March 28, 1967 J. M. VANANZI 3,311,719

SLIDE SWITCH WITH IMPROVED LEVER ACTUATOR

Filed May 11, 1966

Fig. 3.

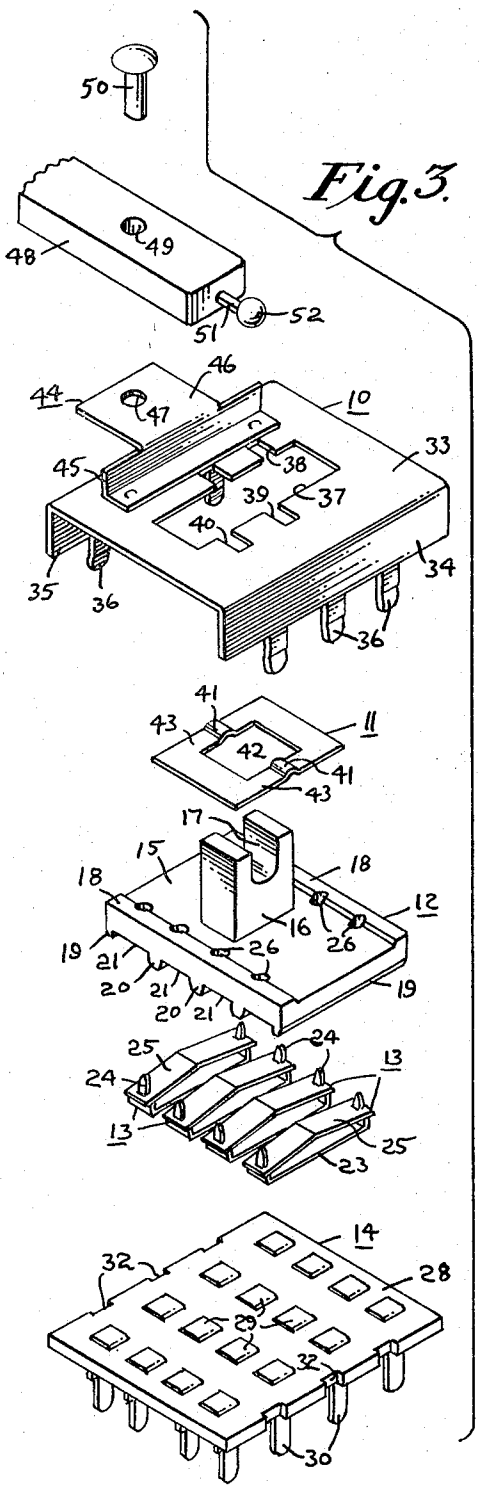


Fig. 2.

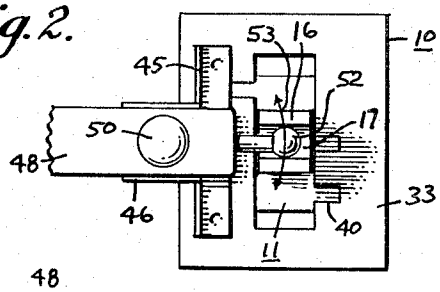


Fig. 1.

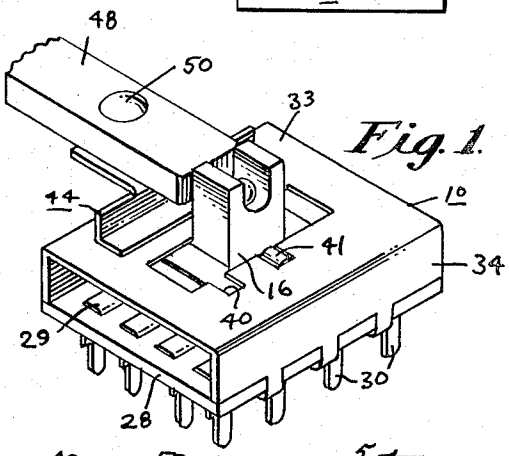


Fig. 4.

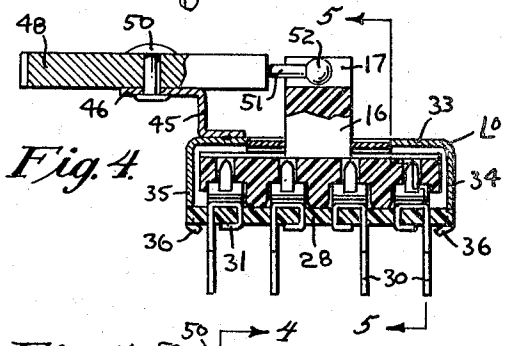
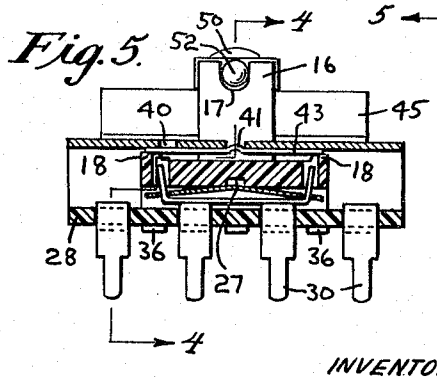


Fig. 5.



INVENTOR.

BY JOSEPH M. VANANZI

ATTORNEY.

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SLIDE SWITCH WITH IMPROVED LEVER ACTUATOR

Joseph M. Vananzi, Meadowbrook, Pa., assignor to Continental-Wirt Electronics Corporation, Philadelphia, Pa., a corporation of Pennsylvania

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This invention relates generally to slide switches, and more particularly relates to a novel slide switch so constructed that the actuating arm or button extends laterally from the side of the switch casework and is of sufficient length that it may be projected directly through an appropriate cut-out in the control panel of apparatus for direct actuation.

Previous types of slide switches have utilized operating arms of buttons accessible through the top of the casework of the switch and opposite to the switch external contact portions which normally project from the insulating contact base of the switch. When used in applications requiring direct contact mounting to a printed circuit board, reasonable servicing requirements do not permit the printed circuit board to be mounted parallel to and very close to the front panel through which the operating arm for the slide switch would have to pass in order to be actuatable. Consequently, with the printed circuit boards positioned in normal fashion substantially perpendicular to the panel of the apparatus, it has been necessary to employ auxiliary mechanical devices to actuate from the panel surface such a slide switch, which is of course mounted with its operating arm or button behind the panel. Accordingly, it is a primary object of my invention to provide a novel slide switch having an extended slider arm projecting through the switch case sidewall substantially at right angles to the normal downward projection direction of the external parts of the switch contacts.

Another object of my invention is to provide a novel slide switch as aforesaid wherein the laterally projecting slide switch actuating arm is a pivoted lever contsruction of selectable length and is sufficiently long to project directly through the control panel of the apparatus in which the switch is utilized to thereby eliminate the need for supplemental mechanical devices otherwise required to actuate the switch.

The foregoing and other objects of my invention will appear more fully hereinafter from a reading of the following specification in conjunction with an examination of the appended drawing, wherein:

FIGURE 1 is a perspective view of the assembled slide switch according to the invention clearly showing the novel lateral extension of the actuating arm;

FIGURE 2 is a top plan view on a reduced scale of the slide switch shown in FIGURE 1;

FIGURE 3 is an exploded perspective view of the switch shown in FIGURE 1 illustrating structural features of the interior parts of the switch not visible in FIGURE 1;

FIGURE 4 is a vertical jump sectional view through the slide switch of FIGURE 1 taken at right angles to the showing of FIGURE 5 and as would be seen when viewed along the line 4—4 of FIGURE 5; and

FIGURE 5 is a vertical jump sectional view through the switch of FIGURE 1 as would be seen when viewed along the line 5—5 of FIGURE 4.

In these several figures, like elements are denoted by like reference characters.

Referring now to the drawing, it is seen that the switch includes a case 10, a detent pressure plate 11 disposed between the undersurface of the case top wall and the immediately below lying switch slider element 12, four electrically conductive slider contact bridges 13 shiftable with the slider 12 and held captive between the latter and the below lying contact assembly 14.

The slider 12 is made of electrical insulating material and has a generally rectangular body portion 15 from the center of which upwardly projects post 16 formed with a U-shaped smooth walled channel extending downward thereinto from the supper surface thereto. Projecting upward from each of the side edges of the upper face of the slider body 15 is a front to rear extending ridge 18. Depending from each of the opposite front and rear edges of the slider body is a skirt 19, while depending from the underside of the slider body 15 parallel to the front and rear skirts 19 are three equispaced barrier ribs 20 which define therebetween and with the front and rear skirts 19 of the channels 21. Within these channels the slider contact bridges 13 are disposed as most clearly seen in FIGURES 4 and 5.

The contact bridges 13 are each formed from a U-shaped metal conductor having a flat base wall 23 and upturned side arms reduced at the upper ends thereof as at 24 so that the latter are projectable through opposite end apertures cut or punched through the ends of an inverted V-shaped resilient biasing element 25. The slider contact bridges 13 are held captive in the slider body channels 21 by projecting the reduced side arm upper ends 24 into apertures 26 formed in the slider body 15 at the inside edges of the ridges 18 and opening into each of the channels 21 as is most clearly seen from FIGURES 3, 4 and 5. The upper upwardly facing vertex of the inverted V resilient biasing elements 25 are each disposed in a slot 27 formed in the undersurface of the slider body 15 and extending transversely of each of the channels 21 at their mid points.

The contact assembly 14 is formed from a rectangular piece of insulating material, such as phenolic board 28 suitably apertured to have projected therethrough a plurality of electrical contacts each having a flat head surface portion 29, a depending tail 30 and a contact locking tab 31, best seen in FIGURE 4, which locks the contact to the insulator baseboard 28. As best seen in FIGURES 4 and 5, the bases 23 of the contact bridges 13 seat downward upon the heads 29 of the contacts and are resiliently biased downward thereagainst by means of the resilient biasing elements 25. The front and rear edges of the contact assembly insulation baseboard 28 are provided with notches 32 to receive the locking ears carried by the case 10.

The case 10 includes a top wall 33, rear wall 34 and a front wall 35, the front and rear walls depending from the top wall and being each provided at their lower edges with three locking ears 36 positionable in the notches 32 of the contact assembly, as best seen in FIGURES 4 and 5. The case top wall 33 is rectangularly apertured as at 37 to permit passage therethrough of the slider post 16, and is also apertured as at 38, 39 and 40 with detent receiving slots into which resiliently snap the raised detents 41 which extend upward from the detent pressure plate 11.

The pressure plate 11 is in the general form of a rectangular annulus having a central aperture 42 corresponding in shape to and adapted to have projected therethrough the post 16 of the slider element 12 and detent carrying arms 43 which bracket the slider post 16 and prevent relative sliding movement between the slider body and pressure plate. As best seen in FIGURE 5 the slider body ridges 18—18 maintain the resilient detent carrying arms 43 of the pressure plate 11 above and out of contact with the upper surface of the slider body 15 so that the detents 41 may shift vertically to be engaged in and disengaged from the detent apertures 38, 39 and 40 formed in the top wall of the case 33.

Soldered, tack welded or otherwise secured to the case top wall 33 proximate to the front wall 35 is a bracket 44 having an angle shaped base 45 provided with an upstanding leg from which forwardly extends a flat shelf 46 apertured as at 47. Seated upon the shelf 46 is an elongated switch actuating lever 48 apertured as at 49 with the shelf and lever apertures vertically aligned to permit passage therethrough of rivet 50 which secures the lever to the shelf for pivotal movement about the rivet. Extending longitudinally centrally from the inner end of lever 50 is a pin 51 which terminates in a ball head 52 disposed within the channel 17 in slider post 16.

As best seen from FIGURES 2 and 5, with the length of actuating lever 48 perpendicular to the case front wall 35, detent 41 is seated in detent apertures 39 to electrically connect the center two contacts of each set of four contacts. Lateral movement of the lever in either direction as shown by arrow 53 in FIGURE 2 causes the lever ball head 52 to rotate in post channel 17 and move slider 15 through movement of slider post 16 to shift detents 41 into either detent aperture 38 or detent aperture 40, thereby electrically connecting the respective end pair of contacts in each set for four contacts. The particular contact arrangement is of course not critical, and many different circuit configurations may be used with the actuating mechanism according to my invention. It should be noted however that the diameter of pin 51 must be less than the width of post channel 17 by a sufficient amount to allow relative movement therebetween without causing a mechanical stop action until at least the end detented positions of the slider 15 have been reached.

Having now described my invention in connection with a particularly illustrated embodiment thereof it will be appreciated that variations and modifications of my invention may now occur from time to time to those persons normally skilled in the art without departing from the essential scope or spirit of the invention, and accordingly it is intended to claim the same broadly as well as specifically as indicated by the appended claims.

What is claimed to be new and useful is:

1. A slide switch comprising in combination, a contact assembly including an insulating base member and a plurality of electrically conductive contact elements carried by said base member, a slider element overlying said contact assembly having a body portion mode of electrical insulating material and a post formation extending upward therefrom with the body of the latter being apertured to form a socket therein, a least one electrically conductive contact bridge held captive to the underpart of said slider body so as to move therewith and mechanically engage a pair of contact elements of said contact assembly, a case enclosing said slider element and having a top wall and depending front and rear walls, said case top wall overlying said slider body and said case front and rear walls extending downwrd immediately in front of and behind said slider element body to the insulating base member of said contact assembly and being locked to the latter by locking ears carried by said case front and rear walls, and a detent pressure plate overlying said slider body and disposed between said slider body and said case top wall, said case top wall being apertured and having projected upward therethrough said slider element post formation, said post formation being narrower than said case top wall aperture so that said post and the slider body may be shifted laterally with respect to said contact assembly and case for a distance determined by the length of said case top wall aperture between at least two detented positions to thereby shift the switch from one contact condition to another, an actuating lever extending longitudinally forward from the case front wall and rearward to a terminating end which latter is shiftably disposed within the socket of the slider post formation, said actuating lever being pivotably secured between its front and rear ends to said case for swinging movement operative to shift said post and slider body between the aforesaid detented positions, the forward length of said actuating lever being sufficiently long to project completely through and be operable from one side of a panel when the remainder of the switch structure is disposed on the opposite side of the panel.

2. A slide switch as defined in claim 1 wherein the upper face of said slider body is formed with a pair of ridges extending upward therefrom proximate to the opposite ends thereof, wherein said detent pressure plate at opposite ends is seated upon said ridges and is free of contact with said slider body therebetween and is provided with upwardly extending detent projections proximate to the midpoint of said detent plate between said slider body ridges, and wherein said case top wall is provided with detent projection receiving apertures into which said detent plate detent projections snap when said slider is moved to each of its detented positions.

3. A slide switch as defined in claim 1 wherein each contact element includes a contact head exposed from above the said insulating base member and a tail which projects downward through and beyond the bottom of said base member, and wherein said actuating lever is pivoted for movement in a plane substantially orthogonal to the downwardly extending tails of the contact element.

4. A slide switch as defined in claim 1 wherein said post formation extends upward from the center of the upper surface of said slider body and the socket formed therein is an open ended open topped channel formation extending downward from the top of the post with the open ends facing toward the planes of the front and rear walls of said case, and wherein the rear terminating end of said actuating lever is a ball head closely fitted between the side walls of the post channel for rotative movement therein when said actuating lever is swung about its pivot.

5. A slide switch comprising in combination, a contact assembly including an insulating base member and a plurality of electrically conductive contact elements carried by said base member, a slider assembly overlying said contact assembly having a body portion made of electrical insulating material and a post formation extending upward therefrom with the body of the latter being apertured to form a socket therein, said slider assembly including at least one electrically conductive contact bridge held captive to the underpart of said slider body so as to move therewith and mechanically engage a pair of contact elements of said contact assembly, a case enclosing said slider assembly and having a top wall and depending front and rear walls, said case top wall overlying said slider body and said case front and rear walls extending downward immediately in front of and behind said slider element body to the insulating base member of said contact assembly and being locked to the latter by locking ears carried by said case front and rear walls, said case top wall being apertured and having projected upward therethrough said slider element post formation being narrower than said case top wall aperture so that said post and the slider body may be shifted laterally with respect to said contact assembly and case for a distance determined by the length of said case top wall aperture between at least two selectively different positions to thereby shift the switch from one contact condition to another, an actuating lever extending longitudinally forward from the case front wall and rearward to a terminating end which latter is shiftably disposed within the socket of the slider post formation, said actuating lever being pivotally secured between its front and rear ends to said case for swinging movement operative to shift said post and slider body between the aforesaid detented positions, the forward length of said actuating lever being sufficiently long to project completely through and be operable from one side of a panel when the remainder of the switch structure is disposed on the opposite side of the panel.

6. A slide switch as defined in claim 5 including detent means for frictionally holding said slider assembly in any one of said selectively different positions.

7. A slide switch as defined in claim 6 wherein the upper face of said slider body is formed with a pair of ridges extending upward therefrom proximate to the opposite ends thereof, wherein said detent means includes a detent pressure plate having its opposite ends seated upon said ridges and its central body portion spaced above said slider body, said pressure plate being provided with upwardly extending detent projections proximate to the midpoint of said detent plate between said slider body ridges, and wherein said case top wall is provided with detent receiving notches into which said detent plate detent projections snap when said slider is moved to each of its detented positions.

8. A slide switch as defined in claim 6 wherein each contact element includes a contact head exposed from above the said insulating base member and a tail which projects downward through and beyond the bottom of said base member, and wherein said actuating lever is pivoted for movement in a plane substantially orthogonal to the downwardly extending tails of the contact element.

9. A slide switch as defined in claim 6 wherein said post formation extends upward from the center of the upper surface of said slider body and the socket formed therein is an open ended open topped channel formation extending downward from the top of the post with the open ends facing toward the planes of the front and rear walls of said case, and wherein the rear terminating end of said actuating lever is a ball head closely fitted between the side walls of the post channel for rotative movement therein when said actuating lever is swung about its pivot.

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ROBERT K. SCHAEFER, *Primary Examiner.*

J. R. SCOTT, *Assistant Examiner.*