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ELECTRIC GLOW DISCHARGE TUBE

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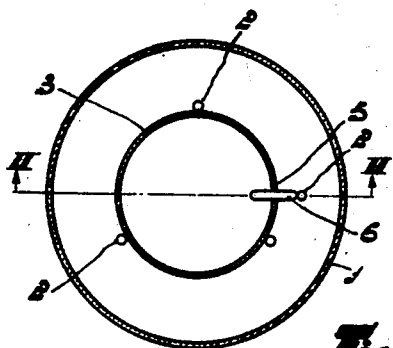


Fig. 1

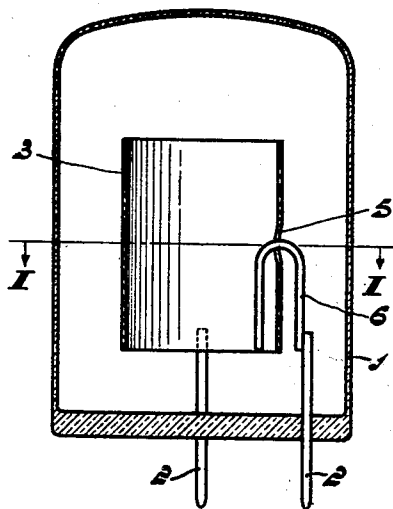


Fig. 2

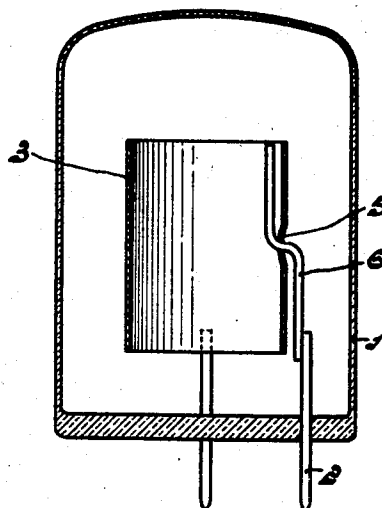


Fig. 3

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ELECTRIC GLOW DISCHARGE TUBE

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4 Claims. (Cl. 313-214)

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This invention relates to electric glow discharge tubes and more particularly to stabilizing tubes.

In the aforesaid tubes the upper limit of the current at which the normal cathode drop still occurs, is determined by the size of the cathode surface. The minimum current is determined by the discharge conditions. Consequently, in order to raise the maximum current as far as possible, it is advisable to make the surface of the electrodes, for a given size of tube, as large as possible, hence the desire to utilize both the front and the rear surfaces of a plate-shaped, flat or cylindrical cathode. However, this has a limitation in that during the transition of the glow discharge from one side of the cathode surface to the other, a comparatively great voltage step of several tenths of a volt may occur. Such voltage steps are very annoying in stabilizing tubes and particularly in tubes having a very flat characteristic curve and with tubes, the operating voltage of which has very small variations and the cathode of which consists of a metal having a melting point higher than 1400° C., practically the whole wall of the tube being coated with a visible layer of such a metal.

According to the invention, a glow discharge tube, particularly a stabilizing tube comprising a cathode, is characterized in that the anode consists of a wire or strip which is shaped so as to extend along both sides of the cathode, substantially equidistant therefrom, while its spacing from the cathode surface in the region where it passes from one side to the other is such that the discharge concentrates in this region at low current strengths.

If in a stabilizing tube the product pd of the gas pressure and the anode-cathode spacing is on the right-hand side of Paschen's minimum, the spacing of the anode from the cathode surface in the region where it passes from one side to the other should be slightly smaller than the spacing where the anode runs substantially equidistant from the cathode, so that the ignition is initiated in this region and the discharge spreads to both sides of the cathode when the discharge current increases.

In order to prevent the characteristic curve from being too steep, it is advisable to provide an aperture midway between the top and the bottom of the cathode surface, through which the anode passes from one side of the cathode to the other. To this end, the anode may be U-shaped or S-shaped and spaced from the edge of the aperture such that the discharge is initiated in this region.

A further advantage of a tube according to the invention having a U-shaped anode, is that the anode-cathode system is only very slightly microphonic, because the mean spacing of the two

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anode parts from the cathode surface remains constant when the anode and cathode move relatively to each other.

In order that the invention may be readily carried into effect, two examples will now be described in detail with reference to the accompanying drawings of which:

Fig. 1 is a horizontal sectional view of a tube having a U-shaped anode, on the line I—I of Fig. 2;

Fig. 2 is a vertical sectional view of the tube shown in Fig. 1 on the line II—II and

Fig. 3 is a vertical sectional view of an alternative form of tube in which the anode is S-shaped.

Referring to the first two figures, the reference numeral 1 designates the glass wall of a discharge tube, in the bottom of which a number of lead-out pins 2 are provided. The cylindrical cathode 3 of the discharge tube consists of a piece of molybdenum sheet having a round aperture 5 approximately halfway between its upper and lower end. Through this aperture passes a U-shaped anode wire 6 which is secured to one of the lead-out pins 2. The spacing of the anode wire from the edge of the aperture is approximately 2.5 mms. and that between the straight parts of the anode wire and the aperture approximately 1.75 mms. With a smooth surface of the cathode, the voltage steps in the characteristic curve do not exceed 10 millivolts.

In Fig. 3, the parts corresponding to those shown in Figs. 1 and 2 bear the same reference numerals. In this example, the anode is S-shaped and passes through the aperture 5 at its point of inflexion.

What I claim is:

1. A glow discharge tube comprising an envelope containing a gaseous medium for producing a gaseous discharge, a cathode body within said envelope for said gaseous discharge, said cathode body having opposite surfaces of identical discharge characteristics, an anode structure within said envelope spaced from said cathode body and having end portions disposed on opposite sides of said cathode body defining a region of cathode crossover therebetween, said end portions being substantially parallel to said cathode surfaces and forming therewith substantially equal given spacings, and an intermediate portion of said cathode connecting said end portions and being spaced from said cathode at said region of cathode crossover a distance which is less than said given spacings and at which the discharge initiates at the cathode crossover region.

2. A glow discharge tube comprising an envelope containing a gaseous medium for producing a gaseous discharge, a cylindrical cathode body within said envelope for said gaseous discharge, said cathode body having an inner and

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outer surface portion both of which have identical discharge characteristics, said cathode being provided with an aperture therein connecting the said surface portions, a wire-shaped anode structure passing through said aperture in spaced relation with said cathode body and having end portions of equal length disposed on opposite sides of said cathode body, said end portions being substantially parallel to said cathode surfaces and forming therewith substantially equal given spacings, and an intermediate portion of said anode extending through the aperture in said cathode and defining therewith a region of cathode crossover, said intermediate portions of said anode structure being spaced from said cathode at said region of cathode crossover a distance which is smaller than said given spacings and at which the discharge initiates solely at the cathode crossover region.

3. A glow discharge tube comprising an envelope containing a gaseous medium for producing a gaseous discharge, a cylindrical cathode body within said envelope for said gaseous discharge, said cathode body having inner and outer surface portions both of which have identical discharge characteristics, said cathode body having an aperture therein connecting the said surfaces, an S-shaped wire anode extending through said aperture in spaced relation with said cathode body and having end portions of equal length disposed on opposite sides of said cathode body, said end portions being substantially parallel to said cathode surfaces and forming therewith substantially parallel given spacings, and an intermediate portion of said anode extending through said aperture of said cathode body and defining with said cathode body a region of cathode crossover, said intermediate portion being spaced from said cath-

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ode body a distance which is less than said given spacings and at which the discharge initiates solely at the region of cathode crossover.

4. A glow discharge tube comprising an envelope containing a gaseous medium for producing a gaseous discharge, a cylindrical cathode body within said envelope for said gaseous discharge, said cathode having an inner and outer surface portion both of which have identical discharge characteristics, said cathode body having an aperture therein connecting the said surfaces, a U-shaped wire anode structure passing through said aperture in spaced relation with said cathode body and having end portions of equal length disposed on opposite sides of said cathode body, said end portions being substantially parallel to said cathode surfaces and forming therewith substantially equal given spacings, and an intermediate portion of said U-shaped anode structure extending through said aperture of said cathode body and defining with said cathode body a region of cathode crossover, said intermediate portion of said anode being spaced from said cathode a distance which is smaller than said given spacings and at which the discharge initiates solely at the region of cathode crossover.

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