Feb. 25, 1936. R. B. THOMAS 2,031,746

LAMP, TUBE AND SIMILAR DEVICE

Filed May 15, 1934

Fig. 1.

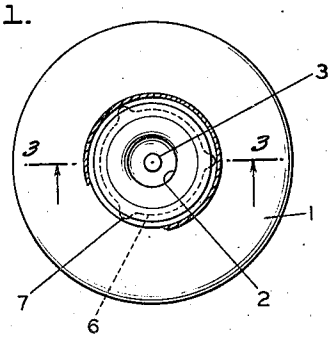


Fig. 5.

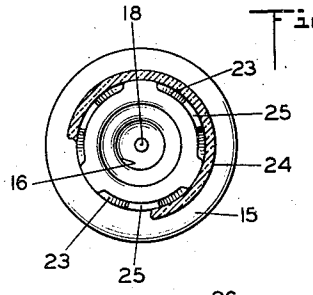


Fig. 2.

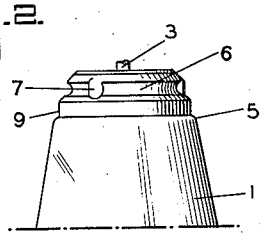


Fig. 6.

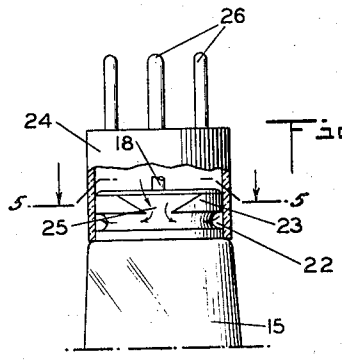
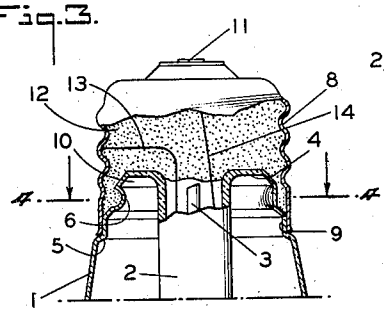


Fig. 3.



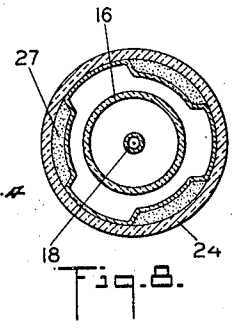


Fig. 8.

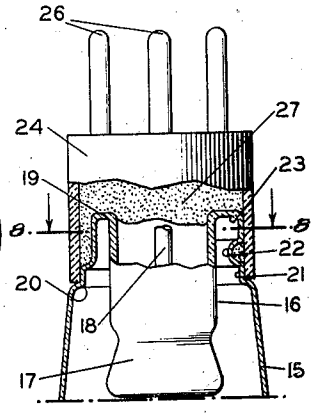


Fig. 7.

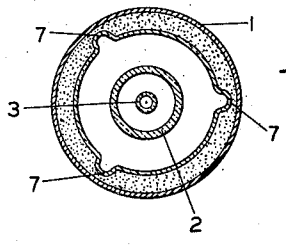


Fig. 4.

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LAMP, TUBE AND SIMILAR DEVICE

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Application May 15, 1934, Serial No. 725,709

8 Claims. (Cl. 176—32)

This invention relates to lamps, tubes and similar devices, and with particularity to improvements in seals and bases for such devices.

An object of the invention is to provide an improved manner of sealing a lamp or tube envelope.

Another object is to provide a lamp or tube with a specially molded seal.

Another object is to provide the seal portion of a lamp or tube with a specially molded configuration whereby the lamp or tube may be more securely fastened to a base.

A feature of the invention relates to a lamp, tube or similar device having an envelope and a base cemented or otherwise bonded thereto, the bonding material being interlocked with the envelope.

Another feature relates to a lamp, tube or similar device having a cemented base, together with means for positively preventing relative movement between the lamp or tube envelope and the base.

Another feature relates to a molded seal for a lamp or tube which is provided with spaced projections or spaced recesses to receive a cement or similar bonding material, whereby resistance of the lamp envelope to movement relative to the base is increased.

A further feature relates to the improved manner of coupling a lamp or tube envelope to a supporting or contacting base.

A further feature relates to a cement-based lamp or tube having locking means to supplement the adhesive bonding effect between the cement and the lamp or tube.

A still further feature relates to the novel organization, arrangement, and relative location of parts which go to make up an improved cemented base for lamps, tubes and similar devices.

Other features and advantages not specifically enumerated will be apparent after a consideration of the following detailed descriptions and the appended claims.

While the invention will be described herein as embodied in certain specific forms it will be understood that this is done merely for purposes of explanation and not by way of limitation.

Accordingly in the drawing, Fig. 1 is a bottom plan view, partly in section of a lamp constructed according to the invention.

Fig. 2 is an elevational view of the lower portion of a lamp having a molded seal according to the invention.

Fig. 3 is an elevational view, partly in section, showing how a lamp is based according to the invention.

Fig. 4 is a sectional view taken along line 4—4 of Fig. 3.

Fig. 5 is a bottom plan view, partly in section, showing a modification of the basing method, as applied to a bayonet-type contact base.

Fig. 6 is an elevational view, partly in section, of the tube of Fig. 5, showing the molded seal.

Fig. 7 is a partial elevational view of Fig. 6 showing the cement or other bonding material in place.

Fig. 8 is a sectional view of Fig. 7 taken along the line 8—8 thereof.

Referring to Figs. 1 to 4, the numeral 1 represents the envelope of a lamp, radio tube or similar device which is preferably of glass or similar moldable material. While the drawing shows only the conical neck portion of the lamp it will be understood that the invention may be embodied in any known shape of lamp. The envelope 1 is adapted to be united to a re-entrant stem portion 2 which terminates in a press (not shown) having the various lead-in and support wires sealed therein in the usual manner. Since the present invention is concerned mainly with the method of sealing the envelope portion to the re-entrant portion and with the method of fastening the sealed envelope to a suitable base, only such portions of the lamp are shown in Figs. 1 to 4 as are necessary to an understanding of the invention. Preferably, although not necessarily, the lamp is of the "tipless" type, that is to say the lamp is provided with an exhaust tubulation 3 carried by the re-entrant stem, through which tubulation the sealed envelope may be exhausted in any approved manner.

As will be seen the stem is provided with a flanged portion 4 which is adapted to be united to the envelope 1. For this purpose the stem is positioned with the said flange in contact with the open end of the envelope and the contacting areas are subjected to sufficient heat to cause the stem flange and the envelope to fuse together. In accordance with the present invention, while this fusing operation is proceeding the parts are subjected to alternate pulls and contractions so as to work the fused areas more uniformly together. At this time also air under pressure may be admitted through the tubulation to force the molten joint against a suitable mold which is positioned around the sealing area. Preferably this mold is designed so as to form the seal portion with a smooth continuous circular shoulder 5 and with an annular re-entrant channel 6. Preferably

also the mold is so designed to provide a series of ribs 7 which block off the channel 6 into a plurality of separate segments, and while the drawing shows three of these ribs it will be understood that a greater or less number may be employed if desired. In order that the contact base 8 may be cemented and held in place symmetrically with respect to the envelope the mold is preferably so designed that the area 9 of the seal-in portion of the envelope between the shoulder 5 and channel 6 is cylindrical and parallel to the longitudinal axis of the envelope. Preferably also, the portion 10 of the seal-in is of lesser diameter than the portion 9 for purposes about to be described.

The lamp having been thus provided with the specially molded seal-in, is next provided with a suitable contact base 8 which may be of any well known construction. Thus a conventional threaded hollow metal base is shown carrying the usual contact button 11 which is insulated from the metal shell of the base in any known manner. Prior to fastening the base in place a quantity of cement 12 is placed in the base preferably with the lamp in an inverted position as shown in Fig. 3 so that the cement or other bonding material when melted, flows downwardly to fill the space between the seal-in portion of the envelope and the base and also to fill the annular channel 6. When the bonding material hardens, because of the annular channel 6 and the blocking ribs 7 it is effectively interlocked with the complementary-shaped seal-in portion of the envelope thus supplementing the ordinary adhesive bond between the bonding material and glass. Consequently in order to effect a separation between the lamp envelope and the base it is necessary to overcome not only the usual adhesiveness of the bonding material to the glass but also to overcome the interlocking effect between the bonding material and the body of the seal-in. It has been found that with ordinary cementing methods, while there may be sufficient adhesiveness between the cement and the surface of the base 8, the same degree of adhesiveness may not be attainable between the cement and glass with the result that excessive torsional forces on the lamp envelope may loosen the envelope in the base. With the interlocking arrangement between the cement and the glass as shown, the normal adhesiveness between the cement and glass is supplemented mechanically, to provide adequate insurance against the envelope becoming loose in the base. It will be understood the manner of fastening the lead wires 10 and 11 to the respective parts of the base forms no feature of the present invention and any well known procedure may be employed in that connection.

While the drawing shows the base 8 of metal it will be understood that any other material may be employed and if desired the portion of the base opposite the annular channel 6 may be provided with inwardly extending projections so as to provide an interlock between the base and the hardened cement. Instead of employing projections for this purpose, the base may be roughened or ridged. Similarly instead of providing the channel 6 with ribs the surface of the channel may be knurled or similarly roughened to provide a plurality of interlocking points between the seal-in portion of the envelope and the hardened cement.

Referring to Figs. 5 to 8, there is shown a modified form of the molded seal and base, as applied to a lamp or tube having a bayonet-type contact base. While the majority of lamps are provided with threaded bases as shown in Figs. 1 to 4, such lamps are in ordinary cases subjected mainly to torsional forces when inserted and removed from their sockets. In the case of lamps or tubes having bayonet-type bases, the major forces are exerted longitudinally, and in certain cases the friction of the cooperating socket contacts may be such that when the lamp or tube is pulled from the socket, the bulb becomes loose in the base.

Figs. 5 to 8 show a type of molded seal which is specially arranged to couple the bulb and base more securely together. In these figures the numeral 15 represents, for example, the neck portion of the enclosing envelope of a conventional radio tube. Adapted to be sealed to the envelope is a re-entrant stem 16 terminating in a press 17 into which are sealed the various lead-in and support wires (not shown), the stem also carrying the usual exhaust tubulation 18. Stem 15 is positioned with the flanged portion 19 in contact with the open end of envelope 15 and the parts are heated to cause them to fuse together, the fused parts preferably being pulled to provide a more uniform bond. During this bonding operation while the seal is still soft, air under pressure may be led into the envelope through tubulation 18 to force the molten seal portion against a suitable external mold. This mold is designed so as to form the seal area with a smooth circumferential shoulder 20, a cylindrical section 21, a re-entrant annular channel 22, and another cylindrical section 23 preferably of the same outside diameter as section 21. Preferably also, sections 21 and 23 have an outside diameter substantially the same as the inside diameter of the shell base 24. During the molding operation, section 23 is formed with a plurality of separate circumferential sectors, adjacent sections being separated by substantially V-shaped channels 25 communicating with annular channel 22 as shown more clearly in Fig. 6. While the drawing shows three of these sectors, separated by three V-shaped channels, it will be obvious that a greater or less number may be provided.

The base 25 may comprise a shell of suitable insulation material carrying one or more contact pins or prongs 26 which are electrically connected to the various lead-in wires (not shown) sealed into press 17. Base 25 is assembled so that its edge seats against shoulder 20, and because of the cylindrical section 21 the positioning of the base in proper relation to the envelope is assured. As stated above, the internal diameter of the base is preferably substantially the same as the outer diameter of sections 21 and 23 of the molded seal so that when the cement or other bonding material 27 becomes molten it flows down through channels 25 into channel 22 as indicated by the arrows (Fig. 6). When the cement hardens there is provided, in addition to the usual adhesive bond, a mechanical keying or interlock between the cement and the molded seal, because the cement conforms itself to the shape determined by channels 23 and 25. If desired, the annular channel 23 may be provided with ribs or projections as disclosed in connection with Figs. 1 to 4, although since the device shown in Figs. 6 to 8 is subjected mostly to longitudinal strains, the type of interlock shown, is amply sufficient to prevent the bulb from becoming loose in the base. It will be understood that the invention is not limited to the particular type of molded interlocked seal shown. Furthermore the invention is not limited to any particular materials.

If desired the base 24 may be provided with projections cooperating with channel 22 to provide an interlock between the base and the hardened cement. Likewise if desired, the annular channel 22 may be replaced by a circumferential bead provided with a plurality of circumferentially spaced notches. Accordingly, the expression "annular channel" as employed herein, is intended to cover a channel which is either in the form of a groove or in the form of an annular bead.

Various changes and modifications may be made herein without departing from the spirit and scope of the invention.

What I claim is:

1. An electric device of the character described comprising an envelope sealed to a stem, the area adjacent the seal having a circumferential shoulder and a cylindrical portion adapted to receive a base, the elements of the cylindrical portion being substantially parallel to the longitudinal axis of the lamp, said area also being provided with an annular channel and a plurality of circumferential locking ribs separated by V-shaped notches.

2. An electric device of the character described comprising an envelope terminating in a neck portion, said neck portion being provided with a circumferential channel and a plurality of other channels communicating with said circumferential channel.

3. An electric device according to claim 2 in which the said other channels are substantially V-shaped.

4. An electric device of the character described comprising an envelope terminating in a neck portion, said neck having a circumferential channel, and a circumferential bead, said bead being sub-divided into sectors by substantially V-shaped notches.

5. In combination, an electric device of the character described comprising an envelope having a neck portion, a base into which said neck portion fits, cementitious bonding material between said neck and base, and means integrally formed on said neck for providing a mechanical interlock between the neck and said material, the last mentioned means including a circumferential bead and a circumferential channel, said bead being subdivided into separate sectors to form V-shaped channels communicating with the circumferential channel.

6. In combination an electric lamp or similar envelope having a neck portion provided with a circumferential shoulder and a cylindrical section adapted to receive a shell base, the elements of the cylindrical section being substantially parallel to the longitudinal axis of the lamp, a circumferential bead on said neck portion, V-shaped notches dividing said bead into sectors, and a cementitious bonding material between said neck and base and forming with said bead and sectors a mechanical interlock.

7. In combination an electric device of the character described comprising an envelope having a neck portion provided with a circumferential channel and a plurality of other channels extending at an angle to the first channel and communicating therewith, a shell base into which said neck fits, and cementitious bonding material between said neck and base, said material filling said channels to provide a mechanical interlock.

8. In combination an electric device of the character described comprising an envelope having a neck portion provided with a pair of spaced cylindrical beads of substantially the same outside diameter, a plurality of notches on one of said beads, a cylindrical shell base adapted to fit over said neck and having substantially the same internal diameter as the outside diameter of said beads, and cementitious material between said base and neck and mechanically interlocked with said notches.

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