M. J. WOHL & H. HERTZBERG.

CIRCUIT BREAKER.

APPLICATION FILED MAR. 20, 1908.

959,827. Patented May 31, 1910.

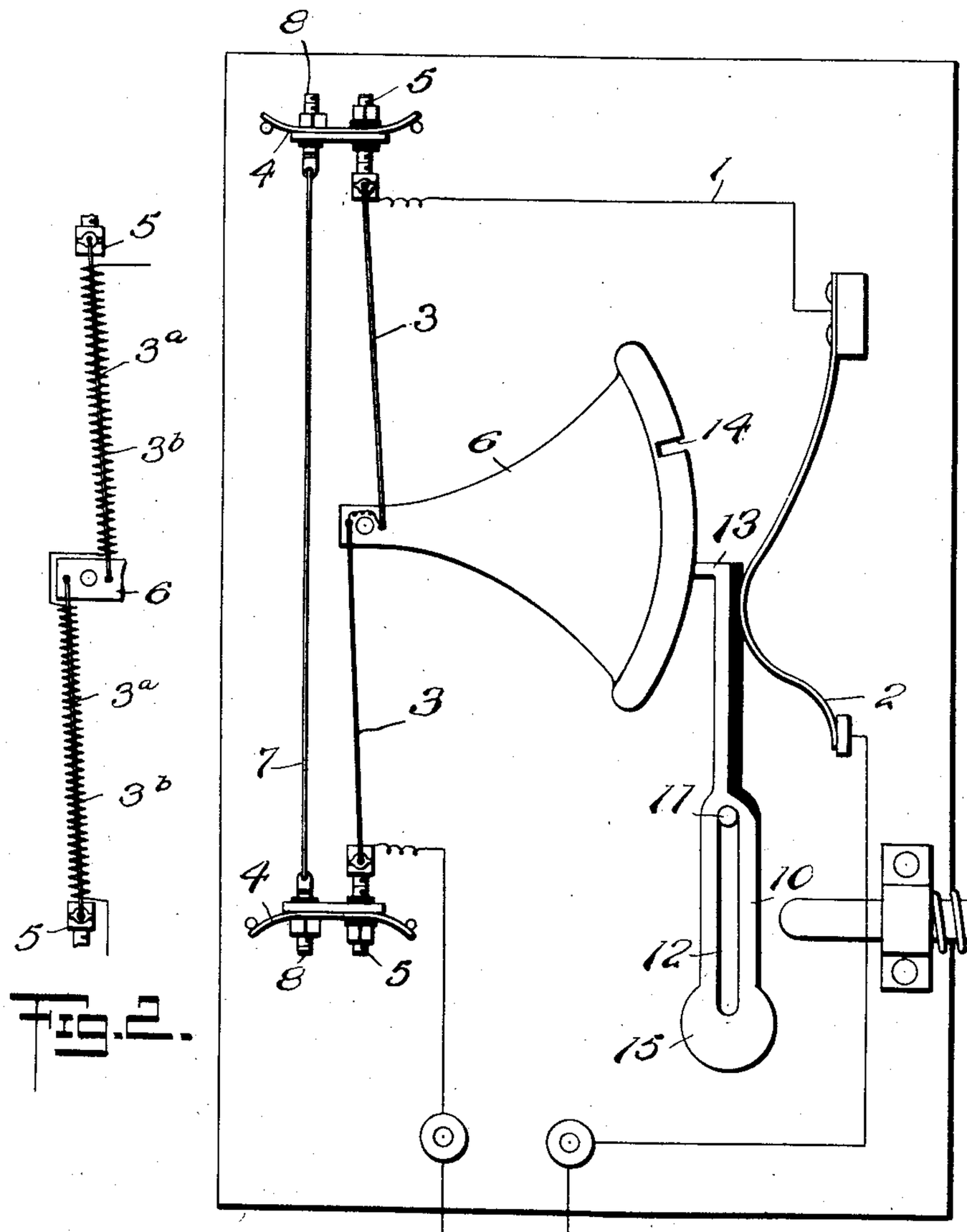

FIG. 1.

FIG. 2.

Witnesses:
G. Robert Thomas
R. B. Brandenburg

Maurice J. Wohl,
Harry Hertzberg, Inventors
By their Attorney Lewis J. Woolitle

UNITED STATES PATENT OFFICE.

MAURICE J. WOHL, OF NEW YORK, AND HARRY HERTZBERG, OF BROOKLYN, NEW YORK, ASSIGNORS TO ABBOT A. LOW, OF HORSESHOE, NEW YORK, MAURICE J. WOHL, OF NEW YORK, N. Y., AND HARRY HERTZBERG, OF BROOKLYN, NEW YORK, TRUSTEES.

CIRCUIT-BREAKER.

959,827. Specification of Letters Patent. Patented May 31, 1910.

Application filed March 20, 1908. Serial No. 422,273.

To all whom it may concern:

Be it known that we, MAURICE J. WOHL and HARRY HERTZBERG, citizens of the United States, and residents, respectively, of the city of New York, borough of Manhattan, county and State of New York, and of the city of New York, borough of Brooklyn, county of Kings, and State of New York, have invented certain new and useful Improvements in Circuit-Breakers, of which the following is a specification.

This invention relates to a circuit breaker operating upon novel lines; and the object, primarily, is to make use of the expansion and contraction of a thermal expansible conductor for operating the device. The principles involved being easy of comprehension and capable of brief description, a preliminary summary will be dispensed with, but the specification will be immediately proceeded with, reference being had to the accompanying semi-diagrammatic drawing, in which—

Figures 1 and 2 show alternative forms of the invention.

1 indicates a circuit, which includes a cut-out 2 of any desired construction, but conveniently of the spring-opened type. The circuit also includes a thermal expansible conductor 3, which is stretched between spring supports 4, being connected to said supports by tension adjusting devices 5. Said conductor is connected intermediate its length with a swinging segment or equivalent structure 6, being connected with said device at two points at opposite sides of the pivotal axis thereof, so that contraction of the conductor causes the segment to swing in one direction. However, the segment is swung only when the conductor 3 expands or contracts under the influence of current variations within the conductor. A compensating wire 7, also stretched between the spring supports 4, being connected thereto by tension adjusting devices 8, prevents the segment 6 being swung when the conductor 3 expands or contracts under the influence of changes in atmospheric temperature. This is brought about by so selecting the compensating wire that it has the same total linear expansion per unit change in atmospheric temperature as the conductor 3. It follows, therefore, that changes in the surrounding temperature will not cause the conductor 3 to swing the segment 6; because the conductor and compensating wire expand and contract equally under such conditions, and, the compensating wire, being connected only to the spring supports, causes these latter to flex one way or other by just this amount: therefore, the outer ends of the conductor 3 suffer displacement, but not the points on the conductor which are connected with the segment 6. It will be understood that the compensating wire 7 is suitably insulated from the conductor 3, so as to carry no current. It will also be observed that, while the movement of the segment 6 in both directions is due to the variations in length of the conductor 3, the descending movement of the segment on the expansion of the conductor is primarily effected by the weight of the segment itself.

The segment 6 acts upon an intermediate operating member 10, here shown as pivoted in an upright position on shaft or stud 11; the member being longitudinally slotted at 12, so as to be capable of being moved up and down, as well as of being swung from side to side. The upper end of this member 10 is shown as being provided with a lug or projection, 13, which is adapted to enter a recess 14 in the periphery of segment 6. The other side of the member 10 engages with the spring cut-out 2, in such fashion that, when the lug 13 engages the periphery of the segment 6, the cut-out is closed, whereas, when the lug 13 is opposite the recess 14, the cut-out 2 forces the lug to enter the recess, thus leaving the cut-out standing open.

It will be observed that the breaking of the circuit may be timed, since the conductor 3 does not heat up at once to expand sufficiently to permit the segment to descend until the recess 14 is opposite the lug 13. Moreover, the time of engagement of the lug with the recess may be timed by adjusting the tension devices 5 and 8.

After the circuit is broken, the conductor 3 cools and contracts, thus lifting the segment 6, and with the latter the member 10, the cut-out 2 still remaining open. The circuit may now be closed, manually or otherwise, by swinging the member 10 to carry the lug 13 out of engagement with the recess 14. The segment 6, being now relieved of the weight of the member 10, will spring

upward slightly, while the member 10 falls of its own weight, whereby the lug 13 is brought in engagement with the periphery of the segment. As shown, the lower end of the member 10 may be weighted, as at 15. A spring-returned push-button 16 may be used for swinging the member 10.

It will be observed that this form of circuit breaker may be used in a variety of connection and for divers purposes. It may be set to break the current practically immediately upon the latter exceeding a certain strength, or it may allow an increased current to flow for a period, variably at will, before breaking the circuit. Further, the parts may be so adjusted that the normal working current may be broken after a predetermined period. In this last way the device will be useful for such machines as are desired to run for a predetermined period at a time.

In Fig. 2 is shown an alternative form of the thermal expansible conductor; it being understood that this expression is used throughout in a generic sense. This form is exactly like that shown in Fig. 1 with the exception of the fact that the single conductor wire 3 is replaced by a wire 3^a, mounted similarly to wire 3, but being designed to carry no current, and a resistance wire 3^b coiled about but insulated from wire 3^a. This wire 3^b is connected in the circuit with the cut-out 2, as is the wire 3 in the equivalent construction. In operation, the resistance wire 3^b becomes heated by the passage of the current, and heats the wire 3^a by radiation. Wire 3^a, being in the nature of a thermostat, turns the segment on contraction, and permits the segment to turn in the opposite direction on expansion, exactly as in the case of wire 3. In fact, the two constructions are quite equivalent; the difference in operation being that the action is slower with the form shown in Fig. 2, since the heating action is slower. This permits the circuit breaker to remain closed for a longer period of time.

It will be understood that the drawing and description forming part of this application are purely illustrative, and that the principles set forth in the following claims may be embodied in a great variety of structural forms without exceeding the bounds of the invention.

What is claimed as new is:

1. The combination of a thermal expansible conductor, a pivoted member connected with said conductor to be swung thereby, said member having a working face provided with a recess, an electrical cut-out, and a projection connected therewith and adapted to ride on said working face and to enter said recess, said cut-out being adapted to open automatically when said projection enters said recess.

2. The combination of a thermal expansible conductor, a pivoted segment connected with said conductor to be swung by the contraction thereof against the force of gravity, said segment having its periphery provided with a recess, an electrical cut-out, and a projection connected therewith and adapted to ride on said periphery and to enter said recess, said cut-out being adapted to open automatically when said projection enters said recess.

3. The combination of a thermal expansible conductor, a pivoted member connected with said conductor to be swung thereby, said member having a working face provided with a recess, an electrical cut-out adapted to open automatically when not held closed, and a member intermediate said working face and said cut-out, being adapted to hold the cut-out closed when in engagement with said working face and to permit the cut-out to open upon entering said recess, said intermediate member being also adapted to be translated with said pivoted member after entering said recess.

4. The combination of a thermal expansible conductor, a pivoted member connected with said conductor so as to be raised by the contraction thereof and to descend upon the expansion thereof, said member having a working face provided with a recess, an electrical cut-out adapted to open automatically when not held closed, and a second pivoted member intermediate said working face and said cut-out and provided with a projection adapted to ride on said working face and to enter said recess, being adapted to hold the cut-out closed while said projection rides on said working face and to permit the cut-out to open when said projection enters said recess, the pivotal mounting of said second member being slotted to permit said member to be raised by the first-named pivoted member after said projection enters said recess.

Signed at New York in the county of Kings and State of New York, this 12th day of March 1908.

MAURICE J. WOHL.
HARRY HERTZBERG.

Witnesses:
JOSEPH F. GARCIA,
GEO. WELLING GIDDINGS.