Feb. 23, 1960 C. A. AQUILLON 2,926,225

ELECTRIC SWITCHES

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Fig. 1.

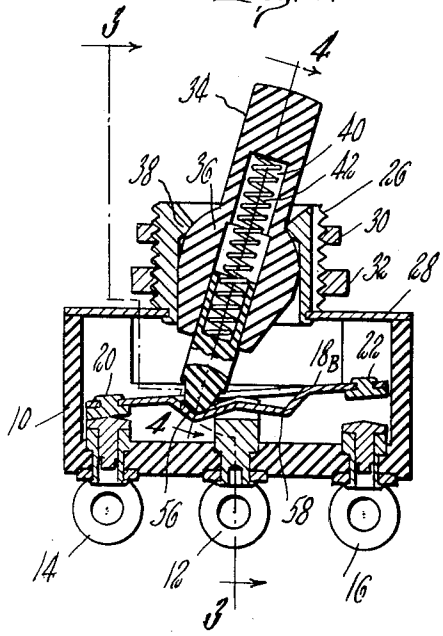
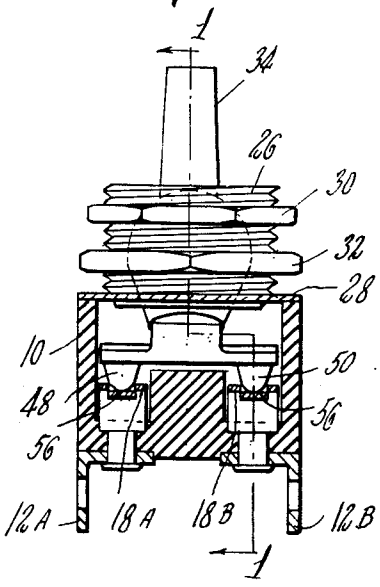


Fig. 3



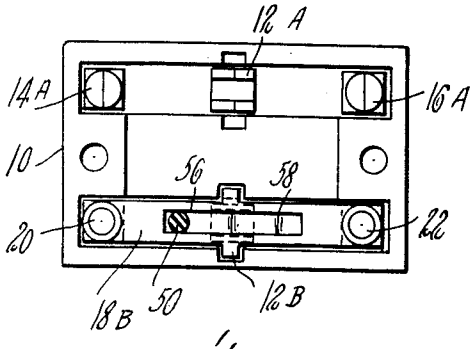


Fig. 2.

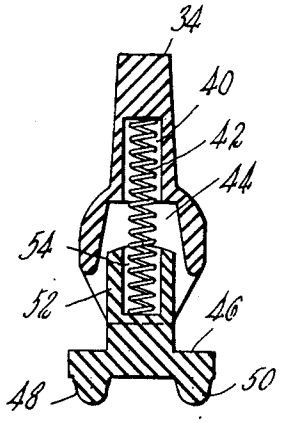


Fig. 4.

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ELECTRIC SWITCHES

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4 Claims. (Cl. 200—67)

This invention relates to electric switches. More particularly it relates to an electric switch of the double-pole type in which the circuit closing and interrupting operations are preferably accomplished by the pivotal movement of an operating lever which tilts a movable contact member.

In double-pole switches of this type in the prior art, a common defect arises from the misalignment of parts due to manufacturing inaccuracies or due to wear in operation such that one of the two circuits sought to be closed is not closed, or is incompletely closed, such that arcing occurs with resultant damage to the contacts.

This occurs because one of the two switch elements tends to bottom first, so that the other one bottoms incompletely or not at all and hence does not properly operate its associated contacts.

The problem can be solved by providing at each contact, a suitable resilient element such that each contact or its actuating means is moved independently of the switch lever in a direction to take up the inaccuracies which may exist. However, such solution is not only expensive, but also require space that may not be available in the switch structure.

Accordingly it is an object of the invention to provide an improved electric switch of the double-pole type, which is not only simple and economical to manufacture, but one which solves the problem of contact closure in a novel manner.

In the switch of the preferred embodiment a tiltable plate, on which the movable contacts are disposed, is associated with the operating lever in cooperating relationship. Interposed between the plate and the lever is a resiliently biased member which contacts the plate and has a suitable rectangular portion which is inserted into the slot in the lever. The slot is dimensioned such that the rectangular member is substantially confined in the plane in which the lever pivots, and must move with the lever, but is substantially unconfined in a plane perpendicular to the aforementioned plane. As the member is free to pivot in the latter plane, this structure permits adequate pressure to be maintained on the contact carrying plate such that the positive closing of both circuits is assured.

Other objects and advantages of this invention will become apparent as the preferred embodiment is described in connection with the accompanying drawings.

In the drawings:

Fig. 1 is an elevational section view taken longitudinally, along the lines 1—1 of Fig. 3, of a switch embodying the principles of the invention;

Fig. 2 is a top view of the switch with the cover and one of the conducting strips removed;

Fig. 3 is a sectional side view taken along the lines 3—3 of Fig. 1; and

Fig. 4 is a sectional view of the operating lever and bridging member taken along the lines 4—4 of Fig. 1.

With reference to the drawing, the preferred embodiment of the switch includes a rectangular casing 10 which is preferably molded from a suitable insulating material. Mounted in the lower portion of the casing are two sets of three contacts which are disposed substantially parallel to one another. Each set consists of three fixed elements, a common center terminal (and associated fixed contact) 12 and two terminals and contacts 14 and 16, which are disposed on either side of the center contact. For convenience, the two sets will be denominated A and B. Thus, the center terminal of the left set as shown in Fig. 2 is denominated 12A and the central terminal of the right set is denominated 12B. A pair of tiltable plates 18 support movable contacts 20 and 22 and are fulcrumed at their centers by the central contacts 12. The plates 18 are conducting material which connect the center terminals 12 to either the terminals 14 or the terminals 16 through contacts 20 or 22, depending on which way the plates 18 are tilted.

The operating lever and associated mechanism is positioned by the externally threaded mounting nipple 26 which, in turn, is supported from the cover plate 28. Nuts 30 and 32 coact with the threads of the nipple 26 to provide a mounting and securing mechanism for the switch. The operating mechanism consists of a lever 34 having an enlarged portion 36 which is received within the nipple 26 and maintained in position against its lip 38. A slot 40 is provided in the lever which is adapted to receive a spring 42. A larger slot 44 is formed in the lower end. A bridge member 46, having two projections 48 and 50 depending from it which contact the plates 18, has, in addition, a rectangular stud 52 upstanding from it. The stud 52 has a recess 54 into which the spring 42 is inserted and its cross-sectional dimension, in the direction the lever 34 is operated, is substantially equal to the width of slot 44 (as shown in Fig. 1). However, the dimension of slot 44 perpendicular to this is substantially greater than that of the stud such that the stud and bridge member 46 (being integral) are free to pivot (in the plane of Fig. 4). In the preferred embodiment, the two confining sides of the slot are parallel to one another and the other two sides are inclined at an angle to one another.

The projection 48 is adapted to coact with the two depressions 56, 58 in conductor 18A and the projection 50 is adapted to coact with corresponding depressions in conductor 18B. These depressions are positioned on either side of the center contact 12. The operating lever 34 and the bridge member, in cooperative resilient relationship when pivoted, move the projections 48 and 50 from the depression on one side of the contact members 12 to the other depression, thus tilting the plates 18 and interrupting one set of circuits while closing the other.

In such switch action it is imperative to close both contacts A and B. The manufacturing tolerances permissible in an economical switch construction as is here desired do not permit the assurance of accurate alignment of both the contacts 14 and 16 and the contacts 20, 22 mounted on the plates 18. Therefore, the contacts may not be adequately closed on either circuit A or on circuit B unless provision is made to compensate for this possible misalignment. The subject invention provides compensation by the unique configuration and coaction of the bridge member and the operating lever. As above described, the slot 44 in the actuating member 34, which receives the stud portion of the bridge member is dimensioned such that it has substantially the same dimension as the stud 52 in the plane of pivoting, while in the plane perpendicular to this, the dimensions of the slot are larger than the corresponding dimensions of the stud such that the bridge member 46 is free to

move laterally or pivot in this plane. Thus, the unique combination of operating lever and bridge member provide an automatic adjustment for certain discrepancies in switch construction which frequently occur in this type of economical switch construction. Where the circuit on either side A or side B is not adequately closed, the spring 42 acts to pivot or rock the bridge member to press the contacts together such that both circuits are properly completed. The freedom of the bridge member 46 pivot in the slot 44 permits this action and thus adequate and positive contact in both circuits is assured.

The bridge member and operating member are preferably molded from a suitable insulating material but may be constructed in other manners within the principles of the invention. It will be observed that this structure provides an improved form of a double-pole electric switch mechanism which may be manufactured economically and which is reliable in operation. Further, it will be understood, that while there has been shown and described herein a preferred embodiment, the invention is not intended to be limited thereby, or towards all details thereof, and departures may be made therefrom within the spirit and scope of the invention as set forth in the appended claims.

I claim:

1. In an electric switch including a base having a pair of laterally spaced movable contacts each cooperating with a fixed contact to close an electric circuit, actuating means for simultaneously closing said laterally spaced contacts with substantially equal contact pressure comprising a rigid bridge member extending laterally of said base and movable longitudinally thereof to engage said movable contacts to close them in one position and open said contacts in another position, and operating means for longitudinally moving said bridge member and maintaining said bridge member with its ends in engagement with said movable contacts in said one position, said operating means including a central lever mounted in said base for pivotal movement in a longitudinal plane, one end of said lever having therein a laterally extending slot for receiving therein said bridge member, a spring interposed between said bridge member and said handle, and means supporting said bridge member for tilting movement in a lateral plane whereby said bridge member freely tilts laterally to maintain its ends in equal pressure engagement with said movable contacts in said one position.

2. In a double-pole electric switch, an insulating casing having two sets of contacts therein, each set of contacts including a pair of movable contacts, a pair of fixed contacts disposed within said casing for cooperation with said movable contacts, and a central contact disposed between said fixed contacts, a current carrying fulcrum member tiltably supporting each set of movable contacts, said fulcrum member resting on said central contact, actuating means for tilting said movable contacts comprising an insulating plate slidably engaging said fulcrum member, said insulating plate fixedly carrying a stud disposed on the opposite side of said plate from said fulcrum member, a hand operable lever adapted to pivot in a predetermined plane, said lever having a slot into which said stud is adapted to enter, said slot having substantially the same cross-sectional dimension as said stud in said predetermined plane to confine said stud therein and having a substantially greater cross-sectional dimension than said stud in the plane such that said plate is permitted to tilt perpendicular to said predetermined plane, for spring means coacting with said lever and plate and urging said plate into contact with said fulcrum member for exerting substantially equal pressure on each movable contact that is closed against a fixed contact.

3. The combination as claimed in claim 2 wherein said slot has two opposed sides parallel to one another and to the other opposed sides being set at an angle such that the cross-sectional area of the slot adjacent to its open end is greater than the cross-sectional area of the slot at its closed end.

4. A double-pole electric switch comprising an insulating casing having two sets of contacts therein, each set of contacts including a movable contact and a fixed contact, actuating means for closing said sets of contacts, comprising an insulating plate engraving said movable contacts, said plate having a stud disposed on the opposite side of said plate from said movable contacts, operating means including a slot into which said stud is adapted to enter, said slot having one cross-sectional dimension substantially greater than the corresponding dimension of said stud, and spring means disposed between and coacting with said operating means and said plate, said spring means urging said plate against said movable contacts such that said plate is free to pivot and apply substantially equal pressure to both sets of contacts.

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