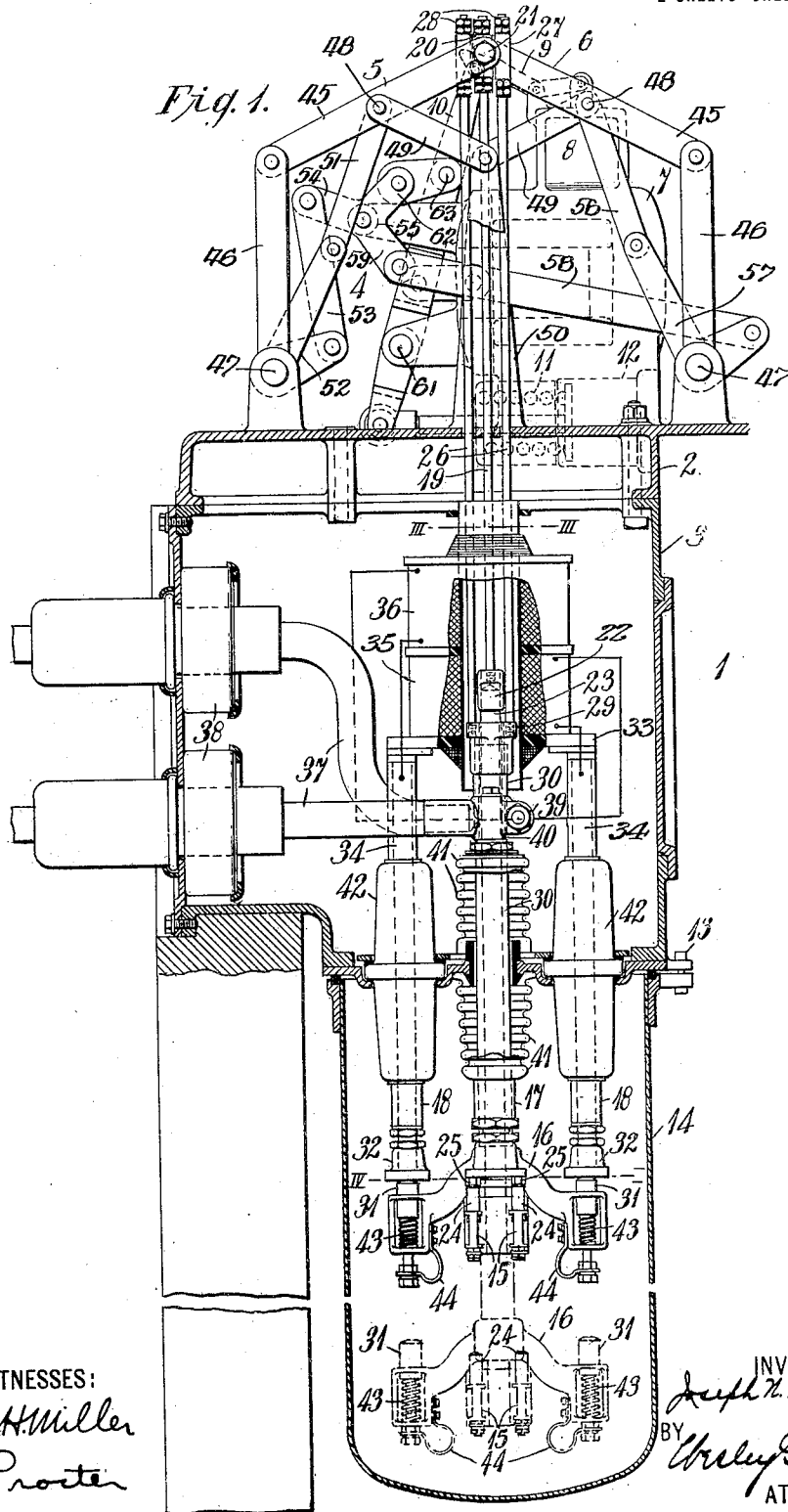


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CIRCUIT INTERRUPTER.
APPLICATION FILED AUG. 11, 1913.

1,181,237.

Patented May 2, 1916.

2 SHEETS—SHEET 1.



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Fig. 2.

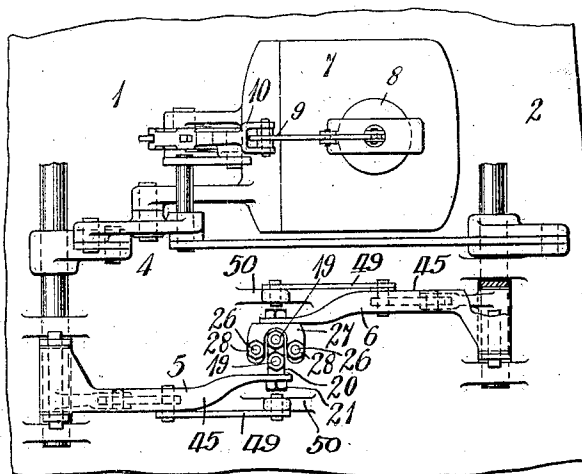


Fig. 5.

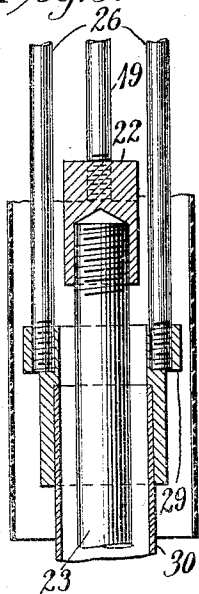


Fig. 3.

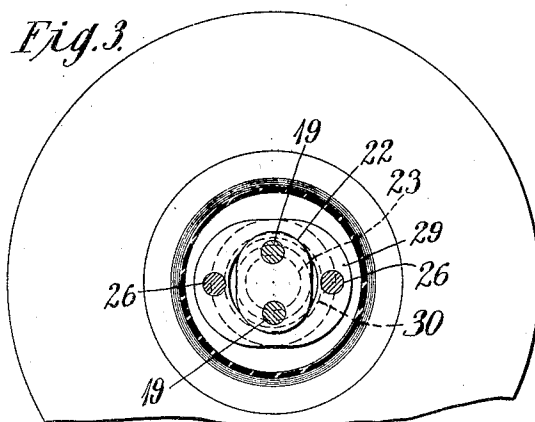
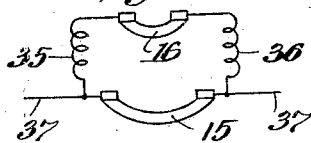


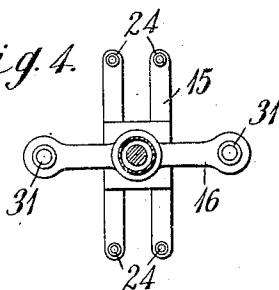
Fig. 6.



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Fig. 4.



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CIRCUIT-INTERRUPTER.

1,181,237.

Specification of Letters Patent.

Patented May 2, 1916.

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To all whom it may concern:

Be it known that I, JOSEPH N. MAHONEY, a citizen of the United States, and a resident of Wilkesburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Circuit-Interruption, of which the following is a specification.

My invention relates to electrical circuit-interrupting devices, and particularly to a concentric arrangement of circuit breakers of the reactance type.

The object of my invention is to provide a compact and efficient circuit breaker of the reactance type.

When a high-potential circuit is opened or closed in switching or automatically by external disturbances, a stationary or traveling transient wave is set up. In order to prevent this transient wave from causing an abnormal current to traverse the circuit, circuit breakers have been provided having auxiliary resistors which dissipate the energy of the transient wave before operation of the main circuit contact members that are connected in parallel relation to the auxiliary contact members.

Circuit breakers of the resistance type require a very large tank, if the resistor is immersed in oil, such being the usual practice for purposes of dissipating the heat. Circuit breakers of the resistance type are further deficient in their choking or reactive properties. To provide a positive choking action, I substitute a reactor for the resistor and thereby obtain a greater choking effect. I further provide a concentric construction of parts that permits the use of a minimum size of breaker.

In the accompanying drawings, Figure 1 is a side view, shown partially in section and partially in elevation, of a circuit breaker embodying my invention; Fig. 2 is a fragmentary plan view of the operating mechanism embodied in my invention; Fig. 3 is a sectional view taken on the line III—III of Fig. 1; Fig. 4 is a sectional view taken on the line IV—IV of Fig. 1; Fig. 5 is a fragmentary detail view, shown partially in section and partially in elevation, of the concentric arrangement of the operating rods embodied in my invention, and Fig. 6 is a diagrammatic view of the electrical connections of my invention.

A circuit breaker 1 comprises a frame 2

supported by a housing 3 that supports, in turn, an operating mechanism 4. The operating mechanism 4 comprises a plurality of links 5 that operate a reactance or auxiliary system of contacts, and a plurality of links 6 that operate a system of main contacts. The linkage mechanism 4 comprises also an electromagnet 7, a tripping magnet 8 that coöperates with a latch 9 and a roller 10, an accelerating spring 11 and a dash pot 12 for controlling the action of the breaker. An oil-containing tank 14 is attached to the under side of the housing 3 by bolts 13. The movable bridging members 15 and 16 and the stationary supporting members 17 and 18 are inclosed in the tank 14.

The motion of the linkage mechanism 5 is transmitted, in a vertical direction, by rods 19 that are attached, at their upper ends, to a block 20, that is attached to the links 5 by a bolt 21. The rods 19 are threaded, at their lower ends, and screwed into a block 22. The upper end of a rod 23 is screwed into the lower side of the block 22, and the bridging member 15, having a plurality of contact members 24 thereon, is secured to its lower end. Contact members 24 engage a plurality of stationary contact members 25 that are mounted on the supporting members 17. The motion of the mechanism 6 is transmitted, in a vertical direction, by rods 26 that are fastened to a U-shaped block 27 by a plurality of nuts 28 which are secured to the upper ends of the rods 26 above and below where they enter the block 27. The lower ends of the rods 26 are screwed into a hollow block 29 of elliptical section in which the block 22 is slidably mounted. A cylindrical hollow rod 30 is screwed to the lower side of the block 29 and has attached to its lower end the bridging arm 16 that supports a plurality of contact members 31. The contact members 31 engage the stationary contact members 32 that are mounted on the stationary supporting members 18. A washer 33 is supported by a plurality of rods 34 that terminate, at their lower ends, in the auxiliary stationary contact members 32. The washer is arranged concentrically with respect to the operating rods 19 and 26 and supports two reactors 35 and 36. The rods 34 serve as conductors from the stationary contact member 32 to one terminal of each of the reactors, as well as supports for the same. The remaining terminal of

each of the reactors is connected to a main conductor 37, substantially as shown in Fig. 6 of the drawings.

The main conductors 37 enter the housing 3 through insulating bushings 38 and terminate at clips 39 that are attached to rods 40 which extend through bushings 41 to the main stationary contact members 25. The rods 34 are protected also from the housing 3 by insulating bushings 42. The movable contact members 24 and 31 are resiliently supported by springs 43 and are connected to the bridging member 16 by flexible conductors 44.

The linkage mechanisms 5 and 6 severally comprise links 45 that are connected, at their upper ends, to the respective blocks 20 and 27. The lower ends of the links 45 are connected to the upper ends of links 46, the lower ends of which are pivotally mounted on stationary pins 47. One end of a guiding link 49 is connected to each of the pins 48 that are located at points intermediate the ends of the links 45 one end of a guiding link 49, the other ends of the links 49 being pivoted to stationary projections 50. A link 51 is attached to the pin 48 in the link 45 of the linkage mechanism 5, and its lower end is connected to the upper end of one arm of a bell-crank lever 52 that is pivoted on one of the pins 47. The other arm of the lever 52 is connected to a link 53, which, in turn, is operatively connected to one arm 54 of a pivoted lever 55. The angle formed by the arms of the bell-crank lever 52 is substantially less than 90°. A link 56 is attached to the pin 48 in the link 45 of the linkage mechanism 6, and its lower end is connected to the upper end of one arm of a bell-crank lever 57 that is pivoted on one of the pins 47. The other arm of the lever 57 is connected to a link 58 which, in turn, is operatively connected to one arm 59 of the lever 55. The angle formed by the arms of the bell-crank lever 57 is substantially 90° or relatively greater than the angle formed by the arms of the lever 52. The roller 10 forms the upper end of a lever 60 that is pivoted on a pin 61 at a point intermediate its ends. The movable core member of the electromagnet 7 is operatively connected to the lever 60, and the arm 62 of the lever 55 is also operatively connected to the lever 60 by a link 63. The lower end of the lever 60 is operatively connected to the movable member of the accelerating spring 11, substantially as shown.

Assuming that the circuit breaker is in its closed position, as shown, and that the tripping electromagnet 8 is energized to trip the same, the operation is as follows: When the latch 9 releases the roller 10, the lever 60 moves counter-clockwise, which motion causes the lever 55 to move also. The

movement of the lever 55 operates the levers 52 and 57. Since the angles formed by the arms of the levers 52 and 57 are relatively different, the rods 26 are moved downwardly first, thus opening the main contact and allowing the reactors to remain in series relation with the main conductors 37. This action tends to choke down any transient wave that has been set up. After such choking effect has lasted a sufficient length of time to cause the system to reach a state of equilibrium, the bridging arms 16 operate, by reason of the further movement of the lever 55, to completely open the circuit.

On closing the circuit, the rods 19 operate first to allow the rush of current to be dissipated in the reactors 35 and 36; then, after a given time interval, the operating rods 26 operate to close the circuit.

I do not limit my invention to any particular form of construction or operating mechanism, as many modifications may be made within the scope of the invention, as set forth in the appended claims.

I claim as my invention:

1. A circuit interrupter comprising main and auxiliary contact members, operating rods for said contact members, said rods being concentrically arranged with respect to each other, reactors disposed around said concentric rods and connected between said main and auxiliary contact members, and an operating mechanism for operating the said rods to effect engagement of the auxiliary contact members before, and disengagement after, the main contact members.

2. A circuit interrupter comprising stationary and movable main contact members, stationary and movable auxiliary contact members, an operating rod for the said main movable contact member, a second operating rod disposed around the first operating rod for the said auxiliary movable contact members, and an operating mechanism for operating the said rods to effect engagement of the auxiliary contact members before, and disengagement after, the main contact members.

3. A circuit interrupter comprising stationary and movable main contact members, stationary and movable auxiliary contact members, an operating rod for the said main movable contact members, a second operating rod disposed around the first operating rod for the said auxiliary movable contact member, two reactors disposed around the said rods and supported by the said stationary auxiliary contact members to which they are electrically connected, and an operating mechanism for operating the said rods to effect engagement of the auxiliary contact members before, and disengagement after, the main contact members.

4. A circuit interrupter comprising main

and auxiliary contact members, operating rods for said contact members, the said rods being concentrically arranged with respect to one another, an operating mechanism comprising a bell-crank lever for operating one of the rods, and a second operating mechanism comprising a bell-crank lever having arms that form an angle substantially different from the angle formed by the arms of the first bell-crank lever to thereby effect engagement of the auxiliary contact members before, and disengagement after, the main contact members.

5. A circuit interrupter comprising stationary and movable main and auxiliary contact members, operating rods for the said movable main and auxiliary contact members, reactors disposed around the said rods and supported by the said auxiliary stationary contact members to which they are electrically connected, and a toggle mechanism for each of the said rods severally comprising a bell-crank lever and a plurality of connecting links, the bell-crank lever in each of the mechanisms having arms which form angles that differ one from the other to thereby effect engagement of the auxiliary contact members before, and disengagement after, the main contact members.

6. A circuit interrupter comprising two pairs of stationary contact members, two movable bridging members disposed at right angles to one another, a plurality of concentrically arranged rods operatively connected to said bridging members, and means for operating said bridging members to effect engagement between one pair of

contact members and one bridging member before, and disengagement after, the other pair of stationary contact members and the other bridging member engage and disengage.

7. In a circuit interrupter, the combination with main and auxiliary contact members, of a plurality of rods operatively connected to said contact members, means for operating said rods to effect engagement of the auxiliary contact members before, and disengagement after, the main contact members, and a reactor concentrically disposed around said rods and electrically connected between certain of said contact members.

8. An operating mechanism for a circuit interrupter comprising two operating rods disposed concentrically with respect to each other, two bell-crank levers for operating said rods, said bell-crank levers having arms which form angles that differ one from the other to cause one rod to operate before the other.

9. A circuit interrupter comprising a plurality of movable and stationary contact members, concentrically disposed operating rods for the movable contact members, and means for operating said rods to effect engagement between one pair of contact members before, and disengagement after, the other pair of contact members.

In testimony whereof, I have hereunto subscribed my name this 29th day of July, 1913.

JOSEPH N. MAHONEY.

Witnesses:

B. B. HINES,
M. C. MERZ.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."