

July 30, 1940.

H. J. HAMMERLY

2,209,918

ELECTRIC SWITCH

Filed April 6, 1936

3 Sheets-Sheet 1

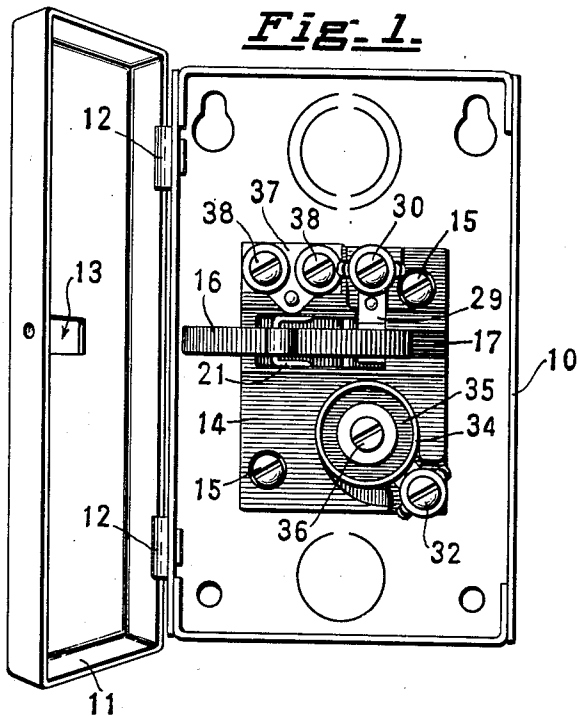


Fig. 5.



Fig. 4.

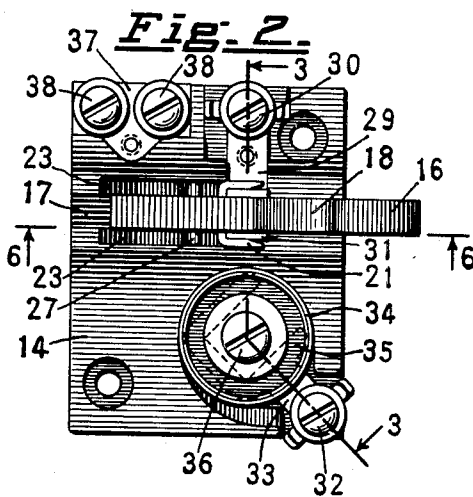
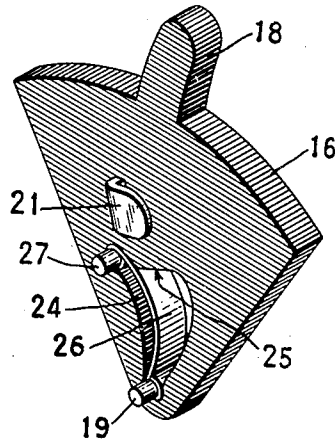
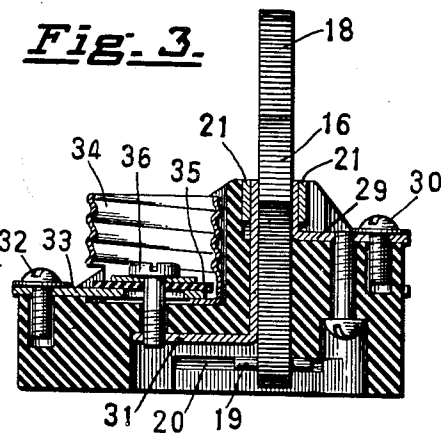


Fig. 3.



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Fig. 6.

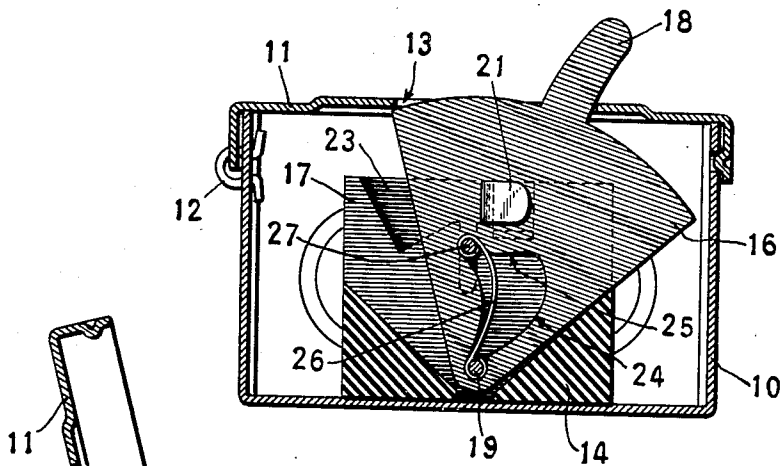
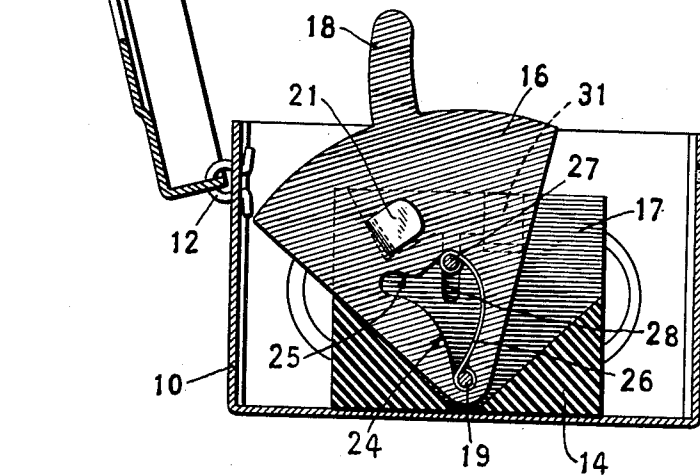


Fig. 7.



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Fig- 8.

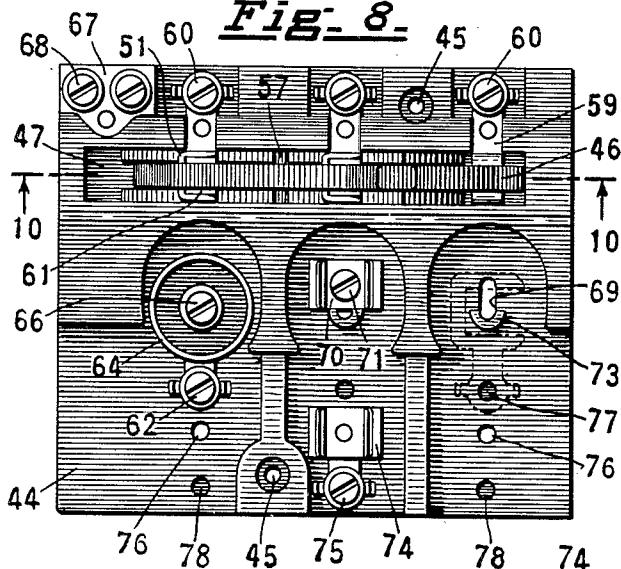


Fig. 9.

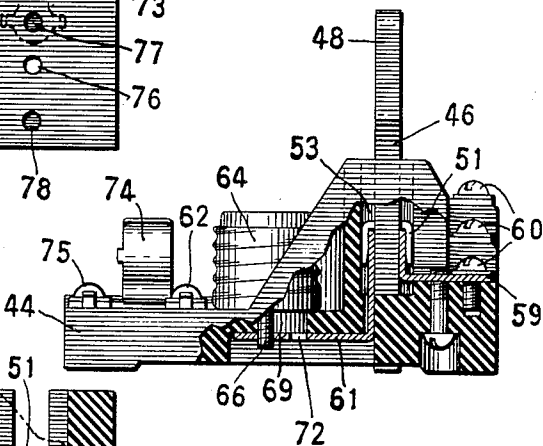


Fig. 10.

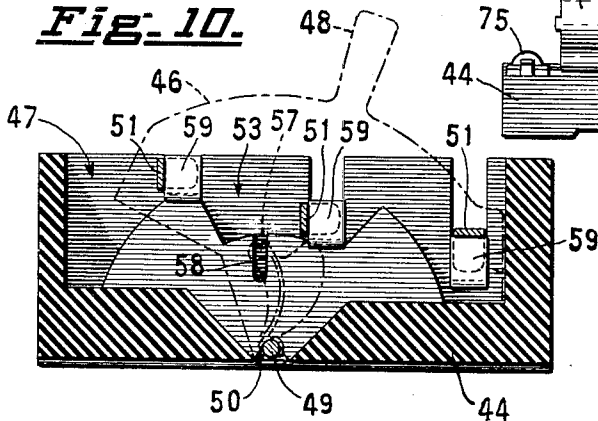
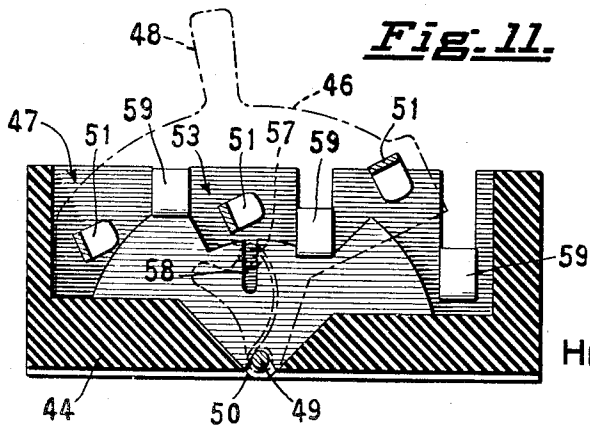


Fig. 11.



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UNITED STATES PATENT OFFICE

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ELECTRIC SWITCH

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Application April 6, 1936, Serial No. 72,941

8 Claims. (Cl. 200—154)

My invention relates to electrical switches. More particularly my invention relates to a snap action switch, preferably combined with a fuse.

One object of my invention is to construct a compact and simple switch with novel contact elements.

Another object is to increase the safety factor in switches of the fused type.

Still another object is to provide an enclosed fused switch of improved design.

These effects are accomplished by building the switch and fuse elements in a single block of insulation and by providing a combined switch contact carrier and arc breaking barrier which is housed almost entirely within the insulation block. The movable switch element and the snap action mechanism are carried by the moving carrier in compact fashion, being located within the carrier whenever possible.

Other objects and advantages will be apparent from the following description taken in connection with the accompanying drawings which show two forms of my invention.

Fig. 1 is a face view of an opened switch box showing one form of my invention with the switch in open position.

Fig. 2 is a similar view on a larger scale showing the switch alone in closed position.

Fig. 3 is a vertical section of the switch substantially on line 3—3 of Fig. 2.

Fig. 4 is a perspective view of the movable parts of the switch.

Fig. 5 is a perspective of the movable switch contact piece.

Fig. 6 is a vertical section of the switch and box on line 6—6 of Fig. 2, showing the switch in closed position and the cover of the box closed.

Fig. 7 is a view similar to Fig. 6 showing the switch open and the cover of the box swung back.

Fig. 8 is a plan view of a modification of my invention, the switch being closed.

Fig. 9 is a side elevation of the modified form, parts being shown in section.

Fig. 10 is a vertical section on the line 10—10 of Fig. 8 showing the switch closed.

Fig. 11 is a view similar to Fig. 10 showing the switch open.

My switch is preferably mounted in a box or receptacle 10 provided with a cover 11 which is hinged as at 12 to the box. In the cover is provided a slot 13 for manipulation of the switch handle when the cover of the box is closed.

The switch mechanism proper is mounted entirely upon an insulating base block 14 which is held in the box by means of suitable screws 15.

The movable parts of the switch are carried by a fan shaped movable switch piece 16, preferably made of a sheet of insulating material. This movable piece also acts as an arc breaker. The element 16 is pivotally mounted in a recess 17 in the block 14 and is provided with a handle 18 for moving the switch piece about the pivot pin 19. This pivot pin is mounted in a groove 20 in the back face of the block.

The movable contact in the switch consists of the single switch blade 21. In manufacture this blade is passed through a slot in the piece 16 before being bent, and after being placed in position the ends of the blade are bent to form the U-shape illustrated in Fig. 5. This secures the blade loosely in place and positions the ends of the same so that they will embrace the proper stationary parts.

This switch blade is preferably beveled on its inner faces as illustrated at 22. This bevel insures proper positioning of the blade with respect to the stationary parts of the switch. A groove 23 in the base block guides the switch blade 21 in its arcuate movement and centers the legs of the contact on the carrier 16.

In order to obtain a snap action of the switch blade the insulating switch piece 16 is provided with a recess or cut-out 24, one side of which is cam shaped as at 25. Within this cut-out is mounted a leaf spring member 26 which has its ends secured to the pivot pin 19 and a sliding pin 27. This pin 27 is mounted to slide in the vertical slot or groove 28 of the insulating base block. With the above structure, assuming the parts to be in the position of Fig. 6, the switch is in the "on" position. When the handle 18 is moved to the left, the switch piece 16 also moves to the left, carrying with it the switch blade 21. As this movement is accomplished, the upper end of the spring 26 and the sliding pin 27 are held from transverse movement by the slot 28. Movement of the switch piece causes the pin and upper spring end to ride on the cam surface 25 and slide downwardly in the groove or slot 28. When the sliding pin and spring have passed the peak of the cam surface, the spring will force itself into the other side of the cam surface, thus throwing the switch piece into the position shown in Fig. 7. Reverse movement of the parts will obviously produce a snap action to close the switch.

The power line contact piece is represented as number 29 in the drawings. This L-shaped piece is suitably secured to the insulating base and extends adjacent to the movable switch piece

and inside of one end of the switch blade 21 (see Fig. 3). Connection to the electrical line is made by means of the binding screw 30 or other suitable means.

5 The circuit contact piece 31 may also be of L-shape and extends closely adjacent the opposite side of the insulating movable switch piece and inside of the other end of the movable switch blade 21.

10 Connection to the circuit from this contact piece 31 is made through the medium of the binding screw 32 which has electrical connection with the forked conducting piece 33. This forked piece is seated in the base of a conventional screw threaded fuse socket such as 34, which socket is adapted to contain an ordinary plug fuse (not shown).

In the bottom of the fuse socket is placed an insulating piece 35 upon which is mounted the central screw 36. This screw 36, besides holding the fuse socket to the insulation block and providing the bottom contact for the fuse socket, also connects this side of the fuse socket to the circuit contact piece 31. When a fuse is inserted in place the electrical connections follow through the binding screw 32, forked piece 33, fuse socket 34, the fuse, screw 36 and contact piece 31.

The contacts 29 and 31 may be slightly resilient and spaced apart at their ends a distance slightly greater than the inside dimension of the U-shaped blade 21. The beveled faces 22 will then function to draw the vertical ends of contacts 29 and 31 toward each other when the switch is thrown on, and a superior contact surface is made.

A terminal connecting piece 37 may be provided at another portion of the insulating block, having binding screws 38 for connection with other wires in the switch box. Suitable knock-outs may be provided in the bottom and sides of the switch box for introduction of the proper wires or conduits.

In operation, assuming that the proper wires are attached to binding screws 30 and 32, and the switch is closed as shown in Figs. 2, 3 and 6, the electric current will pass through the following parts: binding screw 30, contact piece 29, switch blade 21, contact piece 31, screw 36, plug fuse (not shown), fuse socket 34, forked piece 33 and binding screw 32.

The upper edge of the fan shaped piece 16 substantially closes the slot 13 in the cover of the box when the switch is in either the "on" or "off" position.

55 When the switch is moved to "off" position the switch blade moves away from the stationary contact pieces and the fan shaped area of the piece 16 acts as a barrier between the stationary contact pieces and not only tends to break possible arcs from these pieces but also prevents their contact. While the arc is being broken, it is drawn out between the insulating surfaces of the groove 17 and the carrier 16.

The movable switch piece or bridging member 21 being loosely mounted in a slot in the insulating rocker or pivoted switch member 16 is free to adjust itself or float in the groove or recess 17 in the base in a direction transversely of the path of movement of the insulating rocker member so that it is free to properly align itself with the resilient tips of the stationary contact 29 and 31, respectively, when engaged therewith.

In Figs. 8 through 11 I have shown a triple pole switch arrangement embodying my invention. In these figures 44 is the insulating base block

having holes 45 for mounting the switch on a suitable support. The carrier 46 is mounted within the recess 47 and is movable by the handle 48 about the pivot pin 49. This pin is mounted in a recess or groove 50 in the back of the block.

The three switch blades 51 are similar to the blade 21 shown in Figs. 1 through 7 and are manufactured and mounted in a similar fashion. Guiding grooves 53 position these blades 51 properly at all times.

In Figs. 10 and 11 the outline of carrier 46 is shown in dot-dash lines, together with the outline of the cutout, cam face and leaf spring similar to cutout 24, cam face 25 and spring 26 of the single pole form. The sliding pin 57 (like the pin 27) rides in a groove 58 to produce the proper snap action.

The stationary contacts and connections of this three pole switch are similar to those of the other form shown. Contacts 59 are of L-shape, provided with binding screws 60 and suitably held in place on the base block. Contacts 61, on the other side of the switch, are connected to binding screws 62 through fuse sockets 64 with central screws 66. A terminal plate 67 with binding screws 68 may be provided for a neutral line.

In Figs. 8 and 9 is illustrated a fuse mounting structure that may be used with other forms of switch. The base block 47 is provided with a slot 69 through which a connecting screw may be engaged with the contact piece 61. In the case of the screw plug fuse socket above described, the central screw 66 of socket 64 will threadedly engage a hole in contact 61.

If it is desired to use a cartridge fuse instead of a plug fuse, the screw 66 is removed and the plug socket is substituted by a cartridge fuse clip 70 which is held in place by a screw 71 which extends through slot 69 and threadedly engages a hole 72 in contact 61. A shoulder 73 on the base properly aligns the fuse clip 70.

The other clip 74 for the cartridge fuse (not shown) is provided with a binding screw 75 and is held to the block by a screw passing through a hole 76 in the block. In the face of the block suitable recesses 77 are provided for the ends of binding screws 62 when plug fuses are used; recesses 78, for the ends of screws 75 when cartridge fuses are used.

It will thus be seen that the type of fuse used may be easily varied with but little trouble.

By the above structures I have provided an extremely simple and rugged type of switch. The same has a small number of moving and stationary parts. The mounting of the switch blades through the movable switch piece prevents the important parts of the switch from coming apart accidentally and at the same time provides an efficient action. Because of the simplicity of the structure the switch is economical to manufacture and presents a minimum of maintenance costs.

The mounting of the snap action spring in the recess of the switch carrying piece conserves space and keeps these parts insulated against accidental contact with the live switch parts.

The embracing of the stationary contacts by the arms of the movable switch blade positively insures correct contact of the parts.

Although I have shown a single and a triple pole switch arrangement, it is obvious that other numbers of switch contacts and cooperating members could be mounted in the manner shown without departing from the spirit of the invention.

I claim:

1. In an electrical switch, a base, a switch carrier of insulating material movably mounted on said base, a substantially U-shaped switch piece loosely mounted in the carrier, the bight of the U passing through said carrier and the side arms of the switch piece overlying the opposite sides of the carrier, stationary contact pieces supported by said base adjacent to and on opposite sides of said carrier, said stationary contacts adapted to be engaged by the side arms of said switch piece when said carrier is moved to one position, said carrier insulating said contacts from each other when moved to another position, and spring means for moving said switch and carrier relative to said base.

2. In an electrical switch, a base, a plate-like switch carrier of insulating material movably mounted on said base, a U-shaped switch piece passing through said carrier and having arms exposed on the opposite sides of said carrier, stationary contact pieces supported by said base adjacent to and on opposite sides of said carrier, said stationary contacts adapted to be engaged by said switch piece when said carrier is moved to one position, said carrier insulating said contacts from each other when moved to another position, means for moving said switch piece and carrier relative to said base, said carrier plate having a recess therein with a cam surface, and resilient means within said recess, one end of said resilient means bearing against and riding on said cam surface to produce a snap movement of said carrier when said carrier is moved in either direction.

3. In an electrical switch, a base, a switch carrier of insulating material of plate-like form movably mounted on said base, said plate having a recess therein with a cam surface, resilient means entirely within said recess, one end of said means bearing against and riding on said cam surface to produce a snap movement of said carrier, a switch piece mounted on said carrier, and a stationary contact piece supported by said base adjacent to said carrier in the path of movement of said switch piece.

4. In an electrical switch, an insulating base having a groove therein, a switch carrier of insulating material of plate-like form movably mounted in said groove, said plate having a recess therein with a cam surface, resilient means mounted entirely within said recess, one end of said means bearing against and riding on said cam surface to produce a snap movement of said carrier, a switch piece mounted on said carrier within the confines of the groove in the base, and stationary contact pieces supported by said base adjacent to and on opposite sides of said carrier in the path of movement of said switch piece.

5. In an electrical switch, a base, a switch carrier of insulating material of plate-like form pivotally mounted in said base, means for causing pivotal movement of said carrier in said base, said plate having a recess therein with a cam surface having a peaked portion, a spring entirely within said recess, one end of said means bearing against and riding on said cam surface, the other end of said means being located at the carrier pivot, said spring and cam producing a snap action of said carrier when the same is moved, a switch piece mounted on said carrier, and a stationary contact piece supported by said base adjacent to said carrier in the path of movement of said switch piece.

6. In an electrical switch, a base, a switch carrier of insulating material of plate-like form movably mounted on said base, said plate having a recess therein with a cam surface, resilient means entirely within said recess, one end of said means bearing against and riding on said cam surface to produce a snap movement of said carrier, a plurality of spaced switch pieces mounted on said carrier, and pairs of stationary contact pieces supported by said base adjacent to said carrier in the path of movement of said switch pieces.

7. In an electric switch an insulating base having a groove, a stationary contact located at each side of said groove with at least a portion of the contact spaced apart from the adjacent wall, an insulating carrier mounted to move back and forth in said groove between said contacts, a U-shaped switch contact loosely carried by said carrier, the central part of the U-shaped switch contact extending loosely through the carrier and the side arms or tips of the U-shaped switch contact being guided by adjacent walls of the groove in the base and spaced apart from the side walls of the carrier sufficiently to permit the tips to embrace the outer surfaces of the stationary contacts when the carrier is moved to the closed circuit position.

8. In an electric switch an insulating base having a groove, a stationary contact secured to the base on each side of said groove, an insulating rocker pivoted at the bottom of the groove and having a finger piece extending from the front of the groove and having a portion guided in said groove and holding said contacts spaced apart from each other, a U-shaped movable switch contact member loosely carried by said rocker and having a contact tip on each side thereof, said tips being guided in the outer part of said groove and adapted to embrace the outer faces of said stationary contacts in the closed circuit position, the walls of the slot limiting the sidewise movement of the movable switch contact.

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