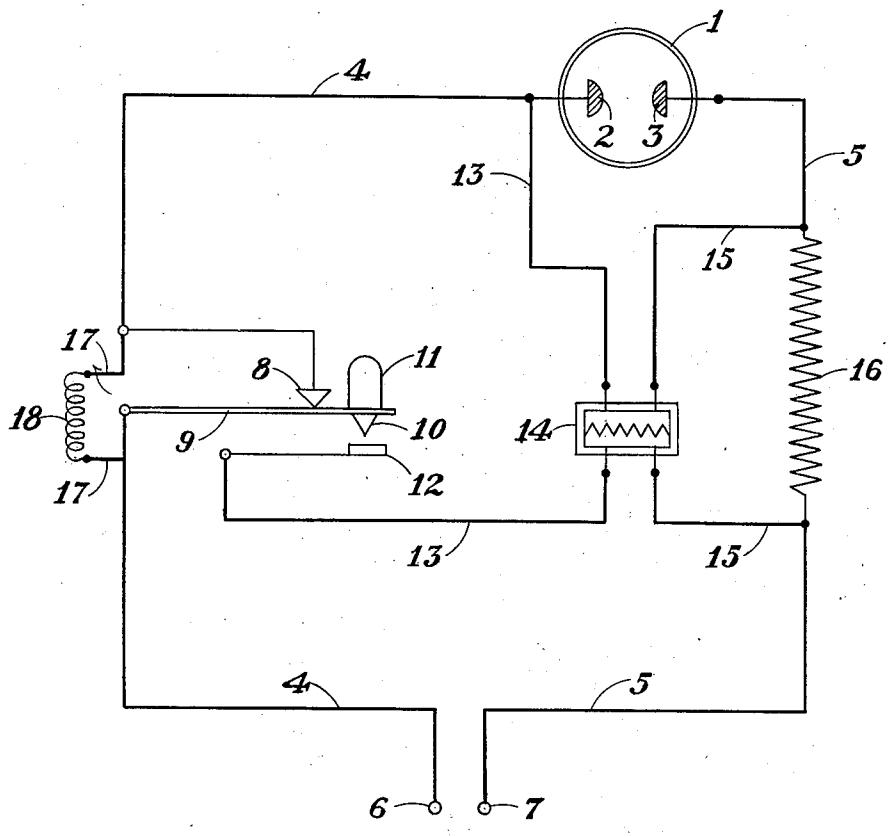
June 7, 1932. M. PIRANI ET AL 1,861,581

GASEOUS ELECTRIC DISCHARGE DEVICE

Filed July 24, 1930



INVENTORS

Marcello Pirani

Karl Becker

Martin Reger

BY Charles V. Mullen

ATTORNEY

Patented June 7, 1932 1,861,581

UNITED STATES PATENT OFFICE

MARCELLO PIRANI, OF BERLIN-WILMERSDORF, KARL BECKER, OF BERLIN-STEGLITZ, AND MARTIN REGER, OF BERLIN, GERMANY, ASSIGNORS TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK

GASEOUS ELECTRIC DISCHARGE DEVICE

Application filed July 24, 1930, Serial No. 470,347, and in Germany August 29, 1929.

The present invention relates to gaseous electric discharge devices generally and more particularly the invention relates to starting means for such devices.

It is well known in the art that in order to start such gaseous electric discharge devices into operation it is necessary to ionize the gas in the discharge path between the electrodes. It is equally well known that a high frequency current is useful for this purpose, said current being generated in an auxiliary apparatus having a suitable circuit. It is a practice in the art to connect a choke coil into one of the leads of the electric discharge device operating on alternating current, the function of said choke coil being to prevent the high frequency oscillations generated in the auxiliary apparatus during the starting period from entering the feeding circuit of the gaseous electric discharge device. A further function of said choke coil is to serve as a resistance in the circuit of the electric discharge device, said device being operated on alternating current. In spite of the use of the choke coil in such a manner, certainty in starting the device was not always obtained. The reason for this uncertainty in the starting operation is that the capacity of the normally wound choke coil used hitherto was too high and for that reason did not offer sufficient resistance to prevent the passage of the high frequency current over the circuit back to the source thus dissipating its energy over the circuit instead of concentrating it on the electric discharge device.

The object of this invention is to insure certainty of starting electric discharge devices operating on sources of alternating current or direct current of the usual high and low voltages of commerce. The invention attains its objects by means of a high frequency apparatus used in conjunction with an open wound coil of low distributed capacity, both of these devices being cut into and out of circuit simultaneously by means of a suitable switching apparatus hereinafter described.

The open wound coil of low distributed capacity of the present invention is much less expensive than the choke coils used hitherto. The coil of the present invention not only has a low distributed capacity but is also considerably under dimensioned with respect to the intensity of the operating current. Said coil is connected into the circuit only during the starting period while the high frequency apparatus is functioning; and it is instantly cut out of the circuit, together with the high frequency generator, by means of a double acting switch on the starting of the electric discharge device when the proper operating current is going over the feeding circuit. Thus any injury to the coil by the operating current is avoided and further even though the coil may be strongly heated by the high frequency starting current this is not harmful as the passage of the high frequency starting current is but momentary.

In the drawing accompanying and forming part of this specification an embodiment of the new and novel starting apparatus is shown schematically.

Referring to the drawing the electric discharge device shown comprises a container 1 having electrodes 2, 3 sealed therein, said electrodes being connected to the terminals 6, 7 of an alternating current source by leads 4, 5 respectively. Lead 4 is provided with a double acting switch comprising a conducting resilient member 9, which is provided with a push button 11 and a contact 10 at one end thereof. Contact 8 of lead 4 makes contact 10 at one end thereof. Contact 8 of lead 4 makes contact with said resilient member 9. Pressure exerted manually, electrically, or mechanically on push-button 11 of resilient member 9 brings contact 10 into a contact making position with another contact 12 which is connected by leads 13, 13 to lead 4, said leads 13, 13 being connected to a high frequency apparatus conventionally shown at 14 and which, as is well known in the art, in the case of an alternating current source consists of a spark gap, an inductance, an oscillatory circuit, and high frequency transformer and which in the case of a direct current source consists of a magnetically operated circuit breaker and an inductance coil. The high frequency apparatus

14 is connected to lead 5 by leads 15, 15. A resistance 16 connected into said lead 5 serves as a ballast resistance when the electric discharge device 1 operates on normal low frequency or voltage. An open wound coil 18 of low distributed capacity considerably under dimensioned with respect to the intensity of the low frequency operating current is connected into lead 4 by leads 17, 17 across the terminals of switch members 9, 8 and is short circuited thereby during normal operation of the device 1.

During the operation of the electric discharge device 1, current flows to electrode 2 thereof through lead 4, spring 9 and contact 8, and to electrode 3 thereof through lead 5 and the resistance 16. To start the electric discharge device contact 10 is brought into contact with counter-contact 12 for an instant by means of pressure exerted on button 11, this energizes the high frequency apparatus which starts the lamp. During this operation the contact between contact 8 and spring 9 is broken and the open wound coil 18 of low distributed capacity is put in the circuit. Said coil 18 has such high resistance to high frequency currents that during the high frequency discharge none of the high frequency current passes it to reach the current source. Thus the high frequency current is directed only to the electric discharge device which is thus started with certainty. After said device has been started resilient member 9 is released to again make contact with contact 8 in which position the high frequency generator 14 and the open wound coil 18 are both cut out of the circuit.

While we have shown and described our device in conjunction with a gaseous electric discharge device of the positive column type it will be understood that we contemplate the use of our invention in electric discharge devices generally which present problems in starting such as, for example, tungsten arc lamps. And further it will be understood that various substitutions, modifications and changes may be made in details of the apparatus shown without departing from the broad spirit and scope of the invention, for example, many other switching devices affecting the same result may be substituted for resilient member 9.

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

1. In combination, an electric discharge device comprising a container, electrodes sealed therein, a main source of current connected to said electrodes, and a starting circuit for said device comprising a high frequency generator connected across the terminals of said main source and in operative relation to the terminals of said device, means in said circuit during starting for preventing oscillations therein passing to the said main source and means for connecting and disconnecting simultaneously said generator and said first mentioned means to and from said main source.

2. In combination, an electric discharge device, a high frequency generator, a blocking impedance for high frequency currents, and means for cutting into and out of circuit simultaneously the high frequency generator and the blocking impedance, said generator being adapted to start said electric discharge device and said blocking impedance being adapted to prevent the passage of the high frequency current to the current source of said electric discharge device.

3. In combination, a gaseous electric discharge device, a high frequency generator, an open wound coil of low distributed capacity, and means for cutting into and out of circuit simultaneously the high frequency generator and the open wound coil of low distributed capacity, said generator being adapted to start said gaseous electric discharge device and said open wound coil being adapted to prevent the passage of the high frequency current to the current source of said gaseous electric discharge device.

In witness whereof we have hereunto set our hands this 9th day of July, 1930.

MARCELLO PIRANI.
KARL BECKER.
MARTIN REGER.