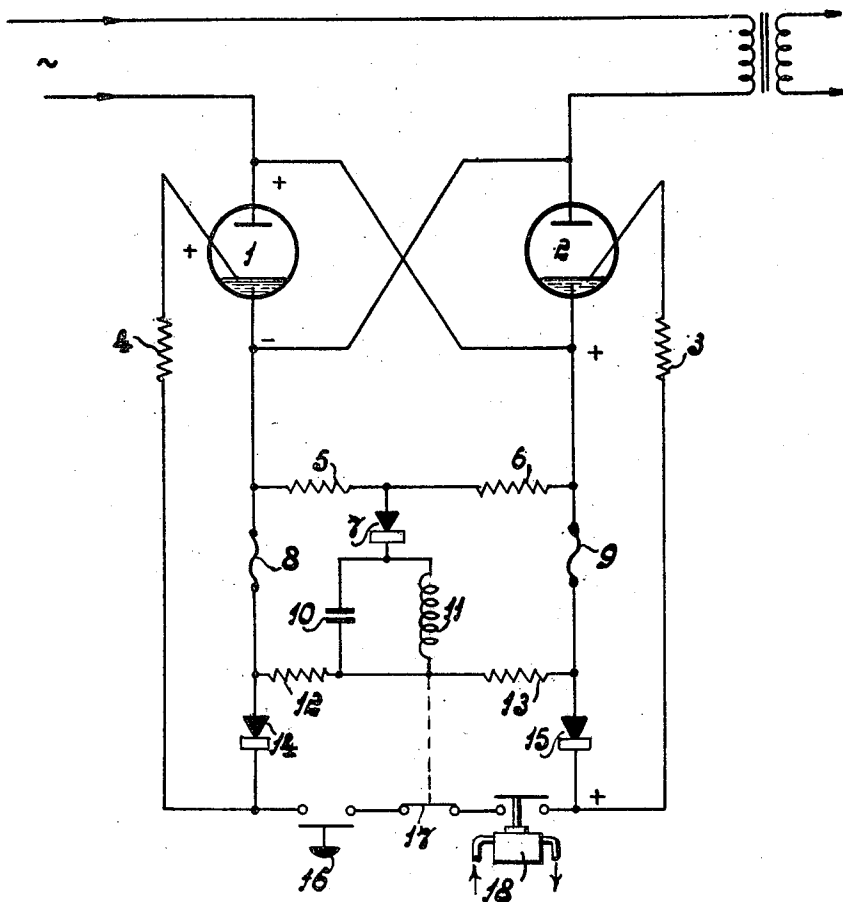


Jan. 14, 1958

HEINZ-WILHELM HARMS
SWITCHING ARRANGEMENT FOR SWITCHING-OFF THE
IGNITION PROTECTIVE GEAR ON THE
BLOWING OF A FUSE
Filed July 29, 1954

2,820,178



INVENTOR
HEINZ WILHELM HARMS
BY *[Signature]*
AGENT

1

2,820,178

SWITCHING ARRANGEMENT FOR SWITCHING-OFF THE IGNITION PROTECTIVE GEAR ON THE BLOWING OF A FUSE

Heinz-Wilhelm Harms, Hamburg-Harburg, Germany, assignor, by mesne assignments, to North American Philips Company, Inc., New York, N. Y., a corporation of Delaware

Application July 29, 1954, Serial No. 446,506

4 Claims. (Cl. 315—201)

The present invention relates to an electrical circuit arrangement for the protection of ignition type tubes.

As is well known, ignitron protective gear is used in apparatus in which alternating voltages frequently have to be switched or controlled. In such systems, the output load is generally a transformer, and the switching and controlling of the alternating voltage supplied to the transformer is accomplished by means of two conversely connected ignitron tubes, one tube controlling the positive half-waves and the other the negative half-waves of the current. The tubes are ignited by current pulses supplied to the ignition electrodes of the tubes and become extinguished when the current passes through zero.

The ignitron protection systems heretofore proposed have the disadvantage that, when a fuse blows, one tube remains operative with the result that the output transformer is supplied with a pulsating direct voltage.

The arrangement according to the invention provides a protection system in which, when a fuse blows, both tubes are automatically switched-off. The invention will be described in greater detail with reference to the appended drawing forming part of the specification. The circuit there shown comprises ignitron tubes 1 and 2, resistors 3 and 4, fuses 8 and 9, rectifiers 14 and 15, operating switch 16 and water control switch 18 and a normally closed contact 17.

The system comprising the above elements operates as follows: When the anode of tube 1 is positive as shown, this tube is ready to fire if sufficient igniter current is passed. The required igniter current is supplied by the series path which may be traced from the anode of tube 1, through the fuse 9, the rectifier 15, the switches 18, 17 and 16, and the resistor 4. On the alternate half cycles, the anode of tube 2 becomes positive and this tube is rendered conductive by energizing the igniter thereof. Current for the igniter of tube 2 is supplied by the series path which may be traced from the anode of tube 2, through the fuse 8, the rectifier 14, switches 16, 17 and 18, and the resistor 3.

It will be seen that in the event that either fuse 8 or 9 blows, only one of the igniter current paths is interrupted, so that only one ignitron is taken out of service, with the result that a pulsating direct voltage is supplied to the output transformer.

According to the invention, in order to switch off both ignitrons in the event of the opening of one of the igniter circuits, there is provided a bridge circuit comprising resistors 5, 6, 12 and 13, a rectifier 7, a capacitor 10 and a relay 11 actuating the contact 17.

In the normal operative condition the bridge made up of resistors 5, 6, 12 and 13, is balanced so that no current flows through the diagonal arm comprising the rectifier 7, the relay 11 having in parallel combination the capacitor 10. Due to the balance of the bridge no current flows through the relay 11 so that the contact 17 remains closed.

2

If now one of the fuses 8 or 9 blows, the balance of the bridge is upset since one bridge arm is interrupted. Consequently a current flows through the zero arm which energizes the relay 11 and opens the contact 17, which is in the common portion of the igniter current paths. As a result both ignition circuits are interrupted so that both tubes remain cut-off.

Naturally this additional switching arrangement may also be used in controllable ignition apparatus in which use is made of grid-controlled rectifiers instead of dry rectifier. The arrangement may be extended so that by means of this safety relay further control circuits are switched-off when a fuse blows.

While the invention has been described by means of a specific example and in a specific embodiment, I do not wish to be limited thereto, for obvious modifications will occur to those skilled in the art without departing from the spirit and scope of the invention.

What is claimed is:

1. An electrical circuit arrangement comprising two discharge devices each having an ionizable medium and having an electrode for initiating ionization of said medium, a first energizing current path connected to the said electrode of the first of said devices and comprising a first member for interrupting said first path upon the flow of excessive current therein, a second energizing current path connected to the said electrode of the second of said devices and comprising a second member for interrupting said second path upon the flow of excessive current therein, and means responsive to the interruption of one of said paths by the said path interrupting member thereof for interrupting the other of said paths.

2. An electrical circuit arrangement comprising two discharge devices each having an ionizable medium and having an electrode for initiating ionization of said medium, a first energizing current path connected to the said electrode of the first of said devices and comprising a first member for interrupting said first path upon the flow of excessive current therein, a second energizing current path connected to the said electrode of the second of said devices and comprising a second member for interrupting said second path upon the flow of excessive current therein, said first and second paths having a portion thereof in common, and means responsive to the interruption of one of said paths by the said path interrupting member thereof for interrupting said common portion of said current paths.

3. An electrical circuit arrangement comprising two discharge devices each having an ionizable medium and having an electrode for initiating ionization of said medium, a first energizing current path connected to the said electrode of the first of said devices and comprising a first member for interrupting said first path upon the flow of excessive current therein, a second energizing current path connected to the said electrode of the second of said devices and comprising a second member for interrupting said second path upon the flow of excessive current therein, and a network shunting said first and second members and comprising means responsive to current flow through said network upon interruption of one of said paths for interrupting the other of said paths.

4. An electrical circuit arrangement comprising two ignitrons each having a cathode, an anode, an ionizable medium and an igniter for initiating ionization of said medium, a first energizing current path connected between the anode and igniter of the first of said ignitrons and comprising in series arrangement, a fuse element, a rectifier, a switch contact and a resistor, a second energizing current path connected between the anode and igniter of

3

the second of said ignitrons and comprising in series arrangement, a second fuse element, a second rectifier, said switch contact and a second resistor, a first network shunting said first fuse element and comprising in series arrangement, a third resistor, a third rectifier, a relay coil and a fourth resistor, a second network shunting said second fuse element and comprising in series arrangement, a fourth resistor, said third rectifier, said relay coil and a fifth resistor, and means to couple said relay coil to said switch contact thereby to actuate the same upon current flow through said relay coil.

5

10

4

References Cited in the file of this patent

UNITED STATES PATENTS

1,660,965	Hartzell	Feb. 28, 1928
1,902,958	Jackson	Mar. 28, 1933
2,377,506	McWhirter et al.	June 5, 1945
2,431,352	Theillaumas	Nov. 25, 1947
2,438,742	Farrow	Mar. 30, 1948
2,441,789	Bivens	May 18, 1948
2,531,958	Williams et al.	Nov. 28, 1950
2,605,325	Glassburn	July 29, 1952
2,665,396	Weinfurt	Jan. 5, 1954