No. 736,913. PATENTED AUG. 18, 1903.

F. E. CASE.

METHOD OF DISRUPTING ARCS.

APPLICATION FILED JAN. 19, 1903.

NO MODEL.

Fig. 1.

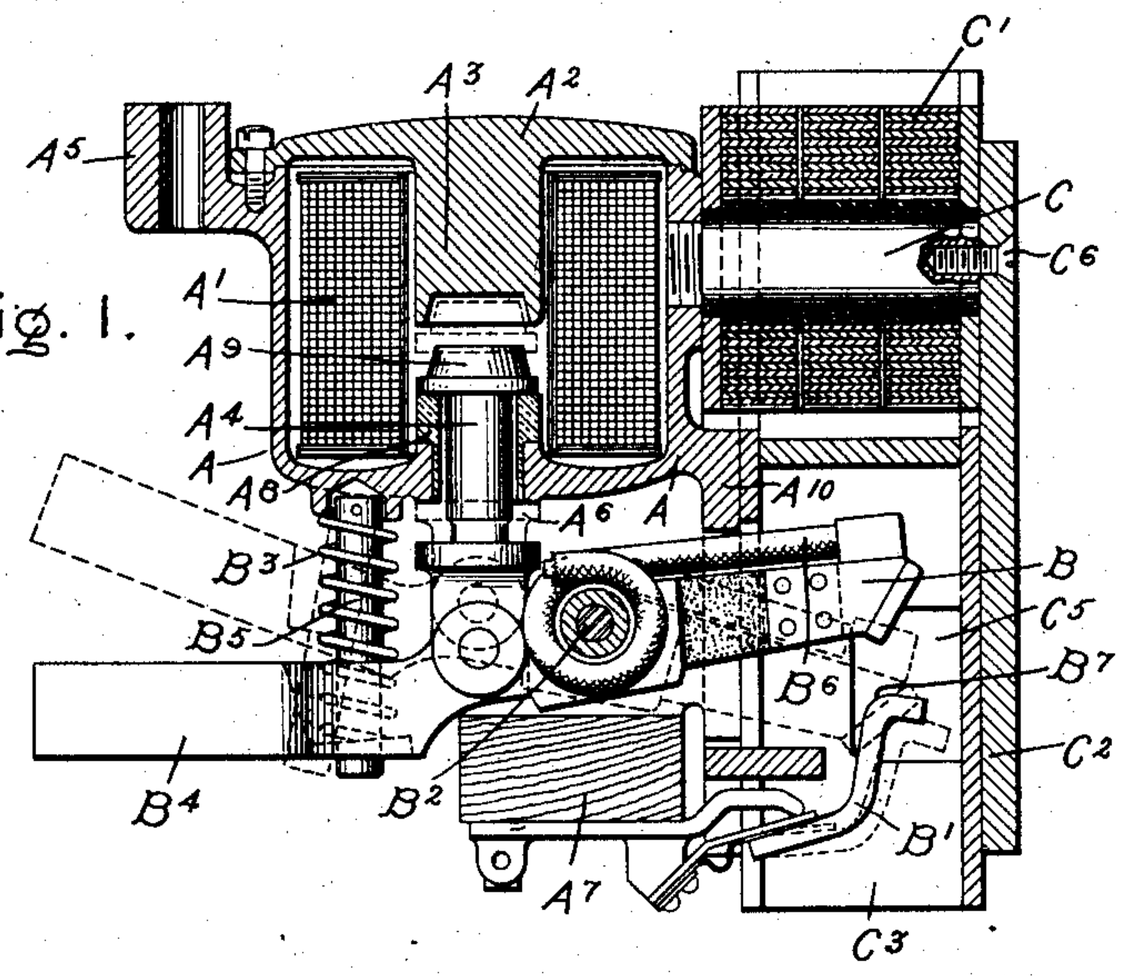


Fig. 2.

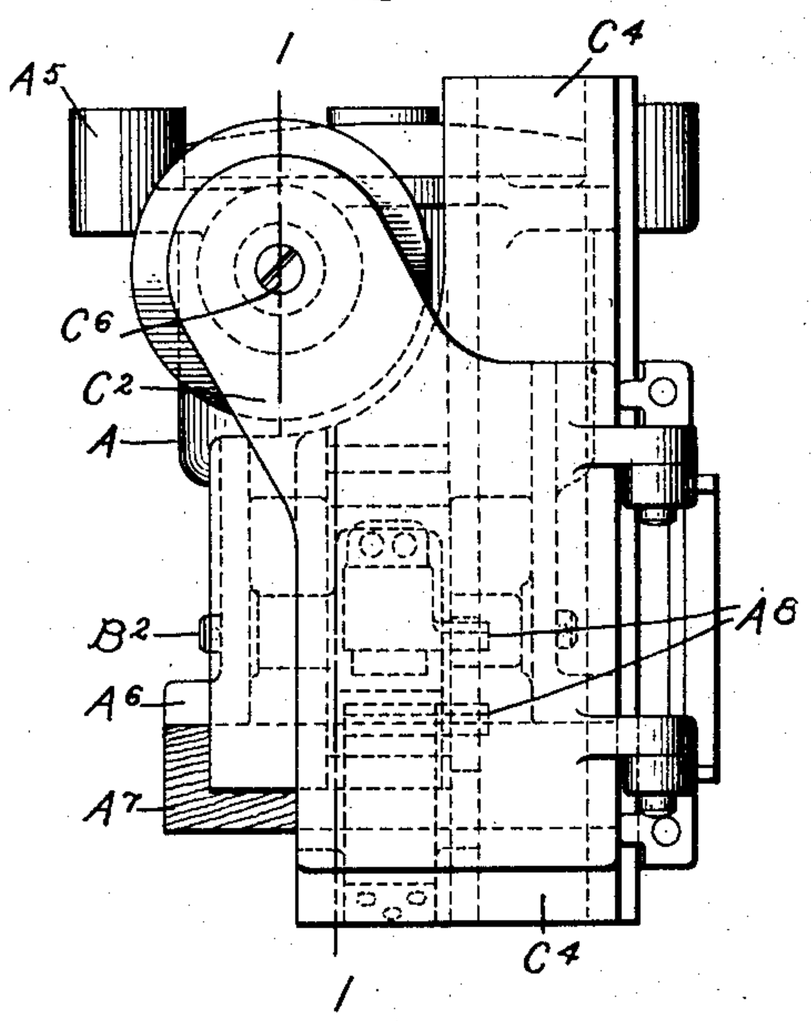
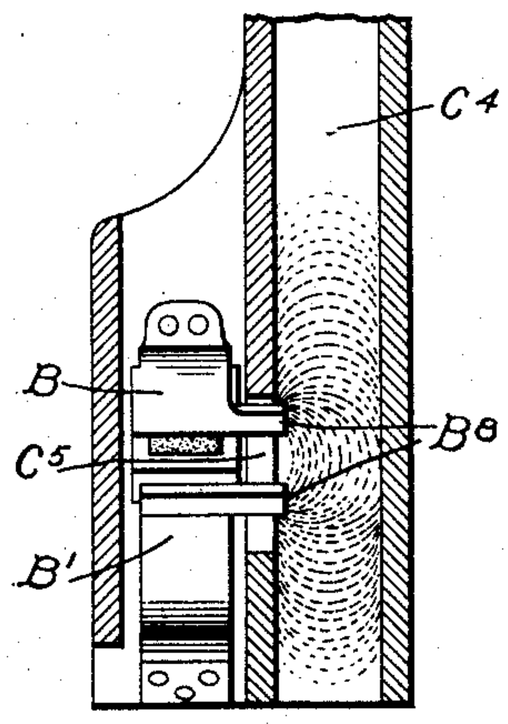


Fig. 3.



Witnesses.
George H. Fielden
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No. 736,913. Patented August 18, 1903.

UNITED STATES PATENT OFFICE.

FRANK E. CASE, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

METHOD OF DISRUPTING ARCS.

SPECIFICATION forming part of Letters Patent No. 736,913, dated August 18, 1903.

Original application filed February 28, 1898, Serial No. 671,994. Divided and this application filed January 19, 1903. Serial No. 139,518. (No model.)

To all whom it may concern:

Be it known that I, FRANK E. CASE, a citizen of the United States, residing at Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in Methods of Disrupting Arcs, of which the following is a specification.

My invention relates to an improved method of disrupting an electric arc formed between the contacts of a switch.

The object of my invention is to disrupt the arc with greater rapidity and more efficiently than has been the case heretofore.

The herein-described method may be used in various forms of switches, but is especially applicable to the separately-actuated contactors of the motor-controllers in the train-control system shown and described in my application, Serial No. 671,994, filed February 28, 1898, of which this application is a division. It must be understood, however, that my improved method of disrupting an arc is not limited in its use to the specific device shown and described in said application.

One form of apparatus for carrying out my improved method of disrupting arcs is applied to the electromagnetically-actuated switch employed in the system above referred to and shown in the accompanying drawings, of which—

Figure 1 represents a sectional view of an electromagnetically-actuated switch or contactor, taken on the line 1 1 of Fig. 2. Fig. 2 is an end elevation of said electromagnetically-actuated switch or contactor; and Fig. 3 is a sectional view of the switch-contacts, showing their position relative to the arc-disrupting or blow-out chute.

Referring now to the figures of the drawings, A represents a cup-shaped casting arranged to form a part of the magnetic circuits and within which is mounted an energizing-coil A′. Secured to the top of the casting A is a cover A^2, provided with a downwardly-extending core A, slightly hollowed out at its lower end to receive the upper end of the movable core A^4. On the side of the casting A are lugs A^5, by means of which the contactors or switches as a whole are secured to a suitable support. Extending downwardly from the casting are lugs A^6, which support pivots B^2 of the switch-blade B, at the same time forming a part of the magnetic circuit of the blow-out. Connecting the lower ends of the lugs A^6 is a piece of wood or other insulating material A^7, forming a support for the stationary contact B′. The movable core A^4 is pivotally secured at its lower end to the switch-arm B and under normal conditions—that is, when no current is flowing in the energizing-coil A′—is held in the position shown by a compression-spring B^3 and by the weighted arm B^4. The spring B^3 surrounds a pivoted pin B^5, which acts as a guide for the switch-arm and at the same time retains the spring in place. The movable core A^4 is surrounded by a non-magnetic bushing A^8 and surmounted by a sheet-metal cap A^9 to prevent it from sticking to the casting and stationary core A^3. The outer and inner ends of the switch-blade are insulated from each other, as indicated in the drawings, and connection is established between the outer end of the switch-blade and the motor-circuit by means of a flexible cable B^6, which is wrapped around the pin B^2 to further increase the flexibility of the connection.

The fixed contact B′ consists of a spring-supported piece of metal provided at its outer end with a rounded portion B^7, with which the switch-blade makes contact. The switch-blade and fixed contact are provided with arcing points or projections B^8. The arrangement of the terminal mounted on the switch-blade and the terminal constituting the fixed contact is a particularly desirable one, for it permits a wiping connection between the parts as they are moved into the position shown by the dotted lines in Fig. 1, yet when the parts are free to return to their normal position there is no friction between them tending to retain them in the closed position. On the contrary, there is a decided effort exerted by the fixed contact tending to force the switch-blade back into the position shown in full lines. When the circuit is first closed between the switch-arm B and the contact B′, the projections B^8 are in contact, but as the switch-blade moves to its final closed position, as shown in dotted lines in Fig. 1, the

projections B^8 move away from each other. These projections B^8 being the first to close the circuit are the last to break it. Consequently all the arcing takes place at this point, and the remainder of the parts are left bright and clean.

Screw-threaded to the casting A is a blow-out magnet-core C, and surrounding the core is a winding C′, consisting of a number of turns of flat metal ribbon which is connected to the cable B^6 in any suitable manner. The downwardly-extending lugs A^6 are connected by a web A^{10}, having a central opening, through which extends the switch-blade. This web, in connection with the lugs A^6, forms one pole-piece for the blow-out magnet, and the plate C^2 forms the other pole-piece. The plate C^2 is hinged on its right-hand side to enable it to be swung outward when it is desired to inspect the contacts and is retained in position by a screw C^6, which enters the core C. Situated between the metal parts of the blow-out magnet and the switch-blade are insulating-walls which form an open-bottomed chamber C^3. Extending parallel to this chamber, in a vertical direction, is a rectangular open-ended chute C^4, made of insulating material. The chamber and chute are connected by a rectangular opening C^5, through which project the arcing extensions B^8 of the switch-blade and fixed contact.

By winding coil C′ in the proper direction the arc may be made to travel toward the extensions B^8 and into the open-ended chute C^4, since an arc when in a magnetic field tends to travel at right angles to the lines of force. This action causes the arc to be stretched, as shown in dotted lines in Fig. 3, and as the arc is blown farther away from the contacts by the action of the magnet it strikes against the side wall of the chute C^4, and as the progress of the arc in this direction is limited by the wall of the chute, the arc still being within the influence of the magnetic field, it is expanded in flattened loops until disrupted. By this arrangement it will be seen that the arc is first blown to the right for a certain distance, and then, by reason of the restriction afforded by the walls of the chute, the arc is blown in two directions from a central point and parallel to the direction of movement of the moving switch-blade or contact B.

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

1. The method of disrupting an arc formed between two contacts, which consists in subjecting the arc to a magnetic field and causing it to move in a direction at right angles to the plane of movement of the contacts, and finally stretching the arc in a direction parallel to the movement of the contacts.

2. The method of disrupting an arc formed between moving contacts, which consists in subjecting the arc to a magnetic field and causing it to move in an angular direction along the surface of the contacts, and finally stretching the arc while in the same magnetic field in a direction parallel to the direction of movement of the contacts.

3. The method of disrupting the arc formed on opening an electric circuit, which consists in elongating the arc to a length greater than the distance between terminals in a direction substantially parallel to the direction in which the arc first tends to form.

4. The method of disrupting an arc formed between two contacts, which consists in subjecting the arc to a magnetic field and causing it to move in a direction substantially at right angles to the plane of movement of the contacts, and limiting its movement in said direction while permitting it to expand in a direction parallel to the direction of movement of the contacts.

In witness whereof I have hereunto set my hand this 14th day of January, 1903.

FRANK E. CASE.

Witnesses:
G. C. HOLLISTER,
HELEN ORFORD.