

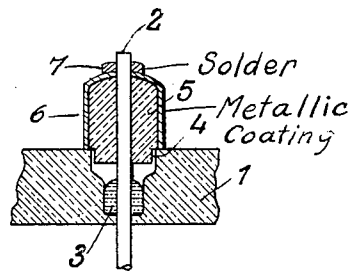
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VACUUM TUBE DEVICE

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UNITED STATES PATENT OFFICE

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VACUUM TUBE DEVICE

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5 Claims. (Cl. 250—27.5)

This invention relates to vacuum tube devices and more particularly to new and useful means for protecting the seals by means of which the lead-in conductors are fixed in such devices.

It is well known to use ceramic materials as constituents of vacuum tube devices, such as electron discharge tubes for instance, and to carry the lead-in conductors to the various electrodes of such tubes through a ceramic member thereof. It is a known expedient in order to secure a vacuum-tight seal between a ceramic body and a conductor extending therethrough to provide cylindrical or spherical cavities in one surface of a ceramic member and to fill up this cavity with a vitreous melt which constitutes a vacuum-tight seal between the supporting ceramic body and the metallic conductor.

It has been taught by experience that the seals of vacuum tube devices of the type referred to above easily become damaged if the conductors projecting therethrough are subjected even to slight bending stresses since cracks will be set up in the vitreous material applied about the conductor, while stronger bendings thereof may cause the material to split and to completely destroy a heretofore vacuum-tight seal.

This invention has for an object to avoid the heretofore mentioned difficulties and to render the seals of vacuum tubes more stable against accidental injuries on account of bending stresses to which the lead-in conductors might be subjected. This is achieved according to the main feature of this invention by providing means which reliably prevent accidental bending stresses imparted to the conductors from being transferred to the actual sealing points between the conductor and its supporting member of ceramic material. Such means may according to one specific aspect of my invention be a sleeve of ceramic material fixed on the conductor and supported in an enlarged portion of the heretofore mentioned cavity of the ceramic disc or plate in which the conductor is sealed. This sleeve will receive or absorb bending stresses and thus serve as reliable protection for the vacuum seals.

My invention will be more readily understood from the following description taken in conjunction with the accompanying drawing, in which the single figure, Fig. 1, is a sectional view in side elevation of a lead-wire sealed in ceramic material, in accordance with my invention.

In the drawing, reference numeral 1 indicates a ceramic member forming part of a vacuum tube device, for example. This ceramic member

is provided with a through-bore which is enlarged, e. g., by means of a countersink, in the surface thereof remote from the inside of the vacuum tube. In this enlarged portion the conductor 2 is sealed to the ceramic member 1 by means of a bead 3 of glass, for example. The end of the aforementioned enlarged portion adjacent the said surface of the ceramic member 1 is according to one of the features of this invention still enlarged so as to form a cylindrical or spherical cavity 4 coaxial with the sealed-in conductor. This cavity is adapted to receive a sleeve or bushing 5 of ceramic material which is rigidly fixed on the outer portion of the conductor 2. This sleeve provides a highly reliable protection for the vacuum seal between the ceramic member 1 and the conductor 2, since bending stresses imparted to the outer end of conductor 2 will be received or absorbed by the sleeve 5 without being transferred to the seal itself. The improved structure according to my invention is easily applicable to all types of vacuum devices since there is no necessity for making a vacuum-tight connection between the conductor 2 and the sleeve 5, a frictional connection between these two members is quite sufficient to secure the desired protective effect.

The sleeve of ceramic material thus attached to a lead-in conductor of a vacuum tube device may according to a further feature of this invention be coated or plated with any suitable metal or metal alloy to form a connector plug in which case a soldered connection must be provided between such metal coating and the sleeve supported conductor.

In the drawing reference numeral 6 represents the metal coating on the sleeve and 7 indicates the solder which joins this coating to the conductor 2.

On applying my invention to electron discharge devices, the sleeve members may be rigidly sealed in a vacuum tube assembly to serve as connector plugs for holding the tube in a tube socket.

What is claimed is:

1. A vacuum seal protection for electron tube devices and the like, comprising a plate of ceramic material having a through-bore with a first enlarged portion and a further still enlarged portion adjacent one surface of said ceramic plate and coaxial with said bore, a metallic conductor projecting through said bore, a vacuum seal in said first enlarged portion intimately uniting said plate and said conductor, and a sleeve of ceramic material frictionally fixed on said conductor in a

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ELECTROMAGNETIC FOCUSING COIL

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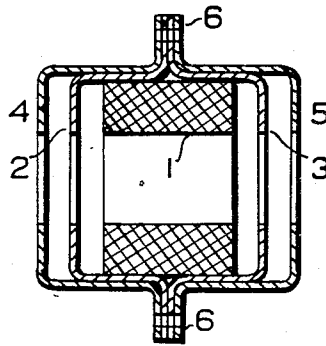


FIG. 1

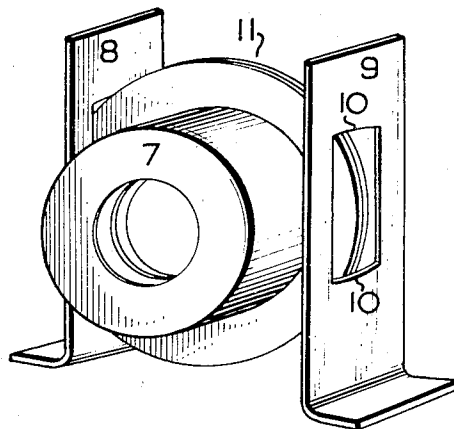


FIG. 2

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