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GASEOUS ELECTRIC DISCHARGE DEVICE

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Fig. 1

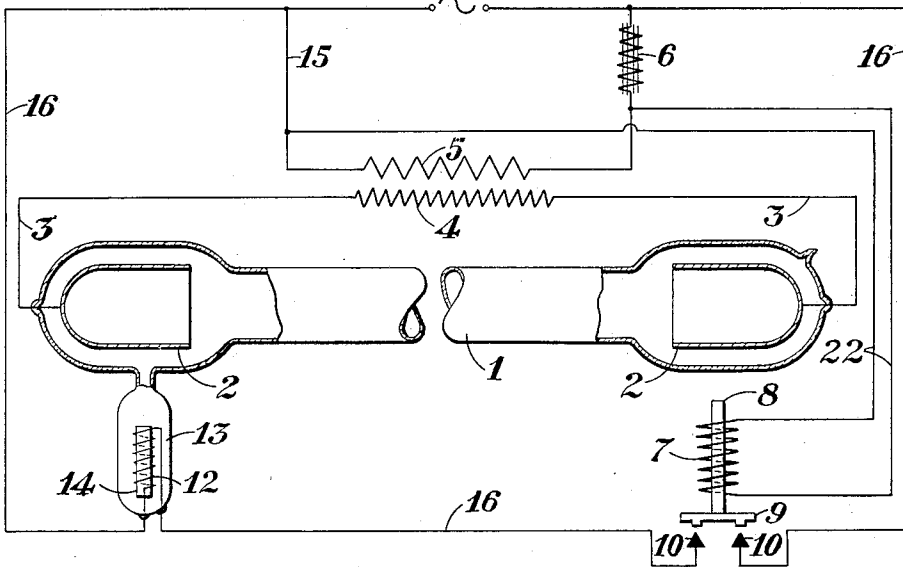


Fig. 2

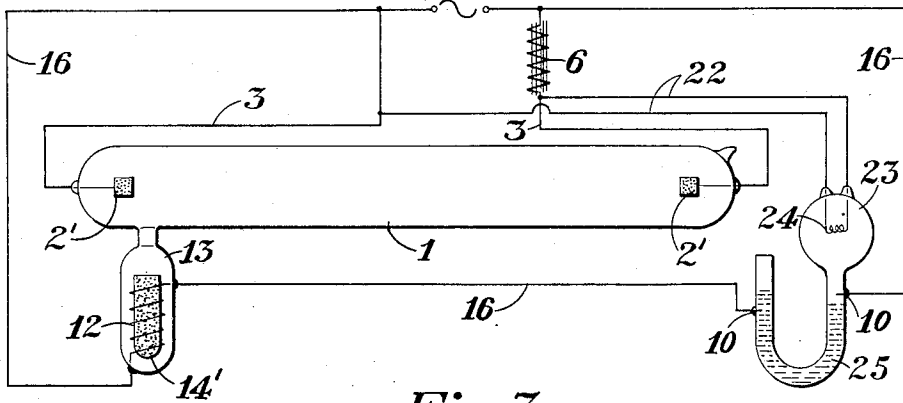
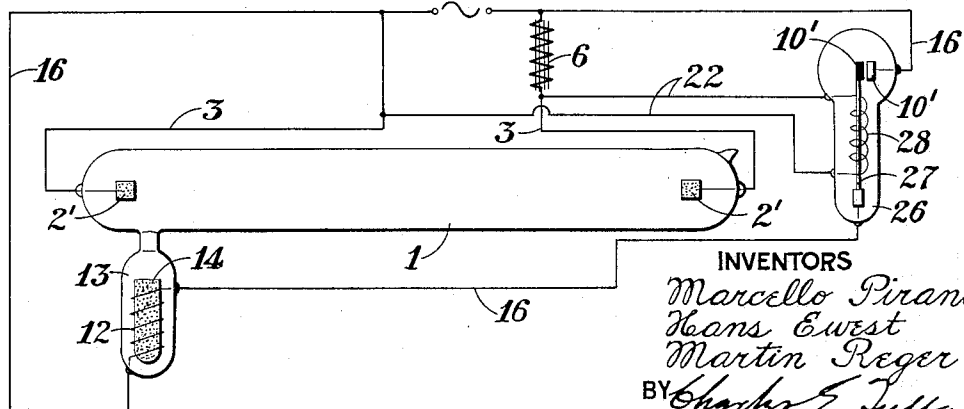


Fig. 3



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GASEOUS ELECTRIC DISCHARGE DEVICE

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Application September 16, 1930, Serial No. 482,222, and in Germany October 19, 1929,

4 Claims. (Cl. 176—125)

The present invention relates generally to gaseous electric discharge devices and more particularly the invention relates to means for feeding gas replenishments to luminescent gas lamp devices similar to those described in co-pending application Serial Number 381,036, filed July 25, 1929 being the invention of Marcello Pirani and Kurt Nitschke.

The gas feeding means of the application referred to comprises a gas evolving material, a heater element for said material, said heater element being connected into the circuit of the electric discharge device at a determined value of the current density of the discharge device by a governor connected in series with one of the electrodes of said gaseous electric discharge device. With such apparatus an oversupply of gas replenishments to the tube is avoided if the current of the circuit is steady.

The object of the present invention is to avoid an oversupply of gas replenishments to a gaseous electric discharge device even with a fluctuating voltage in the main supply source to said device.

The invention attains its object by connecting the governor of the heater element in parallel to the electrodes of the gaseous electric discharge device. In such an arrangement the cutting into and out of circuit of the heater element of the gas evolving material is controlled only by the changes in the voltage drop across the electric discharge device which, as is well known in the art, depends on the gas pressure thereof, and is not affected by fluctuations in the voltage of the supply circuit.

In the drawing accompanying and forming part of this specification three embodiments of the invention are shown for purposes of disclosure in which,

Fig. 1 is a side elevational view of a gaseous electric discharge device partly in section, the electrical circuits therefor being shown schematically.

Fig. 2 is a side elevational view of a gaseous electric discharge device and a thermostatic governor, the electrical circuits therefor being shown schematically, and

Fig. 3 is a side elevation of a gaseous electric discharge device and a different type of thermostatic governor, the electrical circuits therefor being shown schematically.

Like numbers denote like parts in all the figures.

Referring to Fig. 1 the gaseous electric discharge device 1 has the usual sheet metal electrodes 2 which are connected to the secondary 4

of transformer 4, 5 by leads 3. The primary 5 of said transformer 4, 5 is connected to a current source, which is of the usual commercial potentials, through a choke coil 6 and the lead 15. A rod 14 made of a sintered mixture of a gas evolving material and a flux material, as disclosed in the aforementioned application, is sealed into offset chamber 13. Said rod 14 has a heating filament or wire 12 wound around it and evolves gas only when heated. Two contacts 10 are connected into the leads 16 of the heater element 12, from which branch off the choke coil 6 and the lead 15 of transformer 4, 5. When gas replenishments are needed said contacts 10 are bridged by plate 9 attached to core 8 of electro-magnet 7, 8 to connect the heater element 12 into the circuit. Said electro-magnet 7, 8 is connected across the main source through lead 15 and choke coil 6 by leads 22 and thus is in parallel relation to electrodes 2. As is well known in the art, a ballast device, such as a choke coil 6 operates to prevent extreme fluctuations in potential in the heating and feeding circuits of the gaseous electric discharge device, and thus the electro-magnetic governor 7, 8 is not affected by fluctuations in current supply. In the course of time the gas pressure in the operating electric discharge device 1 decreases with a consequent lowering of potential. As coil 7 of electro-magnet 7, 8 then has less potential, core 8 drops until plate 9 bridges contacts 10 putting heater element 12 in the circuit to cause the evolution of gas from rod 14. When the gas pressure has been restored to normal, the potential of the electric discharge device 1 and the electro-magnet 7, 8 is restored to normal, the coil 7 then has a sufficient voltage to lift core 8 and plate 9, and heater element 12 is automatically cut out of the circuit. Thus even with a fluctuation in current intensity in the supply circuit of a gaseous electric discharge device an oversupply of gas replenishment to the device is avoided.

The gaseous electric discharge device shown in Fig. 2 has oxide electrodes 2' which are connected directly to the supply circuit of the usual commercial voltages by leads 3 needing no transformer. Said oxide electrodes 2' may be heated by the line potential or by a heater element wound around them and connected to the line potential. In this embodiment of the invention heater element 12 is wound around a container 14' which has therein a pulverized gas evolving material. The governor is a thermostatic switch consisting of a chamber 23 containing an inert

gas, a quantity of mercury 25 sufficient to bridge contacts 10 and having sealed therein a heating coil 24. Said heating coil 24 is connected in parallel to electrodes 2' by leads 22 so that the heat radiated by coil 24 is governed by the potential of the discharge device 1. If this potential decreases, caused by a loss of gas pressure, less heat is radiated from heating coil 24 so that the gas pressure in chamber 23 is reduced which permits mercury 25 to shift to such position that contacts 10 are bridged. As in the heating circuit of Fig. 1 heater element 12 then remains in the circuit until normal gas pressure is restored in the gaseous electric discharge device 1.

The gaseous electric discharge device and the circuits therefor shown in Fig. 3 are similar to those of Fig. 2 with the exception of the thermostatic governor. In this figure the thermostatic governor comprises a container 26 having a bimetallic strip 27 provided with a heater element 28 which is connected in parallel with the electrodes 2' by leads 22. Said bimetallic strip 27 is connected into lead 16 of the heating circuit and carries one of the two contacts 10. With normal conditions of gas pressure present in the gaseous electric discharge device 1 the potential on heater 28 is sufficient for said heater 28 to radiate enough heat to maintain bimetallic strip 27 in a bent position, in which position contacts 10 are separated. If the gas pressure in gaseous electric discharge device 1 decreases less heat radiates from element 28 as hereinbefore described and bimetallic strip 27 resumes its closed position in which position contacts 10 touch each other to put heater element 12 in the circuit which heats the gas evolving material.

While we have shown and described particular embodiments of our invention it will be understood that such illustration and description is primarily for purposes of disclosure and that numerous substitutions, modifications and changes in the forms and details of the device and in its use and operation may be made by those skilled in the art without departure from the broad spirit and scope of the invention. For example, different governors for connecting into and out of circuit the heating means 12 of the gas evolving material may be used instead of those shown; any suitable form of gas evolving material may be used, or the heater element 12 may operate, as does the well known Moore valve, to open and close a reservoir of gas replenishments.

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

1. In combination, a luminescent electric discharge device, comprising a container, electrodes for said container, a luminescent gas filling in said container, a gas supply chamber for said container, a gas evolving material in said chamber, means comprising a heating coil connected in parallel to said device to heat said gas evolving material and means responsive to changes in potential across said electric discharge device for controlling said heating means.

2. In combination, a luminescent electric discharge device, comprising a container, electrodes for said container, a luminescent gas filling in said container, a gas supply chamber for said container, a gas evolving material in said chamber, a current source for said device, means comprising a heating coil connected to said source and in parallel to said device to heat said gas evolving material and means responsive to changes in the potential of said electric discharge device for controlling said heating means.

3. In combination, an electric discharge device, comprising a container, electrodes for said container, a gas filling in said container, a gas supply chamber for said container, a gas evolving material in said chamber, a current source for said device, a series choke coil for said device, means comprising a heating coil connected in parallel to said device to heat said gas evolving material and means connected to said source through said series choke coil and responsive to changes in the potential of said electric discharge device for controlling said heating means.

4. In combination, an electric discharge device, comprising a container, electrodes for said container, a gas filling in said container, a gas supply chamber for said container, a gas evolving material in said chamber, a current source for said device, a current ballasting device connected to said source, means comprising a heating coil connected in parallel to said device to heat said gas evolving material and means connected to said source through said ballast device and responsive to changes in the potential of said electric discharge device to control said heating means.

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