March 31, 1942. J. F. MILLER 2,278,278

METAL ENVELOPE RADIO TUBE

Filed Feb. 28, 1941

Fig. 1

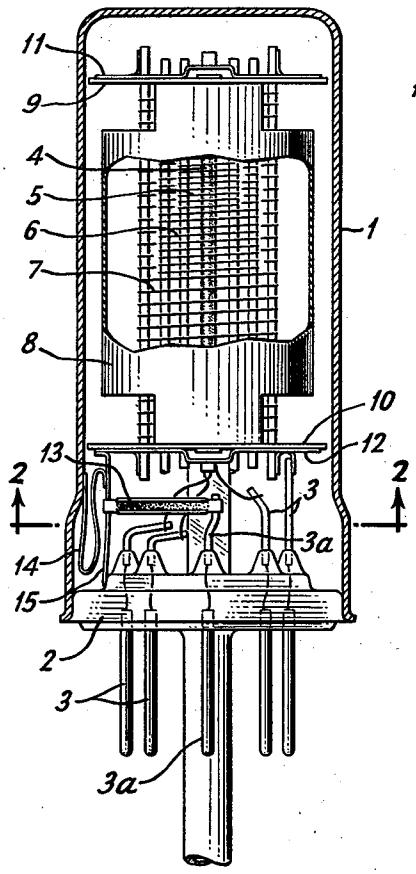


Fig. 2

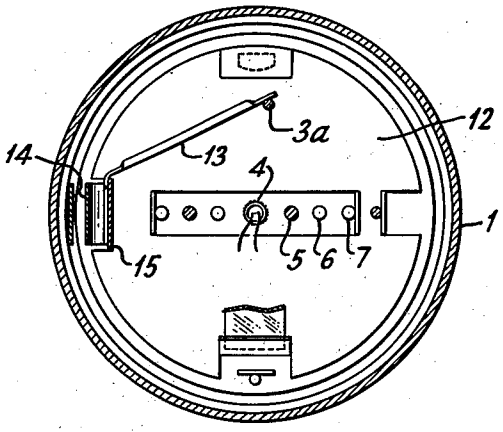
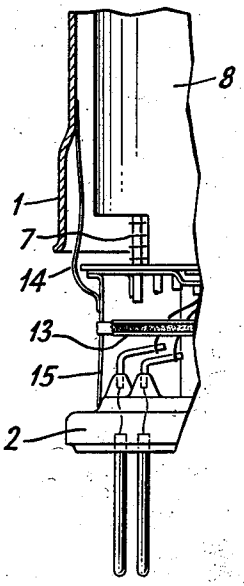


Fig. 3



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METAL ENVELOPE RADIO TUBE

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4 Claims. (Cl. 250—27.5)

My invention relates to electron discharge devices, particularly to radio tubes with metal envelopes.

The metal envelope of a radio tube should be connected to one of the contact pins in the base of the envelope. Where the metal shell is closed by a glass header difficulty is encountered in the manufacture of the tube in obtaining a solid electrical connection between the shell and one of the pins. A sliding contact between the inner surface of the shell and spring fingers on the electrode assembly is unsatisfactory because of dangers of open circuits caused by metal oxides on the surface of the shell, and external connections from the shell to the pin are undesirable for mechanical reasons.

The object of my invention is an improved radio tube with a metal shell having an internal solid connection between the shell and one of the base pins.

The characteristic features of my invention are defined in the appended claims and one embodiment thereof is described in the following specification and shown in the accompanying drawing in which

Figure 1 is a longitudinal sectional view of a radio tube constructed according to my invention;

Figure 2 is a transverse sectional view taken on line 2—2 of the tube shown in Figure 1, and

Figure 3 is a detailed view of a partly assembled radio tube made according to my invention.

The particular radio tube chosen for illustrating my invention and shown in Figure 1 comprises a metal envelope 1 of the cup-shaped shell type closed at one end with a glass header 2, preferably of the glass disc or button type. The periphery of the header is hermetically sealed directly to the inner surface of the shell adjacent its rim. Lead-in conductors 3 are sealed through the header and are joined at their inner ends to the various electrodes in the tube comprising in Figure 1 a cathode 4, a control grid 5, a screen grid 6, a suppressor grid 7, and an anode 8. The electrodes are assembled as a unit between their insulating spacers 9 and 10 and are attached preferably by welding to the upper ends of the conductors sealed in the header. The spacers are preferably sheets of mica reinforced by metal discs 11 and 12 which are cut away opposite the electrode side rods. One of the leads, 3a, is connected to one end of a directly heated getter 13 of the ribbon type, commercially known as tthe "batalum" getter. The external ends of the lead-in conductors may be rigid and employed without further support as the contact pins of the tube.

According to my invention means is provided for connecting the shell directly to one of the lead-in conductors, the connection being made internally of the envelope. One end of a long flexible metal ribbon or tab 14 is attached by welding to the inner surface of the envelope inside the header sealing region, the other end of the ribbon extending beyond the rim of the shell. The electrode assembly is then inserted in the shell to the position shown in Figure 3 and the opposite end of the tab 14 is joined by welding directly to one of the lead-in conductors or, as shown, to a vertical metal strip 15 forming part of the electrode-header assembly. The connection between this strip and the grounding lead 3a is conveniently made through the ribbon of the getter 13. Further insertion of the electrode-header assembly causes the tab to fold upon itself as shown in Figure 1 and without obstruction to the sealing region permanently connects the shell to the grounding pin. Sealing fires played upon the rim of the shell may now be employed to hermetically seal the periphery of the header to the rim of the shell.

The metal strip 15 to which the outer end of the connector tab is attached is preferably wider than the tab and is mounted between the lower spacer and the header by welding the upper end of the strip to the metal disc 12 supporting the lower spacer. The strip depending from this disc preferably bears against the header to form a rigid partition or baffle against which the fold in the connector tab may lay. The fold is thus confined to a small space between the wall of the shell and the strip and cannot move about or come into contact with any of the other lead-in conductors in the header. The ground lead 3a, when connected to the shell through the getter, may serve during exhaust as one terminal for flashing the getter, the other terminal comprising the shell.

My improved radio tube has a permanent internal connection between the metal shell and a grounding pin in its base, and is easy to manufacture.

I claim:

1. An electron discharge device comprising a cup-shaped metal shell, a glass disc header telescoped into the end of said shell and hermetically sealed directly along its periphery to the inside surface of the shell adjacent the rim of the shell, lead-in conductors sealed through said header, a permanent electrical connection between one of

said conductors and said shell comprising a flexible metal ribbon welded at one end to the inside surface of said shell, and connected at the other end to said one conductor.

2. An electron discharge device comprising a tubular metal shell, a glass header sealed in one end of said shell, lead-in conductors sealed through said header, a long flexible metal ribbon, one end of said ribbon being permanently connected to the inside surface of said shell, said ribbon being folded and having its other end connected to one of said conductors.

3. An electron discharge device comprising a cup-shaped metal envelope, a glass header closing one end of said envelope, an electrode assembly with an insulating spacer mounted on said header, a metal strip depending from one side of said spacer, a plurality of lead-in conductors sealed through said header, a folded flexible metal ribbon between said strip and the wall of said shell, one end of the ribbon being joined to said shell, and the other end being joined to said strip, and an electrically heated getter connected between said strip and one of said conductors.

4. An electron discharge device comprising a glass header, a unitary assembly of electrodes mounted on said header and connected to lead-in conductors through the header, a metal shell enclosing said assembly and hermetically sealed to said header, a ribbon getter in the shell, a flexible metal ribbon electrically connected in series with said getter between the wall of the shell and the inner end of one of said conductors.

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