

July 28, 1925.

J. C. GROGAN

1,547,748

BUTT SEAL FOR MINIATURE LAMPS

Filed May 5, 1921

FIG. 1.

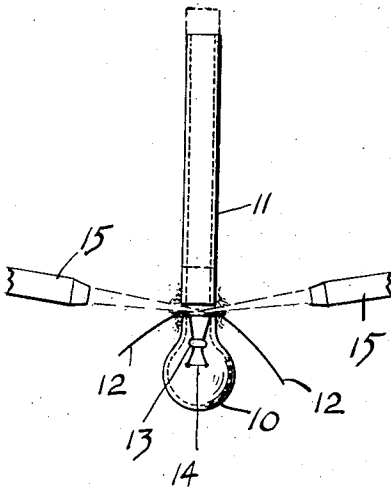


FIG. 2.

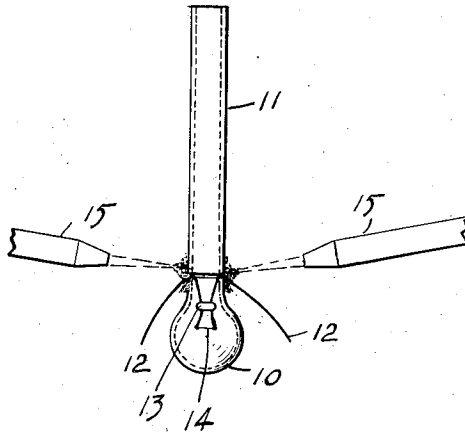


FIG. 3.

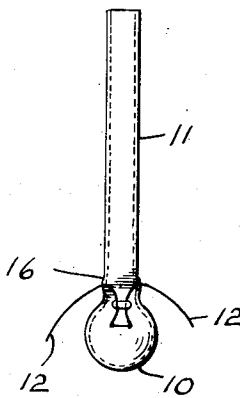


FIG. 4.

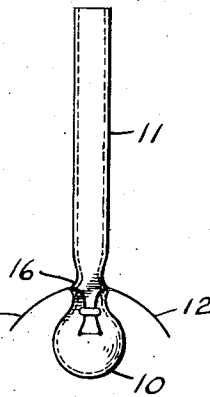
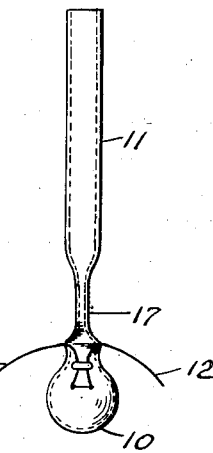


FIG. 5.



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UNITED STATES PATENT OFFICE.

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BUTT SEAL FOR MINIATURE LAMPS.

Application filed May 5, 1921. Serial No. 467,077.

To all whom it may concern:

Be it known that I, JACOB C. GROGAN, a citizen of the United States, and a resident of Newark, in the county of Essex and State of New Jersey, have invented a new and useful Improvement in Butt Seals for Miniature Lamps, of which the following is a specification.

This invention relates to the glass working art and, more particularly, it relates to butt sealing of glass parts, as practiced in the manufacture of incandescent electric lamps.

One of the objects of this invention is to provide a novel method of uniting the ends of glass parts and to include, in the seal performed thereby, one or more electrical conductors.

Another object of this invention is to provide a method of sealing electrical leading-in conductors between the ends of two glass portions of an incandescent lamp, whereby the mass of glass wetting with the conductors is increased and whereby a substantially non-leaking seal is obtained, thereby reducing losses due to faulty seals.

Other objects of this invention will be apparent from the following description.

The accompanying drawings, which form a part of this specification, illustrate a lamp in various stages of manufacture, and, in these drawings—

Fig. 1 illustrates parts of a lamp, as assembled for the sealing-in operation by the old method,

Fig. 2 illustrates parts of a lamp assembled for the sealing-in operation by the new method,

Figs. 3 and 4 illustrate the formation of the seal in successive stages of manufacture and,

Fig. 5 illustrates a completed seal with leading-in conductors sealed in position.

In the manufacture of incandescent electric lamps, it has been found desirable to have each manufacturing step or operation fully and satisfactorily completed in order that the operations following will not prove abortive by reason of defects inherent in one of the earlier operations. In the manufacture of certain incandescent lamps, such, for instance, as miniature lamps of the tipless type, one of the operations provides for the sealing together of two hollow portions of glass which have been assembled with

their openings in register. This operation provides for the inclusion of metallic conductors for carrying electric current from the exterior of the lamp to the filament. In forming the seal, the leading-in conductors are heated conjunctively with the heating of the glass. The method of heating, as heretofore performed, has been destructive to the portions of the leading-in conductors which are embedded in the glass forming the seal as these portions have had their surfaces subjected to the heating fires. This destruction of the conductors prevents them from properly wetting with the glass and making a gas-tight seal.

The new method of sealing together two parts of an incandescent lamp, with leading-in conductors properly embedded in the seal, will be described in connection with the formation of a seal between a lamp bulb and a tube of a miniature lamp of the tipless type. It is to be understood, however, that the method is not limited in its application to miniature lamps but may be employed in making other types of lamps, or in joining parts of vitreous material together and having metals or other bodies embedded in the joint.

The invention will be more readily appreciated by first setting forth a short description of the old method of forming the seal. In Fig. 1 is illustrated a bulb 10 of a miniature lamp and a short length of tubing 11 positioned apart from the bulb although having its opening substantially in alignment with the opening in the bulb. A mount, which usually comprises leading-in conductors 12, a glass bridge 13 for positioning the conductors and a filament 14 attached to the short ends of the conductors, is positioned in the bulb so that the free ends of the conductors hang over the edge of the opening in the bulb.

The glass of the bulb 10 and tube 11 is brought to a plastic condition by first directing the flame from burners 15 to meet substantially in a vertical axis passing through the opening in the bulb and the opening in the stem. The bulb is moved to a position so that the opening edge thereof is in contact with the flame and is thus heated. It is to be noted that, during the heating, the flame plays directly upon those portions of the leading-in conductors which are to be embedded in the seal. During the heating

of the bulb, the stem is maintained in a position above the flames, as illustrated in dotted lines in Fig. 1. The second step of this old method provides for the movement of the tube toward the bulb but not into contact therewith or with the leading-in conductors but to the position illustrated in full lines in Fig. 1. During the heating of the tube, the flame still continues to play directly upon the leading-in conductors.

When the proper plasticity of the lamp parts is obtained, the tube is pressed against the bulb and in contact, for the first time, with the leading-in conductors. The direct application of fire to the leading-in conductors burns off any flux on their surfaces and, in most instances, partially destroys the metal of the conductors to an extent that makes the seal entirely worthless, on account of air leaks. If, for instance, dumet wire, which is usually provided with a coating of copper-borate flux, is employed it is found that the seal between the leading-in wires and the glass is not satisfactory as, apparently, the copper borate is burned from the leading-in conductors and, apparently the copper sheath is punctured. This defect results in the formation of a leaky seal and, therefore, an unsatisfactory manufactured lamp.

By the present method of making a gas-tight seal between the lamp parts it is preferred to indirectly heat those portions of the leading-in conductors which are to be incorporated in the seal and thus prevent the fires from playing directly thereon.

Referring to Fig. 2, the mount and the portions of the lamp to be sealed together are assembled as illustrated, having the electrical conductors 12 in contact with both the bulb 10 and the tube 11 while the latter members have their adjacent edges registering with each other. The bulb and tube may be heated to plastic condition by any desired means, as, for instance, by applying pointed flames or fires which are preferably directed to the base of the tube. In practice, the flames are flared against the bulb and tube to simultaneously heat the edges thereof, but they do not, however, make direct contact with those portions of the leading-in conductors which are to be embedded in the seal. Therefore, any flux which may be on the conductors is not burned off by reason of the excessive heat due to the flames playing directly on the conductors. In the case when dumet wire is employed for the leading-in conductors, the flux carried thereon and the copper sheath thereof are not destroyed or punctured by the direct application of heat. Thus, by protecting certain portions of the conductors, a proper wetting of the leading-in conductors with the glass takes place during the formation of the seal.

After the tube and bulb have been properly heated, preferably by creating a relative movement between the fires and the lamp parts to obtain a circumferential heating, the tube and bulb are forced into intimate contact to properly embed the leading-in conductors. The usual method of providing the relative movement between the fires and the lamp parts is to rotate the bulb and tube in an assembled position.

The pressing of the bulb and the tube together forms an enlargement or ring 16, as illustrated in Fig. 3. The ring 16 is generally of greater diameter than the diameter of the tube or of the top of the bulb, as a relatively large mass of glass collects at this region because of puddling of the glass during the heating. Puddling of the glass provides greater contact surface for embedding the leading-in conductors.

After the tube and bulb have been pressed together, the fires are preferably maintained for a short time to bring the glass of the seal and that contiguous thereto to a substantially uniform temperature. The attainment of this substantially uniform temperature produces a uniformity of plasticity of the glass forming the seal and the adjacent portions of glass. Following the forming of the seal, the rotation of the work is stopped.

The mount is then aligned, if necessary, in the bulb so that the filament is held substantially in the center thereof. During the time required to align the filament, the heated portion of the glass becomes substantially uniform in temperature thus permitting the usual pulling operation for reducing the quantity of glass in the region of the seal and for forming a constriction 17 in the tube 11 for the purpose of sealing off the lamp during the exhausting operations.

In practicing the invention in accordance with the above description, there is a reduction in the number of lamps having faulty seals. The main reason for this increase of efficiency is that a satisfactory wetting of the glass and the leading-in conductors has been obtained.

From the foregoing description, it will be seen that I obtain a satisfactory seal chiefly by protecting from the fires the portions of the leading-in conductors which are incorporated into the glass seal. It is, therefore, desired to be understood that any means for accomplishing this purpose which may be a modification from that set forth and coming within the terms of the appended claims is regarded as being within the scope of the invention.

What is claimed is:

1. The method of butt sealing two tubular bodies and embedding a third body in the seal thereof which comprises positioning said tubular bodies with an end of each part

separated by and in contact with said third body, applying heat to render plastic portions of the tubular bodies adjacent said third body, permitting said plastic portions to unite and embed said third body within the joint and exerting pressure to enlarge said joint.

2. The method of preventing injurious application of heat to leading-in conductors during the butt sealing of the component parts of an incandescent lamp which comprises positioning the ends of tubular glass parts in contact with leading-in wires placed therebetween and rendering adjacent portions of said glass parts plastic by fires impinging only upon the outer cylindrical surfaces of at least one of said parts and effecting a relative movement of said tubular glass parts to unite the same at the plastic portion.

3. The method of butt sealing the component parts of an electric incandescent lamp, which comprises positioning a conductor with a portion thereof in contact with the ends of two lamp parts, applying heat to said parts adjacent said conductor, said adjacent parts being disposed to directly receive said heat and prevent injurious heating of the conductors disposed therebetween, pressing said parts together to enlarge the diameter of the heated portions and permitting them to unite with the leading-in conductors embedded in said enlargement.

4. The method of butt sealing the component parts of an incandescent lamp which consists in assembling a tube in alignment with a bulb having a mount therein and with the leading-in conductors of said mount positioned between and in contact with ends of said bulb and tube, heating the bulb and tube in a manner to prevent injurious application of heat to portions of the leading-in conductors between said tube and bulb, pressing the tube and bulb to-

gether to provide a thickened portion at the point of union and embedding said leading-in conductors in said thickened portion.

5. The method of forming a butt seal in an incandescent lamp which consists in positioning the leading-in conductors of a mount in contact with and between the ends of a bulb and a tube, locally heating portions of the bulb and tube adjacent the conductors and forcing the heated portions of the bulb and tube into a thickened portion having intimate contact with said conductors.

6. The method of butt sealing component parts of an incandescent lamp which consists in inserting a mount in one part with the leading-in wires thereof in contact with an edge of said part, placing another part in contact with leading-in conductors of said mount, applying heat to portions of said lamp parts adjacent to the leading-in conductors until said portions are rendered plastic, pressing the parts to produce a thickened portion to form a seal with the leading-in conductors embedded therein.

7. The method of forming a butt seal in a miniature incandescent electric lamp which consists in positioning portions of the leading-in conductors of a mount in contact with a tube having one of its ends registering with and in close proximity to the open portion of a lamp bulb, applying fires to locally heat the glass of said tube and bulb, said tube serving as a shield to prevent direct application of heat to said portions of the conductors, creating a relative movement between said fires and said lamp parts, pressing the glass of the bulb and tube together and around said conductors and drawing said glass before it has cooled to such a temperature as to be unworkable.

In testimony whereof I have hereunto subscribed my name this 30th day of April, 1921.

JACOB C. GROGAN.