C. C. WOODWORTH.

CALORIC CIRCUIT BREAKER.

APPLICATION FILED MAR. 9, 1909.

934,781. Patented Sept. 21, 1909.

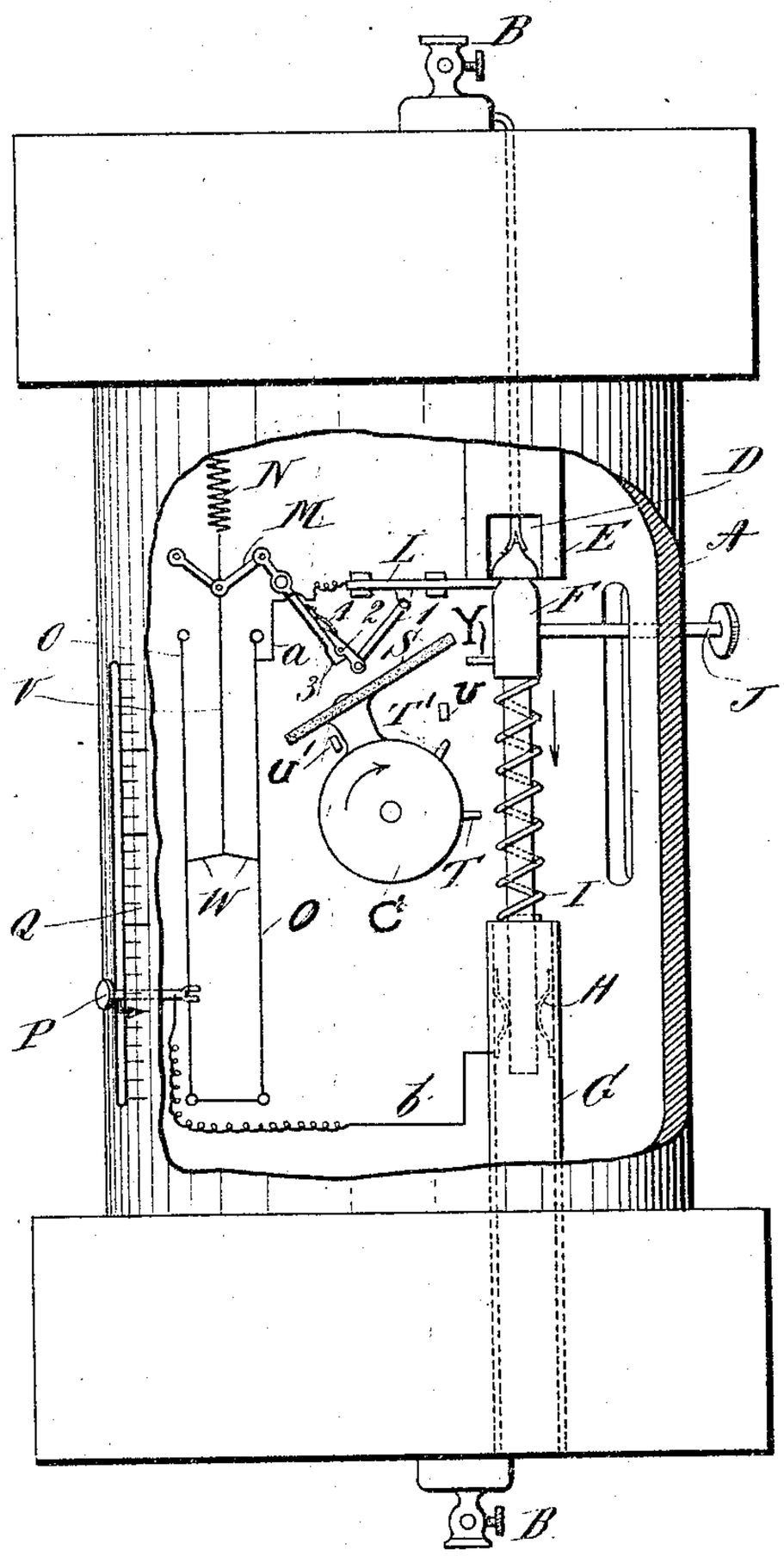

Fig. 1.

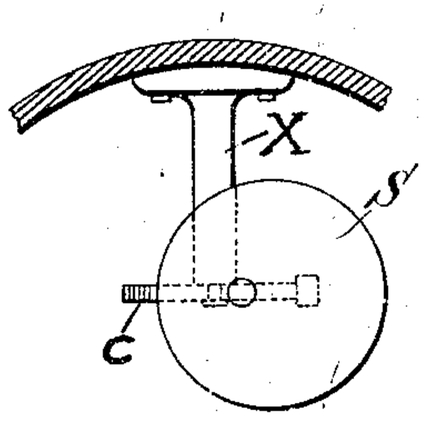

Fig. 2.

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CALORIC CIRCUIT-BREAKER.

934,781. Specification of Letters Patent. Patented Sept. 21, 1909.

Application filed March 9, 1909. Serial No. 482,239.

To all whom it may concern:

Be it known that I, CHARLES C. WOODWORTH, a citizen of the United States, and a resident of Portland, in the county of Multnomah and State of Oregon, have invented a new and useful Improvement in Caloric Circuit-Breakers, of which the following is a specification.

My invention relates to circuit-breakers of the type in which the expansion of a wire traversed by a portion of the main line current controls the opening of such main line without having recourse to mechanically operated devices.

The object of my invention is to improve and simplify the construction of caloric circuit-breakers and to render them more positive and reliable in operation in the manner hereinafter set forth.

In the drawings which accompany and form a part of this specification, Figure 1 is an elevation partly in section of one embodiment of my invention and Fig. 2 is a plan view of one form of arc-breaker that may be employed.

A represents a suitable casing provided with binding posts B B for connecting the circuit-breaker in the main line.

D and F are two contact members, of which D is stationary and F is movable, which are connected with the main line terminals. The stationary contact member D may, as shown, be recessed to receive the tapered end of the movable contact member F. The contact member D may be inclosed in the casing E which may be of insulating material.

G is a tube provided with spring clips H adapted to embrace the lower part of the contact member F. The spring I is secured in any suitable manner to the tube G and to the upper portion of the contact member F, so that when, by means of the arm J extending through a slot in the casing, the members F and D are placed in contact, the spring I tends to separate the same and thereby open the line circuit.

L is a latch arranged to hold the member F in contact with the member D by taking in the groove near the upper end of the member F.

O O represent a suitable thermally actuated device arranged so that the passage of a predetermined amount of current therethrough will cause sufficient expansion to effect the withdrawal of the latch and thereby open the circuit. In the present instance the said thermally actuated device consists of wires suitably mounted in the casing and connected by the cords W to the cord V which in turn is connected to the toggle-lever M, and tends to hold the same in the position shown. A suitable resilient member such as the spring N is connected to said toggle-lever and tends to move the same upwardly, so that the said toggle is balanced between the action of said spring and the cords connecting it with the thermally actuated device.

While I may employ various forms of connections between the toggle, which is operated by the expansion of the thermally actuated device O, and the latch which holds the members D and E in contact, I have shown in the accompanying drawings an arrangement of link connections, the same consisting of the link 1 pivoted to the latch and to the link 2, which in turn is pivoted to the link 3, the upper end of which is connected with one arm of the toggle M. A spring 4 is fixed to the link 3 and serves to hold the free end of the link 2 against said link 3. The function of this compensating spring is to permit a slight lateral movement of the latch L to the left when the contact between D and F is closed and then to force said latch to the right and into the groove in the upper part of the member F when the same has reached its uppermost position.

Q represents a suitably graduated scale which may be placed on the outside of the casing and P is a sliding contact member carrying a pointer coöperating with said scale. The sliding contact member regulates the length of the thermally actuated device O which is in circuit, in a manner which will be obvious.

A flexible conductor *a* connects the latch with one side of the conductor O and the regulator P which makes sliding contact with the other side of said conductor is connected by the flexible conductor *b* with the member F through the spring clips H.

A suitable form of arc-breaker which may be employed in connection with the caloric circuit-breaker above described consists of the disk S of mica or other suitable material attached to the rocker C, which in turn is pivoted to the support X.

U U′ are stops governing the position of

said rocker and Y is a pin coöperating with the projections T T′ to actuate said rocker in a manner which will be obvious.

The operation is as follows: The regulator P is set so that a certain load may be carried without actuating the circuit-breaker, the member F is placed in contact with the member D and the main line thereby closed. A certain very small fraction of the main line current will pass through the latch L, conductor *a*, a portion of the thermally actuated device O, and back to the main line by way of the conductor *b*. As soon as the current rises above a predetermined value, this value being determined by the position of the regulator P, the expansion of the thermally actuated device O enables the spring N to destroy the balance of the toggle M and cause it, through the link mechanism, to draw the latch from the movable contact member, whereupon the spring I draws the latter downward and opens the main line. By virtue of the small mass of the thermally actuated device O, the latter almost immediately cools and resumes its normal position thereby drawing the toggle against the tension of the spring N to its normal position, so that the latch L extends into the path of the contact member F. The latter is now raised by the arm J to close the circuit, and is held in position by the latch.

It will be understood that many modifications may be made in the details of the apparatus above described and in the circuit arrangements therein without departing from the spirit of my invention.

I claim:

1. In a caloric circuit-breaker, the combination with a line circuit of a stationary contact member and a movable contact member connected with said circuit, means whereby said members may be placed in contact to close said circuit, means for holding said members in contact, means for separating said members, thermally actuated means controlling the separation thereof, and means for extinguishing the arc produced by separating said members.

2. In a caloric circuit-breaker, the combination with a line circuit of a stationary contact member and a movable contact member connected with said circuit, means whereby said members may be placed in contact to close said circuit, means for holding said members in contact, means for separating said members, thermally actuated means for controlling the separation thereof, and means operated by said movable contact member for extinguishing the arc produced by separating said members.

3. In a caloric circuit-breaker, the combination with a line circuit of a stationary contact member and a movable contact member connected with said circuit, a thermally actuated device for controlling the separation of said members, a latch holding the movable member in contact with the stationary member, a toggle-lever, links connecting said latch and toggle-lever, and a spring secured to one of said links and coöperating with another which is pivoted thereto.

4. In a caloric circuit-breaker, the combination with a line circuit of a stationary contact member and a movable contact member connected with said circuit, a thermally actuated device for controlling the separation of said members, a latch holding said movable member in contact with the stationary member, a toggle-lever, links connecting said latch and toggle-lever, and a compensating spring coöperating with two members of said link connection.

5. In a caloric circuit-breaker, the combination with a line circuit of a stationary contact member and a movable contact member connected with said circuit, means whereby said members may be placed in contact to close said circuit, means for holding said members in contact, means for separating said members, thermally actuated means for controlling the separation thereof, a rocker arranged to be actuated by said movable contact member and a member of insulating material carried by said rocker and arranged to be interposed between said contact members to extinguish the arc when said members are separated.

6. In a caloric circuit-breaker, a casing inclosing a stationary contact member and a movable member carrying a pin, means whereby said members may be placed in contact, means for holding said members in contact, means for separating said members, thermally actuated means for controlling the separation thereof, a rocker pivoted to said casing and provided with two projections, one arranged in the path of said pin when said members are in contact and the other in the path of said pin when said members are separated, and a member of insulating material carried by said rocker and arranged to be interposed between said contact members to extinguish the arc when said members are separated.

7. In a caloric circuit-breaker, a casing provided with two slots and inclosing a stationary contact member and a movable contact member, an arm projecting through one of said slots and attached to said movable contact member whereby the latter may be placed in contact with said stationary contact member, means for separating said members, thermally actuated means controlling the separation thereof and a regulator for said thermally actuated means extending through the other of said slots.

8. In a caloric circuit-breaker, the combination with a line circuit of a stationary contact member and a movable contact member connected with said circuit, means whereby

said members may be placed in contact to close said circuit, means for holding said members in contact, means for separating said members, a thermally actuated wire controlling the separation of said members, a toggle-lever, links connecting said toggle-lever with said means for holding said members in contact, a spring member, and means whereby said toggle-lever is held in equilibrium between the opposing actions of said spring member and said thermally actuated device.

In testimony whereof, I have hereunto subscribed my name this 3rd day of March 1909.

CHARLES C. WOODWORTH.

Witnesses:
EVA FORTMILLER,
J. C. BRYANT.