

Dec. 18, 1934.

J. P. M. MUTSAERS

1,984,489

GASEOUS ELECTRIC DISCHARGE LAMP DEVICE

Filed Jan. 24, 1933

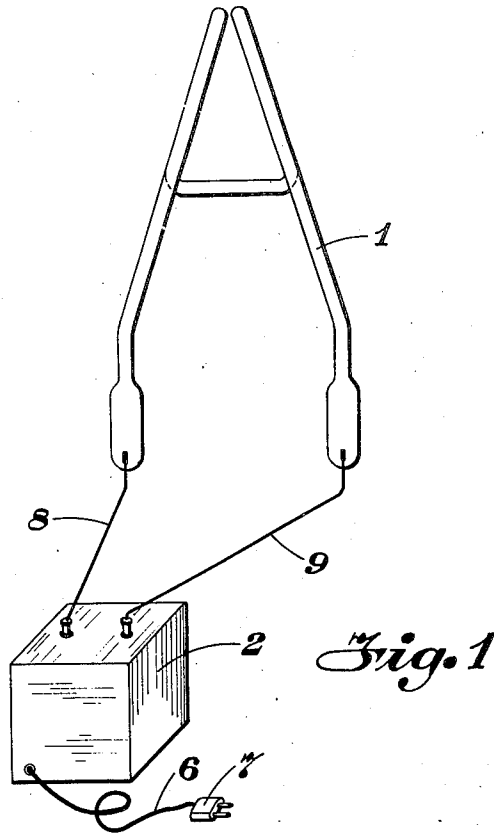


Fig. 2

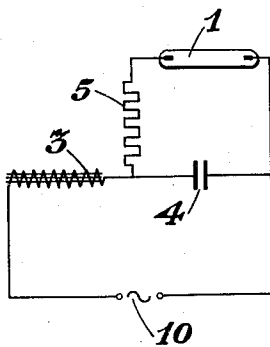
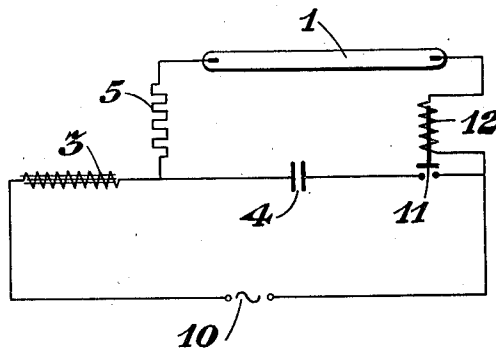


Fig. 3



INVENTOR
Johannes P. M. Mutsaers
BY *Charles E. Tulin*
ATTORNEY

UNITED STATES PATENT OFFICE

1,984,489

GASEOUS ELECTRIC DISCHARGE LAMP
DEVICEJohannes P. M. Mutsaers, Eindhoven, Nether-
lands, assignor to General Electric Company,
a corporation of New YorkApplication January 24, 1933, Serial No. 653,330
In Germany February 11, 1932

1 Claim. (Cl. 176—124)

The present invention relates to gaseous electric discharge lamp devices generally and more particularly the invention relates to improvements in such devices having a luminous positive column discharge.

It is well known in the art that the voltage required for starting the luminous positive column discharge is higher than the voltage required to support the discharge during the operation of gaseous electric discharge devices. Prior starting and operating circuits for devices of the above type have included a transformer for furnishing the high voltage required to start the device into operation. The object of the present invention is to provide a circuit for starting and operating gaseous electric discharge devices on the voltages furnished by the commercial current supply circuits, such as 220 or 110 volts. A further object of the invention is to provide such a circuit as will eliminate the high voltage transformers characteristic of prior circuits for such devices. Still further objects and advantages attaching to the device and to its use and operation will be apparent to those skilled in the art from the following particular description.

The invention attains its objects by a circuit containing a series connected inductance and capacitance connected to an alternating current source of commercial voltage, such as 110 or 220 volts, 50 cycles. The inductance and the capacitance are of such size that resonance is produced. The electric discharge lamp device is connected in parallel with the capacitance, or inductance and an impedance such as a resistance or a choke-coil is connected in series with the lamp device. Due to the resonance in the circuit high voltages exist between the plates of the capacitance and between the terminals of the inductance and said voltages are several times larger than the voltage of the current supply source. A high voltage is thus applied across the terminals of the electric discharge device connected in parallel either with said capacitance or said inductance. When the voltage of the capacitance, or inductance is equal to or greater than the voltage required to start the positive column discharge between the electrodes of the gaseous electric discharge device the voltage of the capacitance or inductance discharges through said discharge device which starts the positive column discharge therein. The resistance or the choke-coil connected in series with the gaseous electric discharge device slows up the discharge of the voltage on the capacitance so that the discharge current between the

electrodes of the electric discharge device is smoother than it would be otherwise.

When the electric discharge device is connected in parallel with the inductance the capacitance discharges through both the discharge device and the alternating current source. It is, therefore, advisable to connect the discharge device in parallel with the capacitance rather than with the inductance, in which case the capacitance discharges only through the circuit made up of the electric discharge lamp device, the parallel connected capacitance and the resistance, or choke-coil connected in series with the lamp device. It will be understood, of course, that either connection is used as desired.

In the drawing accompanying and forming part of this specification two embodiments of the invention are shown, in which

Fig. 1 is a schematic view of an electric discharge lamp device and a perspective view of the housing for the auxiliary apparatus for said lamp device,

Fig. 2 is a schematic view of an electric discharge lamp device and a wiring diagram therefor showing one embodiment of the present invention, and

Fig. 3 is a similar view of another embodiment of the invention.

Like numbers denote like parts in all the figures.

Referring to the drawing the electric discharge lamp device 1 is shaped in the form of a letter A as shown and it will be understood, of course, that said lamp device 1 is formed into other characters as desired. Said lamp device 1 has a charge of gas therein such as a mixture of neon, argon and mercury vapor. During the operation of the device the luminous positive column discharge in such gaseous mixture emits an intensive blue light.

The electrodes of the lamp device 1 are cold electrodes and are connected by leads 8 and 9 to the terminal posts protruding from the box 2. Said box 2 has a cord 6 having a male switch member 7 at the end thereof. The above apparatus is connected to a current source of commercial voltage such as 220 or 110 volts by means of said switch member 7.

Said box 2 contains the starting and operating apparatus for said lamp device 1. This apparatus is illustrated in Fig. 2 and comprises an inductance 3 a capacitance 4, and a resistance 5. Said inductance 3 and said capacitance 4 are connected in series and are connected to the terminals of a 110 or 220 volt, alternating current source of

50 cycles, for example, indicated at 10. Said inductance 3 has a value of approximately 3 henries and said capacitance 4 has a value of 3 to 4 microfarad. Said discharge lamp device 1 is connected to the terminals 10 of the alternating current source and is in parallel with the capacitance 4. A resistance 5 is connected in series with said lamp device 1. Said resistance 5 has a value of 20,000 ohms. The relation of said inductance 3 to said capacitance 4 is such that the current supplied by the alternating current source leads the voltage supplied by said source which is frequently of great advantage for the load on the current supply circuit.

15 The container 1 of the lamp device is approximately 140 cm. in length and the internal diameter of the container 1 is approximately 15 mm. The starting voltage of such an electric discharge lamp device is approximately 900 volts.

20 When current is applied to the above described circuit a voltage considerably higher than that of the current source builds up between the two terminals of the capacitance 4. This voltage continues to build up until it reaches the voltage required to start the lamp device 1 into operation, 900 volts in the example given above. The capacitance 4 then discharges through the circuit made up of the capacitance 4, the resistance 5 and the electric discharge lamp device 1 to start the luminous positive column in said lamp device 1. Said resistance 5 slows up the discharge of capacitance 4 so that a more steady current flows through the lamp device 1 during the operation of said device 1 than would be the case if said resistance 4 were not connected into the circuit. The light emitted by said lamp device 1 is thus of a more steady character. The above described circuit is capable of starting and operating an electric discharge lamp device of 140 cms. in length on a 220 volt, 50 cycle alternating current source without a transformer and it will be understood, of course, that the resonance circuit re-starts the lamp device 1 on each half cycle of the alternating current.

45 The inductance 3 comprises an iron core having wire wound around it. The resistance 5, when desired, is also wound on the iron core of said inductance 3 and in this case the inductance 3 and the resistance 5 are one unit consisting of a wire wound iron core having a tap between the ends of the wire coil. One part of this unit then

serves as the inductance, the other part thereof serves as the resistance, and as a choke-coil.

The embodiment illustrated in Fig. 3 is the same in all respects as that illustrated in Figs. 1 and 2 except that in this embodiment a switch 11 is connected in series with the capacitance 4 and said switch 11 is actuated by an electro-magnet 12 connected in series with the electric discharge lamp device 1 so that the movements of said switch 11 are controlled by the current flow through said lamp device 1. When current is first applied to the circuit, switch 11 is in its closed position as no current flows through said lamp device 1. When the electric discharge through said lamp device 1 is started in the manner described in conjunction with Fig. 1 the current flow through the coil of said electro-magnet 12 energizes said electro-magnet 12 which moves said switch 11 to its open-circuit position in which position the capacitance 4 is out of circuit. The resonance circuit is thus used only during the starting period. It will be understood of course that switch 11 is in an open circuit position during the operation of the lamp device 1.

25 While I have shown and described and have pointed out in the annexed claim certain novel features of the invention, it will be understood that various omissions, substitutions and changes in the forms and details of the device illustrated and in its use and operation may be made by those skilled in the art without departing from the broad spirit and scope of the invention, for example, the invention is applicable to other types of electric discharge devices than that shown and described and is applicable to arc discharge devices designed for the emission of ultra-violet light and to devices having heated electron emitting electrodes.

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

40 A circuit for starting and operating a gaseous electric discharge lamp device on a 220 volt, 50 cycle current source comprising an inductance and a capacitance connected in series and an impedance in series with said lamp device, said capacitance being connected in parallel with said lamp device and means controlled by current flowing in said device for cutting out of circuit said capacitance during the operation of the lamp device.

JOHANNES P. M. MUTSAERS.