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LEAD-IN FOR ELECTRON DISCHARGE DEVICES

Filed Jan. 16, 1935

Fig. 1

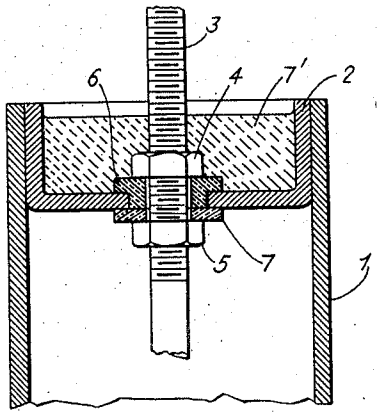


Fig. 2

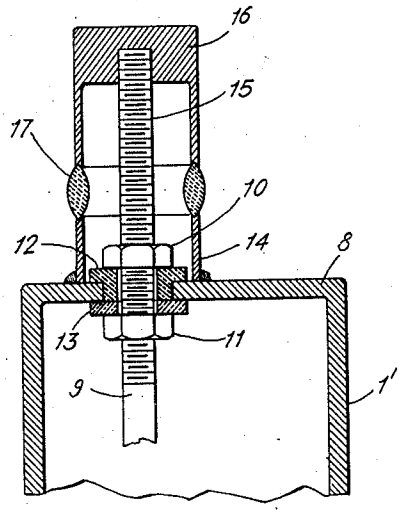
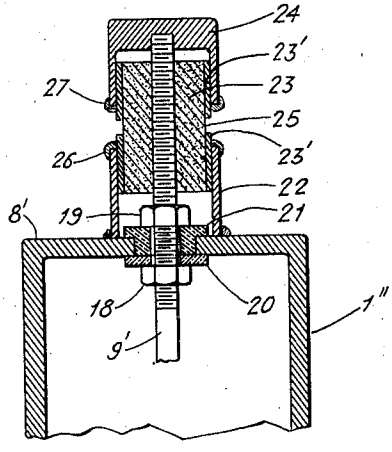


Fig. 3



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LEAD-IN FOR ELECTRON DISCHARGE DEVICES

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2 Claims. (Cl. 250—27.5)

My invention relates to electron discharge devices, more particularly to improvements in lead-ins and the seals for said lead-ins in electron discharge tubes having metal envelopes.

Electron discharge devices having a metallic envelope, for example, rectifiers, switch tubes, and the like, are known in the prior art in which the sealed evacuated metallic envelope is apertured at one or more places, the electrode leads being brought into the envelope and to the electrodes thru these apertures. The electrodes are sealed into the envelope by the aid of insulation, such as glass, which both insulates the lead-ins and hermetically seals them into the envelope. However, one disadvantage of such constructions is that the insulation is called upon to serve at the same time for insulation and also afford mechanical support for the lead-in. In view of the marked mechanical and thermal stresses to which the lead-ins and particularly the seals are subjected, leaks and thus impairment of the vacuum are hard to avoid.

In some conventional electron discharge devices having a metal envelope, and handling high loads, the lead-ins are insulated from and sealed into the metal envelope by the aid of porcelain packing. In these discharge devices however, the problem of sealing in the lead-in is not quite so important inasmuch as the envelope is constantly connected with vacuum pumps, which insure and maintain the requisite vacuum automatically.

The present invention relates to electron discharge devices of the first kind, that is, electron discharge devices which are not constantly connected with the vacuum pump, but which are exhausted, sealed and then disconnected from the pump after exhaust.

An object of my invention is to provide an improved form of lead-in for electron discharge tubes having metal envelopes in which the lead-in seal is relieved of the mechanical and thermal stresses to which the lead-in may be subjected.

According to my invention, the electrodes are supported from the container or vessel by means of lead-ins which are mechanically secured to but insulated from the envelope, the individual seals being relieved of strains, both mechanical and thermal.

Some advantages of the construction made according to my invention are that the insulation materials for supporting the lead-ins in the envelope may be such as to insure adequate insulation and at the same time possess requisite mechanical and thermal properties, and these materials can be selected without considering their ability to provide a vacuum tight seal. The sealing of the lead-ins into the envelope is effected by other insulating material particularly suitable for this purpose at a place which is less subject to thermal and mechanical stresses than the supporting point for the lead-in.

The novel features which I believe to be characteristic of my invention are set forth with particularity in the appended claims, but the invention itself will best be understood by reference to the following description taken in connection with the accompanying drawing in which Figure 1 is a vertical section of a portion of an electron discharge device having a metal envelope and provided with a lead-in seal and support made in accordance with my invention, and Figures 2 and 3 are vertical sections of modifications of the invention shown in Figure 1.

Referring to Figure 1, the electron discharge device has a metal envelope 1 which is fitted with a metallic cup-shaped cover 2 sealed to the envelope and having an aperture surrounded by an annular collar like extension which is on the exterior of the envelope and which in this case is formed by the walls of the cup-shaped cover. The lead 3 extends thru the aperture in the cover and is provided with screw-threads on which are screwed two nuts 4 and 5 adapted to hold together the parts 6 and 7 of an insulating bushing such as an electrical porcelain which has lips engaging opposite sides of the envelope and provides a strong mechanical support for the lead-in 3 in the cover 2. The vacuum tight seal is provided by filling the cover 2 with a lute or cement 7', such as glass, enamel, sealing wax, pitch or the like, as well-known in the art.

In the embodiment of my invention shown in Figure 2 the metallic envelope 1' has a closed end 8 provided with an aperture in which is fitted the rod-like lead-in 9. Two nuts 10 and 11 on opposite sides of an insulation bushing consisting of the two parts 12 and 13, secure the lead-in 9 firmly to the end 8. Welded to and projecting outwardly from the end 8 of the envelope to form a collar like extension is a metal tube or annular collar 14 which surrounds the lead-in 9 on the exterior of the envelope. The rod 9 has at its upper end a screw-thread portion 15 upon which is threaded a metal cap 16. This metal cap 16 is screwed on to such a position that a circular slit is formed between the edges of the cap 16 and of the collar 14. This slit is closed vacuum tight by being filled with insulation material 17,

such as a glass tube or the like with its edges fused to the edges of the cap and the collar.

In the modification shown in Figure 3, the metal envelope 1'' is provided with a closed end 8' having an aperture in which is fitted the rod-like lead-in 9' which supports two nuts 18 and 19 designed to unite the bushing consisting of the parts 20 and 21 and to secure the lead-in to the envelope. The end 8' supports a metal collar 22 which is welded to the envelope and surrounds the lead-in on the exterior of the envelope. A porcelain cylinder 23 is fitted into the collar and is copper coated on its surface at opposite ends as shown at 23'. Mounted over this porcelain cylinder 23 is a metal cap 24 screwed to lead-in 9' in such a way that part of the copper-coated porcelain cylinder remains visible. The porcelain cylinder has an uncoated annular portion 25. The cap 24 as well as the collar 22 are soldered at their edges to the copper coated portions of the porcelain cylinder, as shown at 26 and 27.

The invention is useful both for high vacuum electron discharge devices as well as for gas- and vapor-filled electron discharge devices.

While I have indicated the preferred embodiments of my invention of which I am now aware and have also indicated only one specific application for which my invention may be employed, it will be apparent that my invention is by no means limited to the exact forms illustrated or the use indicated, but that many variations may be made in the particular structure used and the purpose for which it is employed without departing from the scope of my invention as set forth in the appended claims.

What I claim as new is—

1. An electron discharge device having a metal envelope provided with an aperture, an insulating bushing in said aperture having lips engaging opposite sides of the envelope, a rigid lead-in extending thru said envelope and supported by said bushing on said envelope, means for securing said bushing and said lead-in to said envelope for providing a mechanical support for said lead-in, said envelope having a collar-like extension surrounding said lead-in on the exterior of the envelope, a cap on the outer end of said lead-in and an insulating cylinder surrounding said lead-in and having a metal coating on its opposite ends and filling the space between said lead-in and said collar-like extension, said cap and said collar-like extension being soldered to the metal coating on said insulating cylinder to form a vacuum tight seal for said lead-in.

2. An electron discharge device having a metal envelope provided with an aperture, an insulating bushing in said aperture, a rigid lead-in extending through and into said envelope and thru and supported by said bushing, means on opposite sides of said bushing for securing said bushing and said lead-in to said envelope within said aperture, a metallic collar-like member welded to said envelope and surrounding the lead-in on the exterior of said envelope, a cap on the outer end of said lead-in, a cylinder of insulating material surrounding said lead-in and provided with a metal coating at its opposite ends, said cap and said collar being soldered to the metal coating on said cylinder of insulating material to provide a vacuum tight seal for said lead-in.

HANS VATTER.