No. 616,405. Patented Dec. 20, 1898.

C. M. CLARK.

AUTOMATIC MAGNETIC CIRCUIT BREAKER.

(Application filed May 27, 1898.)

(No Model.)

FIG. 2.

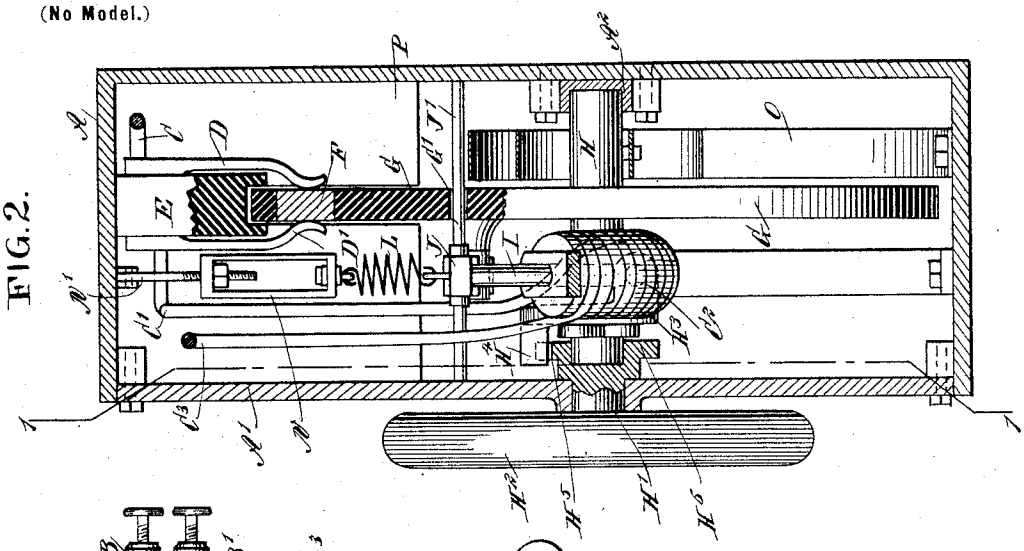
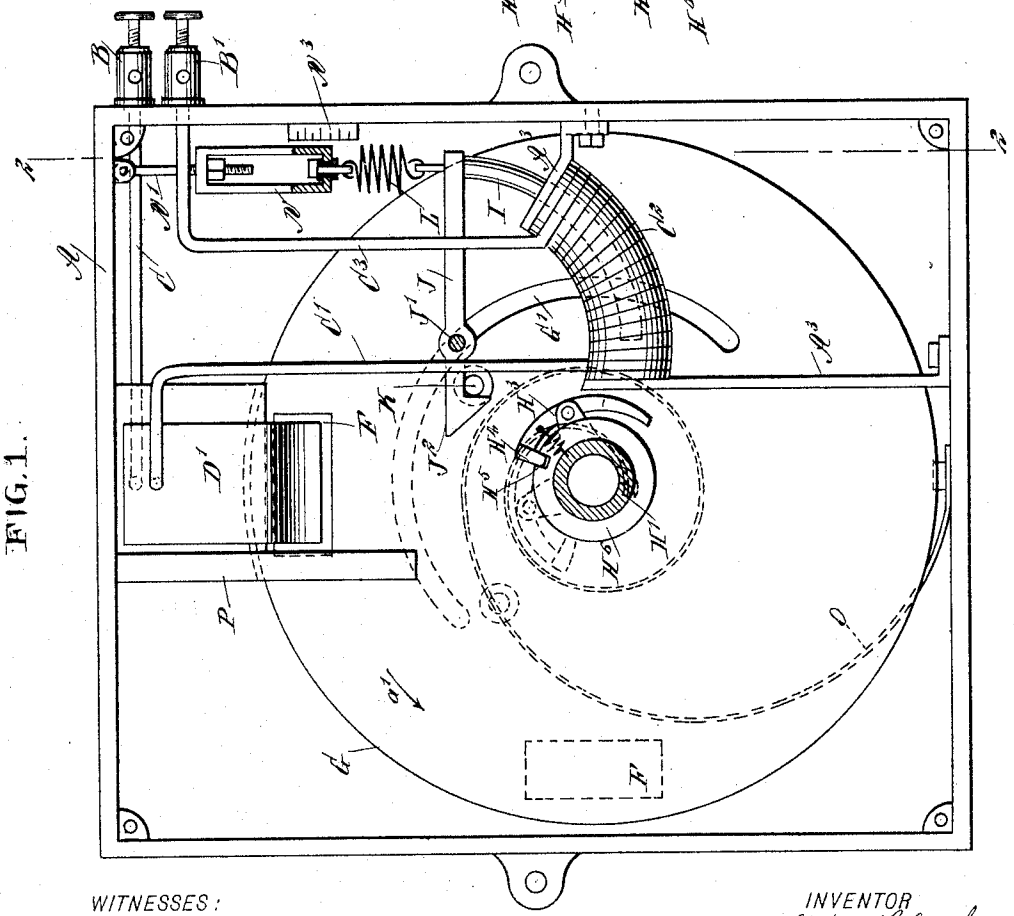


FIG. 1.



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AUTOMATIC MAGNETIC CIRCUIT-BREAKER.

SPECIFICATION forming part of Letters Patent No. 616,405, dated December 20, 1898.

Application filed May 27, 1898. Serial No. 681,884. (No model.)

To all whom it may concern:

Be it known that I, CHARLES M. CLARK, of the city of New York, borough of Brooklyn, in the county of Kings and State of New York, have invented a new and Improved Automatic Magnetic Circuit-Breaker, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved automatic magnetic circuit-breaker which is simple and durable in construction and designed for use on single, two-wire, or multiple circuits, is very sensitive in operation, and is arranged to be set for automatically breaking a circuit in case of an overload, underload, or a combination of both.

The invention consists of novel features and parts and combinations of the same, as will be fully described hereinafter and then pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in both the figures.

Figure 1 is a sectional front elevation of the improvement on the line 1 1 in Fig. 2, and Fig. 2 is a transverse section of the same on the line 2 2 in Fig. 1.

The improved magnetic circuit-breaker is mounted in a casing A, having a cover A′ for hermetically sealing the said casing, so that the apparatus can be located at any desired place without danger of disturbing the workings of the apparatus.

On the casing A are arranged the binding-posts B B′, connected with the ends of the wire forming a circuit, the binding-post B being connected by a wire C with a brush D, secured to a block of insulating material E and secured inside of the casing A. The free end of the brush D is in contact with one side of a metallic block F, secured in the web of a disk G, made of vulcanite or other suitable insulating material and secured on a shaft H, mounted to turn at one end in a bearing A^2, secured to the back of the casing A, the other end of the shaft being coupled to a shaft H′, mounted to turn in bearings formed in the cover A′, as indicated in Fig. 2. A hand-wheel H^2 is secured to the outer end of the shaft H′ for resetting the machine by the operator, as hereinafter more fully described. The coupling between the shafts H and H′ consists of a spring-pressed pawl H^3, fulcrumed on the shaft H and formed with a lug H^4, normally engaging a notch H^5 in the periphery of a collar H^6, secured to the shaft H′. The other face of the block F is normally in contact with the free end of a brush D′, likewise secured to the block E and connected with a wire C′, formed into a solenoid-coil C^2, terminating at its end in a wire C^3, leading to the other binding-post B′. Thus when the several parts are in the position illustrated in the drawings—that is, with the free ends of the brushes D D′ in contact with the block F—then the circuit is closed, and when the disk G is turned and the free ends of the brushes move out of engagement with the block F and in contact with the faces of the disk then the circuit is broken.

In the solenoid-coil C^2 extends a soft-iron core I, secured on one end of a lever J, fulcrumed on a pin J′, held in the casing A, the outer end of the lever being formed into a hook J^2 for engaging a pin K, carried by the disk G. A spring L is connected with the free end of the lever J opposite the core I, so as to hold the hook J^2 normally in engagement with the pin K to lock the disk G in place, and the said spring L is attached to a yoke N, held adjustably on a screw-rod N′, carried by the casing A. A gage N^3 is arranged alongside the yoke N to indicate the tension to which the spring L has been adjusted by the yoke N on the screw-rod N′. Thus by adjusting the yoke N on the screw-rod more or less tension can be given to the spring L to set the device to the desired strength of current at which the circuit would be broken.

A helical spring O is fastened with its inner end to the shaft H and with its outer end to the inside of the casing A, so that when the hook J^2 disengages the pin K then said spring imparts a rotary motion to the disk G in the direction of the arrow *a′* to move the block F out of engagement with the brushes D D′ and break the circuit. A blow-out consisting of a fiber or insulating plate P, secured to the inside of the casing, straddles the disk G adjacent to the brushes D D′, so that when the disk is rotated for breaking the circuit then

the spark produced by the block F, leaving the free ends of the brushes, is readily extinguished or absorbed by the blow-out P. The coil C^2 is preferably supported by brackets A^3, attached to the casing.

The operation is as follows: As long as the current is normal the several parts remain in the position described, the circuit passing from the binding-post B by the wire C, through the brush D, the block F, the brush D′, the wire C′, the coil C^2, and by the wire C^3 to the binding-post B′. When an excessive current passes through the circuit, as described, then the coil C^2 acts as a magnet and attracts the soft-wire core I, so that a swinging motion is imparted to the lever J against the tension of the spring L, and the hook J^2 swings out of engagement with the pin K. As soon as this takes place the helical spring O imparts a rotary motion to the disk G in the direction of the arrow a', so that the block F in moving with the disk moves out of engagement with the brushes D D′, and consequently the circuit is broken.

In order to limit the turning motion of the disk G, I provide the latter with a segmental slot G′, through which passes the pin J′, forming the fulcrum for the lever J.

When it is desired to reset the apparatus after the current has been reduced, the operator turns the hand-wheel H^2 in the inverse direction of the arrow a' until the pin K again snaps under the hook J^2, so as to lock the disk again in position, with the block F in contact with the brushes D and D′.

It is understood that the arrangement may be made for an increase of the load, as well as for a decrease thereof or for a combination of both, by adjusting the spring L and arranging the lever J and the core I accordingly.

The device is very simple and durable in construction, is not liable to get out of order, and is completely automatic in operation.

By having the working parts confined within a hermetically-sealed box or casing it is evident that the apparatus may be located in any desired place—for instance, in places containing gas or other combustible matter in which a spark would cause an explosion and do damage. It will be seen that the apparatus may be placed in any desired position, as it is evident that the several parts will work no matter what the position of the casing is.

When the circuit is broken, as above described, the operator turns the usual switch to shut off the current entirely. Now should the operator turn the hand-wheel H^2 for resetting the machine as described and before he has turned off the excessive current as soon as the disk G in its return movement brings the block F in engagement with the brushes D D′ then the current passes again through the coil C^2 and attracts the core I, which in moving inward strikes against the free end of the pawl H^3 and throws the lug H^4 out of engagement with the notch H^5, so that the spring O turns the shaft H and disk G forward again in the direction of the arrow a' to break the circuit, as described. Thus the shafts H and H′ are disconnected automatically and the machine cannot be reset unless the current is shut off.

Having thus fully described my invention, I claim as new and desire to secure by Letters Patent—

1. A circuit-breaker, comprising a rotary disk of insulating material, a contact-block seated in said disk and extended through the same, fixed brushes normally engaging said block, one at each side of the disk, the said brushes being in an electric circuit, a solenoid in the circuit, a pivoted latch having connection with the solenoid-core and normally engaging with a part on the disk, to hold said disk, a spring for moving the disk when released by the latch, and a blow-out in the form of a plate having an opening through which the disk may move, the said plate being secured near the brushes, substantially as specified.

2. A circuit-breaker, comprising a casing, a shaft consisting of two sections mounted in the casing, a pawl mounted on one of the sections and adapted for locking connection with the other section, a disk mounted on one of the shaft-sections, a spring for rotating the disk, a contact-block carried by the disk, brushes for engaging the contact-block, the said brushes being in the electric circuit, a solenoid in the circuit, and a core in said solenoid, the said core operating to release the disk upon an overload of current, and also operating to move the pawl out of its locking position, substantially as specified.

CHARLES M. CLARK.

Witnesses:
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