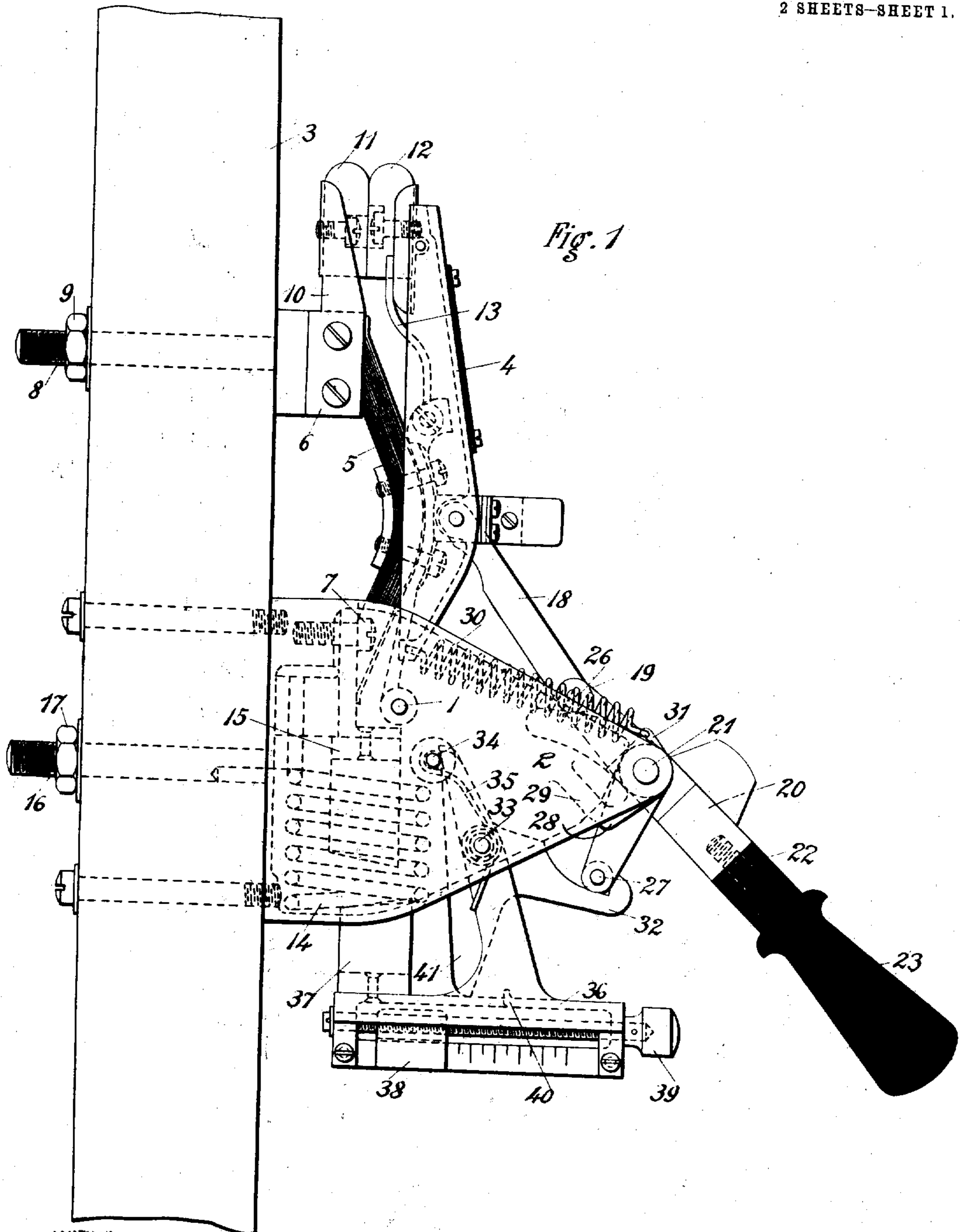


H. R. STUART.
ELECTRICAL CIRCUIT BREAKER.
APPLICATION FILED FEB. 6, 1906.

973,889.

Patented Oct. 25, 1910.
2 SHEETS—SHEET 1.



WITNESSES:
Camille Boulton
Otto S. Schairer

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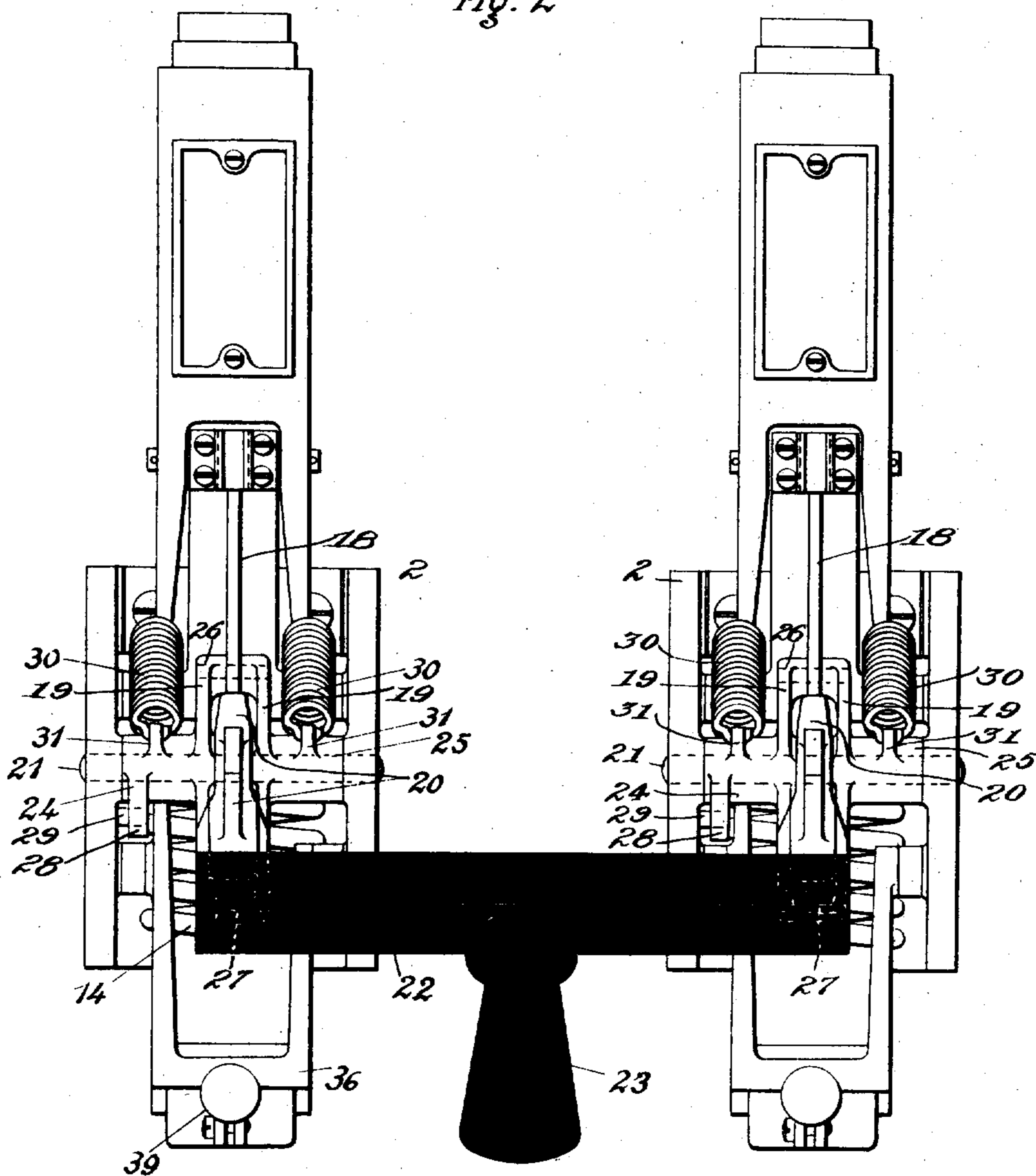
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Fig. 2



WITNESSES:
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UNITED STATES PATENT OFFICE.

HARVE R. STUART, OF WILKINSBURG, PENNSYLVANIA, ASSIGNOR TO WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY, A CORPORATION OF PENNSYLVANIA.

ELECTRICAL-CIRCUIT BREAKER.

973,889.

Specification of Letters Patent.

Patented Oct. 25, 1910.

Application filed February 6, 1906. Serial No. 299,762.

To all whom it may concern:

Be it known that I, HARVE R. STUART, a citizen of the United States, and a resident of Wilkinsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Electrical-Circuit Breakers, of which the following is a specification.

My invention relates to electrical circuit-breakers and particularly to multiple pole breakers.

The object of my invention is to provide a novel and improved structure and arrangement of parts whereby the simultaneous opening of a plurality of circuit-breakers may be effected.

When polyphase electric circuits are protected by means of circuit-breakers, it is desirable that the breakers pertaining to the several phases of the circuit shall be operated simultaneously, or nearly so, upon the occurrence of abnormal conditions. In order to effect such simultaneous operation, the circuit-breakers have heretofore been independently operated and the tripping mechanisms therefor have usually been mechanically connected so that when one breaker was released, release of the others was also effected. For the purpose, however, of rendering the operation of a plurality of such devices more reliable and satisfactory than has been the case when thus constructed and arranged, I propose to provide the breakers with independent tripping mechanisms and with but a single operating handle, and to so construct and arrange the parts that when one of the breakers opens, it will move the operating handle and cause the release of the remaining breakers.

Figure 1 of the accompanying drawings is a view, in side elevation, of a circuit-breaker constructed in accordance with my invention and Fig. 2 is a view, in front elevation of two circuit-breakers like that shown in Fig. 1.

In general, in describing the invention, the parts of only a single circuit-breaker will be referred to, it being understood that the structures of all of the breakers to which the invention is applied are substantially alike.

Pivotally supported upon a pin 1, in a U-shaped bracket 2 upon the front of an insulating panel 3, is a switch arm 4 to which a contact member 5 composed of thin strips

of conducting material, such as copper, is rigidly secured. The ends of the member 5 are beveled and are adapted to engage upper and lower stationary circuit terminals 6 and 7, respectively, the former of which is secured to the panel 3 by means of a through bolt 8, one end of which is screw-threaded and provided with a nut 9, whereby the terminal may be connected to an electrical circuit. A bracket 10 extends upwardly from the terminal 6 and rigidly supports a carbon block 11 with which another carbon block 12, that is pivotally mounted in the upper end of the switch arm 4, is adapted to engage. A spring 13 serves to tilt the block 12 from the position shown, when the circuit-breaker is opened, in such manner that the upper edges of the blocks will be last to disengage and when the circuit-breaker is closed the upper edges will also be first to engage. The circuit terminal 7 is connected to one terminal of a coil 14 having a core 15, the other terminal of the coil being connected to a through bolt 16, the free end of which is threaded and provided with a nut 17, whereby connection may be made to an electrical circuit.

A pair of toggle levers 18 and 19 for operating the switch arm 4 may be actuated by means of another lever 20 that is mounted concentrically with the lever 19, upon a pin 21, between the outer ends of the bracket 2, the inwardly extending end of the lever 20 engaging the toggle levers at the joint between them. The outer ends of the levers 20 of adjacent breakers may be connected by means of a bar 22 that carries an operating handle 23. The toggle lever 19 is in the form of a bell crank comprising two portions 24 and 25, that are loosely mounted upon the pin 21 upon opposite sides of the lever 20 and are connected by means of pins or rivets 26 and 27, the pin 26 serving to pivotally connect the levers 18 and 19. The bell crank lever 19 is provided with a lug 28 that is adapted to engage a corresponding lug or stop 29 on the stationary bracket 2 to prevent complete straightening of the toggle joint. Springs 30, the opposite ends of which are attached to lugs 31 on the toggle lever 19 and to the switch arm 4, normally tend to cause buckling or breaking of the toggle joint.

The levers and the circuit-breaker are held in the position shown, against the tension of

the springs 30, by means of a trigger 32 that engages the pin 27 in the end of the bell crank lever and is loosely mounted upon a pin 33. The trigger is normally maintained in the position shown, against a pin or stop 34, by means of a spring 35. A frame 36, that is also loosely mounted upon the pin 33, carries an armature 37 for the electro-magnet 15 and a weight 38, the position of which may be adjusted by means of a thumb screw 39 for the purpose of varying the electro-magnetic force that the electro-magnet 15 must exert upon the armature 37 in order to raise it. The frame 36 is also provided with a lug or stop 40 that is adapted to engage a downwardly projecting arm 41 of the trigger 32, when the armature 37 is raised, and thus disengage the trigger 32 from the pin 27 and permit the springs 30 to buckle the toggle joint and open the circuit-breaker.

Upon the occurrence of an overload, a ground, a short circuit or any other abnormal condition causing an excessive flow of current upon one conductor of a circuit that is protected by means of these circuit-breakers, the breaker for that conductor will be released automatically, in a manner which will be readily understood from the description and drawings, on account of the raising of the armature. Upon buckling of the toggle joint between the levers 18 and 19, the inwardly extending end of the lever 20, is carried downwardly by the joint. The levers 20 of all of the breakers being rigidly connected by means of the bar 22, all will be operated in a similar manner, and the inner ends thereof will be brought into engagement with the corresponding triggers, the levers being of a length to permit such engagement, and the release of the remaining breakers will thus be effected mechanically. It is seen, therefore, that when one of the circuit-breakers opens automatically on account of the occurrence of abnormal conditions in the corresponding circuit conductor, release of the remaining circuit-breakers is reliably insured by mechanical means.

Since the tripping mechanisms are independently actuated and may be adjusted to operate upon the occurrence of given abnormal conditions in the particular conductors with which they are connected, the operation of all of the breakers in a polyphase circuit, when unbalancing occurs therein, will depend only upon the occurrence of those conditions in a single conductor thereof, and not upon an aggregate effect of the abnormal conditions in two or more conductors, as has heretofore been the case with some circuit-breakers.

While I have shown and described my invention as applied to only two circuit-breakers, it will be readily understood that it is equally applicable to a greater number, and that, if desired, it may be applied to multi-

ple pole or other circuit-breakers for direct current circuits.

Obviously, the structural details and arrangements of the parts of the circuit-breakers may be varied widely from what have here been shown and described without altering the mode of operation of the invention or departing materially from its spirit, and I desire that the invention be construed to cover all such modifications.

I claim as my invention:

1. The combination with a plurality of circuit-breakers, a single closing handle therefor having projections for the respective breakers which severally serve as both closing and tripping members, and devices for retaining the circuit-breakers in closed position, of an electro-magnetically actuated means for withdrawing each retaining device, and means for actuating the projections of the other circuit-breakers to effect withdrawal of their retaining devices.

2. The combination with a plurality of circuit-breakers, operating levers therefor having projecting ends and a single handle for moving all of the levers, of devices for retaining the breakers in closed position, an electromagnetically actuated means for tripping each retaining device and means for actuating the projecting ends of the operating levers to trip all of the retaining devices which are not electromagnetically tripped.

3. In a circuit-breaker, the combination with a movable switch arm and toggle levers for actuating the same, of means cooperating directly with one of said toggle levers to retain the circuit-breaker in closed position, and a loosely mounted lever having an arm for directly engaging the joint between the toggle levers to close the breaker and adapted to engage the retaining means to trip the breaker.

4. In a circuit-breaker, the combination with a movable switch arm and toggle members for actuating the same, of means cooperating directly with one of said toggle members to retain the circuit-breaker in closed position, independently actuated means for releasing the same, and a loosely mounted lever having an arm for engaging the joint between the toggle members to close the breaker and adapted to engage the retaining means to release the breaker.

5. In a circuit-breaker, the combination with a switch arm and toggle members for actuating the same, of a trigger that engages one of said members to retain the circuit-breaker in closed position, and a lever loosely pivoted concentrically with one of the toggle members and having an arm for engaging the joint between the members to close the breaker and adapted to engage the trigger and move it from its holding position.

6. The combination with a plurality of circuit-breakers, each of which comprises a switch arm, toggle members for actuating the same, means coöperating with one of the toggle members for retaining the circuit-breaker in closed position, and levers having projecting ends to effect closing operation of the toggle members and to also trip the retaining means when oppositely

moved, of a single actuating handle for the 10 operating levers of all the breakers.

In testimony whereof, I have hereunto subscribed my name this 30th day of January 1906.

HARVE R. STUART.

Witnesses:

HOWARD G. McDONALD,
BIRNEY HINES.