Dec. 13, 1955 C. F. MILLER 2,727,176

ELECTRICAL DISCHARGE TUBE

Filed Dec. 31, 1952

Fig. 1.

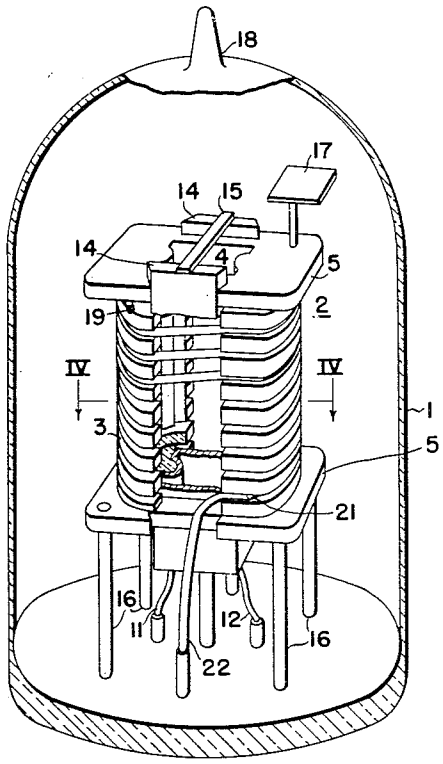


Fig. 2.

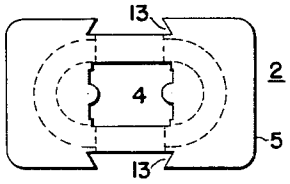


Fig. 4.

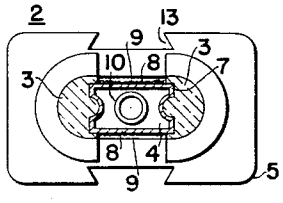


Fig. 3.

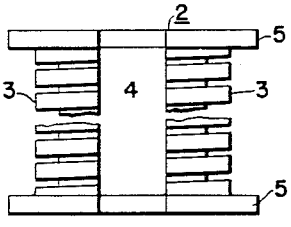
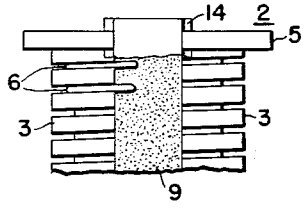


Fig. 5.



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ELECTRICAL DISCHARGE TUBE

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Application December 31, 1952, Serial No. 328,987

2 Claims. (Cl. 313—256)

My invention relates to electron tubes and in particular related to a novel structure utilizing a ceramic electrode support which is adapted to produce more rugged and reliable tubes than the structures of conventional present-day tubes. The invention is directed to large-scale production with a minimum of welding and hand-mounting of tubes of the types widely used in control and radio receiver circuits.

One object of my invention is to provide a novel and improved type of electrical discharge tube.

Another object of my invention is to produce an electron tube of the unipotential grid-controlled type which is more rugged and more uniform in performance than are tubes of structure now conventional.

Still another object is to provide a grid-controlled tube in which the electrode spacings are less subject to variation from shock, vibration and other causes than are conventional tubes now used.

Yet another object is to provide a grid-controlled tube for radio receiver and control circuits which shall be well adapted to mass production and shall require a minimum of handwork in its fabrication.

Other objects of my invention will become apparent upon reading the following description taken in connection with the drawings, in which:

Figure 1 is a perspective schematic view of a tube embodying the principles of my invention,

Fig. 2 is a top view, Fig. 3 a side view, and Fig. 4 a sectional view taken along the line IV—IV in Fig. 1 of a ceramic electrode support used in my invention. Fig. 5 is a broken view showing certain electrode structure in greater detail.

Referring in detail to the drawings a vacuum-tight container 1 encloses an electrode system comprising a support 2 which is shown in more detail in Figs. 2, 3 and 4 on which two anodes, a cathode and a control-electrode are mounted. The support 2 has a central body portion comprising two vertical legs 3 separated by a central opening 4 and joined at top and bottom by flanges 5. The flanges also have central openings corresponding in outline with said open space 4 at the inner faces of the legs 3. The latter are provided with grooves in which a helical grid-winding 6 is positioned. The central opening 4 thus extends from top to bottom of support 2 and it is provided with a metal sleeve 7 which slides into it engaging the inner faces of legs 3, but being spaced away somewhat on its broad side-faces 8 from the adjacent edges of flanges 5. The outer surfaces of side-faces 8 are coated with thermionically-emissive oxides and constitute the cathode 9. A suitable cathode heater 10 of conventional type may be positioned within the sleeve 7 and supplied with heating-current by in-leads 11, 12 sealed through the lower part of envelope 1.

The edges of flanges 5 opposite the cathodes 9 are provided with recesses 13 in which sheet-metal anodes 14 may be slipped. The anodes 14 are tied together with a strap 15 and connected to an in-lead sealed through the base of enclosure 1.

The support 2 is affixed to studs 16 set in the base of enclosure 1, and a getter 17 with a tab is affixed to a post set in its upper flange near the exhaust-tubulation 18. The grid 6 has its ends welded to studs 19 and 21 set in the support 2 at suitable positions, and stud 21 is welded to an in-lead 22 sealed through the walls of enclosure 1.

In an actual tube the support posts 16 would be made much shorter than they have been shown, for the sake of clarity, in Fig. 1.

In manufacture, the cathode sleeve 7 is first slipped into position in the central opening 4 of core 2; the control grid is then wound in place and welded to studs 19 and 21; and the anode plates 14 are slipped into the grooves 13. The resulting structure, including flexible conductors for the in-leads, is then set in position on posts 16 which have already been mounted, together with the in-leads, on a press; the connections are welded to the in-leads and the mounted stem is ready to have the bulb fused in place in a conventional manner.

I claim as my invention:

1. An electrical discharge tube comprising a vacuum-tight container, a ceramic core supported by posts from the walls of said container and comprising legs connected at their ends by cross-ties, a grid-winding about said legs and spacing projections on said legs for aligning it, a cathode sleeve engaging the adjacent faces of said legs and having areas coated with thermionically emissive oxides facing the openings between said legs, anode plates supported by recesses in said cross-ties facing said areas, and in-leads for said cathode, said control-grid and said anode plates sealed through the walls of said enclosure.

2. An electrical discharge tube comprising a vacuum-tight container, a ceramic core supported by posts from the walls of said container and comprising legs connected at their ends by cross-ties, a grid-winding about said legs and grooves on said legs for aligning it, a cathode sleeve engaging the adjacent faces of said legs and having areas coated with thermionically emissive oxides facing the openings between said legs, anode plates supported by recesses in said cross-ties facing said areas, and in-leads for said cathode, said control-grid and said anode plates sealed through the walls of said enclosure.

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