

X2675

March 8, 1966

A. S. MAKAS

3,239,659

GLARE-REDUCING LAMP

Filed June 14, 1963

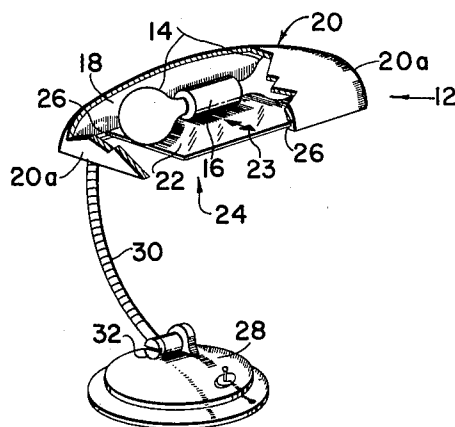


FIG. 1

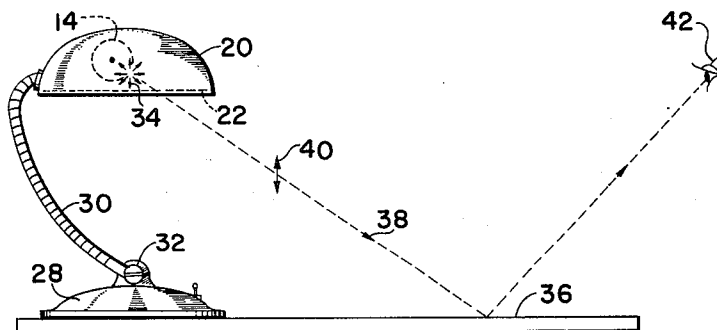


FIG. 2

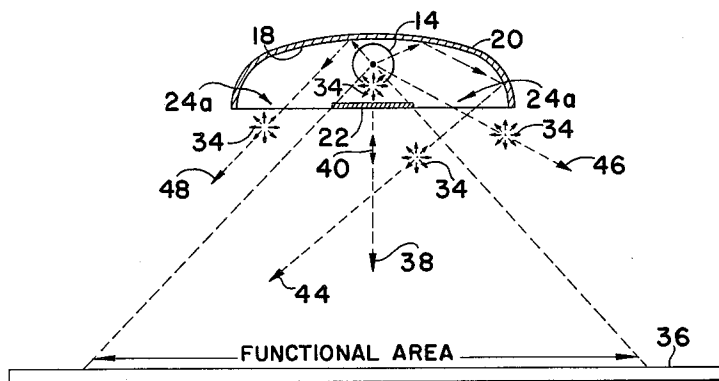


FIG. 3

INVENTOR.

Albert S. Makas

BY

Brown and Mickulka

ATTORNEYS

1

3,239,659

GLARE-REDUCING LAMP

Albert S. Makas, Medford, Mass., assignor to Polaroid Corporation, Cambridge, Mass., a corporation of Delaware

Filed June 14, 1963, Ser. No. 287,960

2 Claims. (Cl. 240-9.5)

This invention relates to illuminating means such as a lamp which produces polarized and non-polarized light functioning together to provide both a high degree of illumination and an essentially glare-free illuminated area.

Although illuminating devices such as so-called reading or desk lamps, positioned generally somewhat above and in front of the user and employing polarizing filters for glare-reduction purposes with respect to an illuminated surface, have previously been known and have functioned with some measure of effectiveness, their principal defect has been the excessive loss of light which has accompanied their operation, due to the large proportion of light absorbed by the filters. On the other hand, where an adequate light level has been maintained, the polarizing efficiency of the filters has been insufficient to obtain the desired glare reduction.

The present invention seeks to overcome the aforesaid deficiencies by providing an illuminating device such as a lamp having the properties of both excellent illumination and freedom from glare. More particularly, the invention proposes to embody these properties in a lamp of a type whereby light rays are predominantly directed downwardly or forwardly onto a working surface and are reflected in a direction generally toward the user.

In accordance with the foregoing considerations, a principal object of the invention is to provide a lamp assembly of the character described possessing characteristics of high efficiency with respect both to its polarizing capabilities for reducing glare and to the overall illumination which it furnishes.

Further objects are to provide a lamp of the aforesaid category which is of relatively simple structure, of wide utility, and which has an appearance consistent with acceptable design standards.

Other objects of the invention will in part be obvious and will in part appear hereinafter.

The invention accordingly comprises the product possessing the features, properties and the relation of components which are exemplified in the following detailed disclosure, and the scope of the application of which will be indicated in the claims.

For a fuller understanding of the nature and objects of the invention reference should be had to the following detailed description taken in connection with the accompanying drawings wherein:

FIGURE 1 is a perspective view of a lamp of the invention, with parts broken away;

FIG. 2 is a diagrammatic side view of the lamp illustrating its operation; and

FIG. 3 is a front view of the light-emitting portion of the lamp, illustrating the directions of functional light rays.

As shown in FIGURE 1, the lamp comprises illumination-providing means, generally indicated at 12, including light source means 14 in the form of a pair of incandescent bulbs mounted horizontally in a socket 16. The socket is attached to the inner surface 18 of an elongated, recessed or concave light shield or shade 20 which partially surrounds the light source. The shield 20 may suitably be formed of a metal, glass, a plastic, or the like and, accordingly, may be either opaque or translucent.

The inner surface 18, either of itself or by reason of means coated thereon or attached thereto, constitutes a

2

light reflector which generally follows the contour of the shield 20. A sheet-like plane-polarizing filter element 22, of given shape and dimensions and having a polarizing axis or direction 23, is mounted across a limited longitudinal portion only, e.g., a central portion, of the open lower face 24 of the shield 20 so as to permit certain direct rays from light source 14 to pass downwardly through it, while other rays, direct or reflected, avoid the filter and pass downwardly through the open areas 24a (FIG. 3) beyond its edges. The open areas at each side of element 22 adjacent to the ends 20a of the shield also permit an efficient circulation of cooling air around the light source 14.

As illustrated in FIG. 2, unpolarized light from the light source 14 vibrates in a plurality of directions, indicated at 34. It includes horizontal vibrations which, if permitted to contribute to, or exist in, direct radiation from the light source 14 to the surface 36, producing a visible image of the light source reflected from the surface 36, would cause glare. The light ray 38, typical of rays emitted directly toward surface 36 and transmitted by plane polarizing filter 22, by reason of the latter's polarizing direction 23, and to a certain extent because part of the horizontal vibrations are reflected from the upper surface of the filter 22 and, therefore, are dissipated harmlessly, includes substantially only vibrations of the type exemplified by vibration 40, that is, vibrations which are disposed at 90° to the horizontal vibrations or, otherwise stated, light which is vibrating parallel to the paper of the drawing. Accordingly, the light transmitted by polarizing filter 22 and reflected from the surface 36 or from any object resting thereon which is visible to an observer at 42 is free of glare.

As previously intimated, the absorption of light by an efficient polarizer of the type employed herein is considerable and may, for example, be as great as sixty percent of the total incident light. Accordingly, the light level at surface 36 may be undesirably low. The present invention overcomes this possibility, as shown in FIG. 3, by providing the supplementary use of certain non-polarized light rays which contribute to illumination of the functional area but which do not convey an image of the light source directly to the surface 36 and thence to the eyes of the user. A single light source 14 is shown in FIG. 3, it being understood that the invention is not limited to any particular type of light source provided that the relative dimensions and positioning of the light source and polarizing filter and the structure of the reflector 18, with respect to a functional area under observation, are correct. These conditions are obtained by providing that any light rays directed toward surface 36 which might render an image of the light source visible, in the form of glare, shall preliminarily pass through the polarizing filter 22 to remove the glare component, and that a maximum of the light rays whose directions do not render the image of the light source thus visible shall enter the functional area of the surface 36 laterally as side or cross-lighting, without passing through the polarizing filter so as to retain their maximum intensity.

Further referring to FIG. 3, the function of polarized and non-polarized light rays, operating together to provide a total illumination of the area of use which considerably exceeds that which would be possible if the polarizing filter 22 were to cover the entire aperture 24 of the shield 20, is illustrated in detail. Where, as shown, the centrally located filter 22 occupies only one-half of the opening 24 the improvement in illumination may be greater than fifty percent. The function of the direct, vertically-polarized light component 38, provided by the polarizing filter 22, has been described with respect to FIG. 2, it being understood that plurality of light rays having such ray

components exists within the limits of the functional area so as to establish a basic glare-free illumination thereof. The ray 44, twice reflected from the surface 18 and thence directed into the area of use, is illustrative of the afore-said "cross-lighting," namely, of the plurality of contributory reflected rays which bypass the polarizing filter 22 and which, by reason of their generally transverse directions, provide additional illumination of the area without causing visible glare. The ray 46 is representative of direct rays which possess undesirable horizontal vibrations but which are traveling in directions away from the functional area, as scattered light, and are not productive of glare. Similarly, the reflected ray 48 is typical of those reflected rays which bypass the polarizing element 22 but which are directed outside of the area of use and for this reason cause no harmful glare effects.

EXAMPLE

A lamp of the type contemplated herein included, by way of example, the following pertinent structural elements and data relating thereto.

(a) Two 40-watt tungsten lamps 14 were mounted along an axis extending from one end 20a of the shield 20 to the other. Each lamp was positioned with its filament approximately 2 inches from the rear surface and 4½ inches from each end of the reflecting surface of the shield. The lamps were located about 10 inches above the surface 36.

(b) The polarizing filter 22 was of an HN35 type, having a transmission of 35%, and was manufactured by Polaroid Corporation, Cambridge, Massachusetts, U.S.A. The filter was mounted at the center of the shield aperture 24 so as to extend, transversely of the shield, from front-to-rear of the aperture and to terminate, longitudinally of the shield, short of the shield ends 20a. It thus covered about 50% of the entire aperture.

(c) The reflector was an aluminized coating on a surface of aspherical contour formed on the inner surface of the metallic shield 20. It included portions adjacent to the shield ends 20a which were so curved as to reflect a large proportion of rays from the light sources 14, laterally, into the functional area to enhance the illumination thereof. Significant reflecting portions adjacent to the shield ends had a radius of curvature of 6 inches or more.

It will be apparent that various other modifications of the lamp within the scope of the invention are possible. The principles involved, obviously, are not limited to a desk lamp and may even be applied to the lighting of vertical wall areas or pictures hung thereon. Although the polarizing filter 22 is preferred as a separate element, it could be of a type embodied in or on the envelope of the light source 14, itself, assuming its dimensions to be such as to insure that direct rays are passed therethrough and indirect rays are passed to the sides thereof. Polarizing means of a type adapted to be formed directly on the enclosure or envelope of a light source is disclosed in U.S. Patent No. 2,252,324, issued to Edwin H. Land. Where a filter 22 of the type shown is employed, its edges should overlie a direct line from the filament of the light source to surface 36. The filter 22 may, of course, be otherwise mounted and its shape and size may be altered somewhat from those of the rectangle shown, e.g., so that

its edges, adjacent to the shield ends 20a are irregular or curved. It is not entirely essential that the polarizing element 22 extend to the rear of the shield aperture, provided that it intercepts direct rays to the surface 36. The reflector can, of course, be differently shaped and can even include planar surface portions. It would also be possible to include a transparent or light-diffusing material in the areas 24a and to provide perforations for heat dissipation elsewhere in the shield. One such structure contemplates a sheet of such material completely covering the aperture 24, with the polarizing means 22 mounted thereon.

Since certain changes may be made in the above product without departing from the scope of the invention herein involved, 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.

What is claimed is:

1. A lamp for producing both polarized and non-polarized light functioning together to provide a substantially glare-free overall illumination of a remotely located functional surface, said lamp comprising light source means, a recessed, elongated concave light shield partially surrounding said light source means and having an open face at a side directed toward said surface to be illuminated, reflecting means affixed to the inner surface of said light shield, a substantially flat sheet comprising plane light polarizing material mounted on said shield, said light polarizing material extending across a central portion only of said open face for polarizing light rays passing directly therethrough and being spaced from both ends of said shield, the reflecting light shield being of such shape and contour that light rays from said source and twice reflected from the reflecting surface are directed into the area of use on said functional surface to provide additional illumination of said surface without glare, the light source being so positioned with respect to the light polarizing material and reflecting surface that light rays passing directly through the open spaces adjacent to the ends of the light shield and the ends of the light polarizing material are emitted laterally outside of the area of use of said functional surface.

2. A lamp, as defined as claim 1, wherein the axis of said polarizing material is substantially normal to the plane of said functional surface.

References Cited by the Examiner

UNITED STATES PATENTS

1,773,915	10/1929	Short	240—9.5 X
2,252,324	8/1941	Land	313—111
2,302,556	11/1942	Kriebel.	
2,302,613	11/1942	Land	240—9.5
2,402,176	6/1946	Marks	240—9.5 X
2,411,189	11/1946	Brown	240—81

FOREIGN PATENTS

1,098,406	3/1955	France.
-----------	--------	---------

NORTON ANSHER, *Primary Examiner.*