Aug. 1, 1939. J. R. GLANS 2,167,885

ELECTRODE ASSEMBLY

Filed June 30, 1938

Fig. 1

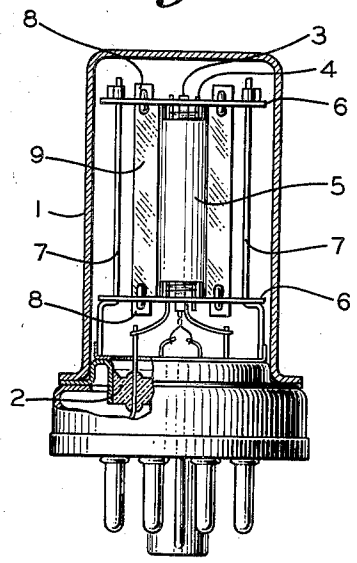


Fig. 2

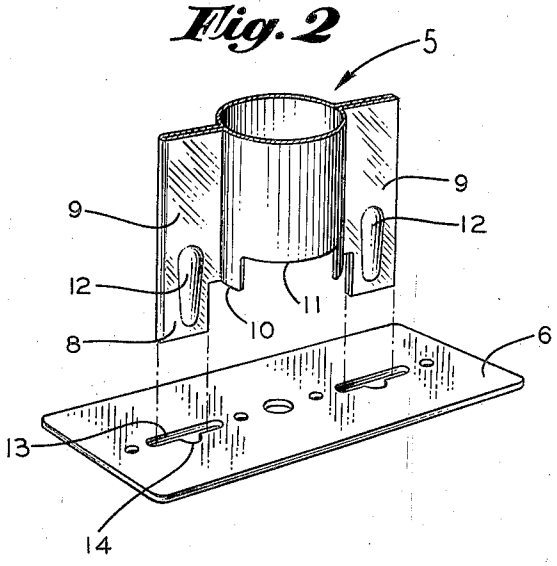
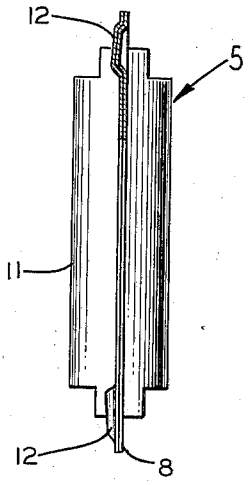


Fig. 3



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ELECTRODE ASSEMBLY

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Application June 30, 1938, Serial No. 216,685

4 Claims. (Cl. 250—27.5)

My invention relates to electrode assemblies for electron discharge devices, particularly to means for mounting plate-like electrodes, such as anodes, in the devices.

The conventional electrode assembly comprises a cathode surrounded by concentric grid and anode electrodes, and a flat spacing member such as a sheet of mica across each end of the assembly to hold the electrodes in insulated spaced relation. To join the electrodes and the spacers, electrode extensions, such as side rods on the grids and ears or lugs on the anodes, are commonly inserted in holes in the mica spacers and locked in place. The usual electrode extensions are difficult to thread into place and add materially to the cost of assembling. Further the extensions are usually sharp edged and cut into the side of the spacer holes when inserted, thus enlarging the holes so that movement of the electrodes and troublesome microphonic noises in the finished tube may occur, and accurate centering of the electrodes is difficult.

An object of my invention is an electrode assembly for electron discharge devices which is easy to assemble, which is rigid in construction and inexpensive to manufacture.

The characteristic features of my invention are defined in the appended claims and the preferred embodiment is described in detail in the following specification and shown in the accompanying drawing in which Figure 1 is a sectioned radio tube showing in elevation an electrode assembly constructed according to my invention, Figure 2 is a detailed perspective view of an anode electrode constructed according to my invention, and Figure 3 is a side elevation partly in section of an anode constructed according to my invention.

The electron discharge device selected for illustrating my invention comprises a metal envelope 1, closed at its lower end with a disc-like press of glass 2, containing lead-in conductors joined at their lower ends to contact pins in the base of the device. The electrode assembly comprises the cathode 3, a wire wound grid on side rods 4, and anode 5 joined at their ends to plate-like insulating spacers 6. The lower spacer rests upon offset shoulders in support rod 7 rising from the header and the upper spacer is held against the end of the anode by tabs welded to the upper ends of the support rods. The ends of cathode 3, side rods 4 and ear extensions 8 on the fins 9 of the anode are threaded through holes in the spacers and the entire assembly lowered on to the support rods 7, lengthwise displacement of the anode being prevented by shoulders 10, Figure 2, on the ends of the anodes which bear against the opposed faces of the two spacers. The electrodes are thus effectively clamped in place between the support rod shoulders and the metal tabs.

To insure accurate spacing between the cylindrical portion 11 of the anode and the included grid and cathode I provide according to my invention novel means for guiding the anode into place and for firmly holding the anode against lateral displacement. The anode is conveniently pressed from sheet metal, such as nickel, to form the cylindrical or barrel portion 11 with two oppositely extending fins 9, the ends of the fins extending axially beyond shoulders 10. In each ear is pressed an embossing or bead 12. The corresponding openings in the mica to receive the ears are elongated slots of substantially the same width as the thickness of the ears. The length of each slot, however, is greater than the width of the ear and the side of the slot is cut out with a semicircular recess 14 to receive the embossings 12. The rounded end of the embossing facilitates the insertion of the ear into its slot and prevents the cutting or digging away of the slot edges. To wedge the ear in place, the embossings may be tapered in an axial direction so that the width and height of the embossing is less at its outer end.

In assembly, the corner of one ear is inserted in the slot and the small end of the embossing of that ear slides into its recess 14, guiding the other ear on that end of the anode into its slot and the spacer and anode are pressed together bringing the spacer into contact with shoulder 10. The mean width and height of each embossing is slightly greater than the radius of its recess 14 so that when the spacer is pressed home the embossing lightly binds the ear in place. The distance between the center line of the anode and the center of the embossings may be accurately determined by the dies of the forming press, and the distance between the side rod and cathode holes in the spacer from the recess 14 may be accurately determined by the dies of the spacer punch press. Accordingly the radial spacing of the anode with its cooperating electrodes is accurately fixed by the machine dies of the presses and cannot be altered by an operator who may carelessly cut the ends of the slots 13 with the relatively sharp edges of the anode ears. The smooth rounded configuration of the embossings prevents fracturing of the spacer at the recesses.

Electrodes made according to my invention are easy to assemble, are firmly and accurately held

in fixed spaced relation, are rugged in construction and are inexpensive to manufacture.

I claim:

1. An electrode assembly comprising a cathode and anode held in concentric fixed spaced relation by an insulating spacer transverse to the axis of the anode, the anode comprising a tubular portion with a radially extending fin, an ear extension on said fin for engaging a slot in said spacer, and means for preventing transverse movement of said ear in said slot, comprising an embossing integral with the fins on one side of said ear in registry with a recess in the side of said slot.

2. An electron discharge device comprising an electrode, a flat ear extending from said electrode, means for fixedly supporting said electrode comprising a plate-like spacer transverse to the electrode with a slot longer than the width of said ear, a raised and rounded bead integral with and on one side of said ear extending into a recess in the side of said slot to hold the edges of the ear spaced from the ends of the slot.

3. An electrode assembly comprising a plurality of concentric electrodes, an insulating spacer transverse to the axis of the electrodes for holding the electrodes in concentric spaced relation, a flat ear extension on one of said electrodes extending through a slot in said spacer, and means for centering said ear extension in the slot comprising a tapered embossing on the ear in registry with a recess in the side of said slot.

4. An electrode assembly comprising a tubular anode and a concentric cathode, an insulating spacer joined to the ends of the electrodes, a shoulder on the end of said anode adapted to hold said spacer normal to the anode axis, and longitudinal fins extending radially from the wall of said anode, and means for accurately fixing the spacing between the anode and cathode comprising an ear on the ends of said fins extending into slots in said spacer, and tapered embossings on the sides of said ears for frictionally engaging recesses in the sides of said slots when the spacers rest against said shoulders.

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