March 18, 1930. R. E. HELLMUND 1,751,205

ELECTROMAGNETIC BLOW-OUT DEVICE

Filed Sept. 2, 1922

Fig. 1.

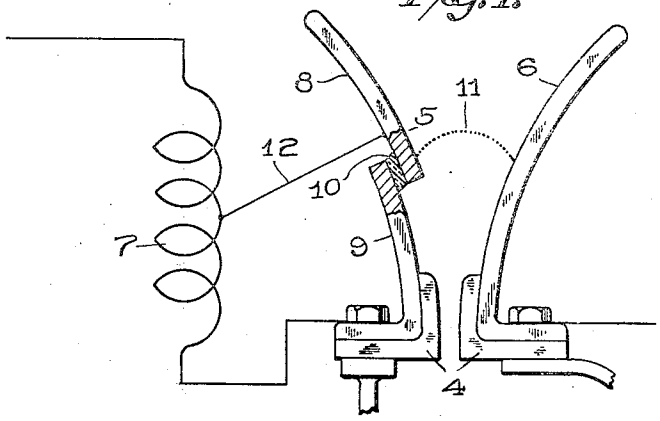


Fig. 2.

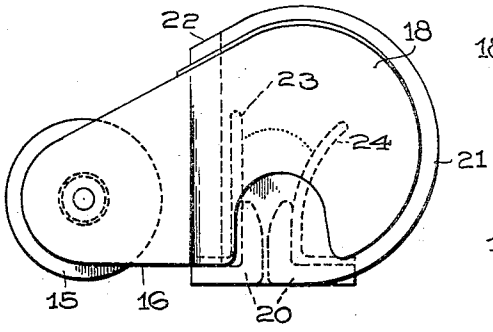
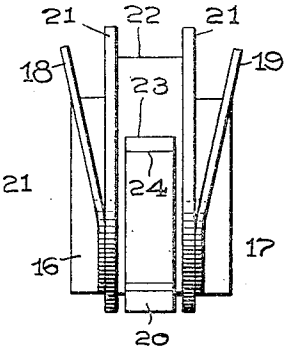


Fig. 3.



WITNESSES:

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UNITED STATES PATENT OFFICE

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ELECTROMAGNETIC BLOW-OUT DEVICE

Application filed September 2, 1922. Serial No. 585,957.

My invention relates to electromagnetic blowout devices for electric switches, and particularly to a method and means for controlling the duration of an arc stream.

My invention has for its object the provision of a method for varying the blowout force exerted upon an arc at different stages of its movement away from the switch terminals and the provision of means for effecting such variation.

Another object of my invention resides in the provision of means for preventing an abrupt interruption of an electric circuit.

The arc blowout devices which are employed in connection with electric switches that control electrical apparatus sometimes extinguish the arcs so quickly that very serious injury to the apparatus sometimes results through a too sudden interruption of the circuit. That is, the arcs are extinguished before sufficient time has elapsed to permit dissipation of the stored energy in the apparatus, thus inducing high voltages and straining the insulation beyond its capacity.

Tests have shown that the current, when being interrupted by the extinguishing of an arc, dies out, first rather slowly and, owing to the magnetic blowout devices necessarily employed in many cases, tends to decrease rather quickly toward the end. It is desirable to provide means for preventing a too rapid dying out of the arc and, although the effective blowout force of an arc-extinguishing device decreases to some extent as the arc moves away from the switch terminals, the rate of decrease is not usually as rapid as may be desirable, owing to the damping effect of the pole pieces of the magnetic circuit. I have provided a means for definitely controlling the duration of the arc stream.

As shown in the accompanying drawing, Figure 1 is a diagrammatic view showing one manner in which my invention may be employed, and

Figs. 2 and 3 are side elevational and front elevational views, respectively, of another embodiment of my invention.

A pair of relatively movable switch members 4, are provided with arc horns 5 and 6, the horn 6 functioning somewhat after the manner usual in devices of this character.

A magnetic blowout coil 7, which is shown in series with the circuit, is provided for blowing arcs upwardly along the horns 5 and 6. The horn 5 is formed in two sections, 8 and 9, that are insulated from one another at 10. When an arc is formed across the terminals 4, it moves upwardly along the horn 6 and the horn member 9, under the influence of the magnetic field generated by the blowout coil 7. When the arc stream reaches the point 11, a shunt circuit is formed across the horn section 8 and a conductor 12, thus short circuiting a portion of the coil 7, and reducing the magnetic flux applied to the arc.

By means of this arrangement, the blowout force exerted upon the arc stream, as it approaches the upper ends of the horns 5 and 6, is reduced and the arc is not extinguished as quickly as it would be if a portion of the blowout coil 7 were not short circuited.

In the form of device shown in Figs. 2 and 3, a blowout coil 15 is mounted between pole pieces 16 and 17 that are flared at their outer portions 18 and 19, respectively, as indicated more clearly in Fig. 3.

A pair of relatively movable contact members 20 are mounted between insulating barriers 21 and a barrier 22 is provided for protecting the coil 15. Arc horns 23 and 24 serve to receive the arcs that are formed across the contact members 20.

When arcs are formed across the switch members 20, the blowout coil 15 functions to cause upward movement thereof, under the influence of magnetic lines of force that pass across the space between the pole pieces 18 and 19.

The density of the magnetic lines of force decreases toward the upper ends of the pole pieces 18 and 19, owing to the increasing gap between such pole pieces. This decrease in magnetic force reduces the effectiveness of the coil 17 and, consequently will cause an arc to be maintained for a longer period of time than would be the case if the pole pieces 18 and 19 were in parallelism. In construc-

tions wherein the pole pieces are parallel, the density of the magnetic lines of force does not vary greatly at different points between their respective surfaces.

The invention is applicable to switches that are employed in connection with either alternating or direct circuits, and other means than those shown may be employed for insuring against the too rapid interruption of a circuit. For instance, in those devices wherein an air current is used to move the arc away from switch terminals, a strong air current may be directed against the arc stream at its point of formation and a weaker air current directed thereagainst at a point remote from the place of formation.

Various changes in detail and general arrangement may be made without departing from the spirit and scope of the invention as defined in the accompanying claims.

I claim as my invention:

1. The combination with a pair of relatively movable contact members, of an arc horn secured to each of the said contact members, one of the arc horns being made in upper and lower sections, a blowout coil, and a connection between an intermediate turn of said coil and the said upper section whereby a portion of the coil is short circuited when one of the arc terminals reaches the said upper section.

2. The combination with a pair of relatively movable contact members having arc horns and a blow-out coil cooperating therewith for causing the arc to move toward the extremities of the horns, of means for automatically shunting a portion of the coil as the arc moves toward the extremities of the horns for reducing its effect on the arc as the latter moves away from the contact members.

3. The combination with a pair of relatively movable contact members having arc horns, blowout means cooperating therewith for causing the arc to move towards the extremities of the horns, and means for automatically shunting a portion of the blowout means as the arc progresses along the horns for reducing its effect on the arc.

In testimony whereof, I have hereunto subscribed my name this 30th day of August, 1922.

RUDOLF E. HELLMUND.