This invention relates to electric switches, and has particular reference to certain improvements especially adapted for, but not restricted to, incorporation in snap switches of the surface type having a cover of molded insulating material.

A switch of the general type in which the present improvements are particularly adapted for embodiment, either wholly or in part, is inclusive of a base, a switch frame mounted thereon, a yoke rockably mounted in said frame and carrying resilient contact arms for cooperation with complementary terminal contact members mounted on the base, a handle operatively connected with said yoke for rocking same, and a removable cap for enclosing the switch mechanism.

One of the objects of the present invention is to provide a flexible cap or cover adapted by distortion to be engaged with and disengaged from holding means on the base. This feature eliminates the necessity of providing special yielding retaining elements for the cap and permits the cap retaining means to be formed as protuberances integral with the switch frame. It also enables a saving of material in the formation of caps molded from dielectric material and, due to the elimination of the spring retaining elements, provides for more rapid and economical manufacture and assembly than has heretofore been possible.

The present improvements also contemplate mounting of the resilient contact arms at opposite sides of the yoke and mounting the yoke for shifting movement in the switch frame, so that each contact arm reacts from its complementary terminal contact to assist in producing and maintaining a firm contact of the other arm with its complementary terminal contact. This assures good contact between the contact elements of the switch following long usage. It moreover enables satisfactory contact to be effected without the necessity of forming either the movable or the fixed contact elements with double blades to receive therebetween the blade of the other contact element.

An additional purpose of the present invention is to enable a saving in the amount of metal in the terminal contacts by reinforcing them with backings constituted by integral base formations, thus to permit said contacts to be formed of relatively thin metal.

A further purpose is to provide a handle insert which may be economically stamped from sheet material to provide trunnions for rockably mounting same in the switch frame and to provide stop formations for cooperation with complementary stop formations on the frame to limit rocking movement of the insert.

In general, it is the purpose of the invention to provide a switch of the type mentioned which is cheap and easy to produce, durable and entirely reliable in operation.

With the foregoing and other purposes in view, the invention consists in the novel features of construction, combination and arrangement of parts as will be hereinafter more fully described, illustrated in the accompanying drawings and defined in the appended claims.

In the drawings, wherein like characters of reference denote corresponding parts in the different views:

Fig. 1 is a central longitudinal section through a snap switch of the surface type having the present improvements embodied therein.

Fig. 2 is a longitudinal sectional view at right angles to Fig. 1.

Fig. 3 is an elevation looking at the inner face of the cap.

Fig. 4 is an end elevation of the switch with the cap removed.

Fig. 5 is a perspective view of the rockable yoke which carries the resilient contact arms.

Fig. 6 is a perspective view of the handle insert.

Fig. 7 is a side elevation of the switch frame.

Fig. 8 is a bottom plan view of the switch frame; and

Fig. 9 is a section on the line A—A of Fig. 4.

While some or all of the present improvements are capable of embodiment in switches other than of the snap, surface type, it is in such switches that said improvements are
particularly adapted for beneficial incorporation, and for this reason a conventional form of snap, surface switch has been chosen for purposes of illustrating said improvements. This switch includes, in accordance with general practice, a base A, a switch frame B, a yoke C, a handle inclusive of a handle insert D, and a cap E.

The base A, which may be formed from any suitable material, such as porcelain, into any suitable or desired shape, consists in the present instance of a circularly shaped body having its outer face centrally recessed, as at 10, to accommodate the switch mechanism, and provided at opposite sides of said recess with ducts 11 through which conductors are adapted to be passed for attachment to a pair of terminal contact members 12, 12 secured to said base.

The switch frame B, which is constructed to be stamped from sheet metal and bent into final form, consists essentially of a pair of spaced side members 13, 13 joined together by bridge pieces 14 into which screws 15, let into recesses in the base A, are adapted for threaded engagement to secure said frame rigidly to said base with the side members 13 spanning the recess 10 in the base as shown. Aligned trunnion receiving holes 16 are formed in the side members 13, 13 and directly inwardly of said openings one or both of said side members is or are provided with spaced stop formations or abutments 17. In addition yoke trunnion seats 18 are formed in said side members, and one or both of the side members is or are provided at opposite ends thereof with cap retaining shoulders or protuberances 19.

The yoke C also is constructed to be stamped from sheet metal and consists generally of a U-shaped body inclusive of a pair of spaced side arms 20, 20 connected together at their inner ends by a cross member 21. On this cross member is formed an outwardly directed lug 22, while extending inwardly from each arm 20, near the outer end thereof is a trunnion 23. The other edge of each arm 20, near its outer end, is provided with an integral rivet extension 24, and secured against the outer edge of each of said arms 20, through the instrumentality of said rivet extensions, is a resilient inwardly extending contact arm 25, said contact arms diverging in the direction of their free inner ends relatively to one another and at their free or inner ends being provided with lateral inwardly directed guide lips 26.

The stamped metal handle insert D consists of a body portion 27 of substantially H shape having an apertured spring attaching ear 28 formed at its inner edge and provided at its outer edge, with a tongue 29 to be embedded in molded dielectric material 30 to form the handle proper of the switch. This insert is formed into substantially H shape by recessing the ends of the body portion as at 31, the result being that the insert is provided at its ends with aligned trunnions 32 and aligned stop formations 33.

In the assembly of the parts described, the trunnions 23 of the yoke C are engaged in the seats 18 of the frame B, the trunnion 32 of the handle insert are engaged in the holes 16 of the frame B, and a coil spring 34 is engaged at its inner end over the lug 22 and at its outer end is connected with the ear 28. By this arrangement the yoke, handle and spring constitute collectively a toggle mechanism in which the spring 34, energized by rocking movement of the handle, serves to flip the yoke C quickly from one to the other of its two positions determined by engagement of the arms 20 thereof with stops 35 formed on the side members of the frame B, the stop lugs 33 of the handle insert D cooperating at the same time with the stop formations 17 of the frame B to limit movement of the handle under the influence of the spring 34.

When the yoke C is rocked in one direction the contact arms 25 carried thereby make contact with the terminal contact members 12 and when said yoke is rocked in the opposite direction, contact between the arms 25 and the members 12 is, of course, broken. The trunnions 23 are of such length, and the difference in width between the sides of the frame B and the arms 20, 20 of the yoke C is such that said yoke is capable of movement in directions at right angles to its plane of rocking movement, that is, said yoke is shiftable in the direction of its axis of rotation. Moreover, the terminal contact members 12, 12 which are disposed abreast one another and are spaced to have their inner or adjacent faces engaged by the resilient contact arms 25, 25. Consequently, when the yoke is rocked to produce contact between the arms 25, 25 and the terminal contacts 12, 12, each arm 25 reacts from its related or complementary terminal contact 12 to tend to shift the yoke laterally, thus to assist in producing and maintaining firm engagement of the other contact arm 25 with its related or complementary terminal contact.

By reference particularly to Fig. 2 of the drawings it will be observed that the terminal contacts 12, 12 are reinforced by integral base formations 36, which engage their outer faces. By reason of this construction the said terminal contacts may be formed relatively thin with a consequent saving in material, since any outward pressure of the resilient arms 25 against said terminal contacts will be resisted by engagement of said contacts with reinforcing formations 36. The terminal contact members 12 are, for economical manufacturing reasons, formed of substantially L shape, one leg of each contact being adapted to be secured by a screw or other
suitable form of fastener to the base, and the other leg, with which a related arm 25 is adapted for engagement, therefore extending perpendicularly to the base. Under such conditions the provision of the reinforcements 36 is important and of material benefit.

The cap E which is adapted to be engaged against the outer face of the base A in enclosing relation to the frame B and the switch mechanism carried thereby, is provided on its side wall with inwardly directed protuberances 37 for cooperation with the protuberances 19 of the switch frame B. Said cap, instead of being of stiff or rigid formation as has been the prior practice, preferably is molded from dielectric material so as to be capable of sufficient flexure to enable its distortion under pressure sufficiently to allow the protuberances 37 to pass over the protuberances 19. By this arrangement said cap may be formed relatively thin with a saving of material and the provision of any special retaining means therefor on the base is eliminated, a considerable saving in manufacturing costs resulting from the easy operation of forming the retaining protuberances 19 on the switch frame. When the cap is distorted by being pressed over the protuberances 19 its inherent tendency to return to normal condition results in the protuberances 37 engaging behind the protuberances 19 and locking the cap in the general assembly.

With reference to the handle insert D it will be noted that the tongue 29 is inclusive of a projection 38 extending perpendicularly from each flat face thereof adapted to be molded into the handle 30 to reinforce the insert D, increase the strength of the union between said insert and said handle and overcome any possibility of the insert breaking away from the handle. In the present instance a hole is formed through the tongue 29 and the projections 38 are formed by a pin engaged through said hole and thereafter crimped or pressed in any suitable manner to lock same to the tongue, crimping of said pin preferably being effected by a tool or die which will result in corrugations being formed along the pin to assure rigid connection of the pin with the material of the handle 30 in which it is embedded. Obviously, however, the projections 38 may be formed by tongues struck out from the tongue 29 or in any other suitable manner.

Without further description it is thought that the features and advantages of the invention will be readily apparent to those skilled in the art, and it will of course be understood that changes in the form, proportion and minor details of construction may be resorted to, without departing from the spirit of the invention and scope of the appended claims.

I claim:

1. An electric switch comprising in combination with a switch base, a switch carrying frame mounted on the base, and a cover made of molded resilient insulating material provided with interior locking elements adapted to be sprung into interlocking engagement with said switch carrying frame.

2. An electric switch comprising in combination with a switch base, fixed locking elements on the base and a cover made of molded resilient insulating material provided with interior molded locking elements adapted to be sprung into interlocking engagement with said elements on the base.

3. An electric switch comprising in combination a switch base, fixed locking elements on the base and a cover made of molded resilient insulating material having a slot in its top wall for the switch handle and formed with an imperforate flange having upon its inner side locking elements adapted to be sprung into interlocking engagement with said elements on the switch base.

4. An electric switch comprising in combination, a switch base, a switch mechanism having an operating handle and including a frame mounted on the base, and a cover for the switch mechanism provided with an opening for receiving said handle and also having interior shoulders, and said cover being made of resilient insulating material whereby said shoulders may engage behind a rigid portion of said switch frame.

5. An electric switch comprising in combination, a switch base, rigid cap anchoring means on the base, a switch mechanism having an operating handle, and a cover made of resilient insulating material for said switch mechanism, said cover having an opening in the top wall thereof for receiving said handle, and inwardly directed shoulders formed on the inside of the cover and adapted to engage with said rigid cap anchoring means on the base.

6. An electric switch comprising in combination, a switch base, cap anchoring means on the base, a toggle switch mechanism mounted on the base and including an oscillating handle, and a cover made of molded resilient insulating material and having a slot in its top wall for receiving said handle, and said cover also having interior molded shoulder portions adapted to engage with said anchoring means on the base.

In testimony whereof I hereunto affix my

signature.

CARL M. PETERSEN.