

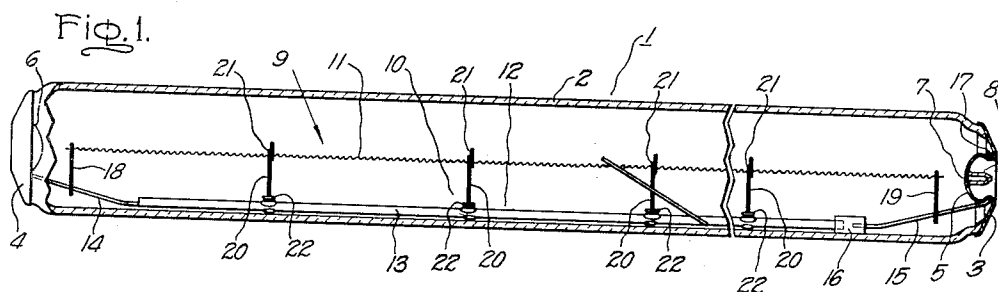
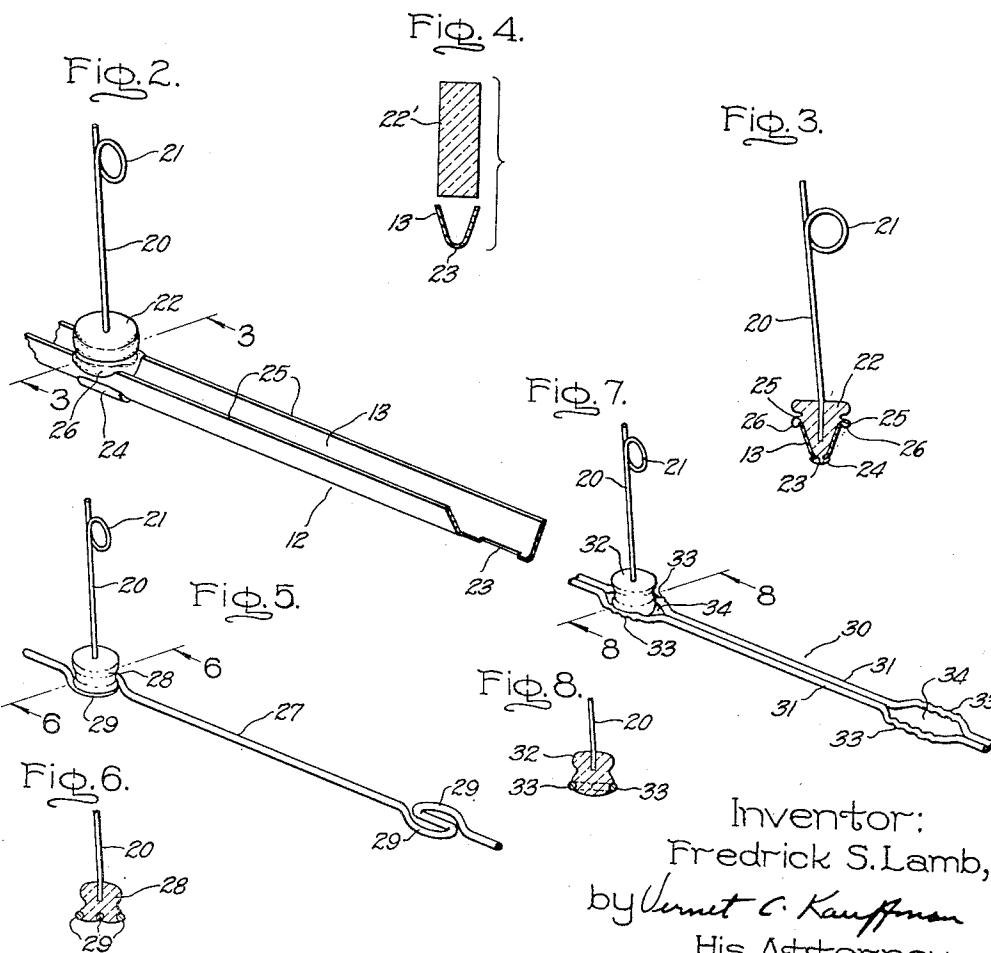
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ELECTRIC INCANDESCENT LAMP

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ELECTRIC INCANDESCENT LAMP

Fredrick S. Lamb, Cleveland Heights, Ohio, assignor to General Electric Company, a corporation of New York; patent dedicated to the Public insofar as it relates to lamps and lamp parts to the extent stated in document recorded in the U. S. Patent Office, January 4, 1954, Liber U-238, page 394

Application January 2, 1951, Serial No. 293,836

5 Claims. (Cl. 313-274)

My invention relates to electric incandescent lamps and similar devices, and more particularly to a mount structure therefor. The invention is of particular utility in connection with electric incandescent lamps of the double-ended tubular type having a base at each end and a filament extending longitudinally of the lamp, such as shown and described in U. S. Patent 2,032,791, Carton, and 2,158,849, Blake, assigned to the assignee of the present invention.

Lamps of the above-mentioned double-ended tubular type are in general use at present and comprise a tubular glass envelope having metal end caps or bases sealed to the opposite ends thereof and an elongated mount supported within the envelope between the metal end caps. The mount comprises an elongated filament extending longitudinally of the envelope and supported at a plurality of spaced points along its length by a number of anchor wires insulatively fastened, by means of glass beads, to an elongated stay member which is resiliently compressible longitudinally between and supported in place by the end caps of the envelope. The stay member comprises a main or center section preferably formed of a metal channel so as to possess adequate rigidity and provided at its opposite ends with terminal wires or end conductors which are electrically connected to the ends of the filament and which bear against the end caps to make electrical connection therewith.

Heretofore, the glass support beads for the filament anchor wires of such lamp mounts have been attached or fastened in place on the metal channel by means of a fused seal therebetween, the glass beads being securely held in place by the bond between the glass and the metal of which the channel is formed. Such a fused seal type of attachment of the glass beads to the metal channel therefore requires the use of a suitable metal for the channel which will readily "wet" and adhere to the glass of which the support beads are made. Up to the present the metal most suitable and preferably employed for this purpose has been a special high-chrome iron alloy of the so-called stainless steel type. Such a material, however, is quite expensive, thus adding materially to the cost of the finished lamp.

It is an object of my invention, therefore, to provide an electric incandescent lamp of the above-mentioned general type having a mount structure of simple and relatively inexpensive construction and easy to fabricate.

Another object of my invention is to provide an electric incandescent lamp of the above-mentioned general type having a lamp mount in which the glass beads which support the filament anchor wires are fastened to the stay member of the mount by means of a mechanical interlock therebetween.

According to the invention, the elongated stay member, which is preferably in the form of a metal channel, is provided with a plurality of spaced apertures or slots through which the glass support beads for the anchor wires are forced, when heated to a plastic condition, to cause the soft glass to spread over and grip the opposite

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sides of the channel around the apertures, thereby keying and locking the glass beads in place on the channel.

Further objects and advantages of my invention will appear from the following description of a species thereof and from the accompanying drawing.

In the drawing, Fig. 1 is a longitudinal sectional view, partly in elevation, of an electric incandescent lamp according to the invention; Fig. 2 is an enlarged fragmentary perspective view of the mount structure of the lamp shown in Fig. 1; Fig. 3 is an enlarged transverse section of the mount structure taken on the line 3-3 of Fig. 2; Fig. 4 is a sectional view illustrating the method of forming the glass beads and attaching them to the channel member of the mount structure; Fig. 5 is a fragmentary perspective view of a modified form of mount construction according to the invention; Fig. 6 is a fragmentary sectional view on the line 6-6 of Fig. 5; and Figs. 7 and 8 are views similar to Figs. 5 and 6, respectively, of another modification of the invention.

Referring to the drawing, the lamp there shown is of the double-ended tubular type shown in the above-mentioned U. S. Patents 2,032,791 and 2,158,849, and comprises an elongated sealed envelope 1 consisting of a tubular glass bulb 2 having disc-shaped metal end caps or bases 3, 4 fusion-sealed to its opposite ends to form end walls for the envelope and contact terminals for the lamp. The said end caps or discs 3, 4 are preferably made of a metal alloy which has a coefficient of expansion approximately the same as that of the glass of which the tube 2 is made and which seals readily thereto by fusion. For a soft glass tube 2, the end caps 3, 4 are preferably made of a chrome-iron alloy containing about 25-30% chromium. The end caps 3, 4 are preferably concave or dish-shaped so that they may be made of thin material while retaining adequate strength, and they are provided with centrally located bosses 5, 6 which project axially inward of the envelope 1. The envelope 1 is exhausted through an aperture 7 at the center of the end cap 3, the said aperture being sealed by a mass of glass 8 which constitutes the tipped-off residue of a glass exhaust tube and which is sheltered within the cavity formed by the boss 5.

Mounted within and extending longitudinally of the envelope 1 is an elongated lamp mount 9 according to the invention comprising a filament support structure 10 and an elongated filament 11 supported thereby. The filament support structure 10 comprises a stay member 12 composed of an elongated straight center section 13 extending longitudinally of the tube 2 adjacent the wall thereof and provided at its opposite ends with terminal wire or conductor extensions 14, 15. The center section 13 of stay member 12 is preferably in the form of an approximately V-shaped channel member to one end of which the terminal wire 14 is electrically connected as by welding. The other terminal wire 15 is insulatively secured to the other end of the channel member 13 by a short length of glass rod 16 in which the respective ends of the channel member 13 and wire 15 are embedded.

As shown, the terminal wires or end conductors 14, 15 extend from the opposite ends of the channel member 13 at a slight angle relative thereto, and their free or outer ends are bent to extend transversely of the channel member 13 and are formed into loops 17 which encircle the bosses 5, 6 on the respectively adjacent end caps to thereby position the lamp mount 9 within the envelope 1 with the filament 11 extending more or less axially of the said envelope. The loop 17 on one or both terminal wires 14, 15 is initially formed with a slight pitch or spiral shape, i. e., it is formed as a coil of less than one full turn, for the purpose of making the stay member 12 resiliently compressible to a slight extent longitudinally thereof. During the manufacture of the lamp, the spiral-shaped

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loop or loops 17 more or less flatten out as the stay member 12 is compressed between the opposite end caps 3, 4, the loops 17 thus resiliently bearing against the concave inner side of the end caps and so making good electrical contact therewith.

The filament 11 is in the form of a coiled tungsten wire which extends substantially the entire length and axially of the envelope 1 and is stretched out and clamped or otherwise electrically connected at its ends to short spur wires 18, 19 welded to the terminal wires 14, 15, respectively. The filament 11 is additionally supported at intermediate points along its length by one or more support or anchor wires 20 extending from the channel member 13 at spaced points therealong, the said support wires being provided at one end with filament-supporting loops 21 and being secured at their other ends and insulated from the channel member by means of small glass support beads 22 in which the support wires 20 are embedded.

In accordance with the invention, the glass beads 22, in place of being fastened to and held in place on the channel member 13 by means of a fused glass-to-metal seal as has heretofore been the practice, are mechanically anchored to the channel member instead. For such purpose, the channel member 13 is formed, at spaced points along its length corresponding to the location of the glass beads thereon, with locking shoulders provided, in this instance, by apertures 23 formed in the channel member 13. The glass beads 22 engage and are immovably held in place on the channel member 13 by the said locking shoulders, the glass beads extending through and at least partially embedding the marginal edges of the apertures 23 so as to be locked to the channel member 13 within the said apertures. The attachment of the glass beads 22 to the channel member 13 is performed by heating one end of a short length of glass rod or a pressed powdered glass pellet 22' (Fig. 4) to a plastic condition and then pressing the heated end down into the channel 13, which is also preferably heated to a slight degree, over the apertures 23 therein so as to substantially fill the interior cross-sectional space of the channel at the respective apertures with glass and also force some of the plastic glass down through the apertures and around the outside edges thereof as shown at 24 in Figs. 2 and 3, thus embedding the marginal portions of the channel member bordering the apertures 23. At the same time some of the plastic glass is forced over the upper edges 25 of the channel member 13 and around its outer sides, as indicated at 26, so as to also embed the upper edges of the channel member in the glass of the bead. The result, therefore, is a secure and strong clamping or mechanical interlock of the glass to the channel such as effectively holds it immovably in place on the channel. After the attachment of the glass rods 22' to the channel member 13, the upper ends of the rods 22' are heated to a plastic condition and fused down, whereupon the support wires 20 are inserted endwise into and embedded in the glass to complete the support wire mounting.

Inasmuch as the attachment of the glass beads 22 to the channel member 13 is customarily effected by automatic means such as causes the location of the glass beads lengthwise of the channel member 13 to vary within small limits, it is preferable that the apertures 23 be in the form of slots extending lengthwise of the channel member so as to allow for any such slight variation in bead location and assure that at least a part of the glass forming the bead will be forced through the respective apertures 23 and become locked therein. While, as shown, the apertures or slots 23 may be formed at the bottom of the V-shaped channel member 13, they may, if desired, be formed in the sides of the channel member instead.

In the modification of Figs. 5 and 6, the center stay section 27 is formed of a relatively rigid metal wire, e. g., nickel-plated iron wire, instead of metal channel as in the previous form of the invention. The stay wire 27 is bent at spaced points along its length, corresponding to

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the locations of the glass beads 28 thereon, into double or S-shaped loops 29 to form locking shoulders which are at least partially embedded in the glass beads 28, as shown in Fig. 6, to thereby mechanically lock and hold the beads immovably in place on the stay wire 27. The glass beads 28 may be attached to the stay wire 27 in the same manner as before, i. e., by heating one end of a short glass rod 22' to a plastic condition and pressing it down onto and at least part way around the underside of the looped wire portions 29 so as to partly embed the individual wires forming the loop, as shown.

Figs. 7 and 8 illustrate another modification of the invention wherein the center stay section 30 is composed of two side-by-side relatively rigid wires 31 which are suitably secured together at points along their length, e. g., by spot-welding or by twisting together, to form a composite wire stay. At spaced points along their length corresponding to the locations of the glass beads 32 thereon, the two wires 31 forming the composite stay wire 30 are bent oppositely away from each other or spread apart, as indicated at 33, to form apertures or longitudinal slots 34 in the stay wire which provide locking shoulders for the glass beads 32. As shown in Fig. 8, the separated wire portions 33 of the stay wire 30 are sufficiently embedded in the glass of the beads 32 to mechanically lock and hold the beads in place on the stay wire. The apertures 34 are preferably elongated longitudinally of the stay wire 30 in order to allow for slight variations in the longitudinal positioning of the beads 32 thereon during manufacture of the mount. In addition, the separated wire portions 33 of the stay wire are preferably either corrugated, crimped or otherwise suitably configured, as shown, in order to provide shoulders for locking the beads against longitudinal sliding movement on the stay wire within the slots 34. As in the previous forms of the invention, the glass beads 32 are attached to the stay wire 30 by heating one end of a short glass rod 22' to a plastic condition and then pressing it down onto the stay wire over the slots 34 therein to force the glass through the slots and at least part way down around the underside of the two separated wires 33 forming the slot, as shown in Fig. 8.

The mechanical fastening of the glass beads 22 to the channel member 13 in accordance with the invention therefore permits the use of an ordinary and much less expensive metal for the channel member other than one, such as the high chrome-iron alloy heretofore employed for such purpose, which will seal to and wet the glass of the support beads. Thus, the channel member 13 may be formed of ordinary rolled iron or steel, for instance, as a result of which the cost of the lamp mount 9 and of the finished lamp is considerably reduced.

Although a preferred embodiment of my invention has been disclosed, it will be apparent that the invention is not to be limited to the specific construction and arrangement of parts shown, but that they may be widely modified within the spirit and scope of my invention as defined by the appended claims.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. An electric lamp comprising a glass envelope, a mount within said envelope comprising an elongated filament and an elongated metallic stay member extending longitudinally of the filament and carrying support wires engaging and supporting the filament at spaced points therealong, said stay member being provided with apertures at spaced points therealong, and glass beads insulatively fastening said support wires to said stay member, said stay member being of a metal other than one which will wet the glass of said beads, and said glass beads extending through said apertures and at least partially embedding the marginal portions of said stay member bordering the said apertures and mechanically locking the beads to the stay member within the said apertures and holding them immovably in place thereon against movement longitudinally as well as laterally thereof, the said

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mechanical lock constituting the sole means of attachment of the glass support beads to the stay member.

2. An electric lamp comprising a glass envelope, a mount within said envelope comprising an elongated filament and an elongated metallic stay member extending longitudinally of the filament and carrying support wires engaging and supporting the filament at spaced points therealong, said stay member comprising a metal channel provided at spaced points therealong with longitudinally extending slots, and glass beads insulatively fastening said support wires to said channel, said channel being of a metal other than one which will wet the glass of said beads, and said glass beads extending through the said slots and at least partially embedding the marginal portions of said channel bordering the said slots and mechanically locking the beads to the channel within the said slots and holding them immovably in place thereon against movement longitudinally as well as laterally thereof, the said mechanical lock constituting the sole means of attachment of the glass support beads to the stay member.

3. An electric lamp comprising a glass envelope, a mount within said envelope comprising an elongated filament and an elongated metallic stay member extending longitudinally of the filament and carrying support wires engaging and supporting the filament at spaced points therealong, said stay member comprising an approximately V-shaped metal channel provided at spaced points therealong with longitudinally extending slots located at the bottom of the channel, and glass beads insulatively fastening said support wires to said channel, said glass beads substantially filling the interior cross-sectional space of said channel at the region of respective ones of said slots and extending through said slots and around onto the outer side of said channel and at least partially embedding the marginal portions of said channel bordering the said slots and mechanically locking the beads to the channel within the said slots and holding them immovably in place thereon against movement longitudinally as well as laterally thereof.

4. An electric lamp comprising a glass envelope, a mount within said envelope comprising an elongated filament and an elongated metallic stay member extending longitudinally of the filament and carrying support wires engaging and supporting the filament at spaced points therealong, said stay member comprising a rigid wire

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having at spaced points therealong double loop-shaped bends lying in a common plane and defining apertures, and glass beads insulatively fastening said support wires to said stay member, said stay member being of a metal other than one which will wet the glass of said beads, and said glass beads extending through the said apertures and at least partially embedding the marginal portions of said stay member bordering the said apertures and mechanically locking the beads to the stay member within the said apertures and holding them immovably in place thereon against movement longitudinally as well as laterally thereof.

5. An electric lamp comprising a glass envelope, a mount within said envelope comprising an elongated filament and an elongated metallic stay member extending longitudinally of the filament and carrying support wires engaging and supporting the filament at spaced points therealong, said stay member comprising a pair of rigid wires extending alongside one another and securely fastened together at points therealong, said wires being locally bent oppositely away from each other at spaced points therealong to conjointly form loop portions in the stay member lying in a common plane and defining apertures in said member, and glass beads insulatively fastening said support wires to said stay member, said stay member being of a metal other than one which will wet the glass of said beads, and said glass beads extending through the said apertures and at least partially embedding the marginal portions of the stay member bordering the said apertures and mechanically locking the beads to the stay member within the said apertures and holding them immovably in place thereon against movement longitudinally as well as laterally.

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