METHOD OF BUTT SEALING INCANDESCENT ELECTRIC LAMPS

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METHOD OF BUTT-SEALING INCANDESCENT ELECTRIC LAMPS

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This invention relates to electric incandescent lamps and relates more particularly to a device and method of sealing lead wires in the wall of a lamp bulb of the miniature type.

In the manufacture of incandescent electric lamps of the miniature type such as Christmas tree lamps as well as certain forms of precision lamps as used for motor vehicles, it is the practice to provide what is termed a mount consisting of a filament having its terminals secured to lead wires. The lead wires are held in spaced relation by a glass bead and the free ends of the leads are bent at a point intermediate the bead and the ends of the leads at right angles and in opposite directions.

The mount so formed is disposed with the filament projecting into a bulb held with the open end or neck up. The extending portions of the lead wires rest upon the edge of the neck and serve to support the filament in the position at which it is secured. An exhaust tube is then moved so that the edge of one end is disposed in contact or in close spaced relation to the extended leads and the neck end of the exhaust tube are heated to consolidate them by fusion which also seals the leads through the wall or neck of the bulb.

This practice, which is termed butt-sealing, has certain defects as for example, it is necessary that the bulb neck have a uniform edge which is difficult to obtain owing to the fact that the neck must be cut to provide such an edge.

Furthermore, the edge of the neck may be a greater or lesser distance from the desired light center of the bulb so that when the mount has been sealed-in, the filament will not always be in the position desired along the longitudinal axis of the bulb or it may be cut of position laterally.

It is an object of the present invention, therefore, to provide a method of controlling the position of a mount within a bulb when the mount leads are sealed through the bulb wall and to shape the bulb neck edge for union with an exhaust tube.

Another object of the invention is to provide a method of butt-sealing which comprises forming in the neck of a bulb a depression or seat a predetermined distance from a point along the longitudinal axis of the bulb to receive the lead of a mount to position the light source of the mount when the lead wires are sealed through the bulb wall upon a consolidation of an exhaust tube with the bulb neck.

Another object of the invention is to provide means for heating to render plastic the edge of a bulb neck in combination with means for forming the plastic edge to provide definitely positioned portions to receive lead wires of a mount.

Other objects and advantages of the invention will be more clearly understood by reference to the following description together with the accompanying drawings in which:

Fig. 1 is a side view of a bulb supported to have the neck portion shaped in accordance with the present invention.

Fig. 2 is a view showing the shaping member in position to shape the bulb neck.

Fig. 3 shows the shaping member in contact with the bulb neck.

Fig. 4 shows the shaping member removed and notches formed in the bulb neck.

Fig. 5 shows a mount being positioned in the notches.

Fig. 6 shows an exhaust tube ready to be moved to position to be sealed to the bulb neck.

Fig. 7 shows the operation of sealing an exhaust tube to the bulb neck.

Fig. 8 shows a bulb with the mount sealed therein.

Fig. 9 shows a modified form of the shaping tool in position above a bulb.

Fig. 10 shows the tool applied to the bulb neck.

Fig. 11 shows the tool above the bulb neck after a shaping operation.

Fig. 12 shows an exhaust tube ready to be position to be sealed to a bulb neck, and

Fig. 13 shows a mount with the lead wires bent to seat in the notches formed by a shaping tool.

As shown in Fig. 1 a bulb 18 may be held in a suitable support 11. The bulb 18 is shown as it is manufactured under ordinary conditions. A mount such as shown in Fig. 5 is positioned with the laterally extending lead wires 12 and 13 of a mount (see Fig. 13) resting on the edge 14 of the bulb neck. The filament or light source 16 hangs downwardly within the bulb and is supported by the leads 12 and 13 preparatory to the union between the bulb neck and an exhaust tube. An exhaust tube is then so disposed that an edge is in contact with or close to the edge 14 of the bulb. Fires are then directed to heat and fuse the edges of the exhaust tube and bulb neck at which time the lead wires are sealed through the resulting wall of the bulb.

This method of butt-sealing an exhaust tube to a bulb is commonly used in the lamp art and is more clearly shown in Patent No. 1,742,153 issued December 31, 1929 for Sealing machine for incandescent lamps and similar articles.

When practicing the method as heretofore
employed, certain difficulties existed in maintaining the position of the filament uniform with respect to a given point as the bulb edge the position of the filament cannot be held to an accurate definite position.

The present invention provides means including a forming tool 20 arranged to move along the longitudinal axis of the bulb toward and away from the plastic neck portion of the bulb 14. The tool 20 may have a flange 22 and a centering tip 21 proportioned to slipably fit the interior surface of the bulb neck. The flange may be provided with oppositely disposed U- or V-shaped bosses or presser lugs 23 radially disposed on the under surface of the tool 20.

The edge 14 of the bulb is then subjected to heat from any suitable source as gas flames 24 and when the edge 14 has been softened, the tool 20 is moved to bring the flange 22 against the bulb edge the position of the filament can be more accurately maintained. The impressions 25 of U- or V-shape as shown in Fig. 4. The tool 20 may be moved to compress the softened glass so that the seats at the bottoms of the grooves or depressions will be determined distance from a point along the axis of the bulb as for example the distance X in Fig. 4 may be positively maintained thus insuring the light source of being disposed at a definite position in a bulb and making it possible to manufacture bulbs in large volume with each filament similarly positioned.

While the bulb is held by jaws 25 a mount is positioned by suitable feeding means 26 so that the lead wires 12 and 13 are disposed in the slots or notches 25. Since the distance between the filament and the laterally positioned portions of the leads can be held uniform, the position of the filament will be controlled by the position of the seats formed by the tool 20. An exhaust tube 28 is then moved so that an end 27 is adjacent to the edge 14 of the bulb and fires 28 are directed against the opposing tubular glass portion to fuse them and seal the lead wires through the wall.

After the exhaust tube is sealed to the bulb and before the glass has hardened, the bulb and tube are moved relative to each other to cause a constricted portion to form in the exhaust tube to facilitate a subsequent tipping-off operation after the bulb has been exhausted. The various operations directed to the shaping of the bulb neck may, obviously, be performed on a machine such as shown in the above mentioned patent in connection with a conveyor which may move the bulb from one position to another for the shaping operations and these operations may be added to machines now employed for sealing exhaust tubes to bulbs.

The tool 20, with the centering portion 21, causes the material displaced at the edge 14 of the bulb to extend outwardly, as shown in Figs. 3 to 8. If desirable, however, as shown in Figs. 10 to 12, a tool 30 may be employed having a hood 31 to enclose the end of the bulb neck during the forming operation. Within the hood may be provided a pair of bosses or a cross bar 32 of a V-shape so arranged that when the tool 30 is moved to engage the plastic neck portion of the bulb the cross bar will form V-shaped notches 33 but the displaced material will be disposed within the neck of the bulb and the outside surface of the neck will remain smooth and cylindrical.

The hood 31 of the tool 30 may be provided with a central pin 30' which serves to maintain the required diameter of the hole in the neck. The hood 31 in conjunction with the pin 30' makes it possible to engage the filament 15 at a flat edge in a plane transverse to the longitudinal axis of the bulb and to so dispose the surface of the edge that the lead wires 12 and 13 will lie flat. The accurate disposition of the filament in a predetermined position within the bulb is thus readily attained. The pin 30' may be so proportioned that it forms a hole of a diameter slightly greater than the distance between opposite outer surfaces of the portions of the lead wires which extend through the neck. By thus controlling the size of the aperture in the neck to fit the said portions of the lead wires the filament may be more effectively centralized.

By reason of the present invention it is possible to improve the quality of lamp in that the desired accuracy and uniformity of light center is possible edge so that the displaced material will be disposed within the neck of the bulb and the outside surface of the neck will remain smooth and cylindrical. The apparatus and method herein described in without departing from the spirit and scope thereof as pointed out in the appended claims.

What is claimed is:

1. The method of positioning the filament of a lamp mount in a given position within a bulb which comprises heating a bulb neck until plastic, forming surfaces on the neck in a predetermined relation to a given point in the bulb, positioning the lead wires of a mount on said surfaces and butt-sealing an exhaust tube on said bulb neck.

2. The method of positioning the filament of a lamp mount in a given position within a bulb which comprises heating a bulb neck until plastic, forming notches in the bulb neck to receive the lead wires of a mount and butt-sealing an exhaust tube to the bulb neck.

3. The method of butt-sealing the component parts of an incandescent electric lamp, which comprises positioning a bulb with the neck disposed uppermost, heating the neck until plastic, forming notches in the plastic portion while controlling the displacement of the plastic material, disposing the lead wires of a mount in said notches and butt-sealing an exhaust tube to said bulb neck.

4. The method of butt-sealing two vitreous tubular bodies and embedding a third body in the seal thereof, which comprises displacing material on the edge of one of said bodies to provide indentations to receive the third body while controlling the flow of displaced material, positioning said third body in said depressions and in butt-sealing to unite said two vitreous bodies.

5. The method of making incandescent electric lamps with the filament in predetermined positions which comprises forming surfaces on the bulb neck a predetermined distance from a given point in the bulb, providing a mount with laterally bent lead wires and with the distances between the bends and the filament equal to the distance between said surfaces and said point in the bulb, positioning said mount with the lead
wires disposed on said surfaces and sealing said wires in said neck.

6. A device for preparing the end of a bulb for a butt-sealing operation comprising, means for supporting a bulb, means for heating the neck of the bulb to render the same plastic, and a presser member movable longitudinally of the bulb for compressing the bulb neck to position the surface of the edge of the said neck a predetermined distance from a point selected along the longitudinal axis of the bulb.

7. A device for preparing the end of a bulb for a butt-sealing operation comprising, means for supporting a bulb, means for heating the neck of the bulb to render the same plastic, and a presser member for compressing the bulb neck longitudinally to position the surface of the edge of the said neck a predetermined distance from a point selected along the longitudinal axis of the bulb, said presser member having means for forming notches across said edge to receive the lead wires of a lamp mount.

8. A device for preparing the end of a bulb for a butt-sealing operation comprising, means for supporting a bulb, means for heating the neck of the bulb to render the same plastic, a presser member for compressing the bulb neck longitudinally to position the surface of the edge of the said neck a predetermined distance from a point selected along the longitudinal axis of the bulb, said presser member having means for forming notches across said edge to receive the lead wires of a lamp mount and means for positioning a mount with the filament within said bulb and the lead wires disposed in said notches.

9. The method of butt-sealing two tubular bodies and embedding a third body in the seal thereof which comprises heating and mechanically compressing to shape the edge of the one body to prepare it for attachment to the said third body, moving the first and second bodies in butt-sealing relation, heating to render plastic adjacent portions of said last mentioned bodies to cause them to unite by fusion and seal said third body.

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