

R. L. BROWNE & A. R. HOWELL.

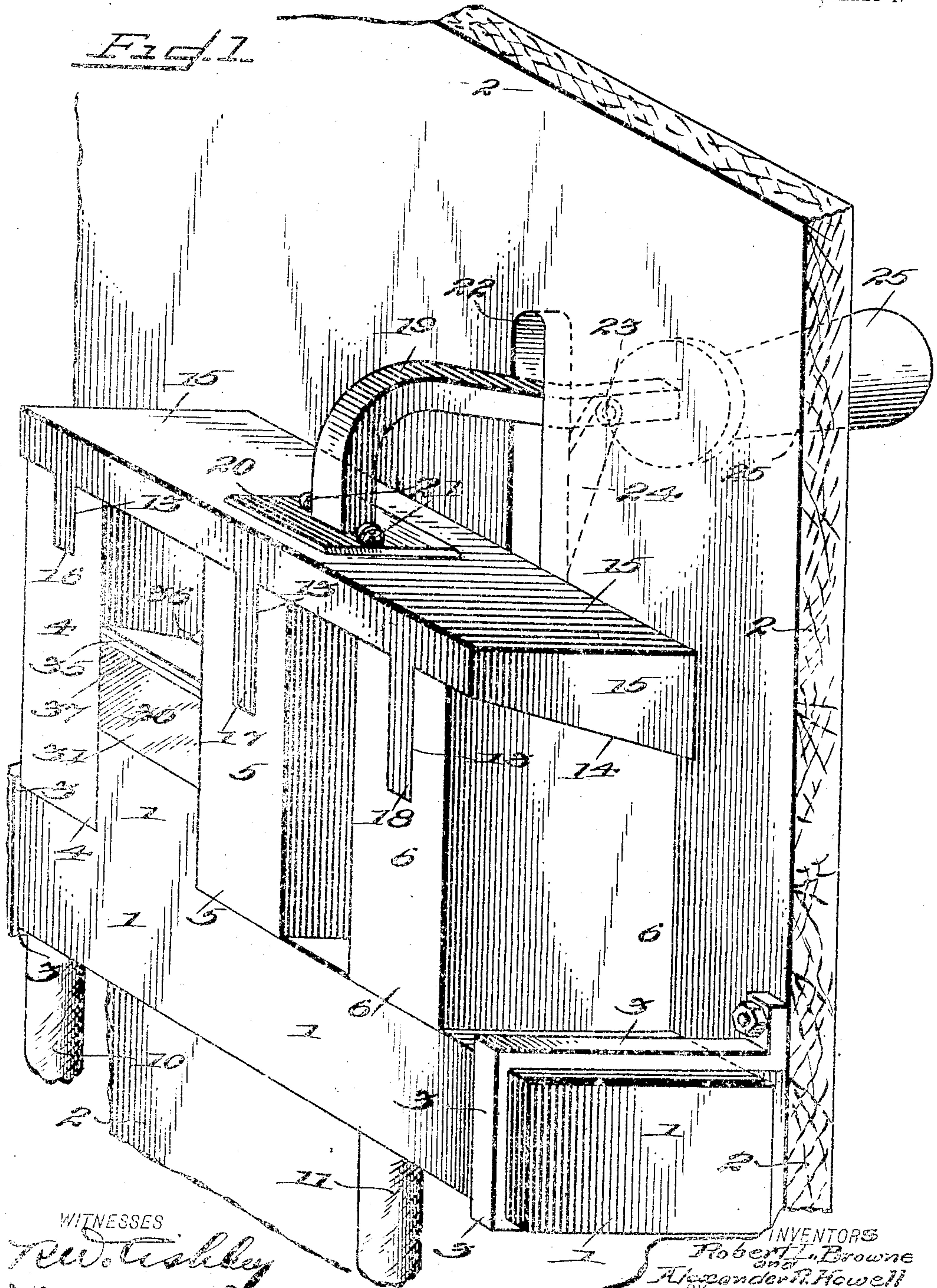
CIRCUIT BREAKER.

APPLICATION FILED MAY 11, 1906.

931,264.

Patented Aug. 17, 1909.

2 SHEETS—SHEET 1.



WITNESSES

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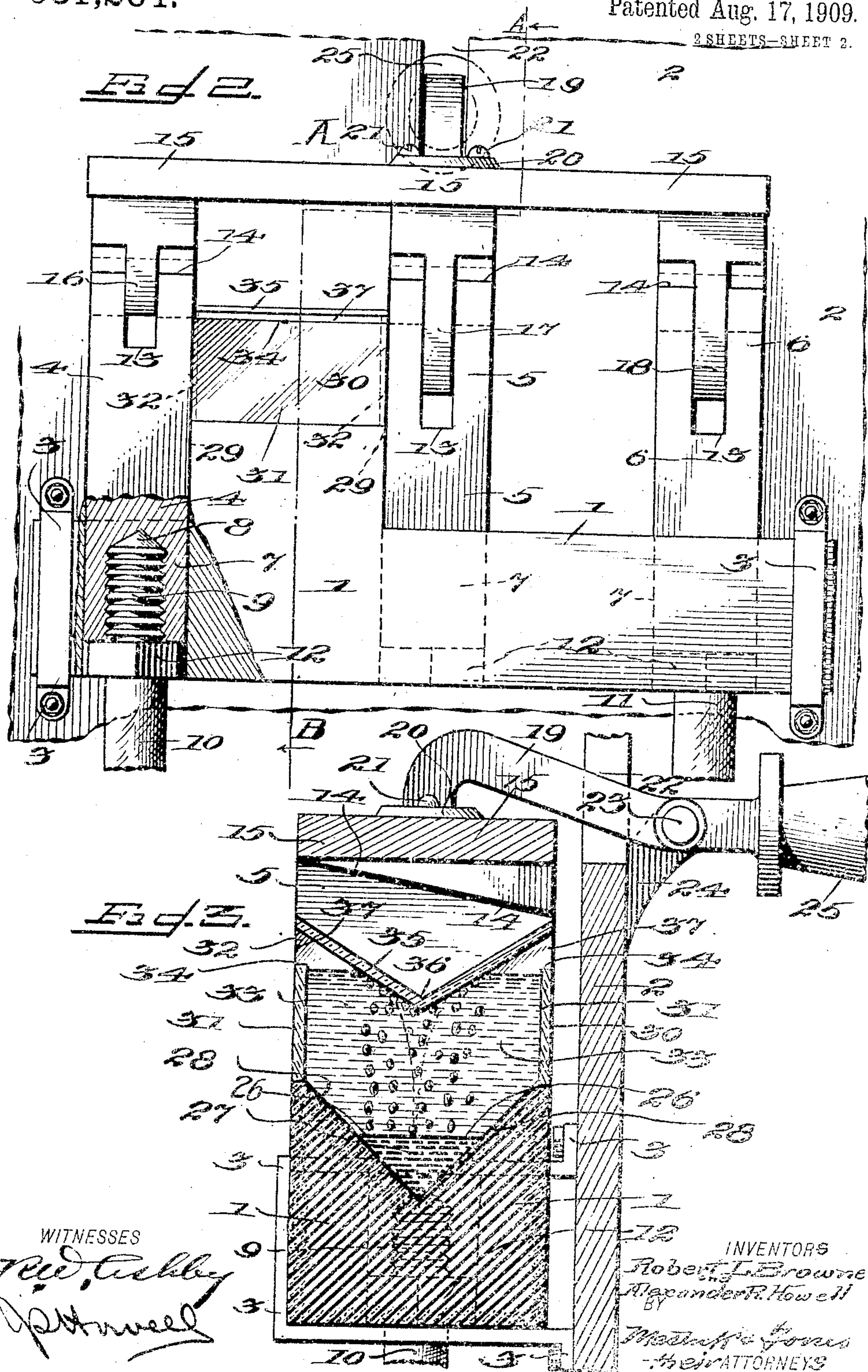
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# UNITED STATES PATENT OFFICE.

ROBERT L. BROWNE AND ALEXANDER R. HOWELL, OF NEW YORK, N. Y.

## CIRCUIT-BREAKER.

No. 931,264.

Specification of Letters Patent.

Patented Aug. 17, 1909.

Application filed May 11, 1906. Serial No. 316,276.

*To all whom it may concern:*

Be it known that we, ROBERT L. BROWNE and ALEXANDER R. HOWELL, citizens of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful improvements in Circuit-Breakers, of which the following is a specification.

Our invention relates to improvements in circuit breakers and has particular reference to apparatus for controlling currents of high voltage.

In the following is described in connection with the accompanying drawings one embodiment of the invention, the features thereof being more particularly pointed out hereinafter in the claims.

In the drawings Figure 1 is a perspective view illustrating the device as applied to the rear side of a switch board; Fig. 2 is a rear elevation showing the switch head partially lifted, and Fig. 3 is a vertical sectional view on the line A—B of Fig. 2.

Similar numerals of reference indicate similar parts throughout the several views.

The apparatus as shown comprises a marble base or foundation 1 fastened to the rear side of a switch board 2 by means of brackets 3, 3.

4, 5 and 6 are conductor bars or pole pieces supported in said marble base 1 by means of lugs 7, said lugs having bores or reception sockets 8 cut therein adapted to receive the screw threaded ends 9 of the circuit mains 10 and 11 held rigid in said sockets by means of jam nuts 12, the means as described affording a practically perfect contact. Conductor bars 4, 5 and 6 have slots 13 suitably formed or cut in their upper ends and extending the entire depth of the bars. The upper surfaces 14 of the bars are slightly beveled or tapered toward the switch board to form a contact or seat for switch head 15 carrying knife blades 16, 17 and 18. Knife blade 16 is much shorter than the other two of said blades for the purpose hereinafter described.

19 is a switch arm fastened to switch head 15 by means of plate 20 and screws 21, said arm 19 extending forwardly through slot 22 in switch board 2 and being pivotally mounted thereon as at 23 on bearing lug 24 fastened to the face of switch board 2, arm 19 having a handle 25 suitably mounted at its extreme outer end.

26 is an auxiliary or secondary conductor

comprising a mercury column 27 suitably placed in trough 28 in the marble base 1 and adapted to contact with the pole pieces 4, and 5 as at 29 forming a path between the respective conductors when the short knife blade 16 is out of contact with conductor 4.

30 is a casing comprising glass side walls 31 and end walls 32, the same forming a container for a suitable insulating substance such as a heavy oil 33. The level of the oil is slightly below the top 34 of the glass casing 30 to provide a space for the expansion of the oil when heated.

35 is a glass cover or shed mounted on end walls 32 the central portion 36 thereof being adapted to project or enter the body of the oil 33 to provide a collector for the mercury while the mercury column is being volatilized, and after volatilization has taken place and the circuit broken, to act as a guide for the return of the volatilized or vaporized mercury to its original position. 37, 37 are vents in the side of said casing or container to provide an uninterrupted passage for the fumes or vapors from the oil which becomes slightly heated by the volatilization of the mercury column or while the current is passing through the auxiliary conductor.

The operation of the device is as follows: The switch being in contact with the conductors permits current to pass from circuit mains 10 and 11 through conductors 4 and 6. The switch is then raised until knife blade 16 is entirely out of contact with conductor 4, the other two of said knife blades 17 and 18 being retained in contact with conductors 5 and 6. As the current will divide between the two parallel paths in proportion to their respective conductivities, when the main circuit is closed through conductor 4 approximately no current will pass through the mercury but when the circuit through conductor 4 is opened a path is formed through the mercury column to conductor 5, and thence through switch head 15 through conductor 6 to main 11. The current passing through the mercury column 27 will volatilize it, forming it into globules, which pass up through the oil 33 and are retained on glass cover or shed 35, the fumes or vapors from the heated oil passing out through vents 37 in the container casing. Immediately upon the complete volatilization of the mercury column the oil fills the mercury trough and breaks the circuit. After



volatilization has taken place, or when the circuit is broken, the globules of mercury retained on the collector cover will form into a mass and be shed from the under surface of the downwardly sloping edges of said cover and return to its original position and condition.

It is obvious that the means as herein described may be widely varied without departing from the spirit of the invention and we do not restrict ourselves to the details of construction herein specifically disclosed.

What we claim and desire to secure by Letters Patent is:—

1. An apparatus of the character described comprising a plurality of conductors, a liquid column of low conductivity connecting two of said conductors and adapted to divide the current passing therethrough until the path through one of the conductors is broken and to be volatilized by said current after said path is broken, and an insulating substance adapted to displace said liquid column upon the volatilization of the latter and to open the circuit.

2. An apparatus of the character described comprising a plurality of primary conductors, an auxiliary conductor in contact with at least two of the primary conductors, said auxiliary conductor comprising a liquid column adapted to conduct the current, a trough therefor, an insulating substance adapted to absorb the heat generated by the passage of current through said liquid column and a container for said insulating substance and means for directing the current from one of the primary conductors through the auxiliary conductor, the passage of the current through the latter volatilizing the liquid and permitting the insulating substance to displace the liquid and break the circuit.

3. An apparatus of the character described comprising a plurality of primary conductors, an auxiliary conductor in contact with at least two of the primary conductors, said

auxiliary conductor comprising a liquid column adapted to conduct the current, a trough therefor, an insulating substance adapted to absorb the heat generated by the passage of current through said liquid column, a container for said insulating substance and means for directing the current from one of the primary conductors through the auxiliary conductor, the passage of the current through the latter volatilizing the liquid and permitting the insulating substance to displace the liquid and break the circuit, and means for collecting the volatilized liquid and returning it to its original position and condition.

4. An apparatus of the character described including an auxiliary conductor comprising a liquid column adapted to conduct current, a trough therefor, an insulating substance adapted to rest on said liquid column, means for volatilizing said liquid column and permitting it to be displaced by the insulating substance to break the circuit, means for collecting said volatilized liquid, and means for returning it to its original position and condition.

5. An apparatus of the character described including an auxiliary conductor comprising a liquid column adapted to conduct current, a trough therefor, oil adapted to rest on said liquid column, means for volatilizing said liquid column and permitting it to be displaced by the oil to break the circuit, means for collecting said volatilized liquid and means for returning it to its original position and condition.

In testimony whereof we have hereunto signed our names in the presence of two subscribing witnesses.

ROBERT L. BROWNE.  
ALEXANDER R. HOWELL.

Witnesses:

SEABURY C. MASTICK,  
ROBERT W. ASHLEY.