

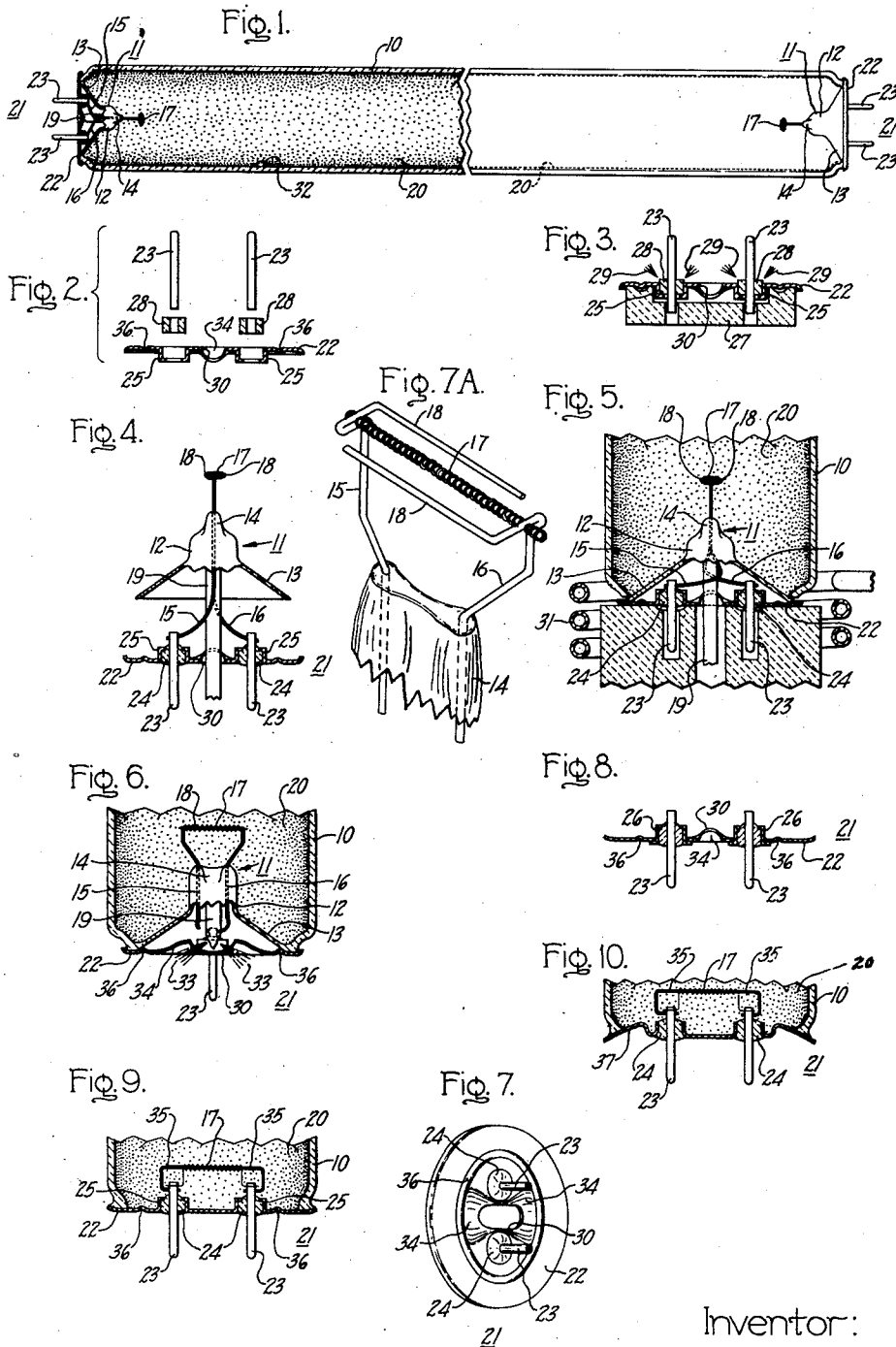
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BASE STRUCTURE FOR ELECTRICAL DEVICES

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BASE STRUCTURE FOR ELECTRICAL DEVICES

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My invention relates in general to electrical lamps and similar devices. More particularly, my invention relates to novel base and terminal structures for, and to a method of manufacture of, such devices.

One object of my invention is to provide an improved method of sealing and basing an electric lamp or similar device.

Another object of my invention is to provide a novel base and terminal structure for gaseous electric discharge lamps comprising a tubular glass container or envelope having an electrode at each end thereof.

A feature of the invention is the connection of the leading-in wires of a preformed lamp mount to the terminals of a finished lamp base, and the subsequent simultaneous sealing of the lamp mount and base to the envelope of the lamp.

Further objects and advantages of my invention will appear from the following description of species thereof and from the accompanying drawing, in which:

Fig. 1 is a side view, partly in section, of a gaseous electric discharge lamp having a base and terminal structure of the type comprising my invention; Figs. 2 and 3 are views showing the steps involved in making the base comprising my invention; Figs. 4 and 5 are views showing the steps involved in assembling the terminal structure of the lamp shown in Fig. 1; Fig. 6 is an enlarged sectional view, at right angles to Fig. 5, showing the tipping-off of the lamp exhaust tube; Fig. 7 is a perspective view of the lamp base comprising my invention; Fig. 7a is a perspective view showing the electrode construction. Fig. 8 is a sectional view of a modified form of base comprising my invention; and Figs. 9 and 10 are sectional views of modified forms of electric lamp terminal structures comprising my invention.

Referring to Fig. 1, the lamp there shown comprises an elongated tubular glass container or envelope 10 having a mount 11 sealed in each end thereof. Each of said mounts comprises a glass stem tube 12 having a flared outer end 13 sealed to the end of the envelope 10, and a compressed inner end 14 sealed around portions of a pair of leading-in wires 15, 16 extending there-through. The ends of an electrode 17 are secured in a suitable manner, as by clamping or welding, to the inner portions of the leading-in wires 15, 16. Each of the electrodes preferably comprises a transversely arranged coiled filament of tungsten, or other suitable re-

fractory metal, having a coating of an electron emissive material, such as barium oxide, thereon. The electrode coil 17 preferably is of linear form and is provided with a pair of auxiliary anodes 18, 18 preferably in the form of straight lengths of wire extending parallel to the transversely arranged linear filament 17 and disposed on opposite sides thereof and in that transverse plane of the envelope passing through the said filament 17. The said wire anodes 18 are preferably formed as extensions of the leading-in wires 15, 16, the said extensions being suitably bent to form the anodes. If desired, however, the anodes 18 may be formed as separate wire elements which are connected at one end to opposite ones of the leading-in wires 15, 16, the other ends of the wires being free.

At least one of the lamp mounts 11 is provided with an exhaust tube 19 through which the envelope 10 is evacuated and filled with gas or vapor or both. Where the device is to serve as a fluorescent lamp, a coating 20 of a suitable fluorescent powder is applied to the inner surface of the envelope 10.

Attached to each end of the envelope 10 is a base 21 comprising a metal disc 22 which is sealed directly to the end of the envelope 10. The said disc 22 is preferably made of a metal having substantially the same coefficient of expansion as the glass of the envelope 10. For sealing to soft glass, the said disc 22 may be made of a chrome-iron alloy known as "Allegheny 55," and for sealing to hard glass, the disc may be made of an iron-nickel-cobalt alloy known as "Ferro-nico." Extending through and projecting outwardly a substantial distance from the metal disc 22 are a pair of rigid metal contact pins or terminals 23 to the inner ends of which are connected the leading-in wires 15, 16 of the associated lamp mount. The base pins or prongs 23, which may be either of solid or hollow form, serve to mount or support the lamp in its socket and to electrically connect the associated lamp electrode 17 to the socket contacts. The base pins 23 are firmly secured to the metal disc 22, at least one of the pins, but preferably both as shown, being insulated from the metal disc by a small glass bead 24 to which the metal disc and contact pins are directly sealed. The metal disc 22 is preferably formed with integral inturned eyelets 25 forming depressions or recesses in the outer surface of the metal disc within which recesses the glass insulating beads 24 are received so as to be flush with the said outer surface of the metal disc.

To prevent cracking of the glass beads 24, the metal disc 22 and contact pins 23, and the glass beads 24, should be made of materials which have matching coefficients of expansion, or nearly so. Thus, where the metal disc 22 is made of "Allegheny 55" metal, the contact pins 23 preferably are also made of such metal and a suitable soft glass employed for the glass beads 24.

In the modified base construction shown in Fig. 8, the metal disc 22 is provided with eyelets 26 formed separate from the disc and secured thereto by welding or brazing. Such a construction enables the use of metal contact pins 23 of different composition from that of the metal disc 22. Thus, while the metal disc itself may be made of "Allegheny 55" metal, the eyelets 26 and the contact pins 23 can be made of a somewhat less expensive material, such as copper plated iron. For sealing together such copper plated iron pins 23 and eyelets 26, a high lead content glass may be used.

In manufacturing the lamp shown in Fig. 1, the lamp mount 11 and completed base 21 are first formed separately and then secured to the envelope 10 to complete the terminal or end assembly of the lamp. Referring to Figs. 2 and 3, the completed base 21 is made by mounting the metal disc 22 on a suitable refractory support 27 with the eyelets 25 extending downwardly. The base contact pins 23 are then inserted through the eyelets 25 in the metal disc 22 and located in proper position relative to the said disc. Small glass collets 28, to form the glass beads 24 of the completed base, are then placed over the contact pins 23 and inserted in the recesses in the disc formed by the eyelets 25. The glass collets 28 and adjacent portions of the pins 23 and disc 22 are then heated by suitable means, as by gas flames 29, until the glass softens and fuses and seals to the eyelets 25 and contact pins 23, thus completing the assembly of the base 21.

As shown in Fig. 4, the completed base 21 is next preliminarily secured to a preformed lamp mount 11 by suitably fastening, as by welding, soldering, or clamping, the outer ends of the leading-in wires 15, 16 of the mount to the inner ends, or into the hollow interior of the base contact pins 23, with the exhaust tube 19 of the mount extending through a central opening 30 in the metal disc 24. The outer portions of the leading-in wires 15, 16 should be of sufficient length to permit their attachment to the contact pins 23 while the metal disc 22 is spaced a sufficient distance from the flare 13 of the mount to permit the insertion therebetween of the tool or tools necessary to effect the attachment of the leading-in wires to the contact pins. In addition, the said outer portions of the leading-in wires 15, 16 should be somewhat flexible so as to permit the bringing together of the stem tube 12 and the metal disc 22, with the periphery of the stem tube flare 13 resting against the metal disc.

After the lamp mount 11 and the base 21 have been preliminarily secured together as described above, they are then secured to the end of the lamp envelope 10 to complete the end assembly of the lamp. Referring to Fig. 5, the preliminarily secured lamp mount 11 and base 21 is placed in an upright position with the periphery of the stem tube flare 13 resting against the inner surface of the metal disc 22. The open end of a vertically disposed envelope 10 is then placed over the lamp mount 11 with the end of the envelope resting on, and preferably pressed

downwardly against the flare 13 of the stem tube. The metal disc 22 is then highly heated by suitable means, as by directing a gas flame at the outer edge portions of the bottom thereof or by surrounding it with a high frequency coil 31 as shown, so as to simultaneously fuse the ends of the stem tube 12 and the envelope 10 together and to the inner surface of the disc 22 of the completed base 21, as shown in Fig. 6. Because of the various cooling effects exerted on the base disc 22, the inner or center portions of said disc do not become as highly heated as the outer edge portions thereof. As a result, the glass beads 24 supporting the pins 23 do not become sufficiently heated and softened to alter or impair the seal between such beads and the base pins 23 or base eyelets 25. After a mount 11 and base 21 have been thus sealed to one end of the envelope 10, the latter is then inverted and another mount 11 and base 21 sealed to the other end of the said envelope in the same manner.

The envelope 10, after having been sealed and based in the above described manner, is then evacuated through the exhaust tube 19 and current passed through the electrodes 17 to activate them. The envelope may then be filled with a suitable gas, such as neon or argon at a pressure of, for example, 4 mm. or so of mercury, and a small quantity of mercury 32 (Fig. 1) or other vaporizable metal may also be added, after which the exhaust tube 19 is tipped off and sealed to thereby hermetically seal the envelope. The tipping-off may be accomplished by a burner having two flames or fires 33 directed at an angle into the central opening 30 in the disc 22 and against opposite sides of the exhaust tube 19 so as to seal the latter off at a point wholly within or behind the outer surface of the disc 22, as shown in Fig. 6.

To facilitate the tipping-off of the exhaust tube 19 inwardly of or behind the outer surface of the base disc 22, the aperture 30 in said disc 22 is preferably elongated in a direction at right angles to the plane of the base pins 23, as shown in Fig. 7. Such an elongated aperture 30 therefore provides an enlarged opening through which the tipping-off fires 33 may be directed to thereby heat and tip-off the exhaust tube 19 at a point behind the outer surface of the base disc 22. The base disc 22 is also formed with an elongated depression 34 extending across the middle of the disc 22 in longitudinal alignment with, and tapering inwardly to the opposite ends of, the elongated center aperture 30. The said depression 34 therefore provides additional passageways through which the tipping-off fires 33 may be directed to thereby further insure the heating and tipping-off of the exhaust tube 19 at a point behind the outer surface of the base disc 22.

Instead of employing the terminal structure shown in Fig. 6 at both ends of the lamp envelope 10, such structure may be provided at only one end of the envelope and the other end of the envelope provided with the modified form of terminal construction shown in Fig. 9. In this modification, the stem tube 12 of the previous form is eliminated and the base disc 22 made imperforate so that the said disc itself forms the end wall of the lamp envelope and hermetically seals the same. The metal disc 22 is sealed directly to the end of the lamp envelope 10, as before, and the ends of the electrode coil 17 connected directly to the inner ends of the base contact pins 23. As before, the filamentary electrode coil 17 is provided with a pair of auxiliary anodes 35,

35 in the form of straight lengths of wire extending substantially parallel to the transversely arranged linear filament 17 and disposed on opposite sides thereof and in that transverse plane of the envelope passing through the said filament 17. The said wire anodes 35 are connected at one end to opposite ones of the base contact pins 23, the other ends of the wire anodes being free. Evacuation of the envelope and introduction thereof of the desired gas and vaporizable metal is performed at the opposite end of the lamp which is provided with the terminal construction shown in Fig. 6, the evacuation and gas filling of the envelope taking place through the exhaust tube 19 extending from the stem tube 12 at the said opposite end of the envelope.

If desired, the modified form of terminal construction shown in Fig. 9 may be provided at both ends of the lamp envelope 10. In this case, however, it is necessary to provide suitable means for evacuating the envelope and filling the same with gas and vaporizable metal. For this purpose, an exhaust tube may be sealed to the metal disc 22 and in communication with a centrally located opening therein, the exhaust tube being tipped off and sealed after the evacuation and filling of the envelope with gas has been completed.

To prevent warping of the metal disc 22 during the manufacture of the base and terminal structure of the lamp, the disc is suitably strengthened as by circularly embossing the same, as indicated at 36. This same result may also be accomplished by dishing the disc inwardly, as shown in the modification illustrated in Fig. 10 wherein the lamp base 21 comprises a metal disc 37 which is curved or dished inwardly.

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

1. An electric device comprising a glass envelope having a re-entrant stem sealed to an end thereof, an electric energy translation element sealed in said envelope, a pair of leading-in wires electrically connected to the ends of said electric energy translation element and extending through and sealed in the said stem, and a base structure secured to the said end of said envelope and comprising a metal disc sealed directly to the said end of said envelope and a pair of contact members rigidly secured to said metal disc, at least one of said contact members being electrically insulated from said metal disc and said leading-in wires being electrically connected to the said contact members.

2. An electric device comprising a tubular glass envelope having a re-entrant stem sealed to each end thereof, an electric energy translation element sealed in said envelope at each end thereof, a pair of leading-in wires electrically connected to the ends of each of said electric energy translation elements and extending through and sealed in the stem at the corresponding end of said envelope, and a base structure secured to each end of said envelope and comprising a metal disc sealed directly to the end of said envelope and a pair of rigid contact prongs firmly secured to said metal disc, said contact prongs extending outwardly a substantial distance from said metal disc to serve as a means for mounting the device in a socket, at least one of said contact prongs being insulated from said metal disc and said leading-in wires being electrically connected to the said contact prongs.

3. An electric discharge device comprising a tubular glass envelope having a base structure secured to each end thereof comprising a metal

disc sealed directly to the end of said envelope and a pair of contact members rigidly secured to and electrically insulated from the said metal disc, the metal disc of one of said base structures serving as an end wall for one end of said envelope and having its contact members hermetically sealed thereto so that the said disc hermetically seals the said end of the envelope, a re-entrant stem sealed into the other end of said envelope and provided with an exhaust tube and a pair of leading-in wires sealed therethrough and electrically connected to the contact members of the associated base structure, and electrodes sealed in said envelope at opposite ends thereof, the electrode at the stem end of said envelope having its ends connected to said leading-in wires and the other electrode having its ends directly connected to the contact members of its associated base structure, the metal disc at the stem end of said envelope having an opening therethrough in line with said exhaust tube and of sufficient size to accommodate said exhaust tube therein prior to the tipping-off of said tube.

4. An electric device comprising a glass envelope having an end thereof provided with a re-entrant glass stem having an exhaust tube extending outwardly therefrom, and a base secured to the said end of said envelope and comprising a disc-shaped metal member having an elongated depression extending across the middle thereof and an aperture at the middle of said depression for the accommodation of said exhaust tube prior to the tipping-off thereof.

5. An electric device comprising a glass envelope having an end thereof provided with a re-entrant glass stem having an exhaust tube extending outwardly therefrom, and a base secured to the said end of said envelope and comprising a disc-shaped metal member having an elongated aperture at the middle of said disc for the accommodation of said exhaust tube prior to the tipping-off thereof, said elongated aperture providing access for tipping-off flames to the said exhaust tube at a point thereof behind the outer surface of said disc.

6. An electric device comprising a glass envelope having an end thereof provided with a re-entrant glass stem having an exhaust tube extending outwardly therefrom, and a base secured to the said end of said envelope and comprising a disc-shaped metal member having an elongated depression extending across the middle thereof and an elongated aperture at the middle of said depression for the accommodation of said exhaust tube prior to the tipping-off thereof, said elongated aperture and depression providing access for tipping-off flames to the said exhaust tube at a point thereof behind the outer surface of said disc, and a pair of terminals insulatively secured to said disc-shaped member and extending outward therefrom, said pins being located on opposite sides of said depression in a plane at right angles to the length of the depression.

7. The method of sealing and basing the envelope of an electric device which comprises a re-entrant glass stem adapted to fit in the end of the envelope and carrying a filament and a pair of leading-in wires, which method comprises electrically connecting the leading-in wires of the stem to the contact terminals of a completed base having a metal disc portion, and then simultaneously fusing said stem and said metal disc portion of said base to the end of said envelope.

8. The method of sealing to a glass envelope

a glass stem carrying a filament and a pair of lead-in wires connected to the ends of said filament and extending outwardly from said stem, and a base comprising a metal disc having solid terminal pins extending therethrough; which method comprises holding the said stem and base in spaced relation while securing the outer ends of said lead-in wires to adjacent ends of said pins; pressing the said stem and disc in abutting relation to enclose therebetween the connections between the lead-in wires and pins, and also pressing the said stem and disc against an open end of the envelope; and then applying heat to fuse both the stem and metal to the said end of the envelope.

9. An electric discharge device comprising an elongated glass envelope, filamentary electrodes in the ends of said envelope, and a base at each end of the envelope comprising a metal disc fused directly to the end of the glass envelope and serving as an end wall therefor, a pair of rigid terminal pins extending through openings in said disc and longitudinally outward therefrom to support the device in a socket, said pins being secured in said openings by fused glass

beads, each of the said filamentary electrodes being carried by, and electrically connected to, the inner ends of the adjacent pair of terminal pins, one of said discs having an exhaust aperture therein closed by a residue of tipped-off exhaust tubing sealed to the disc around said aperture.

10. An electric discharge device comprising an elongated glass envelope, filamentary electrodes in the ends of said envelope, and a base at each end of the envelope comprising a metal disc fused directly to the end of the glass envelope and serving as an end wall therefor, a pair of rigid terminal pins extending through openings in said disc and longitudinally outward therefrom to support the device in a socket, said pins being secured in said openings by fused glass beads, each of the said filamentary electrodes being carried by, and electrically connected to, the inner ends of the adjacent pair of terminal pins, one of said discs having an exhaust aperture therein closed by a residue of tipped-off exhaust tubing sealed to the disc around said aperture, both of said metal discs being inwardly dished to mechanically strengthen them.

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