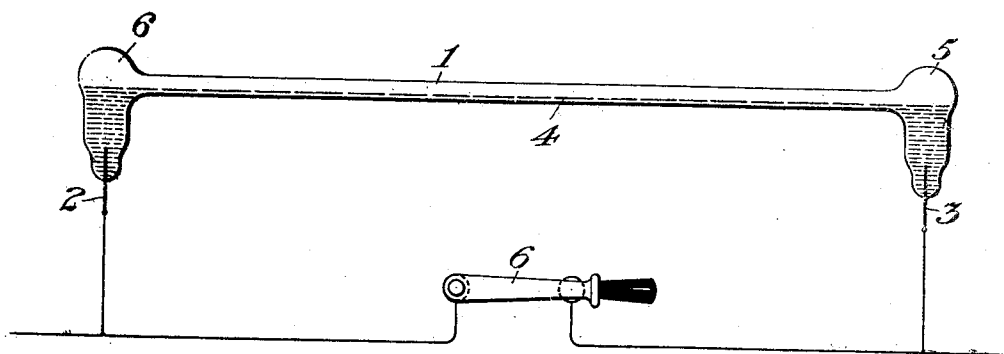


No. 876,918.

PATENTED JAN. 14, 1908.

P. H. THOMAS.
CIRCUIT BREAKER.

APPLICATION FILED JAN. 6, 1905. RENEWED FEB. 19, 1907.



Witnesses
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UNITED STATES PATENT OFFICE.

PERCY H. THOMAS, OF MONTCLAIR, NEW JERSEY, ASSIGNOR TO COOPER HEWITT ELECTRIC COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

CIRCUIT-BREAKER.

No. 876,918.

Specification of Letters Patent.

Patented Jan. 14, 1908.

Original application filed December 10, 1903, Serial No. 184,540. Divided and this application filed January 6, 1905.
Serial No. 239,839. Renewed February 19, 1907. Serial No. 358,218.

To all whom it may concern:

Be it known that I, PERCY H. THOMAS, a citizen of the United States, and resident of Montclair, county of Essex, State of New Jersey, have invented certain new and useful Improvements in Circuit-Breakers, of which the following is a specification.

In an application for Letters Patent of the United States filed by me on the 27th day of June, 1903, Serial Number 163,307, I have shown and described a form of circuit-breaker especially adapted for use in connection with alternating current circuits, the significant feature being that the circuit is broken between surfaces inclosed in an exhausted chamber. When such a circuit-breaker is included in an alternating current circuit, the rupture of the arc takes place when the current momentarily ceases at the zero point of the wave, and cannot start again, this being accomplished without any injurious rise of potential in the external circuit. The described circuit-breaker may also be applied to circuits conveying currents naturally varying, provided the lower limit of variation is below the carrying limit of the circuit-breaker.

In this application I disclose a circuit-breaker which may also be utilized in connection with alternating current circuit, but which is more particularly adapted to be used in connection with direct current circuits.

In the present instance, the interruption of the circuit is accomplished by the gradual introduction of a resistance to the flow of current through increasing the pressure within the exhausted chamber. In gas or vapor apparatus of this character, the resistance to the flow of current, or, in other words, the voltage necessary to pass current, is greatly increased as the pressure of the vapor within the exhausted chamber rises. Apparatus of this class will not pass current below a certain definite limit of electro-motive-force, and when the chamber is made of a proper heat radiating and heat absorbing capacity, this limit may be so fixed that while a normal current will flow through the apparatus an abnormal current will be prohibited from passing through and the current will cease. In this connection it is to be remembered that the pressure in the exhausted chamber is determined by the temperature of the

vaporizable material within the chamber— usually mercury—which is heated by the passage of current. It becomes, then, a question of properly proportioning the dimensions of the chamber so as to give it a definite heat radiating and heat absorbing capacity. This done, a vapor circuit-breaker may be made to operate with certainty within such limits as may be predetermined.

The accompanying drawing illustrates a circuit-breaker embodying my invention.

Referring to the drawing 1 is a container of insulating material having lead-wires 2 and 3 sealed into its ends, the said lead-wires being connected inside the container by a mass of mercury, 4. The circuit-breaker is located in a horizontal position and in this particular form may be arranged in a shunt to a switch of comparatively low resistance which carries the normal current of the circuit. The container 1 is made of small cross-section and contains in the major portion of its length a small amount of mercury bridging the electrodes, into which the lead-wires 2 and 3 extend at opposite ends of the circuit-breaker. I may provide small condensing chambers, 6 and 5, above the respective electrodes.

The switch which carries the normal current is shown at 6, and when this switch is opened, the entire normal current is diverted through the circuit-breaker, whereupon, owing to the thinness of the layer of mercury extending through the major portion of the tube, a portion of the mercury or other conducting liquid is vaporized, creating a high vapor pressure for the purpose already set forth. It will be seen that the development of high vapor pressure in the circuit-breaker under these conditions is gradual; that is to say, the point of actual rupture of the circuit is reached through comparatively small gradations. Accordingly, all tendency to create an injurious rise of potential in the external circuit is avoided.

The present application is a division of my application Serial Number 184,540, filed December 10, 1903.

In a companion application, Serial Number 163,307, filed June 27, 1903, claims are made upon some of the broader features of the invention disclosed herein.

I claim as my invention:—

1. The combination with an electric circuit and a main switch included therein of a

circuit breaker in shunt to the switch, the said circuit breaker including a suitable container having mercury electrodes connected initially by a thin body of mercury, said body
5 being so proportioned as to be vaporized by the passage of current upon the opening of said switch.

2. The combination with an electric circuit and a main switch included therein, of a
10 gas or vapor electric circuit breaker in shunt to said switch, the said circuit breaker including a suitable hermetically sealed and completely exhausted container having mercury electrodes therein initially connected
15 by a thin body of mercury of such dimensions as to be vaporized by the passage of

current therethrough on the opening of the switch.

3. The combination with an electric circuit, and a main switch included therein, of a
20 circuit-breaker in shunt to the switch, the said circuit-breaker being composed of a suitable container having mercury electrodes connected by a thin body of mercury.

Signed at New York, in the county of New
York, and State of New York, this 5th day
25 of January, A. D. 1905.

PERCY H. THOMAS.

Witnesses:

WM. H. CAPEL,

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