Oct. 26, 1954 W. E. BROWN 2,692,920

ELECTRIC SWITCH

Filed July 19, 1951

Fig. 1.

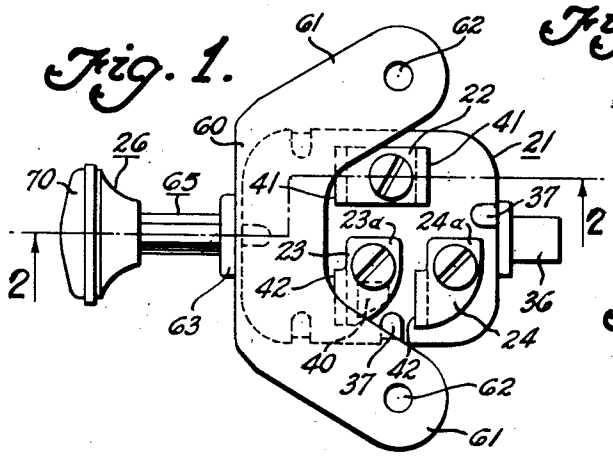


Fig. 4.

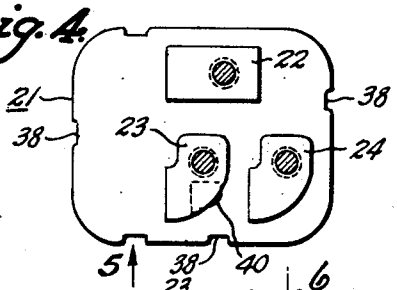


Fig. 5.

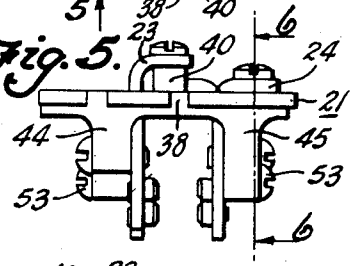


Fig. 2.

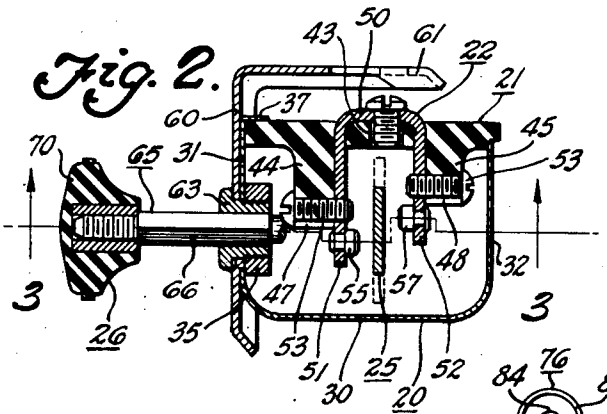


Fig. 6.

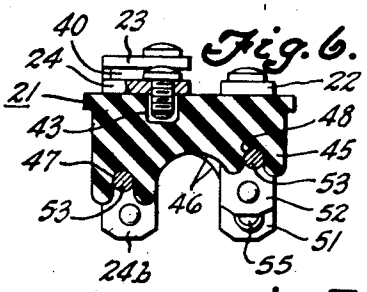


Fig. 7.

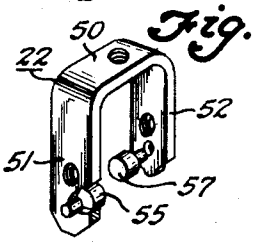


Fig. 9.

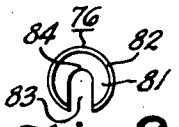


Fig. 3.

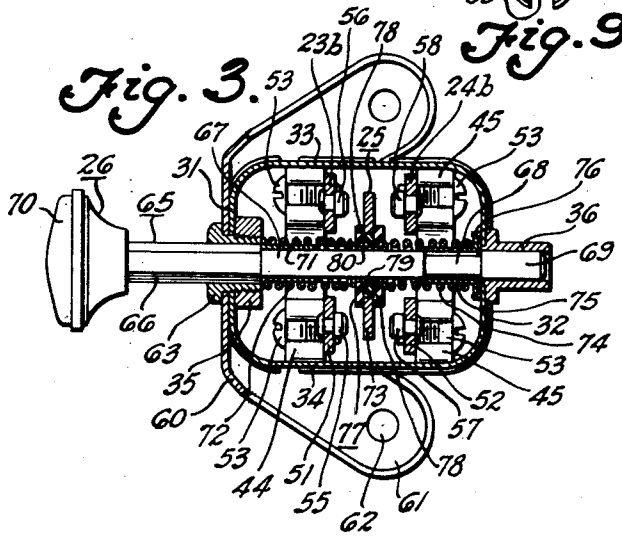
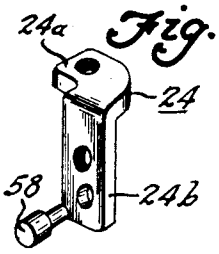


Fig. 8.



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ELECTRIC SWITCH

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7 Claims. (Cl. 200—16)

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This invention relates to electric switches, of the push-pull type to be used in a motor circuit and arranged to enable control of the motor circuit whereby to operate the motor momentarily or for short periods of time in response to manual operation of the switch.

One object of the present invention is to provide an improved push-pull type of switch having normally open contacts and to provide in said switch resilient means for retarding the closing of the switch in either direction of movement of the actuator.

Another object of the invention is to provide a switch so constructed and arranged whereby the same may be selectively actuated to close one of a plurality of circuits.

Another object of the present invention is to provide a push-pull type of switch of the foregoing type utilizing a contact that is normally held in equilibrium in an open position by opposing spring actions, but which may be moved, upon pushing or pulling of the switch actuator, with a differential movement with respect to the actuator, to accomplish contact engagement.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings wherein a preferred embodiment of the present invention is clearly shown.

In the drawings:

Fig. 1 is a top plan view of the switch embodying the present invention.

Fig. 2 is a sectional view taken on line 2—2 of Fig. 1.

Fig. 3 is a sectional view taken on line 3—3 of Fig. 2.

Fig. 4 is a detail top plan view of a closure for the switch and the terminals.

Fig. 5 is a side view of the closure looking in the direction of arrow 5 of Fig. 4.

Fig. 6 is a sectional view of the closure looking in the direction of arrows 6—6 of Fig. 5.

Figs. 7 and 8 show perspective exploded views of the terminals of the switch.

Fig. 9 is a plan view of a retainer for maintaining the parts assembled on the actuator for the switch in position.

Referring to the drawing the switch preferably includes a body or housing 20, a closure 21 secured to the housing, a common or battery terminal 22, and a pair of lead terminals 23, and 24 carried by the closure, a contactor or bridging means 25, and an actuator operating means 26 which when pulled will bridge the common terminal 22 and terminal 23 and when pushed will bridge the common terminal 22 and terminal 24.

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The housing or body 20 is provided with a fixed wall 30, end walls 31 and 32 and side walls 33 and 34 on an open top. In the present instance there is secured to the interior of the end wall 31 an internally threaded member 35 and suitably secured to the exterior of end wall 32 and in alignment with the member 35 is a plain bushing 36. The housing 20 and closure 21 may be secured together in any suitable manner, but as here shown the side and end walls are provided with extending tangs 37 adapted to cooperate with notches 38 provided in the periphery of the closure 21. The tangs 37 and notches 38 are so arranged that the closure 21 can be assembled with the casing 20 in only one relation and the tangs 37 are bent over against the outer surface of the closure as indicated in Fig. 2 to secure the closure to the housing to close the open top.

Referring to the construction of the closure 21, the closure is formed of insulating material molded in one piece, as here shown. During the molding operation of the closure the outer face of the closure is formed with an upwardly extending boss 40 and the necessary spaced apart elongated slits or openings 41 and 42 arranged in pairs and circular openings 43. The inner face of the closure is also formed with a pair of spaced apart parallel depending portions 44 and 45, each depending portion has a central notch 46 and two spaced apart side notches 47 and 48 located in different horizontal planes as illustrated in Fig. 6, the notches 48 in each depending portion being on the upper plane and opposite the notch 47 as viewed in Fig. 2. It will be noted that the notch 48 of one depending portion will be opposite the notch 47 of the other depending portion.

The common or battery terminal 22 is of U-shaped formation having a yoke 50, and arms 51 and 52 with the arm 51 longer than arm 52. The arms 51 and 52 are of such width and thickness that they will have a close fit with the openings 41. When the ends of the arms are inserted in the openings 41 the inner face of the yokes will engage the outer face of the closure. The terminal 22 is held in position preferably by screws 53, one of which passes through the notch 48 of the depending portion 45 and is threaded in the arm 52 while another screw 53 passes through the notch 47 provided in the depending portion 44 and is threaded in the arm 51. The terminals 23 and 24 are of L-shape. The terminal 23 has a short arm 23a resting on the boss 40 and a long arm 23b projecting through one of the elongated open-

ings 42. This terminal 23 is held in position by a screw 53 which passes through the notch 48 in the depending portion 44 and is threaded in the arm 23b. The terminal 24 has a short arm 24a resting on the upper face of the closure and a long arm 24b possing through the elongated opening 43 and held in position by a screw 53 passing through a notch 47 and is threaded in the arm 24b.

The arm 51 of the terminal 22 carries a contact 55 and the arm 23b carries a contact 56. The arm 52 of terminal 22 carries a contact 57 and the arm 24b carries a contact 58.

The switch housing 20 is adapted to be mounted to a support not shown. This mounting may be accomplished by a bracket 60 having wings or continuation 61 having apertures 62 through which means may be extended for securing the switch relative to a suitable support such as an instrument panel of an automobile. The means for securing the bracket 60 to the housing 20 comprising a flanged bearing plug 63 having threaded engagement with member 35 attached to the wall 31 as indicated in Figs. 2 and 3. In this instance the internal hole in the plug 63 is of non-circular formation to receive a shaft or actuating rod 65. The actuator has a non-circular portion 66, a reduced circular portion 67. An angular groove 68 and an end portion 69 which has sliding engagement within the bearing bushing 36. One end of the actuating rod 65 is provided with a knob 70 for effecting its operation. Within the confines of casing 20, the rod 65 has loosely mounted thereon between the portions 66 and 68, a flanged pick-up sleeve or abutment member 71, a coiled spring 72, a movable bridging member or contactor 73, a coiled spring 74, a second flanged pick-up sleeve or abutment member 75 and a retainer cup washer 76. The contactor 73 is insulatingly supported from the rod 65 by a carrier 77 including insulating washers 78, insulating bushing 79, held in assembled relation with the contactor 73 by an eyelet 80.

The retainer washer 76 is provided with a bottom wall 81 and a circular flange 82 and said wall is provided with a slot 83. The circular flange 82 is cut away by the slot 83. The circular groove 68 is adapted to receive the bottom wall 81 of the retainer cup washer 76 through the slot which terminates into an arcuate wall 84. The arcuate wall fits snugly about the bottom of the groove 68 so that portions of the bottom wall 81 will engage shoulders formed by the groove 68 when the washer 76 is in position, the flange 82 will be concentric with the rod 65.

When the retainer cap is in position the springs 72 and 74 will be placed under tension of substantially equal rate and the spring 74, which is interposed between the contactor and the flange of sleeve 75, will urge the flange of sleeve 75 to seat against the bottom wall 81 of the retainer washer 76, so that accidental removal of the retainer washer 76 from the rod 65 is prevented by the spring 74. As mentioned heretofore the springs are under equal tension, thus the springs serve to hold the contactor 73 out of engagement between two sets of pairs of contacts 55, 56 and 57, 58 which complete circuits, namely 55—56 and 57—58.

In operation, it will be apparent from the foregoing when the rod 26 is moved to the left, as viewed in Fig. 3, the portion 69 engages the pick-up sleeve 75 to move same to the left causing the spring 74 to move the contactor 73 to the left. Since the pick-up sleeve 71 abuts against the inner end of the plug, both springs 74 and 72 will be compressed until the contactor 73 bridges contacts 55—56 to complete a circuit. Upon release of the force which moved the rod to the left, the springs 72 and 74 will expand to separate contact from contact 55—56 and return the movable parts of the switch to their normal position, the spring 74 operating to cushion the movement of the contactor 73 and prevent the contactor 73 from engaging contact 57—58. The operation of the rod in the opposite direction will cause the portion 66 to engage the flange of pick-up sleeve 71 to move the spring 72 and contactor 73 to the right. In this instance the retainer cup washer 76 will abut the end wall 32 and the inner end of bushing 36, thus allowing the portion of the rod 26 having the annular groove 68 to slide through the slot 83 of the washer 76 with the result that contactor 73 will compress spring 74 between it and the flange of pick-up sleeve 75 until contactor 73 engages contact 57—58 and effecting closing of another circuit. Since both springs 72, 74 are under substantially the same tension they will be effective to separate contactor out of engagement with contacts 57—58 upon release of the force which actuated the rod to the right. The spring 72 in this instance will cushion the return of contactor 73 and prevent the contactor from engaging contacts 55—56. Since the tensions of the springs are equal the springs will maintain both circuits open.

By referring to Fig. 3 it will be apparent that when the rod is moved to the left the spring 72 is compressed by the carrier and the spring 74 is compressed by the shaft and when the actuator is moved to the right the spring 74 is compressed by the carrier and the spring 72 is compressed by the actuator. By this novel arrangement of the carrier and the springs 72—74 the carrier, with the contactor mounted thereon, there is produced a differential movement of the contactor with respect to the shaft until said contactor engages either contact 55—56 or 57—58.

Continued movement of the rod 65 in either direction after the contactor 73 has bridged one or the other of the pair of contacts, results in no harmful effect because continued push or pull is permitted before the springs become fully compressed.

While the embodiment of the present invention as herein disclosed, constitutes a preferred form, it is to be understood that other forms might be adopted.

What is claimed is as follows:

1. An electric switch comprising, a body; an operating plunger reciprocably mounted in said body; a pair of resilient means operatively associated with the plunger and the body for normally urging said plunger to a predetermined neutral position relative to said body; a contact member slidable on the plunger and held centrally longitudinally thereon between said resilient means; and means slidably carried by said plunger for compressing both of said resilient means when said plunger is moved in either direction from said neutral position; and contacts carried by the body on opposite sides of the contact member and normally out of contact therewith, said member adapted to complete a circuit through said contact on either side according to the direction of longitudinal movement of said plunger from said neutral position as both resilient means are compressed.

2. An electric switch comprising, a housing;

an operating plunger reciprocably mounted in said housing; a pair of springs carried by the plunger; for normally urging said plunger to a predetermined neutral position, means slidably carried by said plunger for compressing both of said springs when said plunger is moved in either direction from said neutral position; a contact bridging member slidable on the plunger and held centrally longitudinally thereon between said springs; and two pairs of contacts carried by the housing on opposite sides of the contact bridging member and normally out of contact therewith, said bridging contact member adapted to complete a circuit through either of said pairs of contacts according to the direction of longitudinal movement of said plunger from said neutral position as both springs are equally compressed.

3. An electric switch comprising, a body; an operative shaft reciprocably mounted in the body; a pair of springs carried by the shaft and adapted for urging said shaft to a predetermined neutral position relative to said body; a contactor slidable on the shaft and held centrally longitudinally thereon between said springs; two pairs of contacts on opposite sides of the contactor; a pair of pick-up sleeves on the shaft forming abutments for said springs, said shaft being adapted to selectively move one of the sleeves and for compressing both springs depending on the direction of movement from said neutral position for causing said contact to move and selectively engage one of said pairs of contacts.

4. In an electric switch, the combination with a body having oppositely disposed stationary contacts; of a reciprocating shaft carried by said body; two abutment members supported by the shaft, each respective abutment being movable with the shaft as it is moved in one direction and having the shaft moved relative thereto in the opopsite direction; a contactor movably carried by the shaft intermediate the stationary contacts; and resilient means interposed between the contactor and each abutment member, said resilient means adapted to urge said shaft to a neutral position with reference to said body and to be compressed simultaneously when said shaft is moved to a position other than said neutral position and to be compressed simultaneously for causing the contactor to move with the shaft and engage one or the other terminals dependent upon the direction of shaft reciprocation.

5. In an electric switch, the combination with a body having oppositely disposed stationary contacts; of a reciprocative shaft carried by said body; two abutment members supported by the shaft, each respective abutment being movable with the shaft as it is moved in one direction and having the shaft moved relative thereto in the opposite direction; a contactor movably carried by the shaft intermediate the stationary contacts; a pair of springs of substantially equal rate acting oppositely on said contactor, each spring being adapted to urge said shaft to a neutral position with reference to said body and to be compressed simultaneously when said shaft is moved to a position other than said neutral position and to be compressed simultaneously and interposed between the contactor and each abutment member for causing the contactor to move with the shaft as the both springs are compressed equally so as to engage one or the other terminals dependent upon the direction of movement of said shaft.

6. An electric switch comprising, a body; a reciprocable shaft mounted in the body; a U-shaped terminal providing spaced contact elements carried by the body; a pair of oppositely disposed individual contact elements carried by the housing and spaced in lateral relation in respect to the contact elements of the U-terminal to provide a pair of contact elements; a pair of flanged sleeves supported by the shaft, each respective sleeve being movable with the shaft as it is moved in one direction and having the shaft move relatively thereto in the opposite direction; a contactor movably mounted on the shaft intermediate the pairs of contact elements; and resilient means interposed between the contactor and each flange of the sleeves, said resilient means being adapted to urge said shaft to a neutral position with reference to said body and to be compressed simultaneously when said shaft is moved to a position other than said neutral position and adapted for being simultaneously compressed for causing the contactor to move with the shaft and engage one pair or the other of contact elements dependent upon the direction of shaft movement and for urging the shaft toward said neutral position.

7. In a push-pull switch, the combination with oppositely disposed spaced stationary terminals; of a reciprocable shaft adapted to move in either direction from a neutral position; two abutment members being movable with the shaft as it is moved in one direction and having the shaft move relatively thereto in the opposite direction; a stop for each abutment member; a carrier of insulating material loosely mounted on the shaft; a bridging member supported by the carrier, said carrier being disposed between the stationary terminals; spring means associated with the shaft for normally holding the abutment members against their respective stops and said shaft in the neutral position and said bridging member out of engagement with the terminals; and means provided by the shaft effective upon movement of the shaft in either direction to cause one of the abutment members to move with the shaft and cause the other abutment member to engage its stop whereby both springs are equally compressed simultaneously for causing the carrier and the bridging member to move relative to the shaft until the bridging member engages one or the other terminal dependent upon the direction of shaft movement, said springs expanding simultaneously to permit the return of the shaft and bridging member to their neutral positions upon release of the means which actuates the shaft.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
983,976	Carpenter	Feb. 14, 1911
1,835,019	Dawson	Dec. 8, 1931
2,423,387	Johnson	July 1, 1947
2,489,185	Johnson	Nov. 22, 1949