

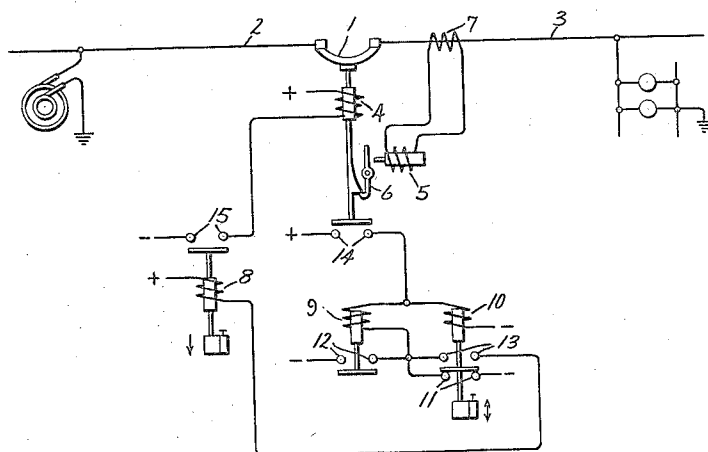
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AUTOMATIC RECLOSING CIRCUIT BREAKER SYSTEM

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AUTOMATIC RECLOSING CIRCUIT
BREAKER SYSTEMJohn H. Neher, Merion, Pa., assignor to General
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4 Claims. (Cl. 175—294)

My invention relates to automatic reclosing circuit breaker systems and its object is to provide an improved arrangement for effecting a single reclosure of a circuit breaker which is simple and inexpensive.

My invention will be better understood from the following description when taken in connection with the accompanying drawing which diagrammatically illustrates an automatic reclosing circuit breaker system embodying my invention, and its scope will be pointed out in the appended claims.

Referring to the drawing, 1 represents a circuit breaker which is arranged to connect a supply circuit 2 to a load circuit 3. The circuit breaker 1 may be of any suitable type, examples of which are well known in the art. As shown in the drawing, the circuit breaker 1 is of the well known latched-in type and includes a closing coil 4 which, when energized, closes the circuit breaker 1, and a trip coil 5 which, when energized, releases a latch 6 that holds the circuit breaker 1 in its closed position. As shown, the trip coil 5 is connected in series with the secondary winding of a current transformer 7, the primary winding of which is connected in series with the circuits 2 and 3 when the circuit breaker 1 is closed. The trip coil 5 is arranged to effect the opening of the circuit breaker 1 when the current through the circuit breaker exceeds a predetermined abnormal value.

The circuit of the closing coil 4 is controlled by means of an auxiliary relay 8 of the well known hesitating type so that the circuit of the closing coil 4 is maintained completed for a sufficient length of time to complete the closing operation of the circuit breaker.

In order to effect a single reclosure of the circuit breaker 1 when it is opened in response to the operation of the trip coil 5, I provide, in accordance with my invention, an instantaneous relay 9 and a time relay 10 which are so interlocked electrically that they can effect only one reclosure of the circuit breaker in case it opens immediately after the initial reclosure. This result is obtained by having the initial energizing circuit of the instantaneous relay 9 completed through the normally closed contacts 11 of the time relay 10 and having the circuit, which effects the closing of the circuit breaker, completed through the series-connected normally open contacts 12 of the instantaneous relay 9 and normally open contacts 13 of the time relay 10. The relay 10 is designed in any well known manner so that when the operating winding of

the relays 9 and 10 are simultaneously energized the relay 10 does not open its contacts 11 until after the relay 9 has closed its contacts 12 and has thereby completed a locking circuit for itself around the contacts 11 of the relay 10. Relay 10 is also arranged in any suitable manner so that it does not reclose its contacts 11 until after the operating winding of the relay 10 has been de-energized for a predetermined length of time. For initiating the operation of the relays 9 and 10 in response to the opening of the circuit breaker 1, I provide the auxiliary contacts 14 on the circuit breaker 1. These auxiliary contacts 14, which are closed when the circuit breaker 1 is opened, are connected in series in the energizing circuits for the operating windings of the relays 9 and 10.

The operation of the arrangement shown in the drawing is as follows: When the circuit breaker 1 is closed and the current through the circuit breaker exceeds a predetermined value, the trip coil 5 releases the latch 6 and effects the opening of the circuit breaker. The closing of the auxiliary contacts 14 on the circuit breaker 1 completes an energizing circuit for the operating winding of the time relay 10 and an energizing circuit for the operating winding of relay 9 through the normally closed contacts 11 of the time relay 10. Relay 9 immediately closes its contacts 12 and thereby completes a locking circuit for itself so that this relay does not become deenergized by the subsequent opening of the contacts 11 of the time relay 10. After a predetermined time interval, relay 10 opens its contacts 11 and closes its contacts 13, thereby completing a closing circuit for the relay 8 through the series connected contacts 12 and 13. By closing its contacts 15, relay 8 completes an energizing circuit for the closing coil 4 so as to effect the closing of the circuit breaker 1. By opening its auxiliary contacts 14, the circuit breaker 1 interrupts the energizing circuits for the relays 9 and 10. Relay 9 immediately opens its contacts 12 but relay 10 maintains its contacts 11 open for a predetermined time after its operating winding is deenergized. Therefore, if the circuit breaker 1 opens within a predetermined time after the initial reclosure thereof, the energizing circuit for the operating coil of relay 10 is reestablished to maintain the relay 10 in its energized position. The reopening of the circuit breaker 1 under these conditions, however, will not effect another reclosure thereof because the initial energizing circuit of the relay 9 is now open at the contacts 11 of the relay 10.

If, however, the circuit breaker 1 remains closed after the initial reclosure thereof, the relay 10 will, after a predetermined time interval, close its contacts 11. The system then is operative to effect another time delay reclosure in response to the next opening of the circuit breaker 1.

While I have, in accordance with the patent statutes, shown and described my invention as applied to a particular system 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 combination, an electric circuit, a circuit breaker in said circuit, means for opening said circuit breaker in response to a predetermined abnormal circuit condition, and means for effecting a single reclosure of said circuit breaker when it opens within a predetermined time after the first reclosure including an instantaneous relay having normally open contacts, a time relay having normally open contacts and normally closed contacts, a circuit for said instantaneous relay including said normally closed contacts of said time relay, means controlled by said circuit breaker for energizing said instantaneous relay circuit and said time relay in response to the initial opening of said circuit breaker, and a closing circuit for said circuit breaker, including said normally open contacts of both of said relays connected in series.

2. In combination, an electric circuit, a circuit breaker in said circuit, means for opening said circuit breaker in response to a predetermined abnormal circuit condition, and means for effecting a single reclosure of said circuit breaker when it opens within a predetermined time after the first reclosure including an instantaneous relay having normally open contacts, a time relay having normally open contacts and normally closed contacts, a circuit for said instantaneous relay including said normally

closed contacts of said time relay, a circuit for said timing relay, contacts in said relay circuits controlled by said circuit breaker so that they are closed when said circuit breaker is open, and a closing circuit for said circuit breaker including said normally open contacts of both of said relays connected in series.

3. In combination, an electric circuit, a circuit breaker in said circuit, means for opening said circuit breaker in response to a predetermined abnormal circuit condition, and means for effecting a single reclosure of said circuit breaker when it opens within a predetermined time after the first reclosure including an instantaneous relay having normally open contacts, a time relay having normally open contacts and normally closed contacts, a circuit for said instantaneous relay including said normally closed contacts of said time relay, a circuit for said timing relay, contacts in said relay circuits controlled by said circuit breaker so that they are closed when said circuit breaker is open, a locking circuit for said instantaneous relay including said normally open contacts of said instantaneous relay and said circuit breaker controlled contacts, and a closing circuit for said circuit breaker including said normally open contacts of both of said relays connected in series.

4. In combination, an electric circuit, a circuit breaker in said circuit, means for opening said circuit breaker in response to a predetermined abnormal circuit condition, and means for effecting a single reclosure of said circuit breaker when it opens within a predetermined time after the first reclosure including an instantaneous relay, a time relay having contacts which close a predetermined time after said time relay is deenergized, an energizing circuit for said instantaneous relay including said time relay contacts, means controlled by said circuit breaker for completing said energizing circuit for said instantaneous relay and an energizing circuit for said time relay in response to the opening of said circuit breaker, and means for completing a closing circuit including said normally open contacts of both of said relays connected in series for effecting the closing of said circuit breaker.

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