June 29, 1937. C. BIRDSEYE 2,084,999

ELECTRIC LAMP

Filed Oct. 17, 1935

Fig. 1.

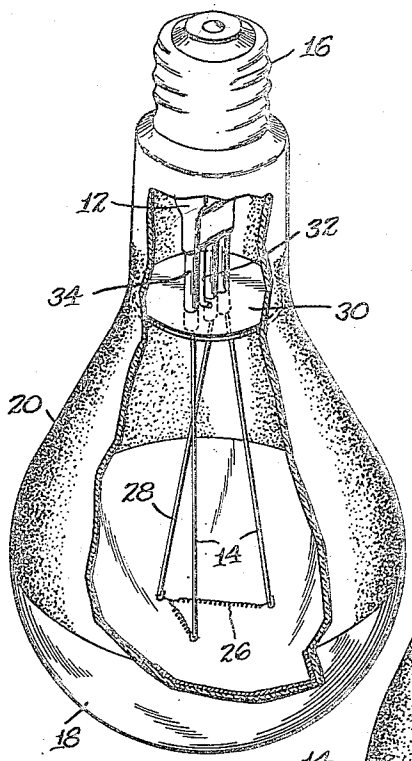


Fig. 2.

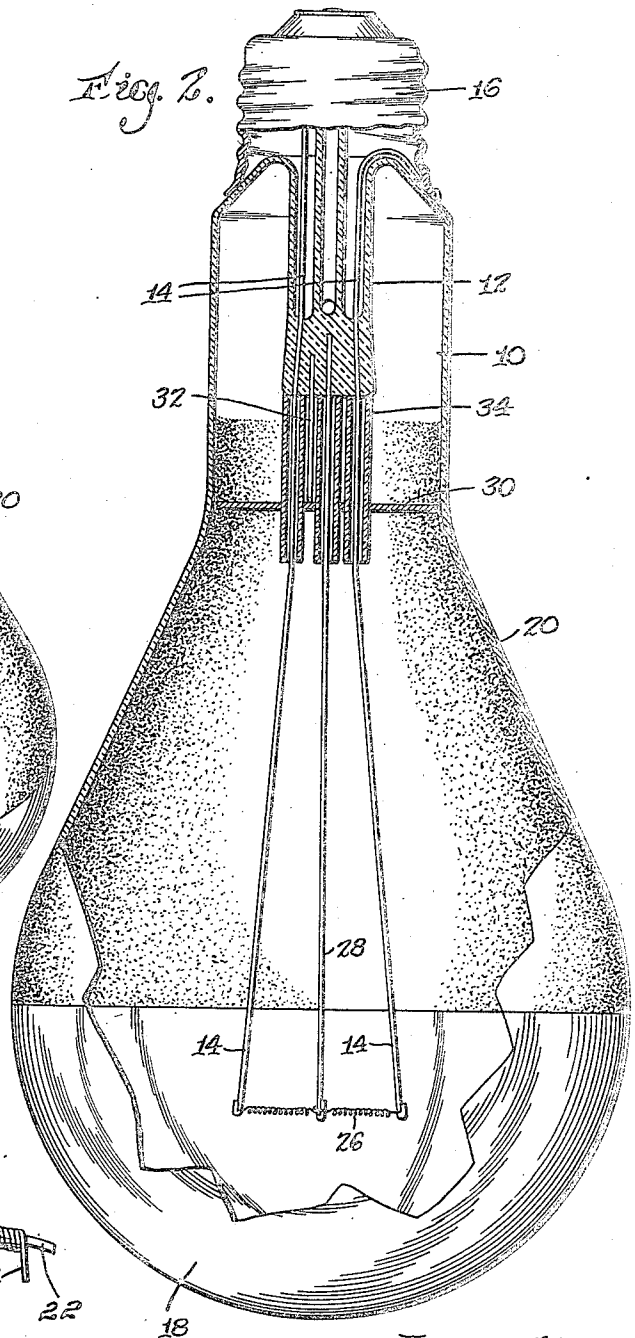


Fig. 3.

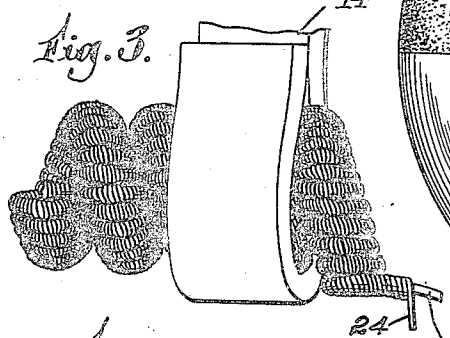
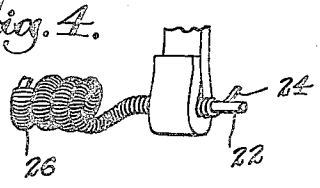


Fig. 4.



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2,084,999

UNITED STATES PATENT OFFICE

2,084,999

ELECTRIC LAMP

Clarence Birdseye, Gloucester, Mass., assignor, by mesne assignments, to Birdseye Electric Corporation, Dover, Del., a corporation of Delaware

Application October 17, 1935, Serial No. 45,410

3 Claims. (Cl. 176—34)

This invention relates to incandescent lamps and consists in a novel lamp of improved lighting efficiency and longer life than lamps heretofore known. The lamp of my invention is produced by employing a reflecting surface formed directly on the walls of the lamp in combination with a compact coiled coil filament located in predetermined relation to the reflecting surface. The reflecting surface may be formed either upon the outer or inner walls of the lamp, although it is preferred to form it upon the inner walls since in this way more effective reflection of the light rays is obtained and the reflecting surface itself is more perfectly protected. However, the location of the reflecting surface is of secondary importance so long as it is disposed so as to concentrate the light rays of the lamp in a usefully directed luminous field or fields reinforced by those rays which would otherwise be wasted. For direct lighting the reflecting surface may be located in a zone extending approximately from the line of maximum bulb diameter to a line in the neck of the bulb or in any other selected zone and for indirect lighting, the reflecting surface may cover the curved end of the bulb up to the line of its maximum diameter or thereabout.

A reflecting surface such as above discussed has the effect of concentrating the heat rays of the filament within the lamp, raising its operating temperature and subjecting the filament and its supports to intense heat which is destructive to filaments of many types as well as their supports. I have discovered, however, that a compact coiled coil filament, preferably having a core of current-conductive material, may be advantageously employed in combination with a reflecting surface of the character discussed and may be relied upon for long life under the exacting conditions to which it is subjected in use. Another advantage incident to the employment of a coiled coil filament in combination with a reflector equipped lamp is that on account of its compact shape and high intrinsic brilliancy, the filament may be conveniently located at the approximate focus of the reflector and the light rays emanating therefrom thus effectively collected and reflected to form an intensely illuminated field.

The high operating temperature of the lamp of my invention presents a serious problem in properly supporting the filament, since all parts of the filament mount are subjected to the very intense heat of the concentrated heat rays. I have discovered that it may be successfully mounted upon supports of refractory metal two of which in some cases may be also utilized as the lead-in wires. Preferably and as herein shown, the supporting wires upon leaving the stem are surrounded by a shield of refractory material through which they are suitably insulated and which is permanently retained in position to protect the glass of the mount and particularly the press of the mount from overheating.

These and other features of the invention will be best understood and appreciated from the following description of a preferred embodiment thereof, selected for purposes of illustration and shown in the accompanying drawing, in which,—

Fig. 1 is a view in perspective with portions broken away, of a lamp designed for indirect lighting,

Fig. 2 is a view in side elevation, partly in section, on an enlarged scale of the same lamp, and

Figs. 3 and 4 are fragmentary views on a still larger scale of alternate forms of filament such as I contemplate employing in the lamp of my invention.

Referring to the drawing, the glass bulb of the lamp is shown as being of conventional shape, including a neck portion 10 which merges into an enlarged globular portion. The bulb is provided with the usual sealed-in glass stem or mount 12, containing an exhaust tube and lead-in wires 14. It may also be provided with a threaded brass base 16 of the usual construction.

The bulb herein shown is designed for indirect lighting and is provided with a peripheral reflecting surface 18 which extends completely over the curved end of the bulb and approximately to its line of maximum diameter. The reflecting surface is preferably secured by depositing metallic silver upon the inside of the bulb in accordance with the method disclosed in the co-pending application of Pincus Deren, Serial No. 42,227, filed September 26, 1935, although the present invention is not limited to a reflector of any specific characteristics. The intermediate parts of the bulb are frosted or etched in an area 20 which extends from the boundary of the reflecting surface to a line within the neck of the bulb. The light passing through the bulb is thus diffused by the frosted surface and shadow effects are eliminated.

As will be apparent, the action of the reflecting surface 18 is to intercept all the light rays of the lamp which would otherwise pass downwardly and direct them upwardly in a definite and concentrated luminous field. The most effective reflecting condition is secured when the filament

is located substantially at the focus of the curved reflecting surface, and in the lamp herein illustrated this is effected by employing a filament of compact construction and high intrinsic brilliancy supported upon refractory metal supports well within the confines of the reflecting zone and substantially at its focus.

One type of filament which may be employed to advantage is that disclosed in the copending application of Charles Spaeth, Serial No. 15,605, filed April 10, 1935, and which comprises a wire helix arranged in substantially continuous contact with a core of current-conductive material and wound with its core into a helix, in other words, a double or triple coiled coil having a permanent core within its primary turns. The construction of such a double coiled filament is illustrated in Fig. 4 in which a core 22 of tungsten wire or the like has coiled thereon a wire 24, and then the wound core itself is formed into a coreless helix. The coiled coil filament 26 of the character indicated is supported in position by three supporting rods or wires of refractory or high melting-point metal such as tungsten. Of these, two supports comprise the lead-in wires 14 which are flattened and bent over at their ends to clamp the ends of the filament. The third support 28 is formed of similar material and embedded or anchored in the glass mount 12.

The glass mount 12 has a flattened press at its inner end through which the lead-in wires 14 pass and in which the end of the supporting wire 28 is embedded. The mount 12 is shorter than the neck 10 of the bulb, being terminated at the greatest practicable distance from the filament and remote from the intensely hot focus of the heat rays in the lamp. The mount is further protected by a shield in the shape of a disk 30 of metal or mica which is supported beyond the end of the stem by a wire 32 embedded in the press of the stem 12 and projecting downwardly from its end. The end of the wire 32 is bent at right angles and secured to the outer face of the disk 30 as shown in Fig. 1. This represents but one convenient construction for positioning the shield in the desired location in the bulb. Preferably, and as herein shown, the lead-in wires 14 and the supporting wire 28 are insulated as they pass from the press by individual insulating tubes 34 of refractory material. The tubes 34 may be fused or otherwise secured to the end of the mount, 12, and at their lower ends extend somewhat beyond the disk 30.

I have illustrated my invention as embodied in a lamp intended for indirect lighting and it will be clear that in a lamp intended for direct lighting constructed in accordance with this invention the reflecting zone will occupy the upper portions of the walls of the lamp, the filament will be located within the confines thereof, and the luminous field will be defined by the clear or etched lower portion of the bulb and may compose a 60° cone of light. In this case the shield 30 may be utilized as a reflector for those rays which would otherwise be lost in the neck of the bulb.

In Fig. 3 is shown a fragment of triple coil coiled filament which in some lamps I prefer to employ instead of the double coil coiled filament of Fig. 4. In this filament tungsten wire 24 is wound upon a tungsten core 22, then the wound core is coiled into a secondary helix and finally the secondary helix is wound into a tertiary larger helix.

From the foregoing description it will be understood that the filament used in the lamp of my invention is in all cases compact and rugged in construction and of high intrinsic brilliancy. It is located in the bulb in the most favorable location possible for lighting efficiency. It is supported moreover by means capable of withstanding extremely high working temperatures and the more delicate parts of the lamp, such as the mount 12, are not only located as remotely as practicable from the focus of the heat rays, but are also shielded effectually from the direct action thereof.

The combination of my invention presents the additional advantage of long lamp life with full color pattern or composition of light. I have found that it is entirely practicable to operate a coiled coil filament at full temperature in a reflector lamp of the character herein shown for well upward of 1000 hours, whereas other filaments must be operated at a somewhat reduced temperature in these lamps in order to give satisfactory life, and this results in light which is deficient in certain rays.

I have found it advantageous to employ in my novel lamps, bulbs somewhat greater in size than commonly has been used in standard practice; for example, to employ a 200 watt bulb with a 150 watt filament. It will be seen therefore that by combining in a lamp a reflecting surface adapted to define and concentrate its luminous field, together with a coiled coil filament and supports of the character above discussed, I am able to produce an improved lamp having greater lighting efficiency and longer life than any lamps heretofore available to the market. I have found these lamps particularly satisfactory and efficient in 150, 200 and 300 watt and larger sizes, although the invention has a wider range of application.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States, is,

1. An incandescent electric lamp comprising, in combination, an oversize bulb provided on a portion of its inner surface with a metallic reflecting surface, a coiled coil filament of compact shape located substantially at the focus of said reflecting surface and adapted to burn at a high temperature and with a high intrinsic brilliancy, a glass mount in the neck of the bulb, refractory metal supports for the filament projecting from said mount, and a heat-reflecting and light-reflecting shield supported in position to protect the press of the mount from the heat developed in the lamp.

2. An incandescent electric lamp comprising, in combination, an oversize bulb provided on a portion of its inner walls with a metallic reflecting surface, a coiled coil filament located substantially at the focus of said reflecting surface and adapted to operate at high temperature, with high intrinsic brilliancy and with the development of excessive heat, the said metallic surface being located by the oversize bulb at a sufficient distance from the filament to escape deterioration by heat, refractory metal supports located within the area subject to direct heat radiation from the filament and concentrated heat reflection from said metallic reflecting surface, a glass mount for said supports, and a neck reflector so located as to protect said mount from the heat developed in the lamp and increase the intensity of light emitted thereby.

3. An incandescent electric lamp comprising, in combination, an oversize bulb provided on its

inner walls with a metallic reflecting surface, and having a frosted light-emitting area, a glass mount in the neck of the bulb, a compact coiled coil filament located partially in the focus of said reflecting surface and adapted to operate at high temperature with the development of excessive heat and with high intrinsic brilliancy, the oversize bulb serving to locate the metallic surface at a distance sufficiently remote from the filament to safeguard it from heat damage, refractory metal supports for the filament, and a neck reflector adapted to reflect away from the mount the greater part of the intense radiation from the filament, the frosted area of the bulb serving to diffuse the intense light radiation from the compact and brilliant filament.

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