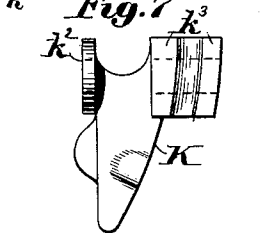
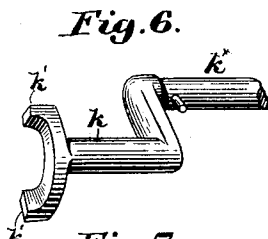
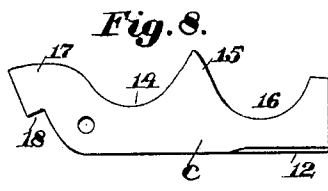
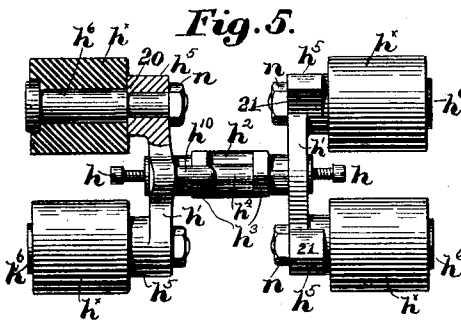
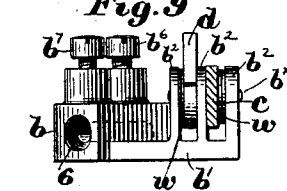
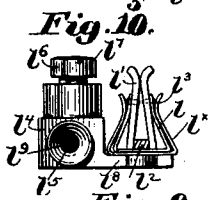
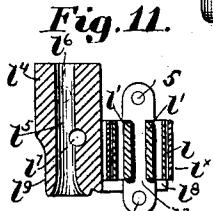
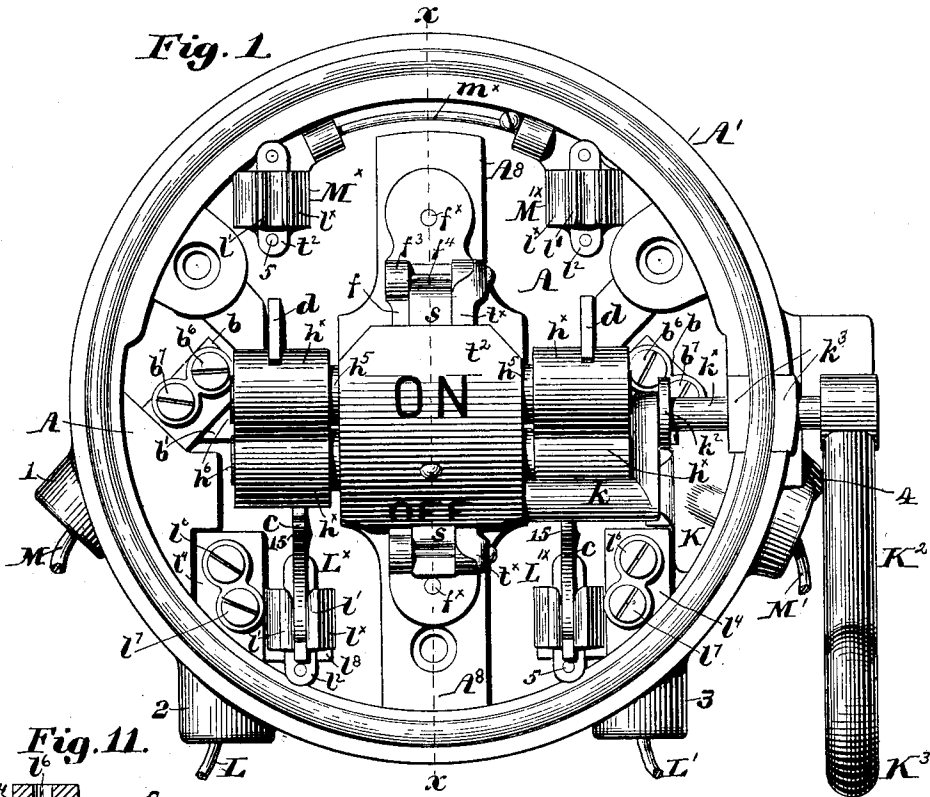


F. A. GILBERT.
ELECTRIC SWITCH.

No. 594,944.

Patented Dec. 7, 1897.



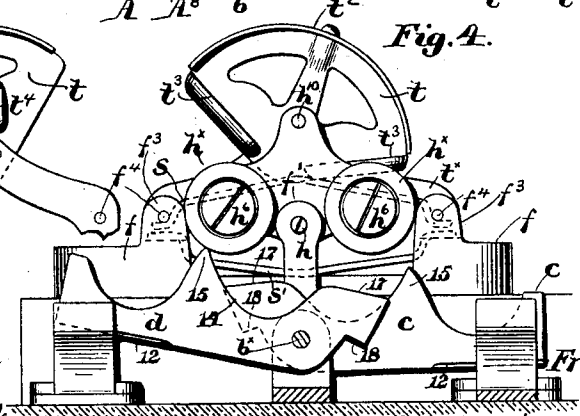
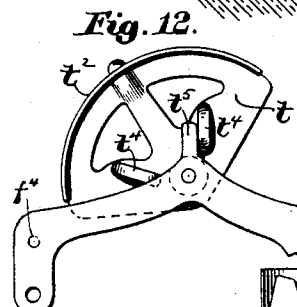
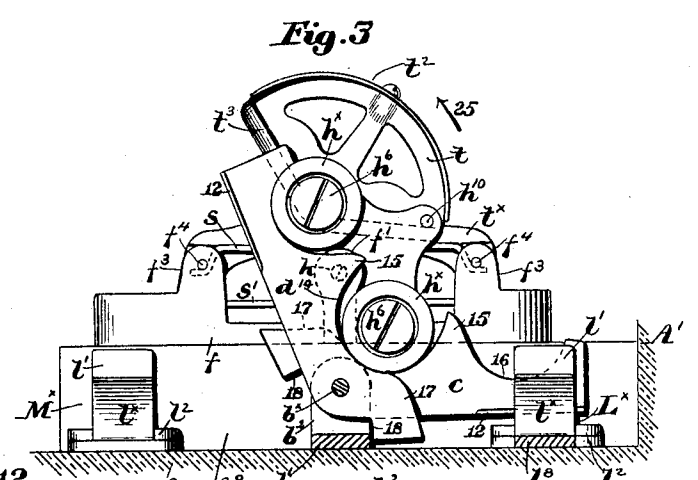
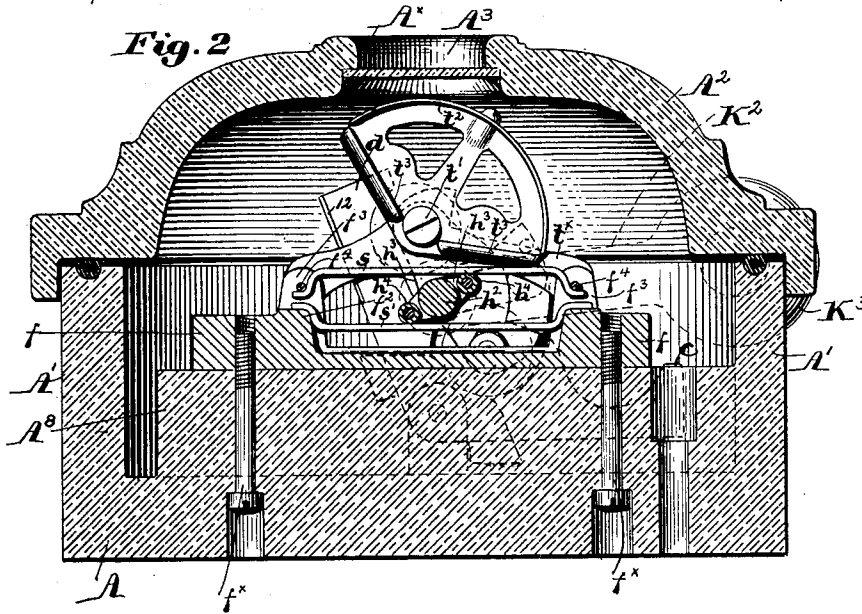
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ELECTRIC SWITCH.

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UNITED STATES PATENT OFFICE.

FREDERICK A. GILBERT, OF BROOKLINE, MASSACHUSETTS.

ELECTRIC SWITCH.

SPECIFICATION forming part of Letters Patent No. 594,944, dated December 7, 1897.

Application filed December 18, 1896. Serial No. 616,183. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK A. GILBERT, of Brookline, in the county of Norfolk and State of Massachusetts, have invented an Improvement in Electric Switches, of which the following description, in connection with the accompanying drawings, is a specification, like letters and figures on the drawings representing like parts.

This invention has for its object the production of a novel electric switch of great power and simple construction, the parts of which are completely inclosed in insulating material, the operation of the switch being readily effected.

In the use of switches employed to cut out a light-circuit it is difficult to provide compact and simple mechanism of sufficient power to control any large number of lights without great danger of burning out the mechanism; but with the apparatus embodying my invention I am enabled to control a large number of lights with perfect safety. The apparatus is so arranged that the working parts are completely inclosed in a casing of insulating material, the means for operating the switch being so constructed as to move quickly and with no possibility of derangement from careless or ignorant handling. The circuit-controller or movable member of the switch is so arranged that electrical connection is established in one circuit before it is broken in the other circuit, the movement of the circuit-controller to cut out one circuit being instantaneous and always following the establishment of complete electrical connection with the other circuit, thus avoiding sparking even with powerful currents.

Various other features of my invention will be hereinafter described in the specification and particularly pointed out in the claims.

Figure 1 is a top or plan view of an electric switch or cut-out embodying my invention, the cover of the insulating-casing being omitted. Fig. 2 is a vertical section thereof on the line $x x$, Fig. 1, looking to the right, with the cover shown in section. Fig. 3, in side elevation, represents the working parts of the switch in operative position with one circuit cut out. Fig. 4 is a similar view, the parts, however, being shown in intermediate position just about to cut out one of the circuits.

Fig. 5 is a top or plan view of the actuator in mid-position, detached. Fig. 6 is a detail of the device for imparting initial movement to the actuator. Fig. 7 is a plan view of the bearing for said operating device. Fig. 8 is a side elevation of one of the members of the circuit-controller detached. Fig. 9, in end elevation, shows the support for the circuit-controller, the members of the latter being shown one in section and one in end elevation. Fig. 10 is an end elevation of one of the line-terminals and its attached binding-post. Fig. 11 is a horizontal sectional view thereof; and Fig. 12 is a left-hand side elevation of the indicator and its support, showing the stops for limiting the movement of said indicator in either direction.

The apparatus is herein shown as mounted on and inclosed in a casing of insulating material, preferably porcelain, consisting of a base A, a cylindrical wall A', and a removable dome-like cover A², the latter having an opening A³ therein, preferably closed with a sheet of glass A^x or other suitable transparent material, the wall A' having hollow bosses or hubs 1 2 3 4 for the admission of the line-terminals.

As herein shown, the main-line terminals M M' enter the bosses 1 4, while the terminals L L' of the light or other circuit enter the bosses 2 3, respectively.

Within the casing and suitably secured thereto are located the fixed line-terminal members M^x M'^x and L^x L'^x, the two latter adjacent the bosses 2 3, and as all of said terminals are of like construction only one will be described in detail.

A bent spring l has secured to the upturned ends thereof metallic contact-plates l' , outwardly bent at their upper ends (see Fig. 10) and at their lower ends loosely entering notches in a separating-plate l'' , provided with holes 5, by which it may be screwed to the base A, said separator resting on the bottom of the spring l , holding it in position. A second similarly-bent spring l^x bears at l^3 against the upper ends of the spring l , aiding the latter in yieldingly pressing the upper ends of the contact-plates l' toward each other, as shown in Fig. 10.

I have shown the terminal members L^x L'^x as attached directly to their binding-posts,

the latter consisting of metal blocks l^4 , having a hole l^5 extended therethrough, Fig. 11, for the bared end of the wire, and two binding-screws l^6 and l^7 are provided. The screw l^6 is adapted to enter and bear squarely upon the wire when inserted in the hole l^5 , as is usual, but the screw l^7 is offset from the longitudinal axis of said hole, so that it will cut more or less into the side of the wire, clamping it thus between the side of the screw and the opposite side of the hole.

I prefer to use the offset screw whenever the size of the line-wire will permit; but if the latter is too small the center binding-screw l^6 is used, bearing directly upon the wire and holding it in place.

The block l^4 has a lateral foot l^8 , on which the separator l^2 of the terminal member is supported, the screws attaching the latter to the casing holding the binding-post in place, the reduced end l^9 of the block l^4 entering its adjacent hub in the casing.

The fixed terminals M^x and M'^x are in construction substantially as described, but in this instance of my invention they are electrically connected by a metal bar or wire m^x , Fig. 1, and located opposite to the terminals L^x and L'^x , but not in alinement therewith, the main-line circuit being completed through the connection m^x when the auxiliary circuit is cut out.

The base A of the casing is elevated, as at A^8 , Figs. 1 and 2, between the two pairs of terminals, and at each side thereof are mounted the movable switch members or circuit-controllers, one for each oppositely-located pair of fixed terminal members.

A casting b , Fig. 9, having a line-wire-receiving hole 6 (see dotted lines) and binding-screws b^6 and b^7 located relatively thereto, as heretofore described, is provided with a lateral base b^1 , having upturned ears b^2 , three in number, and the casting is secured to the base of the casing with the hole 6 preferably in line with the opening of one or other of the bosses 1 or 2 to receive the line-wire led therethrough. On a pin or stud b^x , passing through the ears b^2 , are pivotally mounted the two like but oppositely-extended members or parts c and d of the circuit-controller, one of which is shown separately in Fig. 8. Said members are preferably made as flat blades slightly beveled at their under edges near their outer ends, as at 12, to assist their entrance between the yielding contact-plates l' of the terminal members, said blades being fulcrumed near their inner ends. Each member is shaped at its upper edge to present a cam-surface having depressions 14 and 16 separated by a high portion 15, all at one side of the fulcrum, while at the opposite side thereof the blade is extended to form a toe 17, having a shoulder 18 on its under side. The center ear b^2 separates the two members c and d , and to prevent rattling and also effect a thorough electrical connection between said members I interpose metal spring-washers w between each member and the two

ears at the sides thereof. As the two blade-like members of the circuit-controller are thus out of alinement, the cooperating terminals are correspondingly placed, the path of movement of each member passing between the contact-plates l' of its fixed terminal.

When the members d are in engagement with their terminals M^x and M'^x , the current passes from line by binding-post b to blade or member d , terminal M^x , connection m^x , to terminal M'^x , thence by its cooperating blade d and its binding-post b to line.

When members c are in engagement with their terminals L^x and L'^x , the current passes from line M to binding-post b , blade c , and terminal L^x to circuit at L , and back from L' to terminal L'^x , blade or member c , post b , to main line at M' , it being supposed, as will be described, that when the two members c are in engagement with their terminals the members d will be disengaged from their respective terminals, and vice versa.

In the double-pole switch herein illustrated the two circuit-controllers, each comprising two independently-movable members c and d , are operated in unison by a suitable actuator, now to be described.

The partition A^8 has secured thereto, resting on its top, a stand or support f , attaching-screws f^x , (see Fig. 2,) passed up from the under side of the casing, entering the stand, said screws being thus inclosed in the insulating material of the casing. Upturned ears f' at substantially the center of and at each side of the support f provide bearings for the journals h of the actuator, said journals being shown as screws threaded into the sides of the casting forming the actuator and pivotally supporting it. I have herein shown the said casting as comprising parallel sides h' , rigidly connected by a cross-piece h^2 , provided on opposite sides with pairs of lugs h^3 , in which are mounted, preferably, antifric-tion-rolls h^4 , in parallelism with but eccentric to the axis or fulcrum of the actuator. On their outer faces and at or near the ends the sides h' are enlarged to form bosses h^5 , through which are extended headed studs h^6 , (see Fig. 5,) shouldered at 20 to bear against the bosses and held in place by nuts n on the threaded extremities of the studs. I have preferably rotatably mounted on each stud a roll or spool h^x , of suitable insulating material—such as rubber, porcelain, &c.—said rolls moving in circular arcs having the fulcrum h of the actuator as their common center when said actuator is rocked, the rolls h^x extending beyond the partition A^8 and the actuator-support f . The support f is depressed between its ends to leave abutments f^2 and upright lugs f^3 , in which transverse pins f^4 are held, and two oppositely-bent controlling-springs s and s' are held at their ends between the pins f^4 and the abutments f^2 , as clearly shown in Figs. 2 and 3. The spring s passes over the uppermost friction-roll h^4 of the actuator and the spring s' beneath the other

roll, the springs pressing in opposite directions upon the rolls and tending to retain the actuator at one or the other side of its center.

When the actuator is moved from the position shown in Figs. 2 and 3 to the position shown in Fig. 4, the springs are expanded, and the instant the actuator has passed dead-center the springs act to throw or snap it quickly to the full limit of its throw in the opposite direction, and vice versa, as will be readily understood. The rolls h^4 reduce friction and also reduce to a minimum the possibility of the actuator stopping on center.

Referring now to Fig. 3, one of the insulating rolls or spools h^x is shown as within the depression 14 of the circuit-controller member c and in engagement with the latter, maintaining it locked in contact with its cooperating fixed terminal L^x , while said roll also engages the toe 17 of the member d at the same side of the common fulcrum b^x of said members. The member d is thus maintained elevated and out of contact with its cooperating terminal member M^x , the shoulder 18 limiting movement of the parts, the shoulder bearing against the fixed base b' , while the second roll h^x is in the depression 16 of said member d .

By means of the insulating rolls or spools h^x the actuator is effectually insulated from the circuit-controller, as no other portion of the actuator is in contact with said controller.

Supposing the actuator to be rocked in the direction of arrow 25, Fig. 3, the uppermost or operating roll h^x is depressed, carrying with it the member d , the other or follower roll h^x rising from the toe 17 of said member, and when the actuator is on center the operating-roll will have moved over the high portion 15 of member d , depressing the latter until it has effected a complete electrical contact with the terminal member M^x . At the same time the operating-roll will be just about to enter the depression 14 of member d and engage the toe 17 of member c , the follower-roll having assumed a position above the path of movement of the high portion 15 of the latter member. The springs s s' then act to snap the actuator over. The operating-roll h^x delivers a hammer-like blow upon the toe of member c , instantly throwing that member up into inoperative position and effecting instantaneous disengagement from the terminal member L^x , so that the parts will be in a position just the reverse of that shown in Figs. 2 and 3. It will be remembered that the two rolls h^x on the opposite side of the actuator have been operating in a similar manner, so that the members c and d of the other circuit-controller have been moved relatively to their fixed terminal members M^x and L^x , the described operation cutting out the light or auxiliary circuit, a reverse movement of the actuator cutting it into the main circuit.

The bosses h^5 on one of the side pieces h' of the actuator are oppositely beveled, as at 21, Figs. 2 and 5, to be engaged by one or

other of the lateral extensions k' on a crank-arm k within the casing and secured to a rock-shaft k^x , having bearings at $k^2 k^3$ in a casting K , (shown separately in Fig. 7,) embedded in the top of the wall A' , an operating-arm K^2 being secured to the rock-shaft k^x outside of the casing. Said arm or handle K^2 is preferably provided with an eye K^3 at its free end, to be engaged by a pole having a suitable hook thereon, the switch or cut-out usually being secured to the wall out of ordinary reach. The distance between the ends of the lateral extensions k' is less than the distance between the beveled portions 21 of the bosses h^5 on the actuator, affording lost motion and permitting the springs to snap the actuator over when past dead-center, the rock-shaft k^x being in alinement with the fulcrum of the actuator.

To operate the switch, the arm K^2 is manually swung, rocking the shaft k^x to bring one of the extensions k' into engagement with the adjacent boss, continued movement of the arm or handle rocking the actuator, the initial movement of which is thus manually effected. Such initial movement of the actuator effects complete engagement of one of the members of each circuit-controller with its fixed terminal, unlocking the other member, and when the actuator is past dead-center its movement is completed by the springs, its final movement instantly disengaging the unlocked members from their terminal members and locking the other members in operative position.

The operative member of the circuit-controller is always locked in position, preventing accidental disconnection, and the inoperative member is positively held inoperative until the position of the actuator is positively reversed.

A sector t above the actuator is pivotally mounted at t' on a bracket t^x and has secured to it a curved plate t^2 with the words "On" and "Off" delineated thereon, or words of like import, the plate being located below the sight-opening A^3 of the cover A^2 . Radial ribs t^3 on the sector are in the path of movement of a pin h^{10} on one of the side pieces h of the actuator, so that when the latter is rocked the pin will engage one or other of said ribs and correspondingly throw the sector, moving the plate or indicator t^2 to indicate the condition of the switch and circuits controlled thereby. If desired, stops t^4 on the sector may cooperate with a lug t^5 on the bracket t^x to retain the indicator in position until thrown by the actuator.

Though I have herein shown a double-pole switch, my invention is not restricted thereto, as it will be obvious that it is equally adapted to a single-pole switch. Nor is my invention restricted to the precise construction and arrangement herein shown and described, as various changes in construction and arrangement may be made without departing from the spirit and scope of my invention.

By the construction hereinbefore set forth it will be obvious that the switch can be operated even should the spring break which snaps the actuator, for the full movement of the latter manually will actuate the members of the circuit-controller precisely as has been described, but without the sudden snap or jump imparted by the spring.

Having fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In an electric switch, fixed terminal members, a cooperating two-part member, the mechanically-unconnected parts of which are electrically connected and independently movable, and an actuator for said two-part member, substantially as described.

2. In an electric switch, fixed terminal members, a cooperating circuit-controller comprising two independently-movable members in electrical connection, and an actuator to engage said members successively and positively move one after the other to effect complete engagement of one with its terminal before disengagement of the other member from its terminal, substantially as described.

3. In an electric switch, fixed terminal members, a cooperating circuit-controller comprising two independently-movable members, an actuator therefor, adapted to have a rolling contact with and to move one after another of said members, to effect complete engagement of one with its terminal before disengagement of the other member with its terminal, and a spring to effect rapid final movement of both the actuator and circuit-controller, substantially as described.

4. In an electric switch, fixed terminal members, a normally-locked cooperating circuit-controller comprising two independently-movable members, an actuator manually operated to effect its initial movement, to unlock and effect complete engagement of one with its terminal by such initial movement, and a spring to complete the movement of the actuator, to lock said first member and cause the actuator to engage and move and thereby effect quick disengagement of the other member from its terminal, substantially as described.

5. In an electric switch, fixed terminal members, a cooperating two-part circuit-controller the parts of which are mechanically

disconnected and independently movable, and means to move said parts positively at different speeds, to effect complete engagement of one with its terminal before effecting disengagement of the other with its terminal, substantially as described.

6. In an electric switch, fixed terminal members, a cooperating circuit-closer comprising two independently-movable members having a common fulcrum and provided each with a cam-surface, and an independently-mounted actuator provided with insulated rolls, to engage said cam-surfaces successively and effect the movement of one of said members into engagement with its terminal and to thereafter disengage the other member from its terminal, substantially as described.

7. In an electric switch, a circuit-controller comprising two pivotally-mounted, independently-movable members, each having a cam-surface at one side of its fulcrum and a toe at the other side, and a rocking actuator for said controller, having two insulated rolls, movement of said actuator in either direction causing engagement of a roll with the cam-surface of one member, to move it gradually into operative position, and to thereafter engage the toe of the other member and move it into inoperative position, substantially as described.

8. In an electric switch, a two-part circuit-controller, the independently-movable parts thereof having a common fulcrum and being electrically connected, a stop to limit the movement of each member in one direction, and an actuator to operate said circuit-controller, each member thereof having a locking-recess, to cooperate with and be held in operative position by the actuator, substantially as described.

9. A binding-post for electric wires, having an opening therein for the wire, an offset binding-screw to act upon one side of the wire, and a second binder to bear directly upon the top of the wire, substantially as described.

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

FREDERICK A. GILBERT.

Witnesses:

JOHN C. EDWARDS,
SAMUEL S. SIAS.