

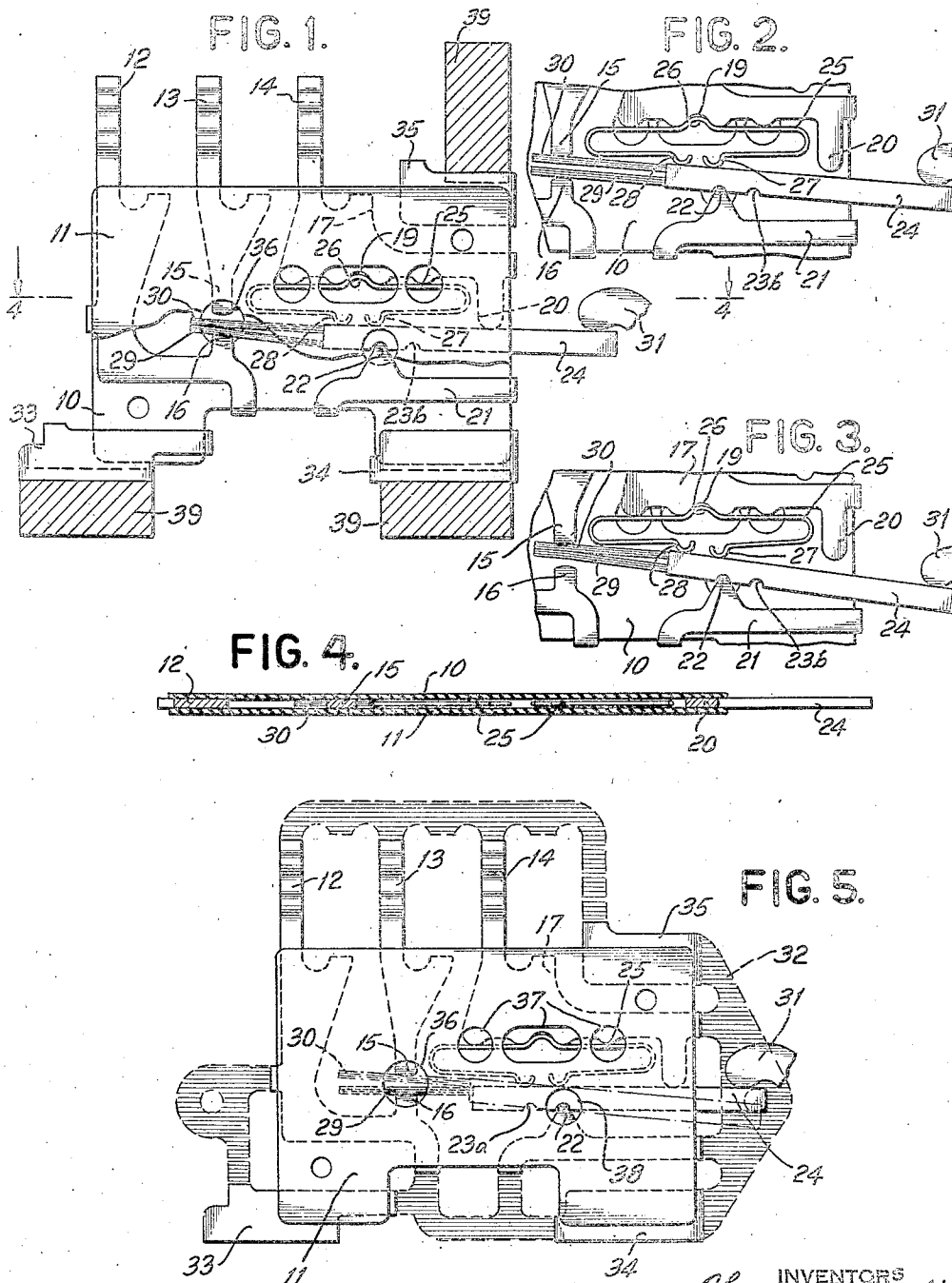
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ELECTRICAL SWITCH

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ELECTRICAL SWITCH

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This invention relates to improvements in electrical switches for making and breaking circuits.

The principal object of the invention is to devise a switch distinguished by its simplicity of construction, compactness in arrangement, and efficiency in operation.

There are occasional requirements for electrical switches of different types, such as "make-before-break," "single pole," "single throw," etc., which are so reduced in thickness or width that a gang of such switches may be assembled in a narrow space. For example, some electrical machines may require ten to fifteen of such independent switch units, more or less, depending upon the requirement, to be located in a space not wider than an inch. The present construction is devised as a solution to such requirement but many of the features of the present invention are applicable to other forms of switches without regard to limiting dimensions.

It is, therefore, a main object of the invention to devise a construction of a switch unit which in respect to its thickness fills the above requirements and which is rugged in construction and efficient in its contact making function.

Another object of the invention is to devise a switch consisting of assembly side plates between which are mounted the coplanar contact making parts of the switch, operable by an externally operated switch lever.

Another object of the invention is to devise an improved method of assembling the parts of the switch and their juncture to said assembly plate without the use of a multiplicity of rivets, pins, etc., which would necessitate great deal more time in assembly.

Another feature of the invention is to devise an improved method of constructing a switch comprising the provision of an assembly switch plate carrying the previously assembled parts, joining said switch plate to the side assembly plates by the use of an adhesive or the like with the application of pressure, and then cutting off certain unused external portions of the switch plate, allowing certain parts of the switch to remain in fixed position and in the desired relationship.

Other objects of the invention will be pointed out in the following description and claims and illustrated in the accompanying drawing, which disclose, by way of example, the principle of the invention and the best mode, which has been contemplated, of applying that principle.

In the drawing:

Fig. 1 is a fragmentary view in side elevation of the improved make-before-break switch.

Fig. 2 is a detail view showing the contact relationship when the switch lever is partially operated.

Fig. 3 is a detail view showing the contact relationship when the switch is fully operated.

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Fig. 4 is a sectional view taken in the line 4—4 of Fig. 1.

Fig. 5 is another construction of a switch of another type which, however, includes the improved features of construction.

The unitary construction of the switch is provided by assembly coordinated coplanar parts between two plates 10, 11 of any suitable insulating material having the necessary insulating characteristics. External of plates 10, 11 are contact terminals 12, 13, 14 to which are soldered or connected in any suitable manner the wires of the electrical circuit the switch is to control. Terminal 13 has an integral extension to form a contact point 15 while an integral extension of terminal 12 provides a contact point 16, both contact points being oppositely disposed with a predetermined separation between them. The terminal 14 is part of a plate 17 which has specially formed portions for certain functions. Numeral 19 designates a scalloped notch of plate 17, and 20 designates a switch lever stop portion. A plate 21 is provided with a triangular extension 22 receiving one of a pair of notches 23a, 23b of a switch lever 24, and the cooperation of a notch 23a with the triangular extension provides a fulcrum for the switch lever 24.

Numeral 25 represents a spring formed with a bowed portion 26 arranged to be seated in the scalloped notch 19. When the bowed portion 26 seats in the notch 19, a resilient portion 27 of the spring 25 exerts a downward force on the lever 24 directly over the pivotal point or fulcrum of lever 24 to maintain the cooperation of notch 23a and triangular extension 22 and electrically connect spring 25 and lever 24. Another resilient portion 28 of the spring 25 exerts a downward force to one side of the fulcrum and in the relationship shown in the drawing urges the switch lever 24 counterclockwise so that switch lever 24 abuts the stop portion 20, maintaining the parts in normal relationship.

Switch lever 24 carries contact making members 29, 30, each preferably consisting of a plurality of brush strands, the flexibility of which provides firm electrical contact with the contact points 16, 15, respectively.

In the normal position shown in Fig. 1 brush 29 is in contact with contact point 16 and stop portion 20 is so located that the force exerted by portion 28 of spring 25 has rocked the switch lever 24 to make brush 29 contact with contact point 16 and to crowd the free end of brush 30 against the free end of brush 29, the brush 30 being now out of electrical contact with the contact point 15. With such relationship of parts an electrical circuit is completed from terminal 14, plate 17, spring 25, switch lever 24, brushes 29, 30, contact point 16, to terminal 12.

A slight rocking of switch lever 24 to the posi-

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tion shown in Fig. 2 has compressed the left bowed portion of spring 25 and in such position brushes 29, 30 are capable of assuming their normal relationship wherein there is no contact between their free ends, and brush 29 is in contact with the contact point 16, but brush 30 is now in contact with the contact point 15. The circuit connection between terminals 14—12 is still maintained while the same circuit can now branch off to the terminal 13.

In Fig. 3 the switch lever 24 has been shown as rocked still further clockwise, first separating brush 29 from contact point 16 and then crowding brush 29 against brush 30, both providing firm electrical contact with contact point 15. Thus, in the position shown in Figs. 2 and 3, the circuit to terminal 13 is made before the circuit to terminal 12 is broken, hence a "make-before-break" circuit connection is made.

Switch lever 24 may now rock clockwise by the action of spring 25 and the reverse operation takes place.

Any suitable operating member may be employed to rock switch lever 24, and numeral 31 designates one which is reciprocated to provide the above described operation of the improved switch. The triangular extension 22 cooperates with the notch 23a of the switch lever 24 when a long stroke of the operating member 31 is available.

The embodiment of Fig. 5 shows the notch 23b of switch lever 24 in cooperation with the triangular extension 22 which relation is desirable when operating member 31 has a short stroke. In this embodiment switch lever 24 has but a single brush 29 to provide an equivalent of a single pole, single throw switch. The circuit wire connected to terminal 14 has a normal circuit connection to the wire connected to terminal 12, as previously described. Rocking of switch lever 24 to the dotted line position separates brush 29 from contact point 16 and then makes firm electrical contact with the contact point 15, and hence the circuit from terminal 14 is now connected to the circuit wire joined to terminal 13.

Obviously, not considering the spring 25 and switch lever 24 the switch as shown has seven coplanar parts disposed between assembly plates 10, 11 and all have a predetermined relationship. This relationship can be made by attaching all of such parts to one or both of the plates 10, 11, but numerous attaching means are required, adding to the cost of assembly, and requiring considerable time to do so.

As outlined in Fig. 5 it is preferred to have all such parts initially as integral coplanar portions of a switch plate 32 having initially the outline shown in Fig. 5. Such plate 32 can be blanked out in one operation by a punch press and assembled between insulating plates 10, 11. Suitable attaching means may be provided to attach all of the plates together but it is preferred to cement, by a suitable adhesive, such parts together, and by application of heat and pressure, provide a welding or bonding of all component parts together. After a unitary assembly is provided, the unit is placed in a punch press and the shaded portions of switch plate 32 shown in Fig. 5 are cut off. Spring 25 and switch lever 24 are then inserted therein with the desired relationship. These parts obviously will remain in their assembled position. Thus, an electrical switch having the external shape shown in Fig. 1 is pro-

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vided with all parts coplanar and in the desired relationship.

In Fig. 1 reference numerals 33, 34, 35 represent isolated portions insulated from all other pieces of the switch assembly which may slide into respective slots of guide blocks 39 to assemble a series of switch units adjacent to each other; to hold them in fixed relation with regard to the individual operating members 31, and to each other.

Both plates 10, 11 may have peep holes 36 to enable inspection of the contact making portions of the switch unit, three others 37 to inspect spring 25, and a hole 38 for inspection of the pivot. All of these enable the information desired to determine whether or not the switch unit is operating in the desired manner and its efficiency in operation.

While there have been shown and described and pointed out the fundamental novel features of the invention, it will be understood that various omissions and substitutions and changes in the form and details of the device illustrated and in its operation may be made by those skilled in the art without departing from the spirit of the invention. It is the intention, therefore, to be limited only as indicated by the scope of the following claims.

What is claimed is:

1. In an electrical switch, the combination of a pair of parallel insulating plates, a pair of oppositely disposed contact members coplanar in arrangement between said insulating plates and carried by both of said plates, a switch lever cooperating with said oppositely disposed contact members operable externally of said insulating plates and in the plane of said contact members to engage one or the other dependent upon the position of said lever, and a plate coplanar with the aforementioned parts of said switch and carried by both of said insulating plates for providing a fulcrum for said switch lever.

2. In an electrical switch, the combination of a pair of parallel insulating plates, a plurality of switch members coplanar in arrangement and carried insulated from each other by and between said insulating plates, a switch lever operable externally of said insulating plates and pivoted to cooperate with said switch members and arranged to operate in the same plane as the latter, a resilient spring between said plates and coplanar with respect to said switch lever and switch members, and further means carried by said insulating plates for mounting said spring.

3. In an electrical switch, the combination of a pair of oppositely disposed contact members, a coplanar switch lever having contact portions cooperating with said contact members, a fulcrum plate for said switch lever, a spring having a resilient portion engaging said switch lever to thrust the latter against the fulcrum portion of said fulcrum plate and having a supplemental resilient switch lever operating portion bearing on said switch lever at a point removed from the fulcrum of the latter, and a pair of insulating plates which carry in a coplanar arrangement said contact members, said spring and said fulcrum plate.

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