

(No Model.)

C. H. RICHARDSON.

CIRCUIT BREAKING DEVICE FOR RECIPROCATING ELECTRIC MACHINES.

No. 508,050.

Patented Nov. 7, 1893.

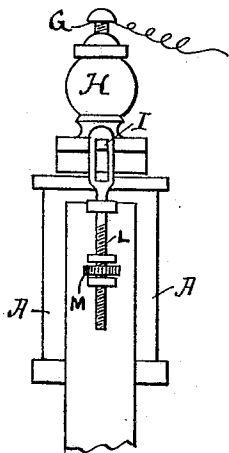


FIG. 2.

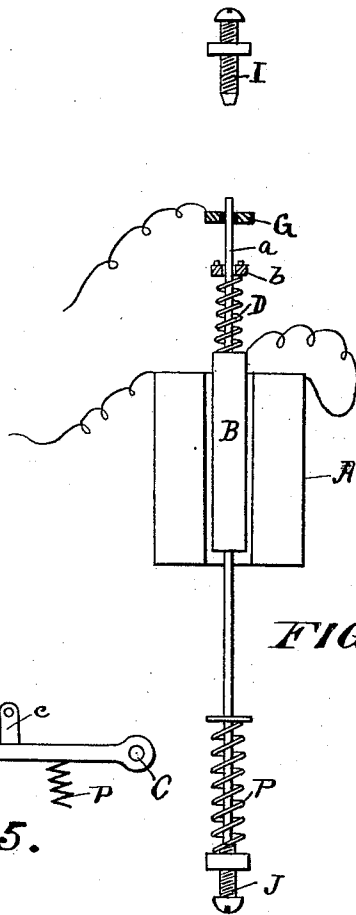


FIG. 4.

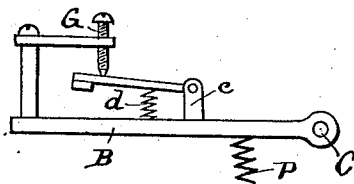


FIG. 5.

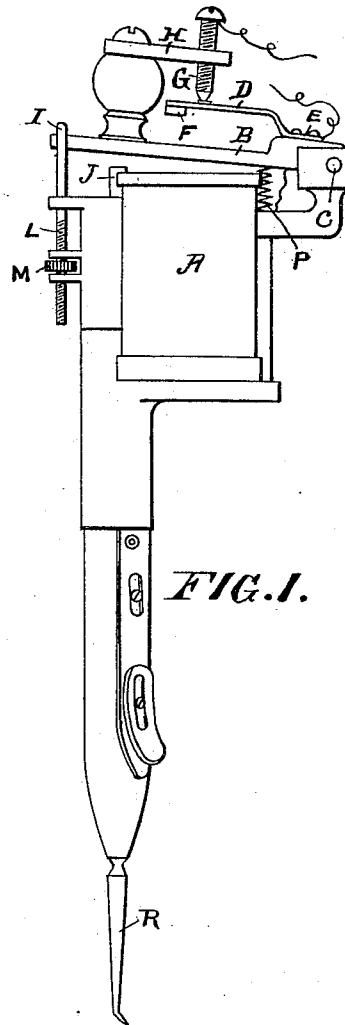


FIG. 1.

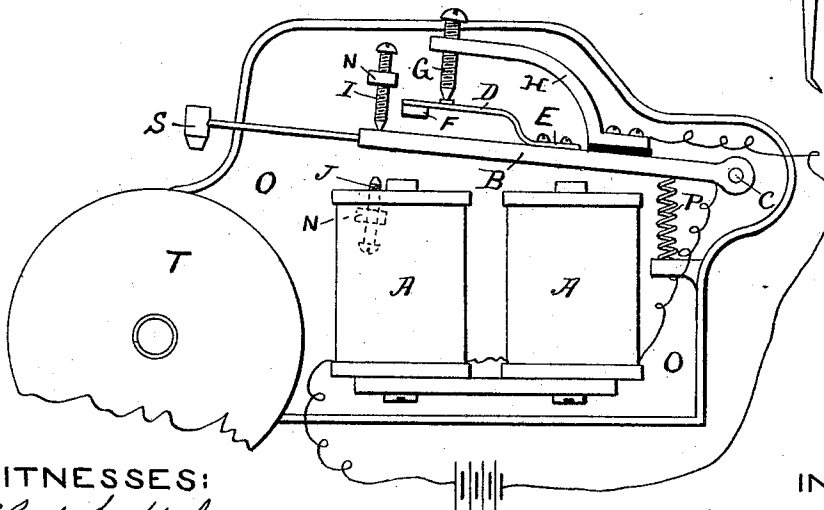


FIG. 3.

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CIRCUIT-BREAKING DEVICE FOR RECIPROCATING ELECTRIC MACHINES.

SPECIFICATION forming part of Letters Patent No. 508,050, dated November 7, 1893.

Application filed July 2, 1892. Serial No. 438,749. (No model.)

To all whom it may concern:

Be it known that I, CHARLES H. RICHARDSON, a citizen of the United States, and a resident of the city and county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Circuit-Breaking Devices for Reciprocating Electrical Machines, of which the following is a specification.

My invention relates to improvements in circuit breaking devices for reciprocating electro-magnetic machines and the object of my invention is to furnish an adjustable circuit breaking device, by means of which the stroke of the armature of an electro-magnetic machine, for instance of an electric dental plugging instrument, or an electric bell, may be varied at will, the extreme length of stroke being limited only by the strength or attractive force of the electro magnets.

In my circuit breaker both contact points are carried by the reciprocating part of the electric machine, which is generally the armature, one of these contact points being preferably a screw which is insulated from the armature and which can be moved in or out for purposes of adjustment, and the other contact consists of a spring or lever, one end of which is secured to the armature and the other end of which is free and is weighted, as hereinafter described. In connection with the armature are adjustable stops which limit its movement in either direction; the armature is also furnished with the usual devices, generally springs, for lifting it from the electro magnets when the circuit is broken.

In the accompanying drawings forming part of this specification, and in which similar letters of reference indicate similar parts throughout the several views—Figure 1, is a side elevation of an electric dental plugging instrument fitted with my improved circuit breaker; Fig. 2, an end elevation of the upper part of the same; Fig. 3, a side elevation of an electric bell furnished with my invention; Fig. 4, my invention as applied to a solenoid magnet, and Fig. 5, a side view of an armature, showing the lower contact point arranged as a lever.

A. are the electro magnets, B. the armature pivoted at C.

D. is a spring or lever, one end of which is

secured to armature B. at E. and the other end of which is free and carries a weight F.

G. is the upper contact point, consisting preferably of a screw and which is carried by an insulated bracket H. carried by the armature B.

I. J. are stops for limiting the movement of the armature B. In Figs. 1 and 2, the upper stop I. consists of an adjustable threaded bar L., moved either up or down as may be desired by means of a stationary nut M., while the lower stop J. consists of the head of the anvil of the plugging instrument. In Fig. 3, both upper and lower stops I. J. consist of screws carried by brackets N. carried by the frame O. of the device.

One wire from the battery or other source of electric supply is connected to the contact point G.; the other wire to the electro magnets A. and from these magnets to the spring or lever D.

The operation of the device is as follows: The screw G. and spring D. being in contact the circuit is closed, the magnets A. are energized and attract the armature B. rapidly until it is suddenly arrested in its movement by coming in contact with the stop J.; when this happens the momentum acquired by the spring or lever D. causes the weighted or free end of this spring or lever to fly downward or away from the upper contact point G. breaking the current and demagnetizing the magnets A. The spring P. immediately raises the armature from the magnets A. and before the spring D. again makes contact with the upper contact point G. the armature has reached its highest point, as determined by the upper stop I. It will be observed that during the downward movement of the armature B. the contact point G. and the spring D. are in contact until the armature has reached the end of its stroke, as determined by the lower stop J., and during all this time the magnets are energized and attracting the armature, the circuit not being broken until the jar caused by the armature striking the lower stop moves the spring D. out of contact with contact point G. This feature is particularly desirable in connection with the break apparatus of Ruhmkorff coils and other induction apparatus, as it allows the core to be fully magnetized before the circuit is broken.

As the contact points are both carried by and move with the armature it will be seen that the stroke of the armature is only limited by the power of the magnets and that the current will always have time to fully energize them before being broken, and it will be further seen that by means of the stops I. J. the stroke of the armature may be adjusted as desired, a feature which is very important in many cases and particularly so in dental pluggers, where sometimes a heavy blow is required and at others a light one. By varying the stroke of the armature a blow of any force within the power of the magnets may be imparted to the plugging tool R.—Fig. 1.

In Fig. 3, S. is a hammer carried by or at the end of the armature and T. a gong.

In Fig. 4, my circuit breaker is shown as applied to a solenoid magnet. A. is the spool of the magnet, B. the core, D. a light spring carried by the core, and G. a contact point carried by a rod *a* projecting outward from the core and insulated from this rod. I. is the upper stop, J. the lower stop limiting the movements of the core, P. a spring for raising core when current is broken, and *b*. a contact point carried by upper end of spring D. One wire from source of electrical supply passes to spool A. and thence to spring D. The other wire is connected to upper contact piece G. The normal position of the contact points G. *b*. is together, but when the core B. is drawn into the spool A. and is suddenly arrested in its movement by the lower stop J. the jar causes the contact piece *b*., carried by spring D., to be moved away from contact G., breaking the circuit, when the spring P, asserts itself and raises the core to its highest position, when the recoil of spring D. again throws contact *b*. against contact G. re-establishing the circuit when the core is again drawn into the spool. With this form of brake apparatus the full stroke of the core of a so-

lenoid may be obtained, which is impossible with the ordinary brake piece.

In Fig. 5 the movable contact piece is shown as a lever supported upon a standard *c* carried by the armature B. A light spring *d*, bearing against the armature and the contact piece raises this latter into contact with the fixed contact G after the movable contact piece has lost its momentum.

Having thus described my invention, I claim—

1. The herein described circuit breaker for reciprocating electro magnetic devices, consisting of a rigid and a movable contact piece, carried by the reciprocating part of the mechanism and operating to break the electric circuit on the completion of the attractive stroke and make it on the completion of the release stroke by the movement due to the momentum of the movable contact, substantially as described.

2. The combination in a circuit breaker of an electro magnet or magnets, an armature, devices for raising said armature from said magnet when current is broken, a movable and a rigid contact point carried by said armature and one or both of which are insulated from said armature, an adjustable stop for limiting the upward movement of said armature and a fixed or movable stop for limiting its downward movement.

3. The combination in a circuit breaker of a magnet and an armature, a rigid contact point carried by and insulated from said armature, a movable contact point carried by said armature, and the free or contact end of which is weighted, and a movable stop, by means of which the stroke of said armature may be adjusted.

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