

May 21, 1968

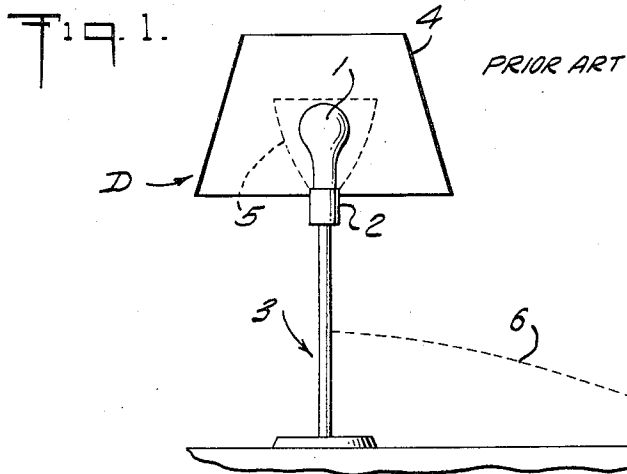
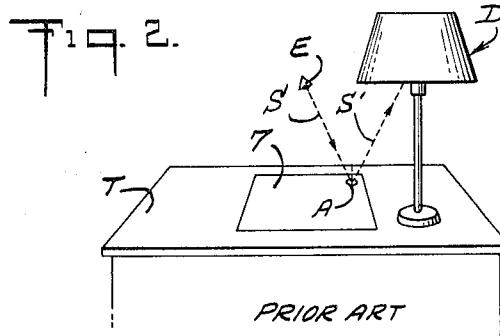
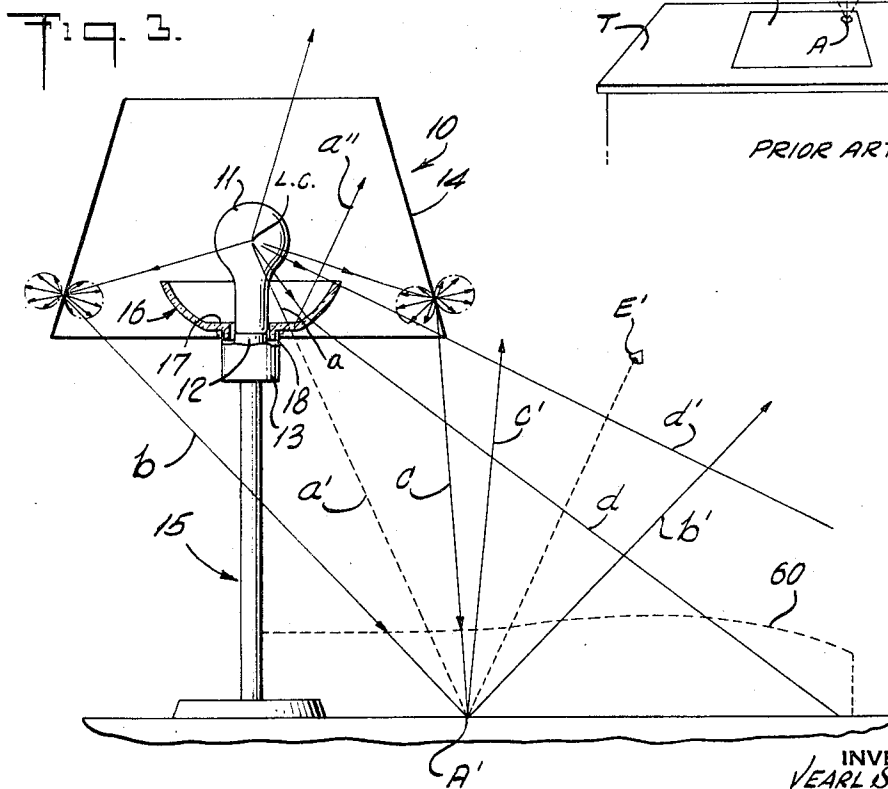
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3,384,743

DESK LAMP

Filed Oct. 21, 1965

2 Sheets-Sheet 1



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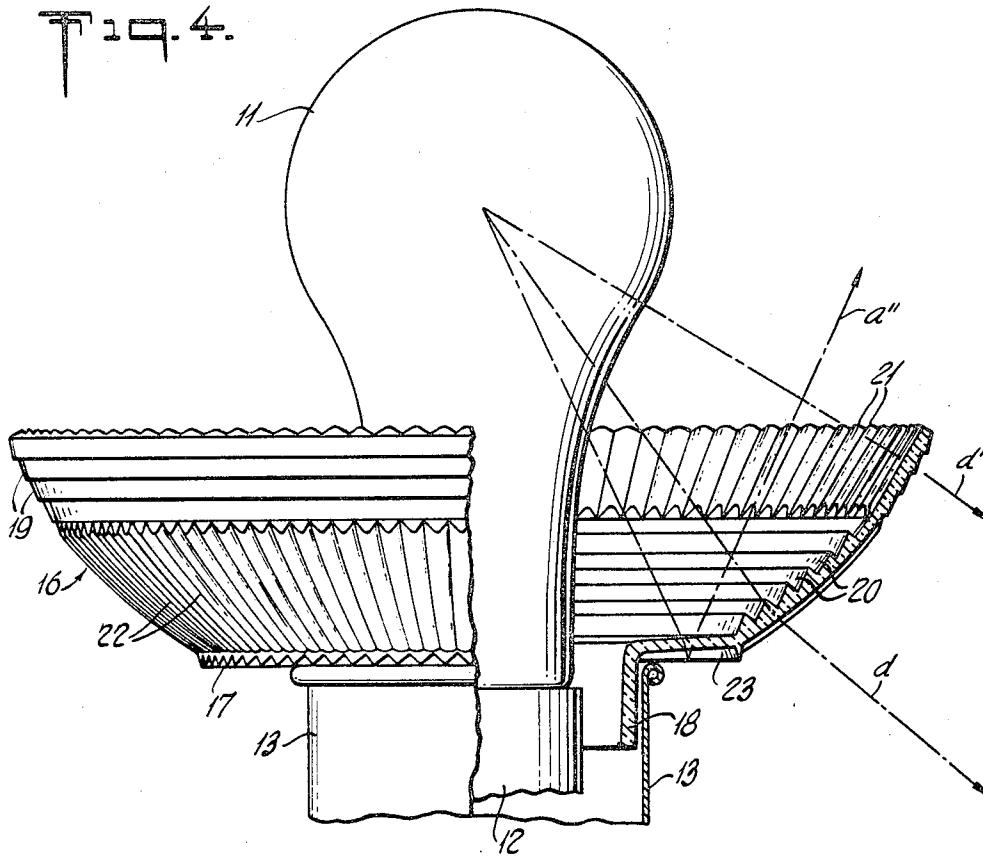
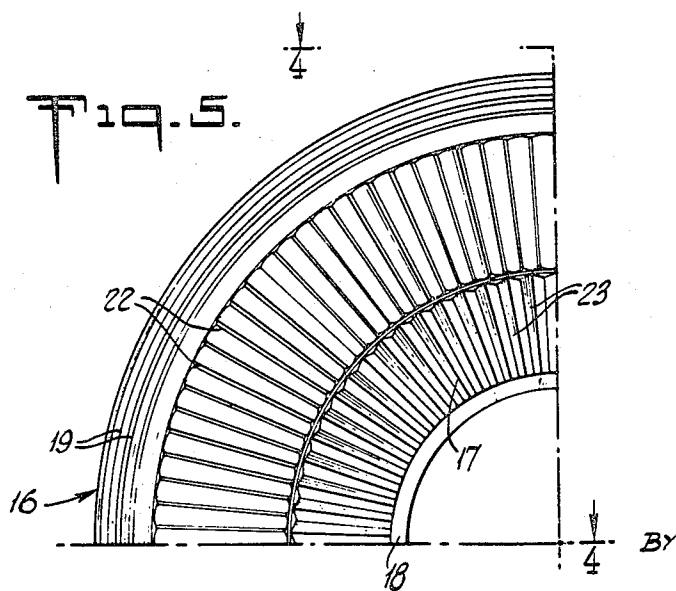
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DESK LAMP

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ABSTRACT OF THE DISCLOSURE

A desk lamp having a light source and a open-bottom lamp shade disposed around the light source. A bowl-shaped light director is disposed below the light source and has an upper portion formed by substantially horizontally extending prisms for receiving direct light from the source and for vertically refracting and substantially evenly distributing the same over a surface beneath the light source. There is also provided a substantially horizontally extending bottom portion with reflecting prisms for reflecting direct light upwardly and away from the surface in order to eliminate veiling glare.

This invention relates to lamps of the type used in the performance of close work such as reading or writing and is more particularly directed to light directors for use therewith.

Desk lamps, such as those usually used in homes or offices, for study or for work are generally provided with a translucent shade which surrounds the light source to shield the lamp from direct view.

It is also well known to provide additional diffusion in such prior art desk lamps by placing an inner diffuser around the light source. These lamps provide illumination levels which vary from high values, directly beneath the light source, to rather low values at points remote to the work or study area.

Another disadvantage of such desk lamps is that a person, working by the light of such a desk lamp, looking at a task material which has a shiny surface, would experience a resulting veiling reflection or glare since in effect he would be looking at a reflected image of the bare light source. This glare is always present in prior art lamps because the light source is normally disposed within a certain area relative to the point at which the paper is being viewed so that the light impinges upon the work at angles which cause the light from the source to be reflected from the task material directly into the viewer's eye. A diffuser placed around the lamp reduces the veiling glare to a degree, but does not increase the light intensity at the outer portion of the work area.

It is, therefore, an object of this invention to provide a light director to be placed relative to a light source in a desk lamp which will provide better distribution of light over the work area and greatly reduce glare from the work surface.

It is a further object of this invention to provide a plastic or clear glass prismatic light director, which is placed below the light source for shielding light from the source at the lower shade opening and which would otherwise travel at angles resulting in glare from a task area.

Further objects and advantages of this invention will become apparent from the following description which will be best understood by reference to the appended drawings in which:

FIG. 1 is an elevational view of a typical prior art desk lamp with the shade shown diagrammatically for the purpose of showing the relative location of the lamp parts;

FIG. 2 is a perspective view illustrating one of the disadvantages of the prior art desk lamp shown in FIG. 1;

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FIG. 3 is an elevational view similar to FIG. 1 and partly in section of a desk lamp using a light director according to this invention;

FIG. 4 is an enlarged elevational view, partly in section taken along the line 4—4 of FIG. 5, and additionally showing the prismatic light director according to the invention; and

FIG. 5 is a bottom plan view of one-half of the prismatic light director shown in FIG. 4.

To more fully describe the advantages and objects of this invention, attention is first directed to FIG. 1 showing the prior art construction in a desk lamp D. The light source comprising an incandescent lamp 1 is placed within a suitable electrical socket member 2 which is supported on a stand 3. A translucent lamp shade 4 is placed over the entire assembly and an inner diffuser may be placed within the shade and around the light source as shown at 5 in dash lines.

Such a desk lamp provides illumination levels which vary from high values, directly beneath the light source, to lower and lower values at points outwardly along the study or work area. This diminution of relative illumination value is shown by the curve 6 shown in dash lines below the desk lamp D. Such a light distribution is obviously disadvantageous in that the differential in illuminosity from one portion of the work area to another has a tiring effect upon a worker and can be very disconcerting and bothersome on various types of task material where even illumination is desirable.

Another disadvantage of this desk lamp is illustrated in FIG. 2 in which the lamp D is standing upon a desk top T upon which a task material 7 is also disposed in a normal position relative to the lamp D and to a worker, represented by an eye E. The worker, viewing the entire work area will, of course, see point A on the work area. Assuming the task material 7 has a shiny surface, as paper for example, the worker would find the veiling reflection or glare quite bad as he would in effect be looking at the reflected image of the bare light source, as indicated by the line of sight S, S' along which rays from the source would travel to the worker's eyes. Similarly, adjacent rays would also strike the task material 7 in the vicinity of point A to contribute to the veiling glare problem.

The solution to both the light distribution problem and the glare problem is solved by the present invention.

In FIG. 3, the desk lamp 10 incorporating the invention comprises an incandescent lamp 11 for a light source, shown within the usual socket 12 mounted within socket holder 13 and surrounded by lamp shade 14. These parts are supported by a conventional lamp stand 15.

The prismatic light director generally designated at 16, is formed at its bottom with an annular portion 17. Depending from the inner edge of the annular portion 17 is a downwardly turned flange 18 which fits into socket holder 13 to center the director in its supported position on the upper beaded edge of socket holder 13.

The director is substantially bowl-shaped, its diameter increasing toward its top open portion which terminates below the light center of lamp 11 adjacent the lower opening of shade 14.

FIG. 4 shows the prismatic structure of the inner and outer surfaces of the light director 16. In FIG. 4 we see a set of external horizontal concentric light refracting prisms 19 disposed at the upper portion of the director. These, together with a second set of internal concentric refracting prisms 20 on the lower portion of the director, act to direct light from the source to the outer portions of the work area. The general direction of the light refracted by prisms 19 and 20 is indicated by typical ray d. Resultingly light which would have fallen in the center of curve 6 in FIG. 1 now is directed toward the outer points of the work area.

Ray d' in FIG. 3 indicates the highest path of travel of light permitted to be emitted from the lower opening of the shade 14.

Internal light spreading or diffusing prisms 21 opposite prisms 19 and external light spreading or diffusing prisms 22 opposite internal prisms 20, act via their flat active surfaces to laterally diffuse the light which is vertically treated by refracting prisms 19 and 20. Prisms 21 and 22 are provided with rounded apices resulting in further diffusion therealong.

An important feature of the invention resides in the provision of light reflecting prisms 23 (FIGS. 4 and 5) in radial disposition on the annular portion 17 of the light director 16. These reflector prisms 23 act to redirect light from the source into upward directions away from the task area. The reflector prisms 23 are restricted to the annular portion 17 of the director in order to eliminate light striking the task area at such angles as will cause glare. Thus, referring to FIG. 3 it can be seen that without the use of the radial reflecting prisms 23, ray a would continue on in the direction of a' towards point A' which is equivalent to position A in FIG. 2. Similarly, as previously noted, adjacent rays would also strike the work area in the vicinity of point A' , and therefore, also contribute to the veiling reflection problem. However, the radial reflecting prisms 23 intercept these rays and reflect them upward as shown by typical ray a'' . The area around point A' is now illuminated by diffused light only, reflected from the interior of the lamp shade as shown by typical rays b and c . Such rays cause little veiling reflection since they are, firstly, indirect light rays, and secondly they are reflected upwardly by the shiny surface of the task material in directions b' and c' which, as can be seen in FIG. 3, are at non-glare angles relative to the worker, represented by eye E' . The total effect of utilizing the reflector prisms 23 in the area of the annular portion 17 acting in conjunction with the refracting prisms 19 and 20 and the diffused light from the shade, is to provide a uniform level of luminosity from beneath the desk lamp to the far end of the work area, as shown by the dash curve 60 showing relative illumination values along the lighted area.

The shade 14 is translucent so that some of the diffused light is transmitted, but it is conceivable that the shade may be made of an opaque material. The top of the shade could be open, as shown, or closed, in which case it would reflect light back down through the light director onto the work area.

Thus it can be seen by the combination of the refracting prisms, and diffusing and reflecting prisms, the relative illumination value, as shown by the dotted line 60 in FIG. 3, is maintained at a usable level over the entire work area. It is also seen that no light is directly reflected from the working surface into the viewer's eyes to produce the veiling reflection. The prismatic light director shown herein may be made of any suitable light diffusing material such as glass or plastic.

It will be understood that the embodiment of the prismatic light director as herein described is merely intended to be representative of an embodiment of the invention and is not intended to limit the scope thereof. The limitations of this invention shall be in accordance with the claims appended hereto.

We claim:

1. In a desk lamp including means for supporting a point, light source above a surface to be illuminated; a bowl-shaped upwardly flaring open-end light director, means for supporting said light director below the light source, said light director having a side wall formed with substantially horizontally extending first prism means for receiving only direct light and for vertically refracting the same and for substantially evenly distributing the same over a substantial area around the lamp on the surface below, said light director having a substantially horizontally extending bottom portion, and hori-

zontally disposed second prism means on said bottom portion for reflecting a portion of the radiant emission of direct light from said light source upwardly and away from the surface, which light would otherwise fall on the surface at angles resulting in veiling glare thereon and in an uneven light distribution from below the lamp outwardly.

2. The combination of claim 1 wherein said means for supporting said light director below the light source comprises a downwardly extending flange, and wherein said bottom portion extends horizontally outwardly therefrom.

3. The light director of claim 1 wherein said second prism means comprise radially extending prisms, said radially extending prisms being formed in an annular pattern on the bottom portion of said bowl.

4. In the combination of claim 1 wherein said prism means for vertically refracting light comprise concentric prisms and said prisms lift the light incident thereon.

5. In the combination of claim 1, said light director further comprising means for laterally diffusing the light vertically refracted by said first prism means.

6. In the combination of claim 5 wherein said means for diffusing light comprise prisms having active flat surfaces receiving light and spreading the same in lateral directions.

7. The light director of claim 6 wherein each of said flat surface prisms include a pair of active surfaces converging in a curved apex.

8. In combination with a desk lamp including a light source, a light director disposed below said light source and comprising an upper portion formed with means for vertically refracting light incident thereon, said light director also comprising a bottom portion formed with means for reflecting light incident thereon upwardly, means on said light director for laterally diffusing the light vertically refracted by said refracting means, an open-bottom lamp shade disposed around said light source, means for supporting said light director below the light center of said light source and adjacent said open bottom of said lamp shade, said shade including surfaces comprising means for diffusing light from the source downwardly to points where the light reflected by said reflecting means would have passed except for said reflecting means.

9. A bowl-shaped upwardly flaring open-end light director for disposition below a light source, said light director having a side wall formed with substantially horizontally extending first prism means for receiving only direct light from a light source and for vertically refracting the same and for substantially evenly distributing the same over a substantial area below the light director, said light director having a substantially horizontally extending bottom portion, and horizontally disposed second prism means on said bottom portion for reflecting a portion of direct light from a light source upwardly through the open end of said light director.

10. In a desk lamp including means for supporting a point light source above a surface to be illuminated: a bowl-shaped upwardly flaring open-end light director, means for supporting said light director below the light source, said light director having a side wall formed with substantially horizontally extending first prism means for receiving only direct light and for vertically refracting the same and for substantially evenly distributing the same over a substantial area around the lamp on the surface below, said first prism means including first prisms on the upper portion of said side wall for vertically downwardly refracting the direct light and also including second prisms on the lower portion of said side wall for vertically upwardly refracting the direct light, said light director having a substantially horizontally extending bottom portion, and horizontally disposed second prism means on said bottom portion for reflecting a portion of the radiant emission of direct light from said light source upwardly and away from the surface, which

light would otherwise fall on the surface at angles resulting in veiling glare thereon and in an uneven light distribution from below the lamp outwardly.

11. The combination of claim 10 wherein said first prisms are located on the outside of said side wall and wherein the second prisms are located on the inside of said side wall. 5

12. In a desk lamp including means for supporting a point light source above a surface to be illuminated: a bowl-shaped upwardly flaring open-end light director, means for supporting said light director below the light source, said light director having a side wall formed with substantially horizontally extending first prism means for receiving only direct light and for vertically refracting the same and for substantially evenly distributing the same over a substantial area around the lamp on the surface below, said first prism means including first prisms on the upper portion of said side wall for vertically downwardly refracting the direct light and also including second prisms on the lower portion of said side wall for vertically upwardly refracting the direct light, means on said side wall for laterally diffusing the light received thereby, said last-mentioned means including prisms having active flat surfaces extending substantially perpendicularly to said first and second prisms, 25

said light director having a substantially horizontally extending bottom portion, and horizontally disposed second prism means on said bottom portion for reflecting a portion of the radiant emission of direct light from said light source upwardly and away from the surface, which light would otherwise fall on the surface at angles resulting in veiling glare thereon and in an uneven light distribution from below the lamp outwardly.

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