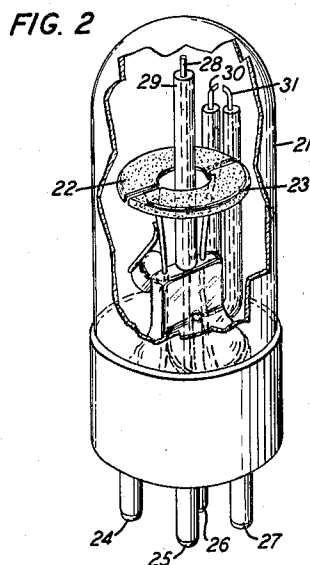
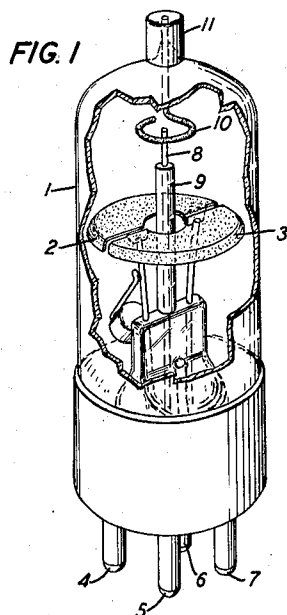


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W. H. T. HOLDEN
GAS FILLED DISCHARGE DEVICE

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GAS FILLED DISCHARGE DEVICE

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3 Claims. (Cl. 250-27.5)

This invention relates to gaseous discharge devices particularly suited for use in selective ringing telephone systems and the like, whereby normal selective operation of the ringers is attained and false breakdown and consequent noise and false ringing operation is prevented, when abnormally high alternating current ground and induced potentials are impressed on the line with which the devices are associated.

A feature of the invention resides in providing a discharge device consisting of a main discharge gap having a substantially unilateral current conducting characteristic, comprising a small area non-activated anode spaced a considerable distance from a large area activated cathode, and a control gap which is independent of the main cathode.

In one embodiment of the invention a control gap is formed by the inclusion within the device of a small area electrode, preferably coated with some electron emitting material, and positioned closely adjacent the active area of said anode.

In another embodiment of the invention, said control gap is formed by the inclusion of two independent small area activated electrodes within said envelope which electrodes are closely spaced with respect to each other and at a relatively greater distance from both said anode and cathode.

The invention will be understood from the following description when read with respect to the accompanying drawing:

Fig. 1 of which shows a gas-filled tube having an activated cathode, a non-activated anode and a third or control electrode closely positioned with respect to the anode whereby a control discharge gap exists between the anode and the control electrode to the exclusion therefrom of the cathode; and,

Fig. 2 shows a tube also having an activated cathode and a non-activated anode, and an independent control discharge gap comprising a pair of closely opposed electrodes, preferably activated, which are located a substantial distance from both the anode and cathode.

Referring to Fig. 1, the tube 1 has a gaseous filling of 95 per cent neon and 5 per cent argon at a pressure of the order of 50 millimeters of mercury and contains a plurality of electrodes, two of which 2, 3 are semicircular in shape and arranged in a plane transverse to the major axis of the tube with the straight edges close together. The upper or outer surfaces of these electrodes 2 and 3 are coated with some suitable electron emitting substance well known in the art. In

systems in which tubes of the present invention are to be used, electrodes 2 and 3 serve as a single electrode (cathode) and hence may be, and are, electrically joined in some suitable manner either by a permanent wire connection within the tube envelope or elsewhere in the circuit, as, for example, in the socket in which the prongs 4, 5, 6 and 7 are seated, to form an apertured disc electrode.

The anode 8 comprises a wire projecting through a circular opening in the cathode 2, 3 and insulated therefrom in any suitable manner, as, for example, by means of a glass tube 9. The exposed or tip portion of the anode 8 is of relatively small area with respect to the upper coated surface of the cathode 2, 3 and is uncoated, hence the gap between the anode 8 and cathode 2, 3 requires a relatively high potential applied thereacross, i. e., of the general order of 200 volts, in the absence of ionization, before an arc will strike therebetween and a substantial amount of current will only flow in a positive direction, i. e., from the anode to the cathode, and only a negligible current flow will be maintained in the reverse direction.

Also positioned in the tube 1 is a so-called control electrode comprising a small wire ring 10 terminating in an exposed terminal 11, although some other tube construction could obviously be resorted to whereby this electrode can be made to terminate in one of the prongs, for example 7, by disconnecting this prong from the half disc electrode 3.

The ring electrode 10 is closely positioned with respect to the anode 8 and consequently is substantially the same distance from the cathode 2, 3 as the anode 8. The control or ring electrode 10 may be, but not necessarily, coated with an electron emitting substance. The control discharge gap of the tube of Fig. 1 therefore exists between the ring electrode 10 and the anode 8 and is independent of the cathode 2, 3.

The manner in which tubes of the character shown in Fig. 1 are employed is shown in United States Patent 2,250,264, issued July 22, 1941, to S. B. Ingram.

Referring to Fig. 2, the tube 21 is of the same general type as the tube previously described and contains a cathode 22, 23 comprising two half disc electrodes 22 and 23, which, as before mentioned in connection with Fig. 1, are joined in some suitable manner to constitute a single electrode. These elements are coated with an electron emitting substance.

Projecting upwardly through an opening in the

cathode is a wire anode 28 insulated from the cathode 22, 23 by a glass tube 29. The exposed area of anode 28 with respect to the cathode constitutes a high voltage, breakdown discharge gap having a unilateral or rectifying characteristic.

In addition to the anode 28 and cathode 22, 23, a pair of closely spaced wire electrodes 30 and 31 are positioned within the envelope which electrodes are insulated from each other and the other two electrodes except for their extreme upper portions which are brought close together. Preferably the exposed portions of electrodes 30 and 31 are coated with some electron emitting substance.

The electrodes 30 and 31 constitute a low voltage breakdown control gap which is independent of both the main anode and the cathode and are at such a distance from both anode and cathode that low voltages of the order sufficient to breakdown said control gap are not effective to cause a discharge between either control electrodes and either the anode or the cathode.

The manner in which tubes having the characteristics of Fig. 2 are used is also shown in Patent 2,250,264, issued July 22, 1941 to S. B. Ingram, and the application of C. W. Halligan, Serial No. 331,296 filed April 24, 1940.

What is claimed is:

1. A gaseous discharge device, comprising a vessel, a gaseous filling therein, a large area cath-

ode coated with electron emitting material and mounted in said vessel, an uncoated anode mounted therein and having a small area exposed to said large area cathode and spaced at a distance therefrom, and a pair of wire control electrodes having their extremities closely spaced with respect to each other and a relatively greater distance from said anode and cathode than from each other at least one of said control electrodes being coated with electron emissive material.

2. In a gas-filled discharge device comprising an enclosing envelope, a gas filling, an anode, a cathode and a pair of small area control electrodes therein, said control electrodes being closely spaced with respect to each other and independent of and separated from said cathode a considerably greater distance than the distance between said control electrodes.

3. In a gas-filled discharge device, a cathode, an anode, and a pair of wire electrodes having their extremities closely spaced with respect to each other and both located at such a distance from said cathode and anode that a low voltage of the potential order sufficient to cause a discharge between said wire electrode is insufficient to cause a discharge between either of said wire electrodes and either the anode or cathode, when said device is not ionized.

WILLIAM H. T. HOLDEN.