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ELECTRIC SWITCH

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Fig. 1.

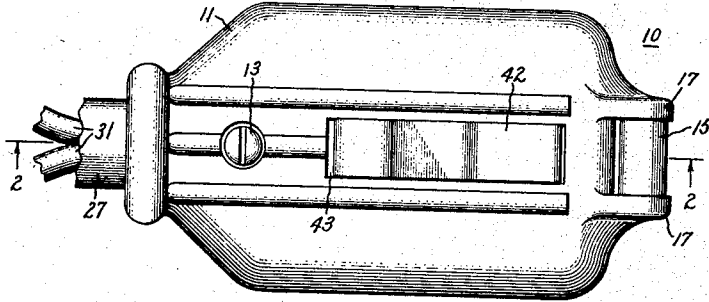


Fig. 2.

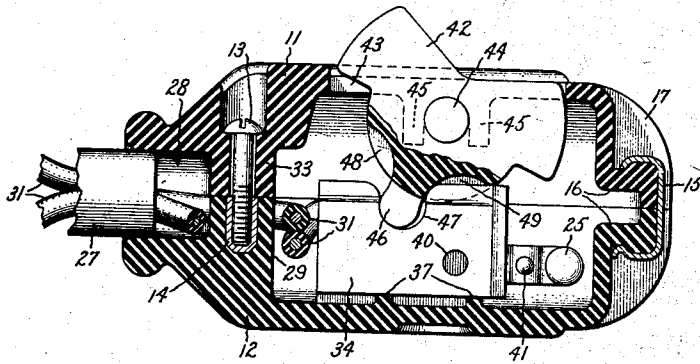


Fig. 3.

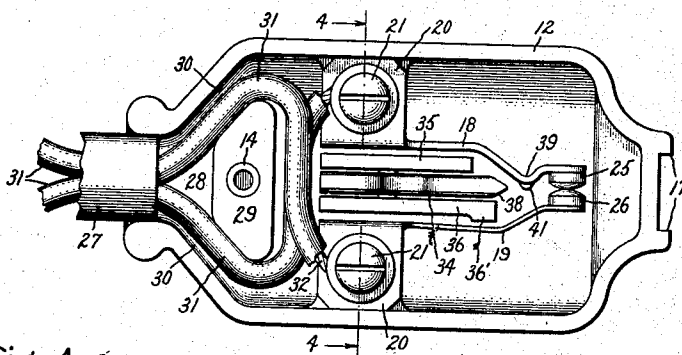


Fig. 4.

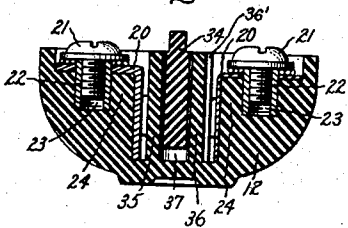
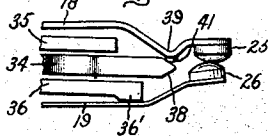


Fig. 5.



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UNITED STATES PATENT OFFICE

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ELECTRIC SWITCH

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8 Claims. (Cl. 200—153)

The present invention relates to electric switches and more particularly to an electric switch of the slow break type.

It is an object of this invention to provide a switch in which an increased rubbing or wiping action takes place between the contacts when they are opened or closed.

It is another object of this invention to provide a switch with a pair of flexible members for supporting the contacts and normally biasing them to closed circuit position and also to provide means for moving one of the contacts away from its closed circuit position while allowing the other contact to follow this movement for a predetermined distance before the contacts are separated.

It is a further object of this invention to provide a switch construction in which the wiping action between the contacts is increased by making one contact supporting member stiffer than the other.

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 a pendant switch embodying my invention; Fig. 2 is a sectional view taken along the line 2—2 of Fig. 1; Fig. 3 is a plan view showing the switch of Fig. 1 with the upper half of the housing removed; Fig. 4 is a sectional view taken along the line 4—4 of Fig. 3; and Fig. 5 is a plan view showing the contact structure as it appears just prior to the separation of the contacts.

Referring to the drawing, a switch body or housing of insulating material, such as a phenolic condensation product is illustrated generally by numeral 10. As shown in Fig. 2 the housing is made in two parts, an upper part 11 and a lower part 12 secured together at one end by a screw 13 which engages a suitable threaded insert 14 in the lower half 12 of the housing. The other end of the housing is secured together by a spring clip 15 which is adapted to engage the spaced parallel wall portions 16 formed on the two parts of the housing. The spring clip 15 is restrained from lateral motion by suitable flanges 17 which are formed integrally with the switch housing.

The contact and terminal structure includes the conducting strips 18 and 19 each of which is provided with a terminal portion 20 extending laterally from its upper edge. The strips 18 and 19 may be formed in any suitable manner but as illustrated they are preferably sheet metal

stampings each having an extending ear which is bent over at right angles to the strips to form the terminals 20. The conducting strips 18 and 19 are secured in the lower half of the housing by terminal screws 21, which pass through suitable openings in the terminals 20 and engage the threaded inserts 22. The inserts are frictionally held in suitable openings 23 formed in upstanding bosses 24 arranged on either side of the housing. Contacts 25 and 26 of silver or other material are secured to the opposed faces of the free ends of the conducting strips 18 and 19 in any suitable manner such as by welding. The conducting strips which are formed of resilient material extend in generally parallel relation and normally bias the contacts to closed circuit position. The switch is connected to an electric circuit by an insulated cord 27 the end of which is received in a suitable recess 28 formed in the end of the switch housing. A strain relief is provided in the present construction by a boss 29 formed on the lower half of the housing and spaced from the outer walls thereof by recesses 30 which are adapted to receive the insulated conductors 31 of the cord 27. As illustrated in Fig. 3 each of the insulated conductors is passed around the boss 29 and its bared end 32 secured to the terminal located on the side of the housing opposite the recess through which the conductor enters the housing. A boss 33 extending completely across the upper half 11 of the housing holds the insulated conductors 31 in the recesses 30.

For moving the contacts to open circuit position a plate or slider 34 of insulating material is mounted for longitudinal movement between the spaced upstanding barrier members or guides 35 and 36 which are preferably molded integrally with the lower half of the housing. A good bearing surface for the slider 34 is provided by the transverse beads 37 formed on the floor of the housing 12 between the barriers 35 and 36. The plate 34 is tapered at its front end as illustrated at 38 and is arranged to cooperate when moved with an offset portion 39 formed on the conducting strip 18 to move the strip and its associated contact 25 away from its normal closed circuit position. Contact 26 will follow the movement of contact 25 under the influence of the resilient strip 19 and will slide longitudinally across the face of contact 25 to the position shown in Fig. 5. This wiping or rubbing action keeps the contacts clean and free from foreign substances which tend to accumulate on the contacts and interfere with the

forming of a good electrical connection. As the movement of the insulating plate or slider 34 is continued, the tapered end 38 passes between the contacts 25 and 26 and positively separates them. A rib or boss 36' formed near the end of the barrier 36 and the flexible conducting member 19 are preferably so arranged that they arrest the movement of the contact 26 at approximately the same instant that the tapered portion 38 of the slider 34 passes between the contacts. An opening 40 formed in the slider is arranged to cooperate with a button 41 formed on the offset portion 39 of the conducting member 18 to releasably hold the parts of the switch in their open circuit position.

As illustrated in Fig. 3 the conducting member supporting the contact 26 is made of a thinner material than the conducting strip 18. This difference in thickness is provided to render the member 18 stiffer than the member 19 to increase the distance which the contact 26 will follow the contact 25 for a given contact pressure. That this action will take place is readily apparent when it is noted that in the normal closed circuit position of the contacts 25 and 26 the members 18 and 19 will both exert the same force on their associated contacts. This means that the lighter conducting member 19 is further from its unstressed position than the member 18 when the contacts are in their normal closed position. This allows the contact 26 to follow contact 25 a greater distance when the member 18 is moved in response to a movement of the slider 34 than would be possible if both supporting strips 18 and 19 were of the same stiffness.

For operating the switch a suitable toggle lever or switch operating member 42 is received in an opening 43 formed in the upper portion 11 of the housing. The lever 42 is mounted for tilting movement by means of the integrally formed trunnions 44 which are rotatably received between two pair of depending legs 45 located on opposite sides of the opening 43. An operating arm 46 on the toggle lever cooperates with a suitable recess 47 formed in the slider so that a tilting movement of the toggle lever serves to move the slider into and out of engagement with the conducting member 18. The walls of the recesses 48 and 49 formed in the lower surface of the toggle lever cooperate with the slider on either side of the recess 47 to provide lateral support and help to maintain the toggle lever in operative relationship with the slider.

In the operation of the switch it is clear that a downward movement of the left-hand end of the toggle lever will cause the slider 34 to move into engagement with the offset portion 39 of the supporting member 18 to move its associated contact 25 upwardly as viewed in Fig. 3. The contact 26 is carried by the more flexible member 19 and will follow the movement of the contact 25 until the tapered portion 38 of the slider separates the contacts. As previously mentioned, this would preferably occur at approximately the same instant that the supporting member 19 engages the rib 36' formed on the barrier 36. During the movement of the contacts prior to their separation it is clear that they are rotating about axes which are spaced from one another and that such rotation will cause the contacts to move relative to each other to the position shown in Fig. 5. It is likewise clear that when the slider is moved to the left by depressing the right-hand end of lever 42, the contact 25 will engage the contact 26 and move its associated conducting strip 18

downwardly as viewed in Fig. 3 until the force exerted by the stiffer supporting member 18 is balanced by that exerted by the supporting member 19. The wiping action which takes place when the contacts are closed helps to establish a connection of low electrical resistance.

The above construction provides a slow break switch with a large wiping action between the contacts on both circuit opening and circuit closing operations so that a low resistance contact is assured.

While I have described and illustrated my invention as applied to a pendant switch, it is apparent that it is not limited to the particular construction shown, and I intend in the appended claims to cover all the modifications within the spirit and scope of my invention.

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

1. In an electric switch, a support, a pair of conducting strips mounted in insulated relation on said support, contacts adapted to open and close an electric circuit associated with said strips, said strips normally biasing said contacts to closed circuit position, spaced barriers on said body extending between said strips, a plate of insulating material movable between said barriers and adapted to separate said contacts, said plate being restrained by said barriers to engage one of said strips and move its associated contact towards its open circuit position while permitting the other of said contacts to follow the movement of said one of said strips and its associated contact for a predetermined distance before said contacts are separated.
2. In an electric switch, a body of insulating material, a pair of resilient conducting members each having a contact portion normally biased to close circuit position, an operating element of insulating material positioned between said conducting members and slidable to separate said contact portions, and means for restraining the sliding movement of said operating element to engage one of said members to move the contact portion thereof away from its closed circuit position while the other of said conducting members is allowed to follow the movement of said one of said members for a predetermined distance before said contact portions are separated.
3. In an electric switch, a body of insulating material, a pair of resilient conducting elements in said body and each having a contact portion normally biased to closed circuit position by the resilience of the element with which it is associated, one of said elements being stiffer than the other, and means for engaging said stiffer element to move it away from its closed circuit position while permitting said other element to follow the movement of said stiffer element before said elements are separated so that the wiping action between the contact portions of said elements is increased.
4. In an electric switch, a support, a pair of elongated resilient elements, each having a portion mounted in insulated relation on said support and a contact portion normally biased to closed circuit position by the resilience of the element with which it is associated, one of said elements being stiffer than the other, an operating member movable to engage said stiffer element to move it away from its closed circuit position while permitting said other element to follow the movement of said stiffer element before the contact portions of said elements are

separated whereby the wiping action of said contacts is increased.

5 In an electric switch, a body of insulating material, a pair of resilient conducting elements in said body having cooperating contact portions associated therewith and normally biased to closed circuit position by the resilience of said elements, one of said elements being stiffer than the other, spaced barriers between said conducting elements, and a plate of insulating material movably mounted between said barriers for separating the contact portions of said conducting elements, the movement of said plate being restrained by said barriers to engage said stiffer conducting element and move it away from its closed circuit position while permitting the other of said conducting elements to follow the movement of said first conducting element for a predetermined distance before said elements are separated so that the wiping action between the contact portions of said conducting elements is increased.

6. In an electric switch, a two part housing of insulating material, a pair of conducting strips in said housing extending in spaced generally parallel relation, contacts normally biased to closed circuit position by said strips, a terminal formed on each of said strips and extending from the upper edges thereof in a plane perpendicular to said strips, a boss adjacent the opposite side walls of one part of said housing, means for securing one of said terminals to each of said bosses, a pair of spaced parallel barriers between said strips, a plate of insulating material positioned between said barriers and adapted to be moved longitudinally to separate said contacts, and interengaging means on said slider and one of said conducting strips for releasably holding

said slider and said contacts in open circuit position.

7. In an electric switch, a housing of insulating material, a pair of conducting elements in said housing normally biased to closed circuit position, a pair of spaced parallel barriers between said conducting elements, a plate of insulating material positioned between said barriers and adapted to be moved longitudinally to separate said contacts, said plate being restrained by said barriers to engage one of said elements to move it from its closed circuit position while the other of said elements is free to follow said movement, and means including one of said barriers for arresting the movement of said other element.

8. In an electric switch, a housing of insulating material, a pair of spaced longitudinally extending conducting strips each secured at one end to said housing, the free ends of said strips having contacts associated therewith and normally biased to closed circuit position by said strips, a pair of guides formed integrally with said housing, a plate of insulating material movably mounted between said guides and adapted when moved to separate said contacts, said plate being recessed from its upper edge, and an operating member pivotally mounted in said housing for moving said plate, said operating member having a centrally located depending arm for engaging the walls of said recess, the lower edge of said operating member also having opposed depending wall portions formed on each side of said operating arm for engaging said plates to hold said plate and said operating member in operative relationship.

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