Aug. 30, 1932. E. R. CARICHOFF 1,875,217

CIRCUIT CONTROLLER

Original Filed Dec. 3, 1927

Fig. 1.

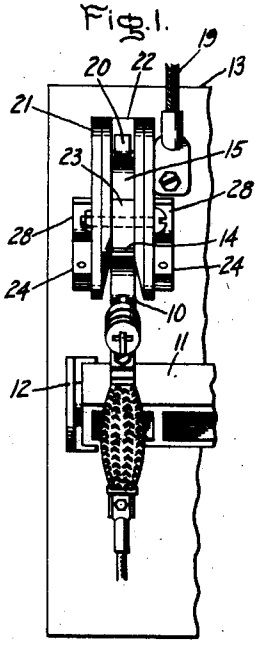
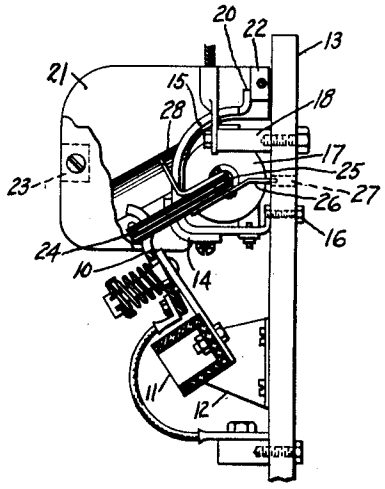


Fig. 2.



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Patented Aug. 30, 1932

1,875,217

UNITED STATES PATENT OFFICE

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CIRCUIT CONTROLLER

Original applications filed December 3, 1927, Serial No. 237,075, Patent No. 1,758,782, dated May 13, 1930, and October 17, 1928, Serial No. 313,118, Patent No. 1,833,736, dated November 24, 1931. Divided and this application filed January 7, 1930. Serial No. 419,179.

This application is a division of my prior application, Serial No. 313,118, filed October 17, 1928, and patented November 24, 1931, No. 1,833,736, which in turn is a division of my prior application, Serial No. 237,075, filed December 3, 1927, and patented May 13, 1930, No. 1,758,782.

The invention relates to circuit controlling devices, particularly multipole switches or contactors and has for its principal object the provision of an improved form of individual magnetic blow-out for each pole of such devices.

More specific objects of the present invention are to combine the arc horn, the arc chute and the magnetic blow-out with the switch contacts so as to increase the arc-interrupting capacities of the switch and at the same time render both manufacture and maintenance of the switch in service relatively simple and inexpensive.

The improvements of the present invention are particularly advantageous when embodied in a multiple pole alternating current contactor such as described and claimed in my above-mentioned copending applications. In such a device the provision of an arc horn associated with the contacts at each pole of the switch together with an effective individual magnetic blow-out for dissipating the arc at each arc horn is of prime importance particularly in motor control service. In order that the arc at each arc horn may be efficiently dissipated, it is desirable that the arc chute should be arranged so as substantially to enclose the switch contacts and confine the arc arising therefrom to the arc horn and at the same time be readily removable for inspection and repair of the contacts, as well as facilitate the wiring operations. With a multiple pole switch the desirability of a compact individual arc horn and magnetic blow-out construction for each pole such as will permit the several poles of the switch to be located as closely together as possible in order to conserve space and thereby reduce the size of the enclosing casing required, will be apparent.

The magnetic arc blow-out construction of the present invention provides the several advantageous features noted without appreciably increasing the cost of manufacture.

Briefly, in the preferred form of the invention, this is accomplished by providing each of the stationary contacts of the multiple circuit controlling switch with an arc horn curved in the shape substantially of the letter "C" with one end of the arc horn secured to the usual switch supporting base or panel and the other end free and provided with an upstanding projection. Within the space encompassed by the curved arc horn the winding for setting up the magnetic arc blow-out field is located and arranged to be directly supported from the arc horn closely adjacent the concave side thereof. To confine the arc to the arcing horn an arc chute formed of spaced apart walls of suitable arc resisting material has the edges of the walls complementary curved so as to fit snugly in engagement with the curved surface of the arc horn. The arc chute is provided with a cross-bar extending between its walls for removably engaging the upturned projection at the end of the arc horn so as to hold the arc chute in proper operating position for confining the arc arising from the contacts while permitting ready removal of the entire arc chute to facilitate wiring or inspection and repairs.

In the accompanying drawing, Fig. 1 is a front view of one pole of a circuit controlling switch provided with the magnetic arc blow-out arrangement of the first invention, and Fig. 2 is a side view of the switch with a portion of the arc chute broken away to reveal more clearly the details of construction.

The switch shown in Fig. 1 comprises the movable switch contact finger 10 resiliently mounted on the rotatable shaft 11 carried by the pivotal support 12 on the base 13. It will be understood that a suitable operating electromagnet such as described and claimed in my above-mentioned application ordinarily is provided for rotating the shaft 11.

As shown more clearly in Fig. 2 the stationary contact 14 which cooperates with the

movable contact 10 in closing and opening the circuit is removably mounted upon the C-shaped support 15 which serves as an arc horn and is secured at one end to the base 13 by the bolt 16. The arc horn 15 is electrically and mechanically connected to one end of the blow-out coil 17 to support the same within the space encompassed by the curved arc horn 15 and closely adacent thereto. The other end of the blow-out coil 17 is connected to the terminal stud 18 from which the line conductor 19 extends.

Thus the arc horn 15 is substantially of C-shape and is supported at one end with the other end free. The arc horn 15 is of sufficient width, as shown in Fig. 1, almost completely to surround the blow-out coil 17. The upper free end of the C-shaped arc horn 15 is provided with an upturned projection 20. The arc chute 21 is arranged to be removably secured in position to confine the arc arising from the switch contacts by means of the upturned finger 20 and the curved portion of the arc horn 15.

As shown in Fig. 1, the arc chute 21 is formed of spaced apart walls of arc resisting material. Suitable spacing lugs 22 and 23 are interposed between the walls forming the arc chutes and the bolts which hold the walls together pass through the lugs. The inner edges 24 of the arc chute walls are curved so that the arc chute fits snugly upon the curved portion of the arc horn 15 with the upturned projection 20 thereof in engagement with the lug 22 and extending between the side walls of the arc chute. Thus the arc chute 21 is firmly maintained in its proper position to receive any arc which may occur upon the separation of the contact 10 from the contact 14. Furthermore, the member 15 serves to support both the blow-out coil 17 and the arc chute 21, and also as an arc horn extending entirely along the curved edge of the arc chute.

The blow-out flux set up by the coil 17 is conducted into the region of the arc by means of the laminated magnetic pole pieces 24 which extend from the magnetic core 25 passing through the blow-out coil 17. As shown, in Fig. 1, the laminated pole pieces 24 extend along the outer sides of the arc chute 21 adjacent to and straddling the point of separation of the contacts 10 and 14. In order to maintain the pole pieces 24 in the proper operating position, the guide 26 is secured to the pole pieces and extends into a hole 27 provided in the base 13. The upturned portion 28 of the pole pieces is provided in order to obtain a wider distribution of the blow-out flux throughout the arcing region.

With the arc chute constructed as described it will be evident that the arc chute may be readily lifted out of engagement with the cuved arc horn 15 as indicated in Fig. 1, thereby exposing the contact finger 10 and the contact 14 for wiring, inspection and any necessary repairs.

The operation of the electromagnetic switch just described will be apparent. Upon rotation of the shaft 11 the switch contacts are either opened or closed depending upon the direction of rotation. The blow-out coils and arc chutes associated therewith insure the rapid disruption of any arcs that may occur upon the separation of the contacts.

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

1. An arc blow-out device including a curved arc horn, a blow-out coil connected with one end of the arc horn to be supported adjacent the concave side thereof, and an arc chute having complementary curved edges and provided with means interlocking with the other end of the arc horn for detachably supporting the complementary curved edges of the arc chute in engagement with the convex side of the arc horn to restrict the arc path.

2. An arc blow-out device including a substantially C-shaped arc horn having one end fixed and a projection at the other end, a blow-out coil having one terminal secured to said arc horn to be supported thereby in the space substantially enclosed by said C-shaped arc horn, an arc chute formed of opposing walls of arc-resisting material having curved edges adapted to fit against the C-shaped arc horn and provided with a spacer therebetween adapted to cooperate with said projection for detachably supporting the arc chute in hooked engagement with the arc horn.

3. In combination, a curved arc horn, an arc chute formed of spaced apart walls of arc-resisting material with complementary curved edges, and cooperating interlocking members on the arc horn and arc chute for detachably supporting the arc chute with the complementary curved edges of the walls thereof in engagement with the curved arc horn.

4. In combination, a substantially C-shaped arc horn having one end fixed and a projection at the other end, and an arc chute formed of opposing walls of arc-resisting material having curved edges adapted to fit against the C-shaped arc horn and provided with a spacer therebetween adapted to cooperate with said projection for detachably supporting the arc chute in hooked engagement with the arc horn.

5. An arc blowout device including a curved arc horn, a blowout coil connected with the arc horn to be supported thereby adjacent the concave side of the arc horn, a magnetic core for said coil having spaced apart lateral projections straddling the arc horn, an arc chute having walls spaced apart to fit between said projections and provided with curved edges formed to engage the convex side of the arc horn to restrict the arc path

thereon, and cooperating interlocking members on the arc horn and the arc chute for detachably supporting the arc chute in position on the arc horn.

6. In combination, a substantially C-shaped arc horn having one end fixed and a projection at the other end, a switch contact member removably secured to said arc horn, a cooperating contact mounted for movement into and out of engagement with said first contact, a blow-out coil connected with said arc horn and mounted in the space encompassed by the said arc horn and adjacent one side thereof, a magnetic core extending through said blow-out coil, magnetic pole pieces extending from each end of said core in opposing spaced relation adjacent said switch contacts, an arc chute formed of separated walls of arc resistant material having curved edges adapted to fit against the C-shaped arc horn in the space between said pole pieces and said contacts and a spacer extending between said walls adapted to cooperate with the said projection at the end of said arc horn for detachably supporting the arc chute in position.

In witness whereof I have hereunto set my hand this 6th day of January 1930.

EUGENE R. CARICHOFF.