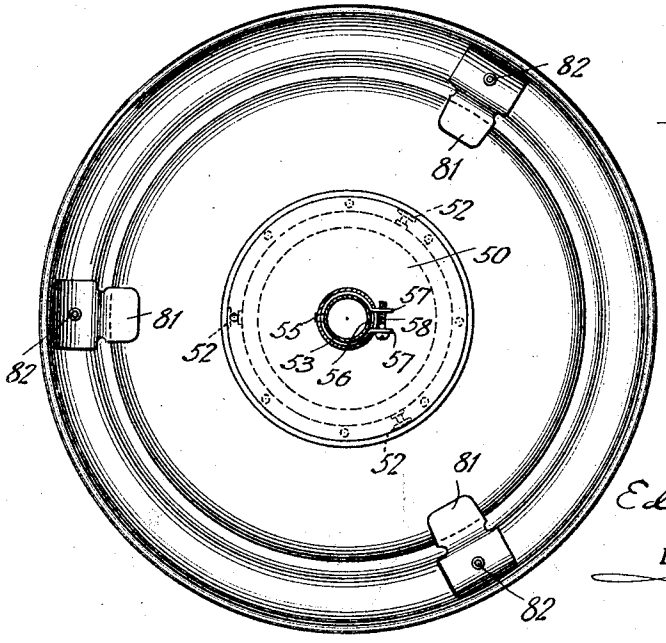

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Fig. 3.

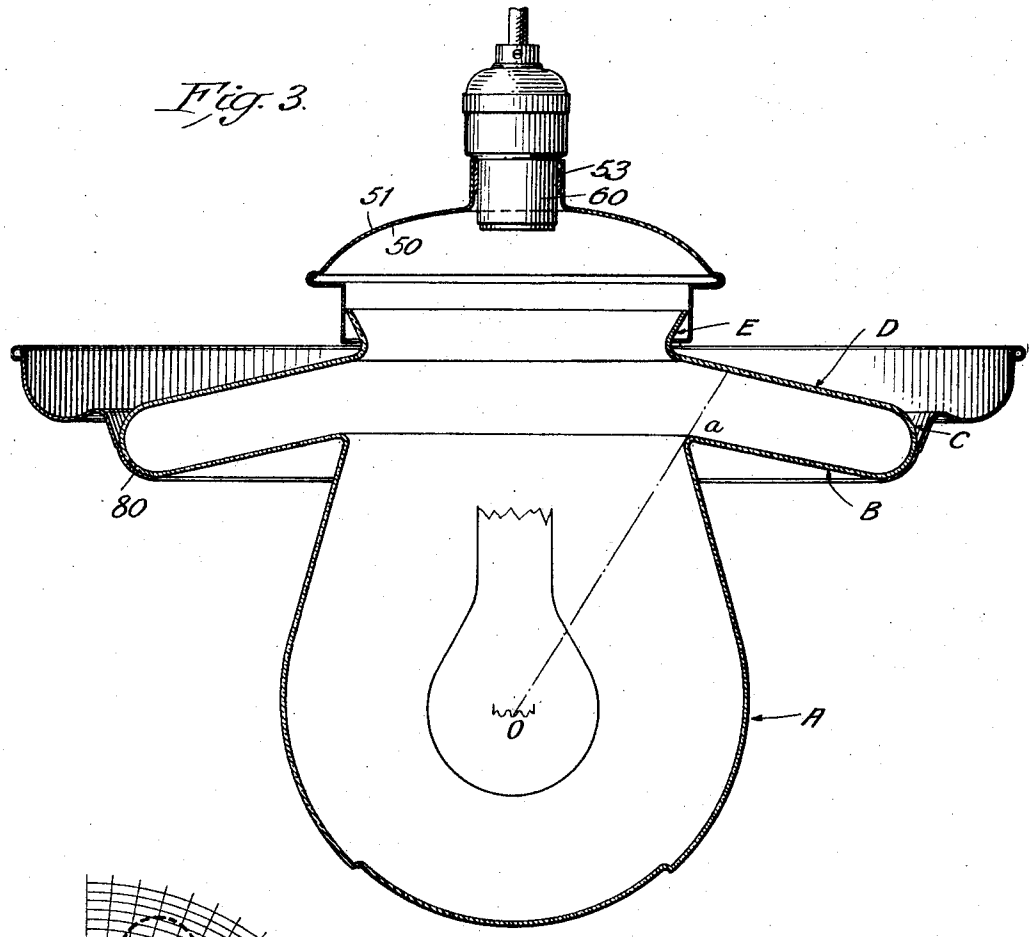
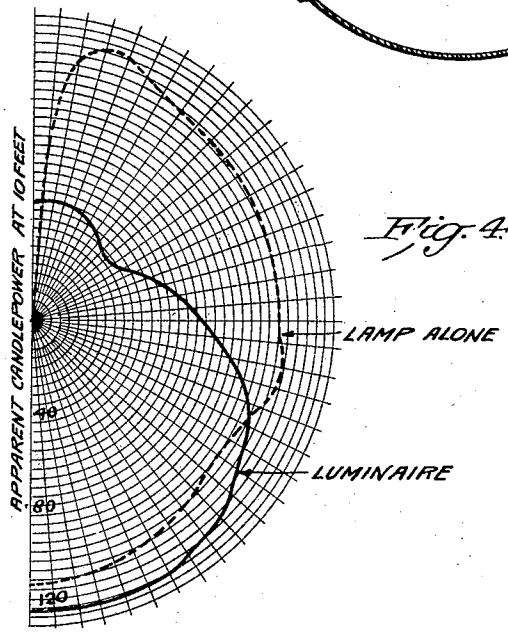


Fig. 4.



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UNITED STATES PATENT OFFICE

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REFLECTOR BOWL FOR ELECTRIC LAMPS

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The invention relates to lamp containing light diffusing bowls such as are used to produce both a decorative and pleasant illuminating effect, adapting them for interior illumination.

The object of the invention is to provide a diffusing bowl of such construction as will give a wider distribution of light on the floor plane and a small amount of light emitted to the ceiling or substantially above the plane of the bowl so that the illumination of the space in the vicinity of the light will not especially depend on the reflected light rays from white ceilings or walls as an added source of illumination of the light source. In this respect, the bowl is especially adapted to the illumination of offices, factories and stores.

The above object is attained by forming the diffusing globe with two upper flanging annular portions in spaced relation to one another and situated above a central lower bowl portion. The configuration of the globe and the disposition of the light source within the globe relative to it are such that only a small part of the rays from the light source upwardly directed and intercepted by the upper flanging portions of the globe is diffused in upward directions but the larger part of this light is reflected in a downward direction and at large angles from these portions. With this arrangement, an illuminated space of large area is obtained and a greater efficiency in the illumination of objects is obtained by using a greater number of the rays from the light source thrown in a downward direction, these added rays being at the same time properly diffused and evenly distributed.

Also, the geometrical configuration of the diffusing globe and the relative disposition at the light source within are such that the above object is accomplished with practically no effects of contrasts to the eye, the variations in the light intensity upon a horizontal plane from a point directly beneath the light source varying as uniform as possible outwardly along said plane in all directions.

The invention also comprehends a diffusing reflector globe fixture which will present an agreeable appearance viewed from the decorative standpoint.

The features of the invention will be made clear with the aid of the description to be given in connection with the accompanying drawings which illustrate the present commercial form of the fixture and in which like parts of the following figures are designated by similar characters of reference:

Fig. 1 is a sectional elevation of the reflector globe fixture showing the directions of the rays from the light source transmitted through the diffusing globe.

Fig. 2 is a top plan view of Fig. 1.

Fig. 3 is a sectional elevation of a fixture showing a modified form of diffusing globe.

Fig. 4 shows candle power curves obtained from a photometric test of the fixture shown in Fig. 1, using a 100 watt clear tungsten lamp and also of the lamp alone, the disposition of the ring filament relative to the diffusing globe in the test being identical to that shown in Fig. 1.

There are many ways in which the diffusing globe 40 can be shaped to carry out the objects of my invention, without departing however from its principle. One practical embodiment is illustrated in Figs. 1 and 2. A central lower portion A is shaped as the oblong portion of an ovoid and forms the major part of the bowl through which the light is transmitted and diffused. The upper circumferential edge *a* of this portion A is formed with an outwardly flanging annular portion B slightly inclined to the horizontal the outer circumference of which is joined through suitable curvature C to an upper annular portion D of similar slope as the portion B so as to provide a small uniform spacing distance between said annular portions B and D. The inner end of the upper portion D projects inwardly substantially within the circumferential edge *a* and then flares outwardly to provide an outer circumferential grooved portion E which permits the attachment of the globe to a reflector 50 by means of the screws 52 passing through the lower circumferential portion of the reflector 50 and extending into the recess E. The bowl 40 is preferably made of semi-translucent or opal glass but it may be frosted however or

otherwise treated to produce the diffusion of the light rays.

The reflector 50, the inner surface 51 of which is of suitable concave curvature and nickel finished or otherwise treated to present a reflecting surface, is adapted to permit its attachment to a standard lamp socket 60, holding a high wattage lamp 70, by means of a flexible band 53, fitting within the neck portion 54 of the reflector 50 and secured to the latter by means of the rivet 55. The neck portion 54 of the reflector 50 is formed with a rectangular aperture 56 and the spaced flanged end portions 57 of the band 53 extend through this aperture 56. A screw 58 threaded through the flanged ends 57 serves to clamp the flexible band 53 securely around the lamp socket 60.

The disposition of the various parts relative to one another is such as will furnish axial alinement of the light source O produced by the lamp, with the diffusing globe 40 and such that the centralized or ring filament O common to high wattage lamps lies suitably below the plane passing through the circumferential edge *a*, the purpose of this location of the light source will be apparent from the following:

As a means which will give the fixture an ornamental appearance, the lower part of the curved portion C of the bowl is covered by an opaque annular member 80 of suitable ornamental design projecting beyond the outer circumference of the globe and held in place by a plurality of clamping plates 81 projecting inwardly over the upper part of the curved portion C of the bowl and securely fastened to the opaque member 80 by means of screws 82. This opaque member 80 in no way impairs the functional operation of the bowl, as will be made apparent by the following descriptive study of the light rays from the source O diffusing through the bowl.

Referring to Fig. 1, it is seen that owing to the geometrical disposition of the various parts, all of the rays from the source O which strike the reflector 50 as illustrated by the line 1 are reflected onto the lower central bowl portion A, these rays striking the reflector 50 at substantially an angle of incidence of 90 degrees. Hence reflected rays from the reflector, striking the central bowl portion A, are transmitted and diffused through this portion, as indicated by the line and diffusing symbol 1′. Also, direct rays from the source O striking the lower central portion A of the bowl are transmitted and diffused through this portion, as indicated by the lines and diffusing symbols 2. The upper portion of this diffused light is in part thrown onto the lower polished glass surface of the lower annular portion B and reflected downwardly therefrom, as indicated by the line 2′, thereby materially adding to the illumination of objects in a downward direction. Also a portion of the light rays from the source O as illustrated by the line 3 reflect from the upper annular portion D onto the lower central portion A through which they are diffused, as indicated by the line and symbol 3′. A portion of the light diffused in this way reflects from the lower annular portion B, as indicated by the line 3″, which also increases downward illumination.

The light ray O^a indicates the lower extreme limit of direct rays from the source O that may strike the upper annular portion D. The rays from the source O at or above the line O^a which strike the upper annular portion D are partly diffused through this portion, as indicated by the line and symbol 3 and the lines and symbols 4, but due to the angle of incidence of these rays, a large portion of this light will be reflected from the upper polished portion D onto either the flanging portion B or the bowl portion A through which they are diffused, as indicated by the line 3′ as already discussed, and the lines and symbols 4′, the latter also adding to the illumination of objects placed below the globe.

From the preceding discussion, it is seen that the larger the angle of incidence of the rays 4, the greater their tendency to be reflected back from the upper annular portion D onto the lower portion B. With the corelative disposition of the bowl and the light source and the directions of the rays just described, there will be a minimum amount of diffused light passing upwardly toward the ceiling and surrounding walls at points located substantially level with or above the source O. Hence, the illumination of the surrounding area depends only to a very slight extent on the reflected light from the ceiling and those portions of the surrounding walls located substantially level with or above the light source O, as an added source of illumination for objects situated below the plane of the bowl.

On the other hand, however, the provision of the spaced annular portions B and D, it is noticed, makes possible a greater illumination of objects placed below the plane of the fixture, and furthermore a greater illumination of objects distantly removed from the vertical passing through the light source O, owing to the light diffused through the lower central globe portion A, being reflected at large angles from the under surface of the lower annular portion B, and to a lesser extent, owing to the light diffused through the lower annular portion B being reflected from the upper portion D.

In consequence of this wider distribution of light on the floor plane and the small amount of light emitted above the plane of the fixture, the latter is remarkably well suited for use in offices and stores, and especially in factories, the ceilings of which are often

more or less formed with projecting beams which add difficulties to the locating of lighting fixtures using reflected light from the ceiling as an added source of illumination. Also, where the ceiling or walls are either panelled or decorated, upwardly directed light becomes an almost total loss and in these cases, my improved lighting fixture is effective as an efficient method of illumination, the larger part of the light being transmitted downwardly over a large floor space while the small amount of light transmitted upwardly is nevertheless sufficient to illuminate the panelled or decorated ceiling or walls. Also in these cases, the lighting fixture produces both a decorative and pleasant illuminating effect.

With this wider distribution of light over a larger floor surface, due to the extra light transmitted from the lower annular portion B, a more uniform distribution of light over a larger floor surface is also obtained since distant objects are in need of more illumination than objects in closer proximity to the vertical.

In this connection, however it is noted that no direct rays from the source O and no reflected rays from the reflector 50 can reach the lower annular surface B, owing to the co-relative disposition of the globe 40, the reflector 50 and the centralized filament O. In this way, too great an illumination of objects removed from the vertical is prevented, which is desirable, since direct or reflected rays from the reflector, if otherwise made to pass through the lower annular portion B, would produce centralized spots, removed from the vertical, of greater light intensity than others located between the latter and the vertical, owing to the special configuration of the bowl, and in consequence there would result non-uniformity of light distribution and hence distressing contrasts and shadows. In other words the absence of incident rays from the source O or from the reflector 50 on the annular portion B results in giving as nearly as possible a uniform diminishing of the light intensity of illuminated objects away from the vertical.

Substantially no incident ray reaches the curved portion C of the globe and consequently the ornamental opaque member 80 does not impair the functional operation of the globe. The opaque member 80, as illustrated in the drawing, is arranged to cover as little of the globe surface as possible, thereby enabling as much of the diffused light as possible to be projected outwardly to adjacent surrounding walls.

Fig. 3 shows a modified form of globe construction. The upper and lower annular portions B and D are still retained but the lower part of the central portion A is of greater curvature than the globe shown in the other figures, and the upper part curves inwardly so as to provide a greater radial width to the lower annular portion B. This form of globe achieves the same functional purpose of illumination as described above.

It is desired to have it understood that the position of the centralized light source O within the globe portion A may be varied, without departing, however, from the principle of the invention. In this respect, the lower the location of this source with respect to the circumferential edge *a*, the less the number of light rays which strike the upper annular portion D of the globe and hence the less the light emitted to the ceiling. The centralized filament O is shown located substantially below the edge *a*, in Fig. 3, for purpose of clearness, although this location could also be shown in the main embodiment of the invention as illustrated in Fig. 1. As shown in Fig. 3, the source O is positioned substantially at the center of curvature of the lower central portion A and the direction of the light ray O^a indicates that a small number of direct rays from the source O may strike the upper annular portion D. In this way, less light reaches the ceiling and correspondingly a greater amount is thrown on the floor plane.

The light distribution from my improved type of reflector globe is illustrated by the comparative photometric candle power curves in Fig. 4, a 100 watt, 1350 lumens clear tungsten lamp of the filament ring type being used. The dotted line curve shows the illuminating radiation of the lamp alone, while the solid line curve B indicates the radiation of the luminair. Both curves indicate the apparent candle power at a distance of ten feet from the light source. From the solid line curve, it is noted that there is a minimum amount of diffused light above the plane of the light source, while below this plane, the curve indicates a maximum amount of light distributed at large angles. Below the horizontal plane, the variation in candle power values from point to point is comparatively small. It is also noted that there is practically no sharp bends in the curve below the light source. Consequently my improved construction of diffusing globe not only affords a maximum amount of light distributed at large angles in a downward direction, but at the same time a gradual diminishing of the light intensity of illuminated objects is obtained, which materially eliminates visual contrast effects.

As obtained from the test shown in Fig. 4, the ratio of the light flux value of the luminair below 90 degrees (669) to the total lumens value of the bare lamp (1340), is .5, indicating a large amount of light transmitted to the floor plane.

The test curves shown in Fig. 4 were obtained for a disposition of the various parts, particularly in regard to the centralized filament O, as shown in Fig. 1. Evidently, for

a location of this filament O lower than the one shown in Fig. 1, photometric tests would produce similar curves, but showing less light diffused upwardly and a greater amount diffused substantially uniformly on the floor plane.

In accordance with the provisions of the patent statutes, the principle of the invention has been described, together with the apparatus which is now considered to represent the best embodiment thereof, but it is desired to have it understood that the apparatus shown is merely illustrative, and that the invention may be carried out in other ways.

The invention having been described, what is claimed as new and desired to be secured by Letters Patent, is as follows:

1. A lighting fixture comprising a light diffusing globe formed of a lower central bowl portion, two outwardly flanging annular portions located above the central bowl portion and in spaced relation to one another, a third annular portion joining the outer ends of said flanging portions, and an opaque annular member supported by and substantially covering the outer surface of said third annular portion.

2. A lighting fixture comprising a diffusing globe formed of a lower central bowl portion, upper and lower outwardly and downwardly flanging annular portions in spaced relation to one another and located substantially above the bowl portion and joined at their outer edges, an outer ornamental annular member carried by said flanges, a concave reflector attached to the inner edge of said upper flanging portion, a lamp socket connected to said reflector, an electric lamp fitted to said socket within the globe, said reflector, socket and lamp being in axial alinement with said globe and the center of the light source produced by the lamp being located below the lowest extreme point of said lower downwardly flanging portion of the globe.

3. A lighting fixture comprising a diffusing globe formed of a lower central bowl portion, an outwardly flanging annular portion joined to the upper edge of said bowl, a second annular portion located above and joined to the first through a suitable curvature, and an ornamental annular member located at the outer circumferences of the annular portions of the globe and clamping members secured to the ornamental member and holding the latter in place by projecting over the upper surface of the upper annular flange portion.

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