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ELECTRON DISCHARGE DEVICE

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Fig. 1.

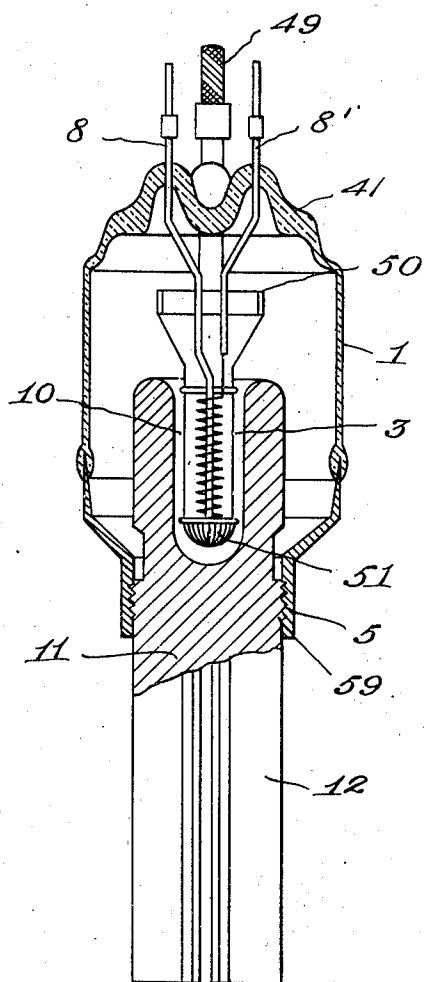
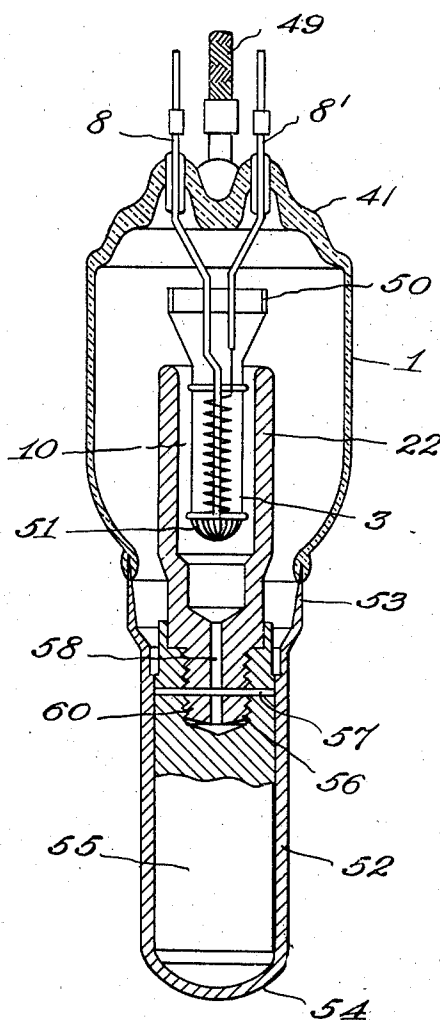


Fig. 2.



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ELECTRON DISCHARGE DEVICE

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Application May 23, 1941, Serial No. 394,796
In France May 28, 1940

3 Claims. (Cl. 250—27.5)

The present invention relates to changes, improvements and modifications to my application entitled "Electron discharge apparatus," Serial No. 386,513, filed April 2, 1941.

In the above-mentioned application description has been given of electron discharge devices comprising anode structures that permit cooling in such a way that the temperature of the anode portion located within the protecting bulb is not the coldest part of the device while still maintaining a sufficiently low temperature to insure suitable operations.

In the said patent application it has been indicated, especially as regards Figs. 6 and 7, that the grid connection might be led from the insulating bulb through the same base as the filament connections. The object of the present invention is particularly to show two examples of devices that comprise this outlet arrangement of the grid and filament connections.

Still another object of the invention is to describe another type of anode construction suitable for use in electron discharge devices of this kind.

Referring to Fig. 1, one end of an evacuated insulating bulb 1 terminates in a pressed-on endplate 41 which is reversed as described in the main patent, and the other end terminates in a metallic sleeve 5 which is hermetically fitted on an anode block 11. The main patent has given a description in detail of this fitting by threading and soldering, and also of the design of the anode block which comprises cooling ribs 12 outside the bulb and a hollowed portion at 10 within the bulb.

Through the pressed-on endplate 41 there are sealed two cathode connections 8 and 8' and a grid lead-in connection 49 in the form of a rod of greater thickness, e. g. of molybdenum, which is secured in any suitable manner in a conductive crown 50 in which there are supported, e. g. brazed on, rigid conductors or uprights which extend within the cavity 10 to serve either as grids 3 or as supports for a grid wire coiled on them. The end of the grid structure facing toward the bottom of the anode cavity 10 is then completed with a trellis cap 51. The filament structure consists of a simple spiral that is well known and will not be further described in detail.

The same grid and filament construction is provided in the device of Fig. 2. However, in the embodiment shown, the anode structure consists of an outer cylinder 52, the tapered end 53 of which is directly sealed to the insulating bulb 1, while its other end is closed by a bottom 54. This portion of the anode may be made by the shaping of a single element. Within the anode

cylinder 52 there is tightly threaded a block 55 which may likewise be of copper, for example, or of another material to which there is secured a sleeve 22 that projects within the tube and forms the anode cavity 10 within which the grid and cathode electrodes penetrate. The bottom end of this sleeve 22, e. g. of molybdenum while cylinder 52 and block 55 may be of copper, has an extension consisting of a cylindrical threaded part 56. This threaded part 56 screws into a threaded recess provided in block 55. A transverse cotter pin 57 insures permanent securing of the two members after they have been screwed into each other. Part 56 is provided with a longitudinal relief hole 58 for the vacuum pumping of the cavity that may be left between block 55 and the bottom of portion 56.

It can be seen that the structures described in the present addition can be particularly suitable for short wave operation because the electrodes have small active surfaces, short feed and support connections and a capacity that is easily adjustable between the bottom of the grid and the bottom of the anode as a result of the threadings, 59 between anode block 11 and sleeve 5 in Fig. 1 and 60 between the threaded portion 56 and anode block 55 of Fig. 2.

It is furthermore evident that as a result of the shape of the anode portion within the device and of the electrical and thermal continuity of this anode portion with the outside part of the device, it is possible to adjust the cooling of the anode to such a point that the temperature of the active portion is sufficiently high to prevent escapes of occluded gas and consequently permit, if desired, the use of a cathode of thoriated tungsten which is known to be advantageous for short-wave power emission tubes.

Instead of the filament structure shown in Figs. 1 and 2, use may be made of other types of construction, e. g. mid-point structures (projecting or not) as shown in Figs. 1 and 7 of the application for the main patent. The anode may also be given any one of the shapes described in the said main patent.

What is claimed is:

1. A symmetrical electron discharge device adapted for ultra high frequency operation comprising an evacuated vessel having a generally cylindrical side wall of insulating material and a pair of end walls, a cathode coaxially located within the side wall, a control grid concentrically surrounding the cathode within the vessel, said grid and cathode having electrical connections passing through and sealed to the insulating ma-

terial of one of said end walls, and the other end wall being formed by a metallic anode, said anode having a cylindrical portion protruding into the vessel and concentrically surrounding the grid and a sleeve sealed to the insulating side wall.

2. A symmetrical electron discharge device adapted for ultra high frequency operation comprising an evacuated vessel having a generally cylindrical vitreous wall and a pair of end walls, one of said end walls being of vitreous material, a cathode coaxially located within said vitreous side wall, a control grid concentrically surrounding the cathode within the vessel, said grid and cathode having electrical connections passing through and sealed to the vitreous end wall, the other end wall being formed by a metallic anode having a sleeve sealed to the vitreous side wall and having a cylindrical portion protruding into the vessel and concentrically located between the grid and vitreous side wall, the arrangement of the anode, grid and cathode and their electrical connections being one of symmetrical alignment.

3. A symmetrical electron discharge device adapted for ultra high frequency operation comprising an evacuated vessel having a generally cylindrical vitreous wall and a pair of end walls, one of said end walls being of vitreous material, a cathode coaxially located within said vitreous side wall, a control grid concentrically surrounding the cathode within the vessel, said grid and cathode having electrical connections passing through and sealed to the vitreous end wall, the other end wall being formed by a metallic anode comprising an outer shell, a sleeve attached to said shell sealed to said vitreous side wall, an inner block of metal located within and in close contact with said sleeve, a partly hollow cylindrical portion protruding from said block into said vessel concentrically located between the grid and vitreous side wall, the arrangement of the anode, grid and cathode and their electrical connections being one of symmetrical alignment.

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