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GETTER STRUCTURE FOR ELECTRON DISCHARGE TUBES

Original Filed March 24, 1943

Fig. 1

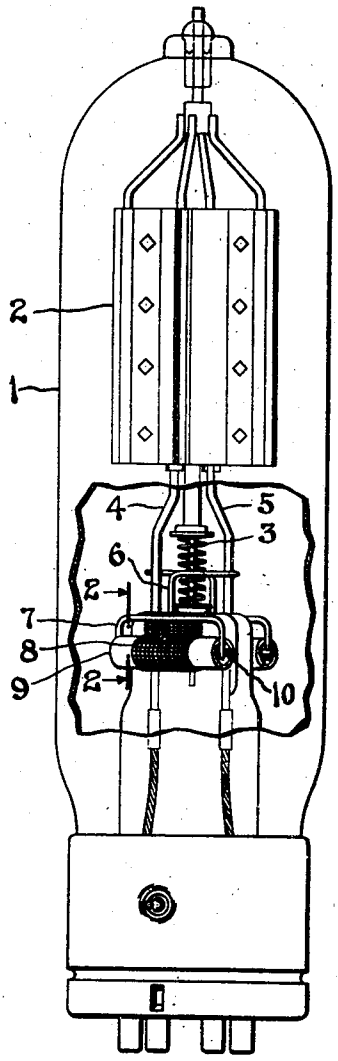
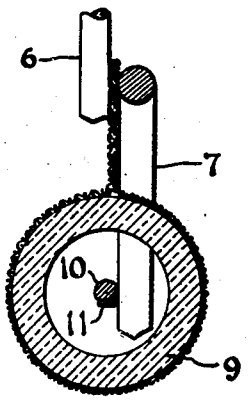


Fig. 2



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GETTER STRUCTURE FOR ELECTRON DISCHARGE TUBES

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3 Claims. (Cl. 250—27.5)

1

In my parent application Serial No. 480,283, filed March 24, 1943, which issued on August 26, 1947, as United States Patent No. 2,426,247, I have claimed the getter structure per se. In this divisional application I claim a vacuum tube employing such getter structure and the method of introducing the getter therein.

This invention relates to apparatus for and the method of introducing getter into vacuum tubes.

For many years it has been customary to introduce getter into highly evacuated tubes such as those used for radio transmission and reception, for example, in order to improve the vacuum within such tubes. It has been found, however, that in the case of high frequency and high voltage tubes employing a high vacuum the introduction of getter, although desirable, presented many difficulties so that it is now the practice not to use any getter in such tubes. The difficulties which have been encountered when a getter has been used in such tubes have been primarily that the getter would be deposited on the electrodes or other portions of the tube within the envelope with undesirable results. For example, if any of the getter were deposited on the electrodes within the tube, the electrodes would become primary emitters of electrons so that the tube would either change its characteristics or cease to function. This is particularly true in case any getter becomes deposited on the inside of the plate. The plate begins to emit electrons and the tube either immediately or after an interval ceases to be useful to perform its desired function. If any getter becomes deposited on the press or stem of the tube or upon the envelope itself, a high voltage puncture is likely to occur particularly in the stem, thus destroying the tube entirely.

I have discovered that a getter may be used in a high voltage, high vacuum tube such as a rectifier tube used in a radio transmitter, for example, with apparatus according to my invention in which the getter is prevented from being deposited upon any of the electrodes of the tube or any portion of the tube itself. With my apparatus I may confine the getter deposit to the inside of a supplementary open ended tube within the evacuated envelope and thus secure the beneficial effects of using a getter without incurring any of the disadvantages which have heretofore accompanied such use in this type of tube.

In the drawings I have illustrated in Figure 1 a front view, partly broken away, of a high vacuum, high voltage rectifier for use in a radio transmitter which has been built in accordance with my invention.

2

Figure 2 is an enlarged section along the lines 2—2 of Figure 1.

Figure 1 shows an envelope 1 having mounted therein an anode 2 which surrounds an elongated filamentary cathode maintained taut by the spring 3. Rods 4 and 5 mounted in the press support the filament at its lower end. Secured to one or both of the rods 4 and 5 in any suitable manner, as by a rod 6, is the getter structure of my invention. Secured to the rod 6 is a yoke 7 which supports a wire mesh 8 which in turn surrounds and supports an open ended tube 9 which is illustrated as a glass tube, but may be of other material, such as metal. Secured to the ends of the yoke 7 is a metal rod 10 which has affixed to it a strip of getter material 11. The getter strip 11 may be of any suitable materials, for example, of a type sold commercially, or it may be of any other suitable material. One very good material to use as a getter, either alone or in combination with other materials, is barium, but barium is a notable example of the type of getter which, if used in accordance with usual practice in a high vacuum, high voltage tube, is subject to the disadvantages mentioned above. The tube 9 surrounds the strip of getter 11 throughout the entire length of that strip. After the tube has been thoroughly baked and evacuated in accordance with the usual practice, the getter may be vaporized in any suitable manner, as for example by applying a high frequency coil to the getter structure so as to induce current around the circuit including the yoke 7 and rod 10. This should be done in such a manner as to avoid flashing the getter, but instead to cause the getter to evaporate. This may be accomplished very simply by simply not applying too strong a field for too long a time, that is, by avoiding too high a degree of heat. As the evaporation from any body occurs in straight lines perpendicular to its surface, the getter which is thus evaporated passes directly to the open ended tube 9 and is deposited thereon. As this tube is open at its ends and as the getter is evaporated gradually there is no building up of pressure within the tube 9 such as would force any of the evaporated getter material out of the ends of this tube so that it is all deposited upon the inner surface of tube 9. Again, as the tube 9 is open at its ends it is, of course, in communication with, indeed a part of, the evacuated space within the bulb and the getter is, therefore, just as effective in

cleaning up any residual gas remaining within the tube as it would be if used in accordance with prior practice.

In addition to the other advantages of my new apparatus and method mentioned above, the introduction of getter in this manner prevents any discoloration whatever of the envelope of the bulb so that it remains perfectly clear and transparent for easy viewing of the interior of the tube both in inspection at the time of manufacture and in use.

I have produced tubes in accordance with the method disclosed herein, and having the structure disclosed, and have found such tubes to have all of the advantages which would be expected from the additional evacuation effect provided by the getter material, but without any of the disadvantages that have heretofore inevitably accompanied previous attempts to use a getter in high vacuum, high voltage rectifiers.

What is claimed is:

1. A high voltage, vacuum tube comprising a metal rod to which a strip of getter material has been affixed, a cylindrical glass tube open at both ends surrounding said rod and coaxial therewith, and a metal yoke supporting said rod within said glass tube, whereby said yoke and rod constitute a closed circuit for electric currents.

2. A high voltage, high vacuum tube comprising a getter strip, a cylindrical glass tube open at both ends surrounding said getter strip with its axis parallel thereto, and a yoke supporting said getter strip whereby a closed circuit is provided through said getter strip for electric currents.

3. A high voltage, high vacuum tube comprising an evacuated envelope, a press within said envelope, a rod mounted upon said press, a yoke secured to said rod, a cylindrical glass tube open at both ends supported by said yoke, and a getter strip within said glass tube and parallel to the axis thereof, supported at its ends by said yoke.

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