

Feb. 17, 1931.

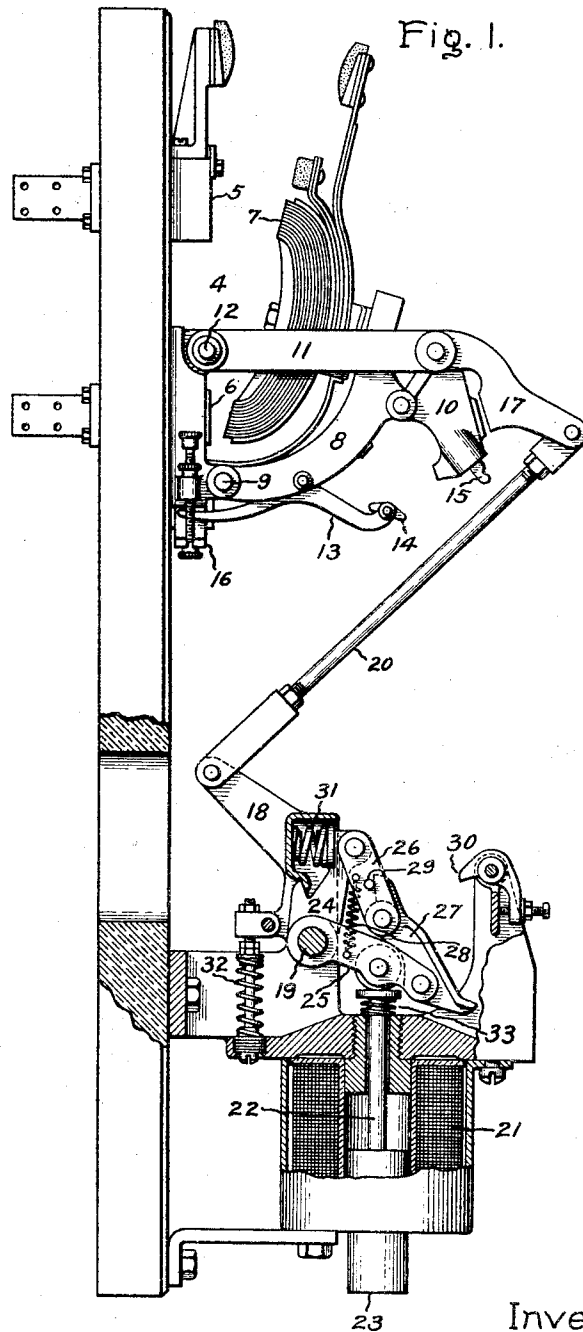
W. A. ATWOOD

1,793,300

ELECTRIC SWITCH

Filed Jan. 31, 1927

2 Sheets-Sheet 1



Inventor
Winfield A. Atwood,
by *Myron S. Jones*
His Attorney.

Feb. 17, 1931.

W. A. ATWOOD

1,793,300

ELECTRIC SWITCH

Filed Jan. 31, 1927

2 Sheets-Sheet 2

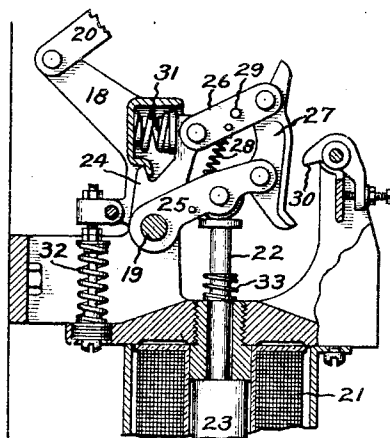
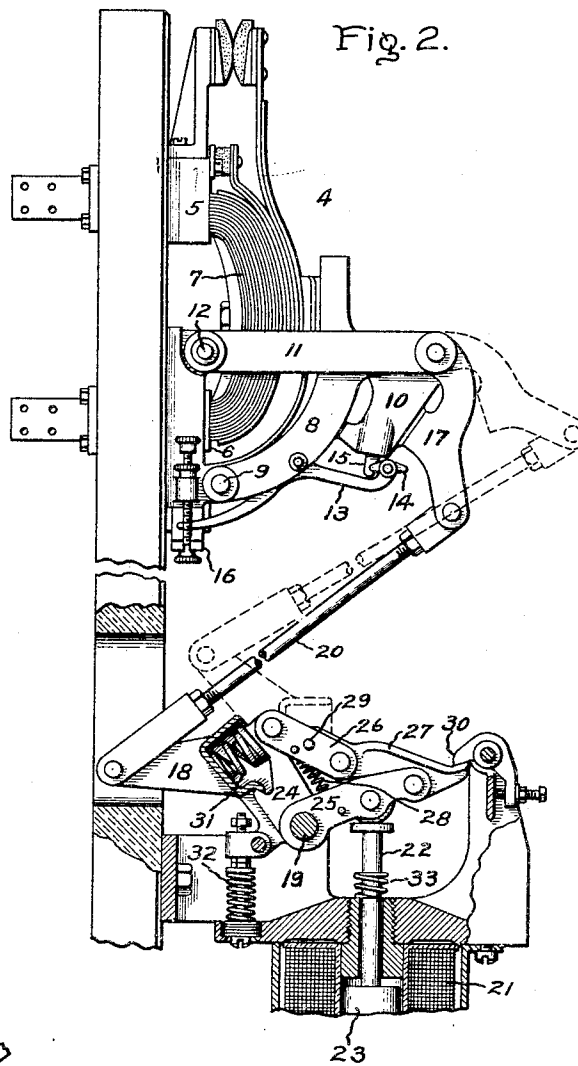


Fig. 3.

Inventor
Winfield A. Atwood.
by *Wm. S. Hunt.*
His Attorney.

UNITED STATES PATENT OFFICE

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

ELECTRIC SWITCH

Application filed January 31, 1927. Serial No. 164,877.

My invention relates to improvements in electric switches and more particularly to circuit interrupters which after opening in response to an abnormal circuit condition can not be maintained closed if reclosed while the abnormal condition prevails, and an object of my invention is to provide an improved electric switch whose operating mechanism upon closing the switch automatically assumes a condition which prevents the switch from being maintained closed under abnormal circuit conditions.

My invention will be better understood from the following description when considered in connection with the accompanying drawings and its scope will be pointed out in the appended claims.

In the accompanying drawings, Fig. 1 is an elevation of an electric switch embodying my invention, the parts being shown in the circuit open position of the switch, Fig. 2 is a similar elevation of the switch just after being latched closed, and Fig. 3 is an elevation of a part of the operating mechanism with the parts in the positions occupied just after the condition shown by the full lines in Fig. 2.

For the purpose of illustrating my invention, I have chosen an electric switch such as a circuit interrupter or breaker 4 of the latched closed type. This comprises stationary contacts 5 and 6 and a movable circuit controlling member or cooperating contact such as a laminated brush 7 which is carried by a brush lever 8 secured to a stationary pivot 9 and which is biased to the circuit opening position. For moving the circuit controlling member 7 to one position, the circuit closing position as shown in Fig. 2, the switch 4 further comprises an operating arm 10 which is pivotally secured to the brush lever 8 and to links 11 which are secured to a stationary pivot 12. For holding the circuit controlling member 7 in the circuit controlling position, there is provided a releasable restraining or latching means comprising a latch member 13 pivoted to the brush lever 8 and carrying a pivoted latch such as a pawl 14 which is arranged to engage a biased catch 15 mounted in the arm 10. The latch member 13 and the pawl 14 form in the position

shown in Fig. 2 an overset toggle which can be moved through the center position to effect the opening of the switch by any suitable releasing means which may be responsive to abnormal circuit conditions. As shown this means comprises an armature 16 which is arranged to be attracted on the occurrence of a predetermined current flowing in the switch 4 and thereby to strike the tail portion of the latch member 13 sufficiently hard to move the toggle 13—14 into the non-restraining position.

For moving the brush 7 to the circuit closing position, I provide a mechanism having an element 17 which may be pivotally connected to the links 11 and the arm 10 and which is arranged on movement in one direction, clockwise as shown in the drawings, to engage the arm and move it clockwise. As shown this mechanism further comprises a crank 18 which is mounted on a stationary pivot 19 and which is connected to the element 17 by a link 20. For actuating this mechanism, I provide suitable means which may be power operated and which as shown comprises an electromagnet 21 having an operating member 22 secured to its armature 23.

In order that the switch 4 can not be maintained in the closed position when it is reclosed while abnormal circuit conditions prevail by keeping the electromagnet 21 energized, I provide between the mechanism and the operating member 22 a collapsible connection comprising as shown levers 24 and 25 and links 26 and 27. These are arranged to assume a rigid condition shown in Fig. 1 under the influence of gravity and a biasing means such as a spring 28. The levers 24 and 25 are mounted on the pivot 19 and are pivotally connected to the links 26 and 27 which form a toggle arranged to be overset to make the connection rigid as shown in Fig. 1, the amount of overset being limited by a stop 29. Through this connection when it is rigid, the operating member 22 during a part of its movement effects the movement of the brush 7 to the circuit closing position and during a subsequent part of its movement effects the collapse of the connection. For this purpose as the armature 23 is attracted on

energization of the electromagnet 21 and the connection turned counter-clockwise as a unit about the pivot 19, a lug 30 preferably adjustably positioned and mounted in the path of movement of the toggle link 27 is engaged thereby as shown in Fig. 2 so that further movement of the armature to the attracted position collapses the connection as shown in Fig. 3. In order to permit this further movement of the operating member 22 after the switch 4 has been closed, I provide yieldable means such as a spring 31 which may be mounted in a housing on the crank 18 whereby relative movement between the crank 18 and lever 24 may occur after the switch 4 has been closed.

In order that the inertia of the element 17 and the parts connected thereto may not tend to delay the opening of the switch 4, I provide means such as a spring 32 in which energy is stored during the movement of the brush 7 to the circuit closing position and while the collapsible connection is rigid as shown in Fig. 2. Upon the collapse of the connection, this spring turns the crank 18 clockwise to the position shown by the dotted lines in Fig. 2 and full lines in Fig. 3, thus moving the element 17 out of the path of movement of the arm 10 as shown by the dotted lines in Fig. 2. For absorbing the shock due to the fall of the armatures 23 and parts whose weight may come on the operating member 22, I provide a resilient means such as a spring 33.

In considering the operation of the illustrated embodiment of my invention, it will be assumed that the parts are positioned as shown in Fig. 1, the switch 4 being open and the collapsible connection being rigid. Upon energizing the electromagnet 21, its armature 23 in moving the operating member 22 up to the position shown in Fig. 2 effects the movement of the brush 7 to the circuit closing position where it is restrained by the latch member 13, pawl 14, and catch 15. The spring 32 will be compressed as shown in Fig. 2. At this point in the movement of the armature 23, the toggle link 27 engages the lug 30 as shown in Fig. 2 and further upward movement of the armature collapses the toggle 26—27, the spring 31 yielding sufficiently to permit the necessary relative movement of the crank 18 and the lever 24. Upon the collapse of the toggle 26—27 to the position shown in Fig. 3, the crank 18 is turned clockwise by the spring 32 to the position shown by solid lines in Fig. 3 and by the dotted lines in Fig. 2. In this movement of the crank 18, the element 17 is turned counter-clockwise out of the way of the operating arm 10 so that the switch 4 is free to open without restraint from the inertia of these members. Even though the electromagnet 21 is kept energized so that its armature 23 remains in the attracted position shown in Fig.

3, the brush 7 is free to move to the circuit open position. As soon as the electromagnet 21 is deenergized, its armature falls and the toggle 26—27 through gravity and the spring 28 resets and thereby restores the rigidity of the collapsible connection, the parts disregarding the switch 4 which may be either closed or open, being positioned as shown in Fig. 1.

While I have shown and described my invention in considerable detail, I do not desire to be limited to the exact arrangement shown, but seek to cover in the appended claims all those modifications that fall within the true spirit and scope of my invention.

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

1. An electric switch comprising a movable circuit controlling member, and means for moving said member to one position comprising a collapsible connection arranged to assume a rigid condition and means operable in one movement for actuating the circuit controlling member to said position during a part of said movement only when said connection is rigid and for causing the collapse of said connection during a subsequent part of said movement.

2. An electric switch comprising a movable circuit controlling member, means for actuating said member to one position comprising a collapsible connection arranged to assume a rigid condition and an operating member operable in one movement for actuating through said connection when rigid the circuit controlling member to said position during a part of said movement and for causing the collapse of said connection during a subsequent part of said movement, and means for restoring said connection to the rigid condition.

3. An electric switch comprising a movable circuit controlling member, and means for actuating said member to circuit closing position comprising a collapsible connection arranged to assume a rigid condition and an operating member operable on movement in one direction for actuating through said connection when rigid the circuit controlling member to said position during a part of said movement and for causing the collapse of said connection on further movement in the same direction.

4. An electric switch comprising a movable circuit controlling member biased for movement to one position, releasable means for restraining the member in another position, and means for moving the member to said other position comprising a collapsible connection arranged to assume a rigid condition and an operating member operable in one movement for actuating through said connection when rigid said circuit controlling member to said other position during a part of said movement and for causing the collapse

of said connection during a subsequent part of said movement.

5 5. An electric switch comprising a movable circuit controlling member, and means for actuating said member to one position comprising a toggle arranged to assume a rigid condition and an electromagnet having an armature operable in one movement on energization of the electromagnet for actuating through said toggle when rigid said member to said position during a part of said movement to the attracted position and for causing the collapse of said toggle during the remainder of said movement to the attracted position.

10 6. An electric switch comprising a movable circuit controlling member, means for actuating said member to one position comprising a toggle arranged to assume a rigid condition and an electromagnet having an armature arranged on energization of the electromagnet to effect through said toggle when the toggle is rigid the movement of said member to said position during a part of its movement to the attracted position and during the remainder of its movement to the attracted position to effect the collapse of said toggle, and means for restoring the toggle to the rigid condition when the electromagnet is deenergized.

20 7. An electric switch comprising a movable member, means for moving the member to one position comprising a mechanism having an element arranged on movement in one direction to engage and move said member to said position, a collapsible connection arranged to assume a rigid condition, yieldable means interposed between said mechanism and said connection and an operating member arranged during a part of its movement to effect through said connection when the connection is rigid the movement of said element in said direction and during a subsequent part of its movement to effect the collapse of said connection.

30 8. An electric switch comprising a movable member, means for restraining the member in one position, means for moving said member to said position comprising a mechanism having an element arranged on movement in one direction to engage and move said member to said position, a collapsible connection arranged to assume a rigid condition, and an operating member arranged during a part of its movement to effect through said connection when the connection is rigid the movement of said element in said direction and during a subsequent part of its movement to effect the collapse of said connection, and means in which energy is stored during the movement of the element in said direction for moving the element on the collapse of said connection in the opposite direction out of the path of movement of the movable member.

9. A circuit interrupter comprising a movable contact biased for movement to the circuit open position, means for holding the contact in the circuit closing position, means for releasing said holding means, and means for moving the contact to the circuit closing position comprising a collapsible connection arranged to assume a rigid condition and when collapsed to allow said contact to move to the circuit open position on the release of said holding means and an operating member operable in one movement for actuating through said connection when rigid the contact to the circuit closing position and for causing the collapse of said connection during a subsequent part of said movement.

10. A circuit interrupter comprising a movable contact biased for movement to the circuit open position, latching means for holding the contact in the circuit closing position, means for releasing said latching means, and means for moving the contact to the circuit closing position comprising a collapsible connection arranged to assume a rigid condition and when collapsed to allow said contact to move to the circuit open position on the release of said latching means and an operating member operable on movement in one direction for actuating through said connection when rigid the contact to the circuit closing position during a part of said movement and for causing the collapse of said connection on further movement in the same direction.

11. An electric switch including a movable circuit controlling member, operating means for effecting movement of the circuit controlling member to one position, a collapsible connection intermediate the operating means and the circuit controlling member adapted to assume a rigid condition and means for releasing said connection from its rigid condition during continued movement of the operating means after the circuit controlling member has been brought to said position by the operating means.

12. An electric switch including a movable circuit controlling member, a movable operating member for effecting movement of the circuit controlling member to the circuit controlling position, a connection intermediate the operating member and the circuit controlling member adapted to assume a rigid condition, means for putting said connection into its rigid condition when the operating member is substantially in the initial position of its path of movement whereby the circuit controlling member can be moved to said circuit controlling position by the movement of said operating member and means for releasing said connection from its rigid condition during continued movement of the operating member after it has brought the circuit controlling member to the circuit controlling position.

trolling position whereby the circuit controlling member is free to retrace its movement irrespective of the position of the operating member.

5 In witness whereof, I have hereunto set my hand this 28th day of January, 1927.

WINFIELD A. ATWOOD.

10

15

20

25

30

35

40

45

50

55

60

65