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P. HUTT

2,275,853

ELECTRIC SWITCH

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Fig. 1.

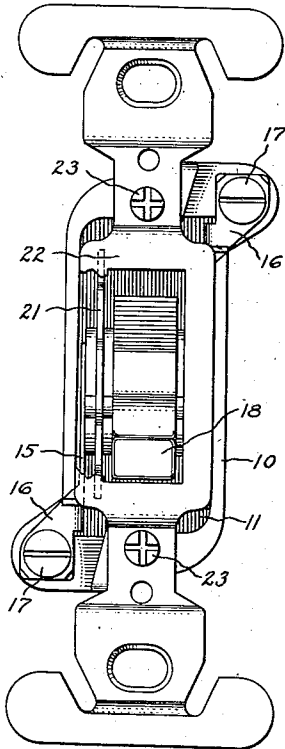


Fig. 2.

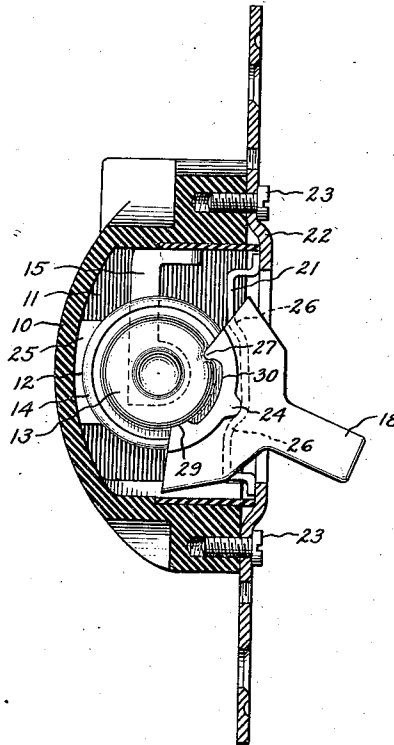


Fig. 3.

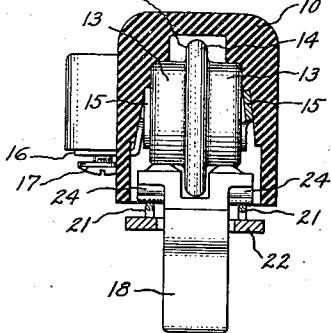
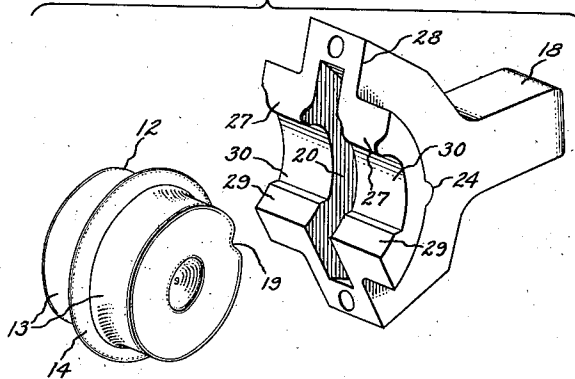


Fig. 4.



Inventor:
Philip Hutt,
by *Harry E. Durham*
His Attorney.

UNITED STATES PATENT OFFICE

2,275,853

ELECTRIC SWITCH

Philip Hutt, Milford, Conn., assignor to General Electric Company, a corporation of New York

Application April 1, 1941, Serial No. 386,249

4 Claims. (Cl. 200—152)

My invention relates to electric switches and more particularly to electric switches of the type having liquid contact circuit controllers.

The object of my invention is to provide an improved construction and arrangement in switches of this type, the improvement relating particularly to the operating mechanism for the liquid contact circuit controller.

In the accompanying drawing, Fig. 1 is a plan view of a switch embodying my invention; Fig. 2 is a view of the interior of the switch the casing being shown in section; Fig. 3 is another view of the end of the switch partly in section; and Fig. 4 is a perspective view of the liquid contact circuit controller and a portion of the operating mechanism.

Referring to the drawing, I have shown my invention applied to a switch incorporating a rotatable liquid contact circuit controller. Such a switch is shown in the Sablesen Patent No. 2,142,153, dated January 3, 1939, which is assigned to the same assignee as the instant invention. The switch includes a housing 10 of insulating material, such as a molded plastic, which is provided with a recess 11 to receive a liquid contact circuit controller 12 in the form of a mercury button. The button comprises two opposed cup-shaped metal terminals 13 separated by a glass bead 14 and an interior insulating barrier (not shown) provided with an orifice which separates the mercury contained within the button into two parts except when the orifice is immersed in the conducting liquid; the interior construction of the mercury button is more fully described in the aforementioned Sablesen patent and forms no part of the present invention.

The circuit controller 12 is supported between spaced contact arms 15 located in the recess 11. Each contact arm is provided with a bearing surface at one end which is seated in a recess in a corresponding cup-shaped terminal so that the mercury button is securely supported between the contact arms. At its other end each arm is formed with a terminal portion 16 extending outside the recess which is provided with a terminal screw 17 for connection to an electrical circuit. An operating handle 18 is formed with projections which engage complementary notches 19 formed in each of the cup-shaped terminals 13 so that the circuit controller is rotated upon movement of the handle. The inner wall of the handle has a recess 20 formed therein to provide clearance for the bead 14 of the circuit controller.

The operating handle and circuit controller are held in assembled relationship by means of spring strips 21 secured in any suitable manner, as by spot welding, to a mounting strap 22 which, in turn, is secured to the housing by drive screws 23. The spring strips 21 bear against abutments 24 on opposite sides of the handle and hold it firmly in engagement with the button. The circuit controller is prevented from moving downwardly out of engagement with the supporting arms 15 by a bearing surface 25, upstanding from the bottom of the recess, over which the periphery of the button slides. Offset surfaces 26 formed in opposite ends of the strips 21 limit movement of the handle and button in either direction. The switch thus far described is substantially the same as that shown and described in the aforementioned Sablesen patent.

In the construction of the switch of the Sablesen patent the projections on the handle which engage the notches in the circuit controller are located centrally of the handle and the widened portions at the base of the handle extend on each side of the projections in contact with the periphery of the button giving, in effect, three points of contact between the button and the handle. While in general this arrangement provided a proper connection between the circuit controller and handle I found that it had several drawbacks. If the projections on the handle were too long or the notches in the button too shallow, by a few thousandths of an inch, then the widened or flanged portions at the base of the handle would not make contact with the surface of the button and the handle would rock relative to the button about the projections as a pivot. On the other hand, if the projections were too short or the notches too deep, the handle would rest on the flange portions and the projections would slide in the notches causing lost motion between the controller and handle. In either case a certain amount of objectionable play occurred between the controller and handle making the switch noisy. Also the circuit controller might not be moved to full circuit closing position.

My invention overcomes these deficiencies by providing a construction in which lost motion or play between the handle and circuit controller is entirely prevented. To this end, I have changed the design of the switch handle to place the projections at one end of the handle flange and provide cooperating bearing surfaces at the other end. Referring to Figs. 2 and 4 of the drawing, I provide projections 27 at one end of

the flange 28 of the handle which cooperate with the notches 19 formed in the terminal members 13. At the other end of the flange I provide bearing surfaces 29 which rest on the peripheries of the terminal members, as shown in Fig. 2. This arrangement gives, in effect, a two-point support for the handle on the mercury button and eliminates the objectionable so-called three point support of prior constructions. The intermediate curved portion 30 of the handle flange is spaced from the periphery of the mercury button so that the handle contacts the button only at the points 27 and 29. This means that the spring strips 21 hold the handle firmly in engagement with the mercury button without possibility of lost motion occurring between the handle and button. This results in a switch which is exceptionally silent and in which the circuit controller may be accurately positioned by the handle at all times.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. In an electric switch, spaced contact members, a liquid contact circuit controller having terminals engaging said contact members supporting the controller for rotation, a portion of said circuit controller being provided with a notch and a handle having a projection seated in said notch and having a bearing portion spaced from said projection engaging the periphery of said circuit controller, the portion of the handle between said projection and bearing portion being spaced from contact with the periphery of said circuit controller.

2. An electric switch comprising a rotatably mounted liquid contact circuit controller, an operating handle, said circuit controller being provided with a notched portion, said handle being formed with a projection seated in said notch and likewise being provided with a bearing portion resting on the circuit controller at a point

spaced circumferentially from said notch, the portion of the handle intermediate said projection and bearing portions being spaced from contact with the periphery of said circuit controller, and spring means biasing said operating handle into engagement with said circuit controller whereby the circuit controller is rotated in response to movement of the handle.

3. In an electric switch, spaced contact members, a liquid contact circuit controller having terminals engaging said contact member supporting the controller for rotation, an operating handle, said circuit controller being provided with a notched portion, said handle being provided with a projection seated in said notch, said handle likewise being formed with a bearing portion spaced from said projection and engaging the periphery of said circuit controller at a point spaced circumferentially from said notch, the intermediate portion of the handle between said projection and said surface being spaced out of contact with the periphery of said circuit controller, and spring means maintaining said handle in seated engagement on said circuit controller whereby said circuit controller is rotated in response to movement of said handle.

4. An electric switch comprising a pivotally mounted circuit controller and an operating handle therefor, interengaging notched portions on said circuit controller and handle, said handle being formed with a bearing portion engaging the circuit controller at a point spaced from the said notched portions, the portion of the handle between said notched portions and said bearing portion being spaced from and out of engagement with the circuit controller, and means maintaining the handle in engagement with the circuit controller whereby said circuit controller is actuated in response to movement of the handle.

PHILIP HUTT.