

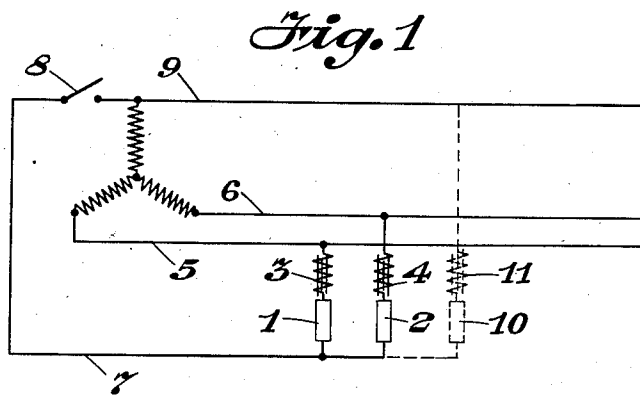
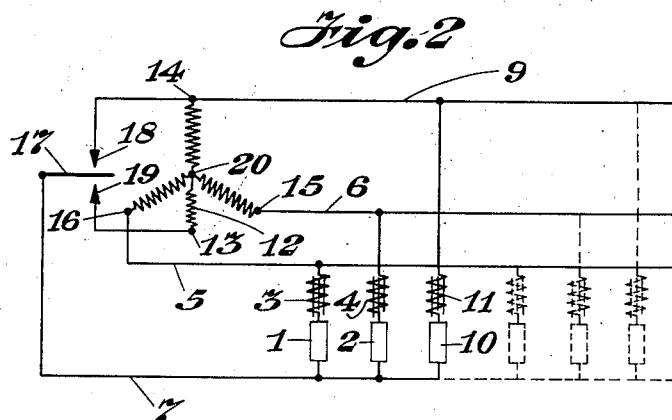
Aug. 13, 1935.

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2,010,849

GASEOUS ELECTRIC DISCHARGE LAMP DEVICE

Filed Sept. 7, 1934



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UNITED STATES PATENT OFFICE

2,010,849

GASEOUS ELECTRIC DISCHARGE LAMP
DEVICE

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Application September 7, 1934, Serial No. 743,141
In the Netherlands September 18, 1933

2 Claims. (Cl. 176—124)

The present invention relates to gaseous electric discharge lamp devices generally and more particularly the invention relates to starting and operating circuits for such devices similar to that disclosed in co-pending application Serial Number 731,149, filed June 18, 1934, the inventors being Cornelis Bol and Eduard Gerardus Dorgelo.

In the co-pending application a circuit is disclosed which comprises a group of at least two gaseous electric discharge lamp devices connected in series, directly or through transformers having their primaries connected in series, across two terminals of a three phase alternating current source and a switch to connect the mid-point of the lamp circuit, between the two series connected lamp devices, to the third terminal of the alternating current source during the starting period of said lamps and to disconnect said mid-point from said terminal during the operation of said lamps. The potential applied to the lamp devices for starting purposes is thus higher than the voltage applied thereto during operation and the impedance devices, such as a choke coil or a resistance, which absorb the difference between the starting voltage and the operating voltage of the lamp devices, are smaller in size than in the case where the same voltage is applied to the lamp circuit both during the starting and operating periods. The circuit as a whole is thus inexpensive and efficient.

In the above described circuit the lamp devices can be connected across only two terminals of the three-phase current source for if a third lamp device were connected across two terminals, including the third terminal to which the switch is connected, this third lamp device would be short circuited during the starting period of the lamp devices.

The object of the present invention is to provide means to apply the starting voltage to a third lamp device connected to the third terminal of the current source in circuits of the above type. 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 circuit according to the present invention comprises a transformer having a point thereon which supplies sufficient voltage to maintain the discharge in the lamps in the series circuit and to start the lamp connected to the third terminal of said transformer. As in the circuit described above the mid-point of the series lamp circuit is first connected to the third terminal

of the transformer to start the series connected lamps into operation. During this period the third lamp, connected to the third terminal of the transformer and to the mid-point of the series lamp circuit, is short circuited as described above. When said series connected lamps have been started into operation the mid-point of said series lamp circuit is disconnected from said third terminal and is then connected to said point on said transformer. The third lamp is thus started into operation after which the mid-point is disconnected from said transformer point.

The invention will be readily understood by an inspection of the drawing accompanying and forming part of this specification and a perusal of the following detailed description thereof.

In the drawing

Fig. 1 illustrates a circuit of the type disclosed in the co-pending application, and

Fig. 2 is a schematic representation of a circuit embodying the present invention.

Like numbers denote like parts in both the figures.

Referring to Figure 1 the circuit comprises two gaseous electric lamp devices 1 and 2, having choke-coils 3 and 4 connected in series therewith respectively, and are connected in series across two terminals of a three phase transformer. The mid-point of the series lamp circuit is connected by lead 7 to the switch 8 which switch connects and disconnects said mid-point to the third terminal of said transformer. As pointed out heretofore a higher voltage (the starting voltage) is applied to the series lamp devices 1 and 2 when said switch 8 is closed and a lower voltage (the operating voltage) is applied thereto when said switch 8 is open. If a lamp device 10 and choke coil 11 (indicated in dotted lines) is connected to the third terminal of the transformer by lead 9 and in series with said lamp devices 1 and 2 said lamp 10 would be short circuited during the starting period when said switch 8 is closed.

Fig. 2 illustrates the means I have found successful for connecting the third lamp device 10 into the circuit. The new and novel circuit illustrated in Fig. 2 comprises a plurality of gaseous electric discharge lamp devices 1, 2 and 10, shown schematically in the drawing, each comprising a container, electrodes sealed therein, at least one of which is electron emitting when heated, and a gaseous atmosphere therein comprising a rare gas, such as neon, at a pressure of approximately 1 to 10 mm. and a vaporizable material, such as sodium. A thermionic electrode comprising a heater in operative relation to a body of elec-

tron emitting material is desirable. A plurality of choke coils 3, 4 and 11 are connected in series with said lamp devices 1, 2 and 10 respectively and each of said lamp devices 1, 2 and 10 are connected to the terminals 16, 15 and 14, respectively, of the secondary of a three phase, star connected transformer by leads 5, 6 and 9, respectively. Said lamps 1, 2 and 10 are connected together and to switch 17, 18, 19 by the common lead 7.

The transformer comprises a coil 12, one end of which is connected to the neutral point 20 of the transformer secondary, which has such dimensions that the opposite end 13 thereof is at a voltage with respect to the terminal 14 equal to the coupled voltage and which is consequently equal to the voltage between the terminals 14 and 15 or 14 and 16. Said end 13 is connected to the contact 19 of the switch 17, 18, 19 and the contact 18 of said switch 17, 18, 19 is connected to the terminal 14 of said transformer secondary.

The lamps in the above described circuit are started into operation by first bringing the switch lever 17 into contact with the contact 18 which applies the starting voltage to the lamp devices 1 and 2. After said lamp devices 1 and 2 have been started into operation the switch lever 17 is moved from contact 18 to contact 19 and the starting voltage is thus applied to the lamp device 10. After the lamp device 10 has been started into operation the switch lever 17 is moved to its neutral position. In the case of an asymmetric load on the circuit the switch lever 17 is brought into contact with the neutral point 20 during the operation of the lamp devices, when desired.

It will be understood of course that many changes can be made in the above described circuit. For example, the special coil 12 can be omitted and the contact 19 be connected to the mid-point of the coil having the ends 16 and 20 provided the voltage supplied by the coil having the terminal 14 is sufficient to start the lamp device 10 and provided the voltage supplied by the coil having the terminal 16 is sufficient to support the discharge in the lamp device 1. In this case however a higher voltage than the normal operating voltage is supplied to the lamp devices 1 and 2.

When it is not desirable to provide a point 13 on the transformer, to which point the switch lever 17 can be connected, an auxiliary transformer having a suitable point is connected to the leads 5, 6 and 9.

Several groups of three gaseous electric discharge lamp devices can be connected into the circuit, when desired. A second group connected into the circuit has been indicated in dotted lines in Fig. 2 of the drawing. When desired, one or more lamp devices are connected in series with said lamp devices 1, 2 and 10 between said leads 5, 6 and 9 and the mid-point of the lamp circuit.

While I have shown and described and have pointed out in the annexed claims 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, thermionic electrodes of the type heated solely by the discharge are used in the lamp devices, when desired.

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

1. A starting and operating circuit for a plurality of gaseous electric discharge devices comprising in combination, a three phase transformer for said devices, a group of at least two of said devices being connected in series across two terminals of said transformer, a switch to connect the mid-point of said group to the third terminal of said transformer during the starting period of said devices and to disconnect said mid-point from said third terminal during the operation of said devices, another of said devices being connected between the mid-point of said group and the third terminal of said current source, said transformer having a point thereon which supplies a voltage of sufficient magnitude with respect to said third terminal to start said device connected to said third terminal and of sufficient magnitude with respect to the other two terminals to maintain the discharge in the series connected devices connected across said last mentioned terminals, a contact on said switch to connect the mid-point of said lamp circuit to the transformer point after said series connected lamp devices have been started into operation and to disconnect said mid-point from said transformer point after all of said devices have been started.

2. A starting and operating circuit for a plurality of gaseous electric discharge devices comprising in combination, a three phase transformer for said devices; a group of at least two of said devices being connected in series across two terminals of said transformer, a switch to connect the mid-point of said group to the third terminal of said transformer during the starting period of said devices and to disconnect said mid-point from said third terminal during the operation of said devices, another of said devices being connected between the mid-point of said group and the third terminal of said current source, said transformer having a point thereon which supplies a voltage of sufficient magnitude with respect to said third terminal to start said device connected to said third terminal and of sufficient magnitude with respect to the other two terminals to maintain the discharge in the series connected devices connected across said last mentioned terminals, a contact on said switch to connect the mid-point of said lamp circuit to the transformer point after said series connected lamp devices have been started into operation and to disconnect said mid-point from said transformer point after all of said devices have been started, said transformer point supplying a voltage with respect to said third terminal which is equal to the voltage between the terminals of said transformer.

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