Nov. 9, 1965 HIROMI MURAKAMI 3,217,201

GETTER DEVICE WITH FILAMENT LEAD SHIELDING

Filed Aug. 25, 1961

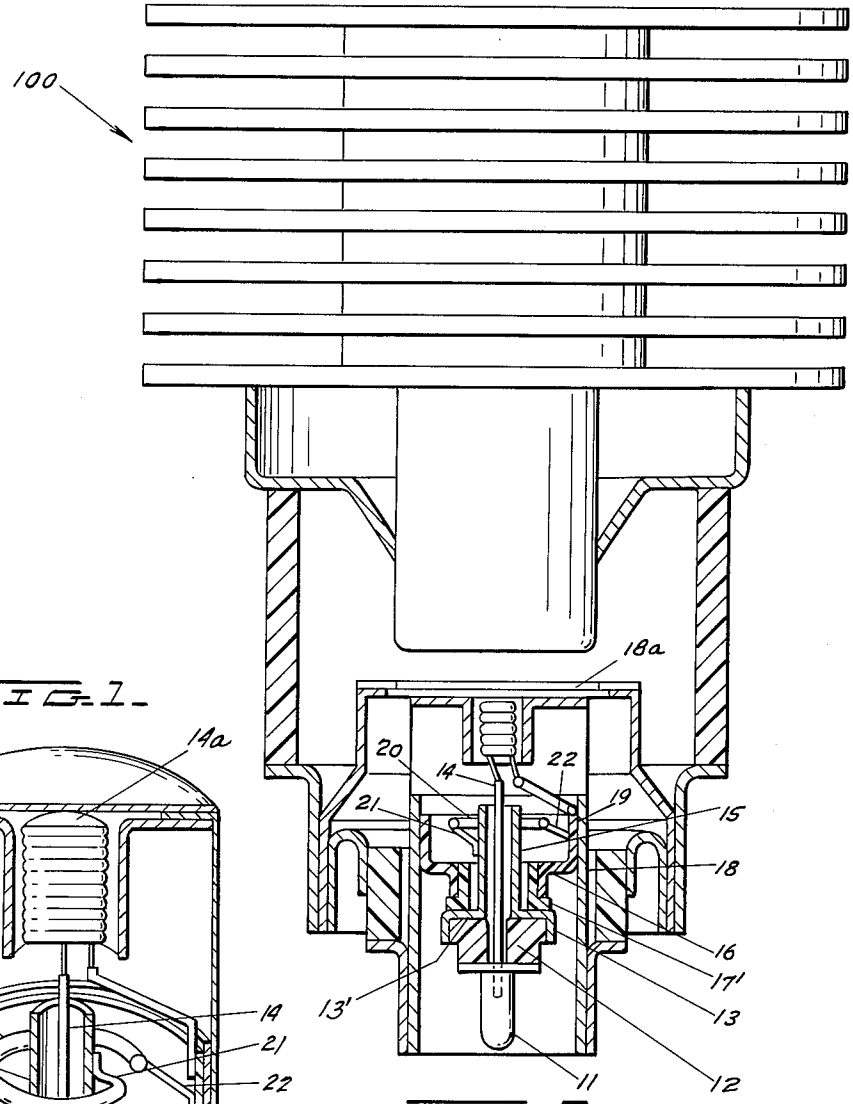

FIG. 2.

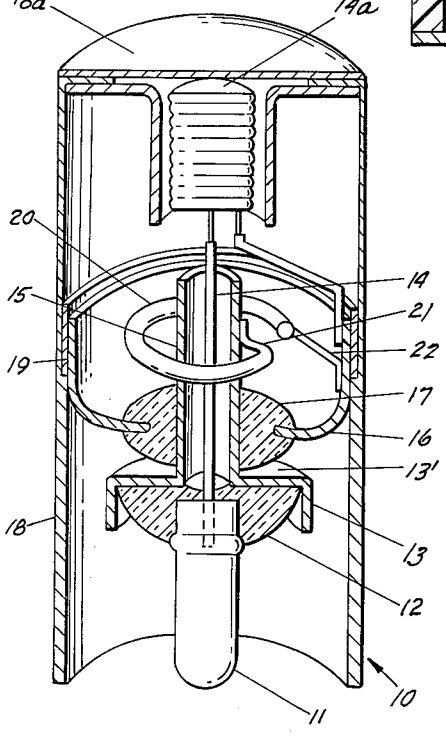

FIG. 1.

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United States Patent Office 3,217,201 Patented Nov. 9, 1965

3,217,201

GETTER DEVICE WITH FILAMENT LEAD SHIELDING

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Filed Aug. 25, 1961, Ser. No. 133,858
Claims priority, application Japan, Aug. 30, 1960, 35/44,372
8 Claims. (Cl. 313—174)

This invention relates to getter devices and more particularly to getter devices employed in disc-seal tubes wherein the getter device is so arranged to provide superior gettering action while providing complete isolation between the tube cathode and heater elements.

Prior art devices employed in Lighthouse tubes of the disc-seal type have poor characteristics due to the inherent construction of the tube since it is difficult to both install and heat the getter properly. A few methods have been employed to overcome this but they have encountered considerable defects. That is, a tube arrangement where the getter is heated by an indirect heating of the heater of the cathode, the flashing of the getter is not always sufficient because it is difficult to control the heating requirements outside of the tube envelope. In order to solve this problem, a lead-wire used for heating the getter has been provided whereby the getter is directly heated by passing a current through the lead-wire from the exterior of the tube envelope in order to flash the getter. This method is well known fundamentally, but considering it concretely in the practice with the approach which has been used hitherto, it is difficult to produce an arrangement wherein the lead-conductor of the getter enters from the outside and where the getter is adequately supported in the tube and, furthermore, insufficient consideration is given to the shielding of the insulating element during flashing.

This invention relates to the getter device which, in order to solve such defects, achieves the object by employing a lead-conductor for heating the getter provided concentrically with the lead-conductor of the heater, a cylindrical shield covering the lead-conductor of the heater and a getter provided concentrically with the said shield which uses both the shield and the lead-wire of the cathode as the connecting terminals.

It is therefore a primary object of this invention to provide a getter device for a disc-seal tube having a novel arrangement for flashing the getter.

Another object of this invention is to provide a getter device which is so arranged as to provide adequate flashing operation wherein the tube cathode and heater elements are shielded from the flashing.

Another object of this invention is to provide a getter device for a disc-seal tube which is concentric with respect to the cathode and heater elements.

Still another object of this invention is to provide a getter device which is concentric with respect to the cathode and heater elements and which is directly heated to produce flashing.

These and other objects of this invention will become apparent in the following description and drawings in which:

FIGURE 1 shows the sectional illustration of an illustrative embodiment of the cathode part of a disc-seal vacuum tube having the getter device of this invention.

FIGURE 2 shows the sectional illustration of the disc-seal tube of this invention sealed by the metalized ceramics.

Referring now to the drawings the cathode portion 10 of the disc-seal tube is comprised of the lead-conductor 11 of the heater 14*a* of the electronic tube one end

of which is anchored to and electrically insulated from the lead-conductor 13 of the getter 20 which is arranged concentrically with respect to lead-conductor 11 by means of insulator member 12. The other end of lead-conductor 11 is electrically connected to the lead-wire 14 of the heater 14*a*. One end of the cylindrical conductor 15 is electrically connected to the lead-conductor 13 of the getter 20 and the other end thereof is a free end. A support member 16 is positioned between the lead-conductor 13 of the getter 20 and the cylindrical conductor 15 by means of insulator 17 while the other end of support member 16 is electrically connected to the lead-conductor 18 of the cathode 18*a* at the seam 19. The getter 20, which forms a ring coil of (at least) one turn is arranged concentrically with respect to the cylindrical conductor 15. The ends of the getter 20 are secured to the cylindrical conductor 15 and the support member 16, by supports 21 and 22 respectively.

In such a construction, a voltage corresponding to the internal resistance of the getter 20 is applied between the lead-conductors 13 of the getter and the lead-conductor 18 of the cathode in order to flash the getter. The impressed voltage causes a current path from lead 13 to conductor 15, lead 21, getter 20, lead 22, support member 16 to lead 18 thus directly heating the getter to initiate evaporation. In this example, the lead-conductor 13 of the getter can draw a comparatively large current because it is insulated sufficiently from the two conductors 11 and 18 and moreover it has a surface area and a cross-sectional area sufficient to make contact with the external circuit to produce flashing even when the lead-conductor 18 of the cathode and the lead-conductor 11 of the heater are closely spaced owing to the coaxial form of the lead conductor 13. The cylindrical conductor 15 has a substantially large cross-sectional and surface area and therefore a large current drawing capability. Inasmuch as the cylindrical conductor 15 surrounds the heater lead 14, it completely prevents the deposition of getter-material on such surface portion of the insulator 12 that is exposed towards the inside of the conductor 15 and thus ensures adequate insulation between the heater lead 14 and the conductor 15 which in turn is connected to the lead conductor 18 of the cathode 18*a*. This is the supreme feature of this invention. In this case the part of the insulator member 17 facing the getter 20 can not avoid having deposited thereon some of the splatterings of the getter 20 due to the flashing of the getter, but some of the spatterings of the getter after flashing does not need to be taken care of because the insulation of that part need only to be maintained during the instant of the flashing of the getter.

FIGURE 2 shows the structure of the disc-seal tube 100 having the getter device 20 of this invention, wherein a ceramic 17′ is used as an insulator. The getter device 20 is the same as that of FIGURE 1, but in this case it is simpler from the view-point of manufacturing and more profitable to provide a conductive path between the lead-conductor 13 and the conductor 13′ by means of the ceramics. Whereas in FIGURE 1, the cylindrical conductor 15 is connected to the conductor 13′ by soldering each to the other and the insulator 17 is connected to the conductor 13′ by soldering each to the other, the ceramic members 17′ and 12 of FIGURE 2 provide adequate positioning and securing of members 13, 13′ and 15 to maintain a current path therethrough. Furthermore, in this case, the cylindrical conductor 15 is insulated perfectly from the cathode lead 18 and this case is more profitable than the case of FIGURE 1 because the evaporated materials do not reach the inner surface of the insulator 17′ facing the cylindrical conductor 15 even if the evaporated materials are deposited on the upper surface of the in-

sulator when the getter is flashed, if only a small space is provided between the inner diameter of the insulator **17** and the outer diameter of the cylindrical conductor **15**.

In the foregoing, I have described my invention only in connection with preferred embodiments thereof. Many variations and modifications of the principles of my invention within the scope of the description herein are obvious. Accordingly, I prefer to be bound not by the specific disclosure herein but only by the appending claims.

I claim:

1. In a vacuum tube having a cathode electrode; an annular cathode lead being substantially perpendicular to said cathode; a heater element for heating said cathode; a second lead for said heater element positioned substantially along the longitudinal axis of said annular cathode lead; a getter element; a substantially cylindrical getter element lead surrounding said heater second lead; said getter element being electrically connected between said getter element lead and said cathode lead; said getter element being adapted to flash upon the impression of a voltage between said getter element lead and said cathode lead for improving the vacuum in said vacuum tube.

2. In a vacuum tube having a cathode electrode; an annular cathode lead being substantially perpendicular to said cathode; a heater element for heating said cathode; a second lead for said heater element positioned substantially along the longitudinal axis of said annular cathode lead; a getter element; a substantially cylindrical getter element lead surrounding said heater second lead; said getter element being electrically connected between said getter element lead and said cathode lead; said getter element being adapted to flash upon the impression of a voltage between said getter element lead and said cathode lead for improving the vacuum in said vacuum tube; said getter element lead being adapted to shield said heater element lead from said getter element to protect the heater element lead during the flashing operation.

3. In a vacuum tube having a cathode electrode; an annular cathode lead being substantially perpendicular to said cathode; a heater element for heating said cathode; a second lead for said heater element positioned substantially along the longitudinal axis of said annular cathode lead; a getter element; a substantially cylindrical getter element lead surrounding said heater second lead; said getter element being electrically connected between said getter element lead and said cathode lead; said getter element being adapted to flash upon the impression of a voltage between said getter element lead and said cathode lead for improving the vacuum in said vacuum tube; said getter element lead being adapted to shield said heater element lead from said getter element to protect the heater element lead during the flashing operation; said getter element having an annular configuration adapted to surround said getter element lead; a first conductive lead connecting one end of said getter to said getter element lead; and a second conductive lead connecting the other end of said getter element to said cathode lead.

4. In a vacuum tube having a cathode electrode; an annular cathode lead being substantially perpendicular to said cathode; a heater element for heating said cathode; a second lead for said heater element positioned substantially along the longitudinal axis of said annular cathode lead; a getter element; a substantially cylindrical getter element lead surrounding said heater second lead; said getter element being electrically connected between said getter element lead and said cathode lead; said getter element being adapted to flash upon the impression of a voltage between said getter element lead and said cathode lead for improving the vacuum in said vacuum tube; said getter element lead being adapted to shield said heater element lead from said getter element to protect the heater element lead during the flashing operation; said getter element having an annular configuration; a first conductive lead connecting one end of said getter to said getter element lead; and a second conductive lead connecting the other end of said getter element to said cathode lead; said getter element being positioned to be concentric with said cathode lead.

5. In a vacuum tube having a cathode electrode; an annular cathode lead being substantially perpendicular to said cathode; a heater element for heating said cathode; a second lead for said heater element positioned substantially along the longitudinal axis of said annular cathode lead; a getter element; a substantially cylindrical getter element lead surrounding said heater second lead; said getter element being electrically connected between said getter element lead and said cathode lead; said getter element being adapted to flash upon the impression of a voltage between said getter element lead and said cathode lead for improving the vacuum in said vacuum tube; an annular shaped first insulating member secured to said second lead and said getter element lead for insulating said second lead from said getter element lead; said first insulating member being adapted to provide an air-tight seal therebetween.

6. In a vacuum tube having a cathode electrode; an annular cathode lead being substantially perpendicular to said cathode; a heater element for heating said cathode; a second lead for said heater element positioned substantially along the longitudinal axis of said annular cathode lead; a getter element; a substantially cylindrical getter element lead surrounding said heater second lead; said getter element being electrically connected between said getter element lead and said cathode lead; said getter element being adapted to flash upon the impression of a voltage between said getter element lead and said cathode lead for improving the vacuum in said vacuum tube; a disc shaped conductive member secured to said cathode lead, said disc shaped member being concentric with said cathode lead; an insulating member positioned between said disc shaped member and said getter element for shielding said heater element lead from said getter element; said insulating member being adapted to create an air-tight seal between said disc-shaped member and said getter element lead.

7. In a vacuum tube having a cathode electrode; an annular cathode lead being substantially perpendicular to said cathode; a heater element for heating said cathode; a second lead for said heater element positioned substantially along the longitudinal axis of said annular cathode lead; a getter element; a substantially cylindrical getter element lead surrounding said heater second lead; said getter element being electrically connected between said getter element lead and said cathode lead; said getter element being adapted to flash upon the impression of a voltage between said getter element lead and said cathode lead for improving the vacuum in said vacuum tube; said getter element lead being adapted to shield said heater element lead from said getter element to protect the heater element lead during the flashing operation; said getter element having a helical configuration of at least one turn; a first conductive lead connecting one end of said getter element to said getter element lead; and a second conductive lead connecting the other end of said getter element to said cathode lead.

8. In a vacuum tube having a cathode electrode; an annular cathode lead being substantially perpendicular to said cathode; a heater element for heating said cathode; a second lead for said heater element positioned substantially along the longitudinal axis of said annular cathode lead; a getter element; a substantially cylindrical getter element lead surrounding said heater second lead; said getter element being electrically connected between said getter element lead and said cathode lead; said getter element being adapted to flash upon the impression of a voltage between said getter element lead and said cathode lead for improving the vacuum in said vacuum tube; an annular shaped first insulating member secured to said

second lead and said getter element lead for insulating said second lead from said getter element lead; said first insulating member being adapted to provide an air-tight seal therebetween; said heater element lead having a terminal at its free end adapted for connection to a source of electrical energy; a second annular shaped insulating member concentric with said getter element lead secured to said terminal and said getter element lead and being adapted to provide an air-tight seal therebetween.

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