May 2, 1933. C. E. FERREE ET AL 1,906,559

LIGHTING UNIT

Filed Jan. 28, 1931

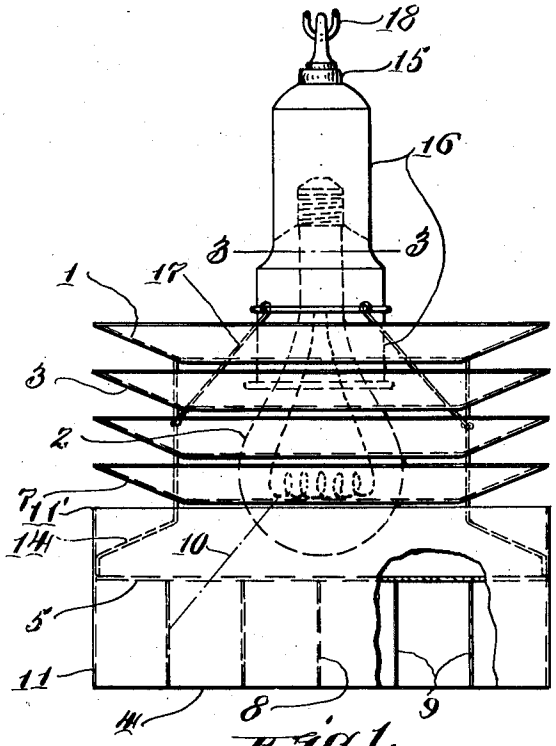


Fig. 1.

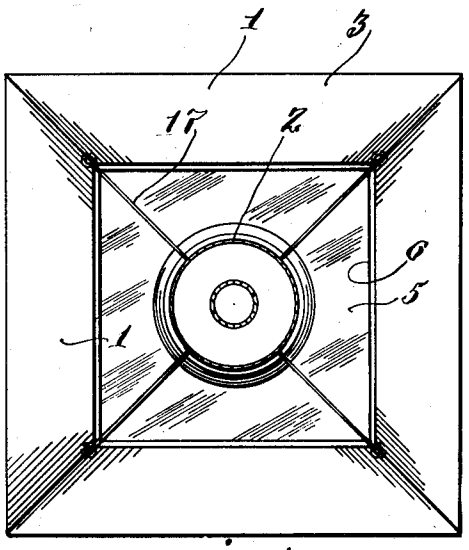


Fig. 3.

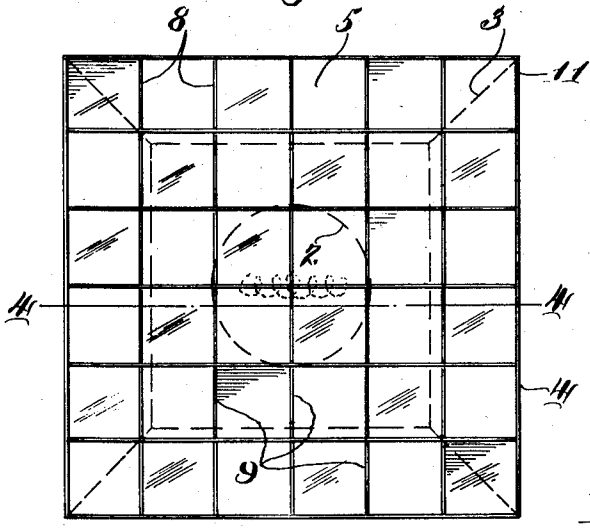


Fig. 2.

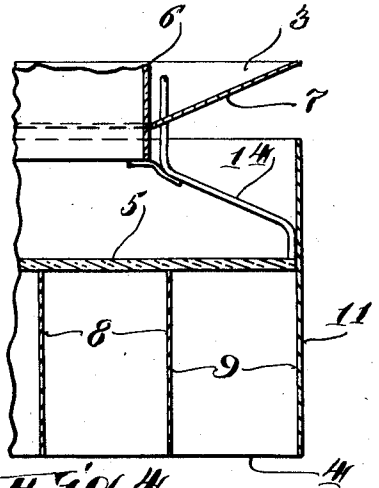


Fig. 4.

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UNITED STATES PATENT OFFICE

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LIGHTING UNIT

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The important objects of the invention are to eliminate all glare from the source of light, to reduce the glare due to reflection from the work to a minimum by diffusing the light before it reaches the plane of work, to retain as nearly as possible the type of distribution of light that is natural to the source, and to accomplish these results with a minimum loss of light.

In the accomplishment of these and other important results of the invention, the use of reflecting surfaces has been abandoned and the principle of shading has been utilized. The shades are so disposed, however, as to intercept those rays only which would produce the effect of harmful glare.

In the preferred embodiment of the invention, which is illustrated and described herein, glare baffles having surfaces of low reflecting power are provided both at the bottom and at the sides of the lamp, forming an enclosure, the top of which is preferably left open. The term "baffle" as used herein, refers to a member having a surface of low reflecting power whereby the objectionable rays are wholly or almost wholly eliminated. It is not a reflector in the sense in which this term is ordinarily used.

The light which passes out of the top of the enclosure is diffused by reflection from the ceiling or from the ceiling and walls before it reaches the plane of the work. The light which passes through the sides of the enclosure is diffused by reflection from the more remote parts of the ceiling and from the walls, or both ceiling and walls before it reaches the working plane. The light rays which are projected downwardly toward the bottom of the enclosure are diffused by a diffusing plate of glassware having high co-efficients both of diffusion and transmission, and the eye is further protected from the inclined but downwardly disposed rays by means of a glare baffle located beneath the light and beneath this bottom diffusing plate, the diffusing plate being located immediately above the glare baffle which forms the bottom of the enclosure. Diffusion plates may, if desired, be also located immediately inside the louvers or baffles which form the sides of the enclosure.

In the accompanying drawing we have shown a lighting unit embodying the features of our invention and illustrating their application to lighting practice.

In the drawing:

Figure 1 is a side elevation of the unit slightly broken away at one point to show the construction of the bottom baffle or louver.

Figure 2 is a bottom plan view of the same.

Figure 3 is a top plan looking downwardly from the plane indicated by line 3, 3, Figure 1, which intersects the canopy or glare shield.

Figure 4 is a fragmentary vertical section on the plane indicated by line 4, 4 of Figure 2, Figures 3 and 4 showing a slightly different form including lateral baffles 6.

Referring to the drawing by numerals, each of which is used to indicate the same or similar parts in the different figures, the construction shown comprises a shade enclosure 1 for the source of illumination 2 shown in the form of an ordinary electric bulb. This enclosure consists of side baffles 3 and bottom baffle 4, on which is supported a bottom glass diffusing plate 5, and the unit may include lateral or side diffusing plates 6, also of glass, though these latter are not a part of the invention in the preferred form, and the plate 5 may be omitted under certain circumstances. While the enclosure 1 is shown as square or rectangular in plan, this shape has been chosen for convenience as contributing to the construction of the baffles at a minimum cost from sheet metal or other cheap material. The external outline does not affect in any way the operation of the unit, and any convenient material, preferably but not necessarily opaque or nearly so may be used in constructing it, the object being to eliminate the harmful glare substantially in the manner described either entirely as in the preferred form of the invention or to a degree which is helpful and useful.

The important feature of the invention is that the source of light be enclosed complete-

ly or with substantial completeness as to the sides and bottom, within a construction comprising top and side baffles whereby the eye is protected from the direct rays by means of these baffles which serve the function of shade members only or mainly so, the surfaces of the bottom baffles and the surfaces, particularly the under surfaces, of the vanes 7 forming the side baffles or louvers, and the bottom baffles being of low reflecting power i. e., they are antiglare baffles, preferably but not necessarily black.

Referring more specifically to the construction shown, the bottom baffle 4 in the preferred construction shown consists of two series of substantially vertical partitions 8 extending across the bottom of the enclosure 1 at right angles to each other, the partitions of each series being preferably parallel and spaced apart a convenient distance, which in the form shown is about two inches, in which construction the partitions are approximately two and one-half inches wide in a vertical direction. These partitions serve to divide the bottom of the enclosure into a series of downwardly disposed passages 9, through which the vertical or substantially vertical light rays are projected upon the work, being first diffused, however, in the preferred form by the glass 5, the sharply inclined rays indicated by reference character 10 being partially eliminated. This action is, however, somewhat modified by the diffusing plate which not only partially diffuses the nearly vertical rays which pass freely through the openings 9, but also serves to diffuse the inclined rays 10, so that considerable portions of these rays are directed downwardly through the baffle 4 at the work. The baffle 4 is shown as enclosed within an outside baffle casing or plate 11, which is vertically disposed, and in the preferred form shown has its upper edge 11′ below the source of illumination.

In this connection it should be understood that while the side and bottom baffles are shown in what is at present regarded as the preferred form, the dimensions, contour and arrangement, of these baffles may be widely varied without change of operation or departure from the spirit of the invention.

The side baffles 3, in the form of the invention shown, consist of upwardly and outwardly inclined plates 7, spaced apart in a vertical direction by a distance which in the form of the invention shown, equals or exceeds to a slight degree the vertical distance between the top and bottom plane of each plate so that the upper outer edge of each side baffle 3 is in a plane slightly lower than the inner lower edge of the baffle next above. The term "low reflecting power" as applied to the baffles imports the definition already recited, it being understood that any and all surfaces which are visible, by the very fact of their visibility must transmit some light to the eye. In the operation of a fairly efficient baffle where a large proportion of the light received by the surface is absorbed, the part which is transmitted to the eye is completely diffused. By reference to the drawing, it will be noted that the angle of inclination of these plates is approximately 23½ degrees and this is the preferred angle from which the plates may be varied to a greater or less degree with some variation of efficiency up to a little less than 45 degrees. Each of the plates 7, as shown, is in the form of a hollow frame or ring which may be shaped to conform to the desired horizontal cross-section of the enclosure. These louver plates or baffle plates 7 are supported on the bottom casing or enclosing plate 11 by means of wire frames 14, or in any suitable manner, and the source of illumination shown in the form of an electric light bulb 2 is mounted in a suitable socket 15, provided with an extended depending canopy or glare shield 16 which encloses all the bright parts of the socket and the shank. On this canopy, in the form of the invention shown, the shade enclosure 1 is supported by means of depending wires 17, the socket and glare shield or canopy 16 being in turn supported from above in any suitable manner, as by means of chain 18 depending from the ceiling.

In the operation of the lighting unit, the rays which pass out at the top of the enclosure, part of which are direct rays from the source of illumination and part of which are reflected from the surface of the diffusing glass 5, which as already pointed out is translucent and of low reflecting power, are diffused by reflection from the ceiling and walls, from which surfaces it reaches the plane of work, but this light is not sufficient to cause any glare at all. The light which passes through the sides of the enclosure is diffused by reflection from the remote parts of the ceiling and from the walls, or from both ceiling and walls before it reaches the working plane. The light which passes through the bottom of the enclosure is diffused by the diffusing plate 5. The vertical rays pass downwardly without interference and portions of the more sharply inclined rays which may tend to pass directly through the glass are cut off and largely eliminated by the baffle plates 8. The side diffusing glass plates 6, if employed, contribute to the further diffusion of the rays which pass through the sides of the enclosure to be reflected from the remote parts of the ceiling and from the walls.

It is also of interest that the unit is particularly adapted to production in large quantities at extremely small cost, being made from thin cheap sheet metal in any form which is found desirable, of which the construction shown is an example, the absence

of reflecting surfaces being an important element which contributes to this result.

We have thus described specifically and in detail a lighting unit embodying the features of the invention in the preferred form in order that the manner of constructing, operating, applying and using the same may be clearly understood; however, the specific terms herein are used descriptively rather than in a limiting sense, the scope of the invention being defined in the claims.

What we claim as new and desire to secure by Letters Patent is:

1. A lighting unit comprising a source of illumination and having side and bottom baffles spaced apart and enclosing the same, the side baffles being inclined upwardly and outwardly and the bottom baffles being substantially vertical and spaced apart in lateral direction, the baffles having their surfaces of low reflecting power, and a diffusing plate overlying the bottom baffle.

2. In a lighting unit, a source of illumination, a canopy therefor covering the bright portions of the shank and socket, an enclosure for the source of illumination comprising side baffles spaced away from the sides of the source of illumination and inclined upwardly and outwardly and spaced apart in a vertical direction, a bottom baffle comprising laterally spaced upright vanes spaced horizontally by distances less than their width in a vertical direction, and a diffusing plate overlying the bottom baffle, the lateral downward disposed surfaces being of low reflecting power.

3. A lighting unit comprising a light source, a structure substantially enclosing the same having a bottom portion and a side portion, said bottom portion comprising upright laterally spaced baffle plates having surfaces of low reflecting power, said side portions comprising a plurality of vertically spaced upwardly and outwardly inclined baffle plates having surfaces of low reflecting power, the upright baffles being wider in a vertical direction than the horizontal dimensions of the spaces between them and diffusing means between the light source and the upright baffles.

4. A lighting unit comprising an enclosure, a light source positioned within said enclosure, said enclosure having a bottom portion and a side wall portion, said bottom portion comprising a plurality of vertically disposed plate members having surfaces of low reflecting power and spaced apart to intercept the laterally inclined downward rays, said side wall portion comprising a series of vertically spaced baffle plates which are inclined outwardly and upwardly at an acute angle with the horizontal, said plates having surfaces of low reflecting power, the structure including light diffusing means between the light source and the bottom portion.

5. A lighting unit comprising a light source, an enclosure substantially surrounding said source said enclosure having a side wall portion comprising a plurality of vertically spaced baffle plates having surfaces of low reflecting power said baffles being inclined upwardly and outwardly at an angle of less than 45 degrees to the horizontal, a plurality of substantially vertical baffles extending downwardly below said inclined baffles and a diffusing plate positioned between said vertical baffles and said inclined baffles.

6. A lighting unit for providing substantially glareless illumination comprising a light source, a structure substantially enclosing said light source and having a bottom portion and a side wall portion, said bottom portion comprising a plurality of upright plates spaced apart to provide vertical openings whereby substantially vertical rays are passed downwardly and the laterally inclined downward rays are intercepted, said side wall comprising a plurality of vertically spaced baffle plates which are inclined upwardly and outwardly from said source, both the vertical and inclined plates having surfaces of low reflecting power and the latter being inclined at an angle of substantially twenty-three degrees to the horizontal, and a light diffusing member between said source and said bottom portion.

7. A lighting unit for providing substantially glareless illumination, comprising a light source, a structure substantially enclosing said light source and having a bottom portion and a side portion, said bottom portion comprising a plurality of upright baffle plates spaced apart in a lateral direction to provide vertical openings whereby substantially vertical rays are passed downwardly and the more sharply inclined downward rays are intercepted, the side portion comprising a plurality of baffle plates spaced apart in a substantially vertical direction and inclined upwardly and outwardly from said source, both the bottom baffles and the side baffles having surfaces of low reflecting power and a light diffusing member in the path of and serving to diffuse the rays which pass downwardly through the bottom portion.

Signed at Baltimore, Maryland, this 26 day of January, 1931.

CLARENCE ERROL FERREE.
GERTRUDE RAND FERREE.