W. RICHTER.

ELECTRIC SWITCH.

APPLICATION FILED JAN. 16, 1919.

1,357,726.

Patented Nov. 2, 1920.

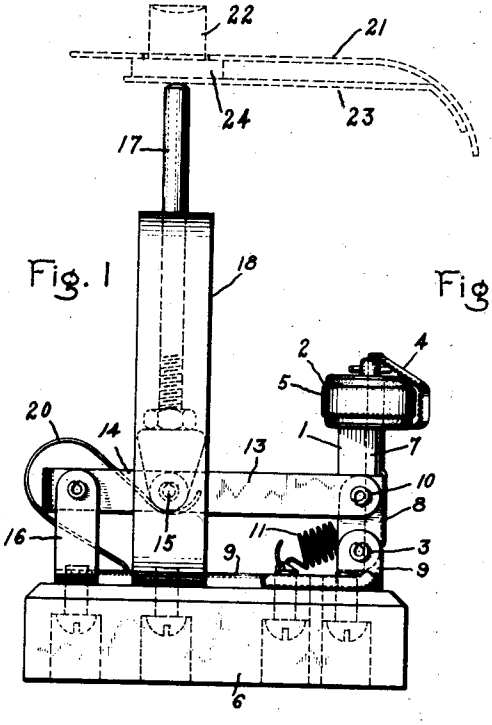


Fig. 1

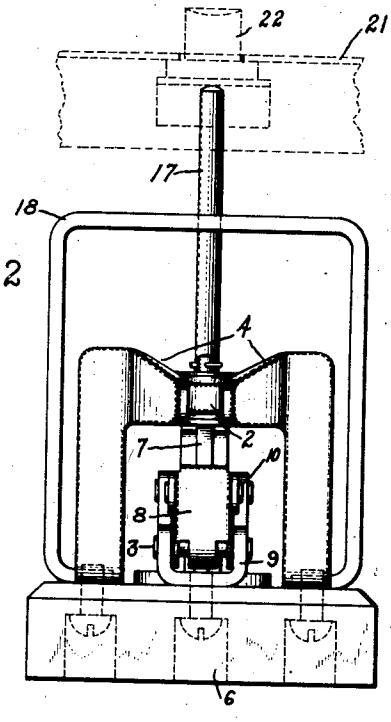


Fig. 2

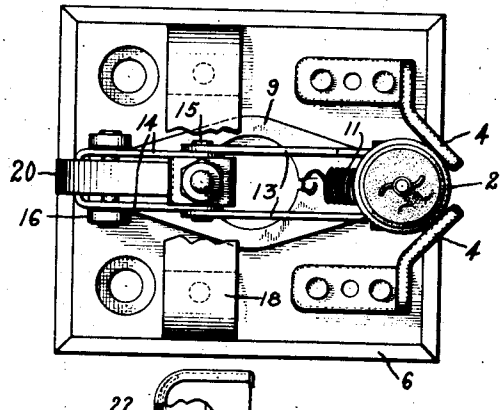


Fig. 3

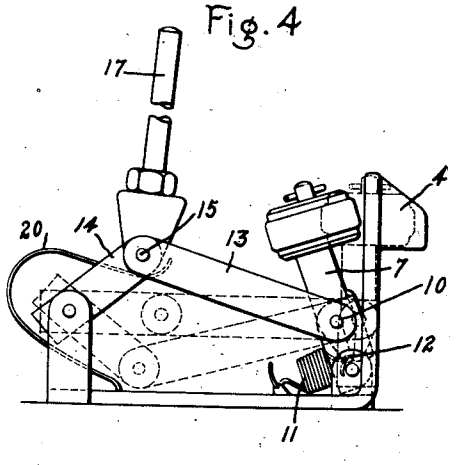


Fig. 4

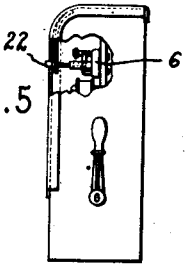


Fig. 5

Inventor:
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UNITED STATES PATENT OFFICE.

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ELECTRIC SWITCH.

1,357,726. Specification of Letters Patent. Patented Nov. 2, 1920.

Application filed January 16, 1919. Serial No. 271,439.

To all whom it may concern:

Be it known that I, WILLIAM RICHTER, a citizen of the United States, residing at Scotia, in the county of Schenectady, State of New York, have invented certain new and useful Improvements in Electric Switches, of which the following is a specification.

My invention relates to the control of electric circuits and has for its object the provision of improved switching means whereby the circuit may be opened and closed in a safe, reliable and efficient manner.

While my invention is quite generally applicable in the field of control of electric circuits, it is particularly useful as a safety device for automatically cutting off current to inclosed control apparatus when the latter is exposed so as to make the apparatus safe for inspection and manipulation. The present tendency is to inclose the switching and control apparatus so as to prevent the operator or unauthorized persons from coming into contact with exposed live parts. It is common, for instance, to inclose the switching mechanism within a metallic case with only an operating handle or member exposed and to provide means whereby when the door of the casing is opened, the power is automatically cut off from the inclosed apparatus. One of the objects of my invention is to provide improved means for accomplishing this result. It is also frequently desirable to be able to quickly cut off the power without opening the door of the inclosing casing. In the case of motor starting apparatus such, for example, as motor starting compensators and the like, where the operating handle is held in running position by a no-voltage magnet, it is desirable to be able to throw the starter to the off position quickly by a simple operation such as the pressing of a push button. Another object of my invention is to provide improved means for accomplishing this result.

In the form of my invention which I have illustrated, I accomplish both purposes with a single switch mechanism, the arrangement being such that the switch may be closed by operating the moving plunger or other transmitting element of the switch, as, for instance, by the closure of the door of the casing, and by operating the plunger further as, for instance, by a push button in the door, the switch may be opened. The particular form of mechanism which I have illustrated is a toggle device so arranged that the first movement of the plunger closes the switch by setting the toggle, and a further movement throws the toggle over center and opens the switch, the whole movement being against the tension of a spring so that when the plunger is released it will automatically return to its initial position. Other objects and purposes of my invention will appear in the course of the following specification in which I have shown my invention embodied in concrete form for purposes of illustration.

In the accompanying drawings illustrating my invention, Figure 1 is a side elevation of my switch in a closed position and showing a section of the casing door in broken lines; Fig. 2 is a front elevation of the parts shown in Fig. 1; Fig. 3 is a plan view of the switch in closed position; Fig. 4 is an outline view of Fig. 1 showing the several positions of the switch, and Fig. 5 shows my switch within a casing.

Referring to the drawings, 1 represents a switch member provided with a contact 2, and moving about a center at 3 into and out of engagement with contacts 4. Contact 2 is shown in the form of a roller having a metallic outer surface 5 loosely mounted on the member 1, so that it may adjust itself to the contacts 4. Contacts 4 are fixedly mounted on a base 6 and extend upward and then outward in a V-shape, as shown, so as to be conveniently engaged by the contact roller. The switch member 1, as shown, is made in two parts, the upper part 7 carrying the contact roller, and the lower part 8 pivoted at 3 to the supporting plate 9. The part 8 is channel shaped and the part 7 enters the channel and is pivoted to it at 10. The two parts are yieldingly held in alinement, as shown, by a spring 11, one end of which is secured to the supporting plate 9 while the other end is secured to a projection 12 on part 7 which extends below the pivot 10. The spring 11, therefore, yieldingly holds the part 7 against the back of the channel but the upper part yields somewhat against the spring tension when it is forced into engagement with the contacts 4, thereby making a yielding and self-alining contact.

The switch member composed of the two

parts 7 and 8 is operated by a toggle arrangement composed of two pairs of links 13 and 14 pivoted to each other at 15. The links 14 are pivoted in a bracket 16 secured to or forming part of the plate 9, while links 13 are pivoted to the lower part 8 of switch member 1. The operating member of the switch is a plunger 17 which passes through and is guided by a frame 18 and has its lower end pivoted at 15 to the pivot point of the link. The movement of the plunger 17, therefore, up and down will move the pivot point of the links, and hence move the switch member 1 into and out of engagement with the contacts 4. A spring 20 forces the plunger and links to the upper position, shown in full lines in Fig. 4, when the parts are unrestrained.

By referring to Fig. 4 the three positions which the parts may assume will be seen. Normally the parts are in the position shown in full lines; when, however, the plunger is pressed far enough to straighten out the links, as shown in dotted lines, the switch arm will be moved to closed position as shown. When released from this position the switch parts will be returned to full line position by the spring 20. If, however, the plunger is pressed further, the links will assume the lower position shown in Fig. 4, thereby moving the switch member to open position. If released from this position, the spring 20 will return the parts to the position shown in full lines, that is, to their normal position.

In Figs. 1 and 2 I have shown in broken lines a door 21 for a casing in which the switch and other apparatus may be inclosed. The door is shown closed, in which position it engages the plunger 17 and forces it inward until the links are straightened and the switch closed. If the door should be opened, of course, the plunger and the other parts will return to normal or open position.

In order to open the switch without opening the door I provide a push button 22 which is engaged by the plunger and extends through the door. The button is yieldingly mounted on a spring 23 which has a shoulder 24 so as to limit the outward movement of the button, as shown. When the door is closed, therefore, and as a consequence the switch also is closed, by pressing the button 22 the plunger 17 will be forced inward to its farthest position shown in Fig 4, thereby opening the switch. When the button is released the switch will return to closed position and, of course, when the door is opened the switch will return to open position. The result is that the switch is always open when the door is open or may be held open by the operator with the door closed. Fig. 5 shows the door on a complete casing with the switch mounted inside.

It will thus be seen that I have provided a very simple arrangement of safety switch mechanism in which a single switch is operated by the door, and may at the same time be operated with the door closed if desired.

While I have described my invention as embodied in concrete form and as operating in a specific manner in accordance with the provisions of the patent statutes, it should be understood that I do not limit my invention thereto as various modifications thereof will suggest themselves to those skilled in the art without departing from the spirit of my invention the scope of which is set forth in the annexed claims.

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

1. A circuit controlling device comprising a switch member biased to one position, an operating member therefor, a toggle operatively connected to the switch member, and means whereby movement of the operating member in one direction straightens the toggle and moves the switch member to another position against its bias and further movement in the same direction breaks the toggle and returns the switch member to its biased position.

2. A circuit controlling device comprising a switch member biased to one position, an operating member therefor, means whereby the movement of the operating member in one direction moves the switch member to a second position and further movement in the same direction returns it to the first position and means for returning the switch member and operating member to the first position whenever the operating member is released.

3. A circuit controlling device comprising a switch member, an operating member therefor, means whereby a continuous movement of the operating member first moves the switch member to a certain position and then returns it, and means for returning the switch member and operating member whenever the latter is released.

4. A circuit controlling device comprising a switch member, an operating member therefor having a forward and return movement, means whereby a forward movement of the operating member moves the switch member to operative position and further movement in the same direction returns it, and means for returning the switch member and operating member whenever the latter is released.

5. A circuit-controlling device comprising a movable contact, a toggle operatively connected to said contact, resilient means opposing the movement of the toggle and to normally hold said contact in one position, and means for straightening said toggle to move the contact to another position by one movement and to break the toggle to move

the contact to the first position by a continuation of that movement.

6. A circuit-controlling device comprising a movable contact biased to one position, a toggle operatively connected to said contact, resilient means opposing the movement of the toggle and to return the contact to its biased position, and means for straightening said toggle to move the switch to another position against its bias by one movement and to break the toggle by a continuation of that movement to move the switch to its biased position.

7. The combination of a casing provided with a door, a switch housed in the casing, comprising a movable contact, a toggle operatively connected to said contact, resilient means biasing the contact to open position and opposing the movement of the toggle, means for straightening said toggle co-acting with said door to close the switch and to break the toggle and open the switch in response to the closing and opening of the door respectively, and means extending through the closed door for breaking the toggle to move the contact to open position.

8. The combination of a casing provided with a door, a switch housed in the casing comprising a movable contact biased to the open position, a toggle operatively connected thereto, resilient means opposing the movement of the toggle to break the toggle and return the switch to the open position when the door is open, mechanism for actuating the contact projecting into the path of the closing door to be acted upon by the latter to straighten the toggle and move the contact to the closed position, and means for breaking the toggle against the action of the said resilient means for moving the contact to open position after the door is closed.

In witness whereof, I have hereunto set my hand this 14th day of January, 1919.

WILLIAM RICHTER.