

March 23, 1943.

K. F. J. KIRSTEN

ELECTRIC SWITCH

Filed Jan. 24, 1941

2,314,407

2 Sheets-Sheet 1

Fig. 2.

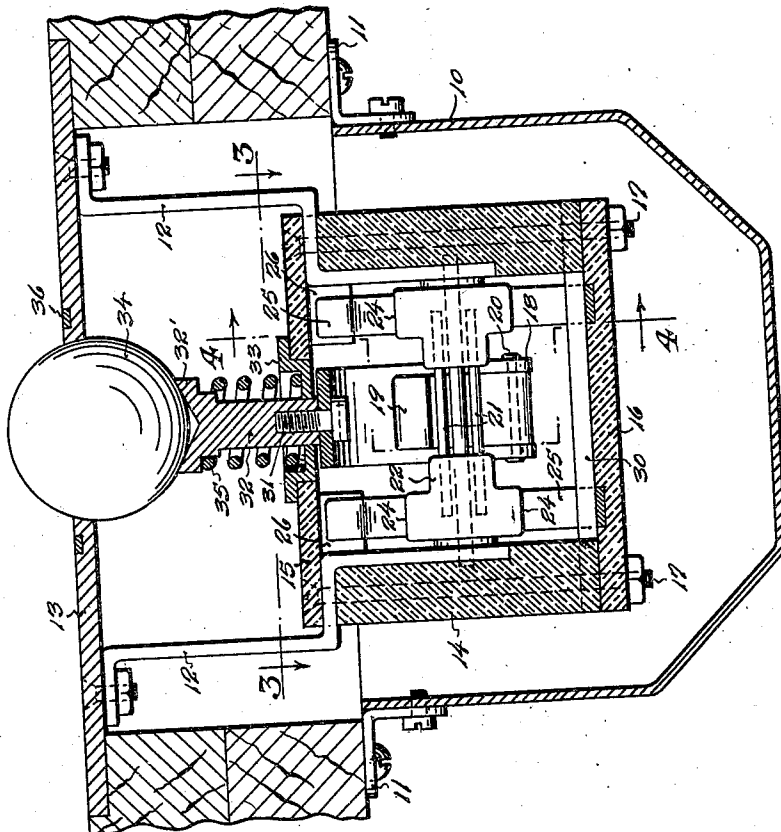
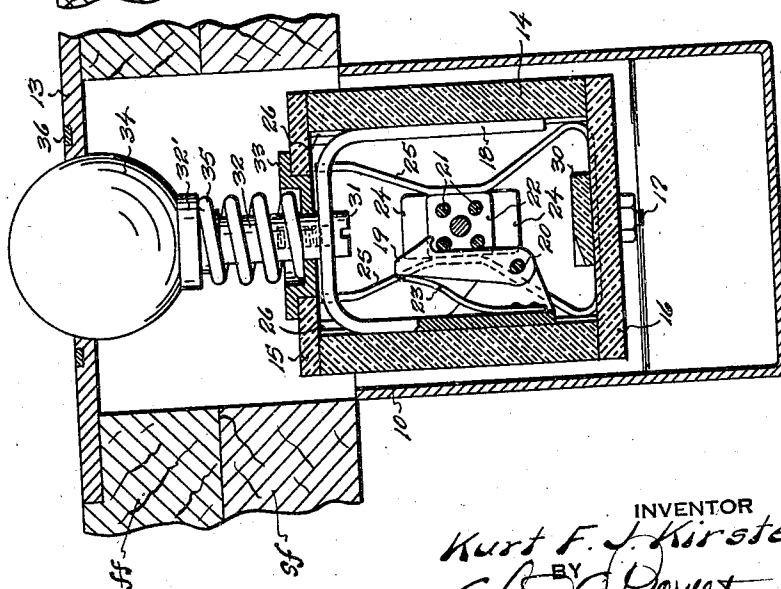


Fig. 1.



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2 Sheets-Sheet 2

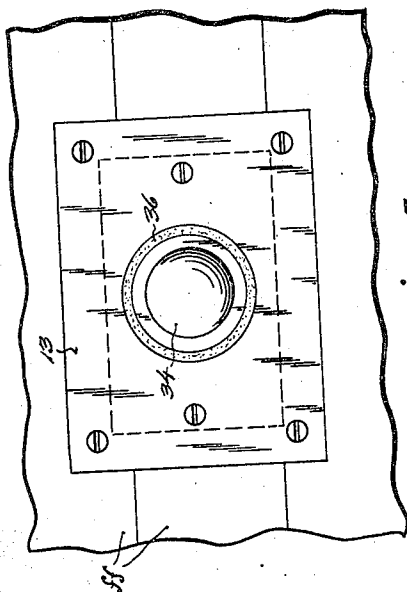


Fig. 5.

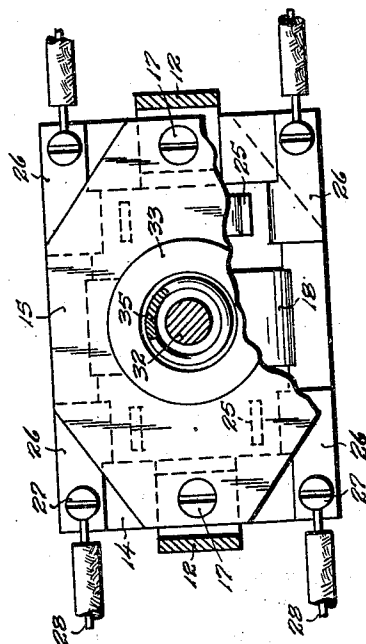


Fig. 3.

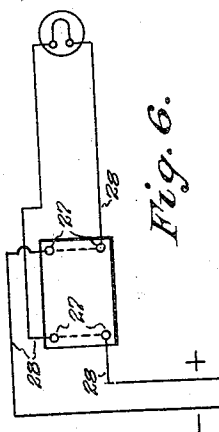


Fig. 6.

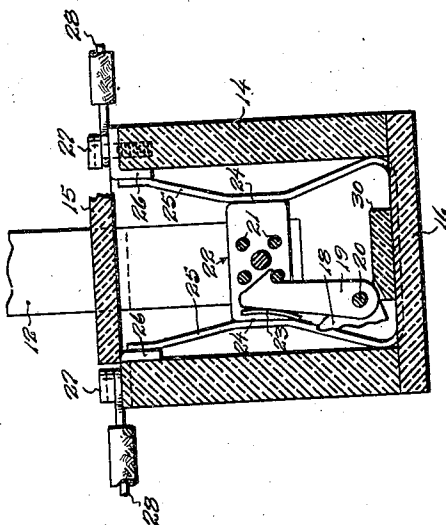


Fig. 4.

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## UNITED STATES PATENT OFFICE

2,314,407

## ELECTRIC SWITCH

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Application January 24, 1941, Serial No. 375,788

9 Claims. (Cl. 200—159)

This invention relates to electric switches, and has for its objects to provide mechanism simple and relatively inexpensive in construction, and durable in operation, particularly adapted for installation in the floor of a room in a manner permitting ready actuation by application of foot pressure thereto.

It is a further and a particular object to provide a switch having its manually-engaged pedal element so engineered as to present a minimum obstruction to a person walking about the room, and which in its inoperative normal position functions to seal the switch proper against admission of room dust or of water or other liquid which might be applied during a cleaning operation or by accident spilled on the floor.

As a still further object the invention aims to provide a switch including an escutcheon plate having therein a ring of a night-luminous substance outlining the actuating element to permit the latter to be easily located in the dark.

Other objects and advantages, with the foregoing, will become apparent in the course of the following description wherein reference is had to the accompanying drawings showing the now preferred embodiment of my switch.

The invention consists in the novel construction and in the adaptation and combination of parts hereinafter described and claimed.

In said drawings:

Figure 1 is a transverse vertical section and Fig. 2 is a longitudinal vertical section taken, respectively, on the substantial transverse median and longitudinal median lines of a switch mechanism constructed in accordance with the present invention, both views having the electric wires deleted therefrom and representing the installation to the floor of a room.

Fig. 3 is a horizontal section taken on line 3—3 of Fig. 2 with a fragmentary showing of the electric wires and with a part of the cover plate for the switch case broken away.

Fig. 4 is a somewhat fragmentary transverse vertical section taken on broken line 4—4 of Fig. 2 excepting that the parts are shown in the positions occupied during a switch-operating movement.

Fig. 5 is a top plan view of the switch; and Fig. 6 is a wiring diagram representing a conventional series hook-up of the binding posts of the switch in an electric circuit including a lamp, this as well as the alternative method of wiring such posts in parallel being common practice where, as in the illustrated embodiment the posts are pluralized.

Having reference to the drawings, the letters *f* and *sf* denote, respectively, the finish and sub-flooring of a room having an opening therein to receive the switch, and the numeral 10 designates a conventional metal box hung by angle brackets 11 below the switch.

Within this box is the switch proper which provides an insulated case suspended by hangers 12 to have the same lie in spaced relation below an escutcheon plate 13, the case being desirably comprised of a rectangular shell 14 closed by top and bottom plates 15—16 and each being vertically bored on the longitudinal median line of the case to provide registering openings through which bolts 17 are received, the bolts serving the added end of securing the hangers which are caught between the shell and the top plate 15.

Formed in the inner wall of each of the shell sides are channeled guide-ways for the vertical sliding movement of a bar-piston 18. Said bar-piston is represented as being of an inverted-U shape and at the lower end of one of its arms carries a pawl 19 pivotally mounted as at 20 and functioning by ratchet engagement with a series of four circumferentially spaced pins 21 to impart quarter-revolutions to a tumbler 22, the pawl being urged into engagement with the tumbler pins by a spring 23. Formed on each end of the tumbler are prominences 24 which, on alternate quarter-turns, act to expand oppositely disposed and spring-retractive contact arms 25 into circuit-closing engagement with contact clips 26, the clips being caught between the upper plate and the shell and receiving screws 27 (Figs. 4 and 5) which act as binding posts for electric wires 28. The spring metal forming the contact arms 25 is produced to a U-shape and finds a seat in recesses provided by the bottom plate of the case, being secured therein by an overlying insulation strip 30 which is fixedly caught between said bottom plate and the shell 14.

Reverting to the bar-piston 18, it will be seen that the same connects through the instrumentality of a screw 31 with a push-rod 32, the push-rod being slidably received through a dished washer 33 seating on the top plate 15. On the push-rod is a surmounting head 32' designed to function as a cup bearing for a ball 34. The ball acts as the pedal element for the push-rod and is urged upwardly by a spring 35 working against the head 32' to have the ball seat against the underside of the escutcheon in a suitable bevelled opening permitting a portion of the ball to project as a push-button beyond the escutcheon.

eon face. I provide, in said escutcheon face, a channel in surrounding relation to the opening, which is filled with a phosphorescent preparation, as 36, or its equivalent in a material capable of glowing in the dark.

The operation of the switch is believed to be clear. Foot-operation of the button in opposition to spring 35 and with the parts in the positions shown in Fig. 1 produces a quarter-turn of the tumbler to spread the arms of the spring contacts 25 into circuit-closing engagement with the terminal clips 26, namely into the positions shown in Fig. 4. Upon a release of the foot the ball returns to its normal position, and a following depression of the button again imparts a quarter-turn to the tumbler to again locate the prominences 24 in vertical alignment whereupon the spring arms 25 are permitted to contract with a resulting break in the circuit. The ball, by its ability to rotate on the surmounting head 32' of the push-rod, reduces wear and assures a dust and liquid-proof seal as the same is held by the spring 35 on its bevelled seat, this rotating faculty additionally minimizing danger of tripping as well as eliminating possibility of damage to the button where a person's shoe is accidentally brought into contact with the same.

It is obvious that the switch might be applied to the wall as well as the floor of a room. The peculiar adaptability to a floor installation makes the latter preferable, however, in that it eliminates the unsightly stains which invariably appear on the paper or other wall finish in proximity of all installations.

It is my intention that the language of the hereto annexed claims be given a scope in its interpretation commensurate with the state of the advance in the art.

What I claim is:

1. In an electric floor switch, in combination: an escutcheon plate arranged to lie substantially flush with the floor and having an annular opening bevelled from the underside; a closed switch case hung in spaced relation below the escutcheon plate and having an opening through its top cover aligned with the opening of the escutcheon plate; switch mechanism within the case; a push-rod working through said opening in the cover, having operative engagement within the case with the switch mechanism, and formed at its upper end with an enlarged cupped head; a ball having a diameter somewhat exceeding the diameter of the escutcheon opening and revolvably supported on the head; and a compression spring applied in surrounding relation to the push-rod and exerting its thrust from the top cover of the switch case against the enlarged head of the push-rod and acting to influence the ball into seating engagement with the bevelled face of the escutcheon opening to have a portion of the ball project through the opening as a push-button for the switch.

2. In an electric switch, in combination: an escutcheon plate having an annular opening therein; a closed switch case hung in spaced relation below the escutcheon plate and having an opening through its top cover aligned with the opening of the escutcheon plate; switch mechanism housed within the case; a dished washer seating in the opening of said cover; a push-rod working through said washer, having operative engagement within the case with the switch mechanism, and formed at its upper end with an enlarged cupped head; a ball having a diameter somewhat exceeding the diameter of the

escutcheon opening and revolvably supported on the head; and a compression spring surrounding the push rod, and bearing at one end on the dished surface of the washer and at the other end against the head to influence the ball into seating engagement with the underside of the escutcheon plate to have a portion of the ball project through the opening as a push-button for the switch.

3. In an electric switch, in combination: an escutcheon plate having an opening therein; a switch case hung in spaced relation below the escutcheon plate comprised of a shell and top and bottom cover plates therefor and characterized in that the hangers therefor are caught between the shell and the top plate of the case, said top plate having an opening therethrough aligned with the opening of the escutcheon plate; contact clips forming the terminals of an electric circuit and carried by the switch case to have their contact faces exposed within the case; a push-rod extending for manual depression through the aligned openings of the escutcheon and top plates; a spring opposing said depression movement; and switch mechanism within the case, operatively associated with the contact clips and with the push-rod, arranged and adapted by successive depression movements of the push-rod to open and close an electric circuit including the contact clips.

4. In an electric switch, in combination: an escutcheon plate having an opening therein; a switch case hung in spaced relation below the escutcheon plate; a push-rod working through the opening of the escutcheon plate and having a bearing in the switch case; a spring acting in opposition to depression movements of the push-rod and with the latter movement acting to obtain reciprocation of the push-rod; contact clips forming the terminals of an electric circuit and having their contact faces exposed within the case; a contact member operatively associated with the contact clips and spring-actuated out of circuit-closing relation therewith; a tumbler journaled in the case arranged and adapted by successive partial turns to obtain movement of the contact member into and out of circuit-closing engagement with the contact clips, said tumbler being provided with a ratchet wheel; and a pawl actuated by the reciprocation of the push-rod and operatively associated with the ratchet wheel to impart said partial turns to the tumbler in response to successive depression movements of the push-rod.

5. In an electric switch, in combination: an escutcheon plate having an opening therein; an insulated switch case hung in spaced relation below the escutcheon and having an opening through its cover aligned with the opening of the escutcheon plate; a push-rod extending through said aligned openings; a bar-piston slidably supported within the case and coupled to the push-rod; a spring acting in opposition to depression movements of the push-rod and with the latter movement acting to obtain reciprocation of the bar-piston; a pawl carried by said bar-piston; a tumbler journaled in the case provided with a series of four pins located parallel to and in circumferentially spaced relation about the tumbler axis and by operative engagement with the pawl functioning as a ratchet wheel to impart quarter-turns to the tumbler; pluralized pairs of contact clips forming the terminals of an electric circuit and having their contact faces exposed within the case; and plural U-shaped spring con-

tact members supported within the case in straddling relation to the tumbler arranged and adapted to successive quarter-turns of the tumbler to be brought in unison into and out of circuit-closing engagement with the contact clips.

6. In an electric switch, in combination: an escutcheon plate having an opening therein; an insulated rectangular switch case hug in spaced relation below the escutcheon plate and comprised of a shell member and top and bottom cover plates therefor, said top plate having an opening therethrough aligned with the opening of the escutcheon plate, and said bottom plate having a pair of transversely extending recesses in its upper face spaced one from the other to lie at each end of the switch chamber; contact clips forming the terminals of an electric circuit and caught between the shell and the top plate in each of the four corners of the case; U-shaped spring contact members having their cross-arm portions seating in the recesses of the bottom plate and locating the free ends of the legs in functioning relation to the contact clips, the spring characteristic of said members acting by contraction to normally hold the legs out of circuit-closing relation to the clips; an insulated strip overlying said cross-arms of the contact members and caught between the shell and the bottom plate at each end of the case to secure said cross-arms in the recesses; a tumbler journaled in the case to lie between the legs of said contact members and arranged and adapted by successive quarter-turns to obtain movement of the spring legs into and out of circuit-closing engagement with the clips, said tumbler being provided with a series of four pins located parallel to and in circumferentially spaced relation about the tumbler axis; a bar-piston slidably supported in the case and providing a pawl having ratchet engagement with the tumbler pins; and a spring-retained push-rod extending through said aligned openings of the escutcheon and top plates and coupled within the case to the bar-piston for imparting ratchet-operating reciprocatory movements to the piston.

7. In an electric switch: the combination of a switch mechanism; a reciprocative push-rod hav-

ing functional connection with the switch mechanism to actuate the latter in one direction only of the rod's reciprocative movement; a manually-depressed ball mounted for free revoluble movement and functional to the push-rod for imparting switch-operating movement to the latter by depression movement of the ball; a coil compression spring surrounding the push-rod with its coil axis co-axial to the rod and working against the latter in opposition to the depression force applied from the ball; and an escutcheon plate formed upon its underside with a seat engaged by the ball in the spring-influenced return travel of the push-rod for limiting said return movement, said escutcheon plate providing an annular opening therethrough co-axial to the seat and having a diameter somewhat less than the diameter of the ball to permit a portion of the latter to be exposed through the plate for use as a push-button in operating the switch.

8. In an electric switch: the combination of a switch mechanism; a reciprocative push-rod having functional connection with the switch mechanism to actuate the latter in one direction only of the rod's reciprocative movement; a ball finding a rotary bearing upon the push-rod and manually depressible for imparting switch-operating movement to the push-rod; a coil compression spring surrounding the push-rod with its coil axis co-axial to the rod and working against the latter in opposition to the depression force applied from the ball; and an escutcheon plate having an annular opening of a diameter somewhat less than the diameter of the ball and upon its underside forming a seat engaged by the ball in the spring-influenced travel of the ball for limiting the return movement of the latter, the seated ball being partially exposed through said escutcheon opening to present a push-button for the operation of the switch.

9. The structure of claim 8 applied as a floor switch with the escutcheon plate lying substantially flush with the floor, and including a switch case for the switch mechanism suspended to lie in spaced relation below the escutcheon plate.

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CERTIFICATE OF CORRECTION.

Patent No. 2,314,407.

March 23, 1943.

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It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, first column, line 34, for "all" read --wall--; page 3, first column, line 3, for "to" read --by--; line 8, for "hug" read --hung--; second column, line 45, for "escutecheon" read --escutcheon--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 4th day of May, A. D. 1943.

(Seal)

Henry Van Arsdale,  
Acting Commissioner of Patents.