

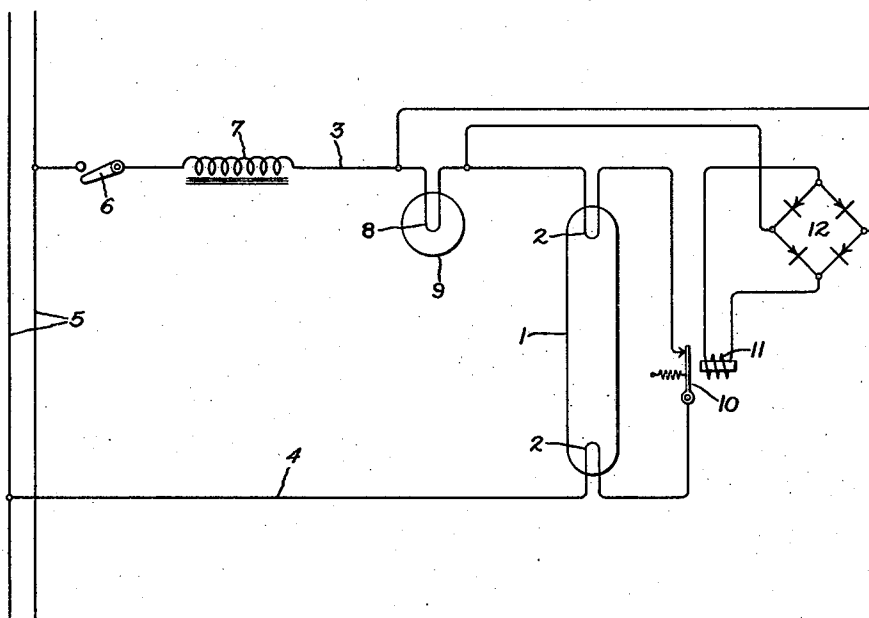
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GASEOUS ELECTRIC DISCHARGE APPARATUS

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UNITED STATES PATENT OFFICE

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GASEOUS ELECTRIC DISCHARGE
APPARATUS

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6 Claims. (Cl. 176—124)

My invention relates to gaseous electric discharge devices, such as discharge lamps, and apparatus for operating them from alternating current circuits. It relates particularly to discharge devices which have electrodes that are initially heated to an electron emitting temperature and to apparatus which, when the electrodes have reached that temperature, applies the starting voltage to the device. It is the object of my invention to provide apparatus of this character having improved means for determining the time delay during which the electrodes are heated and before which the starting voltage is applied across the device. A further object of my invention is the provision of apparatus of this character which is quiet, which provides accurate timing, which automatically corrects for changes in the ambient temperature, and which is inexpensive to manufacture.

My invention will be better understood from the following description taken in connection with the accompanying drawing and its scope will be pointed out in the appended claims.

In the single figure of the drawing which is a circuit diagram illustrating an embodiment of my invention, 1 represents an electric discharge device or lamp having an electrode 2 at either end thereof which electrodes are represented as of filamentary form. The electrodes connect at one end through the connections 3 and 4 with the source of alternating current supply 5 which for example may be a 115 volt, 60 cycle lighting circuit. These connections include the switch 6, the ballast reactor 7 and the resistor 8. The resistor is preferably similar to the electrodes 2, its resistance increasing with an increase in its temperature, in other words, it has a positive resistance-temperature coefficient, the resistor being represented as enclosed in the evacuated envelope 9. Connected between the other ends of the electrodes 2 is the electromagnetic switch 10 which is biased to the closed circuit position illustrated and which is provided with the winding 11 by which it is moved to its open circuit position. The winding 11 is supplied with rectified current obtained from the full wave rectifier 12 which is connected across the resistor 8 whereby the winding is responsive to the potential difference across the resistor.

When the switch 6 is closed to energize the device, there is a relatively large current flow through the resistor 8, the electrodes of the device and the switch 10 which current quickly brings the electrodes 2 to an electron emitting temperature. Until this temperature has been

reached, the potential difference across the resistor 8 is insufficient to cause the switch 10 to be opened. However, by the time that the electrodes have reached the proper temperature for the application of the starting voltage, the potential difference across the resistor will have risen to such a point that the pull of the winding 11 is able to overcome the bias of the switch. The inductive kick due to the opening of the heating circuit by the switch then starts the discharge across the device. From then on the current taken by the device in passing through the resistor produces a sufficient voltage drop therethrough to maintain the switch in open circuit position. In the event of a momentary failure of the source of supply the switch may close but upon a re-establishment of the line voltage, the switch will be opened as before which may require less time if the electrodes and the resistor are still hot. By constructing a resistor similar to the electrodes of the device, it automatically corrects for changes in ambient temperature. The apparatus also works quietly and provides for accurate timing of the electrode heating interval before the application of the starting voltage.

What I claim as new and desire to secure by Letters Patent of the United States, is:

1. An electric discharge device having electrodes adapted to be initially heated to an electron emitting temperature, means including a resistor for connecting said device with a source of current supply and providing a current path including said electrodes for the initial heating thereof and means responsive to an increase in the potential difference across said resistor due to the heating thereof by the current therein for interrupting the heating current between said electrodes.

2. An electric discharge device having electrodes adapted to be initially heated to an electron emitting temperature, means including a resistor for connecting said device with a source of alternating current supply and providing a current path including said electrodes for the initial heating thereof, a switch in said current path between said electrodes and means responsive to an increase in the potential difference across said resistor due to the heating thereof by the current therein for opening said switch.

3. An electric discharge device having electrodes adapted to be initially heated to an electron emitting temperature, means including a resistor of a character similar to that of said electrodes for connecting the electrodes of said

device with a source of alternating current supply, a switch connecting said electrodes to complete a heating circuit therethrough and means for opening said switch in response to a predetermined increase in the potential difference across said resistor due to the heating thereof by the current therein.

4. In combination, a source of alternating current supply, an electric discharge device having electrodes adapted to be initially heated to an electron emitting temperature, connections between one end of each of said electrodes and said source, a switch connecting the other ends of said electrodes, a resistor having a positive resistance-temperature coefficient in one of said connections and electromagnetic means responsive to the rise in potential difference across said resistor resulting from the flow of current therethrough for opening said switch.

5. In combination, a source of alternating current supply, an electric discharge device having electrodes adapted to be initially heated to an electron emitting temperature, connections between one end of each of said electrodes and

said source, a switch connecting the other ends of said electrodes, a resistor having a positive resistance-temperature coefficient in one of said connections, means for opening said switch, electromagnetic means including a rectifier connecting said opening means across said resistor, and means for preventing the opening of said switch until the potential difference across said resistor due to the passage of current therethrough reaches a predetermined value.

6. An electric discharge device having electrodes adapted to be initially heated to an electron emitting temperature, connections for supplying energy from a source of alternating current to said device during the normal operation thereof, a resistor having a positive resistance-temperature coefficient in one of said connections, a circuit connected between said electrodes for conducting heating current therefor and a switch arranged to open said circuit in response to a predetermined increase in the potential difference across said resistor due to the passage of said heating current therethrough.

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