

E. A. BURROWS & F. P. McINTOSH.

CIRCUIT BREAKER.

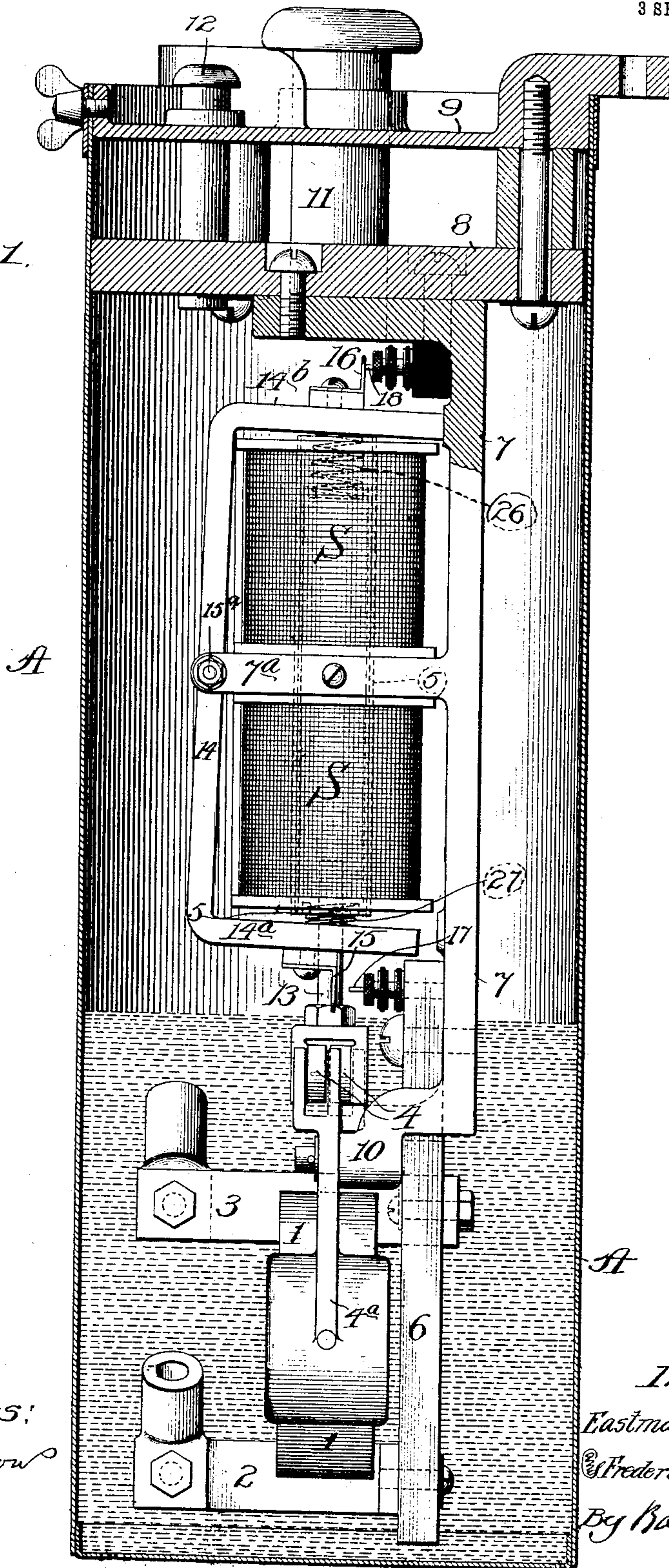
APPLICATION FILED APR. 9, 1906.

963,859.

Patented July 12, 1910.

3 SHEETS—SHEET 1.

Fig. 1.



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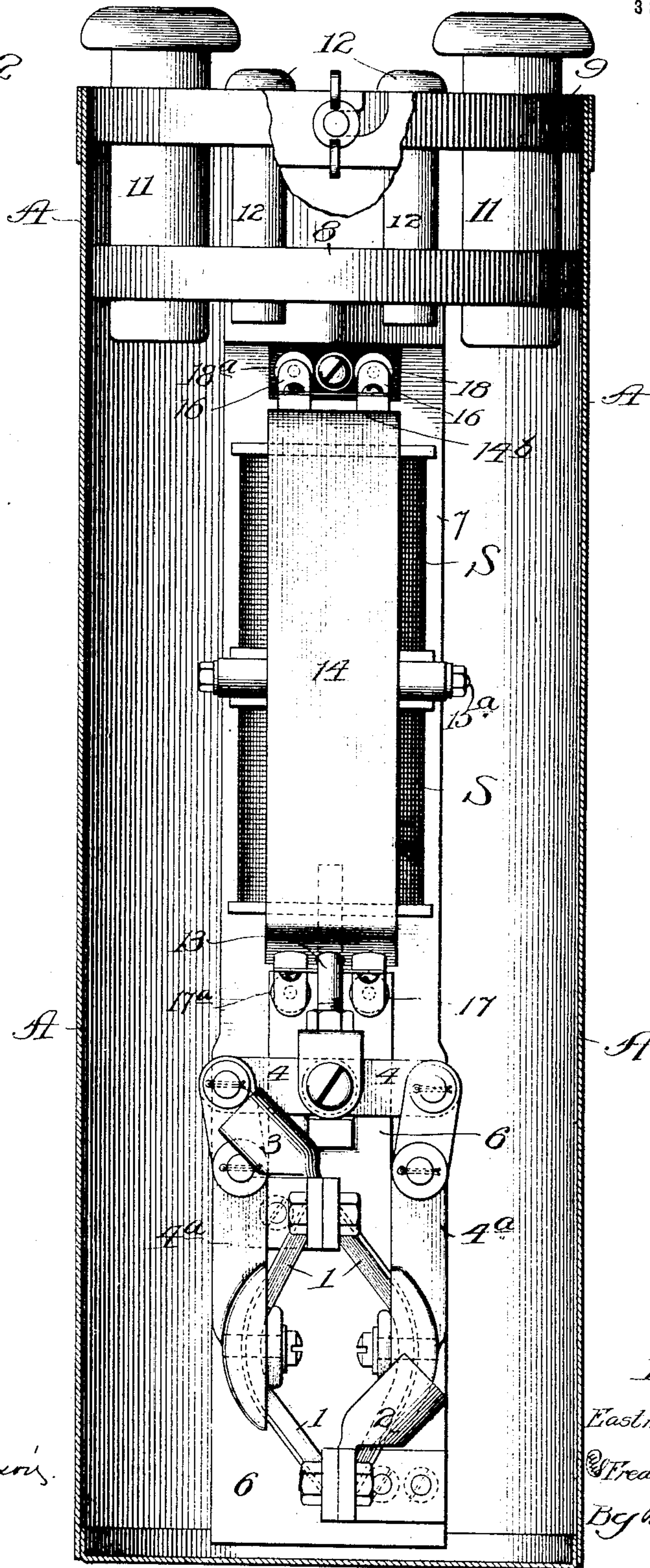
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3 SHEETS—SHEET 2.

Fig 2



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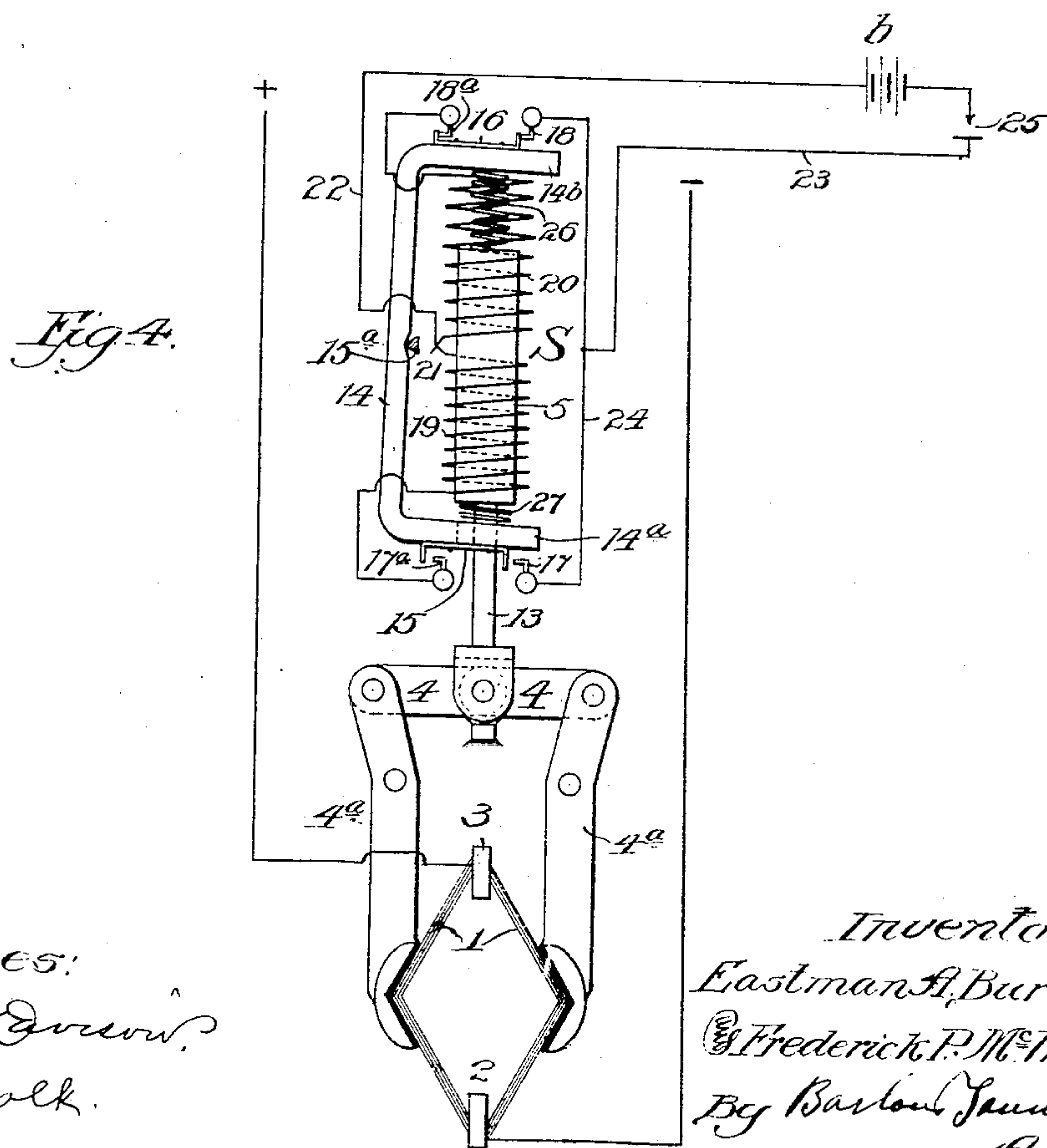
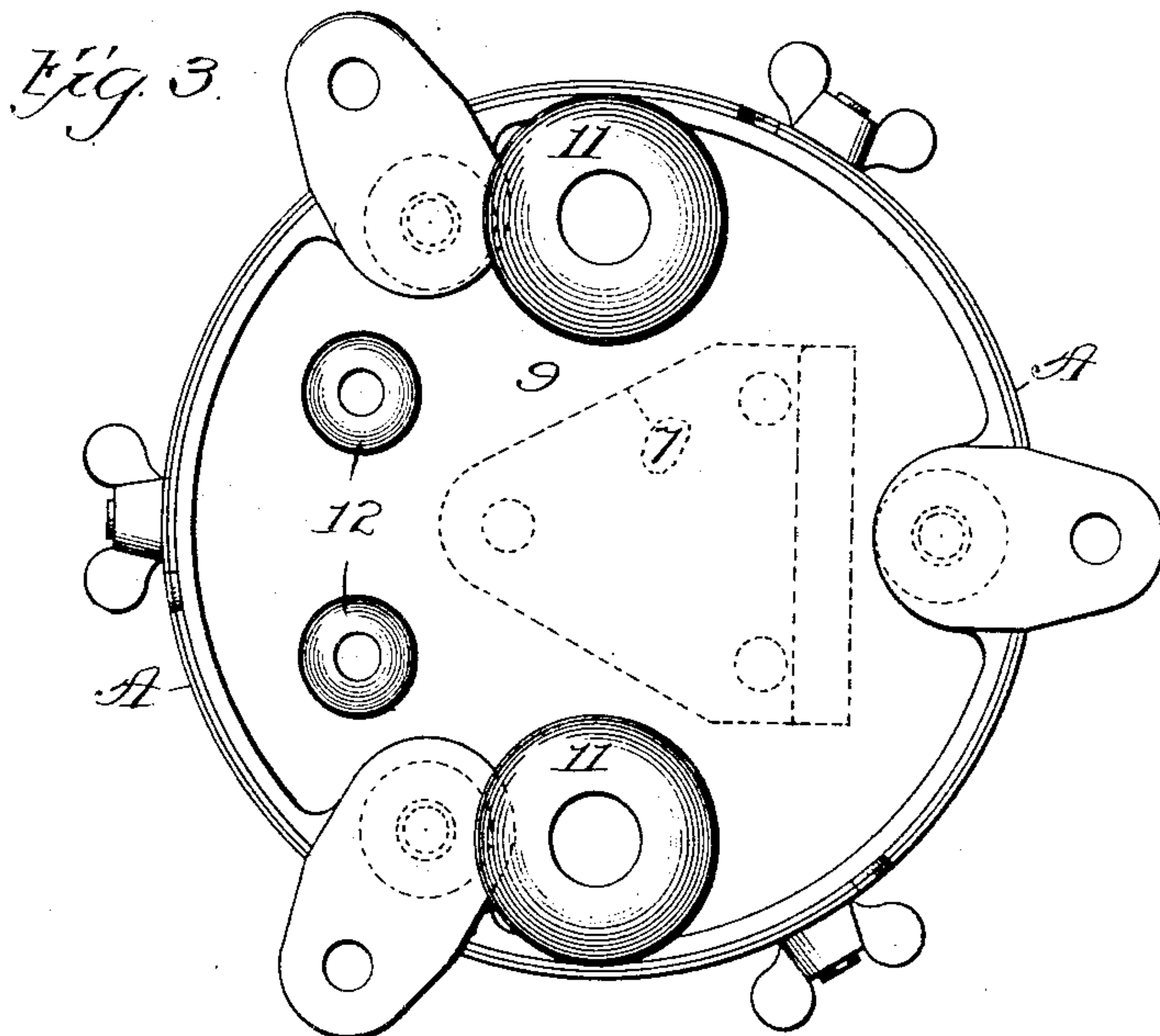
CIRCUIT BREAKER.

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3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

EASTMAN A. BURROWS, OF CHICAGO, ILLINOIS, AND FREDERICK P. McINTOSH, OF ELKHART, INDIANA, ASSIGNORS, BY MESNE ASSIGNMENTS, TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

CIRCUIT-BREAKER.

963,859.

Specification of Letters Patent.

Patented July 12, 1910.

Application filed April 9, 1906. Serial No. 310,789.

To all whom it may concern:

Be it known that we, EASTMAN A. BURROWS and FREDERICK P. McINTOSH, citizens of the United States, residing at Chicago, in the county of Cook and State of Illinois, and Elkhart, in the county of Elkhart and State of Indiana, respectively, have invented a certain new and useful Improvement in Circuit-Breakers, of which the following is a full, clear, concise, and exact description.

Our invention relates to switches for electric circuits, and more particularly to high-potential switches or circuit breakers in which the contact parts are immersed in oil or other insulating fluid to prevent the formation of arcs when the switch is opened.

The object of our invention is to produce a simple and efficient means for operating the circuit breaker, the control for both opening and closing the same being obtained by a single push button circuit.

In its preferred form, our invention contemplates a structure in which the switch proper and a solenoid for actuating the same are inclosed in a box containing oil in which said switch is submerged. This box is mounted in some convenient position, as for example on the back of the switchboard. The solenoid circuit is controlled by a push button mounted on the panel of the switchboard. Since but a single button thus controls both the opening and closing of the switch, the number of panels required is reduced to a minimum, with a consequent cheapening in the cost of installation.

These and other features of our invention may be more readily understood by reference to the accompanying drawing, in which,

Figure 1 is an elevation partly in vertical section, of our invention; Fig. 2 is a view similar to that of Fig. 1, at a right angle thereto; Fig. 3 is a plan view showing the top of the cylindrical box; and Fig. 4 is a diagram showing the circuits employed in our invention.

Similar characters of reference indicate similar parts wherever shown.

The switch illustrated in the drawing is provided with contact blades 1, 1, which engage the stationary switch members 2, 3. The blades 1, 1, are operated by suitable toggle mechanism 4, actuated by the plunger 5 of the solenoid S. These parts, as indicated in Fig. 1, are submerged, so far as is

deemed necessary, in oil or other insulating fluid contained in the cylindrical box A. The members 2, 3, are mounted on an insulating plate 6, secured between the upturned, bifurcated end of a bracket 7. Said bracket may be secured in any suitable manner within the casing, as for example to a plate 8, which is in turn secured to the top 9 of the box. The upturned ends 10, 10, of the bracket serve as mounting posts upon which the members 4^a of the toggle 4 are pivoted.

The conductors of the main circuit pass through the insulators 11, 11, in the top of the box A, and are secured to the members 2, 3, respectively. The conductors leading to the windings of the solenoid S pass through similar insulators 12, 12.

The solenoid S is mounted on arms 7^a of the bracket 7. The movable core or plunger 5 of the solenoid is connected by a rod 13 to the toggle 4, and when said plunger is lowered or raised, it operates said toggle to close or open, respectively, the circuit breaker.

The solenoid coil is equipped with a rocking armature 14, pivotally mounted at 15^a upon the arms 7^a. Said armature is U-shaped, and the legs 14^a and 14^b extend over the opposite ends of the solenoid coil. The leg 14^a, adjacent the toggle mechanism, is slotted to permit the passage therethrough of the rod 13. Bridging members 15 and 16 are insulatedly mounted upon the legs 14^a and 14^b, and serve to connect contacts 17 with 17^a, and 18 with 18^a, respectively, when the corresponding leg of the armature is lowered.

Referring to Fig. 4, it will be observed that the solenoid coil consists of two parts, 19, 20, extending from contacts 17^a and 18^a respectively, and forming a continuous winding. From the point 21 in said winding, a conductor 22 extends to one pole of a battery b. A conductor 23 extends from the other pole of said battery to a conductor 24, which connects contacts 17 and 18. A push button at 25 controls the flow of current from the battery b, said push button being located at any convenient position, as for example, upon the switchboard panel.

With the parts in the position shown in Fig. 4, if the push button be operated a circuit will be closed from battery b through conductors 23, 24, contact 18, bridging mem-

ber 16, contact 18^a, winding 20, conductor 22 to battery. As a result of the energization of the upper half of the solenoid the plunger 5 is drawn upward, operating there-
 5 by the toggle mechanism to bring blades 1 out of contact with switch member 2. As long as the battery circuit is closed by the push button at 25, the end 14^b of the armature 14 is attracted with sufficient force to
 10 hold said armature in the position shown, against the force of a coil spring 26 which is compressed by the plunger 5. Upon the push button being released, however, the spring 26 will reverse the position of the
 15 armature, and thereby close contacts 17 and 17^a, opening contacts 18 and 18^a. The parts will thus be brought into such positions that upon the next succeeding closure of the circuit by the push button at 25, the part 19
 20 of the solenoid will become energized, thereby reversing the position of the plunger and closing the switch contacts of the circuit breaker. A spring 27, corresponding in function and operation to spring 26, serves
 25 to again reverse the position of the armature when the push button is released, thereby placing the various parts in the positions indicated in the drawings. It is apparent, therefore, that the rocking armature 14
 30 serves to shift the solenoid circuit so that after each successive actuation of the controlling push button the plunger 5 is caused to move in a direction reverse to that of its previous movement.

35 Having thus described our invention, we claim:

1. The combination with a circuit breaker, of means for operating the same comprising an electromagnet having alternate windings,
 40 a movable member connected to said circuit breaker and arranged to be moved in a direction to close the same by the energization of one of said windings and in a reverse direction to open the same by the energization
 45 of the other of said windings, an armature for said electromagnet adapted in either of its opposite positions to close a corresponding winding of said electromagnet, and means for shifting the position of said armature at each successive opening of the
 50 circuit of said electromagnet.

2. The combination with a circuit breaker, of means for operating the same comprising an electromagnet, a circuit therefor having
 55 parallel branches with a winding for said electromagnet in each of said branches, a normally open switch in said circuit, an armature for said magnet adapted when in its alternate positions to open one of said
 60 branches and close the other, means for reversing the position of said armature after each successive actuation of said switch, and a movable member controlled by the energization of said electromagnet and arranged
 65 to be moved in a direction to close said cir-

cuit breaker by the energization of one of said windings and in a reverse direction to open said circuit breaker by the energization of the other of said windings.

3. The combination with a circuit breaker, 70 of means for operating the same, comprising an electromagnet, a circuit therefor having parallel branches with a winding for said electromagnet in each of said branches, a normally-open switch in said circuit, an
 75 armature for said electromagnet adapted when in either of its opposite positions to close a corresponding winding of said electromagnet, a spring at each end of the armature, one of said springs being adapted
 80 to reverse the position of said armature after each successive actuation of said switch, and a movable member connected to said circuit breaker and arranged to be moved in a direction to close said circuit
 85 breaker, by the energization of one of said windings and in a reverse direction to open the same by the energization of the other of said windings.

4. The combination with a circuit breaker, 90 of means for operating the same comprising a solenoid, a circuit therefor having parallel branches with a winding for said solenoid in each of said branches, a normally open switch in said circuit, an armature for said
 95 solenoid adapted when in its alternate positions to open one of said branches and close the other, a spring for reversing the position of said armature after each successive actuation of said switch, and a plunger for
 100 the solenoid adapted to be moved in a direction to close said circuit breaker by the energization of one of said windings and in a reverse direction by the energization of the other of said windings.
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5. The combination with a circuit breaker, of means for operating the same comprising a solenoid having alternate windings, a normally open circuit for said solenoid, a
 110 switch controlling said circuit, a plunger connected to said circuit breaker and adapted to be moved in a direction to close the same by the energization of one of said windings and in a reverse direction by the energization of the other of said windings,
 115 and means automatically operated after each successive actuation of said plunger to shift the solenoid circuit from one of said windings to the other.

6. The combination with a circuit breaker, 120 of means for operating the same comprising a solenoid having alternate windings, a plunger connected to said circuit breaker and adapted to be moved in a direction to close the same by the energization of one
 125 of said windings and in a reverse direction by the energization of the other of said windings, a rocking armature adapted when in either of its opposite positions to close a corresponding winding of said solenoid, and
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means for shifting the position of said armature at each successive opening of the circuit of said solenoid.

7. The combination with a circuit breaker,
5 of a box within which said circuit breaker is mounted, an insulating fluid in which the circuit breaker is submerged, a solenoid mounted in said box, a circuit for said solenoid having parallel branches with a
10 winding for the solenoid in each branch, a switch controlling said circuit, an armature controlled by said solenoid for shifting the circuit from one of said windings to the other upon each successive actuation of said

switch, a plunger for said solenoid connected with said circuit breaker for operating the same and adapted at each successive closure of said switch to move in a direction reverse to that of its previous movement. 15

In witness whereof, we hereunto subscribe
our names this 2nd day of April, A. D. 1906. 20

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Witnesses:

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