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BASING OF RADIO TUBES AND THE LIKE

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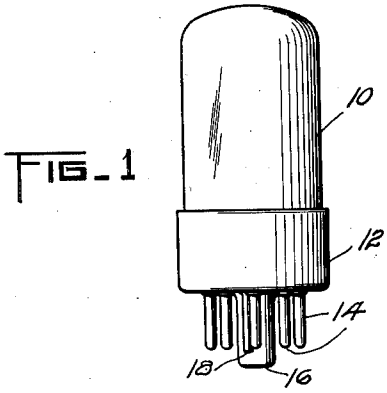


FIG. 1

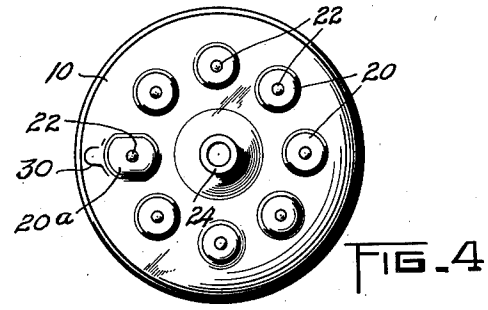


FIG. 4

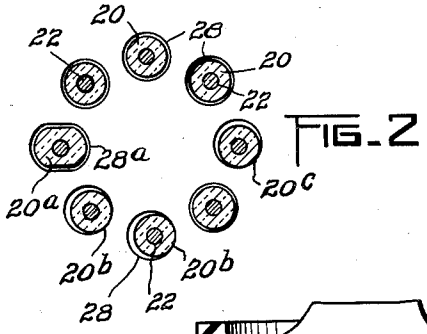


FIG. 2

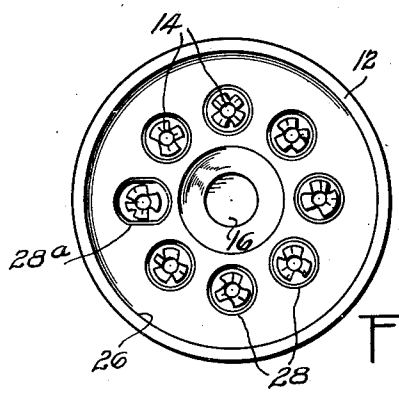


FIG. 5

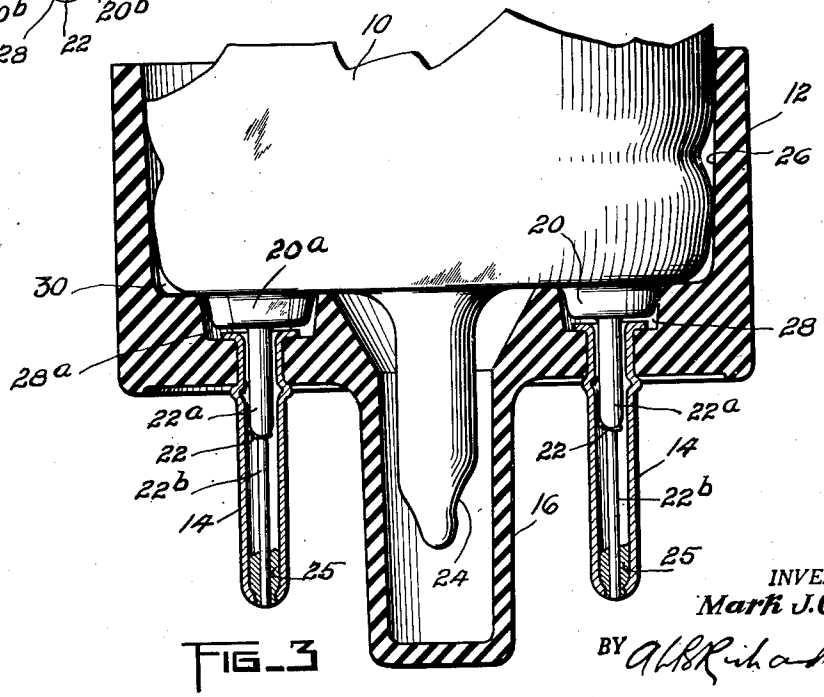


FIG. 3

INVENTOR.
Mark J. Orr
BY A. R. Richardson
His Attorney

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BASING OF RADIO TUBES AND THE LIKE

Mark J. Orr, Emporium, Pa., assignor to Sylvania Electric Products, Inc., a corporation of Massachusetts

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6 Claims. (Cl. 250—27.5)

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This invention relates to radio tubes and the like.

It has heretofore been a standard practice in completing radio tubes and like devices to attach a cupped base, usually of a molded insulating plastic and carrying tubular metal pins, to a glass envelope having flexible metal leads projecting externally from the electrodes within the envelope. A basing cement has been used to secure the glass envelope rigidly to the base. According to that procedure the interior wall of the base is coated with basing cement as a preliminary operation. Then the projecting leads are threaded through the metal tubes of the base, and with the base pressed firmly into contact with the glass envelope, the assembly is heated to form the envelope-to-base seal. The metal leads, projecting beyond the tubular pins, are trimmed even with the tube-ends and soldered thereto to complete the basing operation.

It is an object of the present invention to simplify this process of basing of radio tubes and similar plug in devices. A further object is to devise a novel basing method that is effective yet economical. Another object is to provide new forms of envelope and base which can be assembled without basing cement. The application of cement to the base and the heating of the cement to form the seal are both operations which are eliminated, in the practice of my invention.

In practicing this invention, a plurality of interengaging projections and recesses are provided on the base and on the envelope which prevent mutual rotation about a common axis. In the preferred form of the invention the projections are on the glass envelope in the form of a collar surrounding each of the metal leads, thereby extending the effective length of seal between the glass envelope and each of the leads. For receiving these projections the base is formed with plural cavities adjacent the inner extremities of the usual metal tubes into which the leads are to be threaded and soldered. The interengaging projections and cavities prevent mutual rotation of the base and the glass envelope, thereby establishing the desired envelope-to-base attachment without resort to a cement. The side wall of the base acts further to inhibit relative movement of envelope and base.

The invention, together with further objects and features thereof, will be better understood from the following detailed disclosure of a preferred specific embodiment thereof which is shown in the drawings.

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Fig. 1 is a lateral elevation of a radio tube complete with envelope and base;

Fig. 2 is a schematic view of the envelope projections (shown in section) within the recesses of the base;

Fig. 3 is a vertical section through the base, showing the glass envelope and leads as in the preferred form of completed and based radio tube;

Fig. 4 is a bottom view of the novel envelope with its leads, in this instance the envelope being wholly of glass;

Fig. 5 is a plan view of a novel base adapted for assembly with the envelope of Fig. 4.

In the radio tube of Fig. 1 glass envelope 10 is assembled to base 12 from which pins 14 project. These are to establish connection with a socket (not shown) into which the tube may be plugged. Base 12 includes a central projection 16 having a key 18 which insures proper orientation of the tube in its socket, so that pins 14 will contact the correct socket terminals.

In the form shown envelope 10 has eight axially extending leads 22. Each lead optionally includes a rod 22*a* to the end of which there is butt-welded a more flexible lead 22*b*. Portion 22*a* is of a metal having proper surface characteristics for forming a good metal-to-glass seal and has the same, or nearly the same, coefficient of thermal expansion as that of the glass in accordance with common practice. The composite lead is molded into a glass header which subsequently forms the lower end of the envelope, as a well known step in the manufacture of one form of completed envelope. In the present invention, however, each lead is surrounded by a collar 20 which is formed as part of the header. These collars extend the glass-to-metal seal, when compared to a header of the same thickness which does not have such collars. Viewed otherwise, these collars make it possible to have the same length of glass-to-metal seal while permitting a reduction in the average thickness of the glass header to reduce the processing strains therein. In that type of envelope which is wholly of glass it is desirable to have a header of generally the same thickness as the wall of the remainder of the envelope, but the header must be sufficiently thick to provide the necessary length of glass-to-metal seal at each of the leads. The envelope 10 is also provided with the usual exhaust tubulation 24, sealed off in advance of the basing step.

Base 12 of a molded plastic has an inner surface 26 which is somewhat flared, as shown, to facilitate molding. This surface is made only

slightly larger in diameter than the envelope 10 so that a close fit is obtained. A press fit that might crack the plastic is avoided. Tubular pins 14 are rigidly secured to base 12 in a circle, as in a well known form of prior art base, but in this instance each pin 14 is attached at the bottom of a recess 28. Each recess is made deep enough to accommodate collars 20 and the flared or staked portion of pin 14. There is one recess 28 for each collar 20; except that there is a special recess 28a made larger than the others (Figs. 2 and 3) which is to receive a collar 20a larger than the other collars 20. In the broader aspects of the invention, there may be a larger number of collars and recesses than there are metal leads; the leads need not be central of the projections termed "collars"; and there may be fewer projections than there are leads. The embodiment described is distinctly to be preferred, however.

During the manufacture of the envelope according to known methods, the elements within the envelope must be so connected to leads 22 that they will ultimately be connected to the proper pins 14, in relation to locating key 18. Envelope 10 is provided with a small but readily noted projection 30 (Figs. 3 and 4). When the elements are assembled in a predetermined relation to the various leads they will be properly oriented with respect to key 18 if projection 30 is in proper relation with the base 12. Projection 30 is formed adjacent large collar 20a. Were collar 20a easily discerned from the other collars 20 this projection would not be necessary.

In base assembly operation, leads 22 are threaded through tubes 14 with the aid of projection 30, the lead of collar 20a being thereby aligned with tubular pin 14 in larger-than-average cavity 28a. Envelope 10 is then firmly seated within base 12, and at this time flexible portions 22b of leads 22 would normally extend well beyond the ends of tubes 14. It would be readily apparent to the assembler that the base is not properly assembled to envelope 10, if such should be the case, since large collar 20a would not fit within any recess 28 and would therefore prevent the envelope from firmly seating in the base.

Recesses 28 are made slightly larger than collars 20, but because of expected departures from the ideal, allowed for in my tolerance specifications, one or more shoulders 20b may be relied upon to contact one wall of its recess 28 while one or more shoulders 20c may be relied upon to contact the opposite wall (in the rotational direction) to assure firm interengagement between envelope 10 and base 12, preventing mutual rotation about the axis of the radio tube.

As is apparent from Fig. 3 a clearance is provided between rods 22a and the internal bore of tubular pins 14. Any torsional stress that may be imposed between envelope 10 and base 12 is thus taken up by projections 20 within cavities 28, without straining the metal-to-glass seals of the leads.

Extensions 22b are trimmed neatly at the ends of tubes 14, and, after application of soldering flux to the ends of the tubes and of leads 22b, molten solder 25 is allowed to be drawn up into the tubes. These soldered joints prevent the envelope from tipping one way or another within base 12. The combined action of the soldered leads and the seated collars is such as to prevent any mutual motion between the envelope and the base. The soldering operation is conventional, except that in the present basing procedure it may be necessary to utilize somewhat more solder than in the the prior art where basing cement was relied upon to establish the rigid base-to-envelope seal. The preliminary operation of coating the base with cement and the later operation of cementing the envelope to the base are eliminated. Only a structural modification is necessitated in the mold for the base, and in the header mold if it is not already shaped to form collars 20 and 20a. The resulting economy that arises from the novel method and construction of parts will be apparent, and a further assurance of proper assembly of the envelope within the base is had.

While the invention has been described in connection with radio tubes, it will be evident that it is equally applicable to a variety of other basing uses, as in lamps, cathode-ray tubes, and other devices which are adapted to be plugged into a connector socket.

Having thus described a particular embodiment of my invention and explained its underlying principle, what I claim is:

1. A radio tube comprising a glass envelope having a generally flat end, a plurality of metal leads extending through said flat end, a glass collar surrounding each of of said leads and integral with said end, a base of insulating material having a series of cavities slightly larger than said collars and arranged to receive the collars, and an upstanding tubular portion adapted to receive said glass envelope, a plurality of metal tubes secured to said base, one tube in each of at least several of said cavities and projecting from the opposite surface of the base, the bore of said tubes being larger than the maximum diameter of said leads, said leads being secured to said tubes at their ends remote from the end of said envelope, one of said collars being larger than others and one of said cavities being larger than others to assure unique orientation of the base with respect to the envelope, and a central projection from said base having a circularly asymmetrical orientation portion.

2. A device adapted to be plugged into a socket and comprising an envelope having a generally flat glass end and a cylindrical portion adjacent said end, a plurality of integral projections on the external surface thereof, a metal lead extending centrally through at least certain of said projections and sealed thereto, a base of insulating material having a series of cavities to receive said projections, and an upstanding tubular portion adapted to snugly receive the cylindrical portion of said envelope, a metal tube secured to said base at the bottom of those of the cavities which are to accommodate said metal leads, each lead being secured to its metal tube at a point remote from said envelope.

3. A device adapted to be plugged into a socket comprising an envelope having a cylindrical end portion, a plurality of flexible mutually insulated parallel metal leads extending through and sealed to said envelope at said end, a plurality of external, integral projections thereon, a base of insulating material having a series of parallel metal tubes to receive said leads, and an upstanding tubular portion adapted to snugly receive the cylindrical portion of said envelope, and a series of cavities to receive said projections for inhibiting mutual surface-to-surface sliding of said envelope and said base, said leads being secured to said tubes at points remote from said envelope to prevent material separation of said envelope and to avoid stressing the seals between said envelope and said leads.

4. A plug in device comprising an envelope having a cylindrical portion at one end, a plurality of mutually insulated metal leads extending through said envelope at said end, a base of insulating material having a series of metal tubes to receive said leads, said base having a tubular portion adapted to quickly receive the cylindrical portion of said envelope, and interengaging projections and cavities on said flat end and on said base, respectively, for inhibiting relative movement of said envelope along a surface of said base, said leads being secured to said tubes to prevent mutual separation of said base and said envelope.

5. A device as described in claim 4, wherein said leads are flexible and, at their largest diameter, are smaller than the bore of said tubes.

6. A radio tube or like device comprising an envelope having a plurality of generally parallel projecting metal leads, a collar surrounding each of said leads and integral with said envelope, a base of insulating material having a series of cavities arranged to receive said collars and a

tubular member surrounding said series of cavities and adapted to receive said envelope, a metal tube secured to said base at the bottom of at least several of said cavities and projecting from the opposite surface of the base, said leads being smaller in diameter than the bore of said tubes and being secured to said tubes at their ends remote from said envelope, whereby mutual separation of said envelope and said base is prevented, and surface-to-surface sliding and torsional movement are minimized.

MARK J. ORR.

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