March 26, 1940. P. HUTT 2,195,312

ELECTRIC SWITCH

Filed March 4, 1939

Fig. 1.

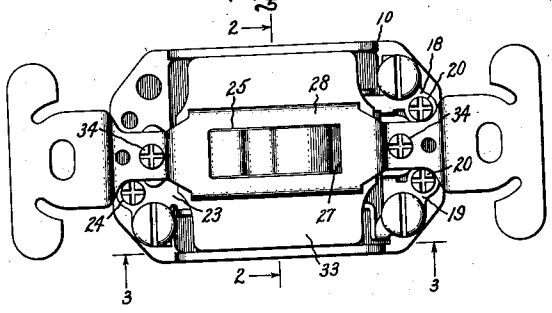


Fig. 2.

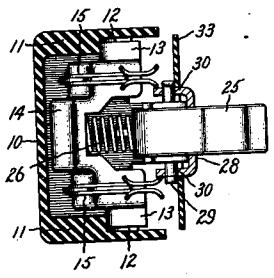


Fig. 3.

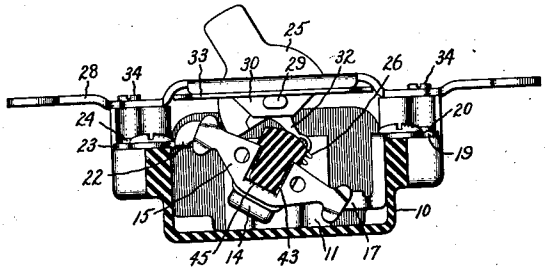


Fig. 5.

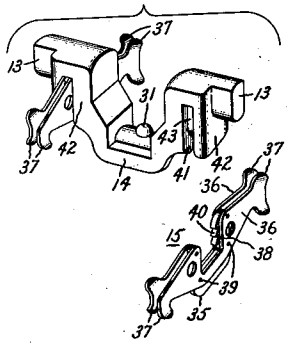


Fig. 4.

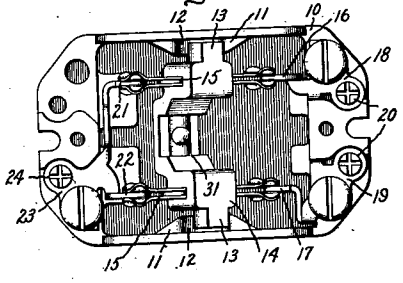
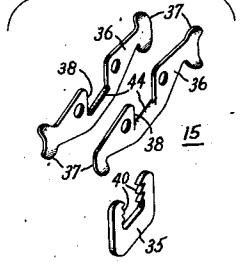


Fig. 6.



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UNITED STATES PATENT OFFICE

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ELECTRIC SWITCH

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Application March 4, 1939, Serial No. 259,831

9 Claims. (Cl. 200—67)

The present invention relates to electric switches, and more particularly to electric snap switches having a movable contact assembly adapted to oscillate from one circuit-controlling position to another.

It is an object of this invention to provide an improved movable contact assembly for a switch of this type which is durable in use and economical to manufacture.

It is another object of this invention to provide a novel contact structure which may be assembled easily on a blade carrier without additional fastening means.

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 a plan view of an electric switch embodying the present invention; Fig. 2 is a sectional view taken along the line 2—2 of Fig. 1; Fig. 3 is a sectional view taken along the lines 3—3 of Fig. 1; Fig. 4 is a view of the interior of the switch of Fig. 1 with a portion of the switch mechanism removed; Fig. 5 is an exploded view of a movable contact assembly embodying the present invention, and Fig. 6 is an exploded view of a modified form of the contact structure.

Referring to the drawing, a casing 10 of suitable insulating material, such as a molded phenolic condensation product, is recessed from one face to receive the switch mechanism. The opposite side walls of the casing are provided with thickened portions 11 in which are formed suitable slots or bearing surfaces 12. The slots are formed in alignment and are open at their upper ends to receive the laterally extending trunnions 13 of a substantially U-shaped contact carrier 14 which is adapted to oscillate with respect to the switch casing about an axis passing through the trunnions. Mounted on the carrier and extending substantially normal to its axis of oscillation are the movable contact structures designated generally by numeral 15 which are adapted to cooperate with fixed contacts secured at opposite ends of the casing to control the electric circuits through the switch. Although not limited thereto, I have illustrated my invention in connection with a three-way switch having fixed contacts 16 and 17 formed integrally with terminals 18 and 19 respectively and secured in one end of the casing by suitable screws 20. At the other end of the casing fixed contacts 21 and 22 and the terminal 23 are formed from a single stamping of conducting material and are secured to the casing by a screw 24. As illustrated in the drawing the fixed contacts 16 and 22 are positioned near the top of the casing and the contacts 17 and 21 near the bottom of the casing, so that with the contact carrier in the position shown in Figs. 3 and 4 an electric circuit is completed from terminal 19 to terminal 23 through contacts 17 and 22 and when the carrier is tilted to its other circuit-controlling position a circuit is completed from terminal 18 to terminal 23 through the contacts 16 and 21.

An operating mechanism for the movable contact assembly is provided by a toggle lever 25 and an over-center compression spring 26. The toggle lever is pivotally mounted in an opening 27 of a mounting strap 28 by a pin 29 which extends through aligned openings formed in the flanges 30 depending from the opposite edges of the mounting strap. The over-center spring is positioned at one end on the blade carrier by an integral projection 31 and is operatively connected at the other end with the inner end of a metallic insert 32 of the toggle lever 25. With this arrangement the compression spring is effective to hold the blade carrier assembled in the casing with the trunnion positioned in the slots 12. A sheet of insulating material 33 which forms a closure for the casing is held between the ends of the pin 29 and the under side of the mounting strap 28 which is secured to the top of the switch casing by suitable bolts 34. With the construction thus far described it is apparent that pivotal movement of the toggle lever 25 is effective to oscillate the contact carrier and its associated contacts from one circuit-controlling position to another with a snap action. The walls of the slots 12 extend divergently upward from a rounded bottom portion and cooperate with the straight sides of the trunnions to limit the movement of the contact carrier relative to the casing.

In accordance with the present invention a simplified movable contact assembly is provided. Referring now to Fig. 5, each of the movable contact structures 15 comprises a U-shaped gripping member 35 and a pair of contact blades 36, which are preferably of the identical construction and stamped from suitable sheet metal conducting material. Each of the blades is formed with a contact portion 37 at either end and at its central portion with a recess 38 opening on one edge of the blade. The contact blades are arranged on opposite sides of the U-shaped gripping member with the recesses 38 in alignment with the open portion of the U-shaped member and are secured thereto in any suitable manner. In the particular construction shown in Fig. 5 the blades

are spot welded to the arms of the gripping member at the four points indicated by numeral 39. The inner edges of the arms of the U-shaped gripping member 37 are substantially parallel and are provided with serrations 40 which extend slightly beyond the side walls of the recesses 38 of the contact blades. A U-shaped groove 41 is formed in each leg 42 of the contact carrier for the reception of the walls of the recessed central portion of the contact structure. The arm portions 43 of the groove are formed in alignment on the opposite faces of the carrier.

In assembling the contact structure on the carrier the open edge of the contact structure is slipped over the lower edge of the carrier with the walls of the contact structure received between the side walls of the groove 41. The contact structure is then pressed onto the carrier until the base of the U-shaped gripping member abuts the bottom of the wall of a portion of the groove 41. The serrations 40 of the gripping member bite into the bottom wall of the arm portions 43 of the groove and prevent the contact structure from sliding off the carrier during operation of the switch. The arms of the U-shaped member are resilient and aid in maintaining the frictional engagement with carrier. The side walls of the groove 41 effectively position the contact structure and prevent its lateral displacement.

In Fig. 6 a modified stationary contact structure is illustrated which is very similar to that just described. In this modification the contact blades 36 are provided with integrally formed inturned flanges 44, each of which extends from the inner face of one of the contacts an amount equal to half the thickness of the gripping member 38. As shown in Fig. 3 these flanges are arranged to engage the inner surface 45 of the base of the U-shaped gripping member so that they are clamped against the bottom surface of the groove 41. As before the serrated portions 40 of the gripping member engage the bottom walls of the aligned arms 42 of the groove 41 and prevent the contact structure from slipping from the carrier.

By utilizing a contact carrier of insulating material it is possible to mount the movable contact structure without the use of insulating washers and bushings and, in this way, the number of parts required is materially reduced. The present invention provides a very simple and inexpensive yet very effective construction for utilizing a contact carrier of insulating material in an electric snap switch.

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

1. In an electric switch, a casing, fixed contacts secured to said casing, a contact carrier of insulating material mounted for oscillating movement with respect to said casing, a movable contact structure adapted to connect certain of said fixed contacts in one position of said carrier, said contact structure having a contact portion at either end and a central portion recessed from one edge thereof, the opposite side walls of said recess being substantially parallel, said movable contact structure being positioned on said contact carrier with said side walls in frictional engagement with opposed surfaces on said carrier, and means on said insulating carrier for preventing lateral displacement of said contact structure.

2. A movable contact assembly for an electric switch comprising a contact carrier of insulating material adapted to be mounted for oscillating movement with respect to a switch casing and having aligned grooves formed in opposite faces thereof and a movable contact structure having a central portion recessed from one edge thereof, the opposite side walls of said recess being substantially parallel and provided with serrations, said movable contact structure being positioned on said contact carrier with said side walls in said grooves and with said serrations in biting engagement with the bottom walls of said grooves.

3. A movable contact assembly for an electric switch comprising a contact carrier adapted to be mounted for oscillating movement with respect to a switch casing, a movable contact structure having a central portion recessed from one edge thereof, the opposite side walls of said recess being substantially parallel and provided with serrations, said movable contact structure being positioned on said contact carrier with said serrations in biting engagement with opposed surfaces on said carrier, and means on said carrier for preventing lateral movement of said contact structure.

4. A movable contact assembly for an electric switch comprising in combination a contact carrier of insulating material and a contact structure, said contact structure comprising a U-shaped gripping member having serrations formed on the inner edge of the opposed arms thereof, a pair of contact blades having a central portion recessed from one edge, said blades being welded to the opposite faces of said U-shaped member with said recesses in alignment with the open portion of said U-shaped member, said contact structure being positioned on said carrier with the serrated edges of said U-shaped member in biting engagement with opposed surfaces on said carrier.

5. A movable contact assembly for an electric switch comprising in combination a contact carrier of insulating material and a contact structure carried thereby, said contact structure comprising a U-shaped gripping member and a contact blade recessed from one edge, said blade being secured to one face of said gripping member with said recess in alignment with the open portion of said U-shaped member, said contact structure being positioned on said carrier with the opposed arms of said U-shaped member in frictional engagement with opposed surfaces on said insulating carrier.

6. A movable contact assembly for an electric switch comprising a substantially U-shaped contact carrier having laterally extending trunnions adapted to mount said carrier for oscillating movement with respect to a switch casing and a contact structure having a central portion recessed from one edge thereof, said contact carrier having aligned grooves formed in the opposite side walls of one arm thereof, said contact structure being positioned on said arm with the opposite walls of said recess positioned in said grooves and frictionally engaging the walls thereof to hold said contact structure on said carrier.

7. A movable contact assembly for an electric switch comprising in combination, a substantially U-shaped contact carrier of insulating material having laterally extending trunnions adapted to mount said carrier for oscillating movement with respect to a switch casing and a contact structure mounted on said carrier and extending in a direction normal to the axis of oscillation of said carrier, said contact structure comprising a con-

tact blade having a contact portion at either end and a central portion recessed from one edge thereof, means secured to said blade and extending along the opposite side walls of said recess, the edges of said means adjacent said recess being provided with serrations, said contact structure being positioned on said one arm of said contact carrier with the serrated edges of said means in biting engagement with opposed surfaces on one arm of said U-shaped carrier.

8. A movable contact assembly for an electric switch comprising in combination, a substantially U-shaped contact carrier of insulating material having laterally extending trunnions adapted to mount said carrier for oscillating movement with respect to a switch casing and a contact structure mounted on said carrier and extending in a direction normal to the axis of oscillation of said carrier, said contact structure comprising a U-shaped gripping member having serrations formed on the inner edge of the opposed arms thereof, a pair of contact blades having a contact portion at either end and a central portion recessed from one edge thereof, said blades being secured to said U-shaped gripping member with said recesses in alignment with the open portion of said U-shaped gripping member, said U-shaped contact carrier having aligned grooves on opposite faces of one arm thereof, said contact structure being positioned on said arm with the serrated edges of said U-shaped gripping member in biting engagement with the bottom walls of said grooves.

9. A movable contact assembly for an electric switch comprising in combination a blade carrier of insulating material and a contact structure, said contact structure comprising a U-shaped gripping means having the inner edge of each arm thereof provided with serrations, a pair of contact blades each recessed from one edge and having a flange portion adjacent the bottom wall of said recess extending normally to the plane of said contact blades, said blades being arranged on opposite sides of said gripping means with said flanges in engagement with the inner edge of the base of said U-shaped member, said blade carrier having a groove formed in three sides thereof, said contact structure being positioned in said groove with said flange portions clamped against the bottom wall of a portion of said groove and with said serrations in biting engagement with the bottom walls of other portions of said groove.

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