

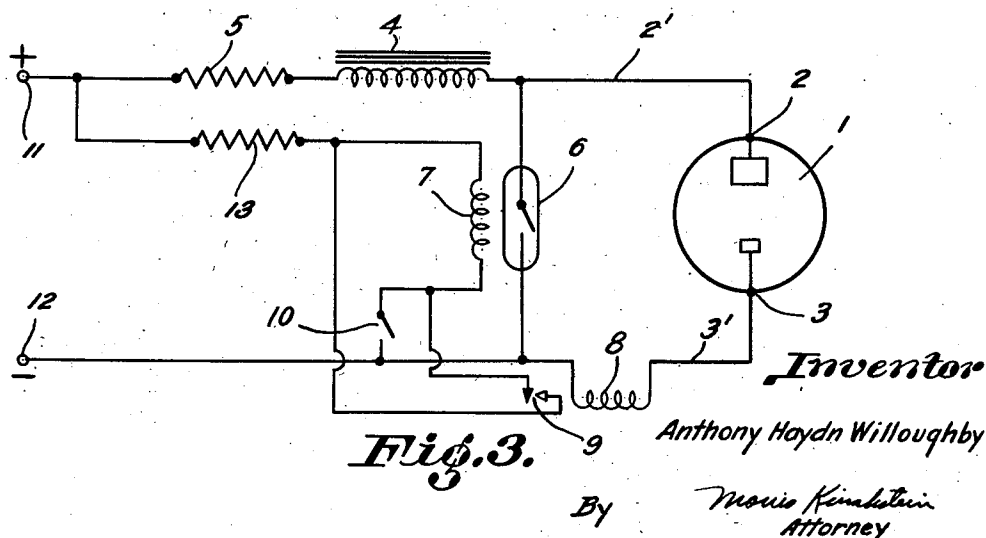
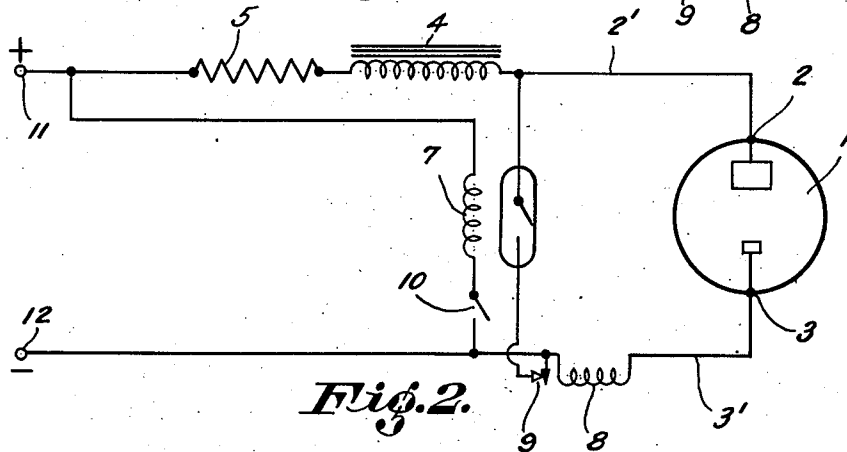
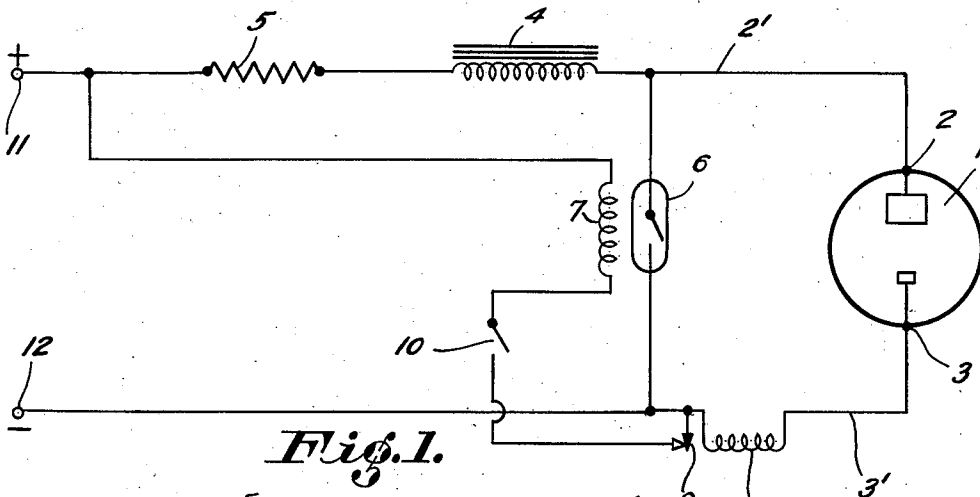
June 19, 1951

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2,557,809

CIRCUIT FOR OPERATING ELECTRIC DISCHARGE LAMPS

Filed Aug. 5, 1948



UNITED STATES PATENT OFFICE

2,557,809

CIRCUIT FOR OPERATING ELECTRIC
DISCHARGE LAMPS

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Application August 5, 1948, Serial No. 42,555
In Great Britain August 11, 1947

4 Claims. (Cl. 315-103)

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This invention relates to electric circuits for operating gas or vapour filled electric discharge lamps from a D. C. supply, of the type comprising an electro-magnetically operated switch adapted in operation of the circuit to short-circuit the discharge lamp when closed and when thereafter opened to give rise to a high voltage pulse, in virtue of inductance in the circuit, which pulse is applied across the lamp and causes the discharge to start.

In such circuits as known hitherto there exists the possibility that the electro-magnetic switch may be accidentally operated whilst the lamp is running, thereby short-circuiting and extinguishing the discharge, which, especially in the case of a metal vapour discharge lamp, may not thereafter restart, on opening of the switch, until the lamp has cooled down sufficiently; also the switch itself may be damaged by such operation.

The object of this invention is to reduce this undesirable possibility.

According to the invention in an electric circuit of the type specified either the operating coil of the said switch or the switch itself is associated with contacts adapted to be operated by a relay which relay is arranged to be operated when current is flowing through the lamp, the arrangement being such that so long as current is flowing through the lamp the relay maintains the contacts in a position in which the switch is rendered inoperative or ineffective.

The contacts may be connected in shunt with the operating coil of the switch and arranged to be closed on operation of the relay, so that the coil is held short-circuited and the switch inoperative whilst the discharge lamp current is flowing, a current-limiting resistance then being required in series with the coil, or the contacts may be connected in series with the switch contacts and arranged to be opened on operation of the relay, so that operation of the switch is rendered ineffective whilst the discharge lamp current is flowing.

But preferably the contacts are connected in series with the operating coil and are arranged to open on operation of the relay, so that the coil is held open-circuited, and the switch rendered inoperative, whilst the discharge lamp current is flowing.

These circuit arrangements in accordance with the invention will now be described by way of example, with reference to Figures 1, 2 and 3 of the accompanying drawings, in which Figure 1 shows schematically the preferred arrangement aforesaid and Figures 2 and 3 the two alternative forms aforementioned.

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In the arrangement shown in Figure 1, a lamp 1, which may be, for example, a 2,500 watt high pressure mercury vapour lamp of the compact source type, is adapted to be connected through lamp-terminals 2, 3, here shown as associated respectively with the anode and cathode of the lamp, by leads 2', 3' to supply-terminals 11, 12 adapted to be connected to a D. C. supply, for example 110 volts. Between the lamp-terminal 2 and the corresponding supply-terminal 11 there are connected in series an inductance coil 4 of low self-capacity and a resistive stabilising impedance 5. Between the lamp-terminal 3 and the corresponding supply-terminal 12 is connected the operating coil 8 or the current-operated relay provided in accordance with this invention.

The electromagnetic switch 6 is a vacuum switch and is connected across the lamp-terminals, being connected to lead 2' at a point between the inductance coil 4 and the lamp-terminal 2, and being connected to lead 3' at a point between the relay coil 8 and the corresponding supply-terminal 12. The operating coil 7 of the vacuum switch is connected across the supply-terminals in series with an operating switch 10 and contacts 9, being the said contacts adapted to be operated by the relay 8; the contacts 9 are arranged to be closed when the relay is not operated by current flowing through the lamp and opened when current flows through the lamp. If desired, a current-limiting resistance may also be connected in series with the coil 7; this is not shown in Figure 1.

Figure 1 shows the relay contacts 9 in the closed position and the circuit is in the condition in which it is adapted to operate in the normal manner for starting the lamp. To start the lamp, the mains supply connected to the supply-terminals 11, 12 is switched on and the switch is closed so that the operating coil 7 of the vacuum switch is energised. This causes the switch 6 to close, and open very quickly when switch 10 is subsequently opened, thus giving rise to an inductive pulse across the inductance coil 4 which pulse is effectively applied across the lamp electrodes and causes the discharge to start. As soon as the lamp has started, the lamp current flowing through the relay coil 8 causes the relay contacts 9 to open, thereby open-circuiting the operating coil 7 of the vacuum switch, so that the latter cannot thereafter be energised, if the switch 10 is accidentally closed, until the lamp has again been extinguished.

Figure 2 shows an alternative arrangement of the circuit wherein the contacts 9 are con-

nected in series with the contacts of the electromagnetic switch 6 and are arranged to be opened on operation of the relay 8, so that operation of the switch 10 is rendered ineffective whilst the discharge lamp current is flowing.

Figure 3 shows a further alternative arrangement of the circuit wherein the contacts 9 are connected in shunt with the operating coil 7 of the electromagnetic switch 6, and are arranged to be closed on operation of the relay 8, thereby short-circuiting the said coil 7, so that operation of the switch 10 is rendered ineffective whilst the discharge lamp current is flowing; in this alternative a current-limiting resistance 13 is required in series with the coil 7.

I claim:

1. An electric circuit for operating a gas or vapour-filled electric discharge lamp from a D. C. supply, said circuit comprising an inductance and a stabilizing resistance in series with the lamp, and an electro-magnetic-operating starting switch, said switch including a pair of normally open contacts in shunt with the lamp and an operating coil in shunt with the lamp, said operating coil being series connected with a pair of normally open and manually operable control contacts, the branch of the circuit including the switch contacts and the branch of the circuit including the operating coil for the switch being connected on opposite sides of said inductance, with the first named branch closer to the lamp, whereby when the control contacts are closed by an operator for starting of the lamp, the operating coil will be energized to close the contacts of the starting switch thereby short-circuiting the lamp, and when the control contacts thereafter are opened the operating coil will be de-energized causing the starting switch to open and thereby produce a high voltage lamp starting pulse across said inductance, said circuit also comprising a relay having an operating coil in series with the lamp for energization by current flowing through the lamp when the lamp is operating, said relay including contacts controlled by its operating coil and so connected to said electromagnetic switch that the latter is rendered inoperable when the lamp is in operation.

2. An electric circuit for operating a gas or vapour-filled electric discharge lamp from a D. C. supply, said circuit comprising an inductance and a stabilizing resistance in series with the lamp, and an electromagnetic-operating starting switch, said switch including a pair of normally open contacts in shunt with the lamp and an

operating coil in shunt with the lamp, said operating coil being series connected with a pair of normally open and manually operable control contacts, the branch of the circuit including the switch contacts and the branch of the circuit including the operating coil for the switch being connected on opposite sides of said inductance, with the first named branch closer to the lamp, whereby when the control contacts are closed by an operator for starting of the lamp the operating coil will be energized to close the contacts of the starting switch thereby short circuiting the lamp, and when the control contacts thereafter are opened the operating coil will be de-energized causing the starting switch to open and thereby produce a high voltage lamp starting pulse across said inductance, said circuit also comprising a relay having an operating coil in series with the lamp for energization by current flowing through the lamp when the lamp is operating, said relay including normally closed contacts controlled by its operating coil and connected in series with the operating coil of the said electromagnetic-operating starting switch so that the relay contacts are opened and the electromagnetic starting switch rendered inoperative when the lamp is in operation.

3. An electric circuit as set forth in claim 1 wherein the relay contacts are normally closed and are connected in series with the contacts of the electromagnetic-operating switch so that the relay contacts are opened when the lamp is in operation.

4. An electric circuit as set forth in claim 1 wherein the relay contacts are normally open and are connected in shunt with the operating coil of the electromagnetic-operating switch so that the relay contacts are closed when the lamp is in operation.

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