INVENTORS, VOSAFAPA/ V, 7AR/7C'A744Aº BY APA LV4 M7AAR AR worak

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Filled April 10, 1967

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ELECTRON TUBE GITTER STRUCTURE
Filed April 10, 1967

Jan. 27, 1970

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ELECTRON TUBE GETTER STRUCTURE

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Filed Apr. 10, 1967, Ser. No. 629,698

Int. Cl. H01J 19/68, 19/70, 61/26

U.S. Cl. 313—178

7 Claims

ABSTRACT OF THE DISCLOSURE

An electron tube getter structure wherein the getter material is disposed in the cathode circuit coaxially within the tube.

RELATED PATENTS

Patents which show getters for electron tubes are 2,898,501; 2,900,549; 2,939,030; and 2,951,170.

BACKGROUND OF THE INVENTION

This invention relates to electron discharge devices and more particularly to an improved getter material structure for high vacuum power tubes and similar devices.

It is desirable during the operating life of electron tubes to remove from the interior of the tubes occluded gases not removed during the exhaust operation which may be detrimental to the tube. This is done by means of a gettering material such as zirconium, titanium, tantalum or the like which is placed within the tube where it will function when heated to remove such gases.

In the manufacture of the tube, it is necessary to carburize the electron emitting cathode. Generally, the cathode is made of thoriated tungsten and the tube with the cathode structure but without the getter material is placed in a hydrocarbon gas atmosphere and heated to incandescence. This carburization process converts the tungsten to tungsten carbide which when heated by passage of an electric current there-through will produce electron emission. However, this carburization must be done before the getter material is placed within the electron tube; otherwise, the getter material would be contaminated by the carburizing atmosphere and deteriorate. In the prior art there are shown various methods for disposing the getter material within the electron tube as shown by the patents cited and in other ways, such as getter wire disposed on a grid cap for wrapping gettering wires or ribbons around the ends of the grid. But the prior art methods do not permit simple and inexpensive assembly of the getter material to the tube structure and often the assembly techniques are cumbersome and expensive or the tube design does lend itself to those techniques.

An object of this invention is to provide an improved tube and getter structure which will permit an inexpensive and simple means of disposing the getter material within an electron tube after the carburization process for the cathode is completed.

IN THE DRAWING

The sole figure shows a longitudinal cross-section view of an electron discharge device embodying the structure of this invention.

DETAILED DESCRIPTION

The drawing discloses an electron discharge device 1 such as a power tube. In the center of the electron discharge device 1 is shown a tube 2 which may be of molybdenum or similar metal which in the upper portion thereof has apertures 3 arranged around the perimeter of the tube. At the opposite end of the tube 2 is brazed or welded a metal disk 5. A cathode 6 which is generally thoriated tungsten and may be formed as a mesh is brazed to the disk 5 and to a disk 7 which in turn are brazed to tube 3 and tube 15 respectively. The cathode structure then is now firmly secured in the center of the tube and supported by the center tubes 2 and 15. It will be observed that the holes 3 in tube 2 are exposed to the cathode 6. A skirt 10, brazed to the support tube 13 and also at the other end thereof is brazed to a ceramic tube 11, constitutes one of the cathode terminals. Disk 7 is brazed to a tube 15 to which in turn is brazed a skirt 16 that is supported on the top end of ceramic tube 11. Skirt 16 continues onward and is brazed to the bottom surface of a ceramic tube 17 and constitutes the second terminal to the cathode circuit thereby providing with a current source a complete circuit for the cathode current.

A cap 20 is secured to disk 5 thus sealing off the upper end of tube 3 and providing a means for centering control grid 22 and screen grid 23 by use of ceramic member 21. The other end of the control grid 22 is brazed to a ring 25 that is supported from a skirt 26 which in turn is brazed to the upper surface of ceramic ring 17 and provides the electrode for the control grid. The screen grid 23 is supported at the bottom end by a skirt 27 which in turn is fastened to a skirt 30 that is brazed to the upper surface of a ceramic tube 31. The bottom surface of the ceramic tube 31 is brazed to the control grid skirt 26. The anode 32 is supported on a disk 33 to which are attached skirts 34 and 35 and are brazed or welded together at the ends thereof. The anode assembly is supported on a ceramic tube 40 by brazing skirt 35 to the upper end thereof and the lower surface of tube 40 is brazed to skirt 30.

After the cathode is carburized, the tube is assembled as shown and the getter material 41 which in the drawing is shown as a ribbon of metal, is inserted into tube 13. Then the cap 42 is brazed or welded to tube 13 thus sealing off the tube at the bottom. The getter material may be titanium or zirconium. It may be in the form of ribbon as shown or wire or even capsules as long as they are larger than the holes 3 and will not fall through. The holes 3 in the tube 2 allow any gases within the electron discharge device to enter the interior of the tube.

It is known that the cathode areas of tubes of the presently described type become hot during operation, reaching the range of temperature necessary for activation of the getter. The temperatures of the parts of the cathode structure in the vicinity of the emitter attain the highest levels and are progressively lower toward the terminal end of the structure. Therefore, this getter arrangement allows for the range of temperatures desirable for the most efficient gettering of the various gases.

While we have described above the principles of our invention in connection with specific apparatus, it is to be clearly understood that this description is made only by way of example and not as a limitation to the scope of our invention as set forth in the objects thereof and in the accompanying claims.

We claim:

1. An electron discharge device comprising a tubular cathode and a surrounding anode mounted in spaced relation, a hollow tubular getter support mounted coaxially within and supporting said cathode, said getter support having longitudinally spaced apertures in the walls and
being closed at both ends, and a separately insertable getter element retained within said getter support between said ends, one of said ends being mounted on an exterior surface of said device to provide access for separate insertion of said getter element and sealing of said one end.

2. The device of claim 1 wherein the other end of said getter support is conductively connected to said cathode.

3. The device of claim 2 wherein said one end includes a cap sealed thereto.

4. An electron discharge according to claim 3 wherein said getter material is in the form of a ribbon extending longitudinally within said getter support.

5. An electron discharge device according to claim 3 wherein said getter material is in the form of a coil.

6. An electron discharge device according to claim 3 wherein said getter material is in the form of a capsule.

7. The device of claim 3 including a tubular control grid positioned between said cathode and anode, and a second cap sealing said other end, said second cap including means supporting and centering said control grid.

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