No. 732,254. PATENTED JUNE 30, 1903.

H. P. BALL.

CIRCUIT BREAKER.

APPLICATION FILED APR. 18, 1902.

NO MODEL.

FIG. 1.

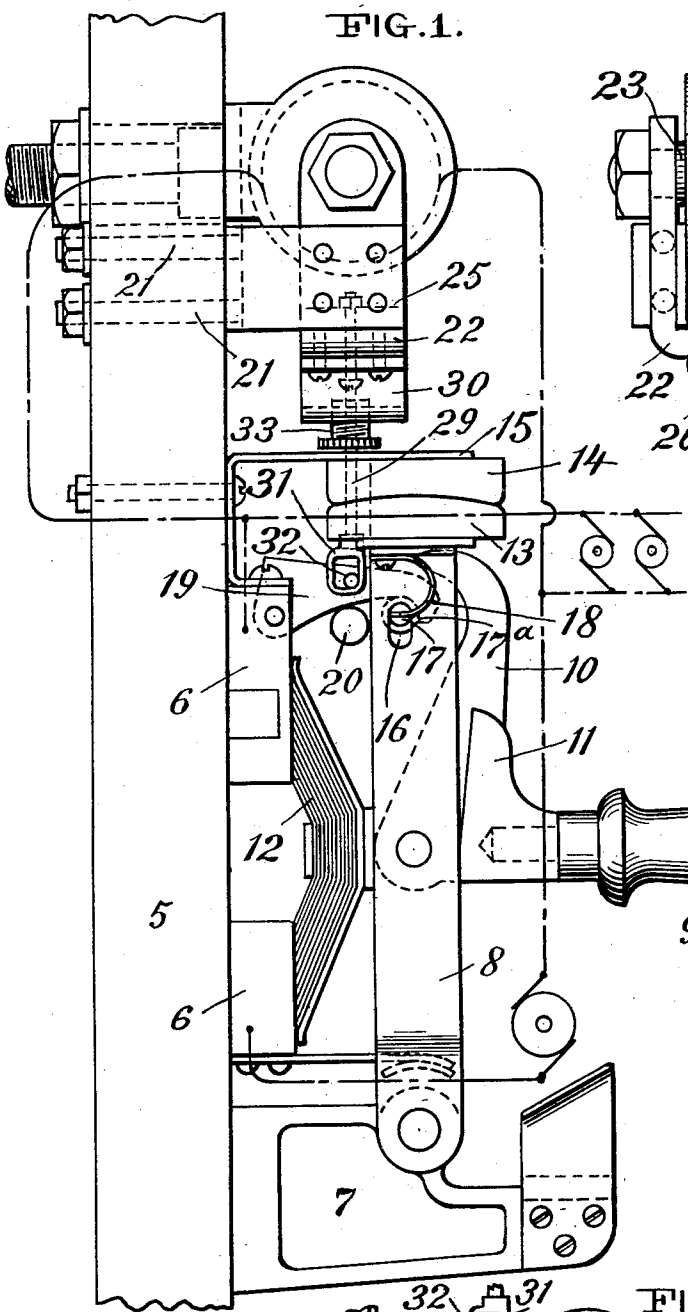


FIG. 2.

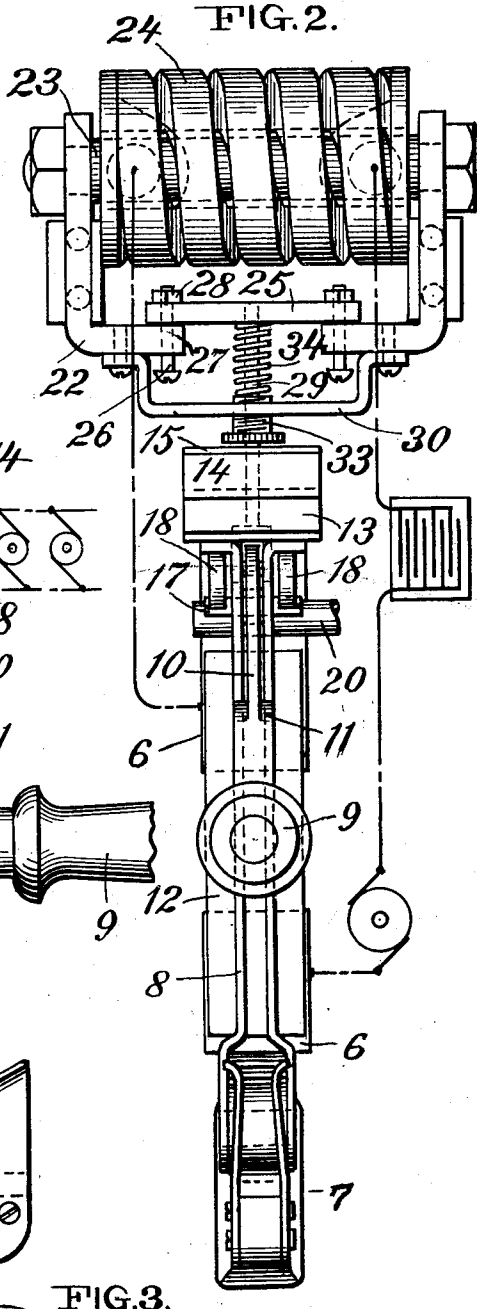
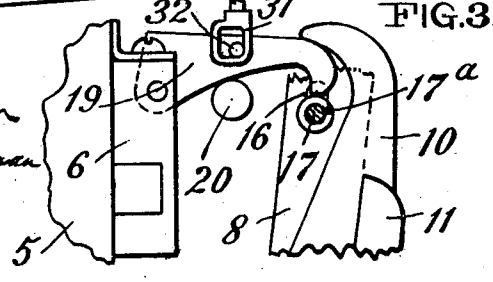


FIG. 3.



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No. 732,254. Patented June 30, 1903.

UNITED STATES PATENT OFFICE.

HENRY PRICE BALL, OF NEW YORK, N. Y., ASSIGNOR TO GENERAL INCANDESCENT ARC LIGHT COMPANY, OF NEW YORK, N. Y., A CORPORATION.

CIRCUIT-BREAKER.

SPECIFICATION forming part of Letters Patent No. 732,254, dated June 30, 1903.

Application filed April 18, 1902. Serial No. 103,483. (No model.)

To all whom it may concern:

Be it known that I, HENRY PRICE BALL, a citizen of the United States, residing at New York city, county and State of New York, have invented certain new and useful Improvements in Circuit-Breakers, of which the following is a specification.

My invention consists in the combination, with a circuit-breaker, of a device which when the current flowing in the circuit within which it is included drops below a certain predetermined amount will act to actuate the circuit-breaker and open the circuit.

The object of my invention is to protect the generator against a reverse current, as in the case where a generator is connected for charging storage batteries, or to protect a motor against a short circuit, as in the case where a motor is actuated by a generator and the current fails and after the motor has stopped running the current suddenly reëstablished.

The accompanying drawings will serve to illustrate my invention.

Figure 1 is a side elevation of my device, also showing diagrammatically the coil of the circuit-breaker connected in circuit as a shunt with a generator and motors. Fig. 2 is a front elevation, also showing diagrammatically the coil of the circuit-breaker connected in series with the generator and storage batteries. Fig. 3 is a side elevation of a portion of the device, illustrating the position of the switch-lever and latch when the hook of the switch-lever first engages with the latch.

In the drawings, 5 indicates the base-plate; 6, metallic contact-blocks suitably secured to the base-plate. Connected to the base-plate below the contact-blocks is a bracket 7, in which is pivotally mounted the switch-lever 8. The switch-lever consists of a pair of parallel plates carrying a pivotally-mounted handle 9, provided with a hook portion 10 and a stop-shoe 11. Mounted on the switch-lever opposite the handle 9 is a spring bridge-piece 12, formed by a number of superposed spring-plates. The bridge-piece is adapted to coact with the contact-blocks 6 to form the main path of the current through the circuit-breaker.

Secured to the upper end of the lever 8 is a carbon contact-block 13, which coacts with a similar contact-block 14 to form a shunt-path through the circuit-breaker across the contact-blocks 6. The block 14 is supported by the spring-plate 15, which is connected to the upper block 6.

Situated in the upper end of the switch-lever 8 is an oblong hole 16, in which is located a horizontal pin 17, carrying the roller 17^a, located between the plates forming the switch-lever. This pin 17 is supported at its ends by the springs 18, which springs are secured at their opposite ends to the upper end of the switch-lever 8. Normally the springs 18 tend to lift the pin 17 upward, so that it shall occupy the position shown in Fig. 1 in the upper end of the slot 16.

Pivoted at the center of the upper contact-block 6 is a latch 19, the hook end of which is adapted to take over the roller 17^a on the pin 17. Located under the latch 19 is shown a horizontal bar 20, (shown broken at one end in Fig. 2,) which bar, when employed in connection with a suitable actuating-magnet, as illustrated in my former patent, No. 686,918, will act when an overload exists in the circuit within which the circuit-breaker is included to raise the latch 19 and release the switch-lever 8 to open the circuit. This bar, however, forms no essential part of my present device and is shown and referred to simply for the purpose of illustrating how a circuit-breaker of the present type, designed to be actuated when a decrease in the electromotive force or current of the circuit occurs, may also be employed in connection with a device to open the circuit when an overload exists.

The circuit-breaker as described is that which I prefer to use; but manifestly any other form of circuit-breaker may be used.

I will now describe the device which I use in connection with the circuit-breaker and which will actuate the circuit-breaker to open the circuit when the electromotive force of the current on the line is reduced below a predetermined amount.

Projecting from the base-plate 5, above the circuit-breaker, are the studs 21, and

secured to and carried by these studs are the angular pole-pieces 22. Located between and fixed to the pole-pieces is a metallic core 23, around which is wound a magnet-coil 24, which when the device is to be connected in circuit as a shunt, as in Fig. 1, is made of a fine wire, or when to be connected in series, as in Fig. 2, of a coarse wire or solenoidal bar of copper.

Located over the horizontal portions of the pole-pieces 22 is a plate-armature 25, carrying in its ends the bolts 26. These bolts are situated in openings 27 in the pole-pieces 22 and serve to limit the upward movement of the armature, which movement may be regulated by adjusting the nuts 28 upon the bolts 26.

Secured to and depending from the armature 25 is a rod 29, which rod passes through an opening in the strap 30, secured below the pole-pieces 22. Connected to the lower end of the rod 29 is a square eye 31, which takes over a pin 32, projecting laterally from the latch 19. This eye has a certain vertical depth which is provided for the purpose of permitting the pin 32 to rise in the eye without actuating the rod 29. This eye is, however, not essential and is only employed in connection with the bar 20 when the device is designed to be operated by an under or an over load. The rod 29 may be connected through any other means to the latch 19.

Arranged in the bottom of the strap 30 is an adjusting-screw 33, and situated between the head of this screw and the bottom of the armature 25, surrounding the rod 29, is a spiral spring 34. This spring tends to raise the armature 25 against the pull of the pole-pieces 22.

The operation of my device is as follows: When no current is passing through the circuit-breaker, the latch 19, rod 29, and armature 25 are pushed upward to the highest position permitted by the bolts 26 under the action of the spring 34. Consequently when the handle 9 is thrown upward and while the device is being closed the hook end 10 bears upon the forward end of the latch 19, pushing it downward and carrying the pin 17 to the lowest position in the slot 16 and the armature 25 against its pole-pieces. Contact at the same time is made between the bridge-piece 12 and contact-blocks 6 and between the carbon contacts 13 and 14. As the circuit is established through the circuit-breaker the pole-pieces 22 of the magnet hold the armature 25, which carries the rod 29, so far down that no upward traction is made upon the latch 19. Upward traction, however, is made upon the roller and pin 17 by the springs 18, which draws the roller under the hook end of the latch 19, and thereby holds the switch-lever in the closed position. Movement of the hook 10 inward is limited by the shoe 11 on the handle 9 impinging upon the side plates of the switch-lever 8. The circuit-breaker will remain latched so long as the current traversing the magnet-coils 24 is maintained above a predetermined amount. When the current falls below this amount, the attraction of the pole-pieces 22 for the armature 25 is diminished, at which time the spring 34 exerts its force, lifts the rod 29 and the latch 19, thereby releasing the switch-lever 8, which is thrown open to break the circuit under the action of the spring bridge-piece 12. The handle 9, being thrown forward, drops by gravity and carries with it the hook 10.

I wish it understood that I do not limit myself to the specific mechanism described constituting the circuit-breaker or that constituting the device for actuating the circuit-breaker, as very many changes may be made in the mechanical construction of such devices without departing from the intent of my invention.

Having thus described my invention, I claim—

1. An underload circuit-breaker, comprising contact-blocks, a pivoted switch-lever carrying a spring bridge-piece, a pivoted hook, and a resiliently-supported pin; a pivoted latch which coacts with the pin on the switch-lever, and means for raising the latch when the current transmitted falls below a predetermined amount.

2. An underload circuit-breaker, comprising contact-blocks, a pivoted switch-lever carrying a spring bridge-piece, a pivoted hook, a resiliently-supported vertically-movable pin, a latch adapted to coact with said pin, and a spring-actuated device adapted to move the latch when the current falls below a predetermined amount.

3. In an underload circuit-breaker, the combination of a pivoted switch-lever, a handle carrying a hook pivoted to said lever, a transversely-arranged pin adapted to have a vertical movement in said switch-lever, a resilient device for supporting said pin, and a pivoted latch which coacts with said pin to hold the lever in a closed position.

4. An underload circuit-breaker, comprising a switch-lever, a latch therefor, means carried by the lever for acting upon the latch when the lever is moved to close the circuit-breaker, a device on said lever adapted to coact with said latch to lock the lever in a closed position, and means for releasing the latch when the current transmitted falls below a predetermined amount.

5. An underload circuit-breaker, comprising a switch-lever, a latch therefor, means carried by the lever for acting upon the latch when the lever is moved to the closed position, a resiliently-mounted device on said lever adapted to coact with said latch to lock the lever in a closed position, and means for releasing the latch when the current transmitted falls below a predetermined amount.

6. An underload circuit-breaker, comprising a switch-lever, a latch therefor, a spring-actuated rod connected to said latch, an armature connected to said rod, and a magnet which when traversed by a current will over-

come the tension of the spring and force the rod out of engagement with the latch, but will permit engagement of the rod with the latch to lift it when the current falls below a normal amount.

7. An underload circuit-breaker, comprising a switch-lever, having a vertically-disposed slot in its upper end, a horizontally-disposed resiliently-supported pin in said slot, a latch adapted to coact with said pin to lock the lever in a closed position, and means for lifting the latch.

8. An underload circuit-breaker, comprising a switch-lever, a resiliently-supported pin carried by said switch-lever, a resiliently-supported latch adapted to coact with said pin on said switch-lever to lock the switch-lever in a closed position, and means carried by the switch-lever for overcoming the resiliency of said pin and latch when locking the lever in a closed position.

9. An underload circuit-breaker, comprising a switch-lever, a resiliently-supported pin carried by said switch-lever, a resiliently-supported latch, means for adjusting the resilient support for said latch, and means carried by the switch-lever for overcoming the resiliency of the pin and latch in bringing the switch-lever to the closed position.

In testimony whereof I affix my signature in the presence of two witnesses.

HENRY PRICE BALL.

Witnesses:
EDWARD M. GERRY,
LOUIS WINTNER.