

July 6, 1937.

S. H. CHURCHILL

2,086,066

ELECTRIC SWITCH

Original Filed Oct. 25, 1934

FIG. 1.

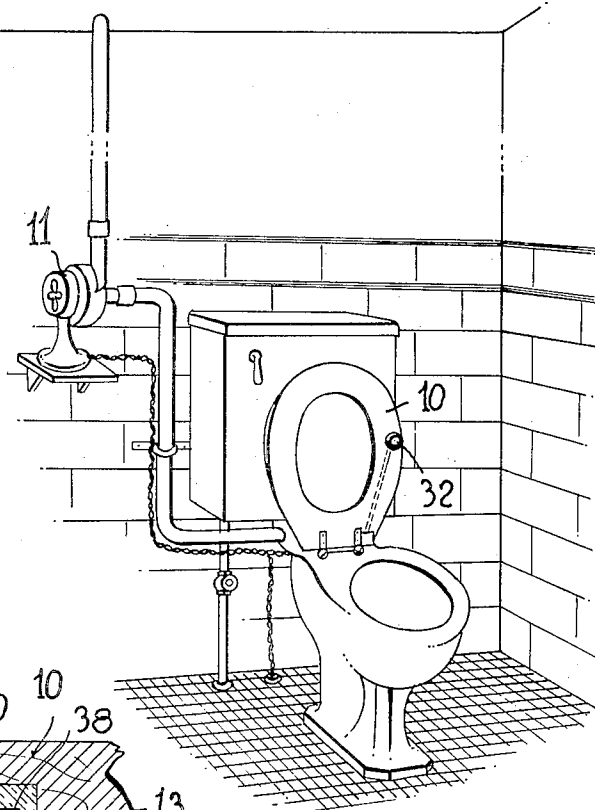


FIG. 2.

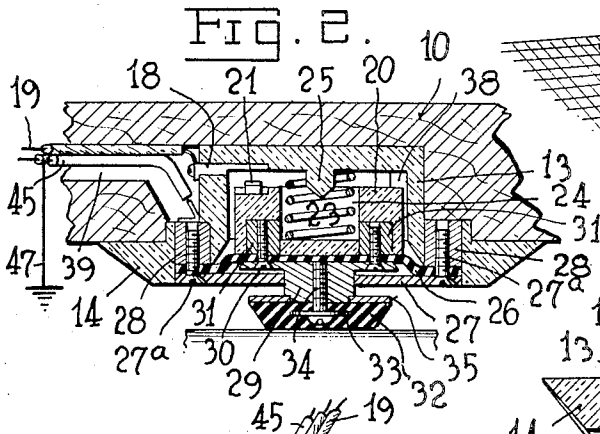


FIG. 4.

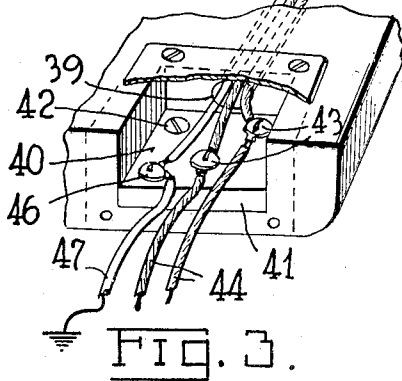
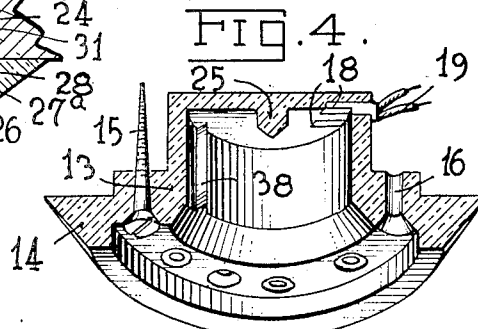
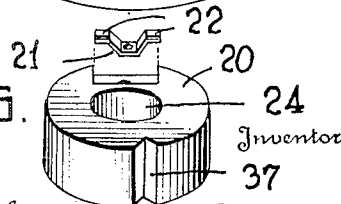


FIG. 5.



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UNITED STATES PATENT OFFICE

2,086,066

ELECTRIC SWITCH

Stanley Harris Churchill, Edmonton, Alberta,
CanadaOriginal application October 25, 1934, Serial No.
750,003. Divided and this application June 22,
1935, Serial No. 27,984

1 Claim. (Cl. 200—85)

My invention relates to switches for electric devices or apparatus. In making my invention, I have given it characteristics of structure of special importance or value in a switch for the automatic control or regulation of an electric motor that is a part of a ventilating system for rooms or compartments in which toilet appliances or fixtures are installed, and the use of which renders ventilation highly desirable. It is obviously of the highest importance that such a switch should safeguard persons from electric shock from the switch either while using or cleansing the fixture and also to assure the switch itself from damage or derangement. Such a switch embodying my invention is shown and described in my application No. 750,003 filed October 25, 1934, for Toilet ventilating apparatus and ventilating methods, and this application is filed as a division of that application in response to a requirement by the Patent Office for division. Accordingly, in the illustration and description, the present application is similar to or corresponds with what is shown and described in my said application No. 750,003, insofar as my switch is concerned, but it is to be understood that I do not restrict or confine myself to the use of my switch invention as a part of a toilet ventilating apparatus, nor to any particular apparatus or relation, since by the present application, patent protection is sought for the switch in itself.

Accordingly, my invention forming the subject of this application, consists in whatever is described by or is included within the terms or scope of the appended claim.

In the drawing:

Fig. 1 is a perspective view of a toilet room fixture provided with a switch embodying my invention for the control of a fan-driving electric motor forming part of a ventilating system;

Fig. 2 is a vertical section through the switch;

Fig. 3 is a detail view in perspective of the junction box applied to the seat of the installation shown in Fig. 1;

Fig. 4 is a detail perspective view in section of a portion of the switch shell;

Fig. 5 is a detail view in perspective of the contact bridge bar carrying plunger and said bridge bar shown separated.

Describing in detail what is shown in the drawing, the switch embodying my invention is shown applied to the seat 10, of a closet bowl for the automatic starting and stopping of an electric fan motor 11, the fan inlet being connected by a pipe 12, with the bowl below the flush tank.

The electric switch structure is shown in Figs.

2, 3 and 4. It includes a shell 13 of bakelite or other material with insulating properties which has an opening at one end from which outwardly projects a flange 14, to lie against the adjacent surface of the seat or other member upon which the switch may be mounted. Said shell is secured firmly in position by retaining screws 15, which pass through holes 16, in the shoulder flange 14, these retaining screws being concealed when the diaphragm and cover plate 17, are assembled in position. At the closed end of the shell embedded in the wall and end and exposed within the same are two stationary contact points or electrodes 18, which respectively by lead wires 19, are connected in circuit with the electric motor of the suction device, the wire connections being on ends of the contacts on the exterior of the side wall of the shell. Loosely mounted within the shell to be readily slidable therein is a plunger 20, which in a recess at one end has secured to it the bridge contact bar 21, adapted by movement of the plunger towards the contact points 18, to touch the latter and thus close the circuit to the motor. This contact bridge bar preferably consists of a flat metal spring with raised ends carrying tungsten or other contact faces 22, reaching beyond the lower face of plunger 20, to which it is secured by a retaining screw as shown. Thus the contact ends touch the contact electrodes 18 and bridge them, at which time current flows through 21. The contact is made by a light springy pressure due to the end of 21 being raised far enough to touch the electrodes 18 before plunger 20 has been stopped on its downward travel. Normally the contact is broken by the lifting of the plunger to carry the bridge bar away from the contact points 18, when it becomes and remains "dead" electrically, by a coil spring 23, centrally placed within a chamber or recess 24, in the plunger. Such spring bears at one end against the closed wall of the shell which carries a central spring retaining stud 25, and at the other end against a surface closing the end of the recess 24. The plunger 20 at its upper or outer end is attached to the central portion of a flexible, preferably rubber, diaphragm 26, which is of greater diameter than the plunger, so that it projects beyond the latter and has its projecting rim or edge secured firmly to the shell 13, between binding or clamping surfaces so that between the latter and the plunger there is a free portion of the diaphragm which permits the latter to buckle when pressure is applied either by the expanding spring 23 on one side or by opposing pressure on the other as from the weight of a

person on the seat. Above the diaphragm and fitting the opening in the shell 13, at that point is a cover plate 27, preferably of metal which lies against the rim or marginal portion of the diaphragm 26, and by means of screws 27a passing therethrough into the shell, clamp or bind such marginal edge against an annular shoulder on the shell. Internally threaded anchor blocks 28, embedded in the shell are provided for engagement by the clamping screws 27a.

The central portion of the diaphragm 26 is clamped between the adjacent end of the plunger 20 and the outwardly flanged end of a collar 29 by means of screws 30, which pass through the diaphragm and into internally threaded anchor blocks 31, embedded in the plunger 20, which is preferably of bakelite or other insulating material. The collar 29, passes outwardly from the shell through a central hole in the cover plate 27 and upon its outer end has secured to it a bumper block 32, preferably of rubber, which contacts with the toilet fixture member which supplies the pressure to the bumper to move the plunger to close the circuit through the bridge bar contact 21. Embedded in the bumper block is a thin, flat disc 33 of metal which serves to securely fix to the bumper block a screw 34, that projects from the end thereof next the collar 29, and which engages an internally threaded central hole in the collar 29, to attach the bumper block to the collar. On the side or base of the bumper block opposite the cover plate 27, is secured a bumper plate 35, which has a central hole that receives the reduced end of the collar 29, so that the plate rests upon a shoulder on the collar and thus is the means for transmitting the bumper pressure to the collar and thence to the circuit-closing plunger 20. Another important function of the bumper plate 35, is to contact with the cover plate 27 when the bumper is moved for circuit-closing so that excess pressure will be taken by these two contacting plates and transmission thereof to the inner parts of the switch is prevented which might result in injury thereto. The distance between the two plates is slightly less than the depth or space between the bottom or inner end of the plunger and the closed end of the shell and allowing the points of the bridge contact bar to make a springy contact with the stationary switch points or electrodes 18, so that such parts are never subjected to any heavy, and possibly damaging, pressure regardless of the force which moves the bumper in circuit-closing movement. The screw 34, of course, secures or holds the bumper plate to the end of the plunger collar 29.

The bumper block has on its outer side a screw-driver slot that reaches to the slotted head of screw 34.

The coil spring 23 has strength or power enough when acting on the seat or movable member of the toilet fixture to lift such member and thus assure movement and holding of the bridge contact bar 21 out of contact with the switch points 18 and thus assure the non-running of the electric motor when the toilet is not in use.

The rubber or elastic diaphragm 26 is to exclude air, moisture and water even if submerged in water, from the interior of such switch mechanism and yet allow free movement of the circuit-closing plunger. To prevent damage to the buckling portion of the diaphragm by any rubbing or cutting action of adjacent parts, a recess 36 is provided adjacent thereto as by beveling the adjacent surface of the shell wall and outer-edge

of the flange of collar 29, to an extent that provides ample space for free movement and buckling of the diaphragm and which eliminates any sharp or cutting edges with which the moving or flexing portion of the diaphragm might have contact. The surfaces on opposite sides of the diaphragm which contact therewith for binding or clamping purposes are held by the screws employed with sufficient pressure to make the joints air, dust and water-tight.

Preferably to prevent any turning movement of the plunger 20, within the shell, the plunger may be provided with a vertical groove 37, extending in an axial direction which slidably engages a rib 38, on the adjacent wall of the shell.

As shown in Figs. 1 and 3, the switch is mounted in the underside of the seat, and preferably at the left side thereof, because that is the side of the seat upon which the weight of the body is thrown in the customary use of the closet, and this assures against accidental opening of the switch by reason of insufficient weight on the seat above the switch as sometimes occurs when the switch is on the right side, even though the toilet fixture continues in use.

From the switch, two lead wires 19 run through a channel or conduit 39, running internally through the seat from the switch to the hinged end of the seat whereat is a junction box 40. The junction box is placed in a recess in the rear lower side of the seat and includes a block 41 of insulating material such as bakelite, rubber or fiber, which is secured in the recess by screws 42. The lead wires 19 are secured to the insulator block 41, by a binding screw or post 43, for each, and to the same binding posts are secured the two current or lead wires 44, which run to the motor.

Besides the two lead wires which connect the switch and the motor, I run a wire 45 from the anchor block 28 adjacent to switch end of conduit 39, which is enlarged at this point for this purpose, soldering wire 45 to the end of the anchor block where it appears flush with flange 14. This brings every exposed metal part of switch into contact with wire 45, which runs to a binding post 46, of the junction box, from which a wire 47 is carried to a ground and thereby the exposed metal parts of the switch are grounded and thus all possible danger of shock from the high voltage house current which the switch carries is eliminated. Thus even if a person should touch the possibly electrified external metal radiator or water pipes, this grounding of the switch would be a perfect safeguard even though such a person might increase the risk by water used in washing the fixture. Further protection from shock is secured by the complete or perfect insulation of the electrodes or contact or switch points, from all other metal parts of the switch and by so mounting bridge contact-var-carrying plunger that it has no electrical contacts except when the switch is actually in use. A further safeguard is provided when the switch is located below, or on the underside of the seat, and is thus hidden and inaccessible to touch, especially when in use. The recess containing the junction box has a cover 48, of insulating material, so that it is protected both physically and electrically, as against short-circuiting, or shocking a user.

My junction box is a most advantageous arrangement because it makes the disconnection of the wiring from the seat a very simple matter and has a location or position which assures that the connections shall be safe and inconspicuous.

The placing of the wires in the seat is a simple and easily performed operation. After the switch has been installed with the two lead wires and the ground wire attached to the switch parts, the three wires are pulled through the conduit 38 to carry their free ends to the junction box and such ends are secured to the binding posts. The switch terminal ends of the three wires are soldered to the stationary contact points and the cover plate screw anchor 28, before the switch shell is secured in the proper recess in the underside of the seat. The diaphragm cover plate, bumper plate and bumper are conveniently put in place after the switch shell with the parts therein is placed in the seat recess.

What I claim is:

An electric switch comprising a body member of insulating material having a chamber therein open at one end and provided with a mounting flange at the open end of the chamber, the inner wall portion of the chamber being flared outwardly near its open end to the plane of the base of a rabbeted portion at the edge of the chamber

opening, a pair of spaced contacts mounted in the base of the chamber in the body member, a plug member of insulating material slidably mounted within the chamber and substantially of the same cross-sectional area as the chamber, a bridging contact for said spaced contacts carried at the innermost end of the plug member and arranged to be moved into contact with said spaced contacts upon inward movement of the plug member, said plug member having a spring housing recess therein, a compression spring mounted within the recess to abut the rear of said recess and the rear of said chamber within the body, a flexible diaphragm secured near its outer edge to the body member within the rabbeted portion and secured at its central portion to the outer end of said plug member to seal the space between the plug member and the inner side walls of the body member, and operating means secured to said plug member through the diaphragm.

STANLEY HARRIS CHURCHILL.