G. A. BURNHAM.

ELECTRIC SERVICE SWITCH.

APPLICATION FILED AUG. 2, 1918.

1,429,275.

Patented Sept. 19, 1922.

3 SHEETS—SHEET 1.

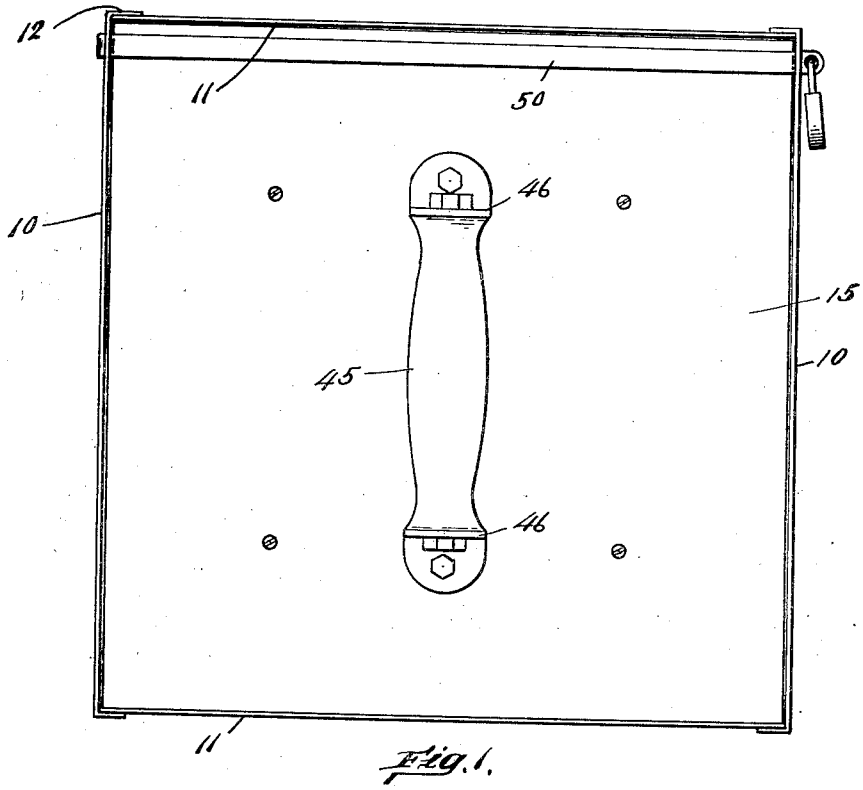


Fig. 1.

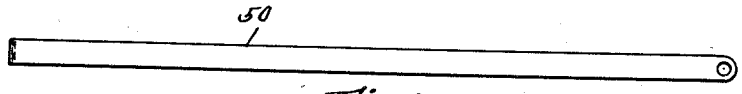


Fig. 9.

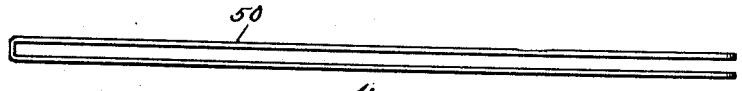


Fig. 10.

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3 SHEETS—SHEET 2.

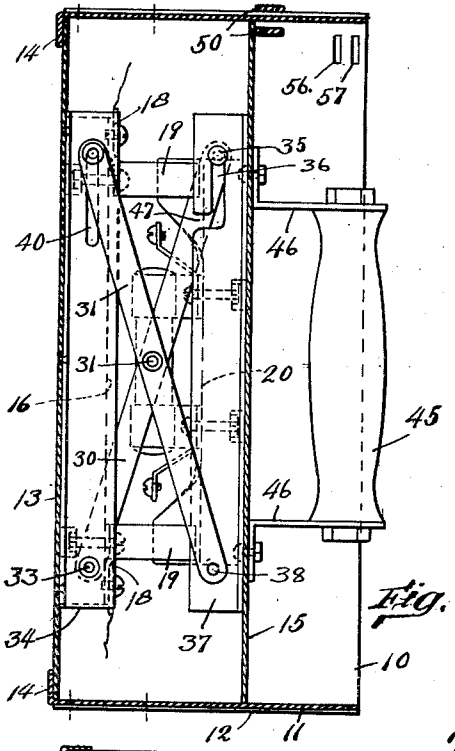


Fig. 2.

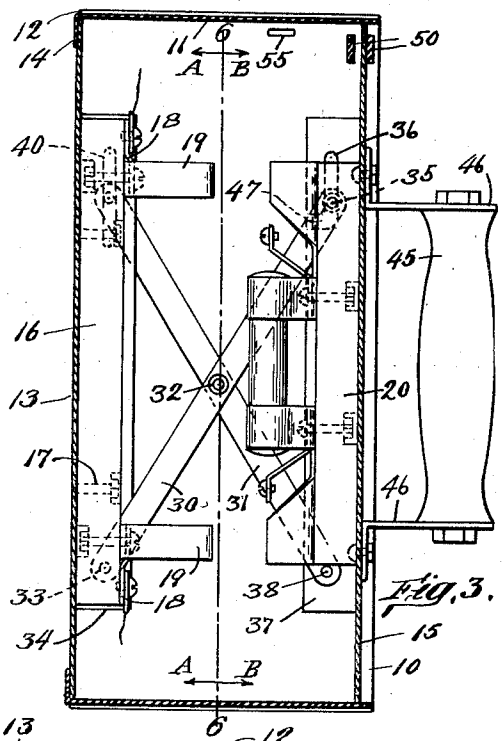


Fig. 3.

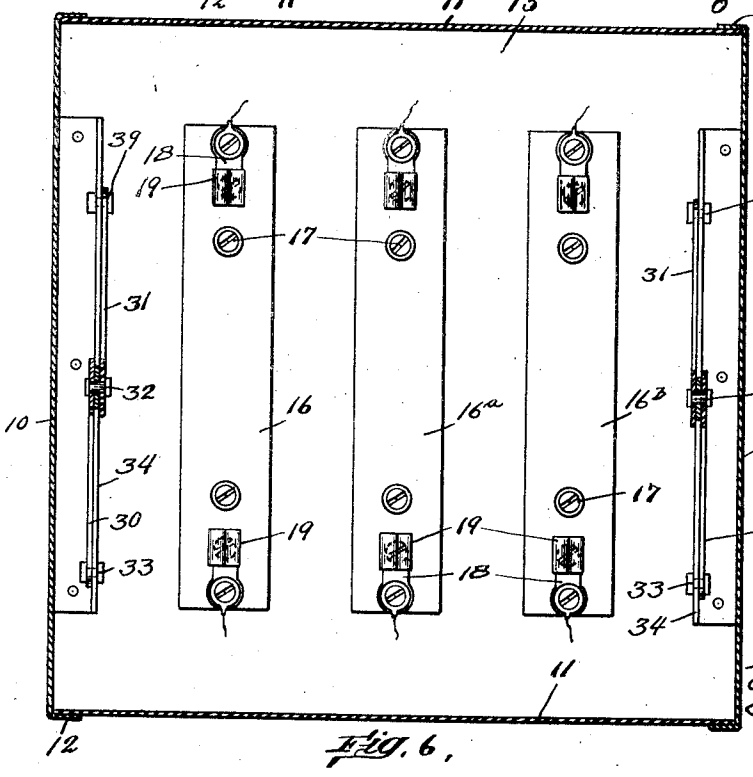


Fig. 6.

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3 SHEETS—SHEET 3.

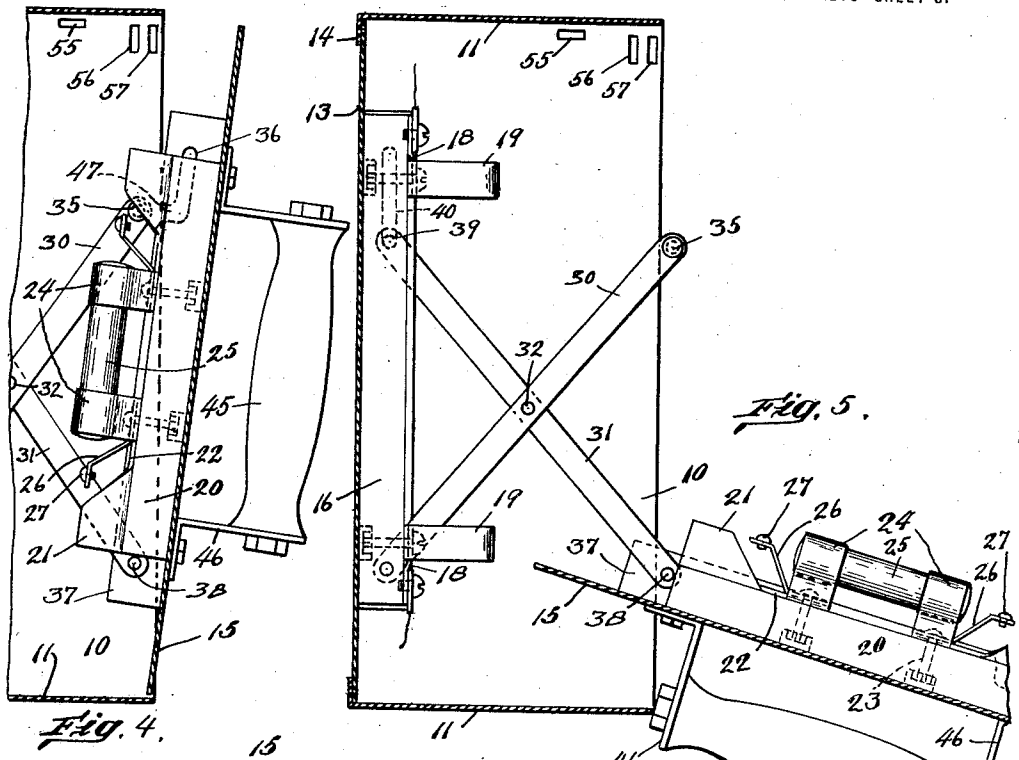


Fig. 4.

Fig. 5.

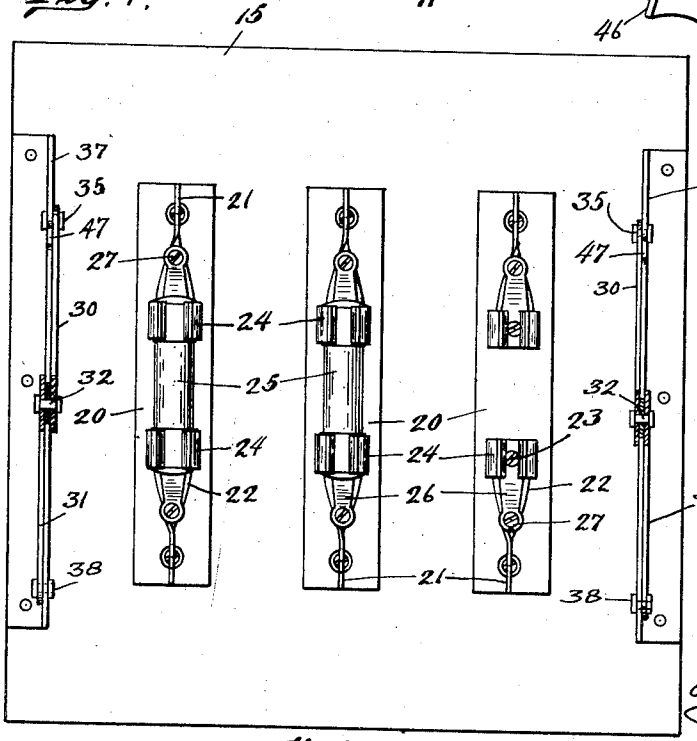


Fig. 7.

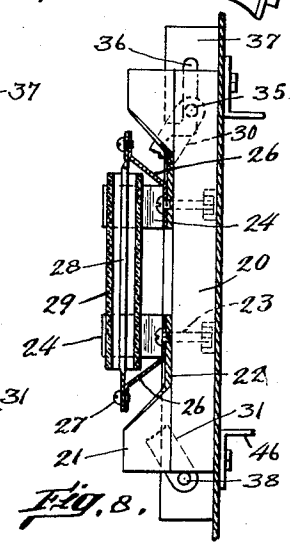


Fig. 8.

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UNITED STATES PATENT OFFICE.

GEORGE A. BURNHAM, OF SAUGUS, MASSACHUSETTS, ASSIGNOR TO SEARS B. CONDIT, OF BROOKLINE, MASSACHUSETTS.

ELECTRIC SERVICE SWITCH.

Application filed August 2, 1918. Serial No. 247,976.

To all whom it may concern:

Be it known that I, GEORGE A. BURNHAM, a citizen of the United States, residing at Saugus, in the county of Essex and State of Massachusetts, have invented an Improvement in Electric Service Switches, of which the following is a specification.

My invention relates to electric switches and has special reference to a switch adapted for the control of small motors and electric service circuits.

The object of my invention is to improve the construction of switches of the type above set forth, and specifically, to provide an electric switch so constructed and arranged that all of its current-carrying elements are enclosed, when the switch is in both open and closed positions; that admits of its being locked in open and closed positions; and locked against access to its components, and operable; that has fusible members associated with and a component part of one of the members of the switch; that admits of the disconnection of said fusible members from the electric circuit and their removal to a position remote from the electric circuit previous to access thereto; and that is simple and inexpensive in construction.

The means whereby I accomplish the object of my invention resides mainly in the unique construction of the switch.

Fig. 1 is a front elevation of a switch embodying my invention.

Fig. 2 is a sectional side elevation of Fig. 1 showing the switch locked in closed position.

Fig. 3 is a view similar to Fig. 2 but showing the switch locked in open position.

Fig. 4 is a sectional detail similar to Figs. 2 and 3 showing the switch cover partially open.

Fig. 5 is a sectional detail showing the cover completely moved to open position.

Fig. 6 is a section along lines 6—6 of Fig. 3 in the direction of arrows A—A showing the stationary contact members.

Fig. 7 is a section along lines 6—6 of Fig. 3 in the direction of arrows B—B showing the cover with fusible members.

Fig. 8 is a sectional detail of the cover and a modified fusible element.

Figs. 9 and 10 are plan and side elevations respectively of the locking member.

As here shown, the component parts of the switch are disposed within the substantially rectangular box structure formed of the side walls 10 and top and bottom walls 11. Said walls are composed of sheet material and the side walls 10 are provided with reflexed end portions or ears 12 to which the top and bottom walls are secured by rivets, spot-welding, or other suitable means to form a solid unitary structure.

The back wall comprises a flat plate 13 also formed of sheet material and secured, as here shown, to the reflexed ears 14 of the top and bottom walls 11, or to the sides and top of the casing by other suitable means to completely enclose the back of the structure.

The front cover 15 is also formed of sheet material and is of such dimensions that it may be slid or moved within the side walls of the structure toward or from the back wall 13 and yet enclose the space included between said cover and the back wall, in which space the stationary and movable switch members are arranged.

The stationary switch members, as here shown, are mounted on separate insulating strips 16, 16^a, 16^b, to the back wall of the structure by the screws 17.

The stationary switch members are each formed from a single strip of resilient material having an extended ear or lug 18 by which they may be secured to the insulating block or support, and having two upstanding and inwardly reflexed contact members 19 which are so disposed that their reflexed portions are nearly in contact so that they may securely engage the blade of the movable switch member adapted to be inserted therebetween. Two of such switch members are provided for each pole of the switch, and for the switch illustrated, adapted for the control of a three phase, or three wire circuit, six stationary switch members, or three stationary switch member units, are employed. It is obvious that the number of pairs of stationary switch members may be varied to suit any particular circuit to be controlled.

The movable switch members are arranged on the cover 15 of the switch and are moved toward or away from the stationary switch members in a straight line as said cover is moved inward or outward in the structure.

The movable switch members for each pole of the switch are separately mounted on the blocks 20 of insulating material and, for each pole of the switch, comprise two contact blocks of strip material having edge portions 21 arranged in alignment with the stationary contact members 19 between which they are adapted to be inserted in a movement of the switch into closed position, and reflexed portions 22 by means of which the contact members are secured in relation on the insulating blocks 20 by suitable screws 23.

Fuse clips 24 of suitable shape to retain a standard enclosed fuse 25 are secured to the portions 22 of each contact member 21, whereby the fuse inserted between said members serves to connect said members, and when the switch is in its closed position, the circuit is closed through said fuses.

The fuse clips 24 are provided with lugs 26 integrally or otherwise connected thereto which are extended upward to about the center line between the fuse engaging portions of the clips but beyond the ends of the enclosed fuses which are adapted to be inserted therein. Said lugs are formed with connecting means 27 by which a fusible wire or link 28 may be connected between the contact members 21, if desired, in place of the enclosed fuses.

In connection with the exposed fusible wire or link 28, I may employ a tube 29 of an insulating material, as fibre, and through which the fusible link or wire is extended. The tube is of such an external diameter and length that it is held between the fuse clips 24.

The use of the tube surrounding the fusible wire or link, over the wire or link alone has advantages in that the combination approximates an enclosed fuse in causing an explosive operation of the fuse which serves to quickly extinguish the arc formed when the fuse is blown.

It is seen that the movable switch members and the stationary switch members for each pole of the switch are separately and independently mounted on a block or strip of insulating material, which, while this arrangement is not essential, is extremely desirable as it permits each pole of the switch to be assembled as a standard unit without regard to the particular circuit the assembled switch may be desired to control, and in the assembling of the switch, as many stationary switch member units, and movable switch member units, may be assembled as are required.

The cover 15 of the switch, with the movable switch members secured thereto, is adapted to be moved toward and away from the back of the structure, which has stationary switch members secured thereon, to close and open the switch, and said cover is guided in its movements by mechanism so arranged that it moves in a substantially straight line between open and closed positions of the switch.

The guiding mechanism is essentially a "lazy tongs" in which two crossed links of equal length are pivotally connected at their points of crossing and one link is pivotally connected to a stationary member and slidingly arranged in a slot in the movable member, and the other link is pivotally connected to said movable member and slidingly arranged in a slot in the stationary member.

Two sets of guide links are arranged at opposite sides of the switch structure. Each set comprises two links 30 and 31 of equal length and pivotally connected together at 32 at their middle points. Said link 30 is pivoted at 33 to the bottom of the extended flange 34 of an angle member secured to the back walls 13 of the structure and its other end is provided with a pin or roller 35 which is slidingly arranged in a slot 36 in the upper portion of the extended flange 37 of an angle member secured to the cover 15.

The link 31 is pivoted at its lower end 38 to the lower end of said flange 37 and its upper end is provided with a pin or roller 39 slidingly arranged in a slot 40 in the top portion of said flange 34 secured to the back wall 13. The pivotal connections of the two links at 33 and 38 respectively to the flanges secured to the stationary back wall 13 and movable cover 15, and the arrangements of the guide slots in said flanges at right angles to a line drawn through said pivotal connections, in connection with the links of equal length is such that the cover 15 is guided in its movements toward or away from the back wall 13 in a straight line, or at all positions between open and closed conditions of the switch, is substantially parallel with the back wall 13.

A handle 45 arranged between two standards 46 secured to the cover 15 forms means whereby the cover may be conveniently operated.

It is necessary that access be had to the fuses arranged on the cover 15 and the cover is therefore adapted to be swung outwardly about its pivotal connection at 38 with the links 31, and, in its most open position, the cover may assume the position shown in Fig. 5, in which position the fuses are entirely free from the enclosing case and are also free from contact with any live part of the switch. Moreover, in this position, the fuses are so far removed from the stationary switch members, which are the only exposed parts of the switch connected to the circuit, and which are moreover at the bottom of the switch structure, that there is absolutely no danger of accidental contact therewith.

In order that the cover may be moved to the position shown in Fig. 5, the walls of guide slots 36 in the flanges of the angle members secured to the cover 15 are cut away to form passage ways 47 at the lower ends of said slots to thereby permit the disengagement of said links 30 therefrom upon an extreme outward movement of the cover.

The length of said slots is such that the cover is guided in a straight line for all movements of the cover between closed and open positions of the switch, in the extreme open position of which it yet completely encloses the switch members within the casing. Upon a further movement of the cover in the switch opening direction, however, the links 30 pass from the guide slots 36 and the cover, being no longer constrained at its upper end, pivots about its pivotal connections 38 with the links 31 and moves to the position shown in Fig. 5.

Locking means are provided whereby the switch may be locked in closed position against movement into open position, or locked in open position against movement into closed position; or locked to permit the normal operation of the switch between open and closed positions, yet prevent the removal of the cover 15 from the switch for access to the fuses or to switch components.

The locking means includes the member 50 formed of strip material and reflexed to form two arms of equal length slightly spaced apart. A hole may be formed in the ends of the arms to admit the passage of the bolt of a lock or sealing means to prevent the removal of the locking member from the switch casing.

Corresponding locking slots 55, 56, 57, are formed in the opposite side walls 10 of the casing through particular ones of which the locking member is adapted to be inserted to lock the switch in any particular condition. When one arm of the locking member is extended through the slots 55 and the other arm passed over the top of the casing, with the cover 15 as shown in Fig. 2, and the bolt of a pad-lock passed through the two arms, the switch is locked in closed position and cannot be opened, and in such position all parts of the switch are locked against access.

When the two arms of the locking member are passed through the two slots 56 and 57, with the cover 15 between the innermost arm and the back wall 13 of the switch, the switch is locked against entrance thereto or against access to its components yet may be moved into open or closed position for the complete control of a circuit connected thereto.

When the cover 15 is positioned between the two arms of the locking member as they are extended through said slots 56 and 57 and locked therein, the switch is locked in open position and cannot be moved into closed position and in such locked position, the switch is completely locked against access to its components.

The circuit leads are adapted to be extended into the switch casing by the provision of suitable knock-out pieces, not shown, in the side and top walls thereof, whereby the leads may enter the switch from any convenient position.

I claim:

1. An electric switch having a casing, stationary and movable switch members disposed therein, a cover for said casing movable within and in closing relation with said casing to close and open the switch and means to lock said cover in switch closed and casing closing position in said casing and to lock the cover in switch open and casing closing position, said cover arranged for movement beyond casing closing position upon release of the lock upon it to expose the switch members.

2. An electric switch having a casing, stationary and movable switch members disposed therein, a cover for said casing movable therein in closing relation with said casing to open and close the switch and a U-shaped locking bar adapted to be passed through slots in opposite side walls of the casing and on opposite sides of the cover to lock the cover against movement in switch open position, and said casing having other slots adapted to receive said locking bar to lock the cover in switch closed position.

3. An electric switch comprising an enclosing casing, a closure therefor bodily movable therein, stationary and movable switch members arranged within said casing, said movable switch members arranged for operation by said closure, and means to guide said closure for bodily movement in a straight line within said casing to open and close the switch while maintaining the casing closed.

4. In an electric switch, an enclosing casing, a closure therefor bodily movable with respect to said casing, stationary and movable switch members arranged within said casing, said movable switch members supported by said closure and movable into closed or open position by a movement of said closure, said closure arranged to maintain the casing closed during such movement and means to guide said closure for movement in a straight line within said casing.

5. In an electric switch, an enclosing casing, stationary switch members arranged therein, a movable cover for said casing, movable switch members carried by said cover, said cover movable toward and from said stationary switch members to close and open the switch while covering the casing, and

links connecting said cover and casing to guide said cover for such movement in a substantially straight line.

6. In an electric switch, the combination of a casing, stationary switch members disposed in said casing, a cover for said casing movable therein and in closing relation with said casing to open and close the switch, movable switch members including two spaced contact members having tubular fuse casing receiving means carried by said casing adapted to receive a tubular fuse to electrically connect said contact members, and means to guide said cover for bodily movement in a straight line within said casing to open and close the switch.

7. In an electric switch, stationary and movable switch members, and operating mechanism therefor comprising links pivotally connected to a stationary component of the switch and slidingly connected with the movable switch members, and other links pivotally connected with said movable switch members and slidingly connected with a stationary component of the switch, whereby said movable switch members are guided toward and away from said stationary members in substantially a straight line.

8. In an electric switch, stationary and movable switch members, and operating mechanism therefor comprising links pivotally connected to a stationary component of the switch and slidingly connected with the movable switch members, and other links pivotaly connected with said movable switch members and slidingly connected with a stationary component of the switch, said links being pivotally connected, said arrangement forming means whereby said movable switch members are guided toward and away from said stationary switch members in substantially a straight line.

9. In an electric switch, stationary and movable switch members, a support for said stationary switch members, a plate bearing said movable switch members, and switch operating mechanism comprising crossed guide links pivoted to said support and plate, and slidably connected to said support and plate, the pivotal and sliding connections with said support and plate arranged in parrallel planes, whereby to guide said plate for movement in a straight line.

10. In an electric switch, an enclosing casing, stationary switch members arranged therein, movable switch members, a plate supporting said movable members, and means to guide said movable switch members toward or away from said stationary members in substantially a straight line comprising sets of crossed links pivotally connected at their point of crossing, one of the links of a set pivoted at one end to said casing and at the other end arranged in sliding engagement with said plate, and the other link of the set pivotally connected at the end to said plate and arranged in sliding engagement with said casing.

11. In an electric switch, an enclosing casing, switch members disposed therein, a cover for said casing movable therein arranged to operate the switch while maintaining the casing closed, and means including guide links arranged to guide said cover for movement in a straight line within said casing, said cover and guiding means arranged for partial disengagement to permit the cover to be moved away from said casing for access therein.

12. In an electric switch, an enclosing casing, switch members disposed therein, a cover for said casing movable within said casing to operate the switch while maintaining the casing closed, guiding means for said cover including links pivoted to said cover, and other links in sliding engagement with said cover, said cover arranged to release the links from sliding engagement therewith to permit said cover to pivot about said other links away from closing position with said casing for access thereto.

13. In an electric switch, an enclosing casing, switch members and fusible elements disposed therein, a cover for said casing bearing said fusible elements movable within said casing to operate the switch while maintaining the casing closed, and means including guide links arranged to guide the cover for movement in a straight line within said casing, said cover and guiding means arranged for partial disengagement to permit the cover to be moved away from the casing for access to the fusible elements.

In testimony whereof, I have signed my name to this specification in the presence of two subscribing witnesses.

GEORGE A. BURNHAM.

Witnesses:

T. T. GREENWOOD,

H. B. DAVIS.