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CATHODE FOR DISCHARGE TUBES

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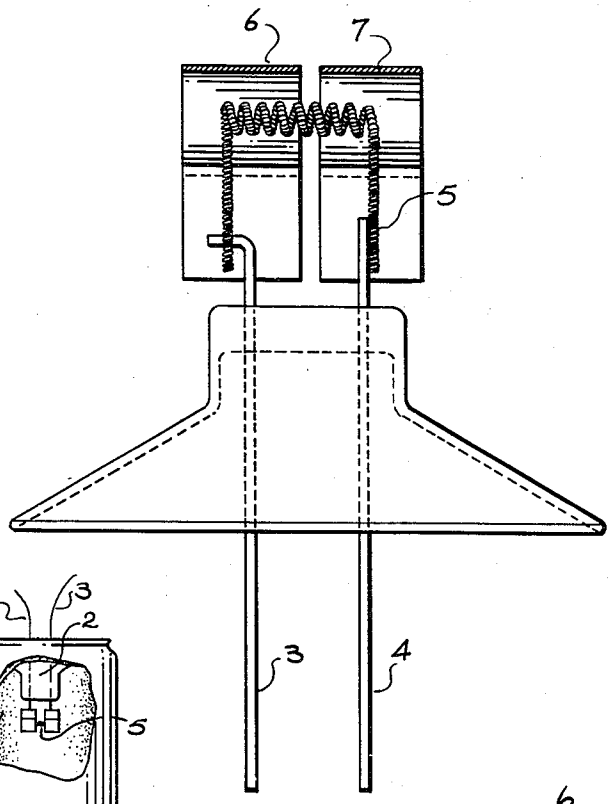


Fig. 1.

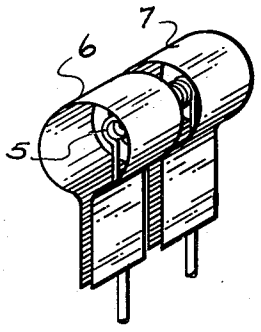


Fig. 2.

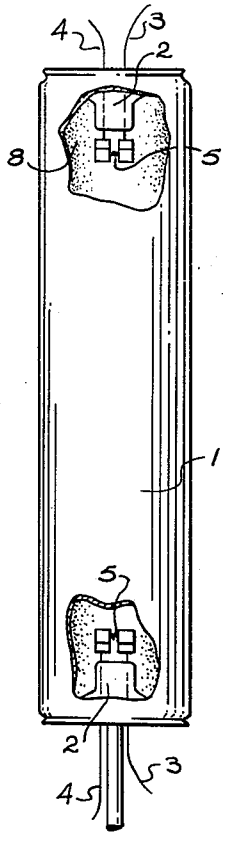


Fig. 3.

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CATHODE FOR DISCHARGE TUBES

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2 Claims. (Cl. 176—126)

This invention relates to electric gaseous discharge devices and more particularly to electrodes and auxiliary electrodes therefor.

An object of my invention is to provide for such a device an auxiliary electrode which will facilitate the starting of the main discharge in the device.

Another object is to provide an auxiliary electrode which will promote ionization on starting the device.

A further object is to provide an auxiliary electrode which will aid in preventing the arc from running down the lead wires of the device.

Other objects, advantages and features will be apparent from the specification below taken in conjunction with the accompanying drawing in which:

Figure 1 is a side elevational view shown partly in section of the auxiliary electrode assembly.

Figure 2 is a perspective view showing the contour of the auxiliary electrodes.

Figure 3 is a side elevational view partly cut away to show the position of the auxiliary electrodes in an electric gaseous discharge lamp.

In Figure 3, the tubular glass envelope 1 has a stem 2 sealed to each end. Lead wires 3 and 4 pass through the stem 2 and support the coiled filamentary electrode 5. The envelope 1 may have a coating 8 of a luminescent material on its inner walls and have a filling of inert gas at about 2 mm. pressure and about 5 to 10 microns of mercury with the normal operating temperature of about 40° C.

Figure 1 shows the lead wires 3 and 4 sealed in the stem 2. The filamentary electrode 5 may be of the coiled coil type with an electron emitting material held within the turns of the smaller coil. This electron emitting material is preferably one or more of the oxides of the alkaline earth group. The filamentary electrode may be joined to the lead wires 3 and 4 either by a right angle weld as it is to lead wire 3 or it may be joined in parallel as it is to lead wire 4. The right angle weld gives a sturdier construction to the entire mount and makes it more readily adjustable and therefore capable of being more accurately aligned.

The auxiliary electrodes 6 and 7 are of a contour substantially as shown in Figure 2 and may be joined to the lead wires 3 and 4 respectively by spot-welding or some similar means. These electrodes may be made of a material such as oxidized aluminum for example which will be resistive to cathode sputtering.

In operation, the lead wires 3 and 4 are connected to a source of voltage sufficient to bring the filamentary electrode to an electron-emitting temperature. The filamentary electrode is preferably proportioned so that the voltage drop across it, with a current sufficient to bring it to the electron-emitting temperature, is slightly greater than the resonance or ionization voltage of the gas or vapor in the glass envelope. There will then be sufficient voltage between each end of the filamentary electrode and the lead-in wire to the opposite end to cause a discharge through the gas.

These auxiliary electrodes also serve as anodes on the inverse half cycle. They act as a radiation shield and thus tend to increase and make more uniform the temperature of the filamentary electrode. This is accomplished by reason of the fact that the auxiliary electrodes pass heat to the entire filamentary electrode by conduction and by radiation. Thus no single point over the area of the filamentary electrode will run at an extremely higher temperature than any other point thereon. The fact that these auxiliary electrodes are coaxial with the filamentary electrode aids even further in this respect and helps prevent the filament heat from escaping and becoming lost throughout the entire lamp. The efficiency and life of the filamentary electrode is substantially increased by the use of this type of auxiliary electrode.

Sputtering of the filamentary electrode coating and disintegration thereof from any cause is decreased sharply by reason of the fact that the auxiliary electrode protects the greater portion of it from the direct line of the discharge across the lamp. Thus the depositing of cathode materials on the walls of the glass envelope as a result of cathode disintegration is correspondingly decreased and in many cases practically eliminated.

These auxiliary electrodes have also proved advantageous in the attempt to eliminate "pipe discharge" or "snaking" conditons. This "snaking" condition is apparently the result of a contamination of the conducting gases in the positive column. The auxiliary electrode, being coaxial to the filamentary electrode will collect many of the molecular and erupted particles from the oxide coated filamentary electrode thus aiding in preventing the contamination of the conducting gases.

It should be noted that the ends of these auxiliary electrodes 6 and 7 are open. This particular type of structure is desirable because it is more conducive to a uniform distribution of the

discharge. A highly localized concentration of the discharge at the exposed portion of the filamentary electrode between the auxiliary electrodes is avoided. Thus long life of the filamentary electrode is obtained.

Another very important and highly desirable result which this invention obtains is the prevention of stripping of the alkaline earth oxide coating from the filamentary electrode in cold starting if the lamp discharge starts before the filamentary electrode comes to full operating temperature.

What I claim is:

1. A cathode for an electric gaseous discharge device comprising: a filamentary electrode; a coating of alkaline earth oxide on said filamentary electrode; and two cylindrical shields coaxial with said filamentary electrode and spaced longitudinally from each other, each of said shields being placed at, and electrically connected to, an end of said filamentary electrode and each of said shields being open at both of its ends.

2. The combination of claim 1 in which the two cylindrical shields extend beyond the ends of said filamentary electrode.

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