

May 14, 1968

W. F. SWISHER

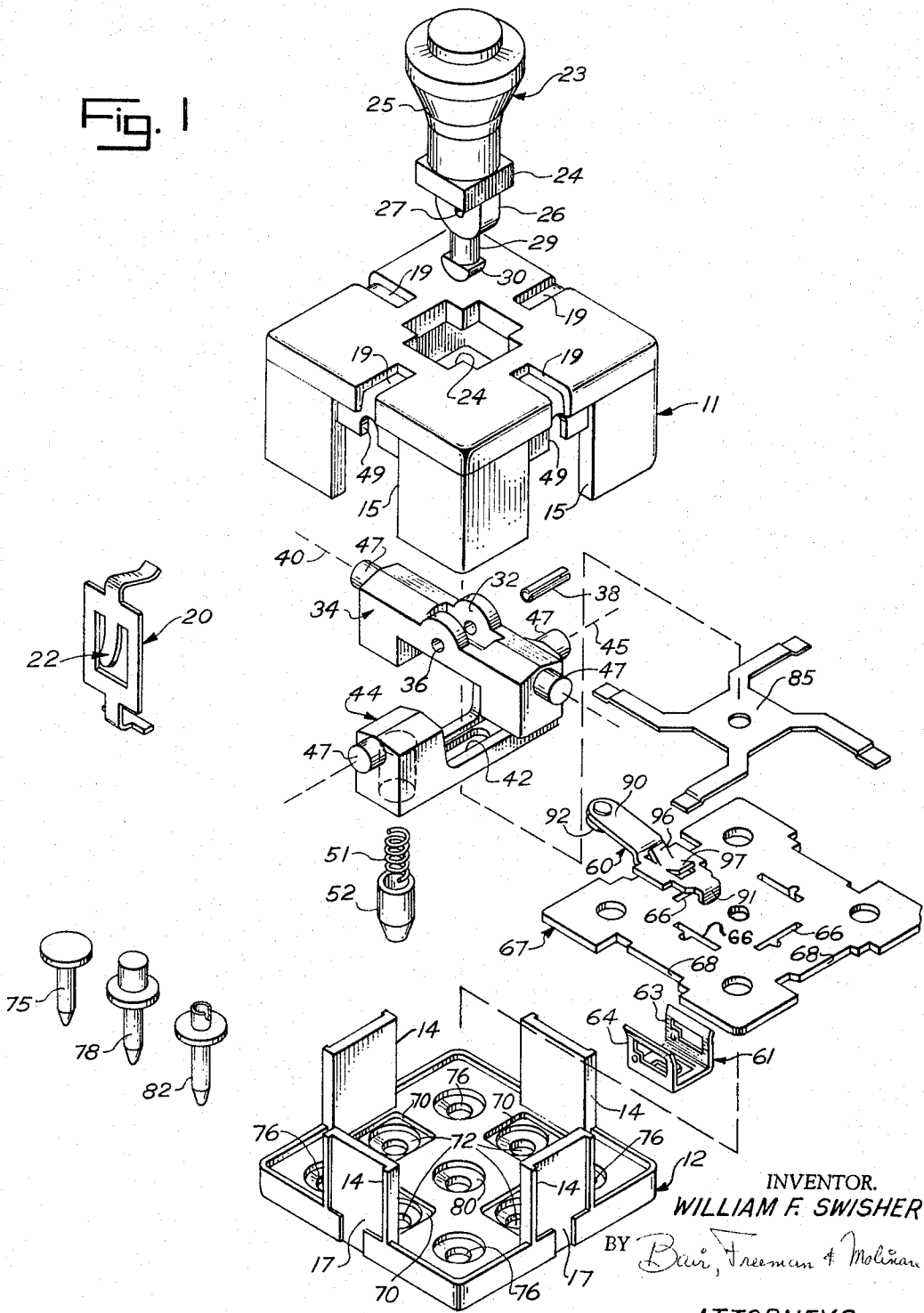
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MULTIPLE POSITION SWITCH

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2 Sheets-Sheet 1

Fig. 1



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2 Sheets-Sheet 2

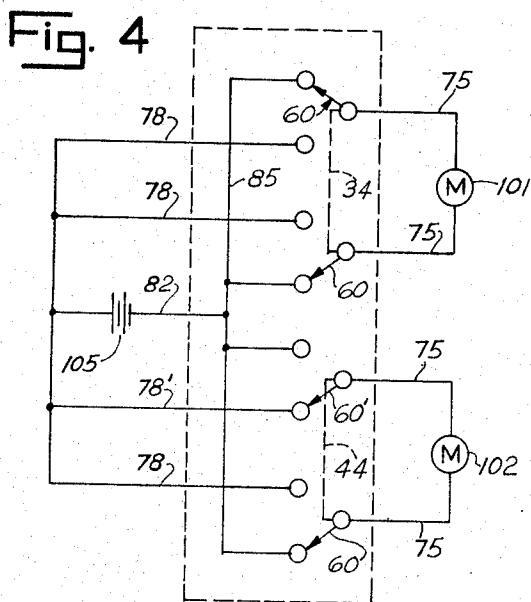
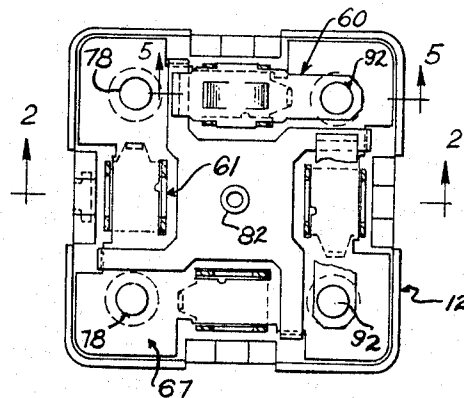
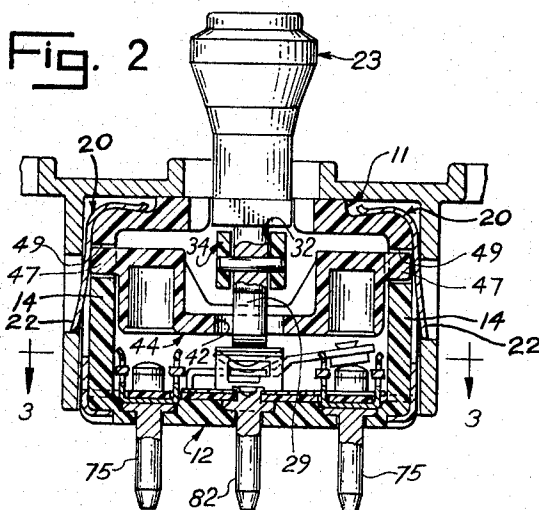


Fig. 5

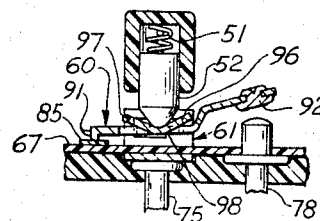
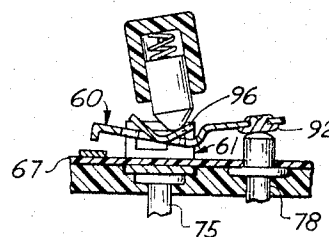


Fig. 6



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1

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MULTIPLE POSITION SWITCH

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6 Claims. (Cl. 200—6)

ABSTRACT OF THE DISCLOSURE

An electrical multiple position switch having an operating lever which alternately rotates a pair of rotatable crankshafts and each crankshaft includes a pair of spring loaded plungers. A terminal board is provided having a plurality of fixed contact terminals and a buss plate. A plurality of pivotable contacts are provided with each of the pivotable contacts being associated with one of the fixed contact terminals. Each of the pivotable contacts is normally urged into contacting relationship with the buss plate. When one of the crankshafts is selectively rotated, one of its associated plungers urges one of the pivotable contacts out of contact with the buss plate and into contact with one of the fixed contact terminals. The lever is capable of movement about at least two axes where movement about one of the axes rotates one crankshaft and movement about the other of the axes rotates the other crankshaft. The whole assembly is inclosed in a two-part housing which is clamped together; the crankshafts are held between the two parts of the housing and the housing prevents movement of the lever about more than one axis at any one time.

BACKGROUND OF THE INVENTION

This invention relates to electrical multi-position switches and, more particularly, to an improved switch for independently controlling a plurality of electrical circuits through the manipulation of a single control.

In many applications, it is desirable to employ a multiple position switch which is capable of energizing a selected one of several circuits by appropriately positioning a single control. Such a switch may be used, for example, to operate the reversible motors used to position a motorized automobile seat, the seat being moved forward, backward, upward or downward depending on which one of four different circuits is closed. To position the seat, the passenger merely moves the switch control in the direction he wishes the seat to move.

It is accordingly a principal object of the present invention to provide a multiple position switch of simple, rugged, and inexpensive construction capable of controlling a plurality of circuits independently by means of a single control.

It is a further object of the invention to provide an exceedingly compact multiple position switch which is inexpensive to fabricate, which is easily assembled, and which is highly durable even when used for extended periods.

SUMMARY OF THE INVENTION

In a principal aspect, the present invention takes the form of a multiple position switch capable of individually controlling a plurality of circuits through the manipulation of a single control member. According to a first feature of the invention, the switch includes first and second crankshafts, mounted for pivotal motion about first and second intersecting axes respectively. The control member is pivotally mounted on the first of these crankshafts and also engages with the second crankshaft to permit both crankshafts to be selectively rotated in either direction.

According to a second feature of the invention, a pair

2

of switches are operatively associated with each crankshaft, each switch having a normal position and an actuated position. Means are employed for coupling the switches to the associated crankshaft such that the first switch is actuated when the associated shaft is rotated in one direction and the second switch is actuated when the associated shaft is rotated in the opposite direction. Thus, upon movement of the control lever, any one of four switches can be selectively actuated, depending upon the selected direction of movement of the control member.

These and other objects, features, and advantages of the present invention will be more clearly understood through a consideration of the following detailed description. In the course of this description, reference will frequently be made to the attached drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an exploded view of a multiple position switch embodying the principles of the invention;

FIG. 2 is a cross sectional view of the multiple position switch shown in FIG. 1 in assembled form and taken substantially along the line 2—2 of FIG. 3;

FIG. 3 is a top view of the multiple position switch taken substantially along the line 3—3 of FIG. 2;

FIG. 4 is a schematic diagram showing the manner of connecting the switch illustrated in FIGS. 1—3 to operate a pair of reversible motors; and

FIGS. 5 and 6 show the normal and actuated positions respectively of a single switch assembly.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The component parts of a preferred four-position switch embodying the principles of the invention are shown in the exploded view of FIG. 1. The internal components of the switch are encased within a housing comprising a cover indicated generally at 11 and a base indicated generally at 12. The base 12 includes four upwardly extending side wall segments 14 which are received by the openings 15 in the side walls of cover 11. Each of the side wall sections 14 in base 12 includes a recessed area 17 which, together with the recessed portions 19 of the cover 11, receive four spring clips of the type shown generally at 20 in FIG. 1. The spring clip 20 serves to hold the cover 11 and base section 12 tightly together and also includes a central flange portion indicated at 22 which serves to hold the entire switch assembly in a mounting bezel as will be discussed in conjunction with FIG. 2.

A control lever indicated generally at 23 extends downwardly through a cross-shaped opening 24 in the cover 11. Control lever 23 includes a square central member 24, a rounded lever member 25 which extends upwardly from the squared member 24, and a flat portion 26 having rounded edges and a central bore 27 which extends through the flat portion 26. A rounded shaft 29 extends downwardly from the flat portion 26 and is terminated at its lower extremity by an enlargement 30.

With the control lever 23 in its assembled position, the flat member 26 is received within a slot section 32 of a first crankshaft shown generally at 34. The crankshaft 34 includes a centrally located bore 36 which, together with the bore 27 in control lever 23, receives a split sleeve pin 38 oriented perpendicular to the longitudinal axis 40 of crankshaft 34. Accordingly, the control lever 23 is mounted for pivotal motion in the plane of axis 40 about the pin 38.

The shaft portion 29 of control lever 23 is received in a slot 42 in the lower crankshaft 44. Crankshaft 44 is oriented such that its axis 45 is perpendicular to the axis 40 of crankshaft 34; that is, axis 45 is in line with the pin 38. Each of the crankshafts 34 and 44 are terminated at their ends by rounded axle members 47 which

are received within rounded slots 49 cut into the cover 11 immediately above the openings 15. In the assembled switch, the axle sections 47 are held in place by the upper edges of side wall sections 14 and by the spring clips 20 as shown in FIG. 2. The axle sections 47 of each crankshaft are attached to an enlarged area which receives a compression spring 51 and plunger 52 (only one spring 51 and one plunger 52 are shown in FIG. 1, although four of each are employed in the switch).

As shown most clearly in FIGS. 5 and 6 of the drawings, each plunger 52 extends downwardly and engages with a contactor 60 which is mounted for pivotal movement upon a yoke member shown generally at 61.

As seen in FIG. 1, each yoke member includes an interior, upwardly extending side wall 63 and an outer, upwardly extending side wall 64. The side wall 63 passes through a slot 66 in a terminal board indicated generally at 67. The side wall 64 of each yoke 61 lies flush against a recess 68 in the terminal board 67. The lower surface of each yoke 61 fits within a recess 70 in the inner surface of the base 12.

A countersunk bore 72 is centrally positioned within the recess 70 and receives a contactor terminal pin 75 having the general shape of a flat-headed nail. Only one pin 75 is shown in FIG. 1. A countersunk bore 76 is positioned at each corner of the base 12 and receives a feed terminal 78, one of which is shown in the exploded view of FIG. 1. A ninth, centrally located, countersunk bore 80 in base 12 receives the buss terminal 82. Buss terminal 82 includes a hollow, vertical projection adapted to be flattened to hold a buss plate 85 in position flush against the terminal board 67. The buss plate 85 includes four arms which extend laterally under a portion of each of the four contactors 60, as best seen in FIG. 3.

Because of the cross-shaped configuration of opening 24 in the cover 11, the control lever 23 is permitted to move in four different directions. As the control lever 23 is pivoted about the pin 38, the engagement of shaft portion 29 with the slot 42 causes rotation of the crankshaft 44. Pivotal motion of the control lever 23 about axis 40 rotates the crankshaft 34 without rotating crankshaft 44.

Rotation of either crankshaft 34 or 44 operates one of the four switches. As shown in FIG. 1, each contactor is provided with two extending arms 90 and 91. A contact member 92 is affixed to the extended arm 90 while the extended arm 91 projects downwardly toward an extended arm of the buss plate 85 as shown in FIGS. 3, 5 and 6. Each contactor 60 includes a pair of flanges 96 and 97 which extend upwardly at an angle to the main body of the contactor 60 to form a V-shaped pair of beveled surfaces which receive the plunger 52.

As illustrated in FIGS. 5 and 6, each contactor 60 is pivotally mounted about a fulcrum point 98 provided by the yoke 61, the fulcrum 98 being positioned between the contact 92 and the junction of flanges 69 and 97 such that the contactor 60 is normally pivoted counter-clockwise about fulcrum 98. In this normal position, the end 91 of contactor 60 is in contact with an extended arm of the buss plate 85 as shown in FIG. 5. When the associated crankshaft is rotated such that the low end of plunger 52 moves toward the contact 92, the engagement between plunger 52 and flange 96 causes the contactor 60 to be pivoted clockwise such that the contact 92 moves into engagement with the terminal pin 78. Had the associated crankshaft been rotated in the opposite direction, there would have been no effect on contactor 60. It may thus be seen that rotation of one of the crankshafts in a given direction operates only one of the two associated contactors, the other remaining in its normal position with end 91 in contact with the buss plate 85.

The schematic diagram shown in FIG. 4 of the drawings illustrates the manner in which the multiple position switch shown in FIGS. 1-3 may be employed to control the operation of a pair of reversible motors 101 and 102, both of which are operated from a direct cur-

rent source indicated by battery 105. The switch itself is shown within the dotted lines and is provided with nine external connections through the four contactor pins 75, the four feed pins 78, and the central buss terminal 82. As indicated schematically in FIG. 4, the negative terminal of battery 105 is connected to buss plate 85 within the switch through the central buss terminal 82. Each of the four corner terminal pins 78 are connected to the positive terminal of battery 105. The terminals of motor 101 are each connected to a contactor 60 by way of the contactor terminal 75. The contactors 60 connected to motor 101 are each operated by the crankshaft 34 as symbolized by the dash line in FIG. 4. Similarly, motor 102 is connected by way of contactor terminals 75 to a second set of contactors 60, each of which is operated in response to the movement of crankshaft 44, as symbolized by the lower dash line in FIG. 4. In the switched position illustrated schematically in FIG. 4, the control lever 23 (shown in FIG. 1) has been pivoted about the pin 38, leaving the crankshaft 34 in its normal position, but rotating the crankshaft 44 such that one of the contactors 60' is moved from its normal position in contact with buss plate 85 and into contact with a terminal pin 78'. In this position, current is allowed to flow from the positive terminal of battery 105, through terminal pin 78' and contactor 60', to energize the motor 102. As may be readily appreciated, either one of the four contactors 60 may be actuated, depending upon the direction in which control lever 23 is pivoted, in order to apply a battery voltage of a selected polarity to either motor 101 or 102.

It is to be understood that the embodiment of the invention which has been described is merely illustrative of one application of the principles of the invention. Numerous modifications may be made by those skilled in the art without departing from the true spirit and scope of the invention.

What is claimed is:

1. A multiple position switch comprising:

first and second crankshafts mounted for pivotal motion about first and second intersecting axes respectively,

a lever pivotally mounted on said first crankshaft and engaging said second crankshaft for rotating a selected one of said crankshafts in a selected direction,

a terminal board,

a buss plate mounted on said terminal board, first, second, third and fourth fixed contacts mounted on said terminal board,

first, second, third and fourth movable contacts mounted on said terminal board,

biasing means mounted on each of said crankshafts and engaging said movable contacts wherein when said first crankshaft is rotated about its axis in a first direction, said first movable contact is urged by said biasing means into contacting relationship with said first fixed contact and said second movable contact is urged into contact with said buss plate; when said first crankshaft is rotated about its axis in a second direction said second movable contact is urged by said biasing means into contacting relationship with said second fixed contact and said first movable contact is urged into contact with said buss plate; when said second crankshaft is rotated about its axis in a third direction said third movable contact is urged by said biasing means into contacting relationship with said third fixed contact and said fourth movable contact is urged into contact with said buss plate; and when said second crankshaft is rotated about its axis in a fourth direction said fourth movable contact is urged by said biasing means into contacting relationship with said fourth fixed contact and said third movable contact is urged into contact with said buss plate.

2. A multiple position switch as set forth in claim 1

5

including a switch housing and an opening in said housing for receiving said lever, said opening being shaped to prevent pivotal motion of said lever about both of said intersecting axes simultaneously.

3. A multiple position switch as set forth in claim 1 including a two-part housing clamped together by a plurality of spring clips, the extremities of each of said crankshafts being clamped between the two parts of said housing and held in place axially by said spring clips.

4. The multiple position switch of claim 1 wherein said first, second, third and fourth movable contacts are normally urged into contact with said buss plate and when one of said crankshafts is rotated about its axis in one of said directions one of said movable contacts is urged out of contact with said buss plate and into contact with one of said fixed contacts.

5. The multiple position switch of claim 1 wherein said

6

movable contacts are pivotally mounted on said terminal board.

6. The multiple position switch of claim 1 wherein said biasing means comprises at least a pair of spring loaded plunger mounted on each crankshaft, said plungers normally engaging said movable contacts.

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