United States Patent [19]

Murata

[11] **3,917,917**

[45] **Nov. 4, 1975**

[54] **KEYBOARD PUSHBUTTON SWITCH ASSEMBLY HAVING MULTILAYER CONTACT AND CIRCUIT STRUCTURE**

[75] Inventor: **Taneo Murata**, Tokyo, Japan

[73] Assignee: **Alps Electric Co., Ltd.**, Tokyo, Japan

[22] Filed: **Aug. 22, 1974**

[21] Appl. No.: **499,600**

[30] **Foreign Application Priority Data**

Aug. 23, 1973 Japan 48-94577

[52] **U.S. Cl.** ..... **200/5 A**; 200/5 R; 200/83 N; 200/159 B; 200/307

[51] **Int. Cl.²** **H01H 13/26**

[58] **Field of Search** ..... 200/1 R, 5 R, 5 A, 83 N, 200/86 R, 275, 159 B, 294–296, 302, 303, 307, 340; 197/98; 340/365 R, 365 A, 365 S, 365 C, 365 E

[56] **References Cited**

UNITED STATES PATENTS

3,571,542	3/1971	Madden et al.	200/83 N
3,584,162	6/1971	Krakinowski	200/83 N X
3,699,294	10/1972	Sudduth	200/5 A X
3,749,859	7/1973	Webb et al.	200/5 A X
3,780,237	12/1973	Seeger, Jr. et al.	200/5 A
3,811,025	5/1974	Bach	200/5 A X
3,860,771	1/1975	Lynn et al.	200/5 A

OTHER PUBLICATIONS

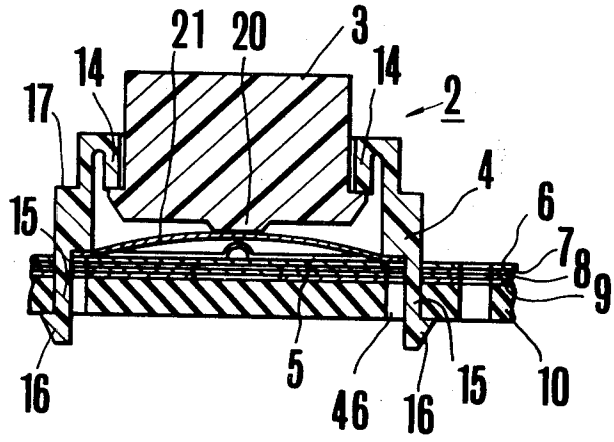
IBM Technical Disclosure Bulletin, J. A. Taris, "Keyboard" Vol. 8, No. 8, 1–1966, p. 1064.

Primary Examiner—James R. Scott
Attorney, Agent, or Firm—Eliot S. Gerber; Guy W. Shoup

[57] **ABSTRACT**

A push-button switch having a plurality of depressable push buttons includes a resilient metal plate provided beneath each push button which is bent in a snapping manner thereby depressing a movable contact provided on a first printed circuit sheet toward a contact assembly provided on a second printed circuit sheet. Upon closure of the movable contact and the contact assembly, another movable contact provided on the rear side of the second printed circuit sheet is depressed toward another contact assembly provided on a printed circuit base board thereby closing the contact assembly.

16 Claims, 8 Drawing Figures



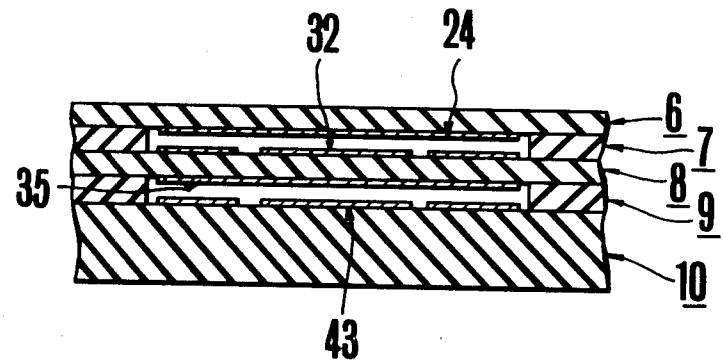


FIG. 1

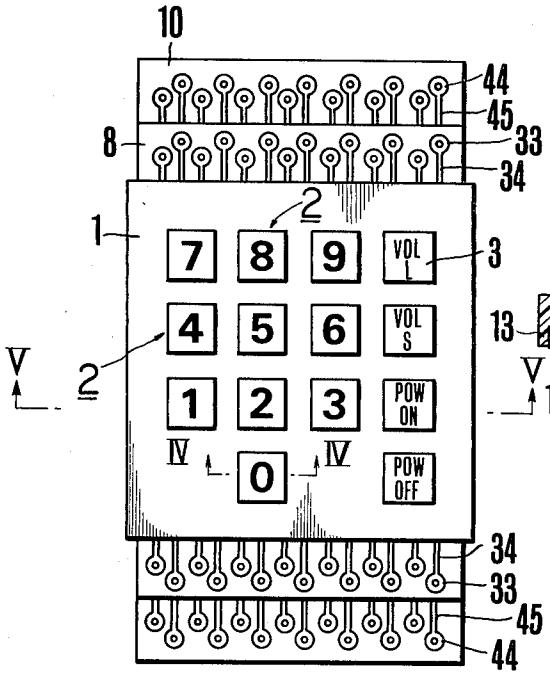


FIG. 2

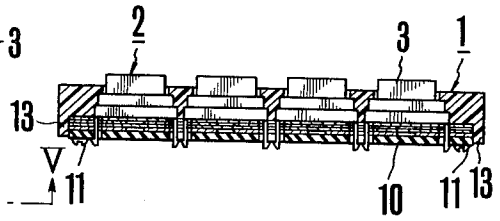


FIG. 3a

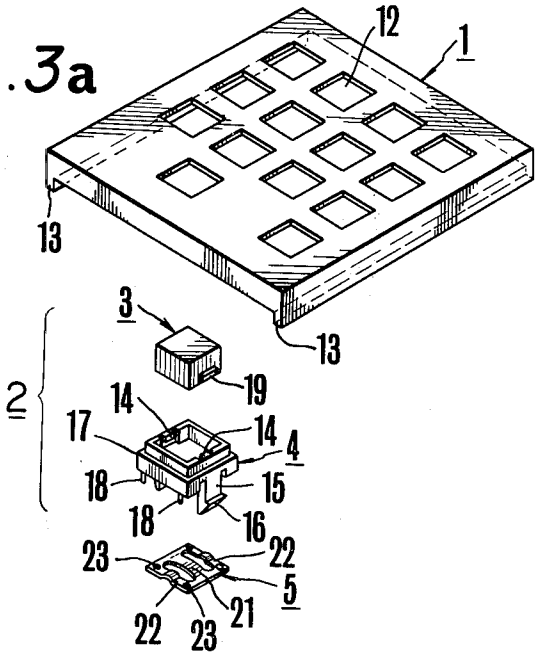


FIG. 3b

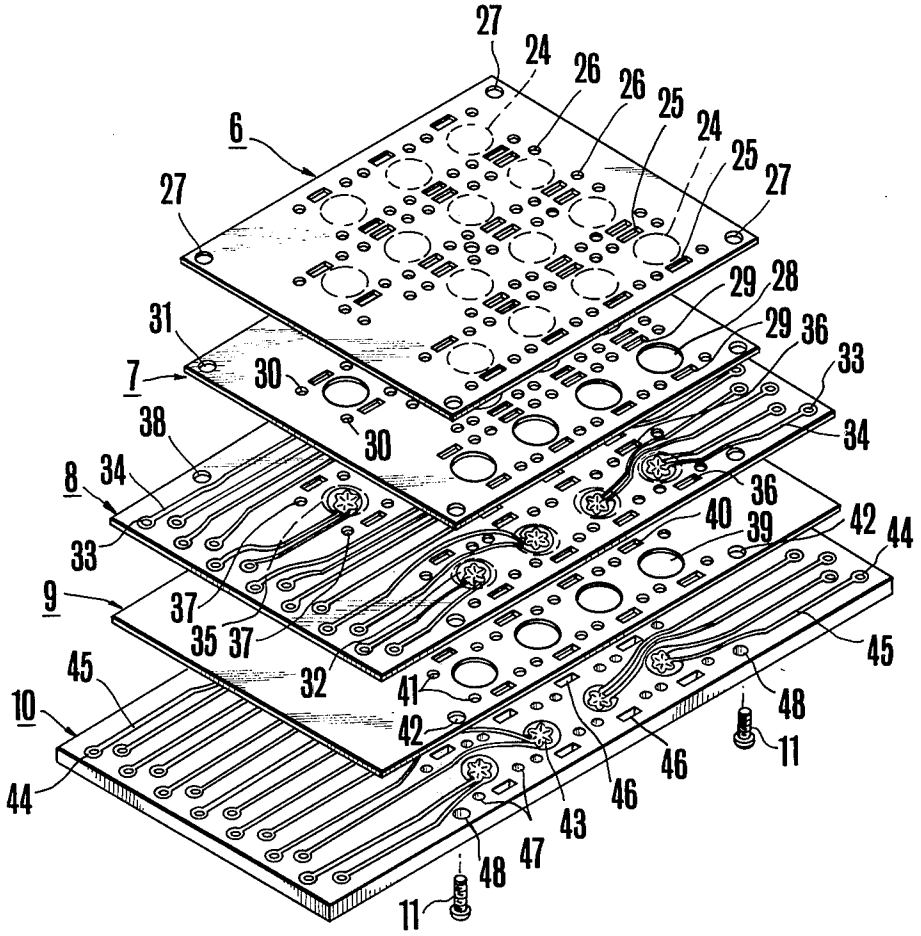

27
24
26
26
25
24
25
27
6
27
29
28
29
36
33
31
7
30
30
34
38
36
8
34
40
39
42
44
33
9
37
35
37
32
45
41
48
45
10
42
46
11
44
46
43
47
48
11

FIG. 4a

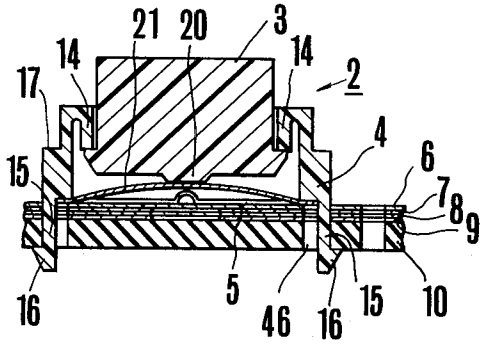


FIG. 4b

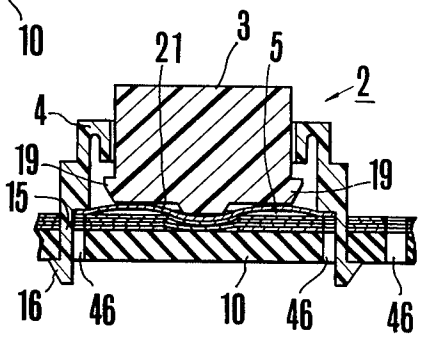


FIG. 5

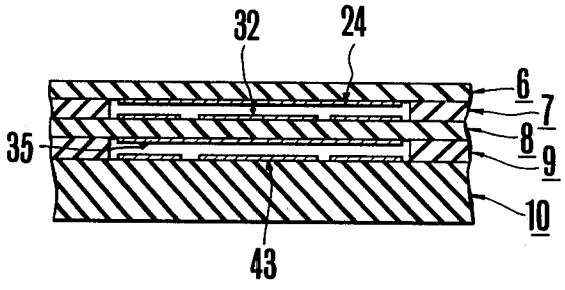
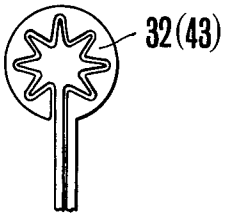


FIG. 6



KEYBOARD PUSHBUTTON SWITCH ASSEMBLY HAVING MULTILAYER CONTACT AND CIRCUIT STRUCTURE

BACKGROUND OF THE INVENTION

This invention relates to push-button switches and more particularly to a snap-acting, multicontact, multicircuit, push-button switch which can be used in a wide variety of applications, e.g. a key board, remote control of television receiver, and other appliances.

Heretofore, various types of snap-acting, push-button switches have been known. However, most of them are of a considerable size, and when a multicontact, multicircuit, push-button switch of snapping action is desired, the construction has been generally complicated, costly and sometimes prone to contact error.

SUMMARY OF THE INVENTION

A primary objective of the present invention is to provide a snap-acting, multicontact, multicircuit, push-button switch which can be constructed in an extremely thin and small size.

Another objective of the invention is to provide a snap-acting, multicontact, multicircuit, push-button switch with totally enclosed contact portions so that any possibility of the intrusion of dust into the contact portions can be substantially eliminated.

Still another objective of the invention is to provide a snap-acting, multicontact, multicircuit, push-button switch wherein insulation between the contacts is always maintained at a high value and the reliability of the operation thereof is also extremely high.

A further objective of the invention is to provide a snap-acting, multicontact, multicircuit, push-button switch which is extremely versatile so that when a plurality of the switches are used on a key board, the arrangement of keys can be varied as desired.

An additional objective of the invention is to provide a snap-acting, multicontact, multicircuit, push-button switch which is simple in construction and easy to assemble.

The above described objectives and other objectives made apparent hereinafter can be achieved by a snap-acting, multicontact, multicircuit, push-button switch comprised of:

a printed circuit base board provided with a plurality of fixed contact assemblies thereon;

a first printed circuit sheet made of an insulating flexible film, on the rear side of which are provided a plurality of disc-like movable contacts;

a second printed circuit sheet interposed between the printed circuit base board and the first printed circuit sheet, and made of an insulating flexible film similar to the first printed circuit sheet;

said second printed circuit sheet having on the front side thereof a plurality of contact assemblies similar to those provided on the printed circuit base board, and on the rear side thereof a plurality of disc-like movable contacts at positions corresponding to the contact assemblies on the front side thereof;

two insulating sheets each having a plurality of holes at positions corresponding to the contacts being interposted between the first and the second printed circuit sheets and between the second printed circuit sheet and the printed circuit base board, respectively;

said holes in the insulating sheets being aligned with said plurality of movable contacts and contact assemblies provided on the first and second printed circuit sheets and the printed circuit base board, so that a plurality of multilayer switches having contacts facing together through said holes are thereby provided; and

resilient plates for snap-action respectively provided under a plurality of push buttons arranged on the front side of the first printed circuit sheet in alignment with said plurality of movable contacts and contact assemblies;

whereby when any one of the push buttons is depressed, the resilient plate under the push button is snapped downwardly thereby depressing the movable contacts and the contact assemblies successively downward, thus closing the contacts in the contact assemblies, and when the push button is released, the button is brought back to its original position under the action of the resilient plate while the movable contacts are separated from the contact assemblies due to the flexibility of the printed circuit sheets.

The nature, principle, and utility of the present invention will be more clearly understood from the following detailed description of the invention when read in conjunction with the accompanying drawings wherein the various parts are designated by reference numerals.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

FIG. **1** is a top plan view of a snap-acting, multicontact, multicircuit, push-button switch constituting a preferred embodiment of the present invention;

FIG. **2** is an elevational view, in cross-section, by V—V line of the push-button switch shown in FIG. **1**;

FIG. **3**(a) is an exploded perspective view showing an upper frame and a push-button assembly included in the switch of this embodiment;

FIG. **3**(b) is an exploded perspective view of printed circuit sheets and a printed circuit base board included in this embodiment;

FIG. **4**(a) is a cross-sectional elevational view by IV—IV line showing a push-button assembly in the non-operative state;

FIG. **4**(b) is a cross-sectional elevational view by IV—IV line showing the same push-button assembly in the operative state;

FIG. **5** is a cross-sectional elevational view showing the separate printed circuit sheets and the printed circuit base board on an enlarged scale; and

FIG. **6** is a plan view showing a contact assembly provided on the second printed circuit sheet and the printed circuit base board on an enlarged scale.

DETAILED DESCRIPTION

Referring now to FIGS. **1** through **6**, there is indicated a snap-acting, multicontact, multicircuit, push-button switch according to the present invention. It comprises an upper frame **1** made of, for instance, a synthetic molded plastic resin such as nylon, ABS, etc. which receives a plurality of push button assemblies **2**. Each assembly **2** comprises a push button **3**, a casing **4**, and a resilient plate **5**. Each assembly **2** slides into its hole in frame **1**.

As shown in FIG. **3**(b) a first printed circuit sheet **6** having a plurality of movable contacts on the rear side

thereof is provided as is a second printed circuit sheet **8** having a plurality of contacts on both sides of the sheet. Insulating sheets **7** and **9** are interposed respectively between the first and the second printed circuit sheets **6** and **8**, and between the second printed circuit sheet **8** and a printed circuit base board **10**, on the front side of which board **10** are provided a plurality of fixed contact assemblies. A required number of screws **11** are provided for securing the upper frame **1** onto the printed circuit base board **10** with all the sheets **6, 7, 8** and **9** held therebetween.

As shown in FIG. **3**(b), the upper frame **1** is provided with a plurality of guide holes **12**, arranged in a checkerboard manner, for receiving the push buttons which are freely slidable in the hole **12**.

On the rear side of the upper frame **1**, there are provided a corresponding number of stepped recesses (not shown) which are adapted to engage the stepped portions **17** of the casings **4**, the casings **4** being of a rectangular configuration. The two side ribs **13** are provided on either side of the upper frame **1** along its lower edge so that the sheets **6, 7, 8** and **9** and the printed circuit base board **10** are received therebetween. The upper frame **1** is further provided with screw holes (not shown) for receiving the screws **11** when all the parts of the switch are assembled together.

The casing **4** for the push-button assembly **2** is made of a synthetic plastic resin and is of a rectangular configuration. At the upper part of the casing, there is formed in an integral manner, a downwardly extending elastic rib **14** defining the central hole receiving the push button **3**. As shown in FIG. **4**(a), at the lower part of the casing **4**, there are provided, also in an integral manner, two legs **15** each having a detent **16** engageable with a hole **46** provided through the base board **10** so that the casing **4** may be secured to the base board when desired. Before final assembly, however, the resilient plate **5** and the plurality of sheets are interposed between the lower surface of the casing **4** and the base board **10** as hereinafter described in more detail.

On the outside of the casing **4**, there is provided the stepped portion **17** which is adapted to engage into the stepped recess (not shown) of the upper frame **1** in a tight manner. The casing **4** is further provided with pillar-like projections **18** (see FIG. **3**(a)) downwardly extending from the four corners of the casing **4**. The pillar-like projections **18** pass through the four holes provided through each of the resilient plate **5**, the sheets **6, 7, 8** and **9**, and the base board **10**, so that the push-button assembly **2**, the resilient plate **5**, and all of the contacts on the sheets and the base board are correctly aligned.

The push button **3** is also made of a synthetic plastic resin, the lower part of which is formed integrally into a pair of stopper projections **19**, which form a substantially triangular detent (seen in cross-section) projecting from both sides of the push button **3**. The push button **3** is further provided with a downwardly projecting portion **20** at the center of its lower surface. The above-mentioned pair of stopper projections **19** fit into the downwardly extending elastic ribs **14** of the casing **4** thereby securing the push button **3** in the casing **4**.

The resilient plate **5** is made of a thin metal plate of high resilience, from which two elongated slots are punched out in a spaced parallel relationship so that a central limb **21** and two side limbs **22** are thereby formed (see FIG. **3**(a)). The side limbs **22** are then made shorter than the central limb **21** by forming, for instance, a fold at the center of each limb **22**, whereby the central limb **21** is bent into an arc-shaped configuration. When the upwardly raised central limb **21** is depressed downwardly, the bending direction of the central limb **21** is reversed, and when the depressing force is released, the central limb is brought back to its original bent state. The resilient plate **5** is further provided with four holes **23** at its four corners through which the four pillar-like projections **18** are passed.

The first printed circuit sheet **6** is preferably made of an insulating film such as a polyester film having flexibility. On the rear side of the insulating film, a plurality of contacts **24** in the form of circular discs, for example of copper foil, are provided. Around each of the contacts **24**, two holes **25** (for passing the legs **15** of the casing **4**) and four holes **26** (for passing the four pillar-Like projections **18**) are provided. Furthermore, holes **27** are provided at the four corners and a central portion of the first printed circuit sheet **6** for passing the mounting screws **11**.

The insulating sheet **7** is preferably made of a polyester film, for example Dupont Mylar, trademark. Sheet **7** is equal in size to that of the first printed circuit sheet **6**. A plurality of holes **28** of a size substantially equal to the contacts **24** are provided at positions aligned with the contacts **24**. Around each hole **28**, two holes **29** (for passing the legs **15** of the casing **4**) and four holes **30** (for passing the pillar-like projections **18**) are provided. At the four corners and a central portion of the insulating sheet **7**, holes **31** for passing the mounting screws **11** are provided.

The second printed circuit sheet **8** is preferably made of an insulating film of a polyester resin having a sufficient flexibility. On the front side of the insulating film, a plurality of contact assemblies **32**, each consisting of two ratchet-wheel shaped contacts spaced apart from each other, as shown in FIG. **6**, are provided at positions vertically aligned with the plurality of holes **28** provided through the insulating sheet **7**. The two ratchet-wheel shaped contacts are respectively connected through corresponding leads **34** to corresponding terminals **33** provided on longitudinal ends of the second printed circuit sheet **8**.

On the rear side of the second printed circuit sheet **8**, a plurality of contacts **35** of circular disc shape are provided at positions vertically aligned with the contact assemblies **32** on the front side of the second printed circuit sheet **8**. Since the second printed circuit sheet **8** is made from an insulating film, the contacts **35** on the rear side thereof will be electrically insulated from the contact assemblies **32** on the front side thereof. On laterally opposite sides of each contact assembly **32**, a pair of holes **36** are bored through the sheet **8** for receiving the legs **15** of the casing **4**. In addition, around each of the contact assemblies **32**, four holes **37** for passing the pillar-like projections **18** are provided through the second printed circuit sheet **8**.

The longitudinal ends of the second printed circuit sheet **8** are extended beyond the insulating sheet **7**, and the leads **34** and the terminals **33** are provided by printing on these extended portions of the second printed circuit sheet **8**.

A plurality of holes **38** for passing mounting screws **11** are further provided through the second printed circuit sheet **8**, so that when the sheet **8** and the insulating sheet **7** are assembled by the mounting screws **11**, the plurality of pairs of holes **36** and the set of guide holes **37** are vertically aligned with the plurality of holes **29**

and the guide holes 30 of the insulating sheet 7.

The insulating sheet 9 is also made of an insulating film such as Mylar, Dupont's trademark for a polyester sheet, of a size equal to that of the second printed circuit sheet 8. A plurality of holes 39 are bored through the insulating sheet 9 in vertical alignment with the plurality of contacts provided on the rear side of the second printed circuit sheet 8. Through the insulating sheet 9, a pair of holes 40 are bored on the laterally opposite sides of each of the plurality of holes 39 for passing the legs 15 of the casing 4, and the set of four guide holes 41 are provided around each of the holes 39. Furthermore, a plurality of holes 42 for passing the mounting screws 11 are also provided through the insulating sheet 9.

The printed circuit base board 10 is made of an insulating plate, on the front surface of which are provided a plurality of fixed contact assemblies 43 each consisting of a pair of ratchet-wheel shaped contacts spaced apart from each other as shown in FIG. 6. On both longitudinal end portions of the printed circuit base board 10 extending beyond the insulating sheet 9, a plurality of terminals 44, each of which is connected through a lead 45 to each of the ratchet-wheel shaped contacts of the contact assemblies 43. On the laterally opposite sides of each of the contact assemblies 43, two holes 46 are provided for passing the legs 15 of the casing 4, and a set of four guide holes 47 are provided around the contact assembly 43. Likewise, a plurality of holes 48 for passing the mounting screws 11 are provided through the printed circuit base board 10.

The push button switch according to the present invention is assembled as follows.

Firstly, the printed circuit base board 10, insulating sheet 9, second printed circuit sheet 8, insulating sheet 7, and the first printed circuit sheet 6 are placed in an overlapping manner in that named order from the bottom upward. The mounting screws 11 are inserted from the bottom upward through the holes 48, 42, 38, 31, and 27 of the base board 10, and sheets 9, 8, 7, and 6, respectively. Thus, the plurality of pairs of holes 40, 36, 29, 25 in their respective sheets are substantially aligned with the pair of holes 46 in the printed circuit base board 10, and the plurality of sets of holes 47, 41, 37, 30 and 26 are also substantially brought into alignment.

Then, the pillar-like projections 18 on the rear side of the casing 4 of the push-button assembly 2 are inserted into the holes 23 of the resilient plate 5 so that the resilient plate is received on the rear side of the casing 4. Then the detents 16 at the ends of the legs 15 of the casing 4 are inserted into the pair of holes 25 in the first printed circuit sheet 6. Simultaneous therewith, the pillar-like projections 18 of the casing 4 are inserted through the set of four guide holes 26 in the same sheet 6, and then the casing 4 is depressed downwards until the pillar-like projections 18 are passed through the guide holes 26, 30, 37, 41 and 47 of the sheets and base board, and the legs 15 of the casing 4 are passed through the pairs of holes 25, 29, 36, 40 and 46 of the same sheets and base board. In this case, the detents 16 at the ends of the legs 15 engage the edges of the holes 46 of the base board 10 so that the casing 4 is fixed to the base board 10 with the sheets 6, 7, 8 and 9 being interposed between the casing 4 and the base board 10.

In a similar manner, all of the casings 4, also fitted with the resilient plates, are secured to the base board 10 with the sheets being interposed therebetween.

Then all of the push buttons 3 are forced into the casings 4 so that the projections 19 of the push buttons fit into the downwardly extending elastic ribs 14 of the casings 4 thereby securing the push buttons in the casings 4.

The upper frame 1 is then placed over the push buttons 3 such that the push buttons 3 pass through the guide holes 12 of the frame 1 and the casings 4 are secured in the stepped recesses on the rear side of the upper frame. In this state, the sheets 6, 7, 8, 9 and the base board 10 are held between the ribs 13 on both sides of the upper frame 1. The assembling of the push button switches is completed when the mounting screws 11 inserted from bottom upwardly through the sheets and the base board are driven into threaded holes (not shown) of the upper frame 1.

It will be noted that the contact 32, shown in FIG. 6, has both of its lines to its different sides. The disc, which is physically pressed against the contact 32 has itself no printed wires or leads leading to it. Rather the disc closes the two sides of the contact 32.

The snap-acting, multicontact, multicircuit, push-button switch according to the invention operates as follows:

The push-button switch thus assembled has any one of the push buttons 3 in vertical alignment with the corresponding resilient plate 5, the contact 24 on the rear side of the first printed circuit sheet 6, the hole 28 in the insulating sheet 7, the contact assembly 32 on the front side, and the contact 35 on the rear side of the second printed circuit sheet 8, the hole in the insulating sheet 9, and the fixed contact assembly 43 on the printed circuit base board 10. When the push button 3 is not depressed, i.e. when the user's finger is removed from the button, the central limb 21 of the resilient plate 5 pushes the push button 3 upwards, and the contact 24 of the rear side of the first printed circuit sheet 6 and the contact assembly 32 on the second printed circuit sheet 8 are thereby kept apart. Likewise, the contact 35 on the rear side of the second printed circuit sheet 8 and the fixed contact assembly 43 on the printed circuit base board 10 are kept apart; hence all of the switches are kept in the opened state.

When a push button is depressed, the central limb 21 of the resilient plate 5 is pushed downward by the projecting portion 20 of the rear surface of the push button 3, and when the downward movement thereof exceeds a predetermined position, the central limb 21 is bent in a snapping manner into a reversed arc position thereby forcing contact 24, located on the rear side of the first printed circuit sheet 6, onto the contact assembly 32, located on the first side of the second printed circuit sheet 8. The portion of the second printed circuit sheet 8 bearing the contact assembly 32 is further bent downward through the hole 39 of the insulating sheet 9 until the contact 35, located on the rear side of the second printed circuit 8 makes physical contact with the fixed contact assembly 43, located on the printed circuit base board 10. In this manner, the circuits connected to the contact assemblies 32 and 43, respectively, are both closed within an extremely short time period. When the push button is released, the central limb 21 of the resilient plate 5 is snapped back to its original position by its own resilience, thereby pushing up the push button 3. The first printed circuit sheet 6 and the second printed circuit sheet 8 are brought back to their original positions by their own elasticity, and the contacts are placed in the opened state. It should be ap-

preciated that any one of the other push buttons and the related contacts are operated in the same manner.

As should be apparent from the above description, the snap-acting, multicontact, multicircuit, push-button switch, according to the present invention, can be operated in snapping manner by means of the resilient plate, the thickness thereof which can be made extremely thin. In addition, all of the contacts are sealed from the outer atmosphere thereby preventing the intrusion of dust and the like from outside, and hence preventing any possibility of deteriorating the insulation. Furthermore, the number of contacts and the circuits in the push-button switch of this invention can be changed as desired, and the arrangement of the push buttons may also be changed as desired.

Although the invention has been described with reference to a preferred embodiment thereof, it will be apparent to those skilled in the art that various modifications or alterations can be executed without departing from the scope of the invention. For instance, the number of printed circuit sheets may be increased or decreased, or the shape of the contact assemblies may be changed from the ratchet-wheel shape to any other suitable configuration.

I claim:

1. A snap-acting, multicontact, multicircuit, pushbutton switch comprising:

a printed circuit base board provided with a plurality of fixed contact assemblies each connected to one pair of a first set of terminals;

a first printed circuit sheet made of an insulating flexible film, a plurality of movable contacts fixed on the rear side of said first printed circuit sheet;

a second printed circuit sheet interposed between said printed circuit base board and said first printed circuit sheet and made of an insulating flexible film, a plurality of movable contact assemblies fixed on the front side of said second printed circuit sheet each contact assembly connected to one pair of a second set of terminals, and a plurality of movable contacts at positions aligning with the contact assemblies on the front side thereof and fixed on the rear side of said second printed circuit sheet;

two insulating flexible film sheets, each having a plurality of holes at positions aligning with said contacts and being interposted between said first and second printed circuits sheets and between the second printed circuit sheet and the printed circuit base board respectively;

a plurality of push buttons arranged on the front side of the first printed circuit sheet in alignment with said plurality of movable contacts and contact assemblies, and a plurality of snap-action resilient spring plates, with one resilient plate provided directly beneath each push button and without another metal spring for each push button,

whereby when any one of the push buttons is depressed it pushes its corresponding resilient plate, pushing the resilient plate downward until it snaps into a reverse position thereby contacting the first printed circuit sheet and forcing the movable contacts of the first printed circuit sheet downward until they meet in physical contact with the movable contact assemblies of the second printed circuit sheet and forcing the movable contacts of the second printed circuit sheet downward until they meet in physical contact with the contact assemblies of the printed circuit base board, and when the push button is released the push button is brought back to its original position by the action of the resilient plate while the movable contacts are separated from the contact assemblies due to the flexibility of the printed circuit sheets.

2. A push-button switch as set forth in claim **1** wherein said plurality of push buttons are received in a plurality of casings, respectively, and each of the casings is provided with a pair of legs each having a detent at the lower end thereof.

3. A push-button switch as set forth in claim **2** wherein said first and second printed circuit sheets, said printed circuit base board, and said two insulating sheets having holes, are all provided with a plurality of pairs of holes in vertically aligned positions so that when said pairs of legs of said casings are passed through said pairs of holes, said first and second printed circuit sheets, printed circuit base board, and two insulating sheets are superimposed in precisely aligned manner.

4. A push-button switch as set forth in claim **2** wherein each of said casings is further provided with four pillar-like projections downwardly extending from the four corners of the casing.

5. A push-button switch as set forth in claim **4** wherein said first and second printed circuit sheets, said printed circuit base board, and two insulating sheets are all further provided with a plurality of sets each including four holes therethrough in vertically aligned positions so that when said four pillar-like projections of the casing pass through said four in one set of holes, said first and second printed circuit sheets, said printed circuit base board, and two insulating sheets are superimposed in far more precisely aligned manner.

6. A push-button switch as set forth in claim **1** wherein said resilient plate is made of a thin metal sheet having three limbs, the central limb of which is longer than the two side limbs, whereby when the central limb is depressed by a push button, the bending state of the resilient plate is changed in a snapping manner into the reversely bent state.

7. A push-button switch as set forth in claim **1** wherein an upper frame having a plurality of holes is further provided so that said plurality of push buttons are upwardly exposed through said plurality of holes.

8. A push-button switch as set forth in claim **7** wherein a substantially rectangular recessed portion is formed around each of said plurality of holes on the rear side of said upper frame, and said plurality of casings are tightly received in said recessed portions.

9. A push-button switch as set forth in claim **7** wherein said upper frame is further provided with two side ribs along the lower side edges, and all of the first and second printed circuit sheets, said printed circuit base board, and two insulating sheets superimposed are received between said side ribs of the upper frame when the push-button switch is assembled.

10. A push-button switch as set forth in claim **9** wherein a plurality of mounting screws are further driven from the rear side of the printed circuit base board to a plurality of threaded holes in the upper frame penetrating through the first and second printed circuit sheets and two insulating sheets.

11. A push-button switch as in claim **6** wherein said resilient plate is further provided with four holes at the four corners thereof.

12. A push-button switch as in claim 8 wherein each of said casings has a stepped portion which fits into said recessed portion in a tight manner.

13. A push-button switch as set forth in claim 2 wherein each of said plurality of push-buttons is further provided an integral pair of projections of a substantially triangular detent cross-section projecting from both sides of the lower part of the push-button, and each of said casings has a downwardly extending rib which fits with and retains said projections.

14. A push-button switch as set forth in claim 1 wherein said plurality of push-buttons are further provided with a downwardly projecting portion at the center of the lower surface.

15. A contact assembly as set forth in claim 1 wherein said plurality of contact members are further provided with leads which connect said contact assemblies to terminals located on the longitudinal ends of said second printed circuit sheet and printed circuit base board.

16. A snap-acting, pushbutton switch comprising:

a printed circuit base board provided with at least one fixed contact assembly;

a printed circuit sheet made of an insulating flexible film placed over the printed circuit base board and provided with at least one movable contact aligning with said fixed contact assembly;

a flexible insulating sheet having at least one hole aligning with said contact and contact assembly and being interposed between the printed circuit sheet and the printed circuit base board;

a push button arranged on the front side of the printed circuit sheet in alignment with the contact and contact assembly, a resilient plate provided beneath the push button;

whereby when the push button is depressed its corresponding resilient plate is pushed downward until it snaps into a reverse position thereby forcing the contact of the printed circuit sheet downward until it comes into physical contact with the contact assembly of the printed circuit base board and when the push button is released the push button is brought back to its original position by the action of the resilient plate while the movable contact is separated from the contact assembly due to the flexibility of the printed circuit sheets.

* * * * *