No. 636,286. Patented Nov. 7, 1899.

E. F. PORTER.

AUTOMATIC ELECTRIC SWITCH.

(Application filed Dec. 27, 1897.)

(No Model.)

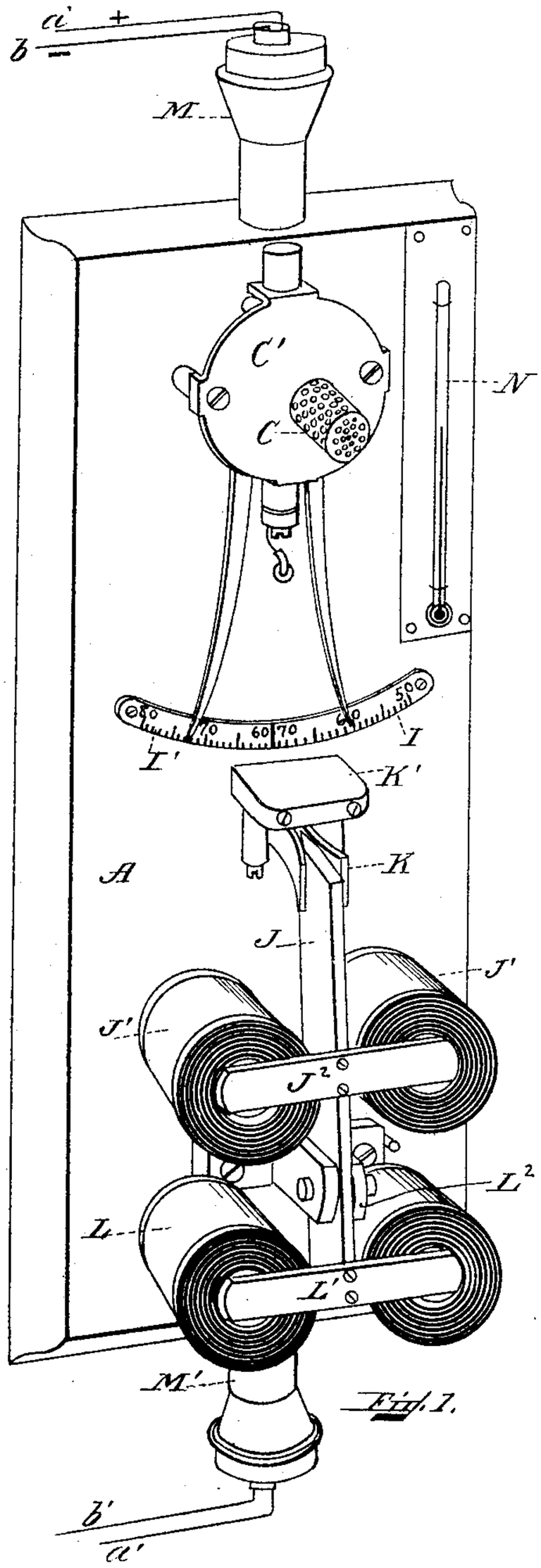

Fig. 1.

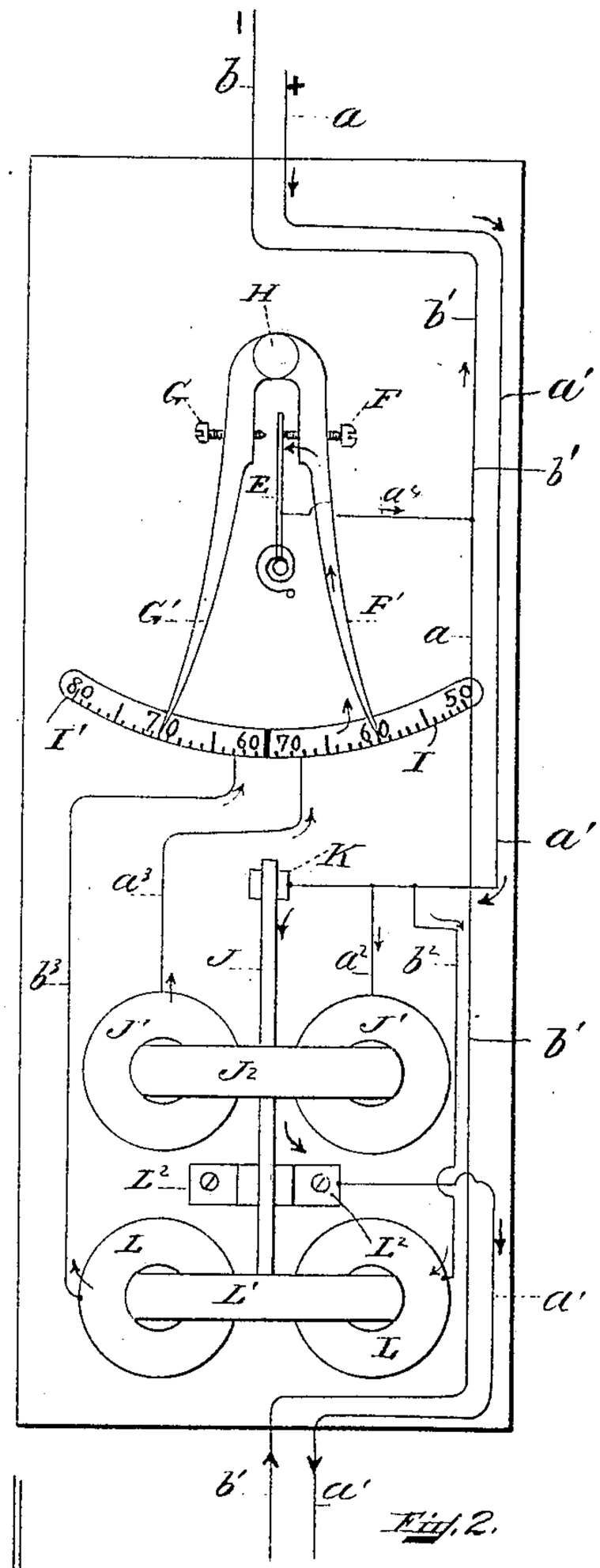

Fig. 2.

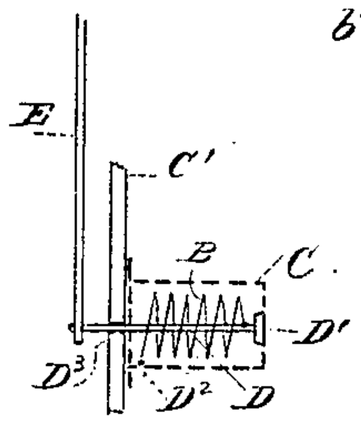

Fig. 3.

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UNITED STATES PATENT OFFICE.

EDWIN F. PORTER, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO THE BAY STATE ELECTRIC HEAT AND LIGHT COMPANY, OF JERSEY CITY, NEW JERSEY.

AUTOMATIC ELECTRIC SWITCH.

SPECIFICATION forming part of Letters Patent No. 636,286, dated November 7, 1899.

Application filed December 27, 1897. Serial No. 663,515. (No model.)

To all whom it may concern:

Be it known that I, EDWIN F. PORTER, a subject of the Queen of Great Britain, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Automatic Electric Switches, of which the following is a specification.

My invention relates to improvements in electric switches operated automatically by a thermostatic device.

The object of my invention is to control automatically the electric current used in any electric apparatus by the rise and fall of temperature.

In the apparatus hereinafter described and in which my invention is embodied an electric switch included in the circuit is opened and closed by means of magnets controlled by the thermostat through which a portion of said circuit passes. In this device the electric circuit may be opened at any desired degree of temperature and closed at any degree and is so constructed that any desired interval may be maintained between the two degrees. For instance, it may be desirable to close the circuit at 70° and open it at 70° for the purpose of operating any electric device.

My invention consists of certain novel features hereinafter described, and particularly pointed out in the claims.

In the accompanying drawings, which illustrate a construction embodying my invention, Figure 1 is a front view in perspective of my improved thermostatic electric switch. Fig. 2 is a diagrammatic view illustrating the manner of wiring. Fig. 3 is a sectional detail view hereinafter described.

Like letters of reference refer to like parts throughout the several views.

In this apparatus the temperature acts upon the thermostatic coil B, which, as shown in Fig. 3, is located within the perforated cylinder C. (Shown in Fig. 1.) One end of this coil is fastened to the shaft D at D′ and to the cylinder C at the other end at D^2, and it imparts rotary motion to the shaft D as it expands or contracts by the variations of the temperature. The lever E, which is fixed fast to the shaft D, receives the motion of the shaft and makes a partial revolution to and fro by the action of the temperature. The lever E in moving to the right comes in contact with the contact-screw F and in moving to the left comes in contact with the contact-screw G, which are respectively carried by the two index-hands F′ and G′, which have a common pivot H and are adjustable on the metallic plates I and I′, which are graduated for different degrees of temperature, as indicated by the positions of the thermostat. The plate C′ provides a support for the cylinder C, the outer end of which forms one bearing for the shaft D, the plate forming the other bearing at D^3, as shown in Fig. 3. The switch-lever J is operated by the electromagnet J′ acting on the armature J^2, and thereby forces the lever into the brushes K, supported by the bracket K′, secured to the base-plate A, closing the circuit in which the above-described apparatus is placed. The circuit is broken by the operation of the electromagnet L acting on the armature L′, secured to the bottom of the switch-lever J, which lever J between the magnets L and J′ is pivotally supported on the bracket L^2, secured to the base-plate A, and the action of the magnet L moves the switch-lever J from contact with the brushes K. This making and breaking of the circuit is controlled by the contact of the lever E as it contacts with either one of the screws F or G. The direction of the current will be more concisely described hereinafter by reference to the diagrammatic view shown in Fig. 2. The plugs M and M′ provide convenient means for interposing the above-described apparatus between a source of electricity and the apparatus using the current.

To describe further and more concisely the operation of the apparatus above referred to, suppose the electric current enters at *a*, with the switch in the position shown, and passes on through the wire *a′* to the switch-brushes K, then from the switch-lever J to the support L^2, thence to the wire *a′* to the machine to be operated, and then returning through the wire *b′* and out at *b*. With the lever E in contact with the screw F a portion of the current passes through the wire a^2 to the magnet J′ and out from the magnet J′ through the wire a^3 to the metallic segment I, then to the index-hand F′, which carries the screw F, and

thence to the lever E and through the wire a^4 and through the wire b' and out at b. With the lever E in the above-described position it is obvious that the electromagnet J′ will attract the armature J^2, placing the switch J in the position shown in Fig 1, and in this construction the current is passed from a source of electricity through the switch to the apparatus using the current. The index-hand F′ having been set at "60°," the current will remain in operation through the closed switch until the temperature acting on the thermostatic coil B and breaking the contact with the screw F shall have moved the lever E to the contact-screw G of the hand G′, which is set at "70°," when a portion of the current will pass in through the wire b^2 to the magnet L and out through the wire b^3 to the metallic segment I′, and then through the hand G′ to the contact-screw G to the lever E and out through the wire a^4 to the wire b' and out at b. With the lever E in the assumed position the magnet L will attract the armature L′, opening the switch, and the current ceases to flow.

The metallic contact-plates I and I′ are insulated from each other, and one is arranged in each branch circuit to convey the current to the hands F′ and G′, respectively, which slide upon and are in contact with said plates, so that said plates I and I′ form, with said hands, sliding metallic contacts for the branch circuits.

As this is an apparatus working on temperature, a thermometer N is located on the base-plate for convenience.

It is obvious that this device may be used in any place where it is necessary to control an electric current either by varying the circuit, by throwing in a resistance instead of breaking it, or by breaking it entirely, as described, and it will be found useful in a great variety of apparatuses working on temperature, such as refrigerators, incubators, heating apparatuses, &c.

I do not limit myself to the arrangement and construction shown, as the same may be varied without departing from the spirit of my invention.

Having thus ascertained the nature of my invention and set forth a construction embodying the same, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In an apparatus of the character specified, a main electric circuit, independent branch circuits from said main circuit, an independent contact-plate in each of said branch circuits and insulated from each other, a switch included in said main circuit, an electromagnet in one of said branch circuits adapted upon the closing of said circuit to be energized to close said switch and to hold it in its closed position by the continued magnetization of said magnet, an electromagnet in the other branch circuit adapted to be energized by the closing of said branch circuit after the other branch circuit has been broken to open said switch and to hold it in its open position by the continued magnetization of said magnet, a single thermostatic closer and breaker common to both said branch circuits to open and close the same and adapted upon a decrease in temperature to close the branch circuit including the magnet which closes the switch and upon an increase in temperature to break said circuit and to close the circuit including the magnet which opens the switch, contacts for establishing the branch circuits through said magnets for operating said switch, index-hands carrying said contacts and adapted to slide on said independent contact-plates and to be set at predetermined temperatures whereby the switch is adapted to open the main circuit at one temperature and to close it at another, and a lever operated by said thermostat and adapted to alternately engage with said contacts to close the branch circuits through the magnets.

2. In an apparatus of the character specified, a main electric circuit, independent branch circuits from said main circuit, an independent graduated scale in each of said branch circuits and insulated from each other, a switch included in said main circuit, an electromagnet in one of said branch circuits adapted upon the closing of said circuit to be energized to close said switch and to hold it in its closed position, an electromagnet in the other branch circuit adapted to be energized by the closing of said branch circuit after the other branch circuit has been broken to open said switch and to hold it in its open position, a thermostat common to both said branch circuits to open and close the same and adapted upon a decrease in temperature to close the branch circuit including the magnet which closes the switch and upon an increase in temperature to break said circuit and to close the circuit including the magnet which opens the switch, contacts for establishing the branch circuits through said magnets for operating said switch, index-hands carrying said contacts and adapted to be set at predetermined temperatures whereby the switch is adapted to open the main circuit at one temperature and to close it at another, and a lever operated by said thermostat and adapted to alternately engage with said contacts to close the branch circuits through the magnets.

3. In an apparatus of the character specified, a main electric circuit, independent branch circuits from said main circuit, an independent graduated scale in each of said branch circuits and insulated from each other, a pivoted switch included in said main circuit and provided with two independent armatures, brushes with which said switch engages to close the main electric circuit, an electromagnet in one of said branch circuits adapted upon the closing of said circuit to be energized to close said switch by attracting one of said armatures and to hold said switch

in its closed position, an electromagnet in the other branch circuit adapted to be energized by the closing of said branch circuit after the other branch circuit has been broken to open said switch by attracting the other armature and to hold said switch in its open position, a thermostat common to both said branch circuits to open and close the same and adapted upon a decrease in temperature to close the branch circuit including the magnet which closes the switch and upon an increase in temperature to break said circuit and to close the circuit including the magnet which opens the switch, contacts for establishing the branch circuits through said magnets for operating said switch, index-hands carrying said contacts and adapted to be set at predetermined temperatures whereby the switch is adapted to open the main circuit at one temperature and to close it at another, and a lever operated by said thermostat and adapted to alternately engage with said contacts to close the branch circuits through the magnets.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 23d day of December, A. D. 1897.

EDWIN F. PORTER.

Witnesses:
A. L. MESSER,
C. A. STEWART.