Feb. 11, 1958 D. M. ADAMS 2,823,272

SWITCH MECHANISM

Filed Sept. 7, 1956 2 Sheets-Sheet 1

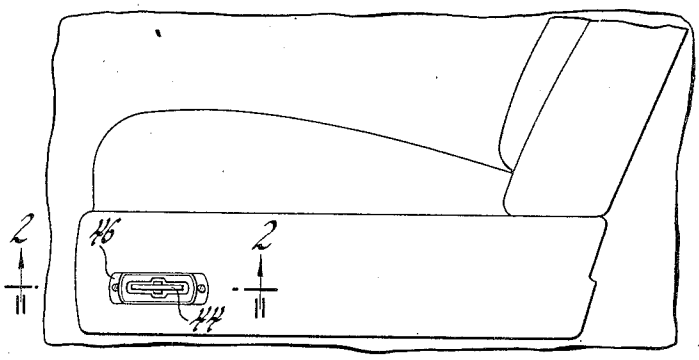


Fig. 1

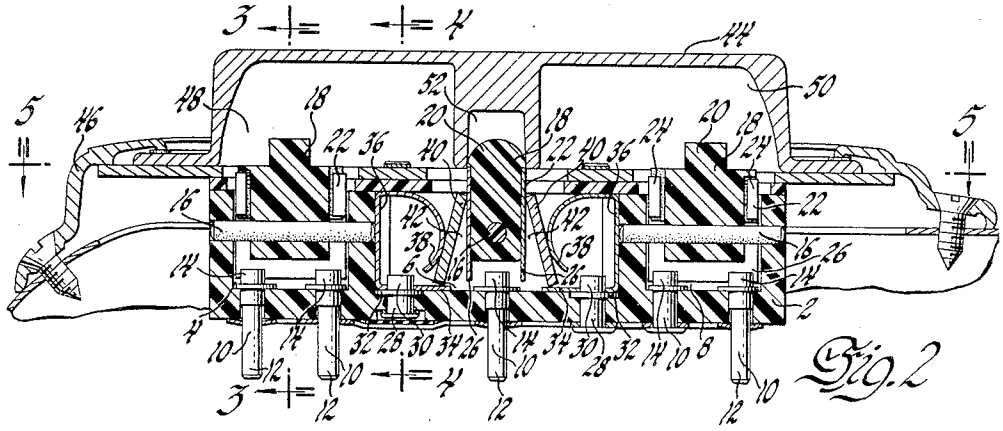


Fig. 2

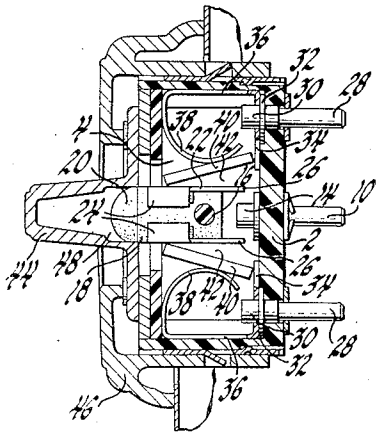


Fig. 3

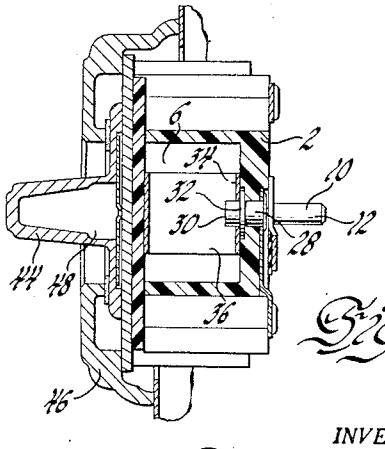


Fig. 4

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SWITCH MECHANISM

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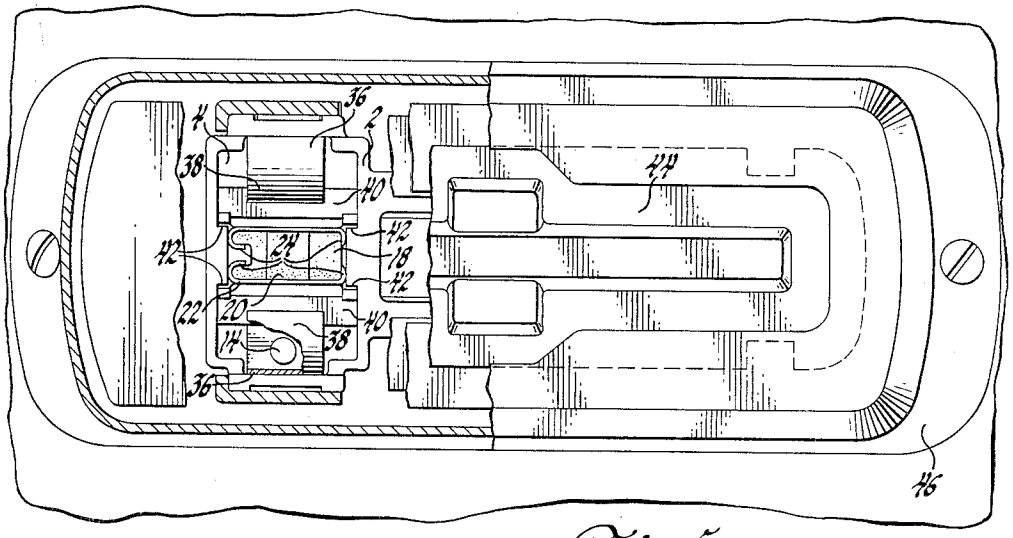


Fig. 5

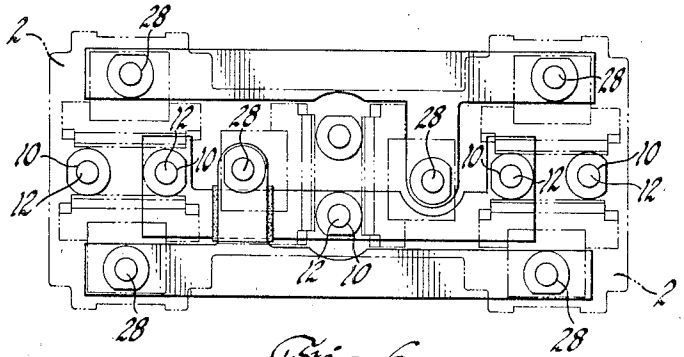


Fig. 6

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SWITCH MECHANISM

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6 Claims. (Cl. 200—6)

This invention relates generally to switching mechanisms and is particularly related to actuators for switching assemblies wherein a plurality of switch contact assemblies are arranged to be operated by a single actuator. For a further understanding of the invention and various objects therefor, reference may be had to the accompanying detailed description and drawings in which:

Figure 1 is a view in elevation of a portion of an automobile seat for which the switching mechanism including the actuator therefor is particularly adapted.

Figure 2 is an enlarged view of the switch mechanism applied to the seat of Figure 1 taken substantially on the line 2—2 and with parts broken away and in section illustrating various details of the switching mechanism including the movable actuator therefor.

Figure 3 is a view taken substantially on the line 3—3 of Figure 2 with parts in section further illustrating details of the switch and the novel unitary actuator therefor.

Figure 4 is a view taken on the line 4—4 of Figure 2 further illustrating details of the switching mechanism.

Figure 5 is a view taken on the line 5—5 of Figure 2 with parts broken away in section further illustrating the details of construction of the switch and its novel actuating mechanism.

Figure 6 is a view of the switch showing various connections to the contacts of the different contact switching assemblies to illustrate how various switching combinations may be obtained.

Although the switching mechanism including the novel actuator therefor is particularly adapted for use for example on a six-way automobile seat as illustrated by Figure 1, it will be appreciated as the description proceeds that the switch mechanism including the novel actuator is not limited to such application and is capable of use in an infinite number of ways and for various applications which it would be impractical to list and describe here. The contact switching assemblies, per se, do not in and of themselves form the subject of this invention and therefore it is deemed that no detailed description is needed with respect thereto other than to indicate how the contact switching assemblies work and how the novel actuator may be combined therewith so as to provide a new inventive combination.

The whole switching assembly includes a single insulating housing or support 2 having three cells 4, 6 and 8 respectively formed therein and in which are located toggle switching contact assemblies similar in every respect except for their arrangement relative to each other. The toggle switching contact assembly which is assembled in cell 4 will be described in detail and it may be assumed that the toggle switching contact assemblies in cells 6 and 8 include like parts operating in a like manner. Referring primarily to Figures 2 and 3 it will be noted that fixed in support 2 and extending into cell 4 are a pair of centrally located longitudinally spaced current carrying studs 10 whose ends 12 may be plugged into a suitable receptacle and whose opposite ends 14 act as switching contacts in a manner

which will appear shortly. Pivotally mounted in cell 4 by means of pin 16 is a switch toggle 18 made of some suitable insulating material. The toggle 18 is provided with an actuating portion 20 at the end most remote from its pivotal movement about pin 16 and with a covering 22 of good conducting material which is held in place on the toggle 18 by means of ears or tabs 24 pinched to clamp longitudinally extending ends of the toggle 18. The covering 22 is provided with oppositely disposed spring contacts 26 which extend on either sides of the ends 14 of studs 10 and which are adapted to engage the ends 14 upon actuation of end 20 of the toggle 18 about the pin 16. Continuing to observe Figure 3 and the left-hand portion of Figure 2, it will be observed that extending into cell 4, in addition to the studs 10, is a pair of transversely disposed studs 28 which likewise may be plugged into suitable female receptacles. The ends 30 of studs 28 extending into cell 4 are each defined by a flange 32 against which the foot or base portion 34 of a springlike clip 36 abuts. The base portions 34 make good electrical contact with the ends 30 of studs 28 through the flange 32. The opposite ends 38 of the clips 36 are springlike and hold a pair of flat plates 40 in contact with the conducting covering 22 when the toggle 18 is in its centered relation between the flexible portions 38 of the clips 36. The plates 40 are limited from moving from the position shown in Figure 3 closer to the pivot pin 16 by means of shoulders 42 (see particularly Figures 3 and 5) so that when the actuator 18 is moved by end 20 about the pivot pin 16, say for example in a clockwise direction, the covering 22 is carried out of contact with the lower (as viewed in Figure 3) plate 40 and the flexible portion 38 of clip 36. However, as the actuator 18 is moved in the clockwise direction the upper of the tabs 26 of covering 22 as viewed in Figure 3 will make contact with the ends 14 of the studs 10, thus completing an electrical circuit from studs 10 through the covering 22, the upper of plates 40 as viewed in Figure 3, the upper spring clip 38 and the upper of the studs 28 as viewed in Figure 3. Movement of the switch actuator 18 in a counterclockwise direction from the position shown will, of course, complete a circuit between the studs 10 and the lower of the studs 28, as viewed in Figure 3, through the lower of the tabs 26 of cover plate 22, the lower of the plates 40 and spring clips 36. From the foregoing description it will be appreciated that movement of the switch actuator 18 from the portion shown in Figure 3 causes alternate switching connections between the upper and lower of the studs 28 and that the toggle 18 is normally biased to the centered position shown by reason of the flexible portions 38 of the clips 36.

The contact switching assembly located in the cell 6 is similar in every respect to that in cell 4 and accordingly like parts have been given like numbers. It will be noted, however, that the contact switching assembly in cell 6 is located at right angles to that in the cell 4 so that movement of the actuator 18 of the switching contact assembly in cell 6 occurs in a plane perpendicular to the plane in which the actuator 18 located in cell 4 moves. The contact switching assembly in cell 8 again is identical in every respect to that shown and described in cell 4 and movement of its toggle 18 to cause switching takes place in a plane parallel to the plane in which movement of the toggle of the contact switching assembly in cell 4 occurs. It may now be appreciated that the switching assembly comprises in actuality what amounts to three switching contact assemblies longitudinally spaced whose toggles are spring biased to extend in the same general direction.

The switching mechanism so far described is considered conventional and by itself does not form the subject matter of the present invention. In the past, however,

such switches have been provided with individual actuators or tabs to move the toggles 18 individually. For example the toggle 18 operating the contact switching assembly in cell 4 might be moved clockwise (up) or counterclockwise (down) from its centered position to move the forward end of the seat shown in Figure 1 either up or down. The toggle 18 of the contact switching assembly in cell 6 might be moved either clockwise or counterclockwise about its pivot, i. e., longitudinally back and forth to move the seat either forward or backward. The contact switching assembly in cell 8 by movement of the toggle 18 in either clockwise (up) or counterclockwise (down) direction about its pivot might be used to raise or lower the rear end of the seat shown in Figure 1 either up or down. While individual operation of the three toggles 18 was satisfactory for accomplishing the different movements of the seat selected the operator found it difficult to remember which switch did which and he often operated the wrong switching assembly and had to get the proper adjustment by a series of trials and errors. The present invention proposes to use a single unitary actuator which moves in a plane normal to the direction in which the toggles 18 normally extend when biased to their centered position by the flexible portions 38 of the clips 36. Thus, if the operator of the seat who often is not in a position to look down at the actuator learns in which direction the single actuator must be moved to achieve the desired seat adjustments he can do so without a series of trials and errors and fumbling about for three individual switches as was formerly necessary. In the present example the logical movements for the actuator to adjust the seat of Figure 1 would be, to raise the seat the operator merely lifts the entire actuator. To lower the seat he lowers the entire actuator. To move the seat forward he would move the actuator forward and to move the seat back he would move the actuator backward. If he wished to raise or lower the forward end of the seat he would raise or lower the forward end of the actuator. If he wished to raise or lower the rearward end of the seat he would raise or lower the rearward end of the actuator. The advantages of this type of unitary switch actuator and control as for example for a power seat having a plurality of selected positions are, of course, obvious.

Referring again to the drawings, this novel actuating mechanism comprises a unitary attractive piece 44 which is secured to the outer face of the switching assembly by means of suitable fastening and clamping means 46 so it can move in a plane normal to the direction in which the toggles 18 normally extend. The piece 44 comprising the unitary actuator is provided with a pair of longitudinally extending co-extensive slots 48 and 50 which receive the upper ends 20 of the toggles 18 of the contact switching assemblies located in cells 4 and 8 respectively. Separating the slots 48 and 50 and lying in the same plane and extending perpendicular to slots 48 and 50 is a slot 52 which is also formed in the unitary actuator 44. The dimensions of these slots 48, 50 and 52 are such that longitudinal movement of actuator 44 will cause movement of the toggle 18 of the contact switching assemblies located in cell 6 without causing any movement of the toggles of the switching assemblies in cells 4 and 8. Vertical movement of the actuator 44 (as viewed in Figure 1) will cause movement of the toggles 18 of the switching assemblies in cells 4 and 8 but because of the length of slot 52 will not cause any actuation of the toggle 18 of the switch assembly located in cell 6. Similarly dimensions of the slots 48, 50 and 52 are also such that if one end of the actuator 44 is moved either up or down the toggle 18 located at the opposite end of the actuator in either cell 4 or 8 and also the toggle 18 in cell 6 will be unaffected. It will thus be seen that by means of a single actuator having movements assimilating those desired, actually eight different switching arrangements may be achieved with the three contact switching assemblies shown. These different switching arrangements which are obtained by the single actuator are as follows:

Switching assembly in cell 4—up and down corresponding to raising and lowering of front of seat.

Switching assembly in cell 8—up and down corresponding to raising and lowering of rear of seat.

Switching assemblies in both cells 4 and 8—either both up or both down corresponding to raising and lowering of entire seat.

Switching assembly in cell 6—either forward or backward corresponding to moving seat forward or backward.

It will be appreciated from the foregoing that by taking a plurality of contact switching assemblies and mounting them and combining them with the novel actuating means in the manner shown, there are innumerable switching combinations that may be obtained, all of which are selectively controlled by predetermined movements of a single actuator and it is this broad concept that forms the primary subject of the present invention. The novel switch mechanism has been described by way of example as a means for controlling the adjustments of an automobile seat. It will be understood, however, that the applications of such a switching mechanism including the novel actuator are limitless and therefore there is no intention to be limited to this single application.

I claim:

1. In combination with a plurality of toggle switches mounted in a single housing and having the toggles thereof biased to extend in the same general direction, a unitary switch actuator having slots therein receiving the toggles of said switches, said slots being arranged to selectively actuate the toggles of said switches against the bias thereof upon predetermined movements of said actuator in a plane generally normal to the direction of extension of said toggles.

2. In combination with a pair of toggle switches mounted on a rigid support and having the toggles thereof biased to extend in the same general direction and movable in directions generally normal to the direction in which they extend, a unitary switch actuator having slots therein receiving the toggles of said switches, said slots extending generally normal to the direction of movement of said toggles such that diagonal movements of such actuator in a plane including said slots and said toggles causes selective actuation of the toggles of said switches against the bias thereof.

3. In combination with a pair of toggle switches mounted on a rigid support and having the toggles thereof biased to extend in the same general direction and each operable in a plane normal to the plane in which the other is operable, a unitary switch actuator having slots therein normal to each other and in a plane normal to the planes in which said toggles are operable, the toggles of said switches being received in said slots so that upon predetermined movement of said actuator selective actuation of said toggles takes place against the bias thereof.

4. In combination, a pair of toggle switches mounted in spaced relation on a rigid support and having the toggles thereof extending in the same general direction and movable in a pair of planes each including one of said toggles, said planes being parallel to each other, a third toggle switch mounted on said support and having the toggle thereof extending in the same general direction as said first mentioned toggles and movable in a plane normal to said parallel planes, a unitary switch actuator having a pair of slots co-extensive with each other which are separated by a slot extending perpendicularly to said first mentioned slots, said co-extensive slots receiving the toggles of said first pair of switches and said last mentioned slot receiving the toggle of said last mentioned switch whereby upon predetermined movements of said actuator in a plane generally normal to the

direction of extension of said toggles the toggles of said switches may be selectively actuated.

5. In combination with a plurality of switches having individual actuators extending generally in the same direction, a unitary switch actuator, biasing means yieldably locating said actuator in a switch non-operating position, said unitary switch actuator engaging said actuators and arranged to selectively actuate said individual actuators upon predetermined movements of said unitary actuator against the bias thereof in a plane generally normal to the direction of extension of said actuators.

6. In combination with a plurality of switches having individual actuators extending generally in the same direction, a unitary switch actuator arranged for random movement which includes linear and rotary movement in a plane generally normal to the direction of extension

of said actuators and engaging said actuators and arranged to selectively actuate said individual actuators in different combinations depending upon the type of movement selected for said unitary actuator in said plane.

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