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E. A. LINSDAY ET AL
REFLECTING ELECTRIC LAMP

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FIG. 1.

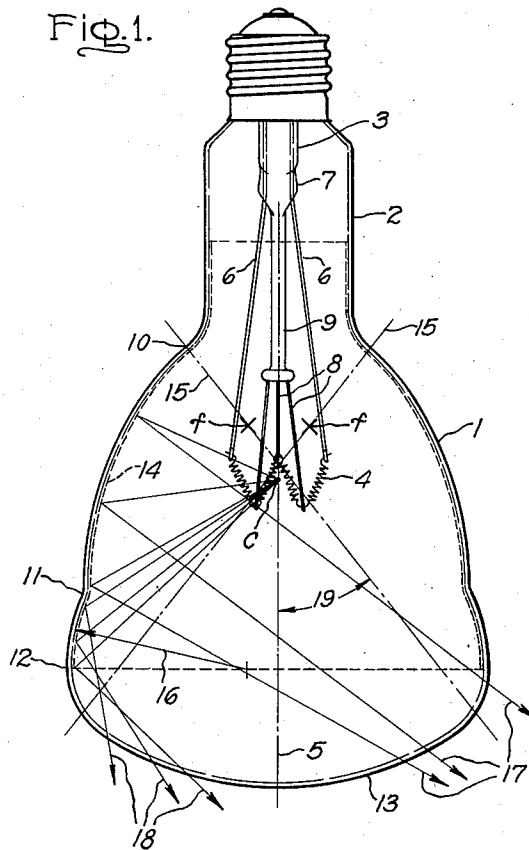


FIG. 2.

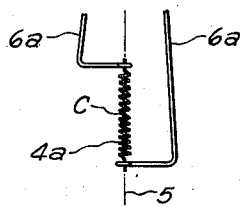
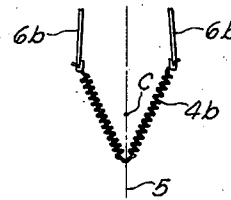


FIG. 3.



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1

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REFLECTING ELECTRIC LAMP

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2 Claims. (Cl. 313-113)

Our invention relates generally to electric lamps, and more particularly to reflector lamps wherein a portion of the surface of the glass lamp bulb is provided with a reflecting coating for collecting and redirecting the light in a desired direction and pattern.

The light source of a high intensity lamp emits a considerable amount of heat along with the visible light radiation and the bulb contour of certain high intensity reflector lamps currently available commercially for general floodlighting purposes is such as to cause intensive localized heating of the glass bulb necessitating the use of special glass compositions having a relatively high softening point.

Accordingly, it is an object of our invention to provide a bulb having a reflecting surface of novel contour which will result in a more even distribution of heat over the face of the bulb through which the light is transmitted while retaining a desired light distribution in the resulting beam. It is a further object to provide a contour which will afford greater clearance between the light source and the bulb neck than that existing in presently available lamps. It is a still further object to provide a contour which will make possible the use of relatively inexpensive standard glasses of relatively low softening point and high coefficient of expansion, such as the lime glasses customarily employed in ordinary light bulbs, rather than the relatively expansive heat resistant glasses such as borosilicate compositions.

Our invention will be better understood from the following description taken in connection with the accompanying drawing and its scope will be pointed out in the appended claims.

In the drawing,

Fig. 1 is an elevation of one embodiment of a reflector lamp comprising our invention, and

Figs. 2 and 3 are fragmentary elevations showing modified forms of filament light sources.

In accordance with one aspect of our invention, the objectives of the invention are achieved by forming the reflecting surface of the bulb of a multiple contour including a major portion enclosing the light source and which reflects light and heat toward the opposite side, and an outwardly flaring minor portion joined to the outer or lower edge of the major portion and which reflects light and heat out of the bulb through adjacent portions of the light-transmitting end face forming the end of the bulb. In that manner we avoid an unduly high concentration of heat at the center of the end face which is characteristic of certain presently available lamps and which tends to result in softening and blistering of the glass bulb.

Referring to Fig. 1 of the drawing, the lamp illustrated therein comprises a glass bulb 1 having a cylindrical neck portion 2 to the end of which is sealed a re-entrant glass stem tube 3. The bulb contains a high intensity light source herein illustrated as an incandescent filament 4 of so-called C7A form wherein the coiled fila-

2

ment is arranged in the form of a series of inclined segments arranged in a cylinder about the bulb axis 5. The filament is connected at its ends to a pair of lead-in wires 6 extending through a press or seal portion 7 of the stem 3, and is supported at intermediate points by support wires 8 extending from a glass arbor 9 projecting from the stem 3. The bulb 1 may contain a conventional gas filling of nitrogen or argon at a pressure of several hundred mms. A heat-deflecting disc (not shown for purposes of clarity) is also customarily provided above the filament 4.

In accordance with the present invention the bulb 1 is provided with a reflecting surface of double contour including a major portion 10, 11 and a minor portion 11, 12 and is terminated by the rounded end face 13. The reflecting surfaces may be formed by a coating of a reflecting metal such as aluminum or silver, preferably applied to the inner surface as indicated by the dotted line 14.

We have obtained good results by forming the major portion 10, 11 of a closed paraboloidal contour defined by revolving about the bulb axis 5, a parabola 10, 11 having its axis 15 at an acute angle to the bulb axis 5 and its focus f spaced from the bulb axis toward the parabola 10, 11. The filament 4 is located with its geometric center c substantially in the bulb axis and below a plane normal to the bulb axis 5 and containing the locus of the focal points f of the parabola 10, 11. Preferably, the center c of the filament is located closely adjacent the point where the axis 15 of the parabola 10, 11 crosses the bulb axis 5. The minor portion 11, 12 of the reflector contour is flared outwardly to a maximum diameter at 12 where it joins the end face 13 which is transparent or translucent and may be lightly frosted. A suitable curvature for the minor portion 11, 12 is obtained, as a practical matter, by forming it as an arc of a circle having the radius 16.

We have illustrated in Fig. 1 a few representations of light and heat rays reflected from the surfaces 10, 11 and 11, 12 and emitted from a theoretical point source of light at c . It will be observed that the rays 17 reflected from the major contour 10, 11 cross the bulb axis 5 within the bulb 1 and pass through the end face 13 on the opposite side of said axis, whereas the rays 18 reflected from the minor contour 11, 12 pass through the face 13 on the same side of the axis 5. However, inasmuch as the filament 4 is of substantial size, a considerable proportion of rays is emitted through the center of the face 13 and a substantial amount is also emitted directly from the filament 4 through the center of said face 13. On the other hand, by directing a considerable proportion of the light and heat through the face 13 in areas away from the center thereof, and particularly through the outer edge where heat is dissipated to the adjacent relatively cool coated surface, the result is a very substantially more uniform distribution of heat over the face 13 while the projected beam of light is an approximately uniform cone of some 60-90° spread.

In a particular embodiment, given by way of example, a lamp having a filament 4 of 750 watt capacity and a bulb 1 having a maximum diameter at 12 of 6½" was proportioned so that the axis 15 of the parabola 10, 11 (of 1½" focal length) was inclined at an angle 19 of approximately 37½° to the axis 5. The distribution of radiant energy over the face 13 was such as to result in a ratio of 3 to 1 for maximum concentration adjacent the center of the face as against minimum concentration adjacent the edges of the face. This is in contrast to a corresponding ratio of 10 to 1 for a commercially available lamp of the same rating. The actual temperature

3

differential in our improved design is in a ratio of approximately 2 to 1.

It will be noted that one effect of the minor contour 11, 12 is to remove the end face 13 from the major contour 10, 11 a sufficient distance to permit the rays reflected therefrom to cross to the opposite side of the face 13 and thereby avoid concentration of heat at the center of the face, the minor contour 11, 12 being flared outwardly to cause rays reflected therefrom to pass through adjacent portions of the face 13 before crossing the bulb axis 5. Moreover, the off-setting of the parabola 10, 11 to space its focus f from the bulb axis 5 was found to be necessary for proper light distribution inasmuch as location of the focus f on the axis 5 resulted in a deficiency of light in the center of the beam.

The form of the light source may be varied considerably from that shown in Fig. 1. For example, as shown in Fig. 2, the filament 4a may be of coiled-coil form supported on lead-in wires 6a with its linear axis coincident with the bulb axis 5 and its geometric center at the point c in Fig. 1. In another modification shown in Fig. 3, the filament 4b is a coiled-coil arranged in the form of a V supported by leads 6b with its geometric center at point c. The light source may also be a high intensity gaseous discharge lamp such as the well known mercury vapor arc tubes.

What we claim as new and desire to secure by Letters Patent of the United States is:

1. An electric lamp comprising a glass bulb having a coated reflecting surface of double contour including major and minor portions and closed by a light-transmitting end face and containing a single compact high intensity light source, the major portion of the reflecting surface having a closed paraboloidal contour defined by revolving about the bulb axis a parabola having its axis at an acute angle to the bulb axis and its focus spaced from said bulb axis toward the parabola, the light source having its geometric center located substantially in the bulb axis and below the plane normal to the bulb axis and containing the locus of the focal points of the paraboloid so that light rays projected from said geometric center toward one side of said major reflecting surface are reflected thereby across the said bulb axis before passing through the said end face, the

4

minor portion of said reflecting surface being joined to the outer edge of said major portion and flared outward to a maximum diameter where it joins the end face of the bulb so that light rays projected from said geometric center toward said minor reflecting surface are reflected through the adjacent portion of said face without crossing said bulb axis.

2. An electric lamp comprising a glass bulb having a coated reflecting surface of double contour including major and minor portions and closed by a light-transmitting end face and containing a single compact high intensity light source, the major portion of the reflecting surface having a closed paraboloidal contour defined by revolving about the bulb axis a parabola having its axis at an acute angle to the bulb axis and its focus spaced from said bulb axis toward the parabola, the light source having its geometric center located adjacent the point where the said axis of the parabola intersects the bulb axis so that light rays projected from said geometric center toward one side of said major reflecting surface are reflected thereby across the said bulb axis before passing through the said end face, the minor portion of said reflecting surface being joined to the outer edge of said major portion and flared outward to a maximum diameter where it joins the end face of the bulb so that light rays projected from said geometric center toward said minor reflecting surface are reflected through the adjacent portion of said face without crossing said bulb axis.

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