Sept. 4, 1928. 1,683,132

C. I. HALL

ELECTRIC SWITCH

Filed June 3, 1924

Fig. 1.

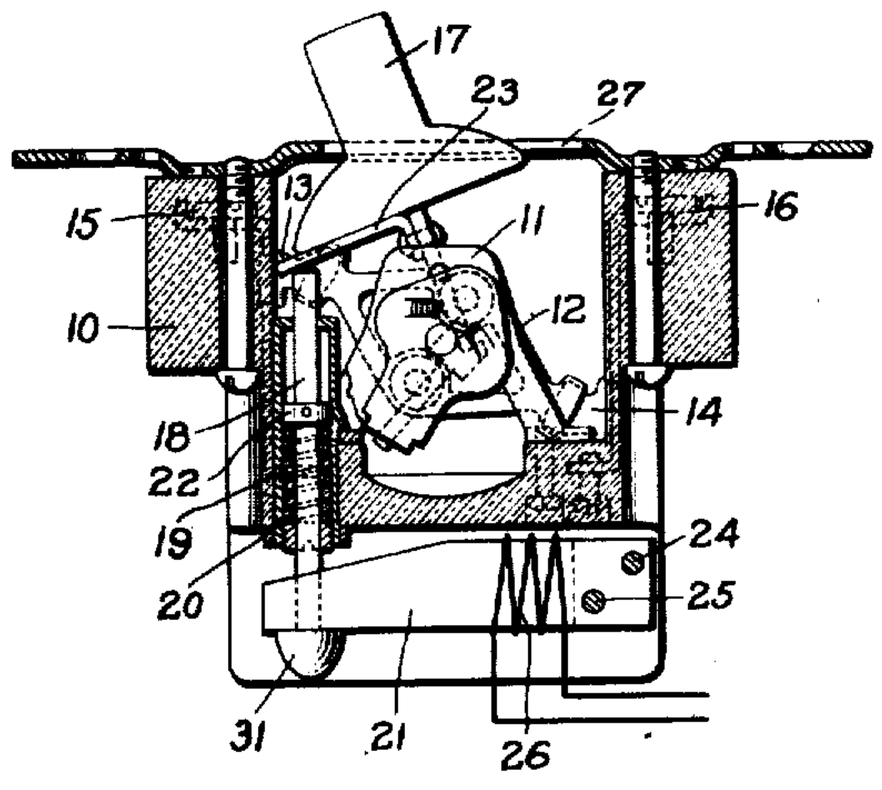


Fig. 2.

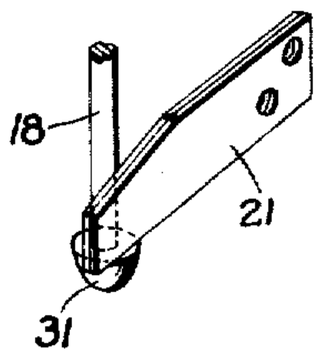
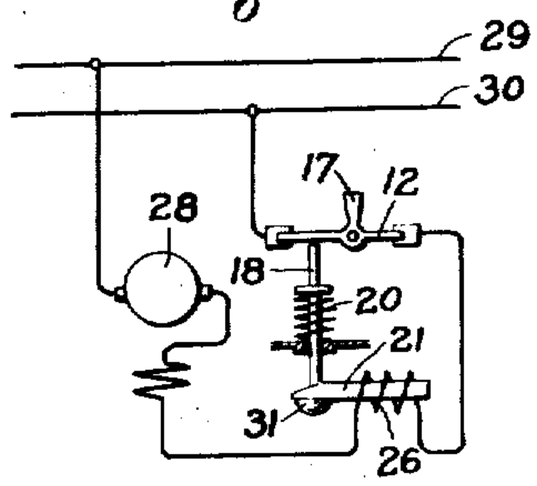


Fig. 3.



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UNITED STATES PATENT OFFICE.

CHESTER I. HALL, OF FORT WAYNE, INDIANA, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

ELECTRIC SWITCH.

Application filed June 3, 1924. Serial No. 717,649.

My present invention relates to improvements in electric switches and in particular to improvements in electric switches which are automatically operated responsively to the heating effect of an electric current.

One of the objects of the invention is to provide a switch which may be manually closed, and either manually opened with a snap action or automatically opened with a snap action in response to the heating effect of a predetermined current for a predetermined time interval.

Although not necessarily limited thereto, the invention is adapted to be embodied in a tumbler type of switch which is opened and closed with a snap action in response to the operation of a pivoted button and is biased to the position to which it is last operated.

The invention relates to various advantageous features of construction and arrangements which will be pointed out particularly hereinafter, and the scope of the invention will be indicated in the appended claims. For a better understanding of the invention, reference is had to the accompanying drawings which show an embodiment of the invention for purposes of illustration, and in which Fig. 1, is a sectional view of a switch of the tumbler type embodying my invention, Fig. 2, is a detailed perspective view of a part of the automatic actuating mechanism of the switch, and Fig. 3 diagrammatically shows the switch connected to control the circuit of a translating device.

Referring to Fig. 1, of the drawing, it will be seen that the electric switch embodying the invention in the preferred form shown comprises the enclosing base 10 formed of an insulating material such as porcelain suitably moulded to receive the tumbler actuating mechanism 11, the movable circuit controlling element 12, and the cooperating stationary contact members 13 and 14. Contact members 13 and 14 are electrically connected respectively to the switch terminals 15 and 16, which are suitably mounted on the base 10.

The tumbler actuating mechanism 11, may be of the type shown in Patent 844,533, to McGavock or in Patent 1,394,976 to De Reamer and as the particular structure of this mechanism is not of the essence of my present invention, no further detailed description thereof is deemed necessary. However it will be evident that when the operating tumbler 17 is thrown from the position shown to the right, the circuit controlling element 12, will be disengaged from the stationary contacts 13 and 14 with a snap action. Likewise upon the return of the operating tumbler 17 to the left, the movable circuit controlling element 12, will re-engage the stationary contacts 13 and 14 in a similar manner. Thus by operating the tumbler 17, the circuit controlling element 11 may be oscillated between the "on" and the "off" positions at will.

In accordance with my invention, an electrically controlled automatic actuating mechanism is provided for operating the circuit controlling element 12 from the "on" position and comprises in the form shown a controlling member 18 which is slidably supported in the tubular casing 19, an actuating spring 20, and a thermal-current responsive latch 21. The casing 19 is mounted in an opening in the base 10 and as shown the spring 20 is of the compression type and is interposed between the collar 22, which is secured to the member 18, and the lower end of the tubular member 19, and serves to bias the upper end of the controlling member 18 into the path of the auxiliary arm 23, which is secured to the operating tumbler 17 so as to move synchronously therewith.

As more clearly shown in Fig. 2 the lower end of the controlling member 18 is provided with an enlarged button or shoulder 31 which is arranged to engage with the thermal-responsive latch 21 when the spring 20 is sufficiently compressed. The thermal current responsive latch 21, is shown as of the bi-metallic thermostatic type, and is secured at one end to the enclosing base 10 by the pins 24 and 25, with the free end extending into latching relation with the button or shoulder 31 of member 18 when cool. An electrical heating coil 26 of suitable proportion and design is disposed in heat conducting relation with the latch 21 and serves to effect the disengagement of the free end of the latter from shoulder 31 in an obvious manner when energized by a predetermined current for a sufficient time.

It will be observed that a supporting plate 27, having a slot through which the tumbler switch operating member 17 projects, is sp-

cured to the enclosing base 10 and permits the entire switch mechanism to be mounted in a wall recess or switch box.

As diagrammatically illustrated in Fig. 3, the tumbler switch embodying my invention in the form shown in Fig. 1, may be employed advantageously to control the connections of an electric translating device, such as for example the electric motor 28, to the supply lines 29 and 30. As shown the motor 28 is energized from the supply lines 29 and 30 through a circuit including the heating coil 26 and the circuit controlling element 12. It will be observed that the thermal responsive latch 21 is in latching engagement with the shoulder 31 of the controlling member 18 so as to maintain the latter in its lower position against the biasing force of the compression spring 20. Under these conditions, the circuit controlling element 12 may be oscillated at will by means of the tumbler operating handle 17 between the "on" and the "off" positions to correspondingly connect and disconnect the motor 28 from the supply lines 29 and 30.

It will be understood that the heating coil 26 is not energized sufficiently by the normal running current of motor 28 to effect movement of the thermal responsive latch 21 from the shoulder 31. However, should the motor 28 become overloaded and receive an excessive current from the supply lines 29 and 30, the heating effect of coil 26 will be correspondingly increased and after a predetermined time interval will cause the thermal responsive latch 21 to flex out of engagement with the shoulder 31 of the controlling member 18. Thereupon the controlling member 18 is released and moves under the biasing force of spring 20, to operate the tumbler handle 17 from the position shown and thereby effect the opening of the circuit controlling element with a snap action as previously described. Thus, motor 28 is automatically disconnected from the supply lines 29 and 30 a predetermined time interval after the occurrence of overload conditions.

When the thermal responsive latch 21 has cooled sufficiently to return into latching relation with the shoulder 31, the motor 28 may be again connected to the supply lines 29 and 30 by operating the tumbler handle 17 to the left. This effects the closure of the circuit controlling element 12 with a snap action and at the same time compresses the spring 20 and returns the shoulder 31 of member 18 into latching engagement with the thermal responsive latch 21. The rounded surface of the shoulder causes the latch to move laterally while the switch is being closed and the latch then moves to the position shown in the drawings when the switch is closed.

In accordance with the provision of the patent statutes I have described the principle of operation of my invention together with the apparatus which I now consider to represent the best embodiment thereof, but I would have it understood that the apparatus shown is only illustrative and that the invention may be carried out by other means.

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 a movable switch member, of means including a resilient member for operating the switch member with a snap action to and from one position, a second resilient member arranged to be put under strain upon operation of the switch member to the said one position for operating the switch member therefrom with a snap action, and a thermal-responsive latch for controlling the operation of said second resilient member in response to predetermined temperature conditions.

2. In an electric switch, the combination with a movable switch member having a circuit closing and a circuit opening position, of an independently movable member for operating the switch element between said positions, a spring connection between the operating member and the switch element for effecting snap action of the switch element each way between said positions upon operation of the operating member, a second spring disposed to be put under strain to move the operating member to return the switch element to the open position upon operation thereof to the closed position, and a thermal-responsive latch for holding the said spring out of operative relation with the said operating member and arranged to release the spring responsively to the heating effect of the current in the circuit controlled by the switch.

3. A thermal responsive snap switch comprising, a circuit controlling element arranged to be operated between a circuit closing position and a circuit opening position and biased to each of said positions when operated thereto, a controlling member arranged to be put under strain by the operation of said switch member to the circuit closing position for returning the switch member to the open position, and a latch arranged to engage the said controlling member and hold the same against the strain thereof, the said latch arranged to release the controlling member responsively to the heating effect of the current in the circuit controlled by the switch.

4. In an electric switch, the combination with a pivoted circuit controlling element, of tumbler actuating mechanism for oscillating the said element between two positions and biasing the same to the last position to which it is oscillated, and an automatic actuating mechanism for the said circuit control-

ling element comprising a controlling member arranged to be biased upon operation of said element to one of said positions to return the said element to the other position and a thermal current responsive latch for holding the said member against the bias thereof.

5. In a manually operable electric switch, the combination with a pivoted circuit controlling element adapted to be oscillated at will between two positions, of an electrically controlled actuating mechanism for the said element comprising an arm connected to the said element to move therewith, a controlling member biased into operative relation with the said arm for returning the said element from one of said positions to the other position, a thermostatic latch for holding the said member against its bias and electrical means for heating the said latch to release the said operating member.

6. The combination with a manually operable two-position tumbler switch mechanism of the class described and an inclosing base therefor having an opening therein, of automatic means for actuating the said mechanism comprising an arm secured to the operating tumbler of said mechanism to move synchronously therewith, a controlling member having one end extending through the opening in the said base and provided with a shoulder, a spring for biasing the said member into operative engagement with said arm to actuate the said mechanism from one of the said positions to the other position, a thermostatic latch disposed in latching relation with the said shoulder for holding the said plunger against the bias of said spring, and electrical means connected in circuit with said switch for heating the said latch to release the said member responsivelv to a predetermined current in said circuit.

In witness whereof, I have hereunto set my hand this 28th day of May, 1924.

CHESTER I. HALL.

DISCLAIMER

1,683,132.—*Chester I. Hall*, Fort Wayne, Ind. ELECTRIC SWITCH. Patent dated September 4, 1928. Disclaimer filed August 18, 1933, by the assignee, *General Electric Company*.

Hereby disclaims the subject-matter of claim 5 of the said Letters Patent which is in the following words, to wit:

"5. In a manually operable electric switch, the combination with a pivoted circuit controlling element adapted to be oscillated at will between two positions, of an electrically controlled actuating mechanism for the said element comprising an arm connected to the said element to move therewith, a controlling member biased into operative relation with the said arm for returning the said element from one of said positions to the other position, a thermostatic latch for holding the said member against its bias and electrical means for heating the said latch to release the said operating member."

Your petitioner also hereby enters the following disclaimer as to claims 1, 3, and 4 of the said Letters Patent:

The invention set forth in claim 1 except when the switch structure embodies means for producing the predetermined temperature conditions which affect the latch, and except when the switch member, while the second resilient member is held by the latch, is movable, in its normal operations, to and from the one position independently of and without affecting the latched resilient member.

The invention as set forth in claim 3 except when the switch structure embodies the means responsive to the current in the circuit controlled by the switch for producing the heat which affects the latch to release the controlling member, and except when the circuit-controlling element or switch member, while the controlling member is held by the latch, is movable, in its normal operations, between the circuit-closing position and the circuit-opening position independently of and without affecting the latched controlling member.

The invention as set forth in claim 4 except when the switch structure embodies means responsive to the current in the circuit controlled by the switch for producing the heat which affects the latch, and except when the circuit-controlling element or member, while the controlling member is held by the latch, is movable, in its normal operations, between the two positions independently of and without affecting the latched controlling member.

[*Official Gazette September 19, 1933.*]

ling element comprising a controlling member arranged to be biased upon operation of said element to one of said positions to return the said element to the other position and a thermal current responsive latch for holding the said member against the bias thereof.

5. In a manually operable electric switch, the combination with a pivoted circuit controlling element adapted to be oscillated at will between two positions, of an electrically controlled actuating mechanism for the said element comprising an arm connected to the said element to move therewith, a controlling member biased into operative relation with the said arm for returning the said element from one of said positions to the other position, a thermostatic latch for holding the said member against its bias and electrical means for heating the said latch to release the said operating member.

6. The combination with a manually operable two-position tumbler switch mechanism of the class described and an inclosing base therefor having an opening therein, of automatic means for actuating the said mechanism comprising an arm secured to the operating tumbler of said mechanism to move synchronously therewith, a controlling member having one end extending through the opening in the said base and provided with a shoulder, a spring for biasing the said member into operative engagement with said arm to actuate the said mechanism from one of the said positions to the other position, a thermostatic latch disposed in latching relation with the said shoulder for holding the said plunger against the bias of said spring, and electrical means connected in circuit with said switch for heating the said latch to release the said member responsivelv to a predetermined current in said circuit.

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The invention as set forth in claim 3 except when the switch structure embodies the means responsive to the current in the circuit controlled by the switch for producing the heat which affects the latch to release the controlling member, and except when the circuit-controlling element or switch member, while the controlling member is held by the latch, is movable, in its normal operations, between the circuit-closing position and the circuit-opening position independently of and without affecting the latched controlling member.

The invention as set forth in claim 4 except when the switch structure embodies means responsive to the current in the circuit controlled by the switch for producing the heat which affects the latch, and except when the circuit-controlling element or member, while the controlling member is held by the latch, is movable, in its normal operations, between the two positions independently of and without affecting the latched controlling member.

[*Official Gazette September 19, 1933.*]