

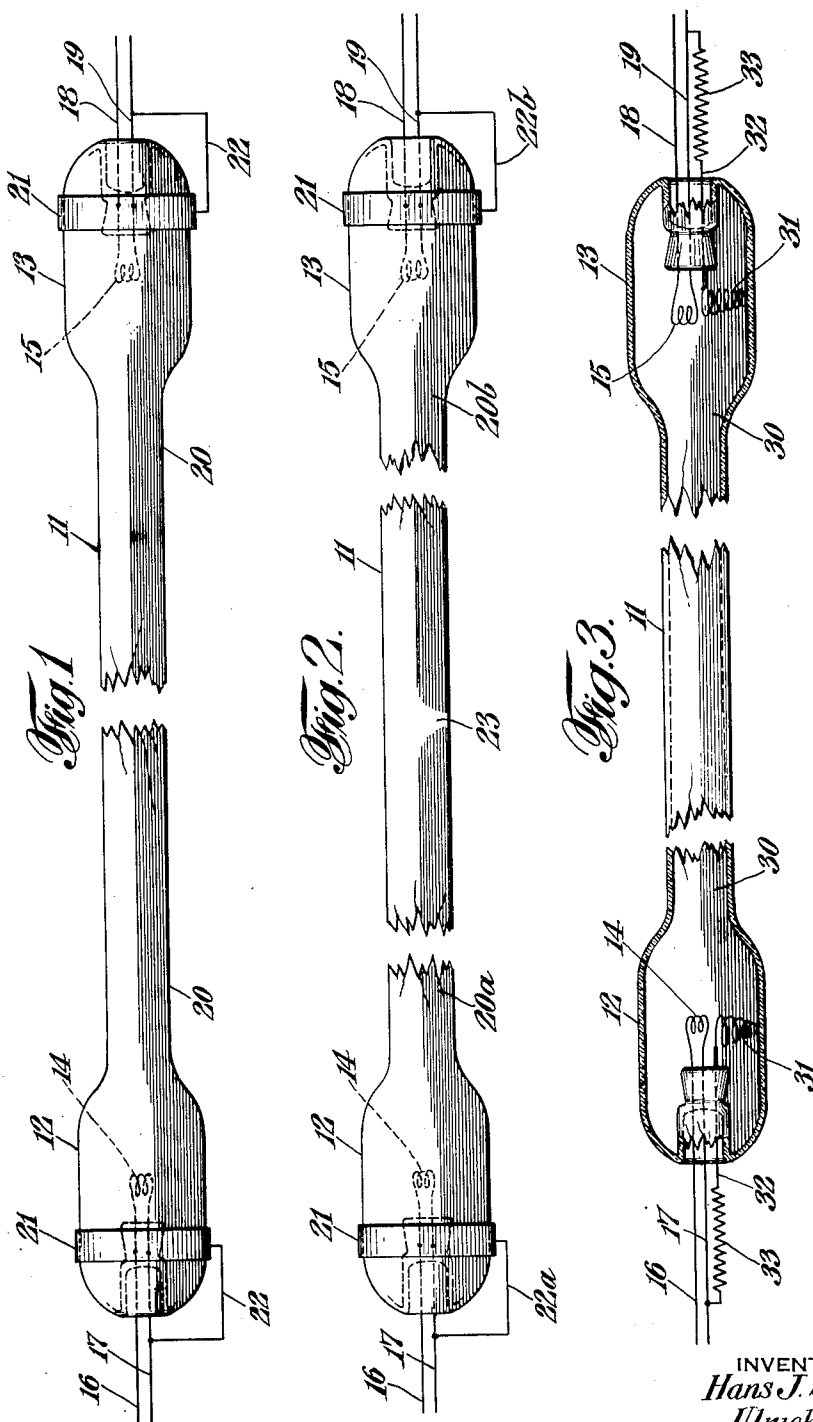
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GAS FILLED ELECTRIC DISCHARGE DEVICE

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GAS FILLED ELECTRIC DISCHARGE DEVICE

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This invention relates to gas discharge devices and particularly to those employing a hot and glowing cathode. It has been observed that such devices sometimes fail to start even when a voltage of several times the ionization potential of the gas is placed across the terminals, or if the discharge does start it becomes unstable and eventually goes out. The cause of such unsatisfactory performance is frequently due to accumulation of wall charges on the interior of the gas discharge receptacle and the consequent distortion of the potential distribution or electrostatic field between the terminals. This is due to selective adsorption of certain ions or by the electrons clinging to the wall. It is one of the objects of the present invention to improve the operation of gas discharge devices and more specifically it is the object to neutralize and prevent the wall charges which are one of the causes of unsatisfactory operation or failure to operate. In order to more clearly explain the invention, reference is made to the following description of several different embodiments thereof taken in connection with the accompanying drawings, in which

Fig. 1 is a longitudinal elevation of a gas discharge tube;

Fig. 2 is a longitudinal elevation of a gas discharge tube of a somewhat different form; and

Fig. 3 is a longitudinal elevation partly in section of still another form of gas discharge tube.

Referring to the drawings more in detail, 11 represents a glass tube or container having enlarged end portions 12 and 13 in which are positioned electrodes 14 and 15. These electrodes may be of any suitable type and are shown as helixes of wire having leading-in wires 16 and 17 for the electrode 14 and leading-in wires 18 and 19 for the electrode 15. Suitable provision may be made, not shown, for connecting these leading-in wires to a source of electrical supply for starting and maintaining the gaseous discharge between two electrodes and also for heating the electrodes whereby they are brought to a glowing and emitting temperature.

On the outside of the tube there may be provided a strip or thin coating 20 of a conductive substance such as bronze paint or aluminum paint. It is also preferable that means be provided for connecting the strip 20 to one or both of the electrodes. The means for this purpose shown in the drawings comprises a metallic band or annular ring 21 which makes a firm contact with the conductive strip 20 and which is connected to one of the leading-in wires of the electrodes as 17 or 19 by means of a conductor 22.

In the form shown in Fig. 2 a conductive strip does not extend from one end of the tube to the other but is divided into two portions 20a and 20b with a space 23 between the two portions 20a and 20b which is not conductive and therefore insulates the two portions from each other. The portion 20a is connected by means of the band 21 through a conductor 22a to the leading-in wire 17 and in a similar manner the portion 20b is connected by means of the band 21 through the conductor 22b to the leading-in wire 19.

In Fig. 3 a suitable conductive strip 30 is provided on the inside of the tube instead of on the outside. There are several ways in which the conductive strip 30 may be obtained. A copper clad tungsten wire may be connected from electrode to electrode within the tube and then vaporized by the passage of a sufficiently large current there-through. The vaporized metal is condensed and deposited on the interior wall of the tube thus providing a conductive path. Another way of obtaining the conductive strip is to pass into the tube a metal vapor while maintaining the portion of the wall on which it is desired to obtain the strip relatively cool, and the rest of the wall at a much higher temperature. Also one of the various methods used for mirroring glass surfaces may be employed provided the coating is such as to withstand the operating temperatures of the tube. Resilient helixes of wire 31 may be provided within the tube at each end for maintaining contact with the conductive strip 30 and are connected to leading-in wires 32 and through resistances 33 to the conductors 17 and 19 respectively.

In operation the conductive strips of Figs. 1 and 2 have imposed thereon by virtue of their connection with the line conductors a voltage which produces a charge on the outside of the tube which tends to counteract the electrostatic effect of the wall charges on the inside of the tube. In the form shown in Fig. 3, the conductive strip 30 being on the inside of the tube also changes the physical or chemical nature of the surface and thereby reduces its adsorbing power or tendency. In this case the wall charges are carried away by the conductive connection to the line conductors and not merely neutralized by opposite charges placed close thereto.

We claim:

1. A gas discharge device comprising an inclosing tube, heatable thermionic electrodes positioned in opposite ends of said tube, and a conductive strip extending longitudinally along said tube throughout substantially its entire length, said strip being divided into as many electrically separated portions as there are electrodes, and means for connecting each portion to one of the electrodes.

2. A gas discharge device comprising an inclosing tube, heatable thermionic electrodes positioned in opposite ends of said tube, and a conductive strip extending longitudinally along said tube throughout substantially its entire length, said strip being divided into as many electrically separated portions as there are electrodes, and means for connecting each portion through a resistance to one of the electrodes.

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