Aug. 29, 1939. A. F. DOTY 2,171,267

ELECTRIC SWITCH

Filed Dec. 19, 1936 2 Sheets-Sheet 1

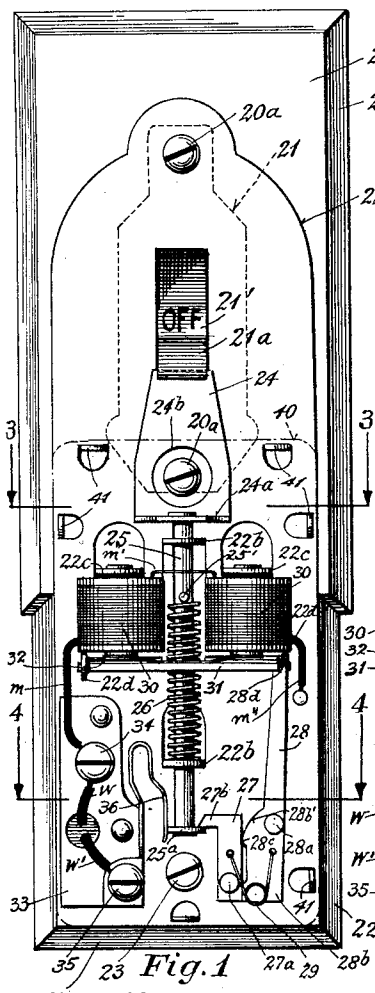


Fig. 1

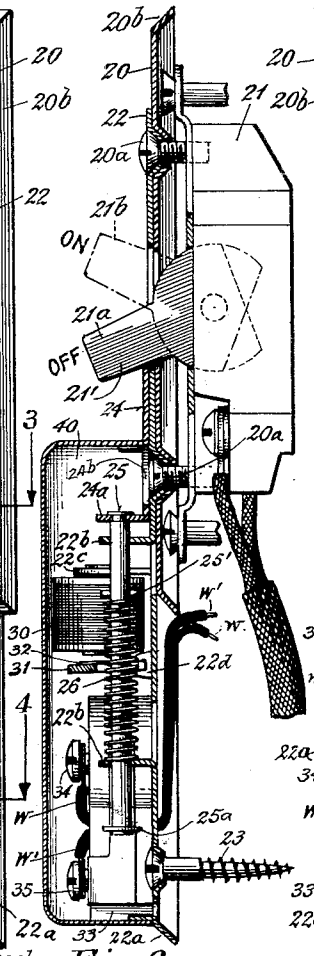


Fig. 2

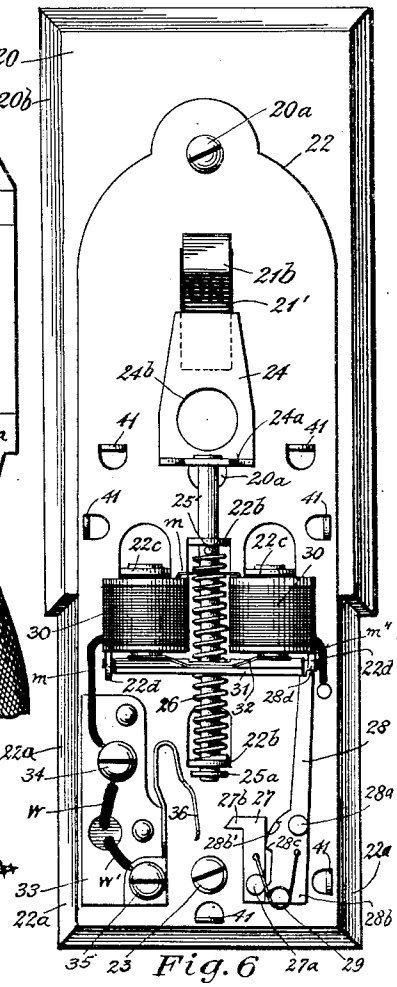


Fig. 6

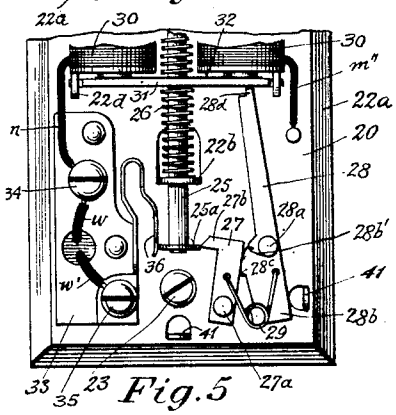


Fig. 5

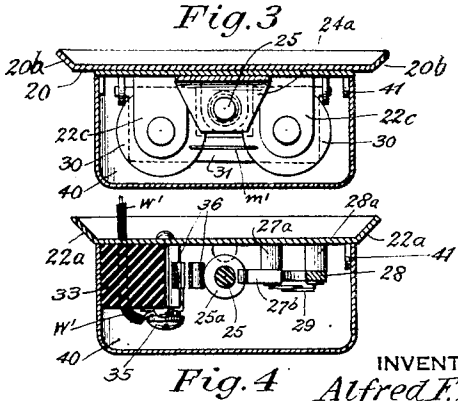


Fig. 4

Fig. 3

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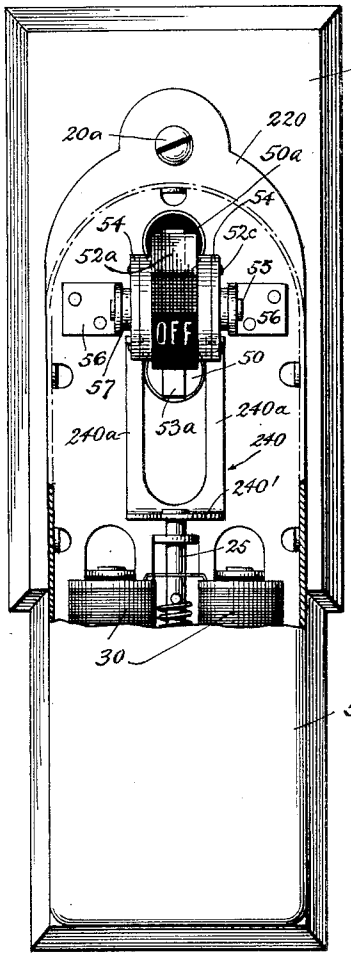


Fig. 7

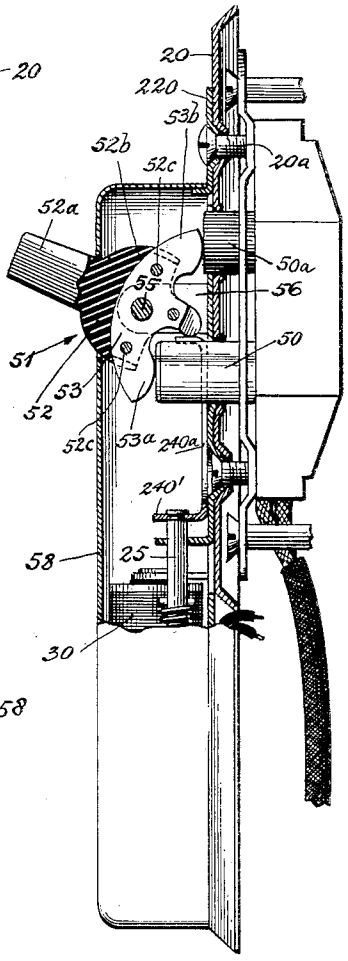


Fig. 8

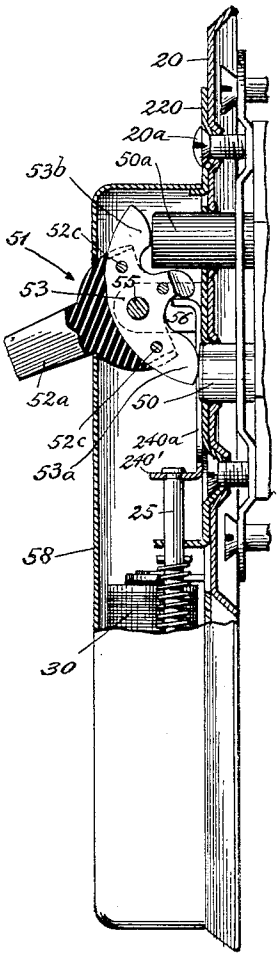


Fig. 9

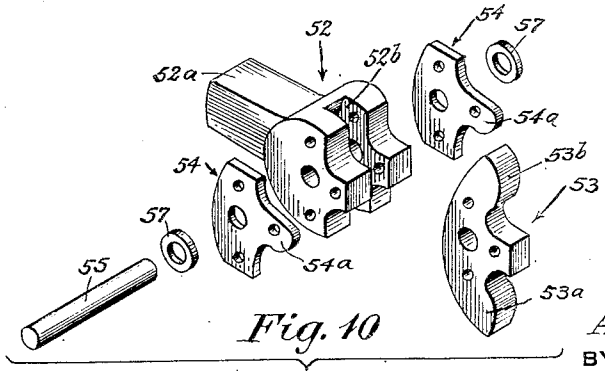


Fig. 10

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Patented Aug. 29, 1939

2,171,267

UNITED STATES PATENT OFFICE

2,171,267

ELECTRIC SWITCH

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Application December 19, 1936, Serial No. 116,707

7 Claims. (Cl. 200—106)

This invention relates to electric switches, more particularly to switches which are generally secured to the walls of rooms and usually covered with flush plates, and it has for one of its objects the provision of an electrically operable device for actuating the manually operable element of the wall switch, this device constituting a remote control for the switch.

Another object of the invention is the provision of a remotely-controlled operator which may be made as an article of manufacture and, as such, may be attached to the flush plate of any wall switch, regardless of whether the latter is of the two-button or the lever variety, without making any changes therein, whatsoever.

A further object of the invention is to provide such a device which will not interfere with the manual operation of the wall switch in the usual manner.

Other objects of the invention will hereinafter appear and be defined in the appended claims.

The uses for which switch-operating devices, made in accordance with my present invention are adapted, are manifold. They may be used for burglar alarms, in which case the opening of a window or a door will result in operating the wall switch in any room where notice of such opening is to be given. In another instance, the lights of a room or hall may be lighted from a remote location, thus avoiding the necessity of groping around in the dark to find the wall switch, the usual manual operation to switch the light on or off being, however, not interfered with.

Another one of the many uses of my improved device may be found in starting an oil burner for heating a domestic furnace or boiler usually located in the basement of the house, without the necessity of manually throwing its wall switch to "on" for that purpose; or an ordinary alarm clock may be set to close the circuit of the switch operator at any particular time desired.

Again, there may be instances in which it is desirable to use the operator for throwing the wall switch in the opposite direction, viz: from "on" to "off", in which case the position of the operator on the flush plate of the wall switch need merely be reversed.

According to one embodiment of the present invention, the device acts directly on the manually movable member of the light switch, that is, either on the manually operable projecting finger piece of a two-position lever switch, or on the buttons of a two-button switch. In its general aspect the principle of the device is somewhat similar to that of a rifle or gun, to this extent: When a rifle is cocked, the hammer is urged to fire by a strong spring which requires considerable manual power to bring the hammer to full-cock position in which it is then held by the trigger which is so sensitive in action that even the slightest touch may release the hammer for action. In my improved switch operator, the movement of the switch lever, or of the button, will compress a stiff spring which urges a slide member, when released, to throw the lever or the button to its initial position. This slide member is, when the spring is compressed, normally non-operative, since it is held against movement by a catch which is strong in action but requires very little effort to release. The release movement of the catch is effected by electro-magnet means, in the preferred form thereof shown, by the movement of an armature of a magnet which is easily operable by a low-tension current in the circuit of which the operator is a part.

I have shown in the drawings a switch operator which can be easily applied to any flush plate of standard type, without making any changes in the plate, or in the regular switch attached thereto, and which consequently effects a substantial saving in transforming the wall device already in use into a remotely-controlled switch as above outlined. On the other hand, it is evident that this combination may be readily incorporated in a single unit or fully equipped article of manufacture.

Referring to the drawings:

Figure 1 is a front face view of a standard flush plate applied to a lever wall switch which is shown in its "off" position, and has my improved device secured thereto and ready to function, the hood which normally covers its mechanism having been removed.

Fig. 2 is a substantially central vertical section of Fig. 1.

Fig. 3 is a horizontal section, on line 3 of Fig. 1.

Fig. 4 is a similar section, on line 4 of Fig. 1.

Fig. 5 shows a fractional face view, similar to that shown in Fig. 1, of the operator in a transitory position.

Fig. 6 shows a view similar to Fig. 1, the operator being shown in position after it has performed its function to throw the switch lever to "on".

Figs. 7 to 10, inclusive, show a modification, my improved device being here applied to the two-button type switch, Fig. 7 being a front view, a portion of the hood being broken away. Fig. 8 is a substantially central vertical section illustrating the device in "off" position. Fig. 9 is a similar view showing the device in "on" position, and Fig. 10 represents an exploded view of the parts which, when assembled, form the manually-operable element of the operator.

Referring to Fig. 1, there is shown a standard lever-type flush plate 20, to the rear of which is attached (normally by strap screws 20a) the body 21 of the switch, having its operating lever 21' shown in "off" position 21a, and adapted to be thrown into its "on" position 21b either

manually as usual, or by my improved operator when the latter is actuated by closing an electric circuit.

In the preferred form thereof shown, this operator comprises a base plate 22 which is provided with apertures matching those of the flush plate 20, and therefore permitting the screws 20a to hold both plates 20 and 22 togther. Also, the lower portion of the base plate 22 may be provided with an aperture to receive an additional wall screw 23 for firmly securing that end of the plate to the wall, this lower portion of the base plate being preferably provided with beveled margins 22a to match the margins 20b of the flush plate and, therefore, making close contacts with the face of the wall to which they are secured.

The underside of the switch lever 21' is, when in its "off" position, closely adjacent to and adapted to be engaged by the upper end of a slide plate 24 which constitutes the directly active member of the operator for throwing the switch lever 21' to its "on" position, and which is guided for vertical movement on the base plate by a vertical rod 25 rigidly attached to the L-bent portion 24a of the slide 24, and is movable in ears 22b, lanced out of the base plate 22 and bent right angularly thereto, as shown.

Means are provided for strongly urging the rod 25, and consequently the slide plate 24, upward, to throw the lever of the switch 21 from "off" to "on", these means are strongly resilient, preferably consisting of an expansion spring 26 coiled around the rod 25 and resting at its lower end on the lower ear 22b above-mentioned; while its upper end engages the underside of a pin 25' secured in the rod 25 and extending beyond the same at both ends. The power of this spring 26 is sufficient to overcome the resistance of the spring usually employed in the switch body for snapping the switch lever into either its "on" or "off" positions.

From the foregoing it will be understood that, when the switch lever is in its depressed or "off" position, the spring 26 will be highly compressed. My improved means employed for retaining the rod 25 in its lowermost position are sturdy in construction and yet withdrawable with a minimum effort, so that a low-tension magnetic circuit will be able to perform that duty, when closed.

This retaining mechanism is herein shown as comprising a latch 27 which is preferably L-shaped and pivoted on the base plate 22, at 27a. The upper branch 27b normally engages the upper face of a small collar 25a firmly secured to the rod, the organization being such that only very little force is required to project the branch 27b over the edge of the collar 25a and maintain it there until released. On the other hand, there is provided a locking member positively preventing the latch 27 from swinging its branch 27b away and clear of the collar 25a, unless this locking member is first released. In the present organization this locker is shown as a rock lever 28 pivoted intermediate its ends, as at 28a, to the base plate 22. The lower end 28b of the lever 28, below its pivot 28a, is so formed that, when the adjacent faces of the latch 27 and lever end 28b are brought into contact with each other, as for instance by a contractive loop spring 29 (whose ends are attached to the latch 27 and lever end 28b, respectively) the upper free end of the lever 28 becomes then locked against swinging movement toward the left. The latch 27 cannot move toward the right to release the collar 25a, no matter how strong the force of the compressed spring 26 may be, because the right-hand face of the latch contacts the left-hand face of the lever end 28b at a point 28c, viz: below the pivot 28a and therefore tends to swing the upper end of the lever toward the left, which however it cannot do as long as such movement is prevented, as for instance by a locking device which is normally in obstructing position, but may be withdrawn by the closure of the low voltage electric circuit of the operator, as follows:

Secured to the base plate 22, more particularly to ears 22c thereof, is an electro-magnet comprising a pair of pole spools 30 and a gravitative plate armature 31 which controls the latch-releasing movement of the lever 28 and is centrally notched to straddle but clear the rod 25, and which is pivoted at its rear edge on a pair of ears 22d, and so arranged that normally its right-hand edge will rest on the top of the lever 28, whose top end however, is notched to provide a lip 28d which is pushed toward the right-hand edge of the armature by the latch-and-lever organization, as above explained, but cannot pass beyond that point unless the armature has been swung upwardly out of the way, and against the pressuer of a slightly resilient non-magnetic anti-freeze blade 32, until it clears the uppermost end of the lever lip, and therefore allows the latter to move to the transitory position shown in Fig. 5, such movement being primarily caused by the force of the spring 26 moving the rod 25 and its collar upward, the latter naturally pulling the latch into the position shown, and thus causing the lover end 28b of the lever 28 to swing toward the right, the lever end 28b having a cam-shaped face 28b' to assist in accomplishing this movement, which entails tensioning of the loop spring 29 sufficiently to keep the adjacent faces of latch-and-lever end in contact with each other.

As soon as the rod collar 25a has passed upward and beyond the latch arm 27b, the loop spring will immediately and quickly return the latch and lever to their original positions, or rather slightly beyond the same, so that the armature, when released from the magnet, may drop into its now free normal place in the lever notch 28d.

Translating the just described functional movement of the locking mechanism to the main switch lever 21, it will be readily seen that, when the rod 25 is snapped upward by its spring 26, the slide plate 24 will naturally go with it and therefore snap the lever 21' from "off" to "on" position, the upward movement of the rod being stopped by the rod pin 25' bringing up against the underside of the upper plate ear 22b (see Fig. 6).

As will now be readily understood, the switch is adapted to be automatically moved from one of its two positions to the other and can be returned to the first position by manual actuation of the lever 21'. The switch preferably, as herein disclosed, is still capable of manual actuation to both positions if this mode of operation should become desirable.

Inasmuch as my invention provides a complete and self-contained unit or article of manufacture which requires nothing except the low-tension circuit wires for releasing the mechanically-operated rod to throw the switch lever from "off" to "on", I have provided an insulated block 33 firmly secured to the base plate and carrying a terminal screw 34 electrically connected by a wire

m with one end of the coil wire of one magnet spool 30, the coil wires of both spools being connected in series by a connection wire *m'*, and the end of the second coil being grounded, by a wire *m''* whose end may be soldered to the plate 22 as indicated. The insulating block 33 also carries another terminal screw 35, which serves to hold a resilient brush member 36 which contacts with the rod collar 25*a* when the rod 25 is down, and thus grounds that screw on the plate also, thereby completing the ground circuit to the second magnet spool 30. When the rod 25 is going up, the brush contact 25*a*—36 will remain intact until the collar 25*a* is entirely clear of the latch 27, and subsequently opens the magnet circuit at that point, regardless of whether the remote circuit closer, which is connected by feed wires W, W' with the terminal screws 34, 35 respectively, is in active condition or not.

As above stated, the primary object of the invention is to provide a switch operator which can be made as an article of manufacture, or as a unit which can be easily and quickly attached to any standard type flush plate in use or on sale, without having to make any changes or structural alterations in, the flush plate, its switch, or in the new switch operator which forms the subject of the present invention and one form of which has been fully described above to be used in connection with a lever-type switch and the base plate 22 of the new operator as shown is provided with a central opening which matches the central slot of the flush plate to permit the switch lever 21 to project therethrough for finger manipulation. The base plate 22 also has the two perforations required to permit the use of the strap screws 20*a* for holding the base plate 22 in place on the flush plate 28, the upper strap screw 20*a* being freely accessible, while the head of the lower strap screw will, when the new base plate 22 is in proper position, be disposed under the slide plate 24, and the latter is, therefore, provided with a large hold 24*b* to give access to the lower strap screw 20*a*, when the slide plate 24 is in its depressed position shown in Fig. 1.

To protect the parts of the operator mechanism as much as possible and yet leave room for hand manipulation of the switch lever 21', there is provided a hood 40 which encloses the entire lower portion of the base plate 22 and the parts carried thereby, and which may be secured thereto in any suitable manner, preferably by tabs 41 as shown.

Referring now to the modification illustrated in Figs. 7 to 10 inclusive, the only difference from the organization previously described will be found in the manner of pushing the "on" button of a two-button switch rearwardly, in contradistinction to pushing the actuating lever of the lever switch to "on", which function is, as above described, performed by the upward movement of the slide 24 acting directly against the underside of the switch lever 21'. In the modification, the entire mechanism for controlling the slide 240 is exactly the same as before, but it now operates a four arm rock lever, pivotally supported between the two switch buttons and the two arms of which contact the outer faces of the two switch buttons respectively, the central third arm is the one directly operated by the slide 240, and the fourth arm is the manually-operable finger of the rock lever. Referring to Fig. 7, the slide 240 is movable on the base plate 220, and secured to the slide rod 25, as before, but it is U-shaped or bifurcated to form a pair of spaced legs 240*a* which straddle the lower or "on" button 50 of the switch, and whose upper ends are L-bent to engage the underside of the third arm of the four-arm lever 51 to rock the latter from the position shown in Fig. 8 to that of Fig. 9. In order to meet its several requirements in a practical mechanical manner, the lever 51 is built up of several pieces, as illustrated in Fig. 10 and comprising a main body 52 made of vulcanite or hard fibre and having a handle or finger piece 52*a* for hand manipulation. The body is centrally recessed, as at 52*b*, to receive a two-branch pusher 53 preferably made of metal and having wings 53*a*, 53*b* adapted to engage the outer end faces of the push buttons 50, 50*a* respectively. The body 52 is flanked at both of its side faces by a pair of similar substantially T-shaped metal plates 54 whose rear extensions 54*a* constitute the parts which are engaged and operated by the L-shaped ends of the slide legs 240*a*. All the several members just described are then assembled and riveted together, as at 52*c*, to form a solid unit, which may be easily placed in position and pivoted on a pin 55 supported in a pair of brackets 56 which are secured on the base plate 22 of the device, as shown, washers 57 being preferably employed for maintaining the unit in centralized position on the plate and relative to the slide legs 240*a*, whose path lies between the pin-supporting brackets 56.

In brief, the usual manner of operating the two-button switch by hand pressure applied to either one or the other of the buttons 50, 50*a*, to throw the switch to either "on" or "off" has now been transformed into the operation of a lever switch, whose actuating lever functions exactly the same as that of the regular lever switch shown in Figs. 1 to 6 inclusive, and which is similarly manipulated by hand to throw the button switch to either "on" or "off".

Likewise, even the outer appearence of the lever switch, when covered by its slotted flush plate, can be easily simulated by the provision of a hood 58 which covers the mechanism to such an extent as to leave only the hand-operable finger arm 51 projecting outwardly through a slot provided for it in the front hood plate portion 58*a*. In other words: The operation of any two-button switch can be easily and inexpensively transformed into that of a lever switch, regardless of any other function which my improved attachment may be primarily intended to perform, but which may be disregarded and would, in that case, dispense with the side plates 54 and all the remote-control elements previously described.

When thus installed, either form of the attachment above described will present a neat appearance, matching in its shape and contour the lines of the flush plate, and will be adapted to receive a similar or harmonizing surface finish.

I claim:

1. As a new article of manufacture, an attachment for actuating a switch having an apertured flush plate and a manually operable member projecting therethrough for normally operating said switch to either of its alternate positions, said attachment comprising a plate; means for attaching the plate to said flush plate; means slidably mounted on the last-named plate engaging said operating member and movable to alternate positions corresponding to the alternate positions of said switch; means including spring means for normally urging said last-named means to one of the said alternate positions to urge said switch to one of its alternate positions; latch means for holding the slidably

mounted means in the other of the alternate positions against the action of said spring means; means for locking said latch means in holding position; and electro-responsive means for releasing said locking means thereby releasing said latch means.

2. As a new article of manufacture, an attachment for actuating a switch having an apertured flush plate and a manually operable member projecting therethrough for normally operating said switch to either of its alternate positions, said attachment comprising a plate; means for attaching the plate to said flush plate; means slidably mounted on the last-named plate engaging said operating member and movable to alternate positions corresponding to the alternate positions of said switch; a rod slidably carried by said last-named plate and operatively connected at one end to said last-named means; spring means normally urging said rod and associated means to one of the said alternate positions; means carried by the opposite end of said rod and adapted to engage latch means carried by said plate for holding the rod in the other of the alternate positions against the action of said spring; means carried by said plate for retaining said latch means in operative position; and electro-responsive means for releasing said locking means thereby releasing said latch means.

3. As a new article of manufacture, an attachment for actuating a switch having an apertured flush plate and a manually operable member projecting therethrough for normally operating said switch to either of its alternate positions, said attachment comprising a plate; means for attaching the plate to said flush plate; means slidably mounted on the last-named plate engaging said operating member and movable to alternate positions corresponding to the alternate positions of said switch; means including spring means for normally urging said last-named means to one of the said alternate positions to urge said switch to one of its alternate positions; pivotally mounted latch means for holding the slidably mounted means in the other of the alternate positions against the action of said spring means; means for locking said latch means in holding position; and means including an electro-responsive means comprising an electromagnet and an armature normally disposed to hold the locking means against movement, said armature being attracted upon energization of said electromagnet to release said locking means thereby releasing said latch means for movement about its pivotal mounting under the action of the urging means to release the slide.

4. In combination with a switch having a manually operable member for throwing it to "on" and "off" positions, a flush plate covering the switch and having an opening through which the member projects and means for securing the flush plate to the switch, of an attachment for actuating the switch comprising a base plate adapted to overlie the flush plate and be secured in place by the means for securing the flush plate to the switch; a slide movable on the base plate and having means thereon for engaging the manually operable member of the switch to throw said member to one of said positions; means for urging said slide to throw the member; a latch for holding the slide against movement by said urging means; and an electro-magnetic mechanism for releasing the latch to permit the slide to move to throw the switch.

5. In combination with a switch having a manually operable member for actuating the switch to "on" and "off" positions; a flush plate covering the switch and having an opening through which the member projects, and means for securing the flush plate to the switch; of an attachment for actuating the switch comprising a base plate adapted to be secured to the exterior of the switch; a slide movable on the base plate and having thereon means for engaging the manually operable member to move it to one of said positions, said operable member being manually engaged and moved into the other position; means for urging the slide into the first position; a latch for engaging and holding the slide when the latter is moved against the urging means by the manual actuation of the operable member from the first position to the other position; and an electromagnetic means for releasing the latch to permit the slide to move to throw the switch.

6. In combination with a switch having a manually operable member for actuating the switch to "on" and "off" positions, a flush plate covering the switch and having an opening through which the member projects, and means for securing the flush plate to the switch; of an attachment for actuating the switch comprising a base plate adapted to be secured to the exterior of the switch; a slide movable on the base plate and having thereon means for engaging the manually operable member to move it to one of said positions, said manually operable member being manually engaged and moved into the other position; means for urging the slide into the first position; a latch for engaging and holding the slide when the latter is moved against the urging means by the manual actuation of the operable member from the first position to the other position; locking means for holding said latch against movement to release position; and electromagnetic means for releasing the locking means.

7. In combination with a switch having a manually operable member for actuating the switch to "on" and "off" positions, a flush plate covering the switch and having an opening through which the member projects, and means for securing the flush plate to the switch; of an attachment for actuating the switch comprising a base plate adapted to be secured to the exterior of the switch without altering the mechanical structure of the switch; a slide movable on the base plate having means for engaging the manually operable member, said means being arranged so that the member is accessible for manual engagement and actuation; means for normally urging the slide to move the manually operable member into one of its positions, said member being moved to the other position by manual operation, movement of the member into the other position storing energy in the urging means; a latch engaging the sliding member for holding the slide against movement from said position to which it is manually moved; locking means for holding the latch in engagement with the slide; and electromagnetic means for releasing the locking means, said locking means being so related to the latch that should the electromagnetic means be operated the latch will not hold the slide in the position to which it is manually moved.

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