Aug. 20, 1929. A. E. ANDERSON 1,725,692

AUTOMATIC RECLOSING CIRCUIT BREAKER SYSTEM

Filed Aug. 11, 1926

Fig. 1.

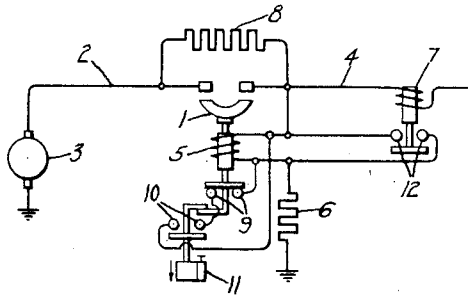
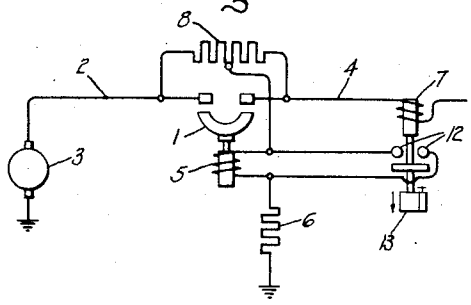


Fig. 2.



Inventor:
Arvid E. Anderson,
by Alexander S. Lunt
His Attorney.

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UNITED STATES PATENT OFFICE.

ARVID E. ANDERSON, OF SCOTIA, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

AUTOMATIC RECLOSING CIRCUIT-BREAKER SYSTEM.

Application filed August 11, 1926. Serial No. 128,671.

My invention relates to automatic reclosing circuit breaker systems and its object is to provide an improved system of this type for controlling the connection between two electric circuits in response to the load conditions thereon.

My invention will be better understood from the following description taken in connection with the accompanying drawing, and its scope will be pointed out in the appended claims.

In the accompanying drawing, Fig. 1 is a diagram of an automatic reclosing circuit breaker system embodying my invention, and Fig. 2 is a modification thereof.

Referring to Fig. 1, 1 is a circuit breaker which connects a supply circuit 2, supplied by a suitable source 3, to a load circuit 4. The circuit breaker 1 is provided with an operating coil 5 which is connected in series with a resistor 6 across the load circuit 4. The coil 5 is arranged to close and maintain the circuit breaker 1 closed so long as the voltage impressed thereon is above a predetermined value.

7 is an overload relay which is connected so as to be energized in accordance with the current flowing from the supply circuit 2 to the load circuit 4 when the circuit breaker 1 is closed. The overload relay 7 is arranged to effect the closing of a shunt circuit of relatively low resistance around the coil 5 when the current through the main contacts of the circuit breaker exceeds a predetermined value. For convenience I refer to such shunt circuits as short circuits.

8 is a current limiting device which is connected across the main terminals of the circuit breaker 1 so that it is inserted in series between supply and load circuit to decrease the current flowing between them to a relatively small value when the circuit breaker is open.

In order to maintain the circuit breaker open for a certain length of time before it can be reclosed automatically, the circuit breaker, in opening, is arranged to complete a short circuit around its coil 5 which is maintained for a certain length of time. This short circuit includes auxiliary contacts 9 on the circuit breaker 1, which are closed as soon as the circuit breaker opens, and other auxiliary contacts 10 on the circuit breaker which are closed when the circuit breaker is closed and which are arranged in any suitable manner, examples of which are well known in the art, so that they do not open until after the circuit breaker has been open for a predetermined length of time. As shown, a dash pot 11 is provided which prevents the opening of the contacts 10 for a certain length of time after the contacts are released by the opening of the circuit breaker. The contacts 9 and 10 are arranged so that when the circuit breaker 1 closes the contacts 9 are opened before the contacts 10 are closed.

The operation of the system shown is as follows: So long as the circuit breaker 1 is closed and the current through the overload relay 7 is below a predetermined value, the coil 5 is sufficiently energized to maintain the circuit breaker 1 closed. Upon the occurrence of an abnormal load condition so that the overload relay 7 closes its contacts 12, the coil 5 is short circuited and after a short time delay, due to the coil 5 being short circuited, the circuit breaker opens, thereby inserting the resistor 8 in series between the supply and load circuits. The closing of the auxiliary contacts 9 on the circuit breaker completes another short circuit around the coil 5 through the contacts 10, so that the coil 5 remains short circuited for a certain length of time after the breaker opens. As soon as the breaker opens, the current through the overload relay 7 decreases to such a value that the relay opens its contacts 12. After the breaker has been open for a predetermined length of time, the contacts 10, which are released by the opening of the breaker, are opened so that the short circuit around the coil 5 is removed.

The coil 5 and resistor 6 are then connected in series across the load circuit 4 so that the coil 5 is energized in accordance with the voltage across the load circuit. It is evident that, due to the resistor 8 being connected in series between the supply and load circuits, the voltage across the load circuit varies with the impedance of load connected thereto. So long as there is an abnormal load connected to the load circuit, the voltage across it is not sufficient to cause the coil 5 to close the circuit breaker. When, however, the load decreases below a predetermined value, the voltage reaches a sufficient value to cause the coil 5 to reclose the circuit breaker 1 and thereby connect the supply and load circuits directly together.

In the modification of my invention shown in Fig. 2, the closing coil 5 of the circuit breaker 1 is connected to substantially the mid-point of the resistor 8, so that the reclosing system is operative to reclose the circuit breaker whenever either of the two circuits which the circuit breaker connects together is the supply circuit and the other is the load circuit. Also, a different means is shown for maintaining short circuit around the coil 5 for a predetermined length of time after the circuit breaker opens. In the modification, this result is obtained by providing the overload relay 7 with a dashpot 13 which is arranged to delay the opening of the relay contacts 12 for a certain length of time after the current through the relay coil has decreased below the drop out value.

The operation of the modification shown in Fig. 2 will be obvious to one skilled in the art from the above description of the operation of the system shown in Fig. 1.

While I have, in accordance with the patent statutes, shown and described my invention as applied to particular systems and as embodying various devices diagrammatically indicated, changes and modifications will be obvious to those skilled in the art, and I, therefore, aim in the appended claims to cover all such changes and modifications as fall within the true spirit and scope of my invention.

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

1. In an automatic reclosing circuit breaker system, a supply circuit, a load circuit, a circuit breaker for connecting said circuits together, an operating coil connected so as to be energized in accordance with the voltage across said load circuit and arranged to effect the closing of and to maintain said circuit breaker closed when the voltage impressed thereon is above a predetermined value, current limiting means arranged to be inserted in series between said circuits by the opening of said circuit breaker, overload responsive means for short circuiting said operating coil to effect the opening of said circuit breaker, and means for maintaining said coil short circuited for a predetermined length of time after the circuit breaker opens.

2. In an automatic reclosing circuit breaker system, a supply circuit, a load circuit, a circuit breaker for connecting said circuits together, a resistor, an operating coil for said circuit breaker connected in series with said resistor across said load circuit, current limiting means arranged to be inserted between said circuits when said circuit breaker is open, an overload relay responsive to the current flowing through said circuit breaker and arranged to complete a short circuit around said operating coil, and means responsive to the opening of said circuit breaker for completing a short circuit around said operating coil for a predetermined length of time.

3. In an automatic reclosing circuit breaker system, a supply circuit, a load circuit, a circuit breaker for connecting said circuits together, a resistor, an operating coil for said circuit breaker connected in series with said resistor across said load circuit, current limiting means arranged to be inserted between said circuits when said circuit breaker is open, an overload relay responsive to the current flowing through said circuit breaker and arranged to complete a short circuit around said operating coil, contacts on said circuit breaker arranged to effect the closing of a short circuit around said operating coil, and other contacts in said last mentioned short circuit arranged to be opened after said circuit breaker has been opened for a predetermined length of time.

In witness whereof, I have hereunto set my hand this 10th day of August, 1926.

ARVID E. ANDERSON.