

No. 890,718.

PATENTED JUNE 16, 1908.

A. SMITH.
CIRCUIT BREAKER.
APPLICATION FILED APR. 24, 1906.

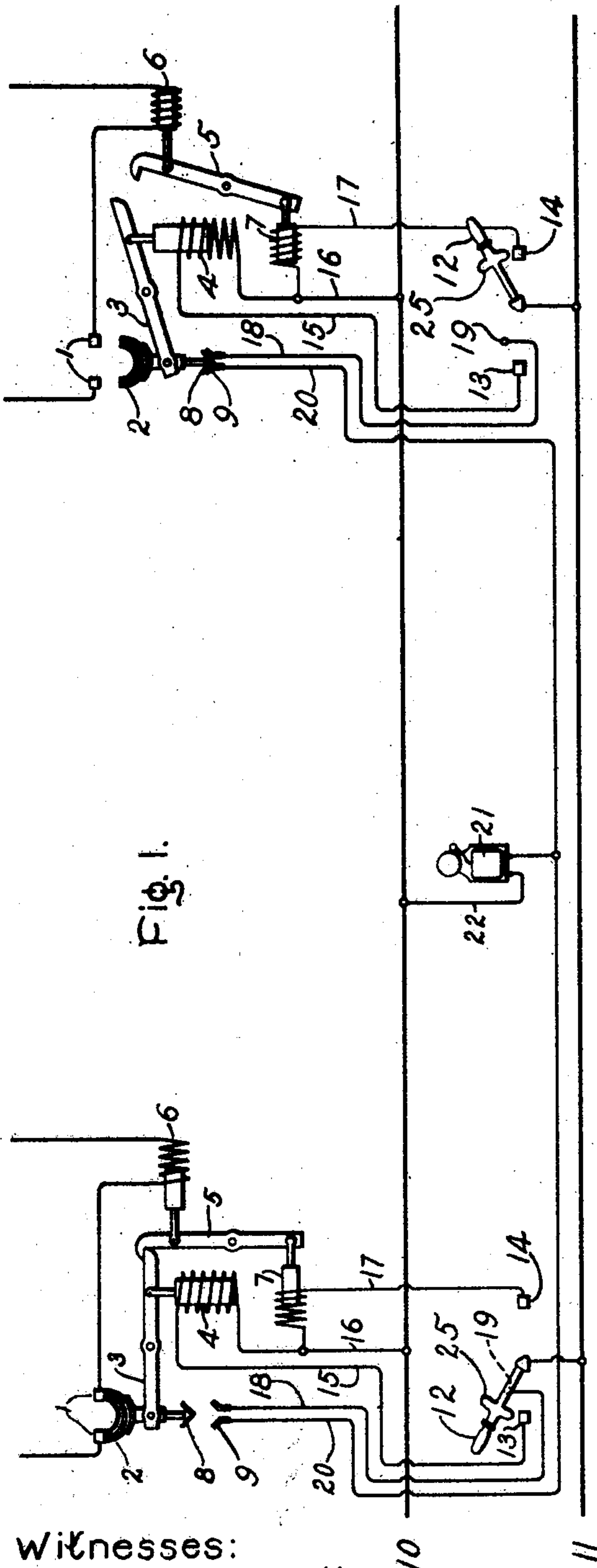


Fig. 1.

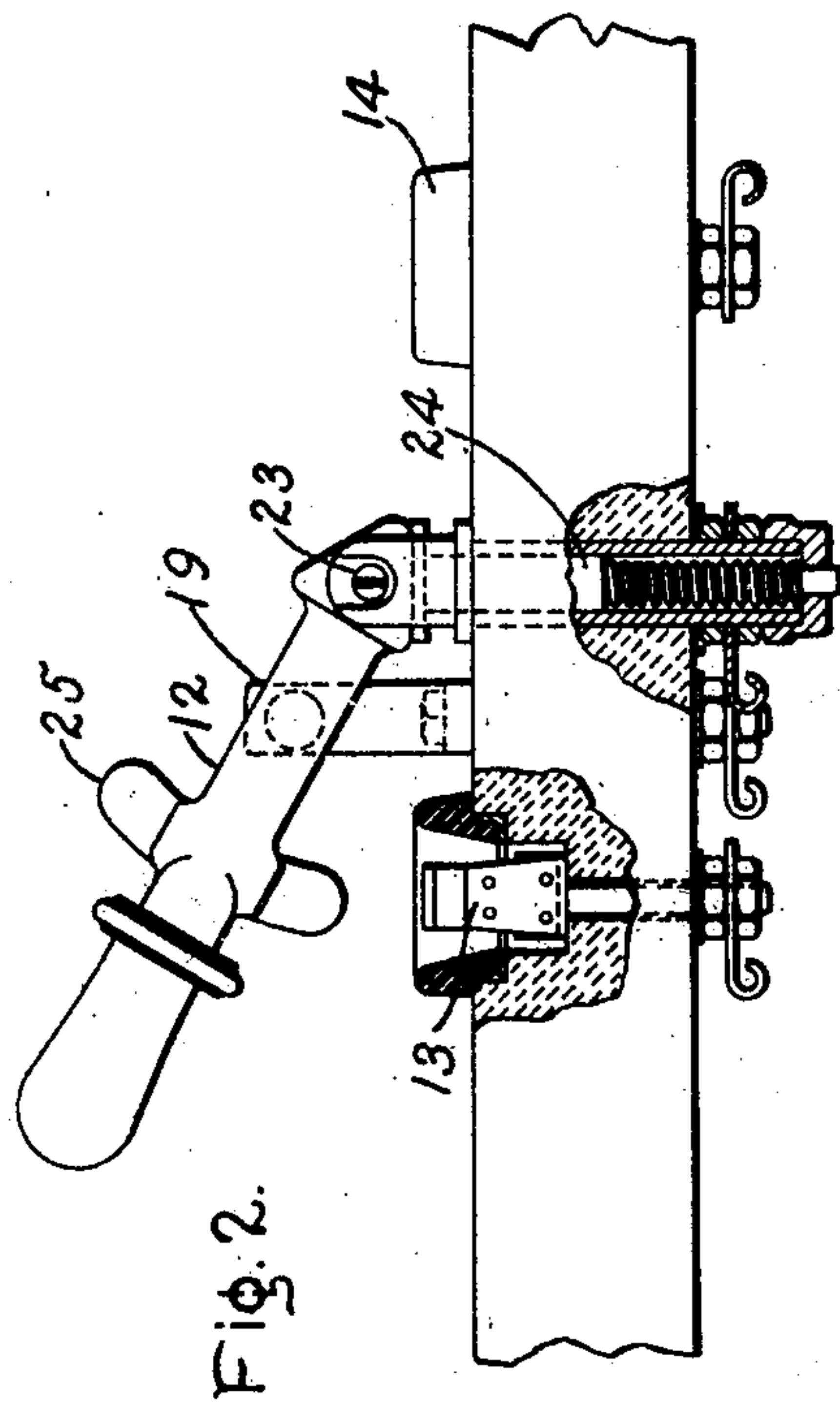


Fig. 2.

Witnesses:

Burchard W. Kelley
Green O. Ford

Inventor:
Arthur Smith.
by *Robert G. Davis*
Atty.

UNITED STATES PATENT OFFICE.

ARTHUR SMITH, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

CIRCUIT-BREAKER.

No. 890,718.

Specification of Letters Patent.

Patented June 16, 1908.

Application filed April 24, 1906. Serial No. 313,424.

To all whom it may concern:

Be it known that I, ARTHUR SMITH, a citizen of the United States, residing at Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in Circuit-Breakers, of which the following is a specification.

This invention relates to automatic electric switches or circuit-breakers, particularly to such as are operated by solenoids or similar devices and are controlled at a point remote from the main switch. Since in switches of this type current is usually supplied to the actuating solenoid only long enough to close the main switch, and is then cut off, the main switch may open automatically and remain open, although the position of the controlling switch indicates to the attendant it was last moved so as to close the main switch. In large central stations, particularly in power-houses for railways, it is customary to control the main circuits by main switches or circuit-breakers of the type above described. The controlling switches are usually mounted on a benchboard or switchboard some distance from the main switches, and since, as a rule, it is impossible to see the main switches from the benchboard, indicators must be provided to show the attendant whether or not the main switch responds to the controlling switch. It is customary to provide visual signals to indicate whether the main switch is open or closed, but when the attendant sees a signal that the main switch is open he cannot tell whether it was opened intentionally or whether it has opened automatically. In railway service, where the automatic circuit-breakers are apt to open as the result of temporary overloads, it is especially desirable that means be provided to call the attention of the benchboard attendant to the fact that a circuit-breaker has opened automatically, so that he may close it with as little delay and interruption to traffic as possible.

The object of this invention is to provide an indicating device for switches which is actuated only when the switch is open, although the last movement of the operating mechanism was for the purpose of closing the switch, or, in other words, when the relation between the switch and its control mechanism is normal; to connect a number of switches to a common alarm or indicator so

that when any one of the switches assumes an abnormal relation to its control mechanism the indicator will be actuated; more specifically, to provide a means, applicable to automatic circuit-breakers controlled from a distance by a control switch, for actuating an indicator when the control switch is in position to indicate that it was last moved to cause the circuit-breaker to close, and in spite of this the circuit-breaker is open; and in general to improve the construction and operation of devices of this class.

My invention will best be understood in connection with the accompanying drawings in which

Figure 1 is a diagram showing the invention applied to two circuit-breakers, and Fig. 2 is a detail view of the control switch which is used to operate the circuit-breakers.

Each circuit-breaker consists of fixed contacts 1 engaged by a bridging contact 2. The bridging contact is carried upon an actuating lever 3 controlled by means of an actuating solenoid 4 energized from the control circuit. A latch 5 is pivoted near the actuating lever 3 and engages the end thereof to hold the circuit-breaker closed. The latch 5 is controlled by an overload coil 6 connected in series with the circuit to be controlled, and also by means of a trip-coil 7 energized from the control circuit. The armature of the overload coil 6 and that of trip-coil 7 are connected to the latch 5 in such a way that when either coil is energized the latch is moved and releases the actuating lever 3, thereby permitting the circuit-breaker to open. An auxiliary bridging contact 8 is carried on the actuating lever 3 and engages auxiliary contacts 9 connected to the control circuit.

The circuit-breakers are controlled from a control circuit having leads 10 and 11. The connection between the control circuit and the coils of the circuit-breakers is controlled by means of control levers 12 which are connected to the lead 11 and may be swung into engagement with contacts 13 and 14. The actuating solenoids 4 are connected with the contacts 13 by leads 15, and with the lead 10 by means of leads 16. The trip-coils 7 are connected with the contacts 14 by means of leads 17 and with the lead 10 by means of the leads 16. On each circuit-breaker one of the auxiliary contacts 9 is connected with the alarm contact 19 by

means of a lead 18, the other one of the auxiliary contacts being connected with an alarm 21 by means of the lead 20. The alarm 21 is connected to the lead 10 by means of the lead 22.

As shown in Fig. 2 the control lever 12, mounted upon a pivot 23, has a triangular end engaged by a spring-pressed plunger 24. Projections 25 on the control lever 12 engage with the contacts 13 and 14 mounted in recesses in the face of the switchboard for the purpose of protecting these contacts from injury and to avoid accidental contact therewith by the operator. The alarm contact 19 is mounted on the switchboard in such position that it engages the control lever 12 when the control lever is in the position shown in Fig. 2 assumed by it under the influence of the spring-pressed plunger 24, when released after having been pushed into engagement with the contact 13. It will be noted that when the control lever 12 is pushed down into engagement with the contact 13 the alarm contact is not in engagement with the control lever and hence at this time the alarm circuit is broken.

The operation of this device is as follows: If it be assumed that the circuit-breaker is open, the control lever 12 is pressed down into engagement with the contact 13. As a result of this movement the circuit through the actuating solenoid 4 is closed, and current flows from the lead 11, through the control lever 12, contact 13, lead 15, actuating solenoid 4, lead 16, to the other lead 10 of the control circuit. The solenoid is thereby energized and throws the bridging contact 2 into engagement with the fixed contacts 1; thereupon the latch 5 engages the end of the actuating lever 3 and locks the circuit-breaker closed. The control lever 12 is now released and springs back to the position shown in Fig. 2 under the influence of the spring-pressed plunger 24 and the triangular surfaces with which this plunger engages. This movement breaks the circuit through the actuating solenoid 4 but the circuit-breaker remains closed as the latch 5 has engaged the actuating lever 3. The alarm contact 19, however, is in engagement with the control lever 12 and the only break in the alarm circuit is at the contacts 9; the control circuit is therefore in a potential condition to ring the alarm the moment the circuit-breaker, by opening, bridges the break point 9 of the alarm circuit. If with the parts in the position above described an overload should come upon the main circuit, the overload coil 6 would be energized and pull the latch 5 out of engagement with the actuating lever 3, which would permit the circuit-breaker to open. When the circuit-breaker opens the auxiliary bridging contacts 8 comes into engagement with the auxiliary contacts 9 and thereby closes the alarm circuit.

Current then flows from the lead 11, through the control lever 12, alarm contact 19, lead 18, auxiliary bridging contact 8, contacts 9, and lead 20, to the alarm device 21, and thence to the other lead 10 of the control circuit by means of the lead 22. As a result the alarm 21 is sounded and the attendant knows that the circuit-breaker has opened automatically. On the other hand, when the circuit-breaker is opened by the attendant, the control lever 12 is thrown into engagement with the contact 14, thereby energizing the trip-coil 7. This moves the latch 5 and causes the circuit-breaker to open and the auxiliary bridging contact 8 engages the auxiliary contacts 9. Since the control lever, however, has been thrown into engagement with the contact 14 and then released, it remains in the position shown at the right-hand side of Fig. 1 and, as the alarm contact 19 is out of engagement with the control lever 12 and the alarm circuit is broken at this point, the alarm is not sounded although the auxiliary bridging contact 8 has closed the alarm circuit at the auxiliary contacts 9 when the switch is opened by means of the control lever 12.

It is evident that with the arrangement disclosed in Fig. 1 a series of circuit-breakers may be controlled from a common control circuit and that these circuit-breakers may have the alarm circuits all connected to a common alarm, as shown at 21, so that if any one of the circuit-breakers opens automatically the alarm will be sounded. This feature is of particular value in a large central station for railway work where many breakers are used and where one of the breakers might open automatically and not be noticed by the attendant unless some kind of an alarm was sounded. It is furthermore evident that, with the arrangement disclosed in Fig. 1, should all of the circuit-breakers open automatically at the same time, as often occurs in railway service, the alarm will continue to sound until all of the breakers have either been closed by the attendant or until the control levers 12 of those breakers which are open have been moved out of engagement with the alarm contacts 19.

It is obvious that many changes and modifications may be made in the form in which I have embodied my invention, and I therefore do not wish to be restricted to the exact form shown, but desire to cover by the annexed claims all changes and modifications within the spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent of the United States, is,—

1. In an electric switch, the combination with operating means for opening and closing the switch, of a manually operated controller for the operating means movable to effect the opening and the closing of the switch, means for normally holding said controller in

either of two positions to indicate its last effective movement, an alarm, and means for actuating the alarm when the position of the switch fails to correspond to the last effective movement of the controller.

2. In an electric switch, the combination with operating means for opening and closing the switch, of a manually operated controller for said operating means movable to effect the opening and the closing of the switch, means for normally holding said controller in either of two positions to indicate its last effective movement, an alarm circuit having a break closed when the controller is in one of said positions, and means for closing another break in series with the first when the position of the switch fails to correspond to the position of the controller

3. In an electric switch, the combination with electrical operating means for opening and closing the switch, of a manually operated controlling device for the circuit of said operating means comprising fixed contacts, a movable controller coöperating therewith and yieldingly held out of engagement with the fixed contacts in a position adjacent the contact last engaged by it, an alarm contact

engaged by the controller only in one of said positions, an alarm circuit connected to said controller and to said alarm contact, and a break in said alarm circuit closed when the position of the switch fails to correspond to the position of the controller.

4. The combination with a plurality of electric switches and operating means for opening and closing each switch, of a manually operated controller for each operating means movable to effect the opening and closing of the switch, means for normally holding each controller in either of two positions to indicate its last effective movement, an electric circuit having a plurality of sets of breaks in parallel, each set consisting of breaks in series, means for closing one set of breaks when the position of any switch fails to correspond to the last effective movement of its controller, and an indicator actuated by the closing of said circuit.

In witness whereof, I have hereunto set my hand this 19th day of April, 1906

ARTHUR SMITH.

Witnesses:

BENJAMIN B. HULL,
HELEN ORFORD.