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H. L. MEYER

3,036,236

ELECTRIC LAMP AND METHOD OF MANUFACTURE

Filed March 30, 1959

FIG. 1.

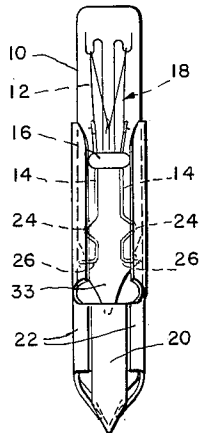


FIG. 3.

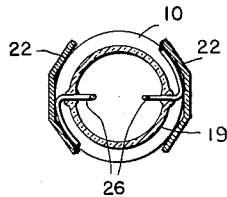


FIG. 2.

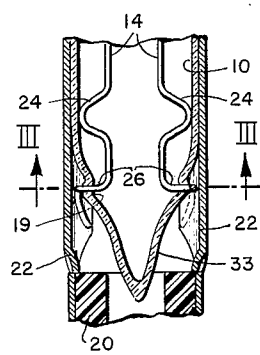


FIG. 4.

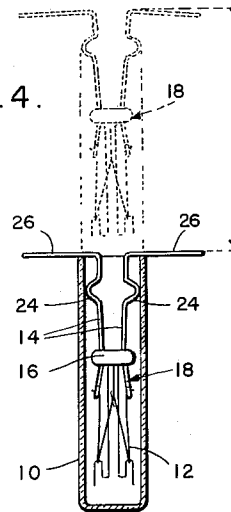


FIG. 5.

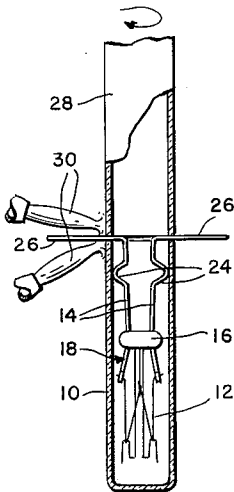


FIG. 6.

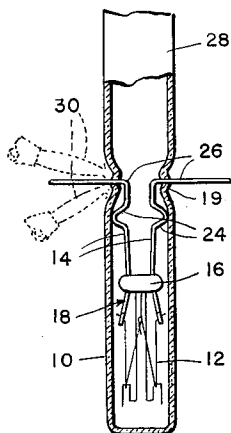


FIG. 7.

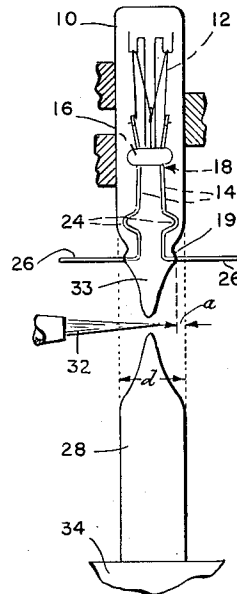


FIG. 8.

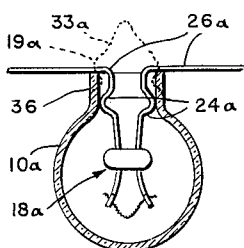
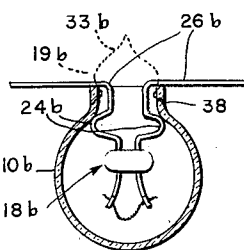


FIG. 9.



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ELECTRIC LAMP AND METHOD OF MANUFACTURE

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5 Claims. (Cl. 313—318)

This invention relates to electric lamps and, more particularly, to an improved filament mount structure for lamps of the butt-seal type and to a method of controlling the width dimension of the butt-seal during the formation thereof.

In butt-seal lamps as presently manufactured it is customary to shape the outer lead wire portions of the filament mount in such a manner that the lead wires fit snugly within and contact the walls of the envelope at the open end thereof when the mount is inserted into its position of use within the envelope and the laterally-disposed lead wire ends are seated against the end of the envelope. While the snug interfit between the mouth of the envelope and the lead wires has the desired effect of centrally locating the mount it prevents the glass from flowing inwardly during the formation of the butt-seal thereby causing the seal to become elongated and assume a flat rather than a round configuration. This flattening effect coupled with the tendency of the glass when molten to wet and creep outwardly along the protruding ends of the lead wires and thus form knots thereat makes it very difficult and frequently impossible to control the width dimension of the finished seal. In those instances where this dimension is critical, as in telephone switchboard lamps, for example, where the metal contact strips of the base extend along and partially enclose the sealed end of the lamp and where the outside diameter of the lamp must be kept within a certain dimension to insure that the lamp will fit into its socket, this lack of control over the width of the butt-seal inherent with the prior art type mounts has always been a problem from both a quality and manufacturing standpoint. In addition, and of equal importance, the prior art construction is also disadvantageous from a cost standpoint since lamps which exceed the permissible width dimension limit have to be rejected and scrapped.

With the foregoing in mind it is the general object of this invention to provide an improved electric lamp of the butt-seal type which will avoid the foregoing and other disadvantages of the prior art.

Another object of this invention is the provision of an improved mount structure for butt-seal lamps which will not only accurately locate the filament within the envelope but facilitate the butt-sealing operation and the formation of seals which will consistently meet the dimension criteria established for the production of usable lamps.

Still another object is the provision of a novel method of manufacturing a butt-seal lamp wherein the width of the finished seal is automatically controlled during its fabrication.

For a better understanding of the invention and the manner in which the aforesaid objects and others which will become apparent as the description proceeds are achieved, reference should be had to the accompanying drawing wherein:

FIG. 1 is an elevational view of a telephone switchboard lamp incorporating this invention;

FIG. 2 is an enlarged side sectional view through the butt-seal portion of the lamp shown in FIG. 1;

FIG. 3 is a cross-sectional view through the butt-seal portion of the lamp taken along the line III—III of FIG. 2, in the direction of the arrows;

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FIG. 4 is an elevational view of the lamp mount and envelope shown in the preceding figures illustrating the manner in which they are assembled preparatory to the butt-sealing operation;

FIGS. 5 and 6 are illustrations of the initial and final stages of the butt-sealing operation;

FIG. 7 is a view illustrating the tipping-off operation after the lamp has been evacuated; and

FIGS. 8 and 9 are alternative embodiments of this invention.

With specific reference to the drawing, in FIG. 1 there is shown a telephone switchboard lamp comprising a tubular envelope 10 of substantially uniform diameter having a filament mount 18 sealed therein. The mount 18 includes the usual pair of lead wires 14, held in spaced longitudinal-extending relation within the envelope 10 by a suitable insulating member such as a glass bead 16, and supports a filament 12 which is attached to the inner ends of said lead wires. The outer lead wire portions of the mount 18 are bent at right angles and in opposite directions (FIG. 4) to provide lead wire ends 26 which laterally project and are sealed through opposite sides of the butt-seal 19 (FIGS. 2 and 3) formed, as hereinafter described, at the end of the envelope 10. A pair of conductor strips 22 are cemented to and partially enclose the sealed end of the envelope 10 and are electrically connected to the protruding lead wire ends 26, as by spot welding for example, as shown in FIGS. 1 to 3. The conductor strips 22 are attached to and insulated from each other by a preformed body 20 of suitable plastic which has a wedge-shaped tip to facilitate the insertion of the lamp into its socket, as is well-known.

In accordance with this invention portions of the lead wires 14 at a predetermined point inward from the laterally extending lead wire ends 26 are bent outwardly to form oppositely disposed arcuate protuberances 24 of such configuration and dimension that the lead wire spacing thereat normally is greater than the inside diameter of the envelope 10, as illustrated by the broken line representation of the mount 18 in FIG. 4. This construction coupled with the fact that the lead wires 14 have a certain degree of natural resiliency provides what may be termed a compressible nodular clip section that resiliently presses against the walls of the envelope 10 at a point remote from the sealing area when the mount 18 is inserted into said envelope in the manner shown in FIG. 4. The protuberances 24 are preferably of substantially the same configuration so that the nodular clip section is symmetrical and thus coacts with the walls of the envelope 10 to center the mount 18 therewithin. The portions of the lead wires 14 between the protuberances 24 and laterally extending lead wire ends 26 are spaced a distance less than the inside diameter of the envelope 10 thereby constituting a constricted lead wire section that is positioned inwardly and centrally of the walls of the envelope 10 when the mount 18 is in its fully inserted position and the lead wire ends 26 are seated against the end edge of said envelope, as shown in FIG. 4.

By virtue of the clearance thus provided between the constricted lead wire section of the mount 18 and the end walls of the envelope 10, the end of said envelope and the abutting end of the exhaust tube 28 positioned thereagainst during the butt-sealing operation collapse inwardly under the influence of sealing fires 30 when said envelope and tube are rotated as a unit therethrough, as shown in FIGS. 5 and 6. The butt-seal 19 thus automatically constricts slightly while it is being formed. By properly shaping the nodular clip and constricted sections of the mount 18 sufficient clearance in the sealing area may be provided to permit the butt-seal 19 to collapse inwardly a distance "a" (FIG. 7) from the side of the envelope 10 and thus have an overall finished width considerably

smaller than the outside diameter "d" of said envelope. It will be noted that the protuberances 24 are located sufficiently remote from the sealing area that they engage a part of the envelope 10 which retains its original tubular shape. Thus, the mount 18 is centrally positioned within the envelope 10 without in the least interfering with the desired influx of the molten glass and resultant constriction of the butt-seal 19.

After the butt-sealing operation has been completed the free end of the exhaust tube 28 is inserted into an exhaust head 34 of an exhaust machine and the lamp evacuated whereupon the tube 28 is severed and sealed-off by means of a suitable tipping fire 32 to form a seal tip 33, as is customary and illustrated in FIG. 7. The sealed-in lamp is then inserted into the base member and the contact strips 22 attached to the envelope 10 and the protruding lead wire ends 26 in the usual manner to complete the fabrication of the lamp.

As a specific example of a suitable mount structure, satisfactory results in the manufacture of telephone switchboard lamps having envelopes $\frac{1}{4}$ of an inch in outside diameter have been obtained by positioning the protuberances 24 approximately 5 mm. inward from the lead wire ends 26 and shaping said protuberances so that they each project outwardly at least $\frac{1}{2}$ mm. and thereby space the constricted lead wire section of the mount a corresponding distance inwardly from the walls of the envelope. The finished width dimensions of the lamps manufactured with such mounts are such that the lamps easily and consistently pass through a hole .310 of an inch in diameter which test is applied to determine the acceptability of the finished lamps with respect to size. The aforesaid mount dimensions are given merely by way of example and may be varied over a wide range depending upon the dimensions and character of the lamp envelope in the sealing area and the amount of constriction of the butt-seal desired.

The invention may also be advantageously employed in the manufacture of other types of butt-seal lamps, as for example, those having an envelope 10a of bulbous configuration and a tubular neck portion 36 of substantially uniform diameter and considerable length, as illustrated in FIG. 8. By properly locating the protuberances 24a the nodular clip section of the mount 18a is so oriented according to this form of the invention that it engages and is resiliently compressed by the neck portion 36 thereby achieving the same advantageous inward positioning of the constricted lead wire section and reduction of the width of the butt-seal 19a in exactly the same manner as set forth above in connection with the tubular type envelopes.

In FIG. 9 there is shown another embodiment of this invention wherein the lamp envelope 10b is also of bulbous configuration but has a neck portion 38 which is too short to practically accommodate the compressible nodular clip section of the mount 18b. In this case the arcuate protuberances 24b are so located that they protrude slightly beyond and resiliently lock with the shoulder formed by the juncture of the bulbous and neck portions of the envelope 10b. This is accomplished by suitably enlarging the arcuate protuberances 24b so that a predetermined part thereof proximate their apexes engage the aforesaid envelope shoulder when the mount 18b is in its fully inserted position. In this manner the constricted lead wire section is locked in the proper position inwardly from and centrally of the neck portion 38 to again provide the desired clearance thereat and effect the constriction of the butt-seal 19b.

It will be recognized from the foregoing that the objects of the invention have been achieved by providing an electric lamp having a butt-seal which can be very conveniently fabricated and held within a preselected width dimension. Moreover, an improved mount structure and method of sealing-in the latter have been provided wherein by properly shaping the lead wires both

the positioning of the mount and control of the butt-seal dimension are automatically and very economically achieved during the regular sequence of operations required to fabricate the lamp.

While several best known embodiments of this invention have been illustrated and described in detail, it is to be particularly understood that various modifications in the configuration and the arrangement of parts may be made without departing from the spirit and scope of the invention.

I claim:

1. An electric lamp comprising an envelope having a neck portion, a butt-seal joining a sealed-off segment of vitreous tubing to said neck portion, a filament in said envelope, and a mount supporting said filament within said envelope including a pair of spaced lead wires extending longitudinally within said neck portion and having laterally disposed ends projecting and sealed through said butt-seal, portions of said lead wires distant from said butt-seal and within said neck portion having a spacing normally greater than the inside dimension of said neck portion thereat and forming a compressible clip section resiliently engaging the inner surfaces of said neck portion, and the portions of said lead wires between said compressible clip section and laterally disposed lead wire ends having a spacing less than the inside dimension of said neck portion thereat and constituting a constricted lead wire section positioned inwardly from the walls of said neck portion, said butt-seal by virtue of the clearance thus provided between said constricted lead wire section and said neck portion in turn being constricted and having an overall width that is within a preselected limit.

2. An electric lamp comprising an envelope having a tubular neck portion of substantially uniform diameter and a bulbous portion, a butt-seal joining a sealed-off segment of vitreous tubing to said neck portion, a filament in said bulbous portion, and a mount supporting said filament within said bulbous portion including a pair of spaced lead wires extending longitudinally within said neck portion and having laterally disposed ends projecting and sealed through said butt-seal at opposite sides thereof, each of said lead wires at a predetermined point inward from said butt-seal having arcuate protuberances therein constituting a compressible nodular clip section normally greater in width than the inside diameter of said neck portion and extending slightly beyond and resiliently interlocking with the shoulder formed by the juncture of said neck and bulbous portions, the portions of said lead wires between said nodular clip section and laterally disposed lead wire ends having a spacing less than the inside diameter of said neck portion and constituting a constricted lead wire section, the curvature and disposition of the nodular clip section with respect to the shoulder of said envelope being such that a predetermined part of each of the protuberances proximate the apex thereof engages the shoulder and in conjunction with the sealed-in ends of said lead wires maintains said constricted lead wire section centrally within and inwardly from the walls of said neck portion, said butt-seal by virtue of the clearance thus provided between said constricted lead wire section and said neck portion in turn being constricted and at its widest dimension no greater than the outside diameter of said neck portion.

3. An electric lamp comprising a tubular envelope of substantially uniform diameter, a butt-seal joining a sealed-off segment of vitreous tubing to one end of said envelope, a filament in said envelope, and a mount supporting and positioning said filament centrally within said envelope including a pair of spaced lead wires extending longitudinally of said envelope and having laterally disposed ends projecting and sealed through said butt-seal at opposite sides thereof, each of said lead wires at a predetermined point inward from said butt-seal having oppositely-disposed bends therein forming a sym-

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metrical nodular clip section that is compressible and normally greater in width than the inside diameter of said envelope and thereby resiliently pressed against the walls thereof, the parts of said lead wires between said nodular clip section and laterally disposed lead wire ends having a spacing less than the inside diameter of said envelope and constituting a constricted lead wire section that is positioned centrally within and inwardly from the walls of said envelope, said butt-seal by virtue of the clearance thus provided between said constricted lead wire section and said neck portion in turn being constricted and at its widest dimension no greater than the outside diameter of said envelope.

4. In the manufacture of an electric lamp that has an envelope with a tubular neck portion terminated by a butt-seal the steps of: bending the outer lead wire portions of the lamp mount to form laterally extending free ends, an adjoining constricted section and, at a preselected point inward from said free ends, a compressible clip section that has a spacing greater than the diameter of said envelope neck portion; inserting the mount into said envelope through the open neck thereof; positioning said mount so that said clip section engages and is resiliently compressed by a part of said envelope remote from the open end thereof, and said constricted section is located at and within the end of said neck portion but spaced inwardly from the walls thereof; sealing an exhaust tube to the end of said neck portion and around the laterally extending free ends of said lead wires by means of sealing fires; and, during the sealing-in operation, forcing the heat-softened end of said neck portion inwardly toward the constricted section of said mount solely by means of said sealing fires thereby to controllably constrict and maintain the width of the finished seal within a predetermined dimension.

5. An electric lamp comprising an envelope having a tubular neck portion of substantially uniform diameter and a bulbous portion, a butt-seal joining a sealed-off

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segment of vitreous tubing to said neck portion, a filament in said bulbous portion, and a mount supporting said filament within said bulbous portion including a pair of spaced lead wires extending longitudinally within said neck portion and having ends sealed through said butt-seal at spaced points on the periphery thereof, each of said lead wires at a predetermined point inward from said butt-seal and within said neck portion having arcuate protuberances therein disposed in a plane substantially normal to a cross-sectional plane of the neck portion and constituting a compressible nodular clip section that is normally greater in width than the inside diameter of said neck portion and is thereby resiliently pressed against the walls thereof, the parts of said lead wires between said nodular clip section and sealed-in ends having a spacing less than the inside diameter of said neck portion and constituting a constricted lead wire section positioned inwardly from the walls of said neck portion, said butt-seal by virtue of the clearance thus provided between said constricted lead wire section and said neck portion, in turn, being constricted and having an overall width that is no greater than the outside diameter of said neck portion.

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