

Dec. 18, 1962

S. E. SWASEY ETAL
ELECTRIC LAMP

3,069,583

Filed Oct. 30, 1959

3 Sheets-Sheet 1

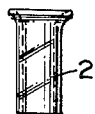


FIG. 2

FIG. 3

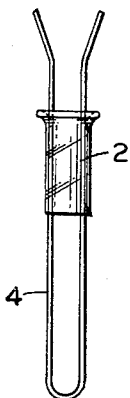


FIG. 4

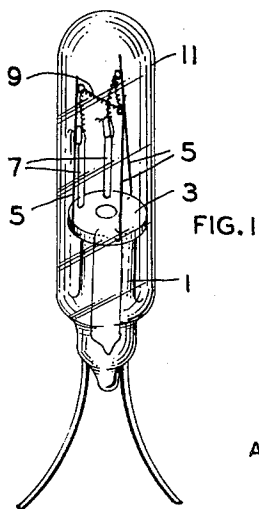
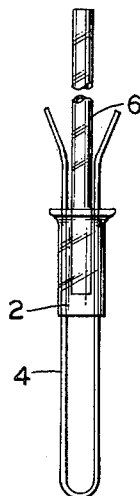


FIG. 1

PRIOR ART

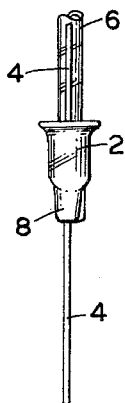


FIG. 5

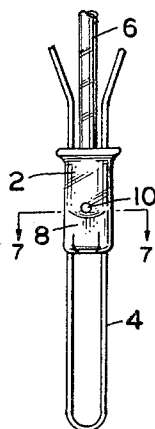


FIG. 6

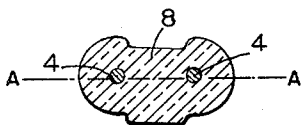


FIG. 7

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3 Sheets-Sheet 2

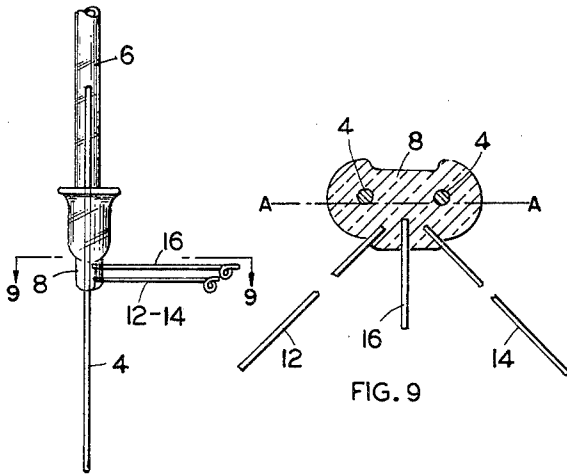


FIG. 8

FIG. 9

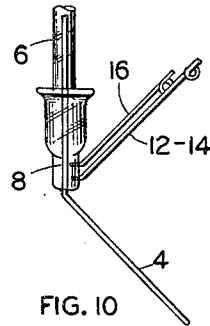


FIG. 10

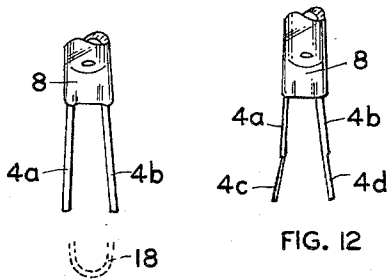


FIG. 11

FIG. 12

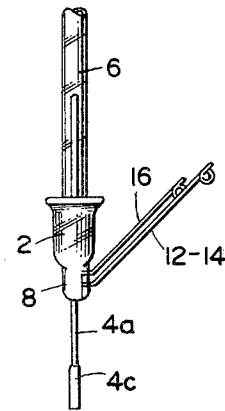


FIG. 13

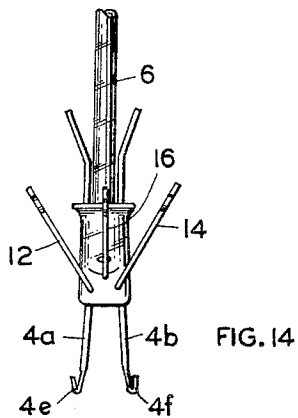


FIG. 14

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3 Sheets-Sheet 3

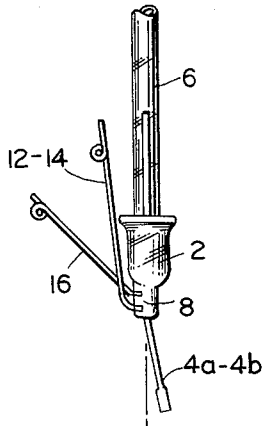


FIG. 15

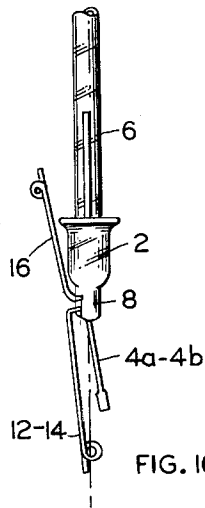


FIG. 16

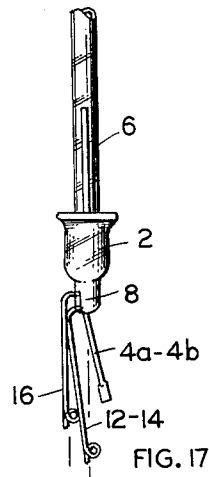


FIG. 17

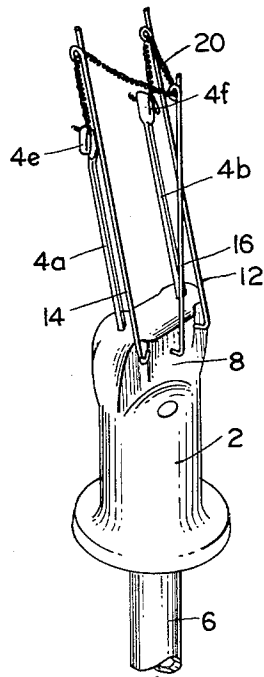


FIG. 18

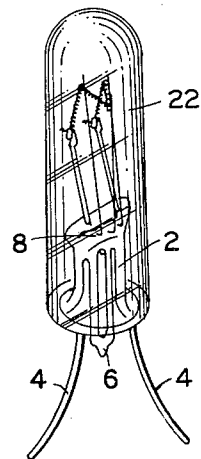


FIG. 19

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1

3,069,583

ELECTRIC LAMP

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3 Claims. (Cl. 313-317)

This invention relates to the manufacture of electric lamps and more particularly to the manufacture of miniature incandescent lamps, i.e., incandescent lamps which are very small in size.

In the manufacture of many types of incandescent lamps, such as those normally used for domestic lighting purposes for example, the lamp filament is usually connected, electrically and mechanically, to the inner ends of a pair of lead-in wires which are supported by and extend through the press portion of a glass flare which is sealed to the open end of the lamp envelope to provide a closed container. In this type of construction, accurate orientation of the lamp filament within the lamp envelope presents no great problem because the inner ends of the lead-in wires on which the filament is mounted are not apt to be accidentally displaced from their desired locus during subsequent lamp manufacturing operations.

On the other hand, in the manufacture of miniature incandescent lamps, such as telephone switchboard lamps for example, the lamps are so small that very serious practical manufacturing difficulties have made it impractical to utilize the flare type of construction with automatic lamp manufacturing equipment. One of these difficulties, for example, is the proper initial positioning of the lead-in wires in spaced relationship within the flare by automatic feeding means, such as shown in U.S. Patent 2,637,144 to Gardner et al. for example. The smaller the inside diameter of the throat of the flare gets, the greater the problem of properly feeding and orienting the lead-in wires becomes. Heretofore this problem has been avoided by using other types of mount structures. However, these other types of mount structures, particularly those used with telephone switchboard type of lamps, have always been characterized by certain recognized deficiencies and manufacturing problems as will be described more fully below.

In view of the foregoing, one of the principal objects of this invention is to provide a high quality mount structure for miniature incandescent lamps.

Another object is to provide a stem structure for miniature incandescent lamps which lends itself to manufacture on high speed automatic equipment.

A further object is to provide miniature incandescent lamps with a mount structure reproducible with a high degree of accuracy and uniformity of location within the lamp envelope.

These and other objects, advantages and features are obtained, in accordance with the principles of this invention, by providing miniature incandescent lamps with a stem type mount structure in which the stem press is preferably shaped so that substantially more glass is located on one side of the lead-in wires sealed therein than on the other, thus providing substantially more readily useable material for the insertion of filament support wires. The outside diameter of the neck of the bulb and the diameter of the flare of the stem type mount is maintained substantially equal so that in effecting the sealing of these two members to one another the bulb is positioned over the mount with the neck of the bulb resting on the adjacent face of the flare adjacent to the peripheral edge thereof. This is a substantial departure from conventional techniques normally used in incan-

2

descent lamp sealing operations where stem type mounts are employed. It has the very decided advantage that it contributes substantially to the attainment of uniformly and accurately positioned mounts sealed in their lamp envelopes. It also provides a much more uniformly shaped envelope end to which a base is affixed, and thus makes possible a substantial improvement in basing quality.

In the accompanying drawings,

FIGURE 1 is a perspective view of a telephone switchboard type of lamp illustrating the conventional construction thereof.

FIGURES 2-18 are details illustrating the parts used and the work performed thereon in the manufacture of a miniature incandescent lamp in accordance with the principles of the invention.

FIGURE 2 is a detail of a flare.

FIGURE 3 is a detail of a flare and lead-in wire assembly.

FIGURE 4 is a detail of a flare, exhaust tube and lead-in wire assembly.

FIGURES 5 and 6 are elevational views, taken 90 degrees apart, of the foregoing assembly after formation of the stem press.

FIGURE 7 is a transverse sectional view taken through the stem press of FIGURE 6.

FIGURE 8 is an elevational detail showing filament support wires inserted in the stem press.

FIGURE 9 is a transverse sectional view taken through the stem press of FIGURE 8 showing the disposition of the lead-in wires therein.

FIGURE 10 is an elevational view showing the positions to which the lead-in wire and the filament support wires are deflected to facilitate severance of the bight of the lead-in wire to form two lead-in wires as shown in FIGURE 11 and the spreading and flattening of the lead-in wires as shown in FIGURE 12.

FIGURE 13 is an elevational view showing the flattened lead-in wires returned to their normal position before the bight was severed and flattening was effected.

FIGURE 14 is a front elevational view showing the work after hooks have been formed at the ends of the lead-in wires.

FIGURE 15 is an elevational view showing some of the filament support wires deflected clockwise slightly and the lead-in wires deflected counter-clockwise slightly.

FIGURE 16 is an elevational view showing the remaining filament support wire bent counter-clockwise.

FIGURE 17 is an elevational view showing all three filament support wires and the lead-in wires disposed in their final positions preparatory to filament mounting.

FIGURE 18 is an enlarged fragmentary detail of the completed stem type mount structure showing the lamp filament attached at its ends to the hooked ends of the lead-in wires and extending through the loops formed at the free ends of the filament support wires.

FIGURE 19 is a perspective view of a completed lamp.

A conventional, commercial telephone switchboard type of miniature incandescent lamp is illustrated in FIGURE 1. The first step in the manufacture of this lamp is to start with a piece of tubing 1, form an outwardly extending peripheral flange 3 on one end thereof and then insert, radially, into said flange 3 on or more filament support wires 5, the number of support wires 5 varying with the type and final shape of the filament to be used. Formation of the flange 3 and inserting of the filament support wires 5 are usually effected on automatic machinery well known to those skilled in the art. Several of the succeeding operations, however, are performed manually and require highly skilled and experienced operators to insure some degree of uniformity and accuracy of workmanship.

3

An operator, working with suitable tools, bends the filament support wires 5 to their proper positions and puddles in the lead-in wires 7 into the flange 3. This operation requires considerable skill because the lead-in wires 7 must be affixed to the flange 3 at rather critical locations with respect to one another and with respect to the filament support wires 5. The length of the lead-in wires 7 extending above the flange 3 is also critical. The operator then mounts a filament 9 by attaching one end thereof to an end of one of the lead-in wires 7, threading it through loops provided therefor on the ends of the filament support wires 5 and then attaching the other end thereof to an end of the other lead-in wire 7. Since the filament is of accurate pre-determined length held within very close tolerances, it is apparent why the relative location of the lead-in wires and filament support wires are critical as just noted.

A lamp envelope 11 is now slipped over this structure and sealed to the tubing 1 to provide an hermetically sealed device. The envelope 11 must be large enough in diameter to clear the mount structure as it is slipped thereover and yet this clearance cannot be a very substantial one because it would tend to increase the already difficult task of sealing the envelope 11 to the tubing 1 without accidentally causing a sealing of or abnormal constriction in the tubing itself. After sealing of the envelope 11 to the tubing 1 the device is evacuated through the tubing and finally the tubing is tipped off.

The manner in which the electrical lamp of this invention is fabricated will now be described. The first sequence of steps constitutes the feeding of several individual work components which are then fabricated into a single unit. This is done on a suitable lamp stem fabricating machine which may be of the type shown in the Gardner et al. Patent 2,637,144 for example. The lamp stem fabricating machine is provided with a plurality of heads which include work-supporting members for retaining the several work components in predetermined relative positions. In the operation of the machine, the heads are moved through a path along which certain devices are disposed for operation on the work components to accomplish the desired work fabrication.

At the start, the flare 2 of FIGURE 2, the wire 4 of FIGURE 3 and the exhaust tube 6 of FIGURE 4 are fed sequentially to a machine head and supported therein in the relative position shown in FIGURE 4. The flare 2 and the exhaust tube 6 may be fed by means such as those in the Gardner et al. Patent 2,637,144. The wire 4 may be fed in accordance with the method taught in the Ward Patent 2,762,110 by the means shown and described in the co-pending application of Swasey et al. Serial No. 757,993. With the work components disposed as shown in FIGURE 4, the assembly is heated at several work stations and finally the stem press is formed in the flare 2 by the action of a pair of dies which move into encompassing relationship with respect to the molten glass. The shape of these dies and the manner in which they engage the molten glass is designed to provide a stem press or pinch 8 substantially as shown in FIGURE 7, i.e., a stem press in which there is a substantially larger body of glass on one side of the legs of the wire 4 sealed therethrough than on the other. As is shown in FIGURE 6, an exhaust port 10 is formed in the flare 2 adjacent to the stem press 8 while the glass is molten and at about the same time that the stem press is formed.

Filament support wires are now inserted into the stem press 8 substantially as shown in FIGURE 8 by suitable means well known in the art of lamp manufacturing and heretofore employed to insert filament support wires in an arbor button. One, two or several of these support wires may be inserted depending on the needs of the particular lamp type being manufactured. In this case there are three filament support wires, 12, 14 and 16 as shown in FIGURE 9, wires 12 and 14 lying in substantially the same horizontal plane as shown in FIGURE 8.

4

It will be noted, as shown in FIGURE 9, that the filament support wires 12, 14 and 16 are embedded in the side of the stem press 8 having the larger body of glass and are insulated from one another within the press.

To facilitate execution of certain subsequent operations, the wire 4 and the filament support wires 12, 14 and 16 are displaced by suitable tools from the positions thereof shown in FIGURE 8 to the positions thereof shown in FIGURE 10. With the wire 4 so disposed, the bight 18 thereof, shown in phantom in FIGURE 11, is severed to provide two lead-in wires 4a and 4b and the new free ends are spread apart slightly and then flattened as shown in FIGURE 12 to provide flats 4c and 4d. The lead-in wires 4a and 4b are then bent back to the position shown in FIGURE 13 and hooks 4e and 4f are formed in the flats 4c and 4d as shown in FIGURE 14.

The structure is now ready for the final positioning of the lead-in wires and the filament support wires in preparation for the mounting of a lamp filament thereon. The lead-in wires 4a and 4b are deflected as shown in FIGURE 15, the filament support wires 12 and 14 are bent to the position shown in FIGURE 16 and the filament support wire 16 is bent to the position shown in FIGURE 17. A filament 20 is then mounted on this supporting structure, the filament being threaded through filament retainers, as loops, provided therefor on the free ends of the filament support wires 12, 14 and 16 and the ends of the filament being clamped in the hooks 4e and 4f on the lead-in-wires 4a and 4b.

The mount assembly of FIGURE 18 is then sealed in a lamp envelope and the sealed envelope is evacuated and finally tipped off to provide the lamp shown in FIGURE 19. As was mentioned above, and as will be noted from an examination of FIGURE 19, the neck of the bulb 22 is sealed to the adjacent face of the flare adjacent to the peripheral edge thereof. This avoids the variations and dislocations of the disposition of the mount structure during sealing which occur many times with some of the well-known sealing techniques.

What we claim is:

1. An incandescent electric lamp comprising: a lamp envelope; a re-entrant stem disposed within and hermetically sealed to said lamp envelope, said stem having a stem press formed therein and an exhaust tube depending therefrom; a pair of lead-in wires sealed in said press intermediate the ends thereof, said lead-in wires extending through said press and being offset from the major transverse axis thereof; at least one filament support wire having one end thereof embedded in said press on the side thereof opposite said lead-in wires, the other end of said filament support wire being provided with a filament retainer; and a filament supported by said lead-in wires and said filament support wire, said filament being supported by said retainer of said filament support wire and being attached at its ends to the adjacent ends of said pair of lead-in wires.

2. An incandescent electric lamp comprising: a lamp bulb having a substantially cylindrical neck portion; a stem, having a press formed in one end thereof and a flare formed in the other end thereof, disposed within said bulb, the neck of said bulb being sealed to said flare adjacent to the peripheral edge thereof; a pair of lead-in wires sealed in said press intermediate the ends thereof, said lead-in wires extending through said press and being offset from the major transverse axis thereof; at least one filament support wire having one end thereof embedded in said press on the side thereof opposite said lead-in wires, the other end of said filament support wire being provided with a loop; and a filament supported by said lead-in wires and said filament support wire, said filament extending through said loop of said filament support wire and being attached at its ends to the adjacent ends of said pair of lead-in wires.

3. The combination of claim 2 in which the outside diameter of the neck of the bulb and the diameter of the flare are substantially equal.

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