E. C. RANEY & C. E. SIMMONS.

AUTOMATIC CIRCUIT BREAKER.

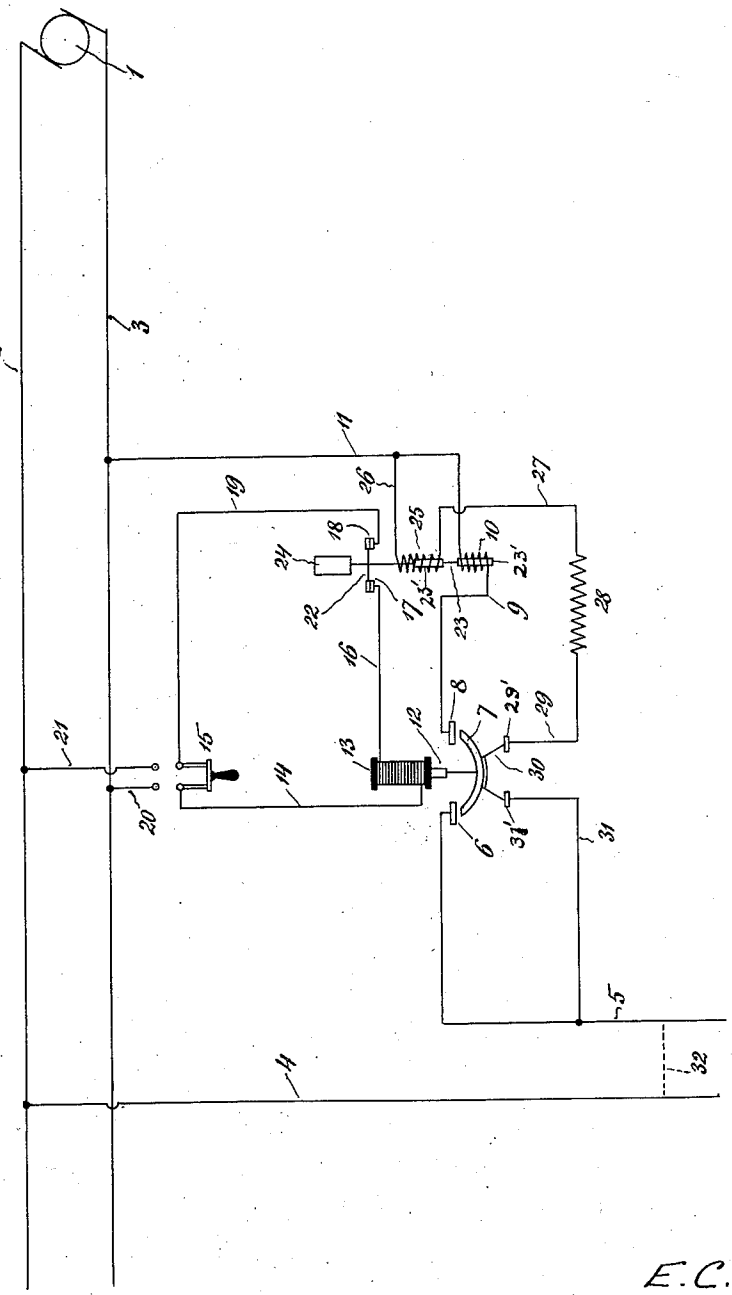
APPLICATION FILED OCT. 10, 1908.

1,005,575.

Patented Oct. 10, 1911.

2 SHEETS—SHEET 1.

Fig. 1.



Witnesses

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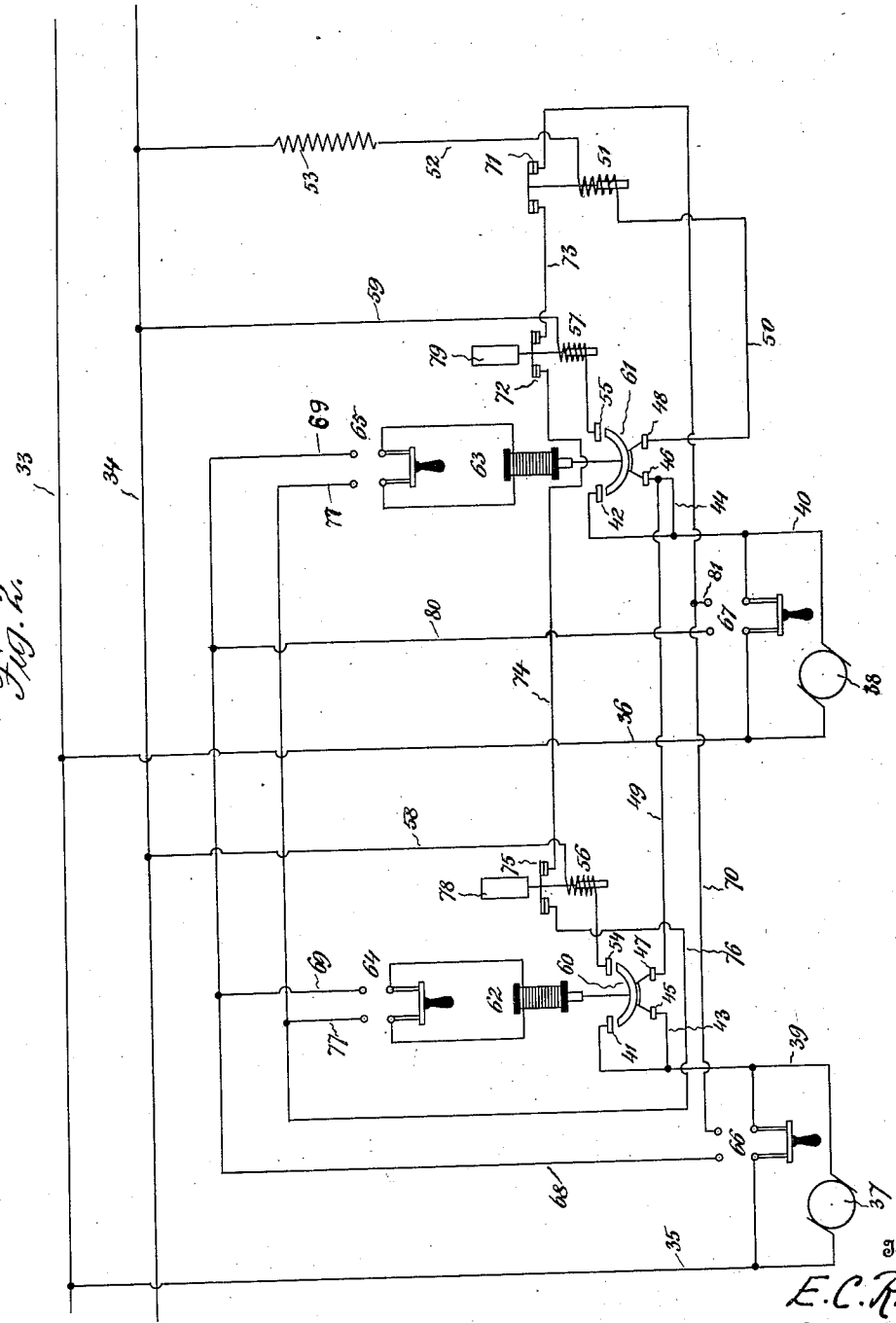
2 SHEETS—SHEET 2.

Fig. 2.



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UNITED STATES PATENT OFFICE.

ESTELLE C. RANEY, OF CROOKSVILLE, AND CHARLES E. SIMMONS, OF STEUBENVILLE, OHIO.

AUTOMATIC CIRCUIT-BREAKER.

1,005,575. Specification of Letters Patent. Patented Oct. 10, 1911.

Application filed October 10, 1908. Serial No. 457,129.

To all whom it may concern:

Be it known that we, (1) ESTELLE C. RANEY and (2) CHARLES E. SIMMONS, citizens of the United States of America, residing at (1) Crooksville and (2) Steubenville, in the counties of (1) Perry and (2) Jefferson, State of Ohio, have invented certain new and useful Improvements in Automatic Circuit-Breakers, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to automatic circuit breakers, and the object of our invention is to provide a switch which will open the circuit on overload or when short circuited, and close the circuit automatically when the overload or short circuit is removed.

To this end we have devised a novel apparatus that can be used in connection with parallel generator work or within a motor circuit with either alternating or direct current, the apparatus being simple in construction, positive in action and highly efficient for controlling circuits that are liable to be overloaded or short circuited.

Our invention will be hereinafter more fully described and then specifically claimed.

Referring to the drawings, Figure 1 is a diagrammatic view of our apparatus in connection with a motor circuit, and Fig. 2 is a similar view of the apparatus used in connection with parallel generator work.

In the drawings, 1 designates a generator having feed lines 2 and 3. Connecting with the feed line 2 is a wire 4 constituting one of the circuit wires of a motor or any other load. The other circuit wire 5 is connected to a contact 6, which is engaged by a main switch 7 adapted to engage another contact 8. The contact 8 is connected by a wire 9 with an overload coil 10 and this overload coil is connected by a wire 11 to the feed line 3.

The main switch 7 is carried by the core 12 of an operating solenoid 13, said solenoid being connected by a wire 14 to a manually operated switch 15, and by a wire 16 to a contact 17. Associated with the contact 17 is another contact 18 which is connected by a wire 19 to the switch 15. The switch 15 is connected with the feed lines 2 and 3 through the medium of wires 20 and 21.

The contacts 17 and 18 are adapted to be connected by an overload switch 22, carried by the plunger of a dash pot 24, said plunger having cores 23′ extending through a holding coil 25 and the overload coil 10 and connected by a rod 23. The holding coil is connected by a wire 26 to the wire 77 and by a wire 27 to a resistance 28. The resistance 28 is connected by a wire 29 to a contact 29′. A wire 31 connected to the motor circuit wire 5 is connected to a contact 31′ which contacts 29′ and 31′ are adapted to be bridged by a yoke 30 on the main switch 7.

When the generator 1 is started, the hand switch 15 is closed to energize the solenoid 13 and raise the switch 7 to engage the contacts 6 and 8. The circuit is then through the feed line 2, motor circuit wires 4 and 5, contacts 6 and 8 by the switch 7 to the overload coil 10, and by wire 11 to the feed line 3.

In case of an overload, or a short circuit, as designated by a dotted line 32, the dash-pot plunger is raised by the overload coil 10, opening the circuit between the contacts 17 and 18, breaking the circuit through the solenoid 13 and allowing the switch 7 to descend and the yoke 30 to engage the contacts 29′ and 31′. The circuit is then through the wires 31 and 29, resistance 28 to the holding coil 25, and by wires 26 and 11 to the feed line 3. After a load has assumed its normal condition, or short circuit removed, the contacts 17 and 18 are again bridged as a result of the current in coil 25 being reduced and the circuits are reëstablished.

The dash-pot 24 is primarily to retard the closing or bridging of the contacts 17 and 18 until core 12 has had time to fall and establish a circuit through switch 7, yoke 30 and coil 25, and the operation of the closing of contacts 17 and 18 is regulated through the medium of the holding coil 25.

In connection with the above circuits, it will be observed that the contacts 17 and 18, switch 22 and cores 23′ constitute an automatic switch controlled by the overload coil and the holding coil.

Reference will now be had to Fig. 2 of the drawings, wherein I have illustrated two bus bars 33 and 34. The bus bar 33 is connected by wires 35 and 36 to generators 37 and 38, said generators being connected by wires 39 and 40 to contacts 41 and 42, and by wires 43 and 44 to contacts 45 and 46 respectively. Associated with the contacts 45 and 46 are contacts 47 and 48, the former being connected by a wire 49 to the wire 44, while the latter is connected by a wire 50 to a holding coil 51, which is connected by a wire 52 to a resistance 53 connecting with the bus bar 34. Associated with the contacts 41 and 42 are contacts 54 and 55, these contacts being connected to overload coils 56 and 57 that are connected to the bus bar 34 by wires 58 and 59. The circuits through the contacts 41, 54, 45, 47, 42, 55, 46, and 48 are controlled by switches 60 and 61 actuated by operating solenoids 62 and 63 in circuit with manually operated switches 64 and 65. In connection with the switches 64 and 65 we use manually operated switches 66 and 67, the former being connected to the wires 35 and 39, by wires 68 and 69 to the switches 64 and 65, by a wire 70 to an automatic switch 71 opened and closed by the holding coil 51. The automatic switch is connected to another switch 72 by a wire 73, and the switch 72 is connected by a wire 74 to still another switch 75, which is connected by wires 76 and 77 to the switches 64 and 65. The switches 72 and 75 are actuated by the overload coils 56 and 57 in conjunction with dash-pots 78 and 79. Switch 67 is connected to the wires 36 and 40, and by wires 80 and 81 to the wires 68 and 70.

When one of the generators is operated, its own switch 66 or 67 and magnet switch 64 or 65, according to which generator is in operation, are closed, but when the generators are operated in parallel, it is only necessary to close either or both of the switches 66 or 67 and the switches 64 or 65.

With the generators operated in parallel, the circuit for the current of the generator 37 for operating the automatic switches is through wire 39, switch 66 to wires 70, through the automatic switch 71, by wires 73 to switch 72, through wires 74 to switch 75, through wire 76 by wire 77, to switch 64, through solenoid 62 by wire 69, to wire 68, and to the wire 35 by switch 66. Also solenoid 63 is in parallel with solenoid 62 across the wires 68 and 76.

In energizing the solenoid 62, the switch 60 is elevated and the circuit is through the bus bars 33 and 34 by wires 35 and 58. In case of an overload, the circuit is broken at the switch 75 which is actuated by the overload coil 56. The breaking of this circuit deënergizes solenoid 62 and allows the switch 60 to descend. The circuit is then through wire 43, contacts 45 and 47, wire 49 to the contacts 46 and 48, wire 50 to the holding coil 51, wire 52 to the resistance 53 which is connected to the bus bar 34.

Since solenoid 63 and switch 72 are in circuit with solenoid 62, switch 75 and generator 38, the overloading or short circuiting of the bus bars 33 and 34 can be readily controlled when the generators 37 and 38 are operated in parallel.

It will be observed that we have devised a novel reclosing circuit breaker, which upon opening by overload, closes another circuit which will automatically close the breaker at the proper time.

An important feature of the circuit breaker resides in the fact that when the bridge 7 (Fig. 1) descends on account of an overload, there is another circuit established from wire 4 through the short circuit or overload 32, to wires 5 and 31, yoke 30, wire 29, resistance 28, wire 27, coil 25, wires 26 and 11 to the line 3. The coil 25 is adjusted whereby when there is a short circuit, enough current will flow through the resistance 28 and coil 25 to hold contacts 22 and 18 open, but whenever the resistance of the other circuit or overload is increased to any desired amount, the coil 25 will allow contacts 22 and 18 to close the main circuit through solenoid 13.

In connection with the parallel operation of generators, it will be observed that all circuit breakers can be closed simultaneously by first closing switches 64 and 65, then upon closing either switch 66 or 67, the breakers are both energized at once.

It is thought from the wiring shown in Fig. 2 that the other currents will be fully understood, and while we have not shown the specific construction in connection with the overload coils, and adjustable circuit closing coils, we reserve the right to select coils suitable for this purpose.

Having now described our invention, what we claim as new, is:—

1. In an electrical distribution system, a generator, feed lines, a motor circuit, a main switch, an operating solenoid for said main switch, a circuit for said solenoid, said solenoid controlled by said motor circuit, an overload switch in the circuit of said solenoid and controlled by said motor circuit, a holding coil coöperating with said overload switch and controlled by a shunt circuit, a retarding device for said overload switch, said main switch serving when in one position to close the main circuit and when in another position to close the shunt circuit.

2. In an electrical distribution system, feed lines, motor circuits, main switches, operating solenoids for said main switches, circuits for said solenoids, said solenoids con-

trolled by said motor circuits, shunt circuits connected to said motor circuits, overload switches in the circuits of said solenoids, holding-coils in coöperative relation with said overload switches, contacts normally bridged by said main switches to close the motor circuits when said operating solenoids are energized, and auxiliary contacts in said shunt circuits adapted to be bridged by said main switches when said solenoids are de-energized.

In testimony whereof we affix our signatures in the presence of two witnesses.

ESTELLE C. RANEY.
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Witnesses:
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