July 4, 1939. P. T. SMITH 2,164,477

ELECTRODE SUPPORT

Filed April 29, 1938

Fig. 1

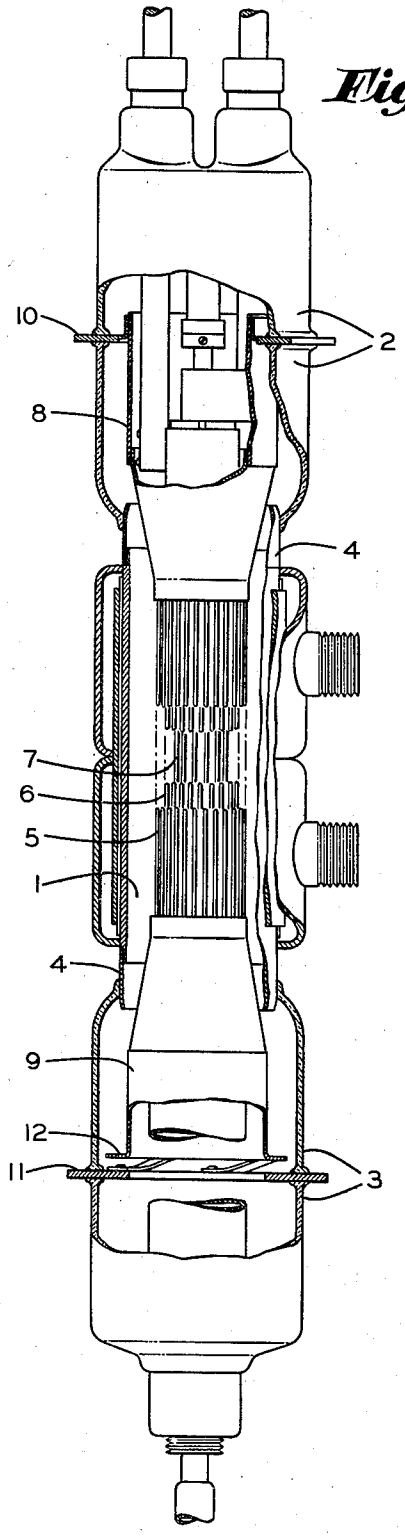
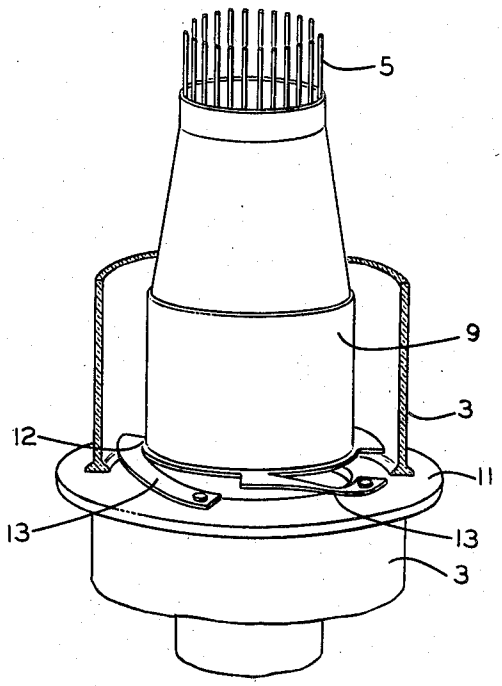


Fig. 2



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Patented July 4, 1939

2,164,477

UNITED STATES PATENT OFFICE

2,164,477

ELECTRODE SUPPORT

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Application April 29, 1938, Serial No. 204,968

5 Claims. (Cl. 250—27.5)

My invention relates to electron discharge devices, and more particularly to means for supporting electrodes in such devices.

In many tubes of the larger sizes a long tubular electrode is supported at each end, one end being slidably journalled in a guide to hold the electrode in place and at the same time permit longitudinal expansion when heated. When the clearance between the electrode and its guide is sufficient at one temperature to permit free longitudinal expansion, the sliding end of the electrode is free to move transversely and thus alter its spaced relation to the other electrodes, and at a higher temperature the guide may bind the end of the electrode and cause the electrode to bow or buckle.

An object of my invention is to provide means for supporting electrodes in electron discharge devices which will prevent transverse displacement of the electrodes but permit free longitudinal expansion without bowing or buckling.

My invention is defined with particularity in the appended claims and preferred embodiments are described in the following specification and the accompanying drawing in which Figure 1 is a sectioned view of an assembled tube embodying my invention, and Figure 2 is a detailed view of an electrode supporting means constructed according to my invention.

The envelope of the tube shown in Figure 1, chosen for illustrating my invention, is similar to the tube shown in the Zottu et al. Patent 2,113,671, issued April 12, 1938, and comprises a cylindrical metal anode 1 closed gas-tight at its ends by cylindrical glass end sections or bulbs 2 and 3 joined coaxially with the anode by sealing rings 4. Within the anode are concentric screen grid 5, control grid 6, and cathode 7, the electrodes each comprising a plurality of parallel wires arranged in cylindrical surfaces concentric with the anode. The wires of the screen grid are attached at their ends to tubular support members 8 and 9 joined to lead-in rings 10 and 11 sealed intermediate their peripheries in the wall of the glass end sections 2 and 3. The upper tubular support member 8 is rigidly attached, preferably by welding or brazing, to an up-turned flange on the inner periphery of the lead-in ring 10 and the lower tube support member 9 is attached to lead-in ring 11 by guide means constructed according to my invention.

Since the total elongation of the screen grid structure of a long transmitter tube may be considerable when heated to operating temperature, it is important that the screen grid be free to elongate to prevent buckling and that the grid be held in its true coaxial position in the tube. The lower end of tubular support member 9, shown in detail in Figure 2, is flared radially outward to provide a flange 12 spaced above lead-in ring 11. Curved strips or fingers 13 of metal substantially normal to the axis of the electrode extend from the radial flange 12 to the upper face of lead-in ring 11 where their ends are secured as by riveting or welding. The curved fingers may conveniently be stamped from the metal of the flange, their free ends being flexed downwardly and attached to the ring. The strips or fingers may be two or more in number and are preferably spaced uniformly around the flange. The width of each strip is sufficient to give it considerable strength against bending in a plane normal to the axis of the tube and the strips or fingers are thin enough to permit easy flexing of the fingers in a direction parallel to the axis of the tube.

In operation the screen grid becomes heated and expands and since its upper end is fixed its lower end moves downwardly bringing flange 12 nearer ring 11 and compressing fingers 13.

The electrode supported by my improved device is free to longitudinally expand, thus preventing bowing or buckling and at the same time prevent transverse displacement of the electrode. My improved electrode supporting means provides a good electrical contact with the electrode, is easy to make and inexpensive to install.

I claim:

1. In combination in an electron discharge device, an envelope, two electrode support means a fixed distance apart in said envelope, an electrode between said support means in said envelope, one end of said electrode being rigidly attached to one of the support means, means for resiliently attaching the other end of said electrode to the other support means for permitting free longitudinal expansion of the electrode and for preventing transverse displacement thereof comprising a plurality of flat spring-like fingers, each finger joined at one end to said other end of the electrode, the remaining ends of said fingers being attached to said other support means.

2. In combination in an electron discharge device, an envelope, an electrode within said envelope, two spaced electrode support means in said envelope, one end of said electrode being rigidly attached to one of the support means, means for resiliently attaching the other end of the electrode to the other support means comprising a plurality of flat spring-like fingers attached at their ends to said other end of the electrode and to said other support, the surface of

the fingers being substantially normal to the said electrode.

3. An electron discharge device comprising an envelope, an electrode in said envelope, two spaced electrode support means in said envelope, one end of said electrode being rigidly attached to one of the support means, means for resiliently attaching the other end of said electrode to the other support means comprising a plurality of flat spring-like fingers joined at their ends to said other end of the electrode and to said other support means, said fingers being resilient in a direction parallel to the axis of said electrode and inflexible in a direction normal to said axis.

4. An electron discharge device comprising an envelope, a tubular electrode in said envelope rigidly supported at one end in the envelope, a radial flange on the other end of said electrode, means for guiding said other end of the electrode in an axial direction when heated comprising curved strips of metal extending from said flange in a plane normal to the axis of said electrode and secured to support means in said envelope.

5. An electron discharge device comprising an envelope with two glass bulbular end sections, a lead-in ring sealed in each bulbular section, the two rings being coaxial with the center line of said envelope, and the inner periphery of each ring extending radially within the envelope, a tubular electrode coaxial with said envelope and rigidly joined at one end to one of said rings, a tubular support member on the other end of said electrode with a radially extending metal flange spaced from the other of said rings, means for joining said flange to said other ring to permit free longitudinal expansion of said electrode and to prevent lateral displacement of the electrode comprising a plurality of flat curved strips stamped from said flange, the free end of the strips being attached to said ring.

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