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2,143,148

LIGHT SHIELD

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FIG.1.

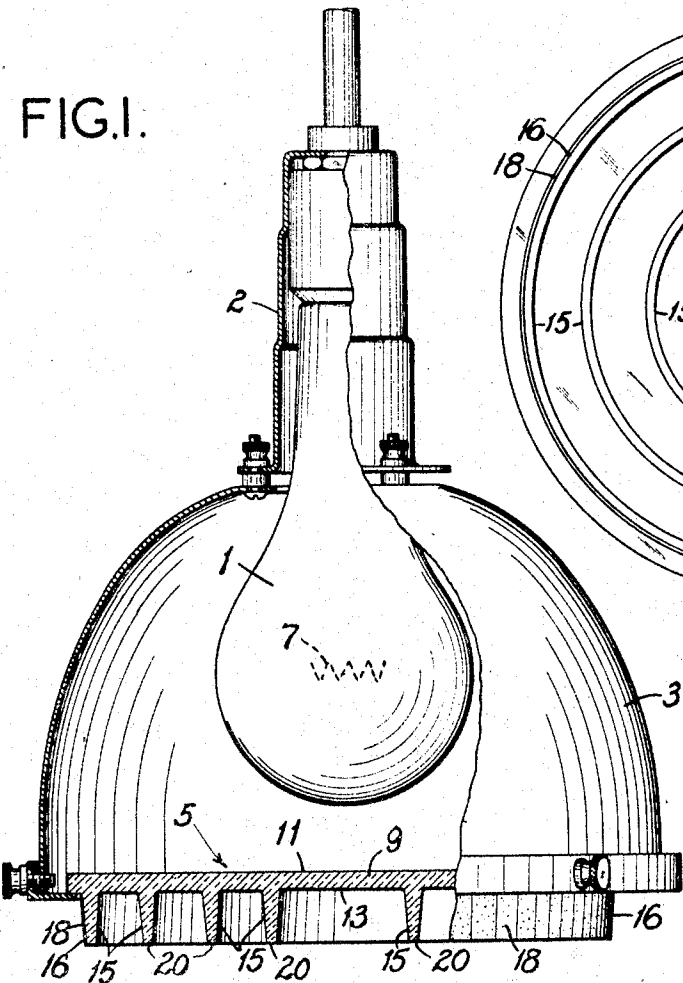


FIG.2.

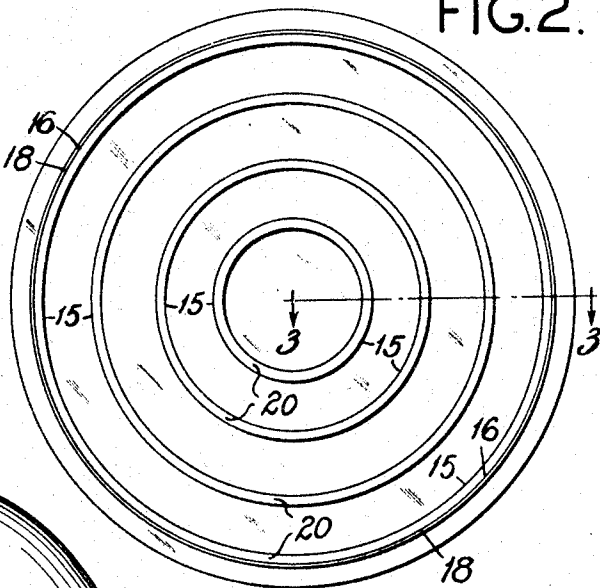
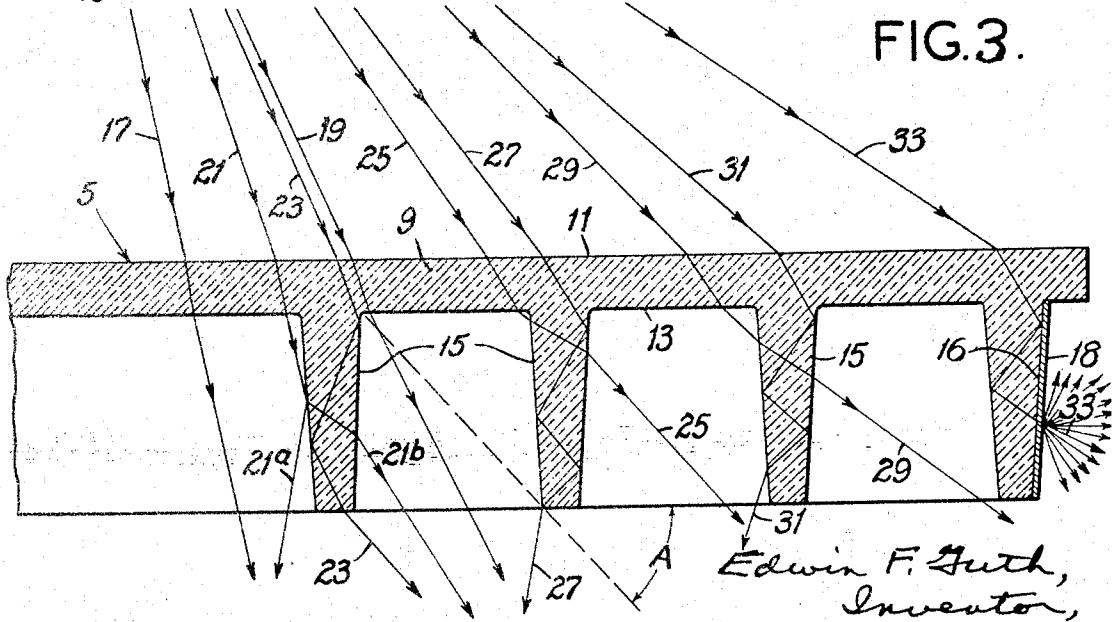


FIG.3.



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LIGHT SHIELD

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1 Claim. (Cl. 240—78)

This invention relates to light shields, and with regard to certain more specific features, to light directing shields.

Among the several objects of the invention may be noted the provision of a light directing shield which is adapted to minimize the glare of a high intensity light source, such as an incandescent filament, but which at the same time is capable of transmitting substantially all of the light incident upon it; the provision of a light shield of the class described wherein direct light rays from a light source are distributed and directed in such a manner that they travel, after passing through the shield, in a large number of directions, but in a predetermined manner, the provision of a light shield of the class described which when placed before a light source exhibits a highly pleasing, softly illuminated appearance, but which nevertheless transmits a relatively great amount of light; and the provision of a light shield of the class described which is relatively simple and economical in construction. Other objects will be in part obvious and in part pointed out hereinafter.

The invention accordingly comprises the elements and combinations of elements, features of construction, and arrangements of parts which will be exemplified in the structures hereinafter described, and the scope of the application of which will be indicated in the following claim.

In the accompanying drawing, in which is illustrated one of various possible embodiments of the invention,

Fig. 1 is a side elevation, partly in section, of a lighting fixture showing a light shield made in accordance with the present invention incorporated therein;

Fig. 2 is a bottom plan view of a light shield made in accordance with the present invention; and,

Fig. 3 is an enlarged cross section taken substantially along line 3—3 of Fig. 2.

Similar reference characters indicate corresponding parts throughout the several views of the drawing.

The present invention relates to light shields which are used for the purpose of directing the light emitted from high intensity sources, such as incandescent filament electric lamps. The present invention finds one of its principal uses in connection with fixtures of the type illustrated in Fig. 1, in which an electric light bulb is indicated at numeral 1. Suspended from a cylinder 2 around the neck of bulb 1 is a reflector 3, of the type ordinarily provided for direct illumination.

Mounted in the bottom part of the reflector 3 is a light shield 5 which is constructed in accordance with the present invention. In the fixture as thus shown, the light from the filament 7 of the bulb 1 is directed downwardly by the reflector 3 and through the shield 5, by means of which shield it is directed, to constitute non-glaring direct illumination.

In the past, the light shields used in connection with fixtures such as that illustrated in Fig. 1 have comprised simply frosted, pebbled, etched, or similar irregular-surfaced glass sheets. A disadvantage incident to the use of such former shields is that they are relatively inefficient in the transmission of light, too much light being reflected in the wrong directions by the irregular surface employed to diffuse the light. A further disadvantage of such shields is that they present a relatively large area of rather intensely illuminated surface, which is of even luminous intensity or brilliance across the entire surface. Such a relatively large, evenly illuminated surface is not entirely pleasing to the eye, and is, by reason of its uniform brilliance, frequently rather glary or troublesome to the beholder.

The light shield of the present invention, as indicated at numeral 5, accomplishes a diffusion of the direct light rays from the filament 7 of the bulb 1, and the rays from the reflector 3, but without inefficiency, and presents a decorative appearance in which the brilliance of the shield to the beholder may vary over the surface of the shield, in a pattern or design that is pleasing to the eye and less glary.

The light shield of the present invention comprises a transparent sheet 9, which may have any desired outer periphery in order to cooperate with the fixture for which it is designed. For example, in Fig. 2, the sheet 9 is circular. Other shapes may be provided at will. The upper surface 11 of the sheet 9 is normally plane, as is the parallel lower surface 13 of the sheet 9. However, it is not necessary, within the purview of the invention, that the surfaces 11 and 13 be plane; under some circumstances, they may be curved, or they may be plane and disposed at non-parallel relationships to each other in order to obtain a directional control, or prismatic effect, on the light passing therethrough. In the simplest and preferred form of the invention, however, the surfaces 11 and 13 are plane and parallel to each other, and they will be so shown and described herein.

Depending from the lower surface 13 are a plurality of concentric, circular ribs or flanges or fins

or like members 15. In the embodiments of Figures 1 and 2, the ribs 15 are four in number, but the number of ribs 15 is entirely optional with the constructor of the shield. The ribs 15 need not be circular, but may be of any conformation, provided they accomplish the obscuring function hereinafter mentioned.

The ribs 15 are desirably provided with considerable depth, in order to obtain the full benefit of the invention, and should be deep enough so that an angle A (Fig. 3) between a straight line drawn from the bottom edge of one rib 15 to the nearest top edge of an adjacent rib 15, and the horizontal, is more than about 30°. For example, in Fig. 3, the ribs 15 are shown as approximately four times as deep as their average thickness. This depth of the ribs provides that, from a normal angle of vision, each rib constitutes a shield interposed against a direct view of the surface of the next inner rib, and thus obscures it. In the embodiment shown in Fig. 3, the ribs 15 taper in thickness from a widest portion where they join the plate 9 to a narrowest portion at their lowermost edges. Such tapering, while advantageous in that it permits easy removal of the shield from its mold, is not entirely necessary to the present invention, and most of the benefits of the invention can be realized if the sides of the ribs 15 are parallel.

In the preferred embodiment of the invention, the entire shield 5, including both the plate 9 and the ribs 15, is cast or formed as an integral unit from heat-resisting crystal glass. Crystal glass is preferred because of its high transparency (it nearly approaches the ideal of perfect transparency) but other suitable transparent materials may likewise be used. The unit need not be integral, as the ribs 15 may be formed as short cylinders and cemented to a flat plate 9 with silica glue, for example.

In the embodiment just described, all surfaces of the shield are left clear and smooth, except the outer side 16 of the outermost rib 15, which is preferably sand-blasted, acid-etched, or enameled to provide a translucent, highly diffusing layer indicated by numeral 18. This layer 18 diminishes the glare of light from the side 16, while analogous glare from the other ribs 15 is effectively cut down by the interposition of the surrounding ribs 15. Optionally, the lowermost edges 20 of all of the ribs 15 may also be etched or blasted or enameled, but the treatment there need not be so great, as not so highly diffusing a layer is necessary at these regions.

It will readily be seen that from no ordinary angle of observation are there visible any rays that are directly reflected from the sides of the ribs.

Fig. 3 indicates diagrammatically the manner in which several selected light rays pass through the light shield of the present invention. It will be understood that the rays shown in Fig. 3 are by way of example only, and that due to the number of rays and the different angles at which they are incident upon the plate 9, the effects thereby produced are greater in number than those exemplified by the selected rays.

A ray 17, for example, will pass through the central portion of the plate 9, inside the innermost rib 15, without any obstruction, encountering only the bending incident to the refraction of the plate 9. The same is true of a ray 19, that is incident upon the upper surface 11 at such an angle that its angle of refraction causes

it to emerge from the surface 13 in a region between two ribs 15. A ray 21 between the rays 17 and 19 will pass through the plate 9 unobstructed, but it will then strike the side of the rib 15 at a relatively slight angle, whereupon it will in part be reflected, as indicated by the line 21a, and in part enter the glass and be refracted and emerge from the opposite surface of the rib 15 at a different angle, as indicated by line 21b. A ray 23 is incident upon the top surface 9 in such a manner that it is refracted and internally reflected two times from the side surfaces of a rib 15, emerging from the lower edge or bottom of said rib 15. A ray 25 enters the plate 9 at surface 11, is refracted, emerges at surface 13 at such an angle that it is incident upon a side of a rib 15 at a relatively great angle, wherefore it passes almost entirely into the rib 15 and is refracted therein and emerges from the opposite surface almost parallel to its original direction. A ray 27 is somewhat similar to the ray 23, in that it is internally reflected in a rib 15, but the particular ray 27 shown is internally reflected three times instead of twice, and emerges near the bottom of one of the sides of the ribs 15 in an almost vertically downward direction. A ray 29 encounters a course similar to the ray 25. A ray 31 likewise has a course similar to the ray 27, and the same is true of a ray 33. Rays such as 27 and 31, due to their long travel in glass, are largely absorbed, and are relatively weak at their point of emergence.

From the relatively small number of rays shown in Fig. 3, it will be seen that the different rays incident upon the top surface 11 are taken care of in widely differing manners, depending upon both their angle of incidence on the surface 11 and the location of the point of incidence. When it is further considered that the filament 7 of the light 1 is not a point source, and that many rays are directed against the shield 5 from the surface of reflector 3, it will be seen that there are an infinite number of possible paths for light rays to take in passing through the shield 5. The resulting effect, however, is very pleasing. The visible surfaces of the plate 9, it will be seen, comprise the inner and outer side surfaces of the ribs 15, the bottom edges of the ribs 15, the annulus portions of surface 13 between ribs 15, and the central portion of surface 13 within the innermost rib 15. In use, these various surfaces all appear to have different brilliances, or at least they present relatively different brilliances to the beholder, lending a pleasing appearance to the light emerging from the shield 5 as a whole.

Fig. 3 demonstrates that the light rays emerging from the bottom of the light shield 5 are at many different angles, and some of which rays are directed almost vertically downwardly, while others are raised to angles greater than their angles of incidence. The general effect is thus a directing one, and the glare of the lamp 1 is thus eliminated to the beholder.

It is to be understood that the light shield of the present invention may be used with any type of lighting fixture, the fixture shown in Fig. 1 being by way of example only. For example, the shield may be used in built-in installations without employing any other fixture means in co-operation therewith.

In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results attained.

As many changes could be made in carrying

out the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

I claim:

10 In combination with an interior illuminating fixture including an electric light bulb and a reflector surrounding at least a part of said bulb, a light shield adapted to diminish the glare of the light from the bulb but without absorbing any considerable amount of light, said shield comprising a flat transparent glass plate of circular
15 form and substantially uniform thickness, said plate having a peripheral flange received by said reflector whereby said plate is supported in fixed relation to said reflector, said plate having a plu-

5 rality of concentric ribs of glass integrally formed with said plate and extending perpendicularly from one side thereof, the other side of the plate being flat and clear, each of said ribs having a cross section tapering downwardly in thickness from the point at which it emerges from the plate to the outer extremity of the rib, each of said ribs being of substantially the same depth and the spacing between adjacent concentric ribs being such that a line drawn from the root of one rib to the crest of an adjacent rib makes an angle of at least 30° to the plane of the glass plate, the remaining surface of the plate on the side on which the ribs are located being substantially flat and clear, the outermost surface of the
15 outermost rib having a light-diffusing character.

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