July 12, 1966 M. Y. TURNBULL 3,260,814

SINGLE POLE SNAP SWITCH WITH A GUIDEPLATE DETACHABLY MOUNTED BETWEEN JUXTAPOSED CASING ELEMENTS

Filed Aug. 19, 1964 4 Sheets-Sheet 1

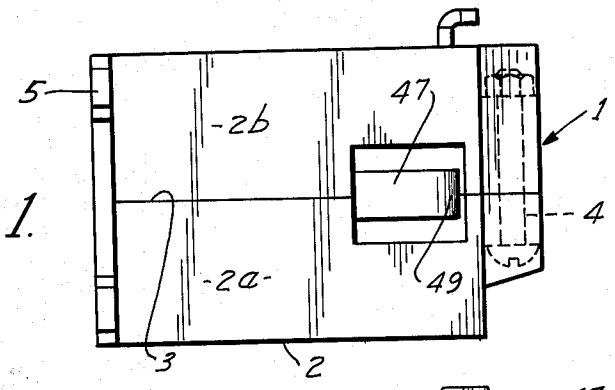
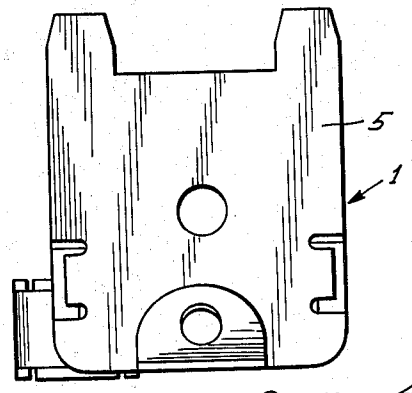


Fig. 1.



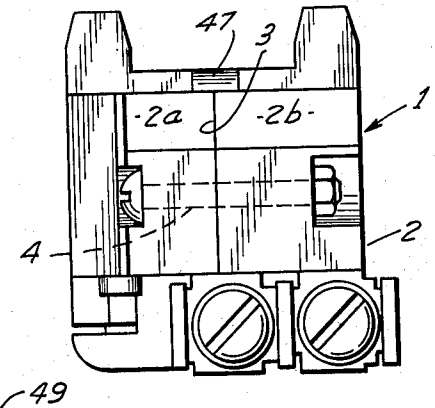


Fig. 2.

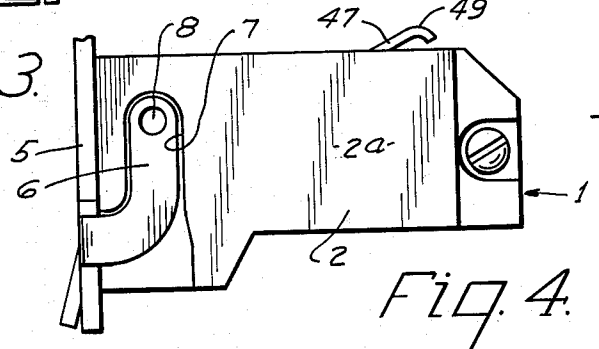


Fig. 3.

Fig. 4.

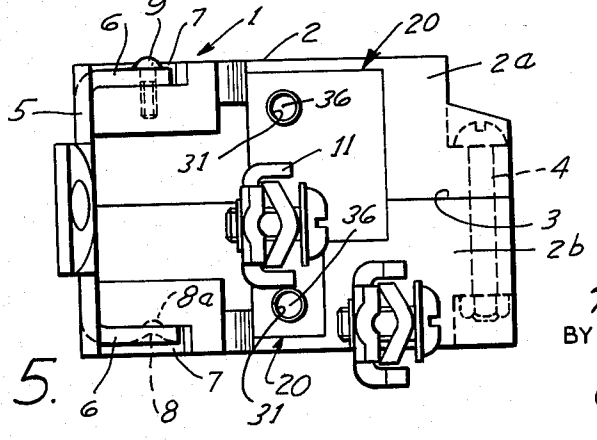


Fig. 5.

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Filed Aug. 19, 1964 4 Sheets-Sheet 2

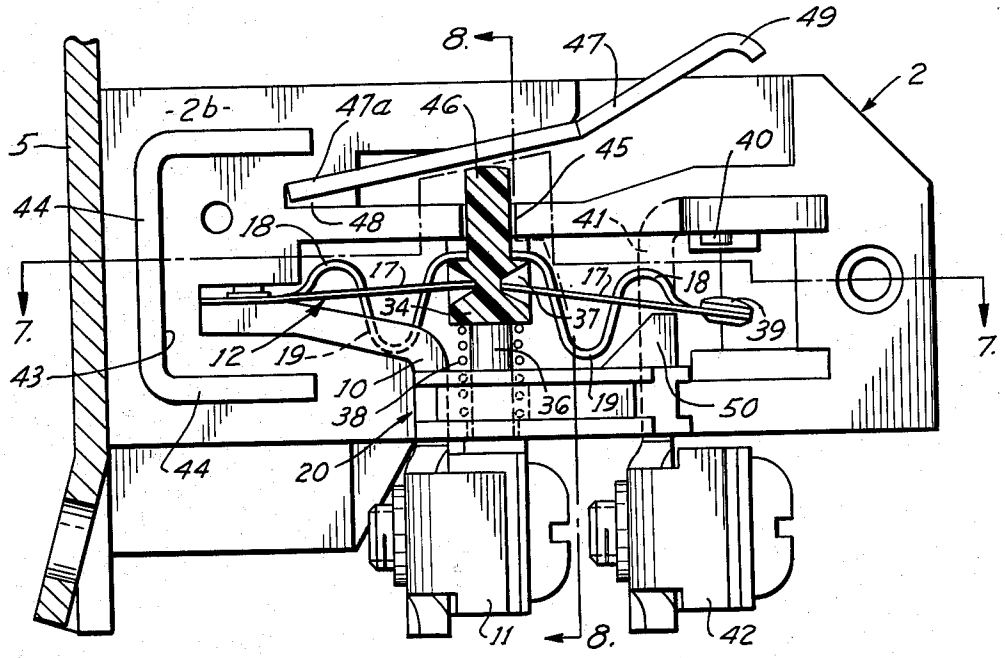


Fig. 6.

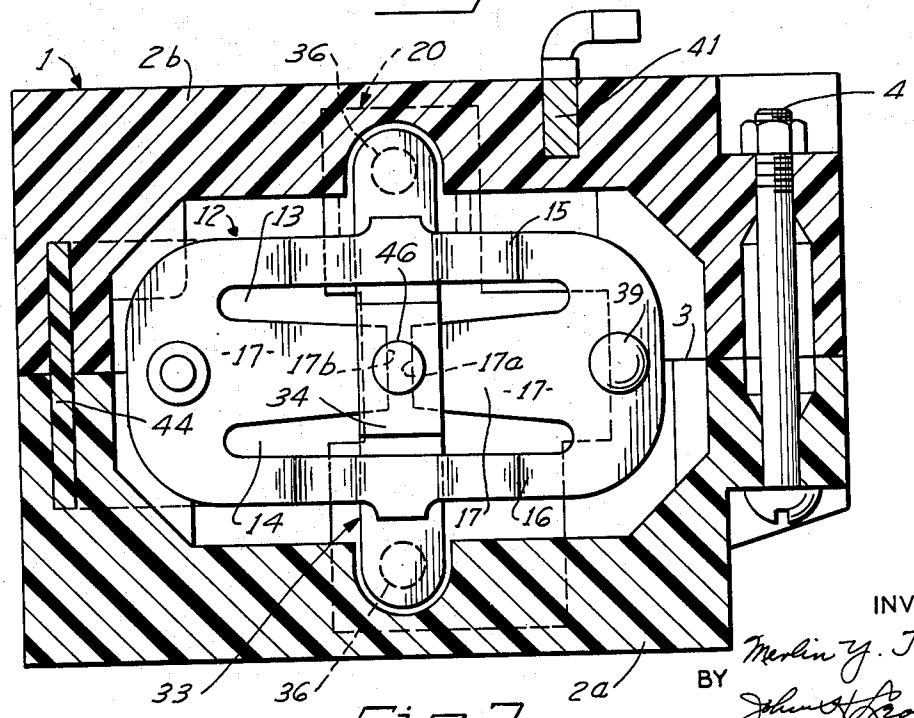


Fig. 7.

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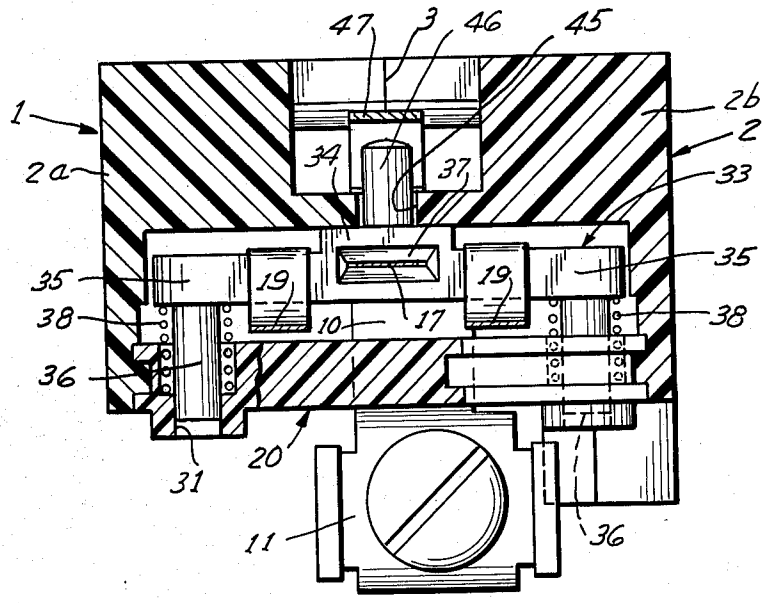


Fig. 8.

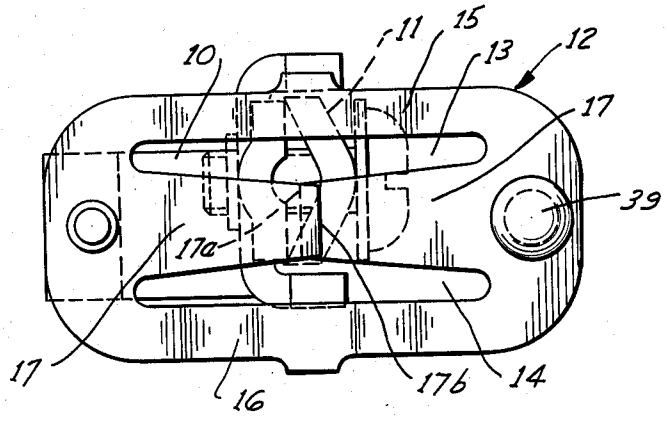


Fig. 9.

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Filed Aug. 19, 1964 4 Sheets-Sheet 4

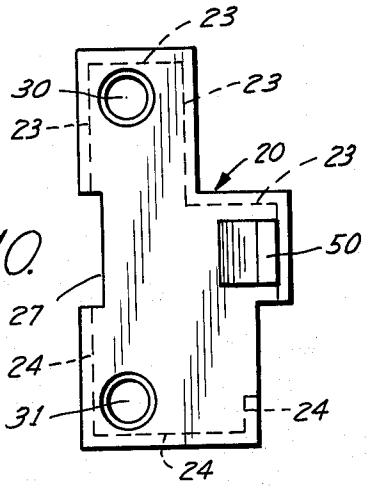


Fig. 10.

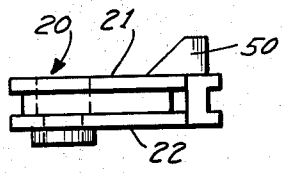


Fig. 11.

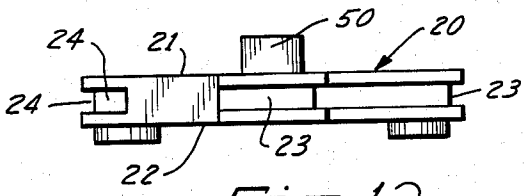


Fig. 12.

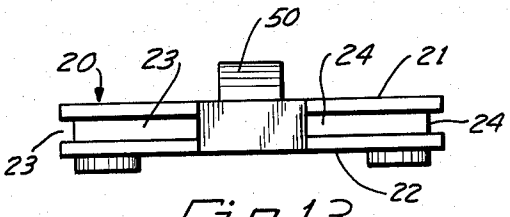


Fig. 13.

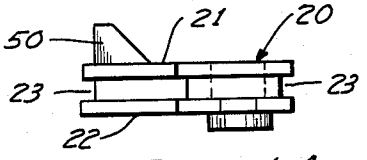


Fig. 14.

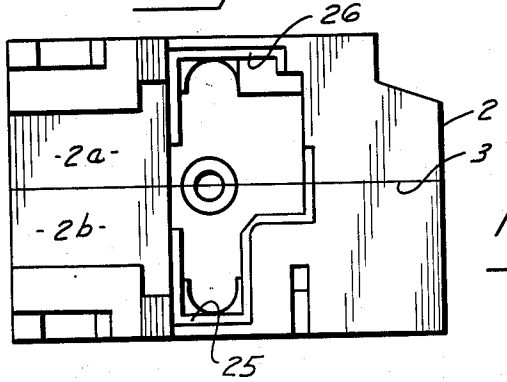


Fig. 15.

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United States Patent Office 3,260,814 Patented July 12, 1966

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3,260,814

SINGLE POLE SNAP SWITCH WITH A GUIDE-PLATE DETACHABLY MOUNTED BETWEEN JUXTAPOSED CASING ELEMENTS

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Filed Aug. 19, 1964, Ser. No. 390,539
5 Claims. (Cl. 200—67)

This invention relates to a snap switch and particularly to a snap switch of the single pole type.

In snap switches of this type, the contacts, snap mechanism, and pushbutton mechanism for operating the snap mechanism are generally mounted in a hollow casing, the pushbutton mechanism being guided for movement to and from its operating positions with respect to the snap mechanism in a direction generally normal to the bottom face of the casing. For guiding the pushbutton mechanism, the conventional practice is to mount it in guideways in opposite side walls of the switch casing and provide biasing spring means between the pushbutton mechanism and bottom wall of the casing. However, in many instances, it is desirable to have a terminal at or near the center of the bottom of the casing opposite the pushbutton, and with the prior structures this was impractical because of the arrangement of the pushbutton mechanism and biasing spring.

In accordance with the present invention, the parts are arranged so that a terminal can be provided at or near the center of the bottom face. This is accomplished primarily by providing a guide plate in the casing and an operating slider carrying the pushbutton and mounted in the guide plate and guided thereby for cooperation with the snap acting mechanism for operating the switch.

Another feature of the invention is the manner in which the structure is made so that it can be readily assembled, particularly so that the guide plate, slider, biasing springs, and snap acting mechanism can be arranged in a subassembly and then readily installed within the casing as a unit.

Various other objects and advantages will become apparent from the following description, wherein reference is made to the drawings, in which:

FIGURE 1 is a top plan view of a switch embodying the principles of the present invention;

FIG. 2 is a right end elevation of the switch illustrated in FIG. 1;

FIG. 3 is a left end elevation of the switch illustrated in FIG. 1;

FIG. 4 is a front elevation of the switch illustrated in FIG. 1;

FIG. 5 is a bottom plan view of the switch illustrated in FIG. 1;

FIG. 6 is an enlarged front elevation of the switch illustrated in FIG. 1; with the front half of the casing removed, the slider being shown partially in section for clearness in illustration;

FIG. 7 is a horizontal sectional view taken on the line 7—7 in FIG. 6;

FIG. 8 is a vertical sectional view taken on the line 8—8 of FIG. 6, parts thereof being shown in elevation for clearness in illustration;

FIG. 9 is a top plan view of a conductor with the central terminal and snap acting mechanism secured to its ends, respectively;

FIG. 10 is a top plan view of the guide plate used in the present invention;

FIG. 11 is a front elevation of the guide plate;

FIG. 12 is a right end elevation of the guide plate;

FIG. 13 is a left end elevation of the guide plate;

FIG. 14 is a rear elevation of the guide plate; and

FIG. 15 is a bottom plan view of the switch casing in assembled condition, with the parts of the switch omitted, showing the means for mounting the guide plate in the casing.

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Referring to the drawings, the switch, generally at **1**, is enclosed in a casing **2** comprising a front portion **2***a* and a rear portion **2***b*. Each of the portions has a cavity therein opening through one face. The portions are assembled with the faces through which the cavities open juxtaposed against each other, as indicated by the line **3**. They are held in assembled relation by the means of a bolt **4** at one and a mounting bracket **5** near the other end. The mounting bracket **5** has lateral ears **6** receivable in suitable grooves **7** formed in the side walls of the front and rear portions **2***a* and **2***b*, and thus embraces the portions and holds them firmly together. One of the ears **6** has formed thereon a boss **8** receivable in a complementary socket **8***a* of one of the casing portions. The other ear is provided with an aperture through which a screw **9** extends into threaded engagement with the other casing portion.

Mounted within the casing is a snap action switch which, in the form illustrated, is shown as a single pole switch. The snap acting mechanism is shown as carried by the inner end of the conductor **10**, the outer end of which carries a connecting terminal **11** for connecting a wire thereto. It is to be noted that the connecting terminal is arranged at or near to the center of the bottom wall of the casing.

Mounted on the inner end of the conductor **10** with the housing is spring strip **12** of conducting material. The strip is provided with two longitudinally extending slots **13** and **14** which divide the strip into two outer marginal frame portions **15** and **16** and a central arm portion **17**. The marginal frame portions **15** and **16** are bent at their ends, as indicated at **18** and **19**, which shortens the overall length of the strip **12**. Before thus shortening of the central portion **17**, it is split transversely at its midportion, thus providing two offset ends **17***a* and **17***b*. These offset ends **17***a* and **17***b* are arranged to be engaged by a pushbutton slider for operation of the switch. The strip **12** and its portions **17***a* and **17***b* provide the snap acting means for the switch.

Mounted within the casing is a guide plate **20** which is arranged to assist in holding the conductor **10** in proper position and also to support the slider for movement along a proper path for operating the snap acting means. In the form illustrated both the casing and plate are of molded insulating material. The plate is shown as having upper and lower substantially planar faces **21** and **22**, and peripherally extending grooves **23** and **24** which are adapted to receive suitable ribs or tongues formed in the casing portions for holding the plate in position.

The plate is receivable endwise in either casing portion. As best illustrated in FIG. 15, the portions **2***a* and

2b have ribs 25 and 26 which are received endwise in the grooves 23 and 24, respectively, when the plate 20 is slid endwise into position in one of the selected portions 2a or 2b and the other portion is then moved into final assembled position with respect to the one portion.

The plate 20 has a notch 27 at one edge in which the conductor 10 is disposed and in which it fits substantially flush with the adjacent edge of the plate. Thus when the plate is inserted in the body with the conductor in place, and the casing portions are brought together, the plate 20 extends forwardly and rearwardly of the body. The plate 20 is provided at its front and rear ends with suitable guideways 30 and 31 which are adapted to receive suitable guide means on a slider.

Supported and guided for movement toward and away from the bottom of the casing by the plate 20 is a pushbutton slider 33. The slider comprises an elongated body having a central body portion 34 with arms 35 extending from both ends thereof forwardly and rearwardly of the casing. Guide means in the form of pins 36 are provided on the ends of the arms, respectively, and are accommodated in the guideways 30 of the plate 20 and thus guide the slider for movement toward and away from the guide plate 20. The body portion 34 is provided with slots 37 which receive the ends 17a and 17b of the central arm portion 17. Springs 38 are disposed on the pins 36 and bear against the plate 20 and normally urge the slider 33 in a direction upwardly away from the plate. This movement biases the arm portions 17 upwardly beyond dead center, thus causing them to move the strip 12 with a snap action in one direction. Upon depression of the slider, the body portion 34 moves the ends 17a and 17b beyond the opposite side of dead center, and this causes the arm portions 17 to move downwardly beyond dead center. This causes them to move the strip 12 to snap upwardly with a snap action.

A movable contact 39 is carried on one end of the strip 12, and a stationary contact 40 is mounted, within the body, on the inner end of a conductor 41 which, at its outer end, carries a terminal connector 42 for connecting an external conductor thereto.

The casing portions are also provided with grooves, such as indicated at 43, which receive and hold in place a suitable electric insulator barrier 44. Also they are provided with notches 45 which, when the front and rear portions of the casing are assembled, accommodate the pushbutton 46 on the slider 33 for movement endwise.

A suitable operating lever 47 has one end 47a mounted in sockets 48 in the casing portions and supporting the lever for rocking relative to the casing toward and away from the pushbutton 46. The other end of the lever, 49, is exposed exteriorly for operation by extraneous equipment. The lever 47 normally is in engagement with the outer end of the pushbutton 46.

Thus, in the form illustrated, upon pressing of the lever 47 downwardly, as shown in FIG. 6, the contacts 39 and 40 are made to close with a snap action. Upon release of the pushbutton 46 by lever 47, the slider 33 is returned by the springs 38 and the contacts are made to open with a snap action. The plate 20 may be provided with a stop 50 which limits the movement of the strip 12 and contact 39 downwardly in the opening direction.

To assemble the moving parts of the switch and the casing portions, the slider and conductor 10 are mounted on the plate 20 and held in assembled relation. While held in this relation, the plate 20 is slid into one of the casing portions, being guided thereby by cooperation of one of the grooves 23 or 24 corresponding with the ribs of the casing portion into which the plate is inserted. The barrier 44 and lever 47 are inserted in the same casing portion. Next, the other portion of the casing is slid onto the end of the plate 20 while guided by the complementary grooves of the plate 20 and ribs of the casing portion, until the adjacent open faces of the casing portions are brought into juxtaposition. The bolt 4 is then inserted to draw the portions 2a and 2b together at one end and the bracket is installed at the other end, thus locking the portions 2a and 2b in assembled position, with the switch elements assembled therein.

It is to be noted that the terminal connector 11 is at or near the midportion of the bottom face of the switch, and yet it can readily be installed without interfering with the moving parts and the operation of the slider.

Having thus described my invention, I claim:

1. A snap switch comprising a hollow casing,
a pair of contacts therein movable relative to each other into and out of contact,
snap acting means movable in opposite directions to positions to cause the contacts to snap into and out of contact, respectively,
a guide plate of electrical insulating material detachably mounted in the casing,
an actuating slider in the casing mounted on the plate for movement in directions relatively toward and away from the plate and connected to the snap acting means for moving the snap acting means in opposite directions upon movement of the slider in opposite directions, respectively,
means carried by the body and accessible for operation from the exterior thereof for moving the slider in one of said directions,
said casing comprising two separate companion casing elements of electrical insulating material with inner faces, respectively, which are detachably juxtaposed against each other in fitting relation when the elements are in assembled relation, said elements having cavities opening at said faces, respectively, and having bottom wall portions which, when the elements are in assembled relation, provide a bottom wall extending normal to the path of movement of the slider, the bottom wall portions having slots, respectively, opening at said faces and extending transversely of the casing, and having guides at the edges of the slots, said guide plate being accommodated in the slots and having guides at its edges cooperable with the guides of the slot edges for constraining the guide plate from movement out of the slots when the elements are in assembled relation to each other and for supporting the guide plate for attachment and detachment from the elements by endwise movement of the plate relative to the slots in opposite directions, respectively, when the elements are separated from each other.

2. An apparatus according to claim 1 wherein the plate has a notch in one of its lateral edges, said notch is spaced from the ends of the plate and is open at opposite faces thereof and at said lateral edge, a rigid conductor has a portion between its ends which is accommodated in said notch, one end portion of the conductor extends into the casing at that face of the guide plate facing the slider and the other end portion of the conductor extends exteriorly of the casing outwardly from that face of the guide plate facing away from the slider, said one end portion of the conductor supports the snap acting means, and a connecting terminal is provided on said other end portion of the conductor.

3. An apparatus according to claim 2 wherein the slider extends endwise across the midportion of the casing cavity in one direction generally endwise of, and parallel to, the plate, and the snap acting means extend across the midportion of the casing cavity between the plate and slider in another direction generally parallel to the plate at 90° to said one direction, and the plate and its notch are positioned relative to each other and to the bottom wall portions so that the notch is adjacent the center of the bottom wall.

4. An apparatus according to claim 3 wherein the slider is elongated in said one direction,
the plate is elongated in said one direction, and

complementary interengaging guide means are provided on the plate and slider, respectively, near their opposite ends, for guiding the slider by the plate during its movement toward and away from the plate.

5. An apparatus according to claim 4 wherein spring means are interposed between the slider and plate near the ends of the slider, respectively, and urge them relatively apart.

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