

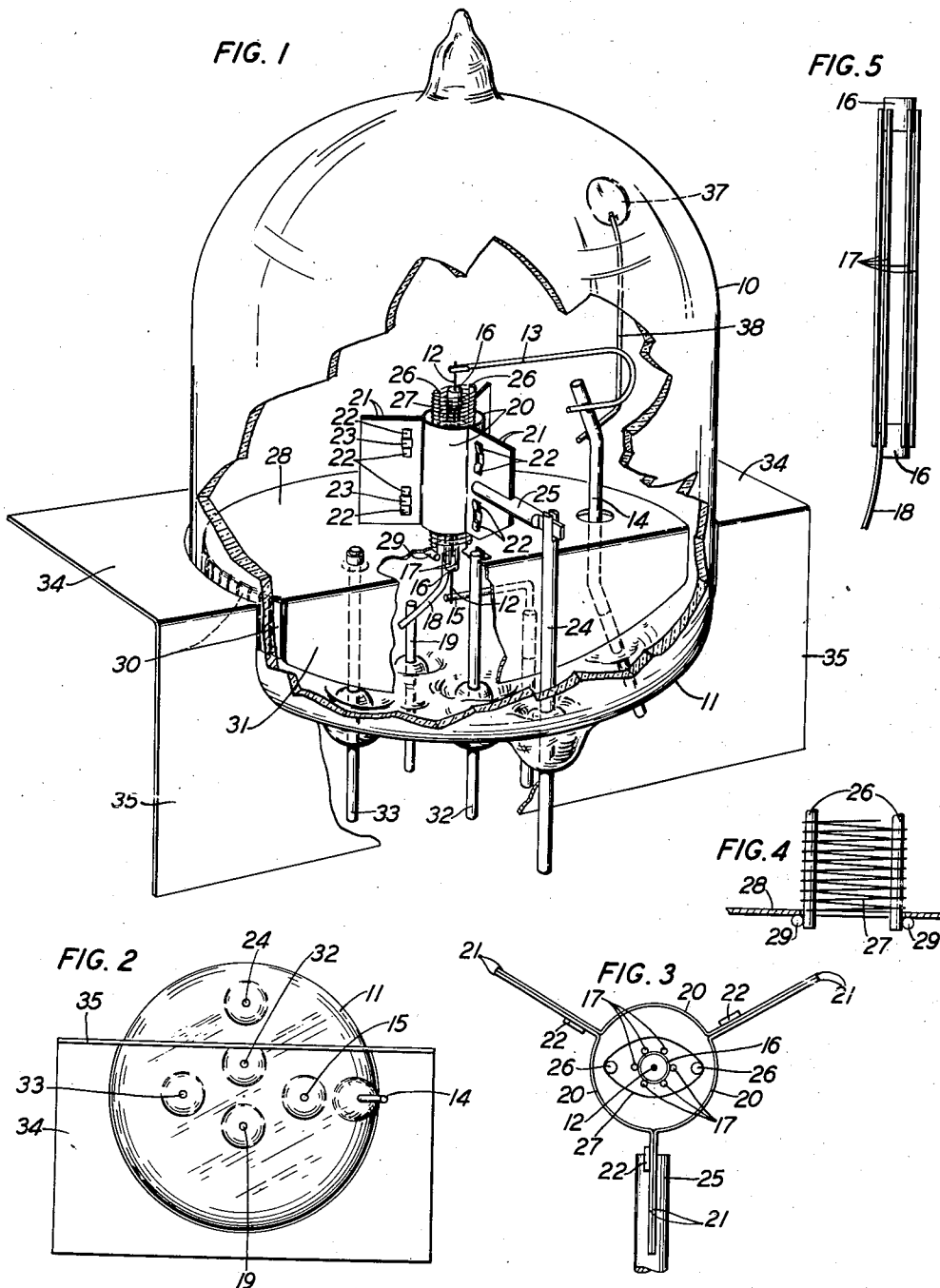
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ELECTRON DISCHARGE DEVICE

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ELECTRON DISCHARGE DEVICE

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5 Claims. (Cl. 250—27.5)

This invention relates to electron discharge devices and more particularly to such devices of the shielded grid type adapted for amplification of ultra high frequency impulses.

One object of this invention is to effectively segregate the input electrodes and conductors of an electron discharge device from the output electrode and conductor.

In one embodiment illustrative of this invention, an electron discharge device comprises an enclosing vessel of the stemless type in which a cathode, an anode, a control electrode or grid, and a screen or shield electrode or grid are mounted by supporting members sealed in one end wall of the vessel, the supporting members serving also as leading-in conductors for the electrodes. A metallic disc or plate, electrically connected to the screen or shield electrode or grid, extends across one end of the electrodes of the device and to immediately adjacent the side walls of the enclosing vessel. The disc or plate is provided with a flange extending to adjacent the end wall of the enclosing vessel in which the leading-in conductors for the electrodes are sealed, and is disposed between the anode leading-in conductor and the cathode or control electrode or grid leading-in conductors. In order to insure a low capacitive and inductive coupling between the input and output conductors for the device, two leading-in conductors are provided for the screen or shield electrode through the plate or disc, one of these conductors being disposed in proximity to the anode support and the other being disposed relatively remote from the anode support and in proximity to the support for the control electrode or grid.

The device may be mounted on a metallic partition or shield having a portion substantially coplanar with the disc or plate and another portion substantially coplanar with the flange on the disc or plate whereby further shielding between the anode leading-in conductor and the leading-in conductors for the control electrode and cathode is obtained.

The invention and the features thereof will be understood more clearly and fully from the following detailed description with reference to the accompanying drawing in which:

Fig. 1 is a perspective view of an electron discharge device and an external shield constructed in accordance with this invention, portions of the enclosing vessel, the shield disc or plate, and the external shield being broken away to show the elements more clearly;

Fig. 2 is an end view showing the disposition

of the external shield and of the leading-in conductors for the electrodes;

Fig. 3 is an end view of the electrodes showing the configuration and relative position thereof;

Fig. 4 is a fragmentary view showing details of the shield or screen grid and plate or disc assembly; and

Fig. 5 is an enlarged detail view of the control electrode or grid.

Referring now to the drawing, the electron discharge device shown comprises an enclosing vessel 10 having a base or end wall 11 in which all of the leading-in conductors for the electrodes are sealed. An incandescible cathode, which may be a linear filament 12 of thoriated tungsten, is supported at one end from a resilient J-shaped metallic member or spring 13 carried by a rigid metallic support or wire 14 sealed in the base or end wall 11 of the enclosing vessel adjacent the periphery thereof. The other end of the filament 12 is suitably secured, as by welding, to a bent support or wire 15 sealed in the base or end wall 11 adjacent the support or wire 14.

A control electrode or grid, shown clearly in Fig. 5, comprises a pair of metallic tubular members or collars 16 and a plurality of wires 17 secured to the tubular members or collars 16 and disposed parallel to each other. The tubular members or collars 16 and wires 17 are disposed about the filament 12 and coaxial therewith, the wires 17 being parallel to the filament 12. The control electrode or grid is supported by a rigid wire 18 secured to one of the collars 16 and to a rigid metallic support or rod 19 sealed in the end or base wall 11 of the enclosing vessel.

An anode encompasses the control electrode or grid and comprises a plurality of sections each having an arcuate portion 20 and flanges 21, the flanges on adjacent sections being secured together in face to face relation by bent tabs 22 on a flange of one section, extending through apertures 23 in a corresponding flange on another section. The arcuate portions 20 form a cylinder coaxially disposed with the filament 12 and control electrode or grid. The anode is supported from a rigid rod or wire 24, by another rigid rod or wire 25 having a slot for receiving two of the flanges 21 and having a reduced end portion fitted in a slot in the wire or rod 24. Preferably the rod or wire 25 is welded to the rod or wire 24 and to the flanges 21 which it engages. As clearly shown in Fig. 2, the anode support wire or rod 24, which con-

stitutes the leading-in conductor for the anode, is sealed in the base or end wall 11 of the enclosing vessel at a point remote from the control electrode or grid conductor 19 and the filament conductors 14 and 15 so that the capacitive coupling between the wire or rod 24 and the other conductors is relatively small.

Disposed between the control electrode or grid and the anode and coaxial therewith is a shield or screen electrode which includes a plurality of parallel rods or wires 26 and an oval helical grid 27, the turns of which are secured, as by welding, to the rods or wires 26. The shield or screen electrode is mounted upon a metallic disc or plate 28, each of the wires or rods 26 being secured, as by welding, to a metallic stub 29 secured, as by welding, to the disc or plate. The disc or plate 28 extends to immediately adjacent the side walls of the enclosing vessel 10, and may be provided with a peripheral flange 30, which may be slotted, as shown in Fig. 1, to expedite the fabrication thereof. In order to effectively segregate the anode leading-in conductor 24 from the control electrode or grid leading-in conductor 19 and the filament leading-in conductors 14 and 15, the disc or plate 28 is provided with a flange 31 extending between the anode conductor and the other conductors and to immediately adjacent the base or end wall 11 of the enclosing vessel, the flange being substantially coextensive with the portions of the control electrode or grid conductor 18, 19 within the vessel 10. The disc or plate 28 is supported by two rigid wires or rods 32 and 33 sealed in the base or end wall 11. As shown in Fig. 2, the wire or rod 32 is disposed relatively near the anode leading-in conductor 24 and the wire or rod 33 is disposed relatively remote from the anode conductor and near the control electrode or grid leading-in conductor 19.

In order to further insure segregation of the anode conductor from the control electrode or grid and filament conductors, the electron discharge device, when operated, may be suitably mounted on a metallic partition or shield having a portion 34 substantially coplanar with the plate or disc 28 and another portion 35 substantially coplanar with the flange 31. The partition or shield extends from immediately adjacent the walls of the enclosing vessel so that it is capacitively coupled to the internal shield 28, 31.

In the operation of the device, the output or utilization circuit may be connected between the conductors 24 and 32 and the input or excitation circuit may be connected between the conductors 19 and 33. The conductor 32 may be grounded through a condenser. The internal shield 28, 31, together with the external shield 34, 35, therefore, effectively segregates the conductors in the input or excitation circuit from the conductors in the output or utilization circuit, so that the device may be operated satisfactorily at ultra high frequencies.

A disc 37 having a getter material, such as magnesium, thereon, is supported from the wire or rod 14 by a wire 38 and may be heated, for example, by high frequency induction, during the fabrication of the device so that the getter material is vaporized and fixes residual gases within the enclosing vessel 10.

Although a specific embodiment of the invention has been shown and described, it will be understood that modifications may be made

therein without departing from the scope and spirit of this invention as defined in the appended claims.

What is claimed is:

1. An electron discharge device comprising an enclosing vessel, a cathode, an anode, a control electrode disposed between said cathode and anode, leading-in conductors for said control electrode and anode sealed in a wall of said vessel, a screen electrode disposed between said control electrode and anode, and a metallic disc extending adjacent one end of said anode, screen and control electrodes, said disc being electrically connected to said screen electrode and having a flange portion disposed between said leading-in conductors.

2. An electron discharge device comprising an enclosing vessel, a cathode, an anode encompassing said cathode, a control electrode between said cathode and anode, leading-in conductors for said control electrode and anode extending through a wall of said vessel, a metallic disc adjacent one end of said anode and control electrode, and a helical shield electrode supported by said disc and electrically connected thereto, said disc having a flange portion disposed between said leading-in conductors.

3. An electron discharge device comprising an enclosing vessel, a cathode, a control electrode, an anode, a metallic disc adjacent one end of said control electrode and anode, a shield electrode carried by and electrically connected to said disc, leading-in conductors for said anode and control electrode, and a plurality of conductors connected to said disc, one of which is disposed in proximity to the leading-in conductor for said anode, and another of which is disposed remote from said anode leading-in conductor.

4. An electron discharge device comprising an enclosing vessel, a cathode, an anode, a control electrode, a shield electrode, leading-in conductors for said anode and control electrode sealed in one wall of said enclosing vessel, shielding means electrically connected to said shield electrode and having a portion disposed between said leading-in conductors and substantially coextensive with the portion of one of said conductors within said vessel, and a plurality of conductors electrically connected to said means and sealed in said wall, one of said plurality of conductors being disposed in proximity to the leading-in conductor for said anode, and another of said plurality of conductors being disposed remote from said anode leading-in conductor and in proximity to the leading-in conductor for said control electrode.

5. In combination, an electron discharge device comprising an enclosing vessel, a cathode, an anode, a control electrode, a shield electrode, leading-in conductors for said control electrode and anode extending through one wall of said vessel, and means for shielding the portions of said conductors within said vessel from each other, said means including a metallic disc extending adjacent one end of said control electrode and anode and having a flange disposed between said conductors, and additional shielding means externally of said vessel capacitively coupled to said first means and including a portion coplanar with said disc and another portion coplanar with said flange and disposed between the portions of said conductors external of said vessel.