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WINDOW CONTROL SWITCH

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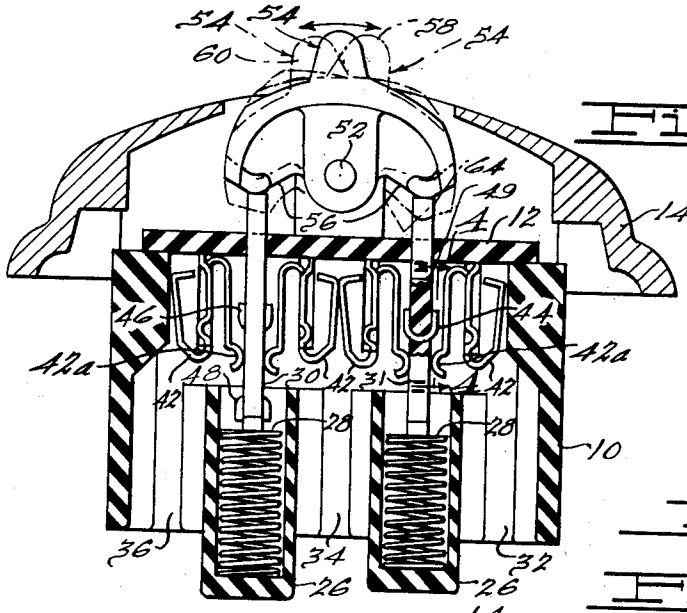


FIG. 1.

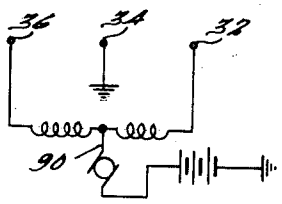


FIG. 5A.

FIG. 2.

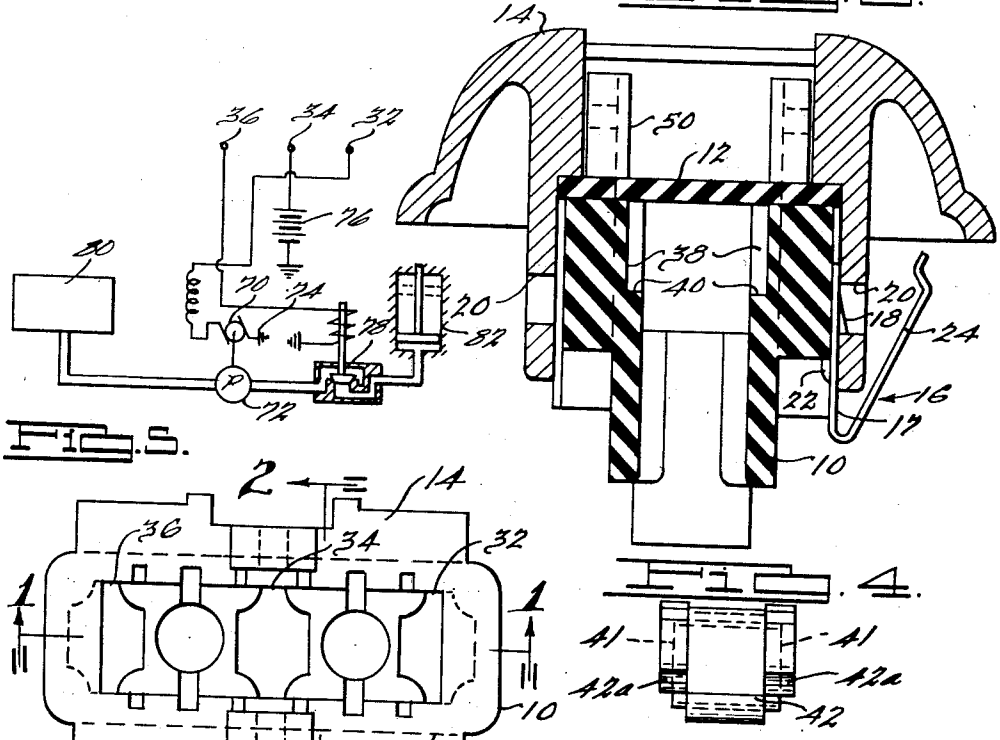


FIG. 5.

FIG. 4.

FIG. 3.

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WINDOW CONTROL SWITCH

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6 Claims. (Cl. 200—16)

The present invention relates generally to an electrical switch for automotive use. More specifically, the invention relates to a multiple-contact switch for control of either electric or hydraulic systems for operating a window lift, seat adjuster, etc.

In recent years, automobiles have been equipped with hydraulic or electric window lifts, hydraulic or electric seat controls, hydraulically-operated convertible tops and other electrically- and hydraulically-operated accessories. These accessories have required such a profusion of switches that ingenuity has been taxed to arrange them in a simple and convenient fashion. There has existed a need, therefore, for a multiple-action or multiple-function switch which is simple, inexpensive and rugged in construction.

It is a principal object of this invention, therefore, to provide a multiple action switch which is capable of operating or controlling more than one electrical or hydraulic accessory.

It is also an object of this invention to provide such a switch in the form of a toggle-operated plunger switch.

Another object of this invention is to provide a multiple action switch which is of rugged, simplified construction and easily installed during assembly-line operations.

Still other objects and advantages of the invention will be apparent, or will become apparent, in the following detailed description of the invention to follow, especially when taken in conjunction with the accompanying drawings, in which:

Figure 1 is a longitudinal sectional view through the switch of this invention, the section being taken along the line 1—1 of Fig. 3;

Fig. 2 is a transverse sectional view of the switch of this invention, with portion removed, the section being taken along the line 2—2 of Fig. 3;

Fig. 3 is a plan view of the switch of Figs. 1 and 2;

Fig. 4 is an enlarged elevational view of one of the terminal connector-contacts shown in Fig. 1, the view being taken as if along the line 4—4 of Fig. 1;

Fig. 5 is a schematic diagram of an illustrative wiring circuit employing the multiple-acting switch of Figs. 1–4, the diagram showing an electric motor, a hydraulic pump and motor and a solenoid-controlled hydraulic cylinder; and

Fig. 5A is a diagram of an exemplary electrical circuit employing the switch of this invention to control an electric window lift mechanism, seat adjustment device or electric top mechanism.

Referring now to the drawings, and particularly Figs. 1 and 2 thereof, it will be seen that the switch of this invention has a base 10 of insulating material and a contact-retainer plate 12 enclosed by a cover 14 which may be of metal for decorative trim purposes. Base 10, plate 12 and cover 14 are held together by a spring clip 16 (Fig. 2) which fits between base 10 and cover 14 and which has a downward prong or shoulder 18 fitted into a hole 20 in cover 16 and, on the same upwardly-disposed leg 17, a clip or shoulder 22 which engages the lower edge

of base 10. An outwardly-projecting clip or arm 24 of spring-clip 16 is provided to mount and support the switch through the upholstery in a car door, seat frame and the like. Although not shown in Fig. 2, it is to be understood that similar spring-clip fasteners can be provided on the other side and ends of the switch body, if desired.

As shown most clearly in Fig. 1, the base 10 houses a pair of spring pockets 26 into one of which is fitted a coiled compression spring 28 and a two-contact plunger 30, and into the other of which there is inserted a similar spring 28 and a single contact plunger 31. Also incorporated in the base 10 are three hexagonal-shaped terminal connector passages 32, 34 and 36. As is best shown in Fig. 2, each of passages 32, 34 and 36 are provided with longitudinal contact-retainer grooves 38 which are square cut so as to provide a shoulder 40 against which the flange 41 of the contact 42 may bear (Fig. 4). Into each of terminal passages 32 and 36 there is pressed (from the top) a single S-shaped prong-type connector-contact 42, while in passage 34 there are two such connector-contacts arranged in opposite directions. With this arrangement, the rounded boss ends of prongs 42*a* of adjacent pairs of connector-contacts are opposed to each other on either side of the plungers 30, 31. The pair of connector-contacts 42 in passage 34 are arranged to be connected to a spade-type or male blade-type terminal connector inserted therebetween. The contact-retainer plate 12 keeps the contacts 42 in position in the grooves 38 against shoulders 40.

The switch shown in Fig. 1 is of a type adapted to operate a hydraulic system, as will appear more clearly in connection with Fig. 5. Thus, the left-hand plunger has contacts 46, 48 above and below the connector contacts 42 so as to function to close the circuit between terminals 34 and 36 on either its upward or downward movement. The right-hand plunger 31, on the other hand, carries only a single contact 44 above the contacts 42 and has a shoulder 49 thereabove to limit its upward travel. When two single contact plungers similar to plunger 31 are employed the switch is effective to operate an electrical system, as will appear below in connection with Fig. 5A.

Secured to the plate 12 are a pair of ears 50 (see Fig. 2) in which are mounted a pin 52 and a toggle-type switch lever 54. The toggle lever 54 has a pair of cam-like surfaces 56 which are so positioned to rest in contact with the upper ends of the plungers 30, 31, the springs 28 serving to maintain the contact and return the toggle lever 54 to the neutral position when released. Thus arranged, rotation of toggle 54 in the clockwise direction to position 58 (as viewed in Fig. 1) will depress the right-hand single-contact plunger 31 to force bridge contact 44 between the prongs of the connector-contacts 42 in terminal passages 32 and 34. At the same time rotation of toggle 54 to position 58 will allow the two-contact plunger 30 to rise under the urging of spring 28 so that the lower contact 48 will be forced between prongs 42 of the contacts in passages 34 and 36. Rotation of toggle 54 in a counterclockwise direction to position 60 depresses the left-hand two-contact plunger 30 to force the upper bridge contact 46 between the prongs of the connector-contacts in passageways 34 and 36 and at the same time the right-hand, single-contact plunger 31 rises under the urging of the spring until shoulder 49 abuts the plate 12 to limit upward movement of this plunger. Positions 58 and 60 correspond to the up- and down-positions of a hydraulic window lift, seat adjusting mechanism, or convertible top lift mechanism, and the like.

As shown in Fig. 5, the contacts have been given numerals, corresponding with the arrangement of terminal passages in Fig. 1, it being understood that in Fig. 5 the numerals indicate terminals or lead wires

rather than passages. As shown, lead 32 is connected to the stator coils of an electric motor 70 of a hydraulic pump 72, the motor having its armature coils grounded at 74. Terminal or lead 34 is connected to a battery 26 and lead 36 is connected to one terminal of a solenoid valve 78 having its other terminal grounded, as indicated. The motor withdraws oil from a reservoir 80 and pumps through the solenoid valve 78 to the operating cylinder 82 of a hydraulic window lift, seat adjustment device or top lift mechanism.

When the toggle 54 is moved to position 58 the battery 76 is connected to the pump motor 70 by a circuit established through contact 44 and terminals 32 and 34 of the switch. At the same time the solenoid valve 78 is energized by a circuit established by contact 48 bridging terminals 34 and 36. The motor 70 begins to operate causing oil to be pumped into cylinder 82 causing its piston to be extended to the "up" position. When the toggle 54 is moved to position 60 only the solenoid valve 78 is energized by a circuit established by contact 46 bridging terminals 34 and 36. Opening of valve 78 allows fluid to return from cylinder 82 to reservoir 80 causing the piston to be retracted to the "down" position of the window, top, etc.

The electrical circuit shown in Fig. 5A is for an electric window lift device, etc., wherein the switch has been equipped with two single-contact plungers such as right-hand plunger 31. Terminals 36 and 32 are connected to the stator coils of a reversible electric motor 90, terminal 34 is connected to ground, and the battery 92 is connected to the motor armature. With this system, positions 58 and 60 of the toggle 54 correspond to the "up" and "down" positions of the electric window lift or the "forward" and "back" positions of an electric seat adjusting mechanism. When the toggle is moved to position 58 lead 32 from the motor is connected to ground through the switch (contact 44 connects terminals 32, 34), thus connecting the motor for rotation in one direction, for example, clockwise rotation, to raise the window. When the toggle is moved to position 60 motor lead 36 is connected to ground by contact 46 connecting terminals 34, 36, thereby causing the motor to rotate in the opposite or counterclockwise direction to lower the window. In either direction the shoulders 49 provide stops against plate 12 to limit the upward movements of the plunger.

What is claimed is:

1. A multiple-action reversing toggle switch comprising a base of insulating material, three terminal passages in said base in side-by-side arrangement, each said passage comprising a contact-carrying bore communicating with a lead insert bore and separated therefrom by a retaining shoulder, an S-shaped connector-contact of the type adapted to receive a knife blade lead tip in each said contact-carrying bore, a plate of insulating material over said passages to retain said connector-contacts against said shoulders in said contact-carrying bores, a cover adapted to be secured to said base over said plate, a pair of plungers journalled between said terminal passages, at least one bridge contact on each said plunger, and a toggle lever for reciprocating said plungers so that their contacts alternately make contact with their respective connector-contacts.

2. A multiple-action reversing toggle switch comprising a base of insulating material, three terminal passages in said base in side-by-side arrangement, each said passage comprising a contact-carrying bore communicating with a lead wire insert bore and separated therefrom by a retaining shoulder, a single S-shaped, prong-type connector-contact in the first and third said contact bores and two

S-shaped prong-type connector contacts in the middle said contact bore adapted to be interconnected by a lead wire inserted therebetween, a retainer plate of insulating material overlying said contact bores to force said connector contacts into contact with said shoulders, a cover adapted to be secured to said base over said retainer plate, a plunger journalled between said single contact in said first contact bore and one of said connector-contacts in said middle bore and carrying one bridge contact above said connector contacts and another below said connector-contacts, a second plunger journalled between the single connector-contact in said third contact bore and the other of said connector-contacts in said middle bore and having a single bridge contact located above said connector contacts, and a toggle lever mounted through said cover and having cam surfaces in contact with said plungers so as to reciprocate the latter to bring said bridge contacts alternately between the prongs of said connector contacts, the said cam surfaces being so shaped and the bridge contacts being so located on the respective plungers that movement of said toggle lever in one direction will force the lower contact of said two-contact plunger and the contact of single-contact plunger simultaneously between the prongs of their respective connector-contacts and movement of said toggle lever in the other direction will force the upper of said contacts on said two-contact plunger between the prongs of its connector-contacts while the contact on said single-contact plunger will be moved away from its connector contacts.

3. A switch as defined in claim 2 and further characterized in that said single-contact plunger has a shoulder positioned above its contact to make contact with said retainer plate and limit its upward movement.

4. A switch as defined in claim 2 and further characterized in that both said plungers are spring-biased into contact with the said cam surfaces of said toggle lever.

5. In a switch, a housing having top and bottom faces with apertures therein opening out of both faces, contacts disposed in said apertures and seated on shoulders facing toward said top face, a closure engaging said top face to hold said contacts on said shoulders, a cover embracing said closure and having a portion thereon engaging the closure to hold it against said top face and a portion extending between said faces, said last mentioned portion being provided with shoulder means and said housing having shoulder means facing oppositely to said last mentioned shoulder means, and a snap-in lock member having oppositely facing tangs formed thereon engaged respectively with said shoulder means to hold said cover and housing together and thus to hold said closure in place.

6. In a switch, a housing having top and bottom faces with apertures therein opening out of both faces, contacts disposed in said apertures, a closure on said top face and providing a pivot, a pivotal member mounted on said pivot and having arms extending in opposite directions from said pivot, a pair of plungers extending parallel to said apertures slidably extending through apertures in said closure and the top ends thereof being operatively engaged by said arms whereby movement of the pivotal member moves said plungers, said plungers having portions in said housing provided with conductive means to operatively engage said contacts.

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