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C. KLOOS

2,089,610

REFLECTOR

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FIG. 1.

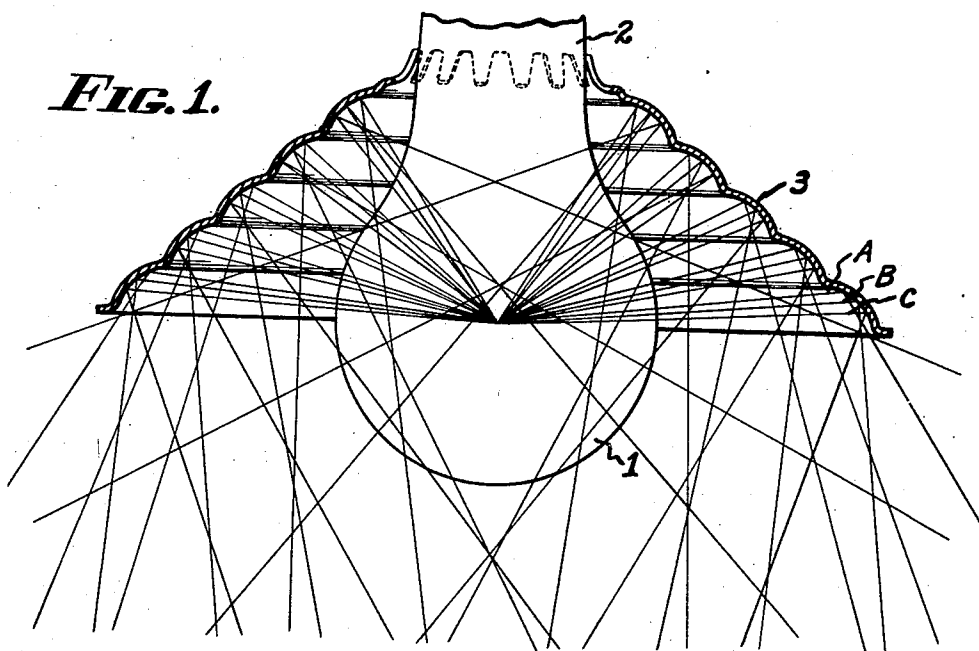


FIG. 4.

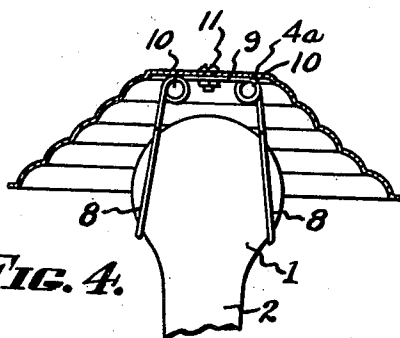
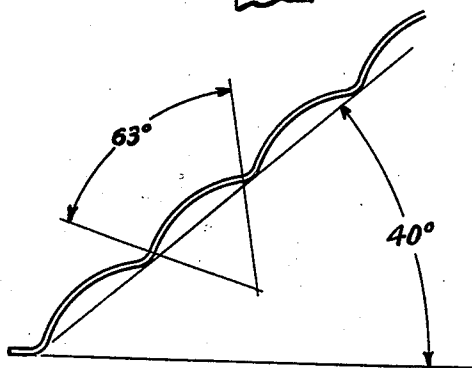


FIG. 2.

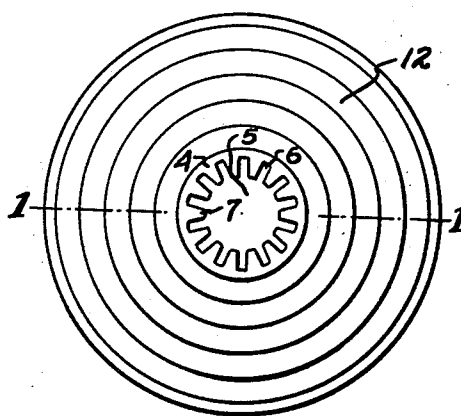


FIG. 3.

INVENTOR.

CARL KLOOS.

BY

Allen & Allen

ATTORNEYS.

UNITED STATES PATENT OFFICE

2,089,610

REFLECTOR

Carl Kloos, Cincinnati, Ohio

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2 Claims. (Cl. 240-103)

My invention relates to reflectors for use in conjunction with lamps, more especially with electric lamps of the incandescent or similar type.

5 An object of my invention is to increase the efficiency of a lamp by a better direction of its rays, and to provide illumination with a high degree of uniformity of distribution over a considerable surface area.

10 A further object is to provide such a reflector of increased efficiency of metal or equivalent very durable material, so that the reflector is practically unbreakable.

A further object is to provide a reflector which 15 has an extremely simple means for mounting it upon a lamp; and particularly means for mounting the reflector on the neck of the well known form of lamp bulb, whereby the reflector may be adjusted readily to the best position relative to the light source in the lamp, and held securely 20 in its adjusted position on the lamp without complication.

An object of my invention specifically stated, is to provide a reflector which, while of generally 25 conical shape does not have the inefficiency of the purely conical reflector, but combines with those advantages which a conical reflector has, the advantages had by reflectors which are concave on the reflecting surface. I have found that 30 by the combination, in a reflector of generally substantially conical form, of a plurality of reflecting surfaces of concave cross section and of relatively sharp degree of curvature, efficiency of reflection may be had which is derived from 35 advantageous factors found in a straight conical reflector and also advantageous factors found in a curved reflector such as, for instance, as found in a parabolic reflector. The small curvatures may approach the form of parabolic curves, although slight deviation therefrom does not materially detract from the desired results, and the 40 curves may be approximately arcs of circles. These curves may be curves of cross section of a succession of annular areas succeeding from the base toward the top of the generally conical 45 shade.

A further object attained by my invention is the correct location of such a series of reflecting surface relative to the effective area of radiation 50 of light in the lamp.

Other objects will appear in the course of the following description, illustrated by the accompanying drawing, in which:—

Fig. 1 is a vertical cross section through a 55 shade or reflector embodying my invention.

Fig. 2 is a diagrammatic enlargement of a part of the cross section of the shade or reflector shown in Fig. 1, more specifically illustrating substantially the formation of the annular concave surface of the reflector shown in Fig. 1.

Fig. 3 is a plan view of the reflector with the gripping tongues in flat condition as they are before the shade or reflector of Fig. 1 is placed on the lamp.

Fig. 4 illustrates my improved reflector with a 10 modified top and mounting whereby it is mounted on a lamp which has its stem lowermost, the reflector having the well known spring loops which grip the spherical part of the lamp.

The lamp 1 illustrated, is a usual form of incandescent electric lamp having the spherical 15 part merging into a stem portion 2, which may be of any of the usual lengths; it being understood that if the lamp 1 is of considerable size, this stem 2 is of considerable length, and the stem usually is of substantially uniform diameter form near one end to where it begins to 20 merge into the main spherical part of the lamp.

My improved shade or reflector 3, as here shown, and as it is preferably made, is made of a 25 single sheet of metal pressed into shape, and with its interior highly polished to afford the necessary reflection. This may be aluminum or its alloys without plating, or, most preferably, stainless steel relying upon the effect of highly 30 polished metal itself. Or it may be any suitable sheet metal with a suitable plating, for instance, nickel, or preferably chromium. I prefer stainless steel because of the very high polish and great brilliancy of reflection afforded on the interior surface of a reflector of such metal, together with the great resistance to corrosion in 35 almost every situation. Of course, the shades may be cast instead of sheet.

In accordance with my object, I preferably give 40 the reflector a general conical shape; but preferably of a considerable width of base in proportion to its height. For instance, as shown in Fig. 2, the angle of the hypotenuse portion to the base is about 40 degrees.

In my invention I incorporate in one reflector 45 those factors of the conical reflector and of the curved reflector, with the result of attaining a concentration of light in the area under the lamp, but at the same time effecting a much 50 greater reflection of light out to those surrounding areas which had been only indifferently illuminated with the use of a conical reflector, and which had been somewhat better illuminated, only at the expense of illumination directly under 55

the lamp, with certain curved forms of reflectors. On that theory and with this object in view, therefore, I make the reflector of generally conical shape of flat proportions, but instead of making the hypotenuse of the angle of the cone a straight or substantially straight line, or instead of making it a fairly continuous curve, I make it in the form of a succession of arcs or curves closely approximating arcs which may be somewhat parabolic or hyperbolic; or possibly a portion of an ellipse. The essential characteristic of the form of this line of my reflector is the internal concavity of a succession of portions of a sharp degree of curvature; these portions being cross sections of annular portions of the generally conical reflector, succeeding each other from near the base toward the top of the cone.

Another consideration, which may be peculiar to the practical embodiment of my invention, is the location substantially of the light source in the plane of the lowest portion or edge of the reflector. In considering this, it is to be remembered, as above stated, that the light source is not a point but a considerable area and, therefore, it may be said that substantially the center of this area would be in the plane of the lower part of the reflector.

The result of this formation substantially as above described, of the reflector and of this location of the light source relative to the lowest effective reflecting portion of the reflector, is to obtain a plurality of reflections, one for each annular interiorly concave portion of the reflector. I have attempted to indicate these by only three sets of lines for each one of these portions at each side of the reflector in Fig. 1; and these lines will indicate approximately the direction of the reflection of some of the uppermost rays, that of medianly located rays, and that of some of the lower rays, reaching each annular reflecting area.

The result is that taking the lower right portion of the reflector in Fig. 1, which substantially represents the operation in any other portion, the upper ray A is reflected at a very desirable angle out past the reflector to a considerably outwardly spaced area of the desk or any other object which the lamp is to illuminate; the median ray B is reflected downward in a direction rather close to the vertical, so that areas lying below the rim of the reflector are adequately illuminated; and the lower rays C are reflected inwardly toward the area under the lamp, but not so decidedly nor in such great proportion as to wastefully augment illumination derived directly from the lamp in these areas.

It will be understood of course, that the above explanations of the theory of operation of my improved reflector may be only an approximation of the true theory, inasmuch as the light source is not the theoretical point included in the diagram of my drawing, and inasmuch as repeated reflection, diffusion and light ray interference all enter into the operation of any lamp with a reflector. However, I have endeavored to set forth as nearly as I understand my invention, the difference in principle of its operation from the principles of operations of various reflectors heretofore in use.

I have provided for firmly holding the reflector in the desired position on the lamp, although the diameters and lengths of various bulbs vary, either because of different designed size of the lamp, or because of unavoidable vari-

ations in size of the lamp designed to be of the same size.

I prefer to provide such an attachment by simply forming the reflector with an initially substantially flat top 4, as seen best in Fig. 3, in which is a central opening 5, and providing a series of slits 6 radiating from this opening 5 so as to leave a series of tongues 7 projecting inward from the outer portion of this flat top 4. The opening 5 is made large enough to allow the shade to be started onto the tip end of the lamp; and the tongues 7 are long enough to bend upward as seen in Fig. 1, as the shade is pushed down onto the stem 2 of the lamp. In this way the tongues 7 form gripping elements, which firmly engage around the lamp stem 2 due to the slight resilience of the metal forming the shade. Since these tongues 7 have been brought to their positions by the stem 2 they closely conform to it, so that there is no slippage or displacement of the shade on the lamp. This result is best attained by the tongues being of moderate length, such as may be pressed up from the flat condition shown in Fig. 3, rather than by any more complicated extension of tongues in a partially upwardly directed condition, as may be found on some reflectors of the prior art, and which do not afford as much ventilation.

In Fig. 4, I have shown my improved reflector as it is made to be mounted on a lamp bulb that has its stem 2 extending away from the reflector, by means of wire loops 8 which straddle the spherical part 1 of the bulb and are joined at the top by an integral cross piece 9, and resilient loops 10, so that the loops 8 effectively grip the bulb; the cross piece being secured to the top of the shade by a screw 11, engaging the cross piece 9 and extending through an aperture in the top 4a of the shade, which is closed except for this aperture. It will be understood that the operation of the lamp and the reflector in this example will be substantially similar to that in the first example, except that, as with any reflector or shade mounted on a lamp in this way, the lamp stem and its base of course occupy the central area and the advantage of the reflector over the ordinary conical shade is still more pronounced; since as above explained, the purely conical shade causes a large percentage of reflection to the area directly under the light source.

Fig. 2 shows an approximate diagram of the preferred cross section of the several annularly inwardly concave areas of the reflector, which as here seen are of transverse extent of a little over 60 degrees, and arranged along an incline of about 40 degrees from the horizontal. These several annular areas are provided for by forming the shade with the upward succeeding of annular corrugations 12, as seen in any examples shown. It will, of course, be understood that I am not limited to such dimensions or to the number of corrugations; all such approximations thereto as may serve my purpose, being within the scope of my invention. Having fully described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. An opaque reflector of generally conical shape, having in succession from its base toward its top a series of circumferential annular portions of inwardly concave cross section with their concavities facing substantially at right angles to their line of arrangement, and means for holding said reflector in such relation to an illumi-

hated filament of an electric light bulb so that the plane of the base of the reflector lies substantially within the area of said illuminated filament, in which the means for holding the reflector in the stated relation to the illuminated filament comprises a normally flat top of the reflector, having an opening therethrough into which the free end of the stem of a lamp bulb may be started, and having slits extending radially from said opening and defining tongues which project radially inwardly to yield into adjusted gripping relation to the lamp bulb stem as the shade is forced along the stem toward the body of the lamp.

2. An opaque reflector of generally conical shape, having in succession from its base toward its top a series of circumferential annular portions of inwardly concave cross section with their concavities facing substantially at right angles to their line of arrangement, and means for hold-

ing said reflector in such relation to an illuminated filament of an electric light bulb so that the plane of the base of the reflector lies substantially within the area of said illuminated filament, in which the material is sheet metal pressed to give the generally conical shape and the shape of the annular portions, the concave inner sides of the annular portions being made sufficiently smooth to afford the desired degree of reflection, in which reflector the means for holding the reflector in the stated relation to the illuminated filament comprises a flat top to the reflector formed integrally with the concave annular portions and having an opening with radiating slits cut in said flat top, forming radially inwardly extending tongues which yield and resiliently grip the stem of a lamp bulb inserted through the opening.

CARL KLOOS. 20