H. GILMORE.

INCANDESCENT ELECTRIC LAMP.

APPLICATION FILED JUNE 7, 1909.

1,031,114.

Patented July 2, 1912.

2 SHEETS—SHEET 1.

Fig. 1.

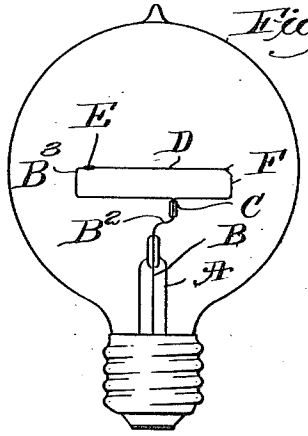


Fig. 2.

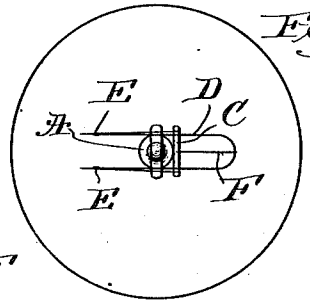


Fig. 3.

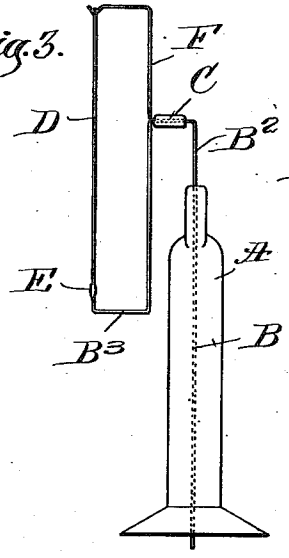


Fig. 4.

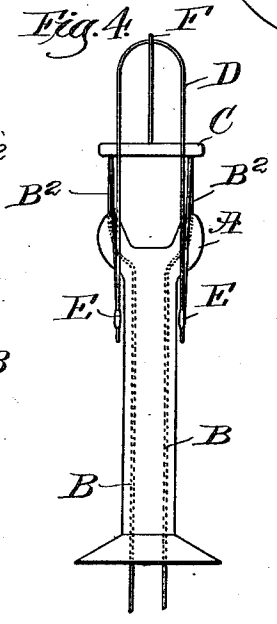
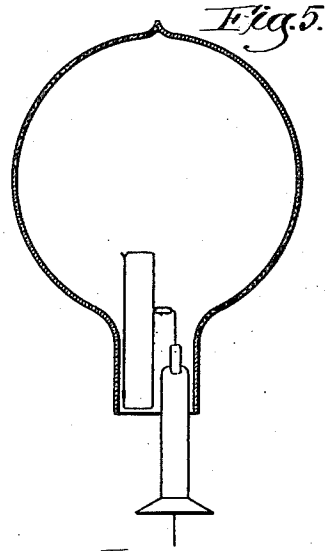


Fig. 5.



Witnesses.
Thomas J. Drummond.
Joseph M. Ward.

Inventor.
Howard Gilmore,
by Crosby Gregory attys.

H. GILMORE.

INCANDESCENT ELECTRIC LAMP.

APPLICATION FILED JUNE 7, 1909.

1,031,114.

Patented July 2, 1912.

2 SHEETS—SHEET 2.

Fig. 6.

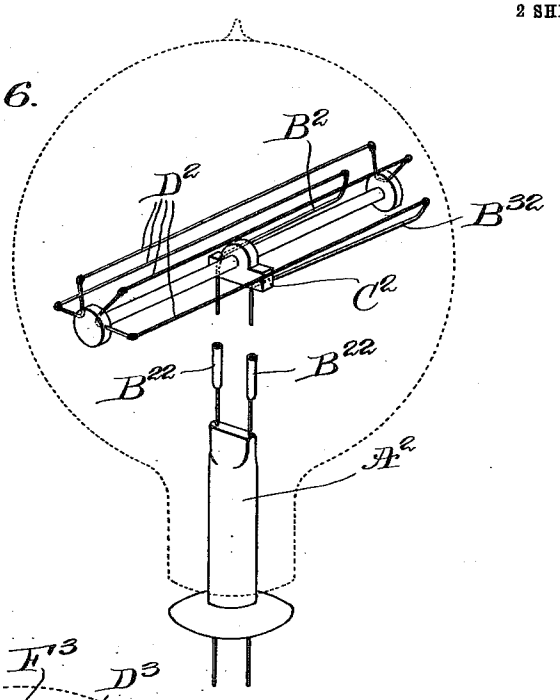


Fig. 7.

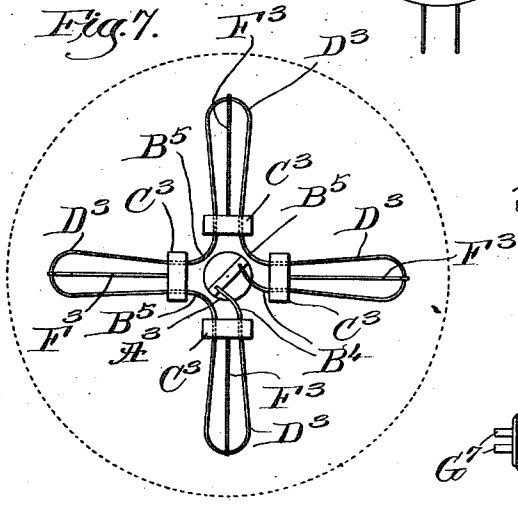


Fig. 8.

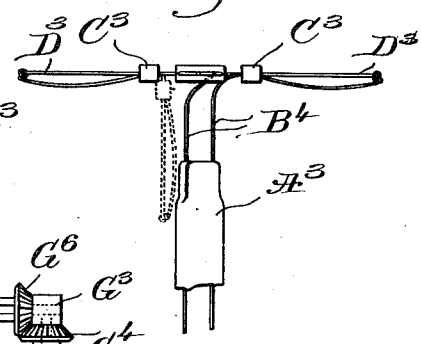
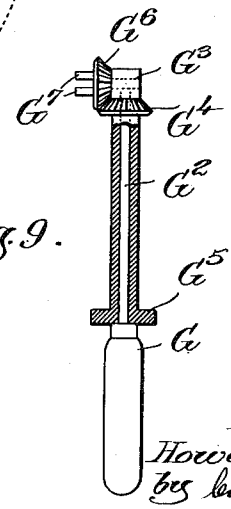


Fig. 9.



Witnesses.
Thomas J. Drummond.
Joseph M. Ward.

Inventor.
Howard Gilmore,
by Busby Treyor. attys.

UNITED STATES PATENT OFFICE.

HOWARD GILMORE, OF BROOKLINE, MASSACHUSETTS.

INCANDESCENT ELECTRIC LAMP.

1,031,114. Specification of Letters Patent. Patented July 2, 1912.

Application filed June 7, 1909. Serial No. 500,510.

To all whom it may concern:

Be it known that I, HOWARD GILMORE, a citizen of the United States, residing at Brookline, county of Norfolk, and State of Massachusetts, have invented an Improvement in Incandescent Electric Lamps, of which the following description, in connection with the accompanying drawing, is a specification, like characters on the drawing representing like parts.

This invention relates to incandescent electric lamps in which it is desired to position a substantially non-flexible filament in such a way as to distribute a large percentage of the light from the tip end of the lamp or that end opposite the base of the lamp or the neck of the bulb.

The light that any filament lamps emits in any particular direction is directly proportioned to the projection of the filament on a plane at right angles to the particular direction, the cooling effects of joints and other such minor matters being disregarded. It follows, therefore, that in order to distribute the light chiefly in the direction opposite the base or toward the tip end of the lamp the filament must be so positioned that a large percentage of its length is visible from the desired direction. Lamps which are used for special purposes, such as in signs or in factories over work benches and in many other cases where it is desired to project the main body of the light from the tip of the lamp or over a particular area to be illuminated render this arrangement desirable.

It is well known that the practical requirements of lamp manufacture require the filament to be inserted through the neck of the bulb. But whatever be the shape or size of the bulb the neck is of a comparatively restricted cross sectional area, and in the ordinary sized bulb the neck in its interior cross section is not much more than three quarters of an inch in diameter. When the filaments used are flexible and do not require much additional support it is a comparatively easy matter to shape the filaments properly, compress them and then crowd them through the neck of the bulb. When inside the bulb the filaments can be readily expanded to assume the desired shape. The metallic filaments formed from tungsten and similar metals, which have recently come into extended commercial use, cannot be subjected to this treatment. These metallic filaments require more or less of an elaborate support at different points throughout their length and are themselves incapable of much handling or distorting without being injured or broken. In the case also of heavy carbon filaments it is difficult and often impossible to flex or distort the filament sufficiently to get it through the neck of the bulb and positioned within the bulb to give the desired distribution of light.

The present invention resides in a lamp having a filament of such a character that it cannot be flexed or distorted materially without injury or breaking, or a filament of a delicate nature provided with a more or less elaborate support, and with the filament located within the bulb and positioned in general transversely to the neck of the bulb so as to project a large percentage of the light toward the tip end of the bulb.

It comprises as an important feature a self-contained unit attached to the leading-in wires consisting of what is herein termed an insulating mount, a filament and its supporting structure; which unit is arranged in the completed lamp so that the filament is substantially perpendicular to the axis of the neck of the lamp bulb, or, as it is herein termed, substantially transverse to the neck; which unit can be altered in angular position with respect to the neck without altering the relative positions of its various components one to another.

The drawings represent different forms of lamps and filaments embodying the invention, and show how the lamp of the invention may readily be constructed.

In the drawings, Figure 1 is a side elevation of a metallic filament lamp of simple construction embodying the invention; Fig. 2 is a tip end elevation of the lamp shown in Fig. 1; Fig. 3 is a side elevation of a stem and the parts connected to and supported thereby in position for insertion through the neck of the bulb in the process of manufacturing a lamp embodying the invention; Fig. 4 is a view of the parts shown in Fig. 3 taken at right angles thereto; Fig. 5 is a side elevation in cross section of the bulb of a lamp such as shown in Fig. 1, with the stem and parts connected to and supported thereby in the process of being inserted through the neck of the bulb. Fig. 6 is a perspective view of a stem, an elaborate form of support and filament, and an elaborate insulating mount in substantially the position they will

occupy in a completed lamp, the bulb being indicated in dotted lines; Fig. 7 is a tip end elevation of another form of elaborate metallic filament support and insulating mount, the bulb being indicated in dotted lines; Fig. 8 is a side elevation of the filament support and insulating mount shown in Fig. 7, together with a portion of the stem, one portion of the filament being shown in dotted lines in position for being inserted through the neck of the bulb; Fig. 9 is a side elevation, partially in cross section, of a desirable tool or device for use in the manufacture of the lamp.

In the form of lamp embodying this invention shown in Figs. 1 and 2, the entire length of the filament projects the light directly toward the tip of the bulb, and the filament extends also at each side of the nubbin at the tip of the bulb so that the maximum amount of light is emitted from the tip end of the bulb. In this form the usual stem is indicated at A, and the leading-in wires B pass through and are sealed in the stem in the usual manner. The insulating mount is indicated at C, and consists of any suitable insulating material of any suitable shape, but preferably it consists of a small block of glass, which is a cheap and easily applied suitable material. The leading-in wires pass through and are sealed in the insulating mount C.

That portion of the leading-in wires which extends between the stem A and the insulating mount C and which is indicated at B^2 is so constructed as to enable the position of the insulating mount to be changed with respect to the stem. The simplest way of securing this result is by forming the leading-in wires at this point of copper or other suitable metal which can be bent without injury to the strength or electrical conductivity of the wires.

The metallic filament, such as a tungsten filament, is indicated at D, and is shown as of a loop shape. Such a filament requires to be well supported and the support in this instance is shown as of a simple but efficient form. The portion of the leading-in wires extending above the mount C and indicated at B^3 is bent, as indicated, and the ends of the loop-shaped filament are united to the ends of the leading-in wires by suitable joints at E. An additional anchor or support F extends up from the insulating mount C and hooks around the looped end of the filament to support and hold it in position. It will thus be seen that the insulating mount C, the portion B^3 of the leading-in wires, and the anchor F which serve as supports for the filament, and the filament D, constitute a structure or a self-contained unit, the position of which may be altered with respect to the remaining parts of the lamp without altering or disturbing the relative positions of the parts of the structure.

The process of assembling a lamp such as that just described and embodying this invention is illustrated in Figs. 3, 4 and 5, the former two figures being considerably enlarged for purposes of illustration. The parts are also lettered similarly to those in Figs. 1 and 2. The stem, leading-in wires, the support, the filament, and the insulating mount, are all assembled in a manner usual and familiar in this class of work. The position of the insulating mount C and the parts supported thereby is then altered with respect to the stem to bring the filament into a position substantially parallel to the stem, as shown in Figs. 3 and 4. In the form illustrated this is secured by bending the portion of the leading-in wires B^2. When in this position and with the filament sufficiently distant from the supporting portion B^3 of the leading-in wires and the anchor or support F to avoid short circuiting, the parts illustrated in Figs. 3 and 4 can be readily arranged and constructed of a size to enable them readily to pass through the neck of a bulb of standard size. In Fig. 5 these parts are indicated in the act of being inserted through the neck of the bulb. When the parts have been inserted in the bulb the position of the insulating mount and the parts supported thereby can readily be changed with respect to the stem to bring the filament into a position transverse to the neck of the bulb or into a position such as shown in Figs. 1 and 2, so that the maximum amount of light will be emitted from the tip end of the bulb. As previously, this alteration in position is readily obtained by bending the portion B^2 of the leading-in wires. This may be done in any suitable way, but it may be readily accomplished by the use of the tool illustrated in Fig. 9. This tool comprises a handle G, a spindle G^2 projecting therefrom and provided at its upper end with a transverse bearing G^3. A bevel gear G^4, having attached thereto a milled head G^5, is journaled on the spindle G^2. A second bevel gear G^6 intermeshes with the bevel gear G^4 and is journaled in the bearing G^3. A pair of jaws G^7 project from the bevel gear G^6. This tool can be slipped in through the neck of the bulb after the stem and connected parts have been inserted; the jaws G^7 slipped over the insulating mount or the leading-in wires just below the insulating mount; and the milled head G^5 rotated, whereupon, as will readily be seen, the insulating mount will be turned into the desired position.

The invention has thus far been particularly described with respect to a simple form of filament and supporting structure, but it is equally adapted for elaborate forms of filament and supporting structure. More

elaborate forms are illustrated in Figs. 6, 7 and 8.

In Fig. 6 the insulating mount is shown at C^2, and the filament is shown in four parallel strands D^2, two of these strands being connected to the portion B^{32} of the leading-in wires, and the remaining ends of the several strands being connected to a suitable supporting structure of what is sometimes called a "clothes reel" type. All the parts thus supported from and carried by the insulating mount C^2 may be altered in position with respect to the stem A^2 without altering their own relative positions. In the construction illustrated in Fig. 6 the leading-in wires extending from the stem to the insulating mount are shown as detachable, sockets B^{22} being formed on the ends of the leading-in wires projecting from the stem, and the ends of the leading-in wires projecting from the insulating mount being adapted to enter and be sealed in these sockets. In the manufacture of the form of lamp shown in Fig. 6 the insulating mount C^2 and the parts supported from and carried thereby can readily be inserted endwise through the neck of the bulb. The stem can then be inserted in the usual way and then the insulating mount C^2 and its connected parts can be turned into the position shown in Fig. 6, and then secured mechanically and electrically to the leading-in wires by means of the sockets provided.

In the form of lamp shown in Figs. 7 and 8 an insulating mount is provided for each one of several separate filaments. It is, in fact, a duplication of the forms shown in Figs. 1 and 2, the construction being modified somewhat by reason of the duplication. The stem A^3 has the leading-in wires B^4 projecting therefrom as in the other form. Four separate filaments D^3 are shown carried by and supported from four separate insulating mounts C^3, a simple form of anchor or support F^3 extending in each instance from the insulating mount to the closed end of the filament loop. As in the case of the other forms each insulating mount, its respective filament and supports constitutes a unitary or self-contained structure which can be moved or altered in position with respect to the stem without disturbing the relative position of the parts of the structure. The leading-in wires may extend from the stem in any suitable way to connect with the several filaments and a simple way has been shown in Figs. 7 and 8 where the two leading-in wires B, B^4 extend up from the stem and extend, one to one insulating mount, and the other to another insulating mount, while the other insulating mounts are supported and electrically connected by the sections B^5 of the leading-in wires in a manner which will be obvious. When it is desired to assemble the lamp the position of each insulating mount with its supported parts is altered with respect to the stem to present all the parts in such a compact form that they may pass readily through the neck of the bulb. As illustrated this is secured by bending the portions B^4 and the sections B^5 of the insulating wire to bring the filaments into position parallel with the stem, as indicated in dotted lines in Fig. 8. After the parts are inserted in the bulb, the leading-in wires may be bent in the opposite direction to position the filament transversely to the neck of the bulb.

It will thus be seen that the invention presents a lamp of the desired character which can be readily and economically constructed and which when completed will have the filament so positioned that a large percentage of or its entire length may be visible from the tip end, and consequently the maximum amount of light may be emitted from the tip end of the bulb; and that the completed lamp presents the metallic or substantially inflexible filament in position and so arranged that it could neither have been placed within the bulb nor can be removed therefrom without changing its position with respect to the stem or the leading-in wires entering through the neck of the bulb.

Having fully described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. An incandescent electric lamp comprising a bulb having a neck and a self-contained unit composed of an insulating mount and a substantially non-flexible filament supported from and carried by said mount and extending substantially transversely to the neck of the bulb, the maximum diameter of the said unit transversely to the neck of the bulb being materially greater than the internal diameter of said neck, whereby it is impossible to insert or remove the unit through the neck without angularly altering its position with respect to the neck and the said unit when thus angularly altered having a cross-sectional area less than that of the neck, whereby the said unit may be inserted through the neck in its altered position.

2. An incandescent electric lamp comprising a bulb having a neck, a flexible support extending through the neck into the bulb, and a self-contained unit composed of an insulating mount connected to said flexible support, a substantially non-flexible filament supported from and carried by said mount and extending substantially transversely to the neck of the bulb, the maximum diameter of the said unit transversely to the neck of the bulb being materially greater than the internal diameter of said neck, whereby it is impossible to insert or remove the unit

through the neck without angularly altering its position with respect to the neck and the said unit when thus angularly altered having a cross-sectional area less than that of the neck, whereby the said unit may be inserted through the neck in its altered position.

3. An incandescent electric lamp comprising a bulb having a neck, a stem, a self-contained unit composed of an insulating mount and a substantially non-flexible filament supported from and carried by said mount and extending substantially transversely to the neck of the bulb, connections between said stem and said mount to permit an angular movement of the former with respect to the latter, the maximum diameter of the said self-contained unit transversely to the neck of the bulb being materially greater than the internal diameter of the said neck, whereby it is impossible to insert or remove the unit through the neck without angularly altering its position with respect to the neck as may be done by means of the connections between the stem and the mount and the said unit when thus angularly altered having a cross-sectional area less than that of the neck, whereby the said unit may be inserted through the neck in its altered position.

4. An incandescent electric lamp comprising a bulb having a neck, leading-in wires extended through the neck into the bulb, and a self-contained unit composed of an insulating mount supported by the leading-in wires, and a substantially non-flexible filament supported from and carried by said mount and extending substantially transversely to the neck of the bulb, the maximum diameter of the said unit transversely to the neck of the bulb being materially greater than the internal diameter of the said neck and the said unit when thus angularly altered having a cross-sectional area less than that of the neck, whereby the said unit may be inserted through the neck in its altered position.

5. An incandescent electric lamp comprising a bulb having a neck and a self-contained unit composed of an insulating mount, a substantially non-flexible filament extending substantially transversely to the neck of the bulb, and supports for the said filament connected to and carried by the said mount, the maximum diameter of the said unit transversely to the neck of the bulb being materially greater than the internal diameter of said neck, whereby it is impossible to insert or remove the unit through the neck without angularly altering its position with respect to the neck and the said unit when thus angularly altered having a cross-sectional area less than that of the neck, whereby the said unit may be inserted through the neck in its altered position.

6. An incandescent electric lamp comprising a bulb having a neck, an insulating mount, leading-in wires extending to and supporting the insulating mount and terminating thereabove, a filament support attached to the insulating mount, a filament attached to the ends of the leading-in wires and supported by the filament support, the ends of the leading-in wires and the filament support extending in approximately opposite directions and transversely to the neck of the bulb.

7. An incandescent electric lamp comprising a bulb having a neck, an insulating mount, leading-in wires extending to and supporting the insulating mount and terminating thereabove, a filament support attached to the insulating mount, a filament attached to the ends of the leading-in wires and supported by the filament support, the ends of the leading-in wires and the filament support extending in approximately opposite directions and transversely to the neck of the bulb, the extent of the said leading-in wires, filament and support transversely to the neck of the bulb being materially greater, and in line with the said neck being less, than the internal diameter of the said neck and whereby the filament may be inserted in or removed from the bulb by bending the portion of the leading-in wires beneath the insulating mount.

In testimony whereof, I have signed by name to this specification, in the presence of two subscribing witnesses.

HOWARD GILMORE.

Witnesses:
EMILY C. HODGES,
THOMAS J. DRUMMOND.