

No. 606,646.

Patented July 5, 1898.

H. B. CUTTER.
RHEOSTAT.

(Application filed June 22, 1897.)

(No Model.)

2 Sheets—Sheet 1.

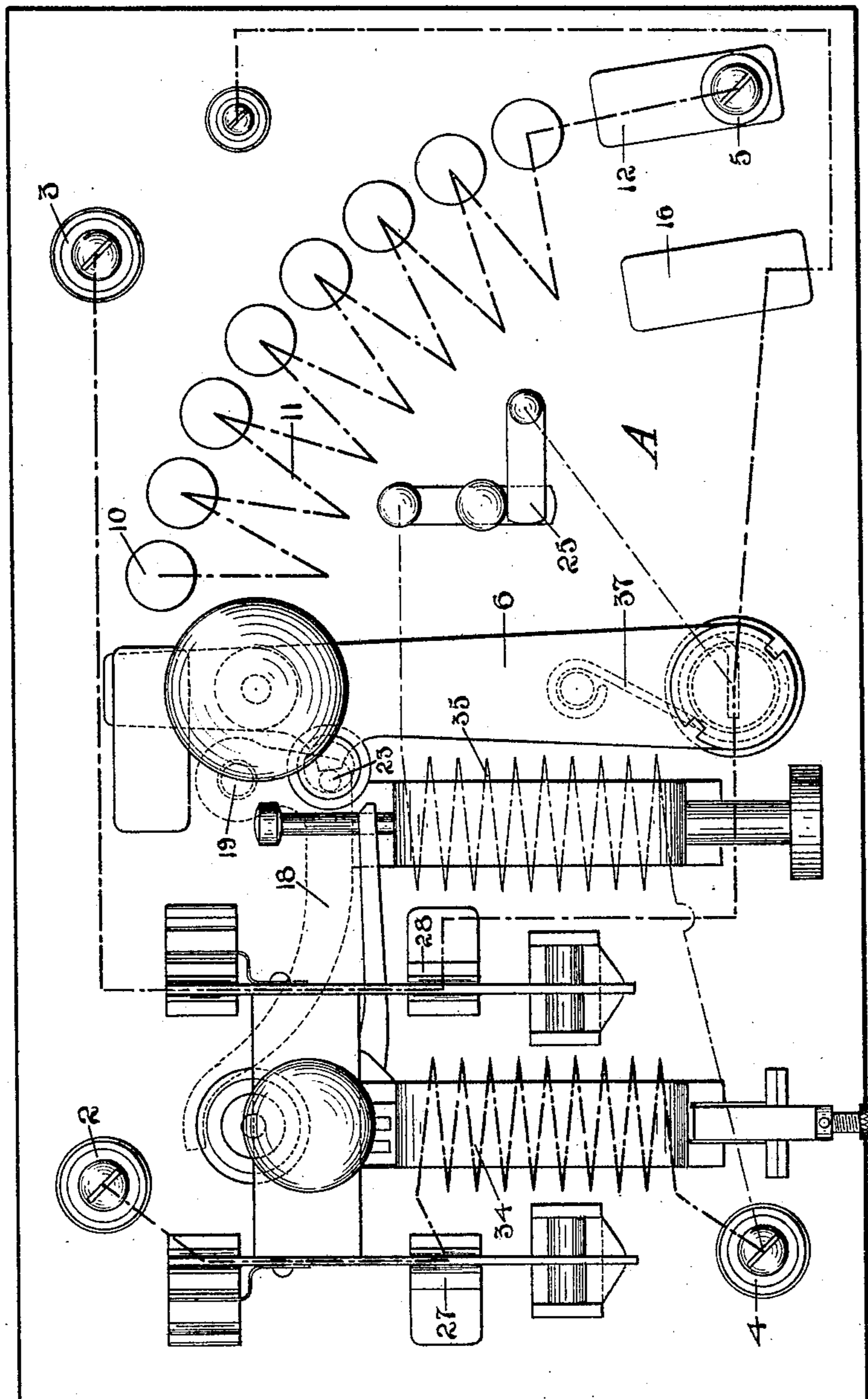


Fig. 1.

WITNESSES

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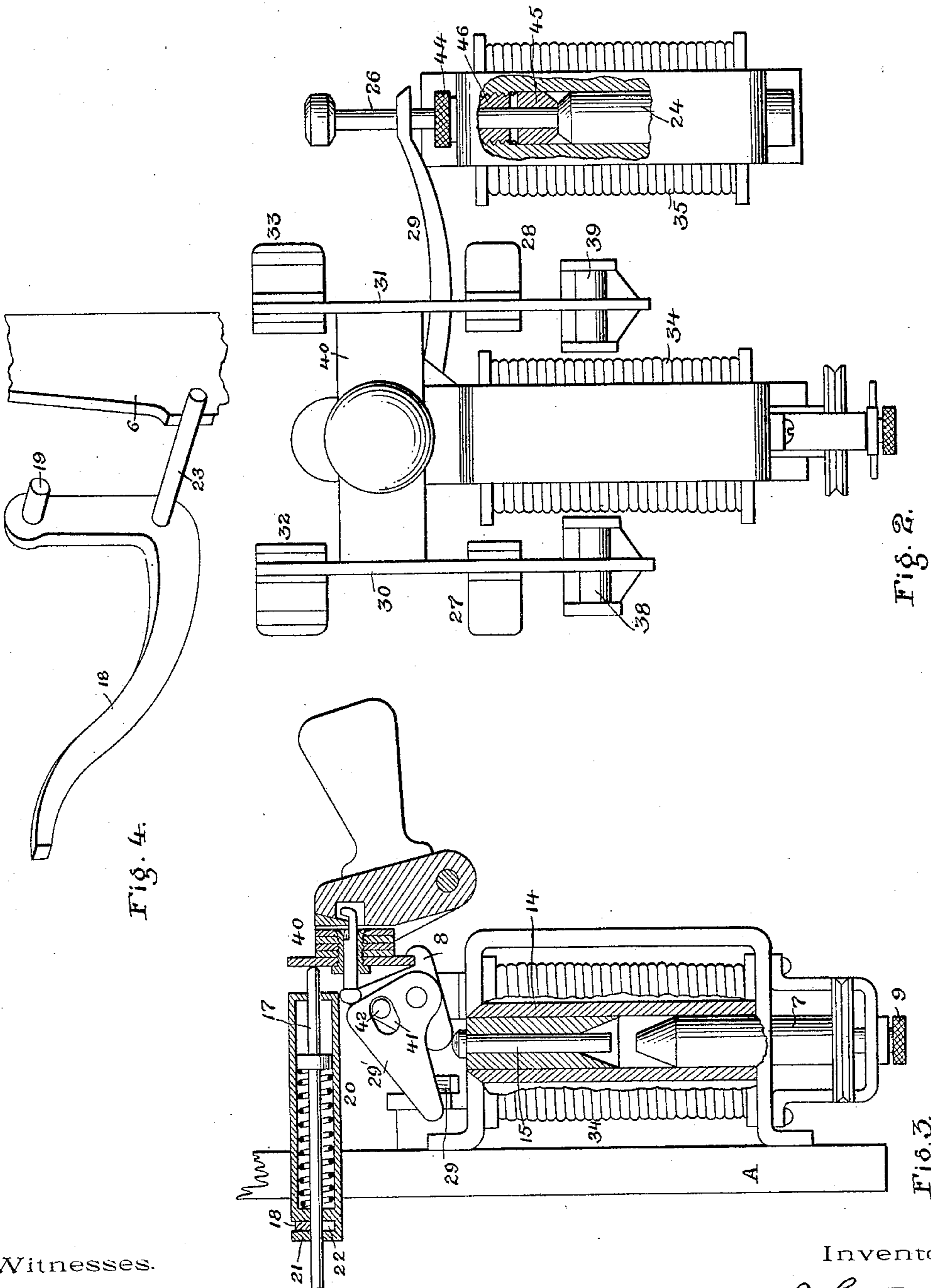
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Witnesses.

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UNITED STATES PATENT OFFICE.

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RHEOSTAT.

SPECIFICATION forming part of Letters Patent No. 606,646, dated July 5, 1898.

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To all whom it may concern:

Be it known that I, HENRY B. CUTTER, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a new and useful Rheostat, of which the following is a specification.

My invention relates to rheostats in combination with automatic circuit-breakers; and among the objects of my improvements are to afford, in combination with the usual means of closing circuits through gradually-decreasing resistance, commonly known as "rheostats," means of automatically opening or breaking the circuit upon the occurrence of a predetermined above-normal or below-normal flow of current and means of automatically preventing the closing of the circuit-breaker until the pivoted arm of the rheostat is brought to such a position that upon the closing of the circuit-breaker no current will flow through the device, or else it will flow through sufficient resistance to protect the motor or other apparatus for which the current is intended.

In the accompanying drawings, Figure 1 is a plane view of my device, showing coils of automatic circuit-breaker and paths of current in diagram. Fig. 2 is a front elevation of the automatic circuit-breaker, in part section, showing means of adjustment of core of underload-coil. Fig. 3 is a side elevation, in part section, of the overload-coil and locking means. Fig. 4 is a perspective view in detail of the locking-lever.

In Fig. 1, A is the base-plate or frame, preferably of slate or other insulating substance. 2 and 3 may be the generator terminal binding-posts, and 4 and 5 the motor binding-posts, or vice versa. The terminal binding-post 2 is connected through one side of the double-pole switch and the solenoid-coil 34 of the circuit-breaker, which are arranged in series, to the terminal binding-post 4. The terminal binding-post 3 is connected through the other side of the double-pole switch to the hub of contact-arm 6, upon which it turns. The said hub is also connected with contact-jaw 16. The terminal binding-post 5 is connected with contact-jaw 12, which is one terminal of the

resistance 11, the other terminal of the said resistance being at contact-piece 10, which, together with the intermediate resistance-contacts, are adapted to contact with the upper end of the pivoted contact or switch arm 6 of the rheostat, so that when said arm moves from the position shown in Fig. 1 as soon as it contacts with contact-piece 10 the current passes from the terminal binding-post 3 through one side of the double-pole switch to the hub of the arm 6, the arm and all of the resistance to the terminal binding-post 5. As the arm approaches its contact-jaws 12 and 16 the resistance decreases as each successive resistance-contact is passed until the arm reaches the contact-jaws 12 and 16, when all resistance is cut out and the current passes direct from the hub through contact-jaw 16 to contact-jaw 12 and terminal binding-post 5.

The underload-coil 35 is connected in shunt between the lower stationary contacts 27 and 28 of the circuit-breaker. In this shunt-circuit may also be placed at a convenient part of the base A or elsewhere a push-button 25 or other contact-breaking device for the purpose of manually cutting the underload-coil 35 out of circuit to cause the arbitrary opening of the circuit-breaker. Coils 34 and 35 (shown diagrammatically in Fig. 1 and in detail in Figs. 2 and 3) are the coils of a familiar type of overload and underload circuit-breaker with means for adjustment to procure its actuation upon the occurrence of a certain predetermined above or below normal flow of current. The bridges or movable contacts 30 and 31 are pivoted at 38 and 39 and are adapted to bridge, respectively, the stationary contacts 27 with 32 and 28 with 33. These bridges are connected at their free ends by the yoke or cross-piece 40, but insulated therefrom. When the switches are closed, the cross-piece 40 encounters the piston 17 and forces it to compress the spring 20. The latch 8 is adapted to engage the cross-piece 40 when the circuit-breaker is closed and to maintain it closed against the force of said spring-actuated piston until the said latch is actuated, as hereinafter described. Coil 34 is adapted to actuate its movable core 7 upon the occurrence of a predetermined over-

load to actuate, through the movable pin 15, said latch 8 to permit the spring-actuated piston 17 to cause the opening of the switch. Adjustment with respect to the amount of overload necessary for its actuation is secured by operating the set-screw 9, upon which rests the movable core 7, to alter the distance between said movable core 7 and the fixed core 14. Coil 35 is adapted during normal flow of current to maintain its movable core 24 in contact with the fixed core 45; but upon an interrupted or predetermined below-normal flow of current the pull between the fixed core and movable core becomes insufficient to restrain the core 24 from actuation by force of gravity and said core 24 is permitted to fall. The extension or rod 26, having an enlargement at its upper end, is attached to core 24 and is freely movable through the fixed cores 45 and 46. Upon the fall of core 24 the enlargement on extension 26 engages with lever 29, causing it to actuate, through cam 29', the latch 8 to permit the opening of the switch, as above described.

It will be noted from an inspection of Fig. 3 that cam 29' is movable on the same pivot as that of latch 8. The pin 42 projects from latch 8 into slot 41 in cam 29', so that after the preliminary movement of the cam 29' upon being actuated by lever 29 the edge of slot 41 encounters pin 42 on latch 8 and causes its actuation. As shown in part section in Fig. 2, the fixed core of coil 35 is in two parts 45 and 46, the latter being threaded in a tube which surrounds the cores and adapted to be manually operated by the knurled head 44 to move to or away from the part 45 to increase or diminish the pull of same, thus furnishing the means of adjustment with respect to the point of below-normal flow necessary for the opening of the circuit-breaker.

The rear end of the piston 17 moves in and is guided by the lug 21. This lug has a slot 22 at right angles with the axis of the piston 17, extending into or beyond the aperture through which said piston moves. This slot is adapted to receive the end of the lever 18, pivoted at 19 to the base A. When the circuit-breaker opens and the piston 17 is driven forward by the spring, the rear end of the piston passes beyond the slot 22 and the lever 18 crosses the path of the piston 17 and prevents it from again being forced to its normal position, which in turn prevents the closing of the circuit-breaker. At the other end of the lever 18 is a projection or pin 23, adapted to be encountered by the contact-arm 6 to cause the withdrawal of the lever 18 from the slot 22 to permit the closing of the circuit-breaker upon said contact-arm 6 reaching an assigned range of positions. The said projection or pin 23 is so covered and incased that it can only be reached by said arm 6 or a projection thereof. The position to which the arm 6 must be brought to actuate the lever 18 to permit the closing of the circuit-breaker

is such that either no current will flow through the device or else that the current will flow through sufficient resistance to protect the motor or other apparatus for which the current is intended. The contacts 12 and 16 are spring-jaws adapted to hold the contact-arm 6 against the force exerted by spring 37. The contact-arm 6 is adapted to be forced into and out of engagement with said contact-jaws 12 and 16 only upon the application of manual force. The spring 37 tends to force the arm 6 when out of engagement with contacts 12 and 16 to the position shown in Fig. 1 and prevents it from resting on any intermediate resistance-contact by reason of the inadvertence or carelessness of the operator.

It is obvious that the automatic means of thus locking open the circuit-breaker, adapted to be actuated to release same when the rheostat-arm is in certain positions, may be varied in form and construction without departing from the spirit of my invention. I do not therefore wish to be confined to the exact form of device above described.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination of a rheostat, an automatic magnetic circuit-breaker, adjustable with respect to the above or below normal flow of current necessary for its actuation, and means of preventing the closing of the circuit-breaker when the rheostat-arm is in certain positions, substantially as described.

2. The combination of a rheostat, an automatic magnetic circuit-breaker and means independent of the rheostat-arm of preventing the closing of the circuit-breaker when the rheostat-arm is in certain positions said means adapted to be actuated to permit said closure when the rheostat-arm is in certain other positions, substantially as described.

3. In combination with a rheostat means of automatically breaking the circuit independently of the movement of the movable contact-arm of the rheostat, upon the occurrence of a predetermined above-normal flow of current and automatic means independent of said movable contact-arm of preventing the closure of the circuit-breaker until actuated by the said movable contact-arm to permit the same, substantially as described.

4. In combination with a rheostat means of automatically breaking the circuit independently of the movement of the movable contact-arm of the rheostat, upon the occurrence of a predetermined below-normal flow of current and automatic means independent of said movable contact-arm of preventing the closure of the circuit-breaker until actuated by the said movable contact-arm to permit the same, substantially as described.

5. In combination with a rheostat means of automatically breaking the circuit independently of the movement of the movable contact-arm of the rheostat, upon the occurrence of a predetermined above-normal or

below-normal flow of current and automatic means independent of said movable contact-arm of preventing the closure of the circuit-breaker until actuated by the said movable
5 contact-arm to permit the same, substantially as described.

6. The combination of a rheostat, an automatic magnetic circuit-breaker, the spring-actuated piston-rod and automatic means of
10 locking said piston-rod when the circuit-breaker is open and the rheostat-arm is in certain positions, said locking means adapted to be actuated to release said piston-rod when the rheostat-arm is in certain other positions,
15 substantially as described.

7. The combination of a rheostat, an automatic magnetic circuit-breaker, automatic means of preventing the closing of the circuit-breaker when the rheostat-arm is in cer-
20 tain positions and means of manually interrupting the flow of current through the automatic magnetic circuit-breaker to cause

its arbitrary actuation, substantially as described.

8. The combination of a rheostat, an auto- 25
matic magnetic circuit-breaker, automatic means of preventing the closing of the circuit-breaker when the rheostat-arm is in certain positions and means of preventing the rheostat-arm from resting on any of the in- 30
termediate resistance contact-points after the withdrawal of the hand from the said rheostat-arm, substantially as described.

9. The combination of a rheostat, an automatic magnetic circuit-breaker, a spring-actu- 35
ated piston and a pivoted lever cooperating therewith as means of preventing the closure of the circuit-breaker when the rheostat-arm is in certain positions, substantially as described.

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Witnesses:

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