May 18, 1948. J. H. KURLANDER 2,441,824

REFLECTOR LAMP

Filed Oct. 16, 1943

Fig. 1.

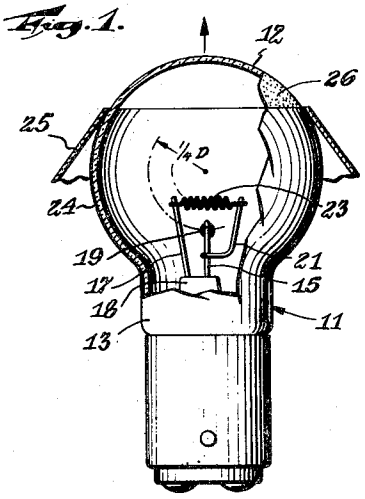


Fig. 2.

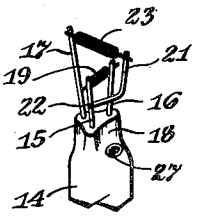


Fig. 3.

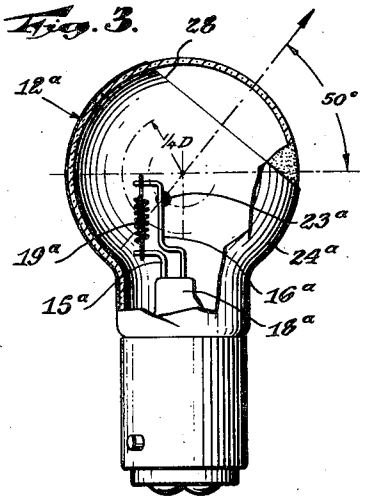


Fig. 4.

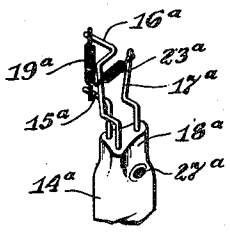


Fig. 5.

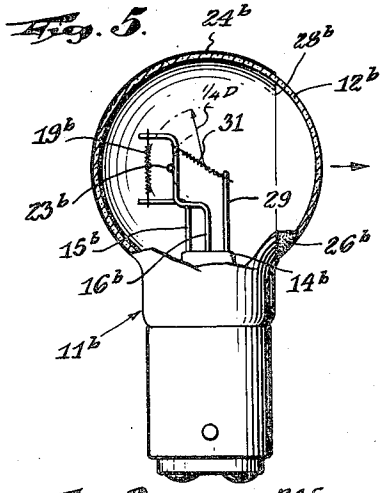


Fig. 6.

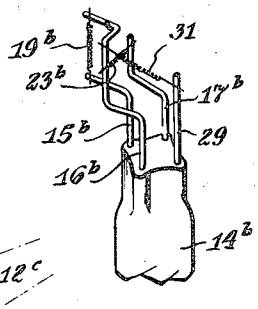


Fig. 7.

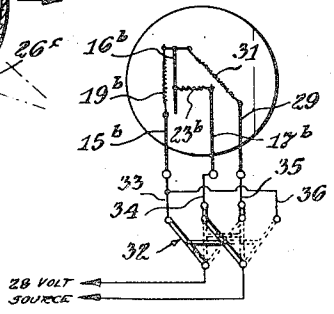


Fig. 8.

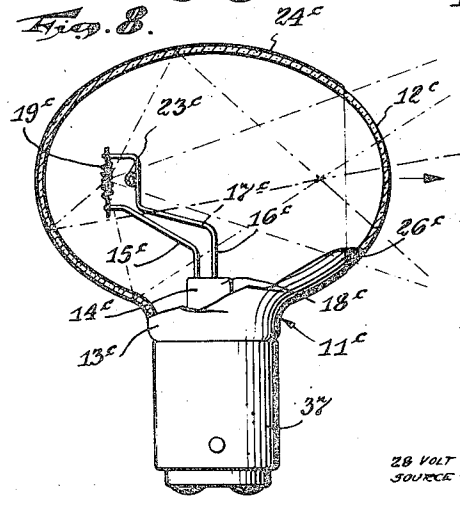
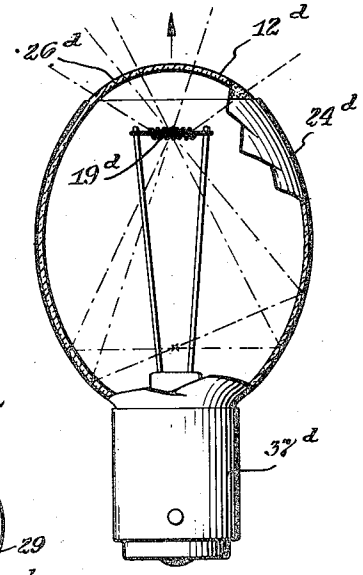


Fig. 9.



INVENTOR
J. H. KURLANDER.
BY
ATTORNEY

Patented May 18, 1948 2,441,824

UNITED STATES PATENT OFFICE

2,441,824

REFLECTOR LAMP

John H. Kurlander, Nutley, N. J., assignor to Westinghouse Electric Corporation, East Pittsburgh, Pa., a corporation of Pennsylvania

Application October 16, 1943, Serial No. 506,479

12 Claims. (Cl. 176—34)

1

This invention relates to optical systems, and more particularly to a reflector lamp of the type described and claimed in my application Serial No. 474,372, filed February 1, 1943, and owned by the assignee of the present application.

The principal object of my invention, generally considered, is to produce a lamp particularly adapted for illuminating a reticle used in optical systems such as those for gun sights, where special conditions arise, such as the directing of the light in a special way, on a reticle of abnormal size, or where particular care must be taken to avoid breakage of the filament.

Other objects and advantages of the invention are similar to those enumerated in my co-pending application above-identified, and still others will become apparent as the description proceeds.

Referring to the drawing which except for Fig. 7 is approximately to scale, but enlarged:

Fig. 1 is a side elevational view, with a portion of a bulb broken away, of a lamp embodying my invention.

Fig. 2 is a perspective view of the mount of the lamp of Fig. 1.

Fig. 3 is a view corresponding generally to Fig. 1, but showing a modification.

Fig. 4 is a perspective view of the mount of the lamp of Fig. 3.

Fig. 5 is a view corresponding generally to Fig. 3, but showing another modification.

Fig. 6 is a perspective view of the mount of the lamp of Fig. 5.

Fig. 7 is a wiring diagram for the filaments of the lamp of Figs. 5 and 6.

Fig. 8 is a view corresponding generally to Fig. 5, but showing a further embodiment of my invention.

Fig. 9 is a view corresponding generally to Fig. 8, but showing, as a still further embodiment of my invention, a lamp with only one filament.

Referring to the drawings in detail, like parts being designated by like reference characters, and first considering the embodiment illustrated in Figs. 1 and 2, there is shown an incandescent electric lamp 11 having a generally spherical bulb 12, of the type designated by the Westinghouse Electric & Manufacturing Company as "G-9," which has an outside diameter of about 1⅛". A bulb of such a size is illustrated because it fits present equipment. However, I do not wish to be so limited as the bulb may be of any suitable size.

Said bulb 12 has a generally cylindrical neck portion 13 projecting therefrom and closed by a flare 14, with an exhaust aperture 27. The flare, in the present embodiment, has three leads con-

2

necting respectively with the filament supports 15, 16 and 17, extending from the press 18. The filament supports 15 and 16 hold the major or primary filament 19 in a normally horizontal position between their free ends, considering the normal position of the lamp as base down, while the support 17 and an extension 21 welded to the support 15, as at 22, holds the minor filament 23 also in a normally horizontal position, but in a vertical plane disposed at right angles to the vertical plane of the major filament.

Inasmuch as the present lamp is the type in which the light is to be taken out along the axis of the bulb, the vertical planes of the filaments 19 and 23 intersect on said axis, and the supports extend generally parallel thereto, flaring slightly, however, from the press 18.

A reflecting coating 24 is provided on the exterior or interior of the bulb and desirably covers appreciably more than one-half of the area thereof, as shown most clearly in Fig. 1, in order to facilitate manufacture. The bulb may be initially completely coated with the reflecting material, a mask applied thereover, as indicated at 25, and the portion outside of said mask removed as by sand blasting or other suitable means. The coating may be of aluminum, silver, gold or other specular material. If a colored material, such as gold, is used, selective reflection will occur, possibly making it unnecessary to have a color filter to use therewith to make the reticle image contrast with the background.

As in my co-pending application, Serial No. 474,372, previously referred to, I make use of the image-forming properties of the smooth spherical concave reflector surface on the bulb, and place the major filament 19 at a distance from the center of the bulb equal to one-half of the radius of the curvature, so that the portion of the bulb approximating a parabolic surface projects substantially parallel light rays out of the top or axial portion thereof. In other words, the filament is placed at what corresponds with the focal point of an approximate paraboloid of revolution, so that the image is reflected approximately to infinity, as with a searchlight reflector.

The minor filament 23 is desirably disposed so that when viewed from above it makes a cross with the major filament, as illustrated. It is desirably disposed close, say at a distance of about two or three millimeters, but at a safe distance from the major filament. If desired, it may be made of the same size. Voltage may be 28 and the candlepower 21 for each filament. In this instance, both filaments are preferably of

the coiled-coil type. However, if desired, the minor filament may be straight or coiled, and the candlepower thereof may be less, or any desired variation may be made, within the spirit and scope of the invention.

Although I contemplate leaving the other half of the bulb clear, yet to get greater uniformity of illumination therefrom, the part that is not coated with the reflecting surface may be frosted as indicated at 26.

Referring now to the embodiment of my invention illustrated in Figs. 3 and 4, there is shown a bulb 12a, which may be identical with that of Fig. 1, enclosing a mount which is designed to project light at an angle of 50° to the horizontal, rather than vertically. Therefore, the center of the major filament 19a is rotated through 40° from the vertical and held by filament supports 15a and 16a extending from the press 18a. In the same way the minor filament 23a is rotated through an angle of about 40° and held in position by connection with the support 16a and another support 17a, it being understood that all of the supports are bent as illustrated in Figs. 3 and 4, and provided with suitable lead-in conductors extending out of the bulb through the flare 14a, with exhaust aperture 27a.

The reflecting coating 24a may be applied as in the preceding embodiment, except that it terminates at an edge 28 lying in a plane disposed at an angle of 40° to the horizontal, so that the axis of the light projected from the bulb is normal to said plane. Except as specifically described in connection with the present embodiment, the same may correspond with that of the preceding embodiment.

The standard electric potential used on aircraft today is 28 volts. It is generally necessary, with the small bulbs used in aircraft, to concentrate the filament as much as possible due to space limitations. Coiled-coil tungsten filaments are usual under such conditions. Unfortunately such coiled-coil filaments lack strength under shock and vibration so that they fail early in life. Such early failures are disastrous in lamps employed for illuminating optical sights.

In order to make use of the strong single or simple coil filaments in such lamps, and still provide an emergency or "stand-by" filament, I have provided a lamp 11b, as illustrated in Figs. 5 and 6. This lamp is for directing light horizontally, like the lamp 11 of my co-pending application Serial No. 474,372, previously referred to, and has a bulb 12b, such as those of the preceding embodiments, but the flare 14b holds four, instead of three, filament supports designated by the reference characters 15b, 16b, 17b and 29. The supports 15b and 16b are for the filament 19b, corresponding in position with the major filament 25 of said co-pending application and the filaments 19 and 19a of the preceding embodiments, the supports 16b and 17b are for the filament 23b, corresponding in position with the minor filaments of said preceding embodiments, and the supports 16b and 29 are for the filament 31, desirably positioned as illustrated. These single coil filaments 19b, 23b and 31 may each be 14 volt, 15 candlepower and so connected that any two can be switched on in series to operate as a major single 28 volt filament, thereby achieving the required strength and still offering a "stand-by" or emergency filament, should one of the three filament coils break or burn out. Failure of two coils would have to occur before the lamp becomes inoperative. It will be understood, however, that the optimum results are obtained when using the filaments 19b and 23b, because of their slightly better locations with respect to the reflecting coating 24b.

In the present embodiment I have shown these filaments 19b, 23b and 31 arranged so that any two of them direct the light from the lamp in a horizontal direction, assuming a base-down normal position like the lamp of Figs. 1 to 5, inclusive, of my co-pending application Serial No. 474,372, previously referred to. However, as in the preceding embodiments in the present application, the reflecting coating 24b, desirably terminated at an edge 28b lying in a vertical plane, covers more than one-half of the bulb area for the same reason, and the frosting 26b, if employed, covers the remainder.

Referring now to Fig. 7, there is shown a switch 32 so positioned with respect to the leads 33, 34, 35 and 36, as illustrated, that when said switch is in the first position, or that to the left shown in full lines, the filaments 19b and 23b are energized in series from the 28 volt power source; when it is in the middle position illustrated in dotted lines, the filaments 23b and 31 are energized; and when it is in the right hand position, the filaments 19b and 31 are energized.

Referring now to the embodiment of my invention illustrated in Fig. 8, there is shown an incandescent electric lamp 11c, having a bulb 12c rotund as in the preceding embodiments, but generally ellipsoidal in shape about an axis perpendicular to that of its base 37, that is, elongated laterally from its axis into ellipsoidal form. Said bulb 12c has a generally cylindrical neck portion 13c projecting from a side thereof, or coaxial with the minor axis of the ellipsoidal bulb section. It will be understood that the main portion of the bulb is the same in plan as in side elevation, that is, said portion is an ellipsoid of revolution about a normally horizontal, rather than a normally vertical, axis.

The neck portion 13c is, as in the previous embodiments, desirably closed by a flare 14c which in the present embodiment has three leads 15c, 16c and 17c, the last of which is directly behind the lead 16c (like the lead 17a is directly behind the lead 16a as viewed in Fig. 3), all of said leads extending from the press 18c. The filament supports 15c and 16c hold the major or primary filament 19c in a normally vertical position between their free ends, considering the normal position of the lamp as base down, and with the center of the filament disposed at one of the foci of the ellipsoid of revolution, while the supports 16c and 17c hold the minor filament 23c in a position, say two or three mm. toward the center of the bulb from the filament 19c, so as to be at a safe distance therefrom while still approximately at the desired focal point. The filament 23c extends horizontally with its axis lying in a vertical plane which is perpendicular to the axis of the ellipsoid and parallel to the corresponding plane of the axis of the filament 19c.

Inasmuch as the present lamp is of the type in which the light is to be taken out along the axis of the ellipsoid, that is, horizontally, the axial plane of the filament 23c intersects the filament 19c at its center, through which the axis of revolution of the ellipsoid passes.

A reflecting coating 24c is provided on the exterior or interior of the bulb, as in the preceding embodiments, and desirably covers appreciably more than one-half of the area thereof, as illustrated, in order to facilitate manufacture, for

reasons previously pointed out in connection with the first embodiment.

The lamp of the present embodiment is particularly adapted for illuminating reticles which are quite large in order to achieve greater sighting accuracy. As will be seen from the lines of reflection, the light passing out of the uncoated, or frosted, portion 26c of the bulb 12c, diverges rather than comes out in parallel rays and, therefore, is adapted to efficiently illuminate a relatively large reticle.

Fig. 9 shows a lamp which is alternative to that of Figs. 1 and 2 in that the light is taken out of and/or projected axially from the bulb 12d, which in this instance is an ellipsoid of revolution about the vertical axis or that of the base 37d. Otherwise the construction is identical with that of Figs. 1 and 2 except that a single filament 19d is employed and positioned at the upper focus of the ellipsoid or that remote from the neck, rather than halfway between the center of the sphere and the reflecting coating. The lines of reflection from the filament are shown in order to indicate how the light is reflected from the coating 24d and passes out of the uncoated, or frosted, upper end portion 26d.

Although preferred embodiments of my invention have been disclosed, it will be understood that modifications may be made within the spirit and scope of the appended claims. It will also be understood that in each form of bulb and filament position, I may use a single or more than one filament, a plurality of filaments, however, being preferred in order to have a spare or "stand-by" in case one burns out at a critical time.

I claim:

1. A reflector lamp comprising a generally spherical bulb with a neck portion extending therefrom, a mount disposed in said neck portion and comprising a helical filament and its lead-in conductors, the axis of said filament being straight for its entire length, and a reflecting coating on more than one-half of said bulb, said filament being offset from the center of said bulb and with its axis intersecting a line through the bulb center and perpendicular to the plane of the edge of the reflecting coating.

2. A reflector lamp comprising a generally spherical bulb with a neck portion extending therefrom, a helical mount disposed in said neck portion and comprising a filament and its lead-in conductors, the axis of said filament being straight for its entire length, and a reflecting coating on more than one-half of said spherical portion, said filament being disposed approximately midway between the central portion of said reflector coating and the center of said bulb and with its axis intersecting a line through the bulb center and perpendicular to the plane of the edge of the reflector coating, so that the coating reflects the light from said filament in approximately parallel rays.

3. A reflector lamp comprising a bulb formed as a simple ellipsoid of revolution with a neck portion extending therefrom, and with its axis as a minor axis of an elliptical axial section, a mount disposed in said neck portion and comprising a filament and its lead-in conductors, and a reflecting coating on more than one-half of said ellipsoid, said filament being disposed at one of the foci of said bulb.

4. A reflector lamp comprising a bulb with a neck portion extending therefrom, a mount disposed in said neck portion and comprising a major filament and its two lead-in conductors, a minor filament connected to one of said conductors and a third conductor and closely disposed with respect to said major filament, and a reflector coating on more than one-half of said bulb, said major filament being offset from the center of said bulb toward the center of said coating, and the minor filament being disposed between said major filament and the center of said bulb.

5. A reflector lamp comprising a bulb formed as a simple ellipsoid of revolution with a neck portion extending therefrom and with its axis as a minor axis of an elliptical axial section, a mount disposed in said neck portion and comprising a helical filament and its lead-in conductor, the axis of said filament being straight for its entire length, and a reflecting coating on more than one half of said bulb and terminating in an edge defining a plane, said filament being disposed at one of the foci of said bulb, with its axis intersecting a line through the bulb center and perpendicular to said edge plane.

6. A reflector lamp comprising a bulb formed as an ellipsoid of revolution with a neck portion extending therefrom normal to the bulb axis of revolution, a mount disposed in said neck portion and comprising a helical filament and its lead-in conductors, the axis of said filament being straight for its entire length, said filament being located at one of the foci of the bulb, another filament supported between said focus and the center of the bulb, and a reflecting coating on more than one half of said bulb and terminating in an edge defining a plane, the axis of said helical filament intersecting a line through the bulb center and perpendicular to said edge plane.

7. A reflector lamp comprising a bulb formed as an ellipsoid of revolution, a neck extending therefrom and coaxial with the axis of revolution thereof, a mount disposed in said neck portion and comprising a helical filament and its lead-in conductors, said filament being located at the focus of said bulb remote from said neck, the axis of said filament being straight for its entire length, and a reflecting coating on more than half of said bulb and terminating in an edge defining a plane, said filament having its axis intersecting a line through the bulb center and perpendicular to said edge plane.

8. A reflector lamp comprising a bulb generally spherical with a neck portion extending therefrom, a mount disposed in said neck portion and comprising a flare, four supports extending from said flare, and three filaments connected to said supports, a reflecting coating on at least one half of said spherical portion, one of said filaments being mounted between the free ends of two of said supports and disposed approximately one half the bulb radius from the center toward said coating, another being mounted between one of said supports and another support and disposed between said first-mentioned filament and said bulb center, and the third being mounted between said common filament support and an additional support, in order to allow for energizing any two of said filaments in series, with the light from the first-mentioned filament reflected from said coating in approximately parallel rays.

9. A reflector lamp comprising a bulb formed as an ellipsoid of revolution with a neck portion extending therefrom normal to the bulb axis of

revolution, a mount disposed in said neck portion and comprising a filament and its lead-in conductors, said filament being located at one of the foci of the ellipsoid, another filament supported between said focus and the center of the bulb, and a reflecting coating on more than one-half of said ellipsoidal portion.

10. A reflector lamp comprising a bulb formed as an ellipsoid of revolution, a neck extending therefrom and coaxial with the axis of revolution thereof, a mount disposed in said neck portion and comprising a filament located at the focus of said bulb remote from said neck and a reflecting coating on more than one-half of said ellipsoidal portion.

11. A reflector lamp comprising a bulb with a neck portion extending therefrom, a mount in said neck portion and comprising four supports and three filaments connected to said supports, a reflecting coating on part of said bulb, said filaments being arranged as a series between said reflecting coating and the bulb center, one of said filaments being mounted between the free ends of two of said supports and disposed at approximately the focal point of the reflecting coating, another being mounted between one of said supports and another support and disposed between said first-mentioned filament and said bulb center, and the third being mounted between said common filament support and the fourth support, in order to allow for energizing any two of said filaments in series.

12. A reflector lamp comprising a bulb with a neck portion extending therefrom, a mount disposed in said neck portion and comprising a helical filament and its lead-in conductors, the axis of said filament being straight for its entire length, and a reflecting coating on more than half of said bulb and terminating in an edge defining a plane, said filament being offset from the center of said bulb and with its axis intersecting a line through the bulb center and perpendicular to said edge plane.

JOHN H. KURLANDER.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
625,219	Truitt	May 16, 1899
1,051,542	Bissell	Jan. 28, 1913
1,150,738	Birch	Aug. 17, 1915
1,213,933	Morey	Jan. 30, 1917
1,240,583	Lakin	Sept. 18, 1917
1,981,329	Rivier	Nov. 20, 1934
1,998,187	Conti	Apr. 16, 1935

FOREIGN PATENTS

Number	Country	Date
4,847	Great Britain	Mar. 11, 1892
300,937	Germany	Aug. 18, 1915
303,844	Germany	June 1919
496,683	France	Mar. 7, 1919
595,666	France	June 19, 1924
643,887	France	Sept. 25, 1928
766,557	France	Apr. 16, 1934