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2,200,981

ELECTRIC SWITCH

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Fig. 1.

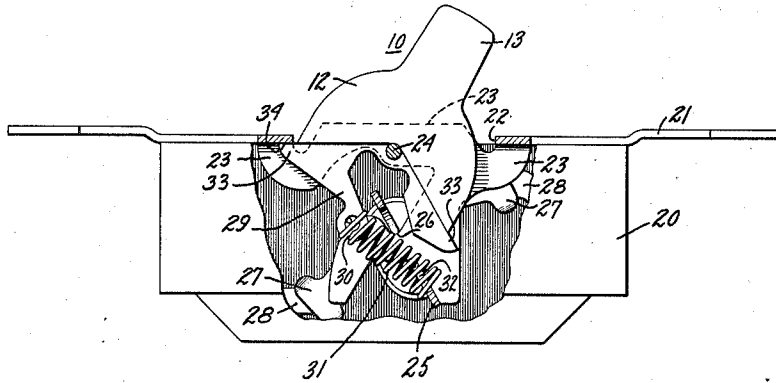


Fig. 2.

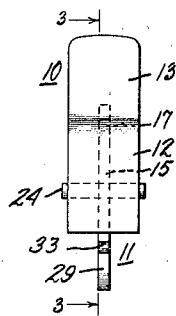


Fig. 3.

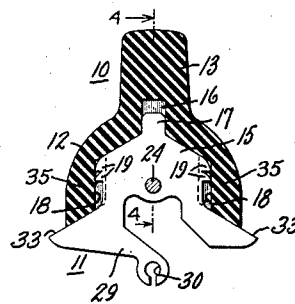
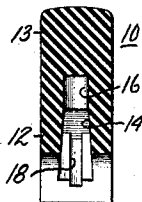


Fig. 4.



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ELECTRIC SWITCH

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4 Claims. (Cl. 200—172)

The present invention relates to electric switches, and more particularly to a switch-operating handle or lever for a snap switch.

Snap switches are often provided with an oscillatable contact structure which is adapted to be moved from one circuit-controlling position to another by means of an over-center spring. A suitable toggle lever may be pivotally mounted with respect to the switch casing and have an arm engaging the over-center spring to actuate the movable contact in response to movement of the toggle lever. Toggle levers for this use are often formed of a body of insulating material having a metallic insert provided with an actuating arm for engaging the over-center spring. It is customary to form toggle levers of this type by molding the insulation directly on the metallic insert. This method of constructing toggle levers is difficult. The position of the insert in the insulation is often inaccurate and the molding about the insert is often imperfect. As a result there are a large number of rejects in toggle levers of this construction and a corresponding high cost of manufacture. It is accordingly an object of this invention to provide a switch handle comprising a metallic insert positioned in and secured to a preformed member of insulating material in a novel manner.

It is another object of this invention to provide a switch-operating lever which is durable in use and economical to manufacture.

Further objects and advantages of the present invention will become apparent as the following description proceeds, reference being had to the accompanying drawing, in which Fig. 1 is an elevational view partially broken away of a snap switch; Fig. 2 is an end view of the operating lever of the switch of Fig. 1; Fig. 3 is a sectional view taken along the line 3—3 of Fig. 2; and Fig. 4 is a sectional view taken along the line 4—4 of Fig. 3 showing the molded portion of the switch handle with the metallic insert removed.

In Figs. 2 to 4 there is shown a switch operating lever constructed in accordance with the present invention. The lever comprises a member 10 of insulating material and a metallic insert 11 positioned in and secured to the insulating member. The member 10 is preferably molded from suitable insulating material such as a phenolic condensation product and is formed with an enlarged body portion 12 and an integral handle 13. A recess 14 of generally rectangular shape opens on one end of the body 12 and is adapted to receive the body portion 15 of the metallic insert 11. A sub-recess 16 of smaller

cross-section opens on the floor of the recess 14 and receives a lug 17 extending from the inner end of the metallic insert. In order to facilitate the molding operation and to reduce the insulating material required, the recess 14 is made considerably wider than the thickness of the metallic insert and lateral support for the insert provided by the side walls of the grooves 18 which are formed in the opposite end walls of the recess 14. The opposite edges of the body portion of the metallic insert are parallel and are provided with bars 19 which have biting engagement with the end walls of the recess 14 or, in the preferred embodiment just described, with the bottom walls of the grooves 18 formed in the end walls of the recess. The barbs preferably extend outwardly and downwardly from the opposite edges of the insert so that the insert may be pressed into the molded handle without excessive pressure. The bars are effective to anchor the insert in the molded member and prevent its withdrawal. The lug 17 is provided with straight parallel edges which tightly engage the walls of the sub-recess 16 to transmit tangential forces between the insulating member and the metallic insert.

In Fig. 1 there is shown a snap switch employing a toggle lever constructed in accordance with the present invention. The switch comprises a casing 20 of insulating material which is suitably recessed from its upper face to provide a housing for the parts of the switch mechanism. A sheet metal mounting strap 21 is secured to the upper face of the insulating body by suitable screws (not shown) and provides a support for the toggle lever and the movable contact structure of the switch. The mounting strap is provided with a slot 22 at its central portion which is bounded on its opposite sides by vertically extending flanges 23. The toggle lever is pivotally mounted by means of a pin 24 which extends through an opening formed in the lower portion of the body 15 of the metallic insert and suitable aligned openings formed in the flanges 23 of the mounting strap. The flanges 23 extend downwardly into the switch casing and form a support for a blade carrier 25. The blade carrier is mounted for oscillation on a V-shaped bearing surface 26 formed on each of the flanges 23 and carries with it a movable contact 27 which in the on-circuit position of the switch illustrated in Fig. 1 engages suitable stationary contacts 28 secured in opposite ends of the switch casing. An arm 29 depending from the metallic insert is provided with

a suitable slot 30 for the reception of one end of an over-center spring 31, the other end of which is held in engagement with blade carrier 25 by a suitable projection 32. It is apparent that movement of the operating lever carries the upper end of the spring through its center line position and moves the movable contact with a snap action. In order to limit the movement of the toggle lever, suitable stops 33 extend from each side of the metallic insert. These stops are arranged to engage the lower surface of the mounting strap 21 adjacent the central slot 22. As shown in Fig. 1, one of the stops 33 engages the strap at 34 when the switch is in the on-circuit position.

As shown in Fig. 3, the sloping walls of the insert 11 which form the stops 33 also engage the lower ends of the walls 35 of the molded insulating member 10 and form means for transmitting tangential forces between the insert and the insulating member. With this construction it is possible to make the lug 17 shorter than would be required if it were relied upon to transmit all the tangential force between the molded member and the insert. With the short lug 17 the sub-recess 16 in the molded member 10 is correspondingly shallow and the molding operation consequently less difficult.

The manufacture of the switch handle described above is very simple and not accompanied by the difficulties encountered in making a handle with a molded-in-insert. After the insulating member 10 has been molded from suitable insulating material and the metallic insert 11 stamped from suitable sheet metal, it is only necessary to press the insert into the recesses formed in the insulating member. As previously pointed out the barbs slope toward the outer end of the insulating member so that the force required to press in the insert is not excessive. At the same time, any force tending to remove the insert bodily from the molded body serves to increase the biting engagement between the barbs 13 and the end walls of the recess 14.

In use, tangential forces of considerable magnitude must be transmitted between the insulating member 10 and the insert 11. These forces which are tangential with respect to the pivotal mounting of the lever are due in part to the engagement of stops 33 of the insert with the mounting strap and in part to the operating force applied to the handle portion of the insulating member. If these forces are transmitted by the barbed edges of the insert, the resulting tendency of the insert to rotate relative to the insulating member forces the barbs deeper into one end wall of the recess 14 and lifts them slightly from the opposite end wall. Repetition of this action in opposite directions soon loosens the barbs and chews away the walls of the insulating member to such an extent that the toggle lever is rendered useless.

In accordance with the present invention tangential forces are transmitted between the insulating member 10 and the insert 11 by the edges of the lug 17 which tightly engage the walls of the sub-recess 16; these edges being straight have no tendency to chew away the insulating member under the action of the tangential forces. On the other side of the barbed portion of the insert the sloping edges 33, which engage a correspondingly sloping surface of the end walls 35 of the molded member 10, also serve to transmit tangential forces between the insulating member and the insert. In other words, one portion of

the insert is provided with barbed edges for transmitting longitudinal forces and other portions located on opposite sides of the barbed portion are relied upon to transmit tangential forces. This construction renders it possible to manufacture a rugged switch-operating lever employing a premolded handle of insulating material and a pressed-in insert. The difficulties encountered with the molded-in insert are obviated and a durable product of low cost is provided.

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

1. An operating lever comprising in combination, a preformed member of insulating material having an integral handle portion and a flat metallic insert therefor, said lever being adapted for mounting for pivotal movement about an axis substantially perpendicular to the plane of said insert, said member having a main recess opening at the end opposite said handle portion and a sub-recess of reduced size opening on the floor of said main recess, said metallic insert having a body portion with barbs extending from the opposite edges thereof, said body portion being positioned in said main recess with said barbs in biting engagement with the end walls of said main recess to secure said insert in said member and a lug projecting from an end of said body portion and engaging the walls of said sub-recess to transmit tangential forces between said member and said insert.

2. An operating lever comprising a preformed member of insulating material and a flat metallic insert therefor, said lever being adapted for mounting for pivotal movement about an axis substantially perpendicular to the plane of said insert, said member having a main recess formed therein opening at one end of said member and a sub-recess of reduced size opening on the floor of said main recess, the opposite end walls of said main recess having grooves formed therein, said metallic insert having a body portion with spaced parallel edges, barbs extending from said edges, said body portion being positioned in said recess with said edges positioned in said grooves, said barbs having biting engagement with the bottom walls of said grooves to anchor said insert in said member and a lug projecting from an end of said body portion and engaging the walls of said sub-recess to transmit tangential forces between said member and said insert.

3. An operating lever comprising a preformed member of insulating material having a recess extending inwardly from one end thereof and a flat metallic insert having one portion with straight parallel edges and another portion with barbs extending from the edges thereof, said insert being pressed into the recessed end of said insulating member with said barbs in biting engagement with the walls of a part of said recess to anchor said insert in said member and with said straight parallel edges in tight engagement with the walls of another part of said recess, said lever being adapted for mounting for pivotal movement about an axis substantially perpendicular to the plane of said insert whereby said straight parallel edges transmit tangential forces between said member and said insert and prevent relative rotation therebetween.

4. An operating lever comprising a preformed member of insulating material having a recess extending inwardly from one end thereof and a flat metallic insert having a body portion with straight parallel edges provided with barbs and other portions having edges without barbs lo-

5 cated on opposite sides of said body portion, said insert being pressed into the recessed end of said insulating member with said barbs in biting engagement with the walls of said recess to anchor said insert in said preformed member and with the edges of said other parts in tight engagement with said preformed member, said lever

being adapted for mounting for pivotal movement about an axis substantially perpendicular to the plane of said insert whereby the edges of said other portions are effective to transmit tangential forces between said member and said insert 5 and prevent relative rotation therebetween.

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