

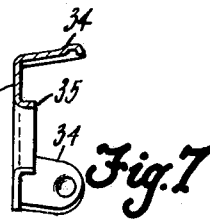
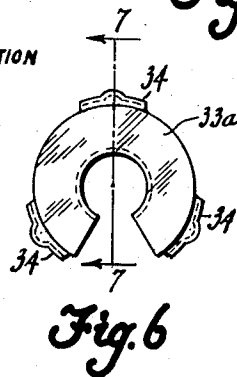
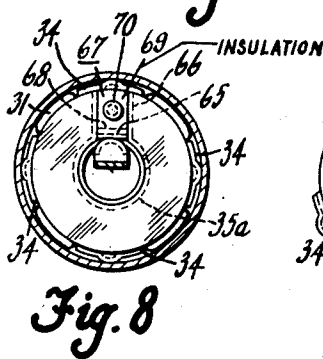
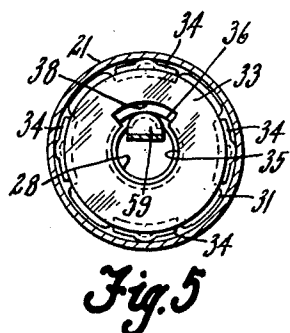
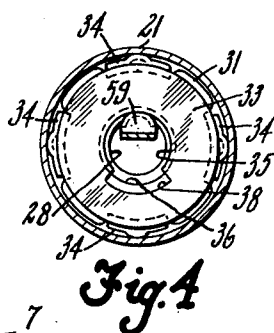
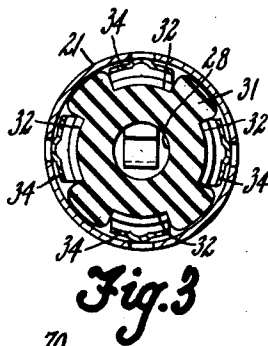
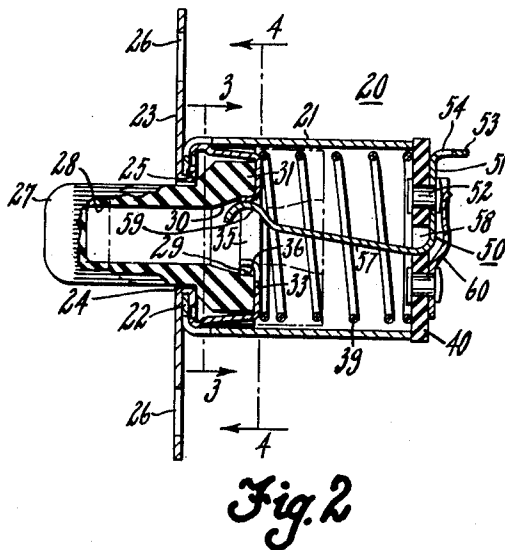
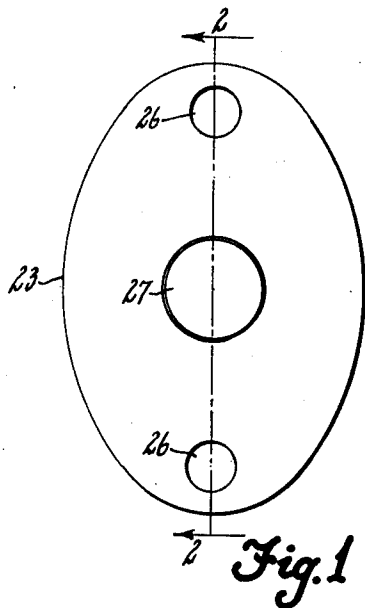
Dec. 1, 1953

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2,661,407

SWITCH

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## UNITED STATES PATENT OFFICE

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## SWITCH

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5 Claims. (Cl. 200—61.78)

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This invention relates to electric switches of the plunger type having a novel structure, one which is economical to make, easy to assemble, and effective in use.

When a lamp or other current consuming device is mounted within an enclosure it is desirable to provide a switch for the lamp or device so that it will be connected with a current source upon opening of a door for the enclosure to a closed position and when the door is closed the switch will be actuated to an open position. This is a good safety feature, but on many occasions it is desirable to have the door open for a long period of time, such as during cleaning of the enclosure, making repairs, or for emergency operations. While the lamp or device does not draw too much current from the battery it does drain the storage battery unnecessarily which irritates a person to see the lamp burning, or the device operating, especially during the daytime, or when not needed.

A feature of the present invention is to provide a novel plunger type switch for a lamp adapted to be closed when the door is opened and opened when the door is closed and yet being capable of manual manipulation so that the switch can be moved to an open position when the door is opened.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings wherein a preferred embodiment of the present invention is clearly shown.

In the drawings:

Fig. 1 is a front plan view of the switch embodying the present invention.

Fig. 2 is a sectional view taken on line 2—2 of Fig. 1;

Fig. 3 is a sectional view taken on line 3—3 of Fig. 2;

Fig. 4 is a sectional view taken on line 4—4 of Fig. 2 showing the switch in an on position;

Fig. 5 is a view similar to Fig. 4 showing the switch in an open position;

Fig. 6 is a plan view of a modified form of a contact element;

Fig. 7 is a sectional view taken on line 7—7 of Fig. 6.

Fig. 8 is a sectional view similar to Fig. 4

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but showing another modified form of a contact element.

Referring to the drawings, the switch unit is indicated in its entirety by reference numeral 20. The body of the switch includes a hollow cup-like member of metal having a cylindrical side wall 21 and an end wall 22 provided with an aperture. A mounting plate 23 is provided with an annular flange 24 which extends through the opening in the end wall 22 and is riveted over, as at 25, against the underside of the end wall 22 to hold the plate 23 and casing 21 in assembled relation. The plate 23 has suitable openings 26 so that plate can be secured to a suitable support, such as a frame for a door, not shown.

A manually operable plunger or actuator 27 of molded insulating material, such as Bakelite or other suitable moldable plastic, has a longitudinal axial bore 28 extending from its lower end and terminating short of its upper end or outer end thereof. The bore is counterbored to provide a shoulder 29 and the bore is provided with a tapered wall portion 30. The lower end of the plunger is somewhat enlarged to provide an annular integral collar or head 31. The plunger has a free sliding fit within the flange 24 and is normally held in abutting engagement with the riveted over portion 25 of the flange 24. The head 31, in this instance, is provided with a plurality of peripheral notches 32. The head carries a contact plate 33 of metal, said plate has a plurality of resilient arms or fingers 34, bent back along the head 31. These fingers have a free fit within the notches 32, but they prevent the contact plate 33 from turning relative to the head 31. The fingers are bent outwardly so that the free ends thereof will continuously engage the cylindrical wall 21 to form a ground connection.

The movable plate contact 33 is provided with an interrupted returned central flange 35 which fits into the enlarged portion of the bore 28 below the tapered portion 29. In this instance the interrupted flange is formed by a notch 38 which exposes a portion 36 of the enlarged portion of the bore 28. The plunger 27 is projected outwardly by resilient means, such as a coiled compression spring 39 having one end bearing against a closure 40 of insulating material and the other end

bearing against the movable contact 33. One side of the head 31 engages the riveted over portion 25 to limit the outward movement of the plunger 27. The closure 40 is secured to the casing by having the inner face thereof abut the rear end of the wall 21. The periphery of the closure is formed with a plurality of notches each receiving a projecting tang. The ends of these tangs are bent over the rear side of casing so as to secure firmly the closure to the casing. Since this procedure of securing a closure to a housing is well known the tangs and notches are not shown.

Mounted on the closure 40 is a terminal strap member 50 which has an arm 51 secured to the back of the base by a rivet 52. The arm is bent outwardly as at 53. This bent end is provided with a slot or opening 54 to receive an apertured spade terminal associated with a lead wire or cable. The terminal 50 also includes a contact arm 57 which extends freely through an aperture 58 of the base. The arm 57 extends through the spring and is biased toward the cylindrical wall 21. The free end of the terminal has a spheroidal indentation 59 and normally engages the contact flange 35 after the manner shown in Fig. 2 to close a circuit.

There is also riveted to the outside of the closure a spring arm 60 which overlies the rivet 52. Thus, when a flat contact or spade terminal is slipped through the slot 54 and under the spring arm 60 until an opening in the flat terminal snaps over the rivet 52 the spring arm will hold the flat terminal yielding in place.

It will now be apparent that with the switch in its normal circuit closed position, as shown in Fig. 2, the circuit may be broken by merely pushing in the plunger to the right to move the flange 35 out of engagement with the contact arm 57. When the plunger has moved a certain distance the spring contact will leave the flange and be cammed therefrom by the tapered surface 30 and on the inner surface 28 of the hollow plunger 27. However if it is desired to open the circuit with the switch parts in their normal positions, shown in Fig. 2, without the necessity of pushing the plunger inwardly or to the right against the biasing force of the spring 39, a turn may be imparted to the plunger until the spheroidal indentation is opposite the surface 35 to open the circuit. In order to complete the circuit it will be necessary to turn the plunger in one direction or the other in order to have the spheroidal indentation to again engage the contact surface 35.

A modification of the contact ring 33 is shown in Figs. 6 and 7. The construction of this contact shown in Fig. 6 is substantially the same as that already described, differing only in the slight matter of forming the interrupted contact surface 35. In this instance a segment including a spring arm 34 is cut from the ring contact to form a C-shaped contact 33a. It is to be understood that the arms could be spaced so that the angular distances between the arms could be 90° apart, instead of 120° as shown in Fig. 6, and assembled with a plunger having its head provided with correspondingly spaced notches to receive the arms.

Another modification of the contact ring 33 for use with the plunger is shown in Fig. 8. In this modification, the ring is shaped to provide a longitudinal recess 65 in the flange portion 35a and a transverse recess 66 in the body of the ring. These recesses receive an L-shaped insulator 67 having an arm 68 extending into the recess

65 and an arm 69 extending into the recess 66, a pin 70 secures the insulator to the plunger. By this arrangement the spheroidal indentation 59 of the arm 57 will engage the arm 68 to obtain the open circuit position.

While the embodiment of the present invention as herein disclosed constitutes a preferred form, it is to be understood that other forms might be adopted.

What is claimed is as follows:

1. In an electric switch, the combination comprising; a metal housing; a plunger of insulating material slidably supported by the housing and having a recess; a movable contact member supported by the inner end of the plunger and having an interrupted contact surface extending into the recess of the plunger and having segmental fingers engaging the housing; a closure for the housing; a spring contact having one end fixed to the closure and having its free end extending into the recess and adapted to engage the contact surface within the recess when the plunger is in its normal position, the walls of said recess providing a surface for engagement by the free end of the spring contact upon turning of the plunger a certain angular distance to disengage the contacts; and resilient means for opposing inward thrusts of the plunger to disengage the contacts.

2. In an electric switch, the combination comprising; a metal housing; a plunger of insulating material slidably supported by the housing and having a recess; a movable contact supported by the inner end of the plunger and having an interrupted contact surface extending into the recess of the plunger and having resilient positions engaging the housing; a closure for the housing; a spring contact having one end fixed to the closure and having its free end extending into the recess and normally engaging the contact surface within the pocket when the plunger is in its normal position, said free end adapted to engage the plunger where the contact surface is interrupted upon turning of the plunger a certain angular distance to disengage the contacts; and resilient means for opposing the inward thrusts of the plunger to disengage the contacts.

3. In an electric switch, the combination of a housing; a plunger of insulating material reciprocally and rotatably supported by the housing, said plunger having a recess; a ring contact carried by the inner end of the plunger and having a contact surface extending into the recess; an insulator associated with the ring contact for interrupting the contact surface within the recess; a closure for the housing; a spring contact having one end fixed to the closure and having its free end terminating within the recess and cooperating with the contact surface within the pocket to complete a circuit and with the insulator to break the circuit in the normal position of the plunger; and a spring disposed between the ring contact and the closure, said spring serving to keep the plunger in its normal position unless the plunger is depressed to move the contact surface out of engagement with the spring contact.

4. In a push type switch, the combination comprising a housing; a plunger slidably supported by the housing, said plunger having a conical wall; a movable contact controlled by the plunger having an interrupted contact surface; a stationary contact within the housing engageable with said movable contact in certain normal positions of said plunger, said con-

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ical wall operating to disengage the contacts when the plunger is actuated out of its normal position; and said stationary contact being adapted to disengage the movable contact and engage the plunger when the movable contact is interrupted upon turning of the plunger in its normal position.

5. In a push type switch, the combination comprising, a housing, a plunger slidably supported by the housing, said plunger having a recess provided with a conical wall adjacent the mouth of said recess; a movable contact having an interrupted contact surface controlled by a plunger upon movement thereof; a stationary contact member engageable with said movable

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contact in certain normal positions of said plunger, said conical wall operating to disengage the contacts when the plunger is actuated out of its normal position, and said stationary contact adapted to engage the plunger when the movable contact is interrupted upon turning of said plunger in its normal position.

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