Dec. 26, 1933. V. L. RONCI ET AL 1,941,110

ELECTRON DISCHARGE DEVICE

Filed Dec. 11, 1929

FIG. 3.

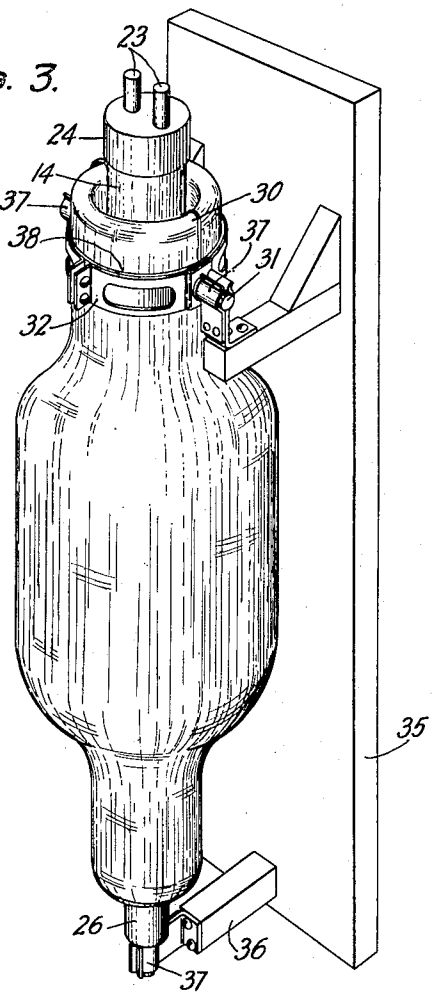


FIG. 1.

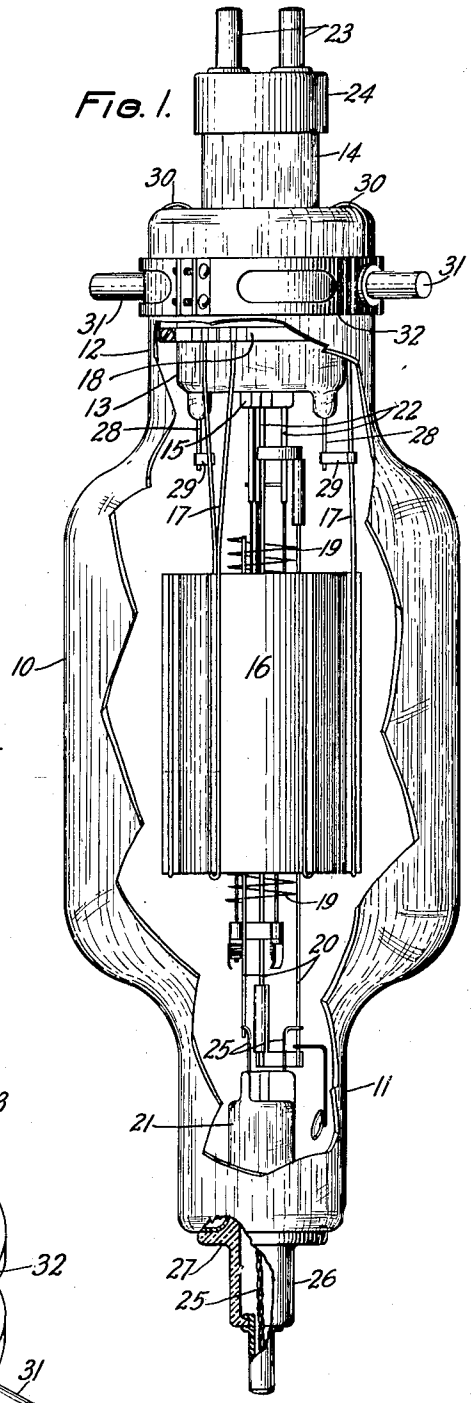
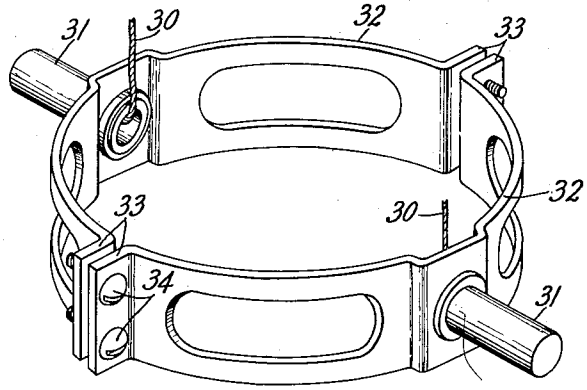


FIG. 2.



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ELECTRON DISCHARGE DEVICE

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Serial No. 413,165

9 Claims. (Cl. 250—27.5)

This invention relates to electron discharge devices and more particularly to terminal connections for the electrodes in such devices.

An object of the invention is to prevent electrical conduction between the high and low potential terminals of discharge devices.

In accordance with this invention the discharge device comprises an enclosing vessel having a glass stem at one end for supporting a plurality of electrodes, principally the filament and plate electrode. The filament is supported from a press on the stem and the plate electrode surrounds the filament and is supported by a collar engaging the stem. The leading-in wires for the filament are sealed in the stem and extend outwardly to a base carrying terminals attached to an extension of the glass vessel and these terminals conduct low voltage to the filament for heating it and causing emission of electrons to the plate electrode. When the device is used as an oscillation generator or amplifier of high power exceedingly high voltages are applied to the plate electrode to obtain high power output. In order to prevent corona discharge or leakage between the low potential filament terminals and the high potential plate terminals, the plate electrode leading-in wires are connected to radial terminals projecting from a metallic band fastened to the outside wall of the vessel near one end. This arrangement overcomes the close spacing of the high potential and low potential terminals so that the insulating base is not destroyed by destructive discharges arcing across the various terminals and substantially increases the insulating paths between the filament and plate terminals to insure uniform and efficient operation of the device over a long period of service.

The various features of this invention will be more readily understood from the following detailed description with reference to the accompanying drawing in which

Fig. 1 shows in elevation an electron discharge device partly broken away to show the interior electrode structure and illustrating the location of the various terminals for the electrodes in accordance with this invention;

Fig. 2 is a perspective view on an enlarged scale of the metallic terminal carrying band for the anode of the device; and

Fig. 3 shows in perspective the mounting of the device on a base and the support therefor.

Referring particularly to Fig. 1, the electron discharge device comprises a glass enclosing vessel having a large diameter center portion 10 and end portions 11 and 12 of smaller diameter. A plurality of concentric glass walls are disposed within the end portion 12 with the outer edge of the outer wall joined to the glass portion 12 to form a reentrant stem 13, the other end of the outer wall joined to the inner end of the next succeeding wall to form an outwardly extending stem 14, and the outer end of the second wall joined to an end of the innermost wall to form another reentrant stem (not shown) terminating in a press portion 15. This arrangement provides a long insulating path between the filament and anode leading-in wires within the device.

A filamentary cathode (not shown) is supported from the press portion 15 and a large surface anode 16 is attached to the stem 13 by heavy wires 17 welded to a collar 18 clamped around the stem 13. A helical wire grid 19 is supported by rods 20 from a reentrant stem 21 at the other end of the vessel 10 and disposed coaxially with the anode 16. The detailed construction of the electrodes and their assembly in the device is fully described in a copending application of V. L. Ronci and H. W. Ericsson Ser. No. 413,164 filed December 11, 1929. The filament leading-in wires 22 are embedded in the press 15 and extend outwardly through the stem 14 and are attached to pin type terminals 23 carried by a cup-shaped insulating member 24 preferably of "isolantite", which is attached to the end of the stem 14.

The grid supporting rods 20 are welded to bent wires 25 which are sealed in the reentrant stem 21 and twisted together external to glass portion 11. A thimble type insulating plug 26 of "isolantite" having an annular flange portion 27 is cemented to the glass portion 11 and carries a metallic pin type terminal in which the twisted wires 25 are soldered. The multiple leading-in wires 25 serve to form a large surface to impress the high frequency signal current on the control or grid electrode 19.

When the device of the type disclosed is used as an oscillation generator or amplifier of high power, exceedingly high potentials are applied to the anode or plate electrode 16 and there is danger of corona leakage or disruptive arc discharge between the high potential anode terminals and the low potential filament terminals. In accordance with this invention leakage between the anode and filament terminals exterior of the enclosing vessel is prevented by placing the anode and filament terminals a relatively long distance apart. The anode leading-in wires 28 within the device are connected to the heavy

wires 17 by metallic strips 29 welded thereto and are embedded in the stem 13. Flexible lengths of wire 30 are attached to the leading-in wires 28 and bent over the edge of the end portion 12 of the vessel and soldered to radial pin terminals 31 projecting from and carried by a collar 32 encircling the end portion 12 at an appropriate distance from the filament terminals. As shown in Fig. 2 the collar comprises two semi-circular slotted metallic bands 32 provided with flanges 33 which are clamped together by screws 34. Between the collar and the glass portion 12 is a strip of yieldable insulating material 38, such as asbestos. The terminal pins 31 are attached to offset portions of the collar 32 intermediate the flanged ends 33 and the offset portions form cavities to allow the wires 30 to enter the terminals 31. This arrangement increases the insulating path between the anode and filament terminals and also provides a relatively long air gap therebetween, thus preventing arcs and other discharges between the terminals whereby uniform and efficient operation of the device over a long period of service is assured.

An improved support for the device which facilitates the mounting and ready replacement of the device in radio or telephonic installation is shown in Fig. 3 and comprises a base portion 35 of insulating material, for example "Bakelite", from which extends a plurality of arms 36 provided with spring clips 37 for engaging the terminals and holding the device. This structure provides an inexpensive and compact support for the electron discharge device in a horizontal or vertical position.

What is claimed is:

1. An electron discharge device comprising a glass vessel having a reentrant stem, a filament and a plate electrode supported from said stem, a base having terminals for said filament attached to said stem, and a terminal carrying member embracing said vessel and connected to said plate electrode.

2. An electron discharge device comprising a glass vessel having a reentrant stem, a filament and plate electrode supported from said stem, a base having terminals for said filament attached to said stem, and a terminal member having two symmetrical portions clamped about said vessel and connected to said plate electrode.

3. An electron discharge device comprising an enclosing vessel, an electrode supported within said vessel, a metal band encompassing said vessel, radial terminals extending from said band, and an electrical connection between said electrode and said terminals.

4. An electron discharge device comprising an enclosing vessel having an extending portion, a reentrant stem within said portion, an electrode supported from said stem, a plurality of leading-in wires attached to said electrode and extending from said stem, and a metal ring member encircling said portion and electrically connected to said leading-in wires.

5. An electron discharge device comprising an enclosing vessel having a reentrant stem, an electrode supported from said stem, a split collar clamped to said vessel, terminal pins on said collar, and an electrical connection between said electrode and said terminal pins.

6. An electron discharge device comprising a glass vessel having an extending end portion, an outwardly extending stem and a reentrant stem terminating in a press portion concentrically disposed within said end portion, an electrode supported from said press portion, a base member of insulating material mounted on said extending stem, terminal pins on said base member, and leading-in wires for said electrode embedded in said press portion and connected to said terminal pins.

7. An electron discharge device comprising a glass vessel, a reentrant stem, an outwardly extending stem, and a press disposed concentrically with respect to said vessel, a filament supported from said press, a base having terminals for said filament attached to said extending stem, filament leading-in wires embedded in said press and connected to said terminals, an anode within said vessel supported from said reentrant stem, a metallic band surrounding said vessel remote from said terminals, and a multiple electrical connection between said anode and said band.

8. In combination, an electron discharge device comprising a glass vessel having an extending portion at each end, a reentrant stem within one portion, an electrode mounted on said stem, a metallic band surrounding said portion, terminal pins extending from said band at substantially right angles to the longitudinal axis of said band, said pins being electrically connected to said electrode, a second electrode mounted on the other portion parallel to said other electrode, a terminal for said second electrode projecting from said portion and a support for said device comprising a base portion, a plurality of parallel arms extending therefrom, one arm for each of said terminal pins, and stationary metallic clips on said arms for engaging said terminal pins.

9. An electron discharge device comprising an enclosing vessel, a plurality of cooperating and electrically separate electrodes mounted within said vessel, a terminal member extending from each end of said vessel, electrical connections between said terminal members and two of said electrodes, a metallic band clamped about said vessel intermediate said terminal members, and an electrical connection between said band and another of said electrodes.

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