

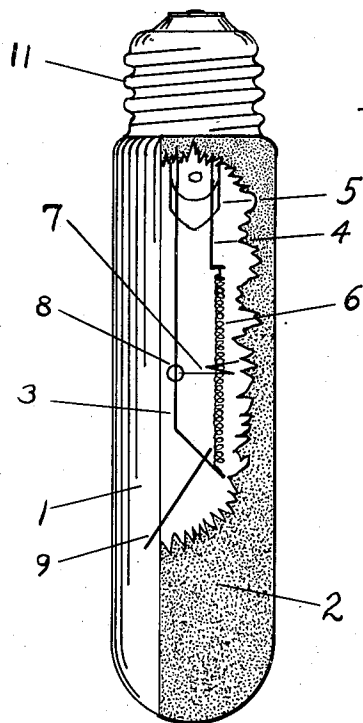
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O. H. BIGGS

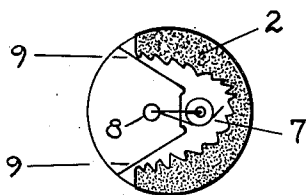
2,158,561

REFLECTOR BULB LAMP

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—Fig. 1.—



—Fig. 2.—

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REFLECTOR BULB LAMP

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2 Claims. (Cl. 176—34)

This invention relates to electric incandescent lamps, and particularly to such lamps in which a reflecting coating is placed on part of the surface of the lamp bulb to give a directed beam of light.

An object of the invention is to provide in such a lamp a proper cooperation of reflecting surface and filament to produce the desired beam. For example, if a cylindrical reflector of semi-circular cross section is used, the filament according to the invention should preferably be extended in a straight line parallel to the axis of the cylinder and halfway between the inner circumference of the cylinder and the longitudinal axis of the cylinder.

Another object is to provide a filament support such as to insure that the reflecting surface and the filament will be in proper cooperative relation in the finished lamp, and throughout the life of the lamp. Still another object is to provide a coiled coil filament of the proper type for such a lamp; and yet another object is to provide a smooth specular metal-reflecting coating for the proper portion of the interior surface of such a lamp, and a rougher, etched, frosted surface over the remainder of the interior surface.

Still another object is to provide filling for such a lamp of gases which absorb the invisible radiations, such as ultraviolet or infra-red, emitted by the filament, to prevent overheating of the reflector, which might otherwise absorb these radiations.

Other objects and advantages of the invention will be apparent from the following specification taken with the accompanying drawing in which:

Figure 1 is a side elevation, with part of the envelope broken away, for clearness of a lamp according to the invention; and

Figure 2 is a sectional view taken horizontally just above part 9 of Figure 1 of such a lamp.

In Figure 1, a sealed tubular lamp bulb is shown with a portion of its interior surface coated with a reflecting coating 2, and a portion 1 of its surface free from such coating. The portion 1 may be frosted, if desired. Lead-in or support wires 3, 4 extend from the stem 5 to support the filament 6 in a position parallel to the longitudinal axis of the tube and preferably at the focus of the reflecting surface. The filament 6 may be a coiled tungsten wire, and is preferably a doubly coiled tungsten wire, such as shown for example, in copending application Serial No. 183,063, filed January 3, 1938. The filament is supported at its center by a support wire 7 attached at one end to

the lead-in wire 3 by the insulating or glass bead 8, and looped around the filament at the other end. Wire spacers 9 extend from the lead-in 3 to rest on the uncoated part of the inner surface of the bulb to position the filament. These spacers may, of course, extend from any other filament support, such as the wire 7, for example. For clearness in drawing, the wire 7 is shown looped more loosely around the filament than it would generally be in practice. The lamp bulb contains a filling of an inert gas, preferably at a pressure above half an atmosphere. The lamp has a contact base 11.

If the reflector coating on the inside of a bulb is silver or aluminum, it will not only cooperate with the filament to give a reflected beam of light, but it will also cooperate with the tungsten filament and gas filling to reduce blackening of the lamp bulb and to increase the life of the lamp. An oxide coating on the aluminum will also cooperate to reduce blackening.

The invention is not confined to the use of tubular bulbs. A concentrated filament may, of course, be placed at the focus of a reflector portion of a pear-shaped bulb, such as shown in copending application Serial No. 183,063, filed January 3, 1938. In that case, the bulb size is preferably made one size larger than that ordinarily used for the same size filament in a bulb without the reflector coating; for example, using a 400 watt filament in a 500 watt bulb. In the case of the tubular bulb, the next size larger bulb may also be used, but I have found that with such a bulb, a 25 watt filament may be placed satisfactorily in a 25 watt bulb, of the size usual for an uncoated lamp.

The reflector coating 2 may be smooth metal surface to give sharp specular reflection, or it may be a white or colored glaze or enamel to give a somewhat more diffuse reflection. The reflector coating 2 is preferably on the interior surface of the bulb and preferably extends over nearly the entire length of the bulb, and around at least half of the circumference of the bulb, as shown in Figure 1. The coating can be deposited by the evaporation process described in copending application Serial No. 691,322, filed September 28, 1933, now United States Patent No. 2,123,706, issued July 12, 1938, by spraying, or by chemical deposition. The reflecting surface can be placed on the desired part of the bulb by first coating the entire interior of the bulb, and afterward removing the coating from the parts intended to transmit light, by mechanical means, such as the buffing or the like

described in the copending application mentioned, or by running a chemical solution which dissolves the metal, over the metal which is to be removed. If desired, the portion of the bulb which is to remain free from coating can be protected during evaporation deposition or the like by a proper shield. For example, during chemical deposition of the metal, the parts to remain clear can be protected by a wax coating, which is afterward removed by melting.

After a metallic reflecting coating has been applied to the proper portions of the bulb, the remaining portion of the bulb can be frosted on the inside surface if desired. If an organic etching solution, such as that sold commercially under the name "Etcholite" is used, the glass can be frosted over the uncoated area while the metallic coated area remains unaffected by the solution; that is, the organic etching solution can be applied to the entire interior of the bulb and will frost the uncoated part of the bulb without affecting the metal coating over the remainder of the bulb. By an organic etching solution, I mean a solution such as ammonium bifluoride and barium sulphate in a quantity of molasses or the like, which is practically free from water, in order to prevent the formation of hydrofluoric acid. If desired, of course, the frosting can be done on the outside of the bulb. In many cases, the frosting will not be desired. Its purpose is merely to smooth out any irregularity in the reflected beam, and it should not be heavy enough to destroy the beam.

The arrangement of the filament in the form of a "coiled-coil" of small diameter permits the use of a shorter length of coil for a given voltage, because of the increased resistance of the coil per unit length. A coiled-coil is made by winding a wire into a coil of small diameter and then winding that coil about a larger diameter. If the coil is to retain its shape and position during life, the second coiling should be in the same direction as the first; for example, if the first coil is wound in the direction of a right-handed screw thread, the second coil should be also wound in the right-handed direction.

The coil is supported in a fairly straight line between two leads from the stem press. Additional support for the filament may be provided by a wire looped loosely around the coil and attached to the stem press, for example, or as shown in the drawing, to one of the leads through an insulating bead. A wire from the filament support may extend to the inside of the bulb, resting there, to space the filament the required distance

from the reflector. This will tend to keep the filament more securely in position, and will insure ease in setting the filament in position during manufacture. Since the bulb, containing the reflector, and the stem, containing the filament and leads, are made separately, and are only joined when the bulb parts are sealed together, such a spacer is extremely helpful during the manufacture of the bulb, to properly align the filament.

The filament should be set parallel to the bulb axis, in some position between said axis and the circumference of the bulb. Preferably the filament should be placed just halfway between the circumference and axis, for this position will give a narrow beam of substantially parallel light from the lamp.

The most satisfactory metals for efficient light reflection are silver and aluminum. The latter has poor reflection for the infra-red, or heat radiation, and the silver has poor reflection for both infra-red and ultraviolet. To prevent excessive heating of the reflector by unreflected, or absorbed, infra-red or ultraviolet radiation, a gas filling can be used in the lamp, the gas filling having the additional feature of preventing evaporation from the filament. Nitrogen, at half an atmosphere or more, will absorb infra-red radiation, and thus prevent it from reaching the reflecting surface, but argon at the same pressures will generally be more effective in the ultraviolet, and is thus to be preferred with a silver reflector.

The filament of this invention is intended to be a singly or doubly coiled wire whose maximum coil diameter is small compared to the coil length, so that the resulting coil can be considered as a straight line filament to be focused properly by the cylindrical reflector.

What I claim is:

1. A gas-filled incandescent lamp having a coiled tungsten filament and having a material portion of its inner surface coated with metallic aluminum, the aluminum serving as a means to substantially prevent blackening of the bulb throughout the life of the filament.

2. A gas-filled incandescent lamp having a coiled tungsten filament, the bulb of said lamp having a material portion of its inner surface coated with metallic aluminum, an oxide coating on said aluminum, said coatings combining to form a means to substantially prevent blackening of the remaining portion of the bulb throughout the life of the filament.

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