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J. E. BEGGS

2,344,280

LEAD-IN ARRANGEMENT

Filed April 11, 1942

Fig. 1.

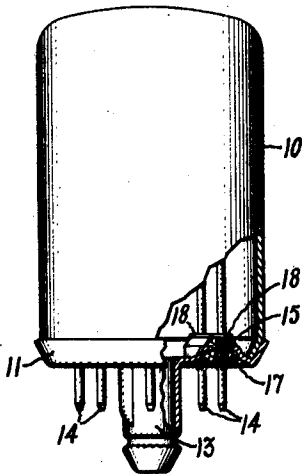


Fig. 2.

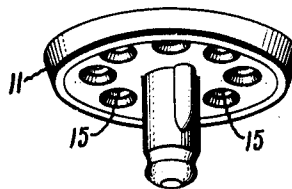


Fig. 3.

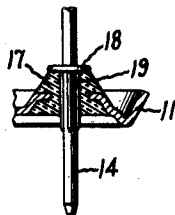


Fig. 4.



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UNITED STATES PATENT OFFICE

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LEAD-IN ARRANGEMENT

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Application April 11, 1942, Serial No. 438,559

4 Claims. (Cl. 250—27.5)

This is a continuation-in-part in the nature of a division of my prior application Serial No. 408,315, filed August 26, 1941, and which matured into Patent No. 2,292,863 on August 11, 1942.

The present invention relates to an improved lead-in arrangement and, while not limited thereto, is especially applicable in connection with metal-enclosed electrical discharge devices such as metal vacuum tubes.

It is a primary object of the invention to provide a lead-in construction which is especially characterized by its ability to withstand mechanical and thermal shock.

In a typical embodiment, the invention makes use of the combination of a body of glass and a metal conductor sealed through the glass, the conductor being of fluted configuration at the region of its union with the glass. This is found to provide a seal which is not only of good mechanical strength but which also assures equalized temperature conditions in the glass, thus minimizing the likelihood of fracture of the seal due to thermally generated strains.

The features which I desire to protect herein are pointed out in the appended claims. The invention itself, together with further objects and advantages thereof, may best be understood by reference to the following description taken in connection with the drawing, in which Fig. 1 represents a metal vacuum tube suitably embodying the invention; Fig. 2 is a perspective view of one part of the tube envelope; Fig. 3 shows a lead-in arrangement according to the invention; and Fig. 4 is a cross section of the conductor used in the lead-in arrangement of Fig. 3.

Referring particularly to Fig. 1, there is shown a metal-enclosed vacuum tube comprising a cylindrical shell 10 which is assumed to contain suitable electrode structures (not shown), such as an anode, a cathode and one or more grids. The shell 10 is closed at its lower end by means of a circular header 11 (shown separately in Fig. 2) which is peripherally joined to the shell, as by soldering. The shell 10 and the header 11 may be suitably constituted of iron (cold rolled steel) and the header is provided with a protuberance 13 which serves as a guide for locating the tube in an appropriate socket.

For energizing and supporting the enclosed electrode structures there are provided relatively rigid lead-in conductors 14 which project through various openings 15 punched or otherwise formed in the header 11. These conductors are shaped at their outer extremities to serve as contact pins for insertion in a cooperating socket and are in-

wardly connected to the electrode structure. Each lead-in conductor is supported in insulatingly spaced relation with respect to the header by means of a mass or bead 17 of fusible vitreous material which also constitutes a seal for the associated header opening. Assuming that the metallic parts associated with the seal are constituted of iron or of a material having the expansion characteristics of iron, the vitreous material employed for completing the seal may suitably be a glass of the character described in Patent No. 2,272,747, granted February 10, 1942, in the name of A. W. Hull and Louis Navias. In order to improve the adherence of the glass and metal, it may be desirable in some cases to provide both the header 11 and the lead-in conductors 14 with a plating of copper as a preliminary to the sealing operation.

For reasons which are fully stated in my aforementioned application Serial No. 408,315, each of the lead-in conductors 14 is provided with an integral flange 18 which abuts the glass component of the associated seal at the region of conjunction of the glass and the lead-in conductor. In addition, in accordance with my present invention each of the lead-in conductors is provided with a series of longitudinally extending ribs 19 (see Figs. 3 and 4) which cause the conductor to assume a fluted aspect. The fluted portion of the conductor preferably extends through the entire body of the glass bead 17.

Seals having the form described in the foregoing are characterized by a degree of mechanical strength sufficient to avoid cracking by strains imposed on them as a result of the use of the externally projecting parts of the lead-in conductors as contact pins. In addition, the seals are unusually free from cracking resulting from strains attributable to thermal causes. This is due in part to the fact that the presence of the flanges 18 tends to prevent the occurrence of sharp temperature gradients at the boundary between the glass and lead-in conductors and to assure a more uniform distribution of heat flow through the various parts of the seal structure. It is due additionally, however, to the ribs 19 which serve to increase the rigidity of the embedded portion of the seal and also produce a better distribution of thermal heat flow within the glass.

While I have described the invention by reference to a particular application of it, it will be understood that it is capable of use in connection with various enclosed electrical devices other than electrical discharge devices. I aim

in the appended claims to cover all variations of structure or use which come within the true spirit and scope of the foregoing disclosure.

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

1. A lead-in arrangement comprising a body of fusible vitreous material, and a rigid cylindrical lead-in conductor sealed through the vitreous material and having a portion extending on one side of said vitreous material to form a contact prong, said conductor being fluted longitudinally at the region of its union with the vitreous material thereby providing means for preventing rotation of said conductor and for providing heat dissipation means.

2. A lead-in arrangement comprising a body of glass serving as a sealing-in means, and a rigid cylindrical lead-in conductor sealed through the glass and having a portion extending on one side of said glass to form a contact prong, said conductor bearing integral longitudinal ribs at the region of its union with the glass thereby providing means for preventing rotation of said conductor and for dissipating heat.

3. In an electrical device which comprises a sealed container, the combination which includes

a body of glass having an appreciable metallic content and forming a part of the wall structure of the container, and a solid cylindrical lead-in conductor sealed through the glass and shaped at its outer extremity to serve as a contact prong, said lead-in conductor being fluted longitudinally at the region at which it passes through the glass thereby providing means for preventing rotation of said conductor and stiffening said conductor in the region of said glass and co-operating with said glass to increase the dissipation of heat from said conductor.

4. In an electrical device which comprises an enclosing metal wall part having a small opening therein, the combination which includes a bead of glass having an appreciable metallic content and fused in the said opening, and a solid cylindrical lead-in conductor sealed through the bead and having a portion extending on one side of said bead to form a contact prong, the said lead-in conductor being fluted longitudinally at the region of its union with the said glass thereby providing with said glass a thermal path for the flow of heat between said wall part and said conductor.

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