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GETTER

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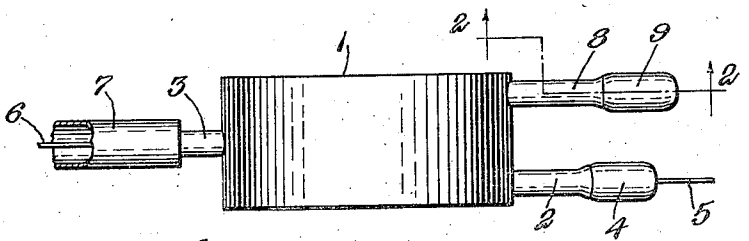


Fig. 1.

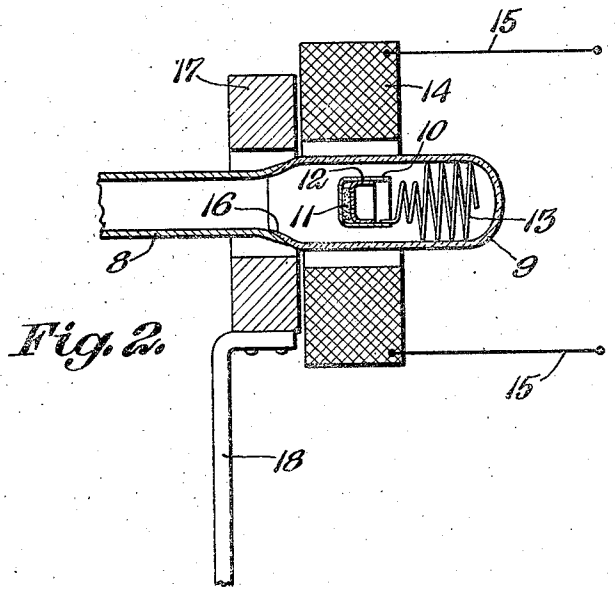


Fig. 2.

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GETTER

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4 Claims. (Cl. 250—27.5)

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This invention relates to a getter arrangement and method for introducing a getter, particularly in connection with that type of discharge tube which is made with a metal envelope.

A number of discharge tubes are made with their outer envelope of metal through which lead-in conductors are introduced by means of insulating seals. In such tubes difficulties have been encountered in vaporizing getter materials due to the fact that the metal envelope electrically shields the interior of the tube, and thus prevents the usual induction heating for the purposes of vaporizing the getter. Various other methods of heating the getter have been attempted, but heretofore each such attempt has encountered serious difficulties.

An object of this invention is to devise an arrangement whereby a getter may be vaporized into a metal envelope by induction heating.

Another object is to accomplish the foregoing without producing undesired heating of any of the glass-to-metal seals of the metal envelope.

A further object is to accomplish the heating of the getter in a simple and effective and reliable manner.

The foregoing and other objects of this invention will be best understood from the following description of an exemplification thereof, reference being had to the accompanying drawing, wherein:

Fig. 1 is a side view of a metal envelope tube, such as a magnetron, incorporating certain features of my invention; and

Fig. 2 is a cross-section of the getter arm taken along line 2—2 of Fig. 1, and showing the auxiliary elements which are associated therewith during vaporization of the getter.

The tube shown in Fig. 1 consists of a hollow metal envelope 1 which may be made of a highly-conductive material, such as copper. For example, the envelope 1 may be part of a magnetron. Such a magnetron is provided with a number of metallic pipes 2 and 3 hermetically sealed into the tube walls and through which lead-in conductors are introduced into the tube. For example, the pipe 2 has sealed to its outer end a glass chamber 4 through the outer end of which is sealed a lead-in conductor 5 which may extend to one of the electrodes within the tube, such as the cathode. In the same way a lead-in conductor 6 which, for example, may be the high frequency lead from the tube, is sealed through the end of the pipe 3, which may constitute a lead extending from the the envelope 1, serving in this instance as the anode of the magnetron. The pipe 3 may likewise carry a conductive pipe 7 which surrounds the conductor 6 and forms therewith a concentric high frequency line. The envelope 1 may be provided with one or more additional pipes not shown, through which lead-in conductors sealed through a glass seal at the outer end of said pipes extend.

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In addition to the above construction, there is provided a pipe or tube 8 of conductive material, such as copper, hermetically sealed in the wall of the envelope. The pipe 8 has sealed to the outer end thereof a glass envelope 9. The interior of the envelope 9 as well as that of the pipe 8 communicate with the interior of the envelope 1. Within the envelope 9 is supported a metallic cup 10, at the bottom of which is contained a getter material 11. This getter material may be, for example, an easily vaporizable material, such as barium, or a reaction mixture, such as barium oxide and aluminum. The getter material 11 is maintained within the cup 10 by a perforated metallic insert 12, which may be retained in place within the cup 10 by being welded thereto. The perforations in the insert 12 permit vaporized getter material to escape into the envelope 9. The cup 10 may be supported by means of an open spiral spring 13, one end of which is welded to the cup 10 and the other end of which is of sufficient diameter to firmly engage the inner walls of the envelope 9, thus retaining the cup 10 firmly in place at substantially the center of said envelope 9. It will be noted that the cup 10 has its open end facing the back of the envelope 9 so as to avoid the blowing of particles liberated within the cup 10 into the interior of the main envelope through the pipe 8.

After the tube has been exhausted and freed of occluded gases in the usual manner, the getter material 11 is liberated by surrounding the glass envelope 9 with a coil 14 which is adapted to be fed with relatively high frequency induction heating current from a pair of lead-in conductors 15. These conductors 15 are adapted to be connected to a suitable source of high frequency current. In this way currents are induced in the walls of the cup 10, and generate sufficient heat to raise the material 11 to vaporizing or reaction temperature at which the getter material is vaporized and deposited on the walls of the envelope 9 to accomplish the usual residual gas cleanup. Thus it will be seen that the getter material is readily vaporized by induction heating without substantial interference with such action due to the fact that the discharge device involved possesses a metallic envelope.

When the coil 14 is placed around the cup 10, it likewise approaches the seal 16 between the pipe 8 and the glass envelope 9 so closely that in absence of some protective means, heat would be generated within the walls of the pipe 8 to such an extent as to injure said seal. I have found that this injurious heating may be avoided without substantial interference with the heating of the getter by surrounding the seal 16 with a relatively heavy ring 17 of a highly-conductive material, such as copper. The ring 17 may be supported in proper position, for example, by a standard 18. The copper ring 17 has such a low resistance that any currents which are generated in it by means of the coil 14 do not liberate a sufficient amount of heat to substantially raise the temperature of said ring 17. At the same time this action effectively protects and shields the seal 16 against the generation of heat adjacent said seal. In this way I have been able to effectively vaporize the getter material 11 without any danger of injuring the seal 16.

Of course it is to be understood that this invention is not limited to the particular details as described above as many equivalents will suggest themselves to those skilled in the art. For example, the arrangement which I have shown lends itself to other types of heating of getter materials contained within the envelope 9 as by the application of a flame thereto. Also various aspects of my invention may be incorporated into a variety of tube types. It is accordingly desired that the appended claims be given a broad interpretation commensurate with the scope of the invention within the art.

What is claimed is:

1. The method of introducing a vaporizable material into a discharge device comprising an envelope of a conducting material, a glass envelope sealed to said envelope projecting exteriorly of said envelope and enclosing a space communicating with the interior of said envelope, and a vaporizable material contained within said space adjacent the seal between said glass and conducting envelopes, said method comprising subjecting said vaporizable material to a varying magnetic field to produce induction heating thereof, and surrounding said seal with a body of a good conductive material to prevent undesired heating of said seal.

2. The method of introducing a vaporizable material into a discharge device comprising an envelope of a conducting material, a glass envelope sealed to said envelope projecting exteriorly of said envelope and enclosing a space communicating with the interior of said envelope, and a vaporizable material contained within said space adjacent the seal between said glass and conducting envelopes, said method comprising subjecting said vaporizable material to a varying magnetic field to produce induction heating thereof, and surrounding said seal with a relatively massive ring of a good conductive material to prevent undesired heating of said seal.

3. The method of introducing a vaporizable material into a discharge device comprising an envelope of a conducting material, a hollow conducting tube communicating with the interior of said envelope and sealed to the wall thereof, a glass envelope sealed to the outer end of said tube and enclosing a space communicating with the interior of said tube, and a vaporizable material contained within said space adjacent the seal between said glass envelope and said tube, said method comprising subjecting said vaporizable material to a varying magnetic field to produce induction heating thereof, and surrounding said seal with a body of a good conductive material to prevent undesired heating of said seal.

4. The method of introducing a vaporizable material into a discharge device comprising an envelope of a conducting material, a hollow conducting tube communicating with the interior of said envelope and sealed to the wall thereof, a glass envelope sealed to the outer end of said tube and enclosing a space communicating with the interior of said tube, and a vaporizable material contained within said space adjacent the seal between said glass envelope and said tube, said method comprising subjecting said vaporizable material to a varying magnetic field to produce induction heating thereof, and surrounding said seal with a relatively massive ring of a good conductive material to prevent undesired heating of said seal.

PERCY L. SPENCER.