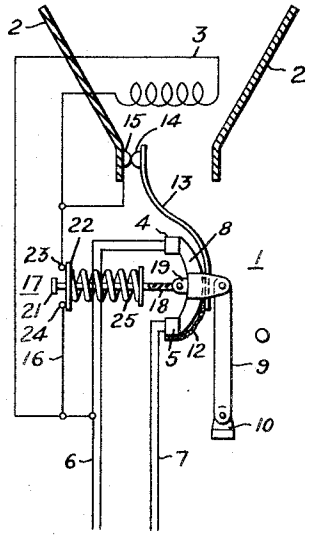
June 14, 1932. R. C. MASON 1,863,312

TRANSFER CONTACT

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UNITED STATES PATENT OFFICE

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TRANSFER CONTACT

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My invention relates to circuit interrupters and more particularly to blowout coils therefor.

One object of my invention is to provide a blowout magnet for an arc-quenching device that shall be short-circuited by a switch when the circuit interrupter is closed.

Another object of my invention is to provide a blowout coil of the above described type that shall be inserted in a circuit by the opening of a switch having a plurality of contact members.

Another object of my invention is to provide a switch of the multi-break type that shall be arranged to excite the blowout magnet of a circuit interrupter by inserting it in circuit in series with the auxiliary arcing contacts which shunt the main contacts of the circuit interrupter when the latter open.

A further object of my invention is to provide a switch for a magnet winding of the above-described character so arranged that the arc drawn at the switch contacts shall be quickly extinguished and which shall insert the magnet winding in the circuit between the time the main contacts separate and the time the auxiliary contacts separate during the sequence of operation of the circuit interrupter.

Heretofore, it had been the practice, in providing blowout coils for circuit interrupters, to construct the coils from heavy strap copper capable of continuously carrying the full rated current. The objection to this structure was the extreme bulk and the cost of the blowout structure.

In practicing my invention, I provide a winding for a blowout structure that may be of high resistance, in comparison with the coils heretofore employed for the same purpose. This coil is connected in circuit with the main line through the arcing contacts. My coil, however, being of high resistance, is unable to carry a continuous load except for a very short time and is, therefore, shunted by a circuit containing a switch so designed as to be capable of quickly breaking the circuit and transferring the full line current to the coil in a manner that will now be described in detail.

Referring to the drawing,

The single figure is a diagrammatic view of a circuit interrupter embodying my invention.

My invention comprises, in general, a circuit interrupter 1, having an arc-quenching structure 2, adjacent to which a winding 3 is located and employed to draw the arc upon opening of the circuit interrupter into the arc-quenching device 2, which may be of any suitable type known in the art.

The circuit interrupter 1 comprises stationary contact members 4 and 5 that are connected to the main conductors 6 and 7. The contact members 4 and 5 are bridged by a main current-carrying member 8 that is supported on an operating mechanism 9 pivoted to a stationary member 10. The main current-carrying member 8 is permanently connected to the contact member 5 by a flexible shunt 12 and supports in circuit a spring member 13 that carries a movable auxiliary contact member 14 upon its upper end. The auxiliary contact member 14 abuts against a stationary auxiliary member 15 when the circuit interrupter is in closed position and draws an arc therewith when the circuit interrupter 1 is opened. The winding 3 is shunted across the stationary auxiliary contact member 15 and main contact 4, and the passage of current therethrough, when the circuit interrupter 1 is closed, is prevented by a conductor 16, containing a switch 17, which shunts winding 3. Any current passing through the auxiliary contact members 14 and 15, when in closed position, will now traverse the conductor 16 and the switch 17 rather than pass through the coil 3.

The switch 17 is, therefore, employed to transfer the current from the conductor 16 to the winding 3 when the circuit interrupter is opening. This arrangement reduces the size of the switch 17, as the highest voltage to which it will be subjected is that developed by the winding 3. This voltage can be made as small as desirable and is always too small to cause the arc to be re-established between the contacts of the transfer switch 17 after the arc is extinguished.

The length of time the arc will persist be-

tween the contacts of the switch 17 will depend on the inductance of the coil. The minimum time must be of sufficient length for the energy developed in the arc to equal the energy stored in the magnetic field for the particular value of current flowing at the instant the transfer is complete. The actual time will be somewhat greater than this minimum because of the resistance of the winding 3.

The voltage effective for transferring current to the winding 3 will be the difference between the voltage developed by the arc and the IR drop in the winding. The resistance of a winding of practical design may be such that, on heavy currents, the IR drop may approach or equal the voltage of a single arc. For this reason, the switch 17 is of the multi-break type, so that the voltage applied by transfer current to the winding will be two or more times that of a single arc. The higher the transfer voltage, the shorter will be the time of transfer and the less the deterioration of the transfer contacts for a given amount of energy set up in the magnetic field.

The switch 17 is of the multi-break type and may be of any design so long as it functions in a manner similar to the one shown in the drawing. An insulating rod 18 is connected to the main current-carrying member 8 by a pin 19 and has an enlarged portion 21 on its outer end. A conducting bar 22 is loosely supported on the rod 18 and is biased against the contact members 23 and 24 by a spring 25. The sequence of operation of the switch 17 and the circuit interrupter will now be described.

Upon movement of the main current-carrying member 8 away from the contact terminals 4 and 5, the rod 18 attached thereto will be drawn outward and the enlarged portion 21 will be moved toward the conducting bar 22 that is still held against the contact members 23 and 24 by the spring 25. The length of travel of the rod 18 is adjusted so that, just at the instant the main current-carrying member 8 is separated from the contact members 4 and 5, the enlarged portion 21 comes into engagement with the contact bar 22 and moves it out of contact with the contact terminals 23 and 24.

The interruption of the conductor 16 should take place before the contact members 14 and 15 are separated. This is insured by the resiliency of the spring 13, which is stressed during the closing movement of the circuit interrupter and which maintains the contact member 14 in engagement with contact member 15 for some time after the main current-carrying member 8 starts its opening movement.

Upon the separation of the contacts of the transfer switch 17, a plurality of arcs will be established with the bridging member and, as noted above, will be sustained until the arc energy of the contacts 14 and 15 have equalled the energy stored in the magnetic field, after which the load current will be completely transferred to the winding 3. The arc at the contacts 14 and 15 will be drawn into the arc chute 2 by the flux produced by the winding 3 and will be quickly extinguished.

It will thus be seen that I have provided a magnetic winding for an arc-quenching device that is considerably more economical in cost and space than any heretofore employed. This winding is inserted in the circuit by a transfer contact when the circuit interrupter is opening. The winding is in series with the main arc, and the transfer contacts bridging the winding is only subject to the voltage drop across the winding when transferring the load currents. The transfer switch is of the multi-break type in order to increase the transfer voltage so that the time of transfer is decreased.

It is to be understood that such changes in the form, arrangement and connections of the component parts of my invention may be made as shall fall within the scope of the appended claims.

I claim as my invention:

1. The combination, in a circuit interrupter having arcing contacts associated with an arc-quenching means that employs a blow-out magnet to move the arc into the said means, of arcing means shunted across the winding of said magnet for by-passing the current therefrom while the circuit interrupter is closed and means actuated by the circuit interrupter to operate said arcing means to insert said winding in series with said arcing contacts before they are opened, said arcing means being connected in series with said arcing contacts.

2. The combination, in a circuit interrupter having arcing contacts associated with an arc-quenching means, of a blow-out magnet associated with the said means in circuit with said arcing contacts, arcing means shunting the winding of said blow-out magnet and means connecting said arcing means to the circuit interrupter for actuating the last said means before the auxiliary contacts separate upon the operation of the said circuit interrupter, said arcing means being connected in series with said arcing contacts.

3. In combination, a circuit interrupter having contact members associated with an arc-quenching chamber, a winding associated with said contact members, a contactor shunting said winding when the circuit interrupter is closed, and means actuated by the movement of said circuit interrupter for operating the contactor to connect the coil in series with said contact members before they separate, said contactor being connected in series with said contact members.

4. In a circuit interrupter, means between which an arc is formed, a magnetizing coil for acting on said arc, and a switch in shunt with said coil, said switch and coil being so connected that there is no voltage impressed across said switch after said circuit interrupter has opened the circuit.

In testimony whereof I have hereunto subscribed my name this 12th day of May, 1928.

RURIC C. MASON.