

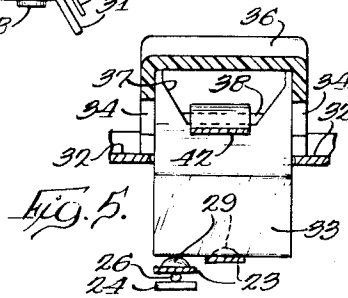
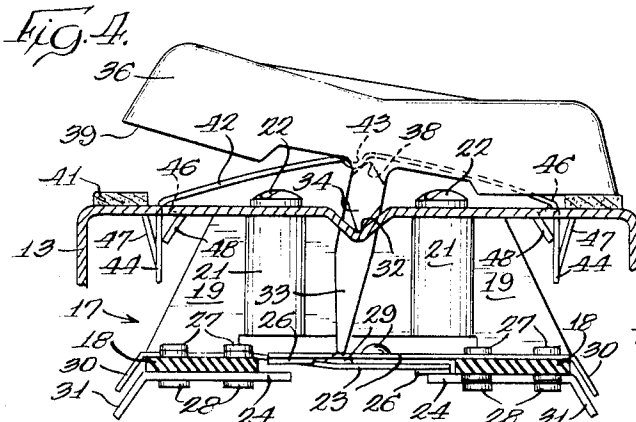
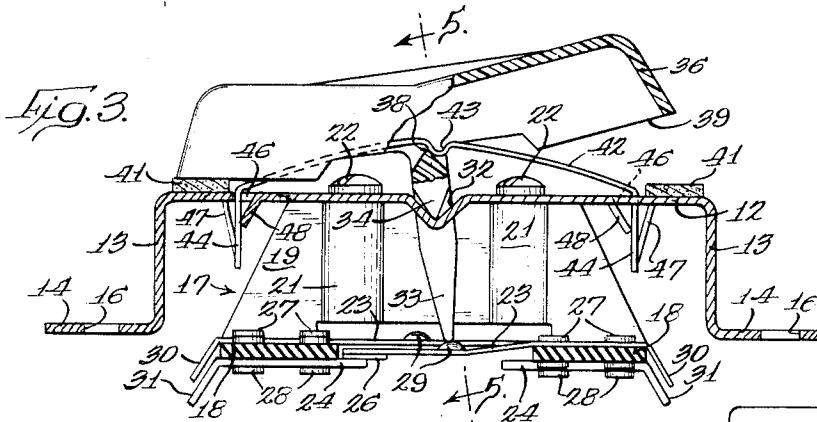
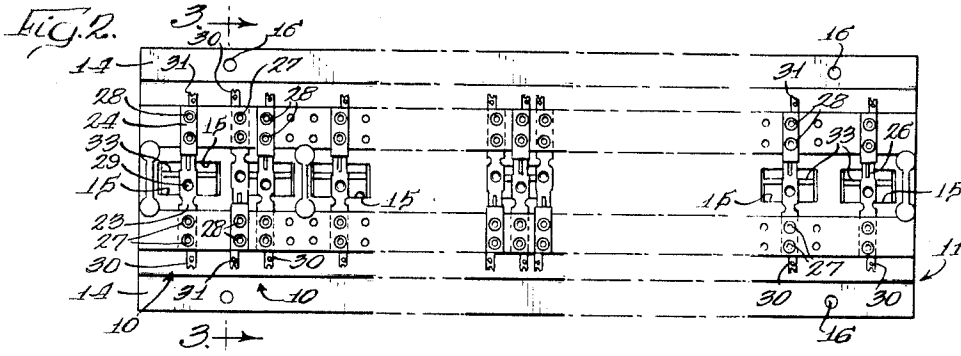
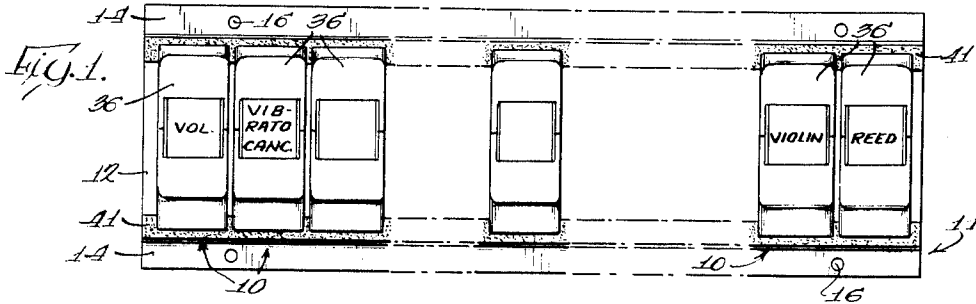
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PIVOTED-TYPE LEVER-OPERATED SWITCH

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1

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PIVOTED-TYPE LEVER-OPERATED SWITCH

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4 Claims. (Cl. 200—6)

This invention relates generally to switches, and more particularly to a novel tablet switch of the type used in electric organs as stops for voice control.

Objects of the invention are to provide a switch control mechanism of simple and durable construction which may be quickly and easily assembled and disassembled, and which is fabricated from materials and parts which are readily available or easily constructed, whereby significant economies in fabrication and maintenance of the switch may be attained while assuring quiet and reliable operation thereof over a long service life.

Another object of the invention is to provide a switching mechanism of the type referred to in the foregoing object, wherein a number of sets of contacts, affecting a number of circuits, may be actuated by a single actuating member, and wherein a wide variety of combinations and sequences of make or break contacts may be easily realized.

Other objects and advantages of the invention will be apparent from the following description of a presently preferred embodiment thereof, taken in conjunction with the accompanying drawing wherein like numerals refer to the same or identical parts in all of the figures, and in which:

FIG. 1 is a top plan view of a group of tablet switches of the present invention assembled in a mounting base therefor;

FIG. 2 is a bottom view of the apparatus of FIG. 1;

FIG. 3 is a vertical sectional view taken generally on the line 3—3 of FIG. 2, but on a larger scale, with certain portions of the tablet cap portion broken away to show certain details of construction, the switch actuating member being shown in one of its two toggle positions;

FIG. 4 is a view similar to FIG. 3, wherein the switch actuating member is in its other toggle position; and

FIG. 5 is a sectional view taken generally on the line 5—5 of FIG. 3, showing a detail of the switch actuating member.

Referring now to the drawing for a more detailed description of the present switch, there is shown in FIGS. 1 and 2 a plurality of switches, each shown generally as 10, assembled in a mounting base indicated generally at 11. The mounting base includes a plate portion 12 which, in the embodiment shown, comprises the web of a channel-shaped member having dependent flanges 13, each of the latter being bent outwardly at its free end to form an additional flange 14. The plate portion 12 has an opening 15 therein, preferably substantially rectangular in shape, located substantially centrally of the sides of the plate portion. The flanges 14 are apertured at spaced points along their length, as at 16, whereby the mounting base may be secured by screws to any convenient part of an organ console, e.g., to the back side of a panel which in some consoles rises from the rear end of the manual keyboard, the panel having openings therein through which the tablets for actuating the switches project either singly or in groups.

The mounting base 11 also includes a contact support member, shown generally as 17, which may comprise a pair of laterally spaced plate portions 18 and laterally extending, spaced web portions 19 rigidly connecting the plate portions 18, the webs 19 including pairs of internally threaded bosses 21, whereby the contact support

2

member 17 may be secured tightly to the under side of plate portion 12 by means of screws 22. The plate portions 18, webs 19 and bosses 21 are fabricated as a unitary member of solid electrical insulating material, and are preferably molded of any suitable solid plastic material as a unitary part.

The contact support member 17 carries at least one set of electrical contacts, and embodiments showing the use of one, two and three such sets of contacts are illustrated in FIG. 2. In FIGS. 3 and 4, an embodiment is illustrated in which two sets of contacts are used, such sets including movable contact members 23 and respective related fixed contacts 24. The movable contact members, which are preferably formed of flat spring bronze stock, have contact wires 26 of palladium or other precious metal welded respectively to their free ends, and are secured respectively at the ends opposite the contact wires 26 to the insulating plate members 18 by means of rivets 27. If desired, contact wires similar to wires 26 may be welded to the upper surfaces of the fixed contacts 24, but crosswise relative to the wires 26, to provide good electrical contact between the associated pairs of fixed and movable contact members. The fixed contacts 24 are secured to the plates 18 by means of rivets 28.

The upper surface of each of the movable contact members 23 is seen to comprise a generally flat portion, and there is formed thereon a raised portion 29 which preferably takes the form of a curved projection formed integrally in such contact members by a conventional pressing operation. The movable contact members are provided with integral connectors 30, and the fixed contacts 24 are provided with integral connectors 31, for connecting the respective contact members to the circuits to be controlled by the respective switches.

The movable contact members 23 are so positioned in the contact support member 17 that the raised portions 29 are in substantial alignment vertically with the opening 15 in the plate portion 12.

The part of the plate portion 12 bordering on the opening 15 is provided with a pair of opposed grooves 32, preferably C-shaped (one of which is shown in each of FIGS. 3 and 4), the grooves being positioned substantially at the mid-points of opposite sides of the opening 15. The grooves 32 are disposed at substantially the same height above the flat portions of the movable contact members 23 and run transversely of the latter. A switch actuator 33, preferably in the form of a blade, projects downwardly through the opening 15, the actuator 33 having opposed lugs 34 intermediate its ends which rest in the grooves 32, thus providing a pivotal support for the actuator in the mounting base. The bottom of the actuator blade engages the movable contact members 23, and is of such a length that when the actuator engages the flat portion of the upper surface of contact member 23, the latter does not engage its opposed fixed contact 24, but when the bottom of the actuator engages the top of the raised portion 29 of a movable contact member the latter engages its opposed fixed contact 24.

The upper end of the actuator blade 33 is integral at its sides with a cap portion 36 of generally rectangular shape and having a hollow underside, which constitutes the tablet conventionally used in the consoles of electric organs for manipulation by the player, the actuator blade and its cap portion 36 being fabricated of rigid electrical insulating material and being preferably molded of any suitable plastic material as a unitary part. The upper end of the actuator blade 33, between the sides thereof integral with the cap portion 36, is spaced from the top wall of the cap portion, forming an opening 37 (FIG. 5), and is preferably wedge-shaped in cross-section to provide an edge 38 having a small radius of cur-

3

vature, the edge 38 running parallel to the axis of rotation of the lugs 34 in the grooves 32. The bottom edges 39 forming the longitudinal sides of the cap portion 36 are disposed substantially above the surface of the plate portion 12, and are inclined upwardly slightly from the transverse center line of the cap portion, so that the cap portion may be rocked or oscillated through a small angle about the axis of the above mentioned pivotal support of the actuator blade, the limits of such rocking motion being provided by felt abutments or stops 41 secured to the top of the plate portion 12.

The lugs 34 of the actuator 33 are maintained in their pivotal engagement in grooves 32 by means of a leaf spring member 42 having a downwardly directed detent or projection 43 substantially at its center, and having a downwardly directed flange 44 at each of its ends. The flanges 44 are inserted through openings 46 in the plate portion 12, the openings being disposed on either side of the groove 32 and substantially equidistant therefrom. The spring 42 is so formed that the flanges 44 must be stressed slightly inwardly in order to pass them through the openings 46, and thus the flanges 44 exert an outward bias, tending to hold the central portion of the spring 42 in position to engage resiliently the upper edge 38 of the actuator blade. Preferably, a detent is provided on the outer surfaces of the flanges 44 to assist in holding the spring 42 securely in place on the plate portion 12. In the preferred embodiment shown, this detent is in the form of a tongue or flap 47 cut out of the flange material adjacent the end of the latter, and then upset outwardly of the plane of the flange, with the flap 47 being connected at its lower end to the flange 44. To assist further in maintaining the spring 42 in place on the plate portion 12, the openings 46 are formed by cutting the material of the plate portion on three sides to form rectangular flaps 48 therein, the latter being respectively joined to the plate portion 12 along their inward edges, and then pressing the flaps 48 downwardly to an angular position, as shown in FIGS. 3 and 4. The flaps 48 thus prevent dislodging of the springs 42 by accidental inward stressing of the flanges 44.

The spring 42 and its securing flanges 44 and detents 47 are so proportioned that when the spring is positioned in the opening 37 of the actuator 33, with the flanges 44 disposed in the openings 46 as just described, the spring 42 resiliently engages the upper edge 38 of the actuator blade with the detent 43 in position to be engaged by the upper edge of the actuator.

In operation of the switch mechanism shown in FIGS. 3 and 4, which contains two sets of electrical contacts, it is seen that the movable contact members 23 are so placed in the contact support member 17 of the mounting base that the raised portions 29 are disposed on opposite sides of a vertical plane which contains the axis of rotation of the lugs 34 in the grooves 32. Thus, when the left side (FIGS. 3 and 4) of the tablet or cap portion 36 is pressed downwardly against the felt stop 41 of the mounting base, the upper edge 38 of the actuator blade is placed against the left slope of the detent 43, in which position the bottom edge of the actuator blade 33 engages the raised portion 29 of one of the movable contact members, causing its contact wire 26 to engage its corresponding fixed contact 24, closing that switch while leaving open the switch containing the other set of contacts. If the right side of the tablet or cap portion 36 is now pressed to bring it against the left stop 41 (the position of FIG. 4), the upper edge 38 of the actuator blade moves under the detent 43 and comes to rest in its other toggle position against the right slope of the detent, in the course of which action the bottom edge of the actuator blade moves out of engagement with the raised portion 29 of the first movable contact member (whereupon the resilience of the latter causes it to rise and thus to separate its contact wire 26 from

4

the corresponding fixed contact 24), and into engagement with the raised portion 29 of the other movable contact member, causing its contact wire 26 to engage its corresponding fixed contact 24.

Although in the illustrated embodiment the upper edge 38 of the actuator blade is shown disposed above the plate portion 12, it will be understood that, if desired, the edge 38 may be disposed below the plate portion. In such case, the shape of the spring 42 would be suitably modified to bring the detent 43 down to the level needed for its engagement with the edge 38. Generally speaking, the distance of the edge 38 above or below the axis of rotation of the lugs 34 is determined with a view to providing the amount of displacement of the edge 38 relative to the detent 43 to obtain the required toggle action, and at the same time to provide the desired amount of movement of the bottom edge of the actuator blade 33 relative to the contacts which it engages.

While there has been shown and described a particular embodiment of the present invention, it will be apparent to those skilled in the art that numerous modifications and variations may be made in the form and construction thereof without departing from the spirit of the invention. It is therefore intended by the following claims to include within the scope of the invention all such similar and modified forms of the disclosed invention by which substantially the results of the invention may be obtained by substantially the same or equivalent means.

What is claimed is:

1. A switching device comprising a mounting base including an upper plate portion having an opening therein, and a contact support member secured to said plate portion below the latter, a fixed contact and a cooperating movable contact carried by said contact support member, the upper surface of said movable contact being formed with a generally flat portion and a raised portion projecting above said flat portion, said raised portion being in substantial alignment with said opening, an actuating blade projecting downwardly through said opening into engagement with said upper surface of said movable contact, said actuating blade being pivotally supported intermediate its ends on said plate portion for oscillation about an axis substantially parallel to said flat portion of said movable contact and disposed substantially transversely of the latter, said actuating blade having an upper edge disposed substantially parallel to said axis and at a different level from that of said axis, an elongated spring member resiliently engaging said upper edge and secured at its ends to said mounting base, said spring member having a downwardly directed projection intermediate its ends for engagement by said upper edge to provide toggle action to said actuating blade in its oscillation, said blade being adapted when in one of its toggle positions to engage said raised portion and when in the other of its toggle positions to engage said flat portion of said movable contact, the contacts being adapted to be in engagement when said actuating blade is in one of its said toggle positions and to be separated when said actuating blade is in the other of its said toggle positions.

2. A switching device comprising a mounting base including an upper plate portion having an opening therein, and a contact support member secured to the plate portion below the latter, a fixed contact and a cooperating movable contact carried by said contact support member, the upper surface of said movable contact being formed with a generally flat portion and a raised portion projecting above said flat portion, said raised portion being in substantial alignment with said opening, an actuating blade projecting downwardly through said opening into engagement with said upper surface of said movable contact, said actuating blade being pivotally supported intermediate its ends on said plate portion for oscillation about an axis substantially parallel to said flat portion of said movable contact and disposed substantially transversely of the latter, said actuating blade having an upper

5

edge disposed substantially parallel to said axis and at a different level from that of said axis, said upper plate portion having a pair of apertures spaced substantially equidistantly from said axis, an elongated leaf spring member resiliently engaging said upper edge of said actuating blade and having a downwardly directed flange at each end, an outwardly directed detent formed on each of said flanges, said flanges being reposed in said respective apertures with the said detents maintained in abutting position against the underside of said upper plate portion bordering said apertures and thus maintaining said spring member in resilient engagement with the said upper edge of the actuating blade, said spring member having a downwardly directed projection intermediate its ends for engagement by said upper edge to provide toggle action to said actuating blade in its oscillation, said blade being adapted when in one of its toggle positions to engage said raised portion and when in the other of its toggle positions to engage said flat portion of said movable contact, the contacts being adapted to be in engagement when said actuating blade is in one of its said toggle positions and to be separated when said actuating blade is in the other of its said toggle positions.

3. A switching device comprising a mounting base including an upper plate portion having an opening therein, and a contact support member secured to the plate portion below the latter, a fixed contact member and a cooperating movable contact member carried by said contact support member, the upper surface of said movable contact member being formed with a generally flat portion and a raised portion projecting above said flat portion, said raised portion being in substantial alignment with said opening, said upper plate member being provided with opposed grooves on opposite sides of said opening, said grooves being disposed at substantially the same height above said flat portion of said movable contact member and running substantially transversely of the latter, an actuating blade projecting downwardly through said opening into engagement with said upper surface of said movable contact member, said actuating blade having lugs projecting from its opposite sides intermediate its ends and pivotally supported in said grooves, said actuating blade having an upper edge disposed substantially parallel to the axis of rotation of said lugs in said grooves and at a different level from that of said axis, said upper plate portion having a pair of apertures spaced substantially equidistantly from said axis, a flat leaf spring resiliently engaging said upper edge of said actuating blade and having a downwardly directed flange at each end, an upwardly directed flap portion struck outwardly from each of said flanges adjacent the free ends thereof, said flanges being reposed in said respective apertures with said flaps disposed under said upper plate portion bordering said apertures and thus maintaining said leaf spring in resilient engagement with the said upper edge of said actuating blade, said leaf spring member having a downwardly directed projection intermediate its ends for engagement by said upper edge to provide toggle action to said actuating blade in its oscillation, said blade being adapted when in one of its toggle positions to engage said raised portion and when in the other of its toggle positions to engage said flat portion of said movable contact member, the said contact members being adapted to be in engage-

6

ment when said actuating blade is in one of its said toggle positions and to be separated when said actuating blade is in the other of its said toggle positions.

4. A switch device comprising a mounting base including an upper plate portion having an opening therein and a contact support member secured to said plate portion below the latter, a plurality of fixed contacts and a corresponding number of movable contact members carried by said contact support member, the upper surfaces of said movable contact members being formed with a generally flat portion and a raised portion projecting above the flat portion, said raised portions being in substantial alignment with said opening, an actuating blade projecting downwardly through said opening into engagement with said upper surfaces of said movable contact members, said blade being pivotally supported intermediate its ends on said plate portion for oscillation about an axis substantially parallel to the plane formed by said flat portions of said movable contact members and disposed substantially transversely of said movable contact members, said actuating blade having an upper edge disposed substantially parallel to said axis and at a different level from that of said axis, an inverted substantially dish-shaped cap member having opposed parallel sides integral with the upper edges of said actuating blade and disposed substantially symmetrically with respect to said actuating blade, said upper edge of said actuating blade being spaced below the inverted bottom of said cap member, an elongated spring member resiliently engaging said upper edge of the actuating blade and secured at its ends to said mounting base, said spring member having a downwardly directed projection intermediate its ends for engagement by said upper edge to provide toggle action to said actuating blade in its oscillation, the bottom marginal edge of said cap member being spaced above said mounting base when said upper edge of said actuating blade is on dead center with respect to said projection on said spring, the ends of said cap member remote from said pivotal support being adapted to abut the top of said mounting base to limit movement of said actuating blade to a predetermined distance in either direction of oscillation in said toggle action, at least two of said raised portions of said movable contact members being positioned on opposite sides of the plane including said upper edge of said actuating blade and its said pivot axis when the actuating blade is in said dead center position, said blade being adapted when in one of its toggle positions to engage the raised portion of one of said movable contact members and the flat portion of another of said movable contact members, and when in the other of its said toggle positions to engage the raised portion of said other movable contact member and the flat portion of said one movable contact member, the movable contact members being adapted when their said raised portions are engaged by said actuating blade to engage their respective fixed contacts, and when said raised portions are not engaged by said actuating blade to be out of engagement with their respective fixed contacts.

No references cited.

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