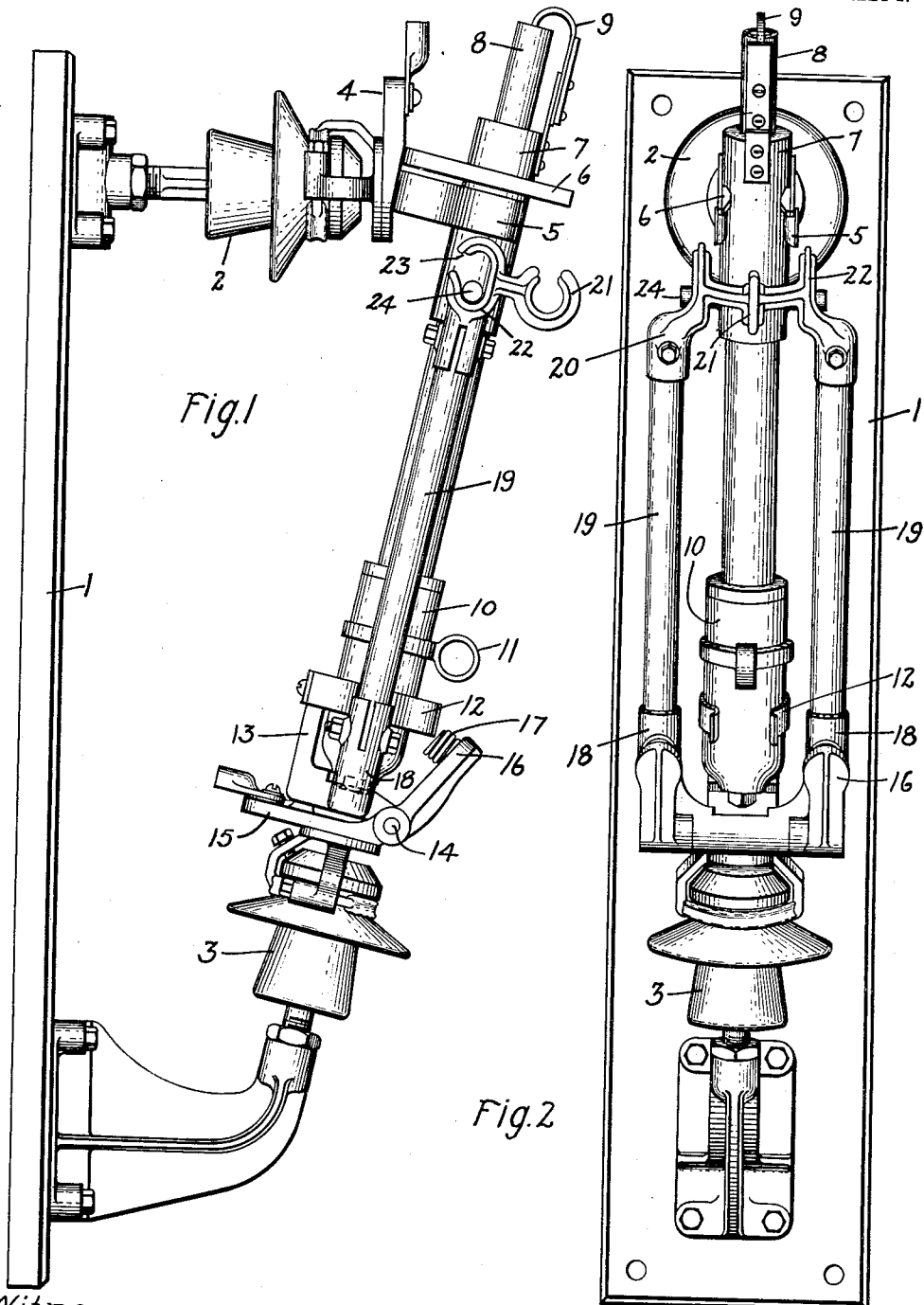


973,613.

W. A. ATWOOD.
CIRCUIT CONTROLLER.
APPLICATION FILED FEB. 16, 1909.

Patented Oct. 25, 1910.

2 SHEETS—SHEET 1.



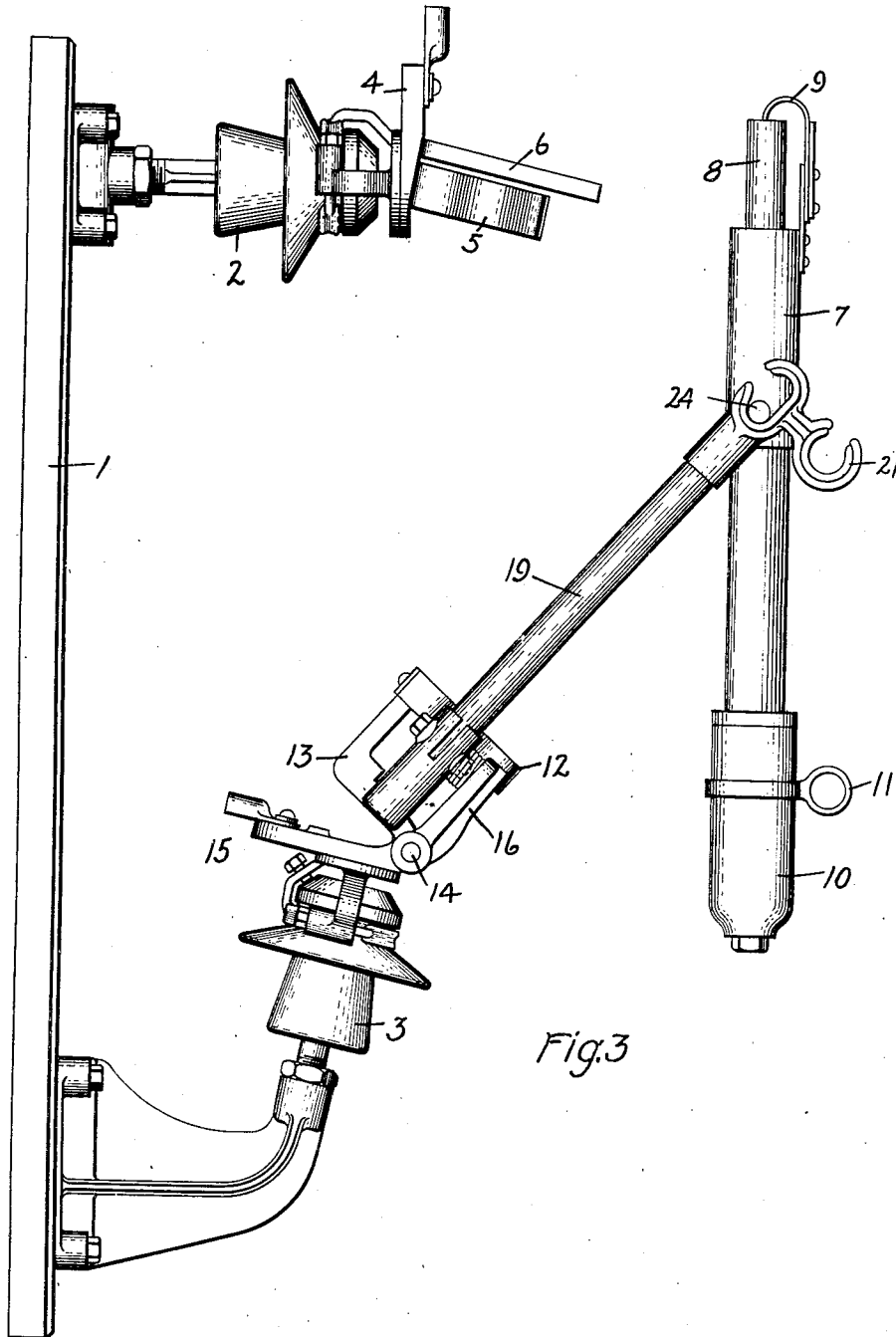
Witnesses:
Lloyd C. Bush
J. Ellis Glen

Inventor:
Winfield A. Atwood,
By *W. A. Atwood*
Att'y.

973,613.

W. A. ATWOOD.
CIRCUIT CONTROLLER.
APPLICATION FILED FEB. 16, 1909.

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



Witnesses:
Lloyd C. Bush
J. Ellis Glen.

Inventor:
Winfield A. Atwood,
By *Alfred H. Davis*
Att'y.

UNITED STATES PATENT OFFICE.

WINFIELD A. ATWOOD, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

CIRCUIT-CONTROLLER.

973,613.

Specification of Letters Patent.

Patented Oct. 25, 1910.

Application filed February 16, 1909. Serial No. 478,251.

To all whom it may concern:

Be it known that I, WINFIELD A. ATWOOD, 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-Controllers, of which the following is a specification.

My invention relates to switches for controlling electric circuits and more particularly to disconnecting switches of the type in which two adjacent terminals are bridged by a fuse mounted on a movable member which carries it into and out of engagement with the two circuit terminals. In some devices of this type which have heretofore been used, the fuse was mounted in clips on a movable switch member pivoted to one of the circuit terminals and moved about its pivot to carry one end of the fuse into and out of engagement with the other terminal. The fuse was commonly of the expulsion type, consisting of a comparatively long insulating tube closed at one end by means of a strong metallic explosion chamber and having a strip of fusible metal strung through the tube to complete the circuit between the explosion chamber and a contact ring which was mounted near the other end of the tube to cooperate with contact clips on one of the circuit terminals, while the explosion chamber of the expulsion fuse was engaged by contact clips which were always in electrical connection with the terminal on which the movable member was pivoted. As a result of this construction, the explosion chamber of the fuse was always alive even after the fuse had blown and the fuse had to be removed from the switch member by means of a long wooden pole having on one end a clamping device for gripping the fuse and thereby enabling the operator to remove and replace the fuse with safety. The handling of a heavy fuse of the expulsion type by means of a long pole was attended with considerable difficulty and the object of my invention is to provide a simple and convenient switch in which the operator can, without danger, take hold of the fuse to remove or replace it.

In carrying out my invention, a movable insulating member is provided to carry the fuse into and out of engagement with the circuit terminals and the fuse is suspended from the support to swing like a pendulum in alinement with the two terminals. When

the circuit is opened the movable member swings away from both terminals into circuit opening position, and the fuse swings freely out of contact with either terminal. The movable member is so mounted that when it reaches circuit opening position, the fuse is carried to such a distance from the terminals that the operator can handle it without getting into dangerous proximity to the terminals. The fuse may be suspended from the movable support in various ways, but in the preferred construction it is provided with pivots or trunnions, which fit into forks mounted on the movable insulating member and shaped to permit the fuse to be removed and replaced with ease. After the fusible strip in the fuse has been removed and the fuse has been hung on the support, the operator uses a long pole to move the support to circuit closing position, whereupon the fuse swings into engagement with both the circuit terminals and the circuit is completed.

My invention will best be understood in connection with the accompanying drawings, which illustrate one of the forms in which my invention may be embodied and in which—

Figure 1 is a side view of a disconnecting switch embodying my invention; Fig. 2 a plan view of the switch shown in Fig. 1; and Fig. 3 a view of the switch shown in Fig. 1 when it is open.

In the specific form of device shown in the drawings, convenience in operation is secured and the lateral width of the device is reduced to a minimum by mounting the circuit terminals in vertical alinement with each other on a panel or switchboard 1, of any suitable material such as slate or marble, by means of insulators 2 and 3 of any suitable type. To the upper insulator 2 is secured a fixed circuit terminal 4 provided with contact clips 5 and holding clips 6, both of which engage a suitable fuse, preferably of the expulsion type, as shown in the drawing, and comprising a contact sleeve 7 which fits snugly between the contact clips 5 and holding clips 6 and is mounted on the upper end of an insulating tube 8, through which a fusible strip 9 is strung to connect the sleeve 7 with a metallic explosion chamber 10 which closes the lower end of the insulating tube 8. The explosion chamber 10 is provided with a ring 11, 110

and fits between contact clips 12 mounted on and forming part of a movable terminal 13, which in the specific form shown in the drawings, is mounted on a pivot 14 supported by a terminal plate 15, which is provided with an extension 16 for carrying a spring stop or buffer 17 to limit the movement of the movable terminal 13 about its pivot. In the specific construction shown in the drawings, the movable terminal 13 forms part of a movable switch member comprising two metallic sockets 18 mounted on and movable with the movable terminal 13 and carrying insulating rods 19, which are joined at their upper ends by means of a yoke or insulating support 20. Although the yoke or support is preferably made of metal it constitutes an insulating support for the fuse, because it is carried upon the insulating rods 19 which are of such a length that when the switch is open, as shown in Fig. 3, the yoke or support 20 is so far from both the fixed terminal 4 and the movable terminal 13 that the operator can place his hands on it with safety. The movable switch member is swung about the pivot 14 in any suitable manner, but in the preferred construction, the yoke or support is provided with a hook 21 for enabling the operator to swing the movable switch member into and out of circuit closing position by means of a long wooden pole or similar operating device.

If an overload occurs upon the circuit and the fusible strip 9 is melted, the fuse must be removed from the movable switch member and a new strip placed in position and in order to facilitate this operation the fuse is suspended from the insulating support 20 in any suitable manner so that it will swing freely in alinement with the contact clips 5 and 12 and is preferably suspended in such a manner that it may be easily detached from the insulating support 20 by the operator. Various means may be used for detachably suspending the fuse on the insulating support 20, but in the preferred construction, the support is provided with forks 22, which have openings 23 in one side and the fuse is provided near its upper end with trunnions 24, which easily slip through the openings 23, and when in position in the forks 22, as shown in Fig. 3, suspend the fuse on the insulating support 20, and act as pivots about which the fuse can swing freely. As is apparent from Fig. 3, the fuse can be easily removed from the insulating support 20 by lifting it to carry the trunnions out through the openings 23, and since all parts of the fuse are at a safe distance from both the terminals of the circuit when the movable member is in the circuit opening position shown in Fig. 3, the operator can take hold of the fuse with his hands and thereby easily remove it from

and replace it in the forks of the insulating support 20.

The operation of the device is as follows: If an overload occurs while the device is in circuit closing position, as shown in Fig. 1, the fusible strip 9 melts and opens the circuit. In order to replace the fuse the operator inserts in the hook a hook which is mounted on the end of a long wooden pole and then pulls, thereby swinging the movable switch member about its pivot into the position shown in Fig. 3 where the switch member is stopped by the buffer or spring 17. If the weight of the explosion chamber is not great enough to cause the explosion chamber to swing out of the clips 12 into the position shown in Fig. 3, the operator inserts the hook on the end of the wooden operating rod in the ring 11, and by a slight movement releases the explosion chamber 10 from clip 12, whereupon the fuse swings into the vertical position, as shown in Fig. 3. The explosion chamber 10 is thus carried to such a distance from the lower circuit terminal that the operator can take hold of it with safety and can then easily lift the fuse out of the forks 22 by passing the trunnions 24 through the openings 23. The fusible support or fuse 9 is then replaced with one end secured to the sleeve 7 and the other to the explosion chamber 10, and the fuse is suspended on the insulating support 20 by passing the trunnions 24 down through the openings 23 into the forks 22, whereupon the fuse hangs in the position shown in Fig. 3, and swings about its pivots in alinement with the terminals 5 and 12. The operator can place the fuse in this position by hand because the insulating rods 19 are sufficiently long and of the proper material to thoroughly protect him from the potential of the lower terminal 13. The operator then places a hook on the end of the wooden operating rod in the hook 21 and swings the movable switch member counter-clockwise about its pivot into circuit closing position. As the sleeve 7 on the upper end of the fuse engages the contact clips 5, the resistance offered by the clips to further movement of the sleeve tends to swing the lower end of the fuse and the explosion chamber 10 into engagement with the contact clips 12. Shortly before the insulating support 20 reaches the position shown in Fig. 1, both the sleeve 7 and the explosion chamber 10 are in engagement with the ends of the contact clips 5 and 12 and further movement of the insulating support toward the circuit closing position forces both the sleeve 7 and the explosion chamber 10 between their respective contact clips, hence by the time the insulating support reaches the circuit closing position, the parts are in the position shown in Fig. 1, in which both the sleeve 7 and explosion chamber 10 are in electrical

engagement with their contact clips and the circuit is completed through the fuse 9. If for any reason the explosion chamber does not go into place in the contact clips 12 it can be forced into position by inserting the hook on the wooden pole in the ring 11 and then pushing the explosion chamber into the clips. Since the operator has been able to handle the fuse with his hands during the most difficult part of its manipulation the operation of removing and replacing it can be carried out with great ease and in a very short space of time.

My invention may be embodied in various other forms than that disclosed above and I therefore do not wish to restrict myself to the precise arrangement disclosed, but aim in the appended claims to cover all modifications which are 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 a controller for an electric circuit, the combination with two adjacent circuit terminals, of a protective device for opening the circuit in response to abnormal current, an insulating support for said protective device mounted to carry said protective device into and out of circuit with both of said terminals, and means for securing said device on said support to move into and out of engagement with one of said terminals.

2. In a controller for an electric circuit, the combination with two adjacent contact terminals, of a fuse arranged to cooperate with both of said terminals to connect them and thereby close the circuit, a movable insulating fuse support arranged to carry said fuse into and out of engagement with both of said contacts, and means for movably mounting said fuse on said support to permit it to move relatively to said support and in alinement with said terminals.

3. In a controller for an electric circuit, the combination with relatively movable adjacent contacts, of an insulating support mounted on and movable with one of said contacts, and a fuse pivotally mounted on said support to swing in alinement with said contacts to bring its ends into engagement with both said contacts.

4. In a circuit controller, the combination with a fixed terminal and a movable terminal mounted adjacent thereto, of an insulating support movable with said movable terminal, a fuse for bridging said terminals to close the circuit, and means whereby said fuse is detachably secured to said support to swing into and out of engagement with said movable terminal and to engage both terminals when said support and said fuse are in circuit closing position.

5. In a controller for an electric circuit,

the combination with a stationary terminal, 65 of a movable terminal pivoted adjacent thereto, an insulating support mounted on said movable terminal, and a fuse pivotally mounted on said support to swing into and out of engagement with said movable terminal and to engage both said terminals when in circuit closing position.

6. In a circuit controller, the combination with a fixed terminal, of a movable switch member pivoted adjacent said terminal, a 75 movable terminal mounted on said member, a fuse pivotally mounted on said member and insulated from said movable terminal to swing into and out of engagement with said movable terminal.

7. In a circuit controller, the combination with a fixed terminal, of a movable switch member comprising a pivoted terminal, an insulating support mounted on said terminal, a fuse for engaging both terminals when 85 said switch member is in circuit closing position, and means whereby said fuse is suspended on the outer end of said support to swing into and out of engagement with said pivoted terminal.

8. In a circuit controller, the combination with a fixed terminal, of a movable switch member comprising a pivoted terminal, an insulating support mounted on said terminal, a fuse for engaging both terminals when 95 said switch member is in circuit closing position, and means whereby said fuse is detachably suspended from said support when out of engagement with said movable terminal.

9. In a circuit controller, the combination with a fixed terminal, of a movable switch member comprising a pivoted terminal, an insulating support provided with a fork and mounted on said pivoted terminal, and a 105 fuse arranged to engage both terminals when said switch member is in circuit closing position, said fuse being provided with a trunnion to fit into said fork, whereby said fuse is detachably suspended from said fork.

10. The combination with a fixed terminal clip, of a pivoted cooperating switch member comprising a pivoted movable terminal clip, an insulating support mounted on and movable with said movable terminal 115 clip and having a fork, and a fuse having contacts at each end to engage said terminal clips and a trunnion between its ends to enter the fork on said support, whereby one of said fuse contacts may be swung into and out of engagement with said movable terminal clip.

In witness whereof, I have hereunto set my hand this 13th day of February, 1909.

WINFIELD A. ATWOOD.

Witnesses:

BENJAMIN B. HULL,
HELEN ORFORD.