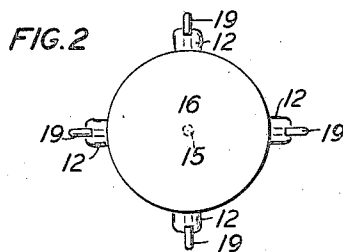
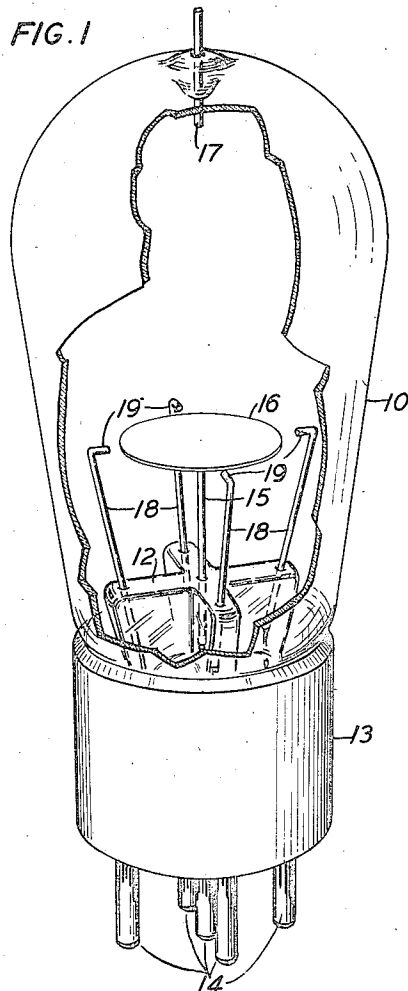


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ELECTRIC DISCHARGE DEVICE
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ELECTRIC DISCHARGE DEVICE

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6 Claims. (Cl. 250—27.5)

This invention relates to electric discharge devices and more particularly to such devices of the cold cathode type and wherein the initiation of a discharge between the cathode and another electrode is controlled by the potential of a third electrode.

One object of this invention is to enable and to expedite the automatic connection of each of a plurality of lines individually to another line. More specifically an object of this invention is to enable and to expedite the automatic connection of each of a plurality of telephone subscribers' lines to a line including a line-finder in automatic telephone systems.

In one illustrative embodiment of this invention, an electric discharge device comprises an enclosing vessel having an ionizable medium, for example a gas such as a mixture of neon and argon, therein. The vessel encloses a cold cathode, an anode, and a plurality of control electrodes. The cathode may be in the form of a circular disc and the control electrodes may be rods disposed about the periphery of the cathode and each having an end bent toward the cathode, the several control electrodes being sufficiently spaced from each other so that the fields thereof do not overlap.

Each of the control electrodes may be used as a trigger to initiate a discharge between the cathode and the anode. For example, as shown and described in my copending application Serial No. 735,758, filed July 18, 1934, each of the control electrodes may be connected to a subscriber's line and the anode may be connected in circuit with a line-finder. When a subscriber at one station makes a call, a suitable potential is impressed upon the control electrode corresponding to the station, to cause breakdown of the discharge device and thereby to connect the station to the line-finder circuit.

The invention and the features thereof will be understood more clearly and full from the following detailed description with reference to the accompanying drawing in which:

Fig. 1 is a perspective view of an electric discharge device illustrative of one embodiment of this invention, a portion of the enclosing vessel being broken away to show the cathode and control electrodes more clearly; and

Fig. 2 is a top view of the cathode and the control electrodes showing the configuration and disposition thereof.

Referring now to the drawing, the electric discharge device there illustrated comprises an enclosing vessel 10 having an inwardly extending

stem which terminates in a multi-armed press 12. An insulating base 13 is suitably secured to the end of the enclosing vessel adjacent the stem and carries a plurality of terminal prongs 14 through which the cathode and the control electrodes of the device may be associated with external circuits.

A rigid metallic support or rod 15 extends from the center of the press 12 and carries a cathode 16, which may be of the cold type and, as shown more clearly in Fig. 2, may be in the form of a circular plate or disc. The rod 15 may be electrically connected to one of the terminal prongs 14 and forms a part of the lead-in to the cathode. An anode is disposed in cooperative relation to and coaxial with the cathode 16 and may consist of a metallic rod 17 sealed in the end of the vessel 10 remote from the stem and having its inner end directed toward the cathode.

The cathode 16 is encompassed by a plurality of control electrodes 18, each of which may consist of a metallic rod embedded in one of the arms of the press 12 and may have a bent end 19 directed inwardly toward the cathode. The several control electrodes 18 preferably are uniformly spaced from each other and at a distance sufficiently great to prevent material interaction of the fields thereof. Each control electrode is electrically connected to a corresponding one of the terminal prongs 14.

The several control electrodes may be shielded from one another by insulating or metallic screens disposed between adjacent control electrodes. Such screens may be supported from the stem or may be supported individually from the control electrodes.

The several control electrodes 18 may be utilized independently as trigger controls to initiate a discharge between the cathode 16 and the anode 17. Thus, if a potential less than the breakdown or ionization potential of the ionizable medium or gas in the vessel 10 is applied between the cathode and anode, no current will flow in a circuit connected between the cathode and anode until a critical potential sufficient to cause ionization is impressed upon one of the control electrodes. Hence, the electric discharge device in accordance with this invention may be utilized for closing a circuit, such as a line finder circuit in automatic telephone systems connected between the anode 17 and the cathode 16, through the agency of any one of a number of other circuits, such as circuits each including a telephone substation, connected between the control electrodes 18 and the cathode 16.

In one embodiment of the invention, the ionizable medium may be a mixture of neon and argon, at a pressure of 30 mm. the argon constituting about one per cent of the mixture, the anode may be spaced of the order of one inch from the cathode, and the several control electrodes may be spaced from the cathode of the order of 1/64 of an inch. In operating such a device the anode potential may be approximately 150 volts or more, and the control electrode potential necessary to initiate a discharge would be approximately 70 volts.

Although the invention has been illustrated embodied in a device having four control electrodes, it may be embodied in devices having a greater or lesser number of control electrodes. Moreover, although the control electrodes have been shown as equally spaced from the cathode, they may be spaced unequally therefrom so that the critical control electrode potentials are different. Furthermore, it will be understood that various modifications may be made in the specific embodiment of the invention shown and described without departing from the scope and spirit of this invention as defined in the appended claims.

What is claimed is:

1. A trigger device comprising an enclosing vessel having a filling of argon, a cathode, an anode, and a plurality of control electrodes disposed about said cathode and equally spaced therefrom.
2. A gaseous discharge device comprising a disc cathode, an anode, and a plurality of control

electrodes disposed about the periphery of said cathode.

3. A trigger device comprising an enclosing vessel having a filling of argon, a cold disc cathode, an anode, and a plurality of control electrodes disposed about the periphery of said cathode.

4. A gaseous discharge device comprising a disc cathode, an anode in cooperative relation with said cathode, and a plurality of rod control electrodes disposed about the periphery of said cathode and each having an end directed toward said cathode.

5. A trigger device comprising an enclosing vessel having a gaseous filling, a circular disc cold cathode, a rod anode having one end directed toward said cathode, and a plurality of rod control electrodes disposed about the periphery of said cathode and each having an end directed toward said cathode.

6. An electric discharge device comprising an enclosing vessel having a gas therein and having a stem terminating in a multi-armed press, a support extending from said stem, a disc cold cathode carried by said rod, a rod anode sealed in said enclosing vessel and having one end directed toward said cathode, and a plurality of control electrodes disposed about said cathode, each of said control electrodes being a rod embedded in one of the arms of said press and having its inner end bent toward said cathode.

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