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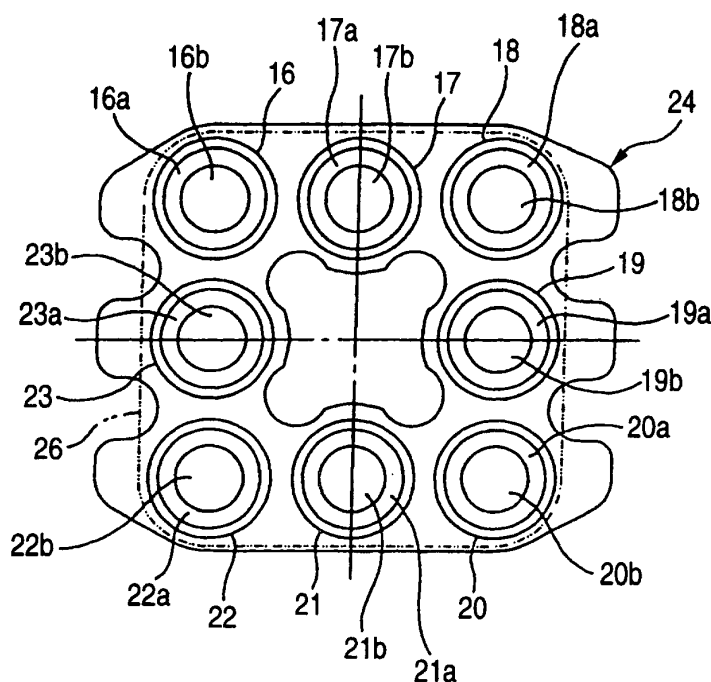
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(54) **Mirror switch device**

(57) A pressure member unit (24) having eight dome-shaped elastic pressure members (16 to 23) made of rubber is arranged on a circuit board. A total of eight elastic pressure members are respectively provided at four corner parts (elastic pressure members 16, 18, 20 and 22) of side parts of a rectangular form of a pusher (26) and at four positions (elastic pressure mem-

bers 17, 19, 21 and 23) between them. Six switch parts are provided so as to only correspond to the two elastic pressure members (16 and 20) at a pair of corner parts which are located diagonally among the elastic pressure members (16 to 23) and to the elastic pressure members (17, 23, 19 and 21) respectively adjacent to both the corner parts.

FIG. 1



Description

BACKGROUND OF THE INVENTION

[0001] The present invention relates to a mirror switch device having six switch parts.

[0002] Figs.8 to 11 show a general mirror switch device 1. In this mirror switch device 1, an operating knob 2 is operated by pressing respectively upper, lower, right and left parts thereof. On the back surface side thereof, a substantially rectangular plate shaped pusher 3 (see a two-dot chain line in Fig. 9 and a solid line in Fig. 11) is provided. On the back surface side of the pusher 3, a pressure member unit 4 made of rubber is provided. In the pressure member unit, six elastic pressure members 4a to 4f are formed by an integral molding. On the back surface side of the elastic pressure members 4a to 4f, a circuit board 5 is disposed. Then, switch parts 6A and 6F are arranged to respectively correspond to the elastic pressure members 4a to 4b. The switch parts 6A to 6F have the same structures. For instance, one switch part 6C thereof is now described. As shown in Figs. 10 and 11, the switch part 6C comprises a movable contact 6Ca provided on the back surface of the elastic pressure member 4c and fixed contacts 6Cb and 6Cc provided on the circuit board 5.

[0003] In the switch part 6C, when the elastic pressure member 4c is pressed down, the movable contact 6Ca allows both the fixed contacts 6Cb and 6Cc to be electrically conducted (turned on) to each other. When the elastic pressure member 4c is returned, the movable contact 6Ca disconnects (turn off) both the fixed contacts 6Cb and 6Cc from each other.

[0004] When the upper part of the operating knob 2 is pressed and operated, the two elastic pressure members 4a and 4b are pressed down to turn on both the switch parts 6A and 6B. Then, a mirror motor which is not shown in the drawing is energized and driven so that a mirror operates upward. When the right part of the operating knob 2 is likewise pressed and operated, the two elastic pressure members 4c and 4d are pressed down to turn on both the switch parts 6C and 6D. When the lower part of the operating knob 2 is pressed and operated, the two elastic pressure members 4d and 4e are pressed down to turn on both the switch parts 6D and 6E. When the left part of the operating knob 2 is pressed and operated, the two elastic pressure members 4f and 4a are pressed down to turn on both the switch parts 6F and 6A.

[0005] However, in the above-described structure, for instance, when an eccentric position in the upper side part of the pusher 3 designated by reference character Ph in Fig. 9 is pressed and operated, or when even a central position PO is slantingly pressed and operated, though the switch parts 6A and 6B should be turned on, the switch parts 6B and 6C are inconveniently turned on, or the switch parts 6A, 6B and 6C are undesirably turned on.

SUMMARY OF THE INVENTION

[0006] The present invention has been invented by taking the above-described circumstances into consideration and it is an object to provide a mirror switch device having six switch parts in which two switch parts are turned on by selectively pressing and operating four side parts of a pusher to assuredly turn on the switch parts.

[0007] In order to solve the aforesaid object, the invention is characterized by having the following arrangement.

(1) A mirror switch device comprising:

a substantially rectangular pusher including four side parts to be pressed and operated; elastic pressure members of the total number of eight disposed respectively at four corner parts of the side parts of the pusher and at four parts between the corner parts; and six switch parts disposed so as to correspond only to the two elastic pressure members at a pair of corner parts which have a diagonal relation among the elastic pressure members and to the elastic pressure members respectively located at both adjacent positions to the two elastic pressure members.

(2) The mirror switch device according to (1), wherein the elastic pressure members disposed between the corner parts are provided at positions respectively separated by an equal distance from the corner parts.

[0008] According to the invention, the one side part of the pusher has a total of three elastic pressure members located at two positions of both corner parts and one position between them correspondingly to the side part. Especially, since the elastic pressure members are located at the two positions of both the corner parts, even when one side part of the pusher is slightly slantingly pressed and operated or even when an eccentric position is pressed or operated, the two elastic pressure members located at both the corner parts corresponding to one side part are substantially equally pressed, so that the elastic pressure member between them is pressed. Consequently, the two elastic pressure members corresponding to switch parts are assuredly pressed to assuredly operate the above-described switch parts.

[0009] Further according to the invention, an operating force is more equally exerted on the three elastic pressure members corresponding to each side part, so that the switch operation is further assuredly carried out.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010]

Fig. 1 is a plan view of a pressure member unit showing one embodiment of the present invention.

Fig. 2 is a front view of a mirror switch device.

Fig. 3 is a longitudinally side sectional view of the mirror switch device.

Fig. 4 is a front view showing the arrangement of fixed contacts.

Fig. 5 is a front view of an operating knob showing its front and back parts by passing through it.

Fig. 6A is a view showing a state that all switch parts are completely turned off and Fig. 6B is a view showing a state that switch parts are partly turned on.

Fig. 7 is a sectional view taken along an arrow line S-S in Fig. 6B.

Fig. 8 is a view showing a conventional example corresponding to Fig. 2.

Fig. 9 is a view corresponding to Fig. 1.

Fig. 10 is a view corresponding to Fig. 4.

Fig. 11 is a view corresponding to Fig. 3.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[0011] Now, an embodiment of the present invention will be described by referring to Figs. 1 to 7. Firstly, Fig. 2 shows a mirror switch device 13 viewed from a front. In Figs. 2 and 3, a circuit board 15 is disposed in a switch case 14. On the circuit board 15, a pressure member unit 24 having eight elastic pressure members 16 to 23 is arranged. The pressure member unit 24 is made of rubber and accordingly, the elastic pressure members 16 to 23 are also respectively made of rubber.

[0012] The eight elastic pressure members 16 to 23 respectively form a dome shape. The elastic pressure member 23 as one of them will be described below. This elastic pressure member 23 includes an operated part 23b at the top part of a thin rising part 23a. The operated part 23b receives a pressure force in the direction shown by an arrow mark A in Fig. 3 to move toward the direction (see Fig. 6B), while the rising part 23a is deformed. When the pressure force is released, the operated part 23b is returned to an original position due to an elastic restoring force of the rising part 23a.

[0013] A pusher 26 pressed and operated by an operating knob 25 is provided in the side of operated parts 16b to 23b of the elastic pressure members 16 to 23. This pusher 26 is configured in a substantially rectangular shape as shown by a two-dot chain line in Fig. 1. The operating knob 25 is provided in the switch case 14 so that the respective side parts of upper, lower, right and left parts can be pressed and operated to prevent the operating knob 25 from slipping out by claw parts 25a. Then, pressure leg parts 25b are formed from the

back surfaces of the four corners of the operating knob 25. The end parts of the pressure leg parts abut on the pusher 26. Accordingly, the upper, lower, right and left sides of the pusher 26 are respectively pressed and operated in accordance with the pressing operation of the operating knob 25. The pusher 26 and the operating knob 25 are returned to their original positions in accordance with the elastic reset operations of the elastic pressure members 16 to 23. Marks 25d, 25e, 25f and 25g showing operating points are formed on the operating knob 25.

[0014] Here, a total of eight elastic pressure members 16 to 23 are provided respectively at the four corner parts (elastic pressure members 16, 18, 20 and 22) of the rectangular form of the pusher 26 and at four positions (elastic pressure members 17, 19, 21 and 23) between them.

[0015] Six switch parts 27 to 32 are provided so as to only correspond to the two elastic pressure members 16 and 20 diagonally located at a pair of corner parts among the elastic pressure members 16 to 23, and the elastic pressure members 17, 23, 19 and 21 respectively located at both the adjacent positions to the corner parts. Since the switch parts 17 to 32 have the same structures, only the switch part 32 will be representatively described below.

[0016] The switch part 32 comprises a movable contact plate 32a attached to the back surface of the operated part 23b of the elastic pressure member 23, and fixed contact parts 32b and 32c opposed thereto and formed on the circuit board 15. The movable contact plate 32a allows both the fixed contact parts 32b and 32c to be electrically connected and the switch part 32 to be turned on.

[0017] Movable contact plates 18c and 22c are formed (see Fig 4) on the back surfaces of the operated parts 18b and 22b of the other pair of elastic pressure members 18 and 22 which are located diagonally. However, fixed contacts opposed thereto are not formed and the switch parts are not substantially provided. A reason why the elastic pressure members 18 and 22 are provided with the movable contact plates 18c and 22c (see Fig. 4) in a similar manner to those of other elastic pressure members 16, 17, 19, 20, 21 and 23 resides in that all the elastic pressure members have the same structures in order to facilitate a manufacture. In this case, the movable contact plates 18c and 22c may not be provided.

[0018] In this case, the elastic pressure members 17, 19, 21 and 23 between the corner parts are respectively provided at positions separated by equal distance from the corner parts (for instance, the elastic pressure member 17 is located at a position 1/2 as large as the clearance between the elastic pressure members 16 and 18).

[0019] In the above-described structure, when a user presses the mark 25g on the left part of the operating knob 25, the left side part of the pusher 26 is displaced as shown in Fig. 6B. Thus, as shown in Fig. 7, the left

side part of the pusher 26 causes the elastic pressure members 16, 23 and 22 to be deformed.

[0020] In this case, according to this embodiment, since the elastic pressure members 16 and 22 are provided correspondingly to the left side part of the pusher 26, especially at the two positions of both the corner parts, even when the left side part is slightly slantingly pressed and operated or an eccentric position is pressed or operated, the elastic pressure members 16 and 22 at the two positions of both the corner parts corresponding to the left side part are substantially equally pressed, and accordingly, the elastic pressure member 23 between them is likewise pressed. As a result, the two elastic pressure members 16 and 23 corresponding to the switch parts 27 and 32 are assuredly pressed to certainly operate the switch parts 27 and 32.

[0021] Particularly, according to this embodiment, since the elastic pressure member 23 between the corner parts of the elastic pressure members 16, 23 and 22 corresponding to the left side part of the pusher 26 is provided at a position equal distance spaced from the corner parts, an operating force is more equally exerted on the three elastic pressure members 16, 23 and 22 to more assuredly perform a switch operation.

When the upper side part, the lower side part and the right side part of the pusher 26 are pressed and operated, similar operational effects are obtained.

[0022] The present invention is not limited to the above-described embodiment. For instance, the switch parts 27 to 32 may be composed of other switches such as tact switches.

[0023] As apparent from the above description, according to the present invention, the six switch parts are provided and the four side parts of the pusher are selectively pressed and operated to turn on the two switch parts, so that an excellent effect that the switch parts can be assuredly turn on can be achieved.

wherein the elastic pressure members disposed between the corner parts are provided at positions respectively separated by an equal distance from the corner parts.

Claims

1. A mirror switch device comprising:

a substantially rectangular pusher including four side parts to be pressed and operated; elastic pressure members of the total number of eight disposed respectively at four corner parts of the side parts of the pusher and at four parts between the corner parts; and six switch parts disposed so as to correspond only to the two elastic pressure members at a pair of corner parts which have a diagonal relation among the elastic pressure members and to the elastic pressure members respectively located at both adjacent positions to the two elastic pressure members.

2. The mirror switch device according to claim 1,

FIG. 1

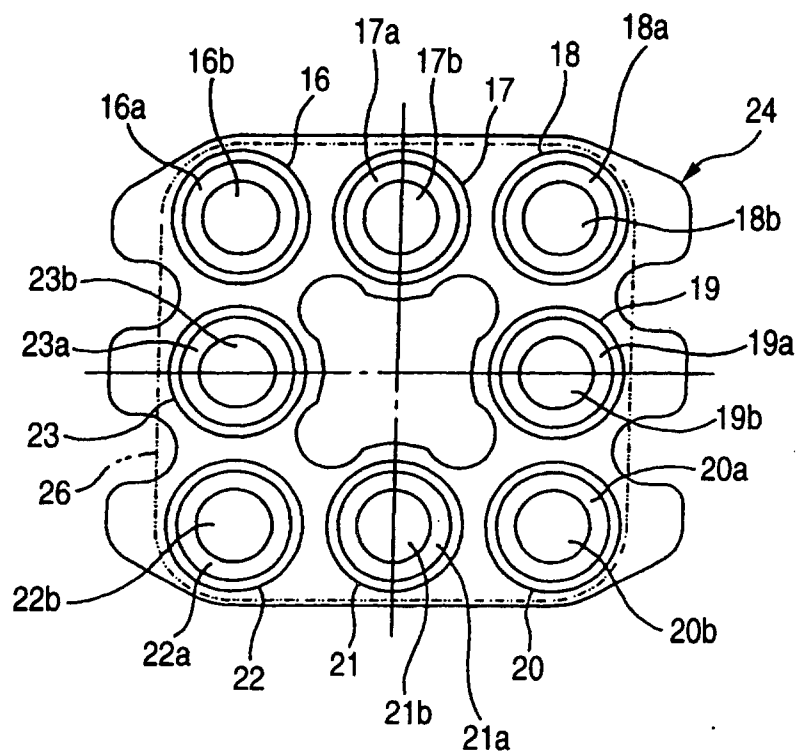


FIG. 2

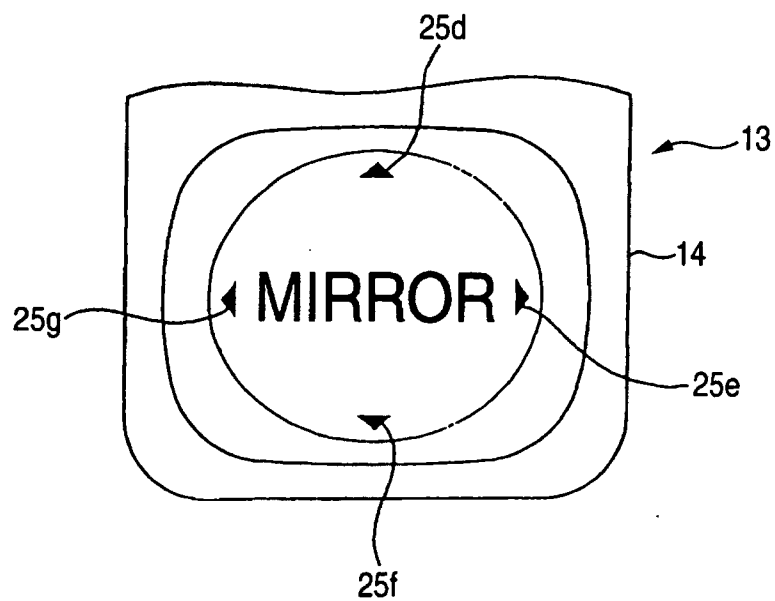


FIG. 3

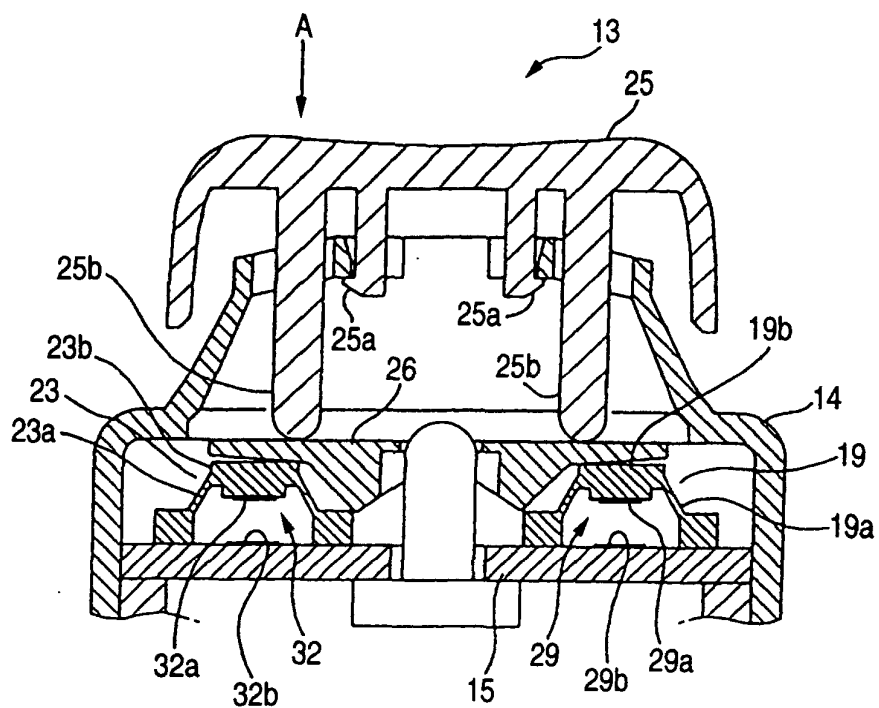


FIG. 4

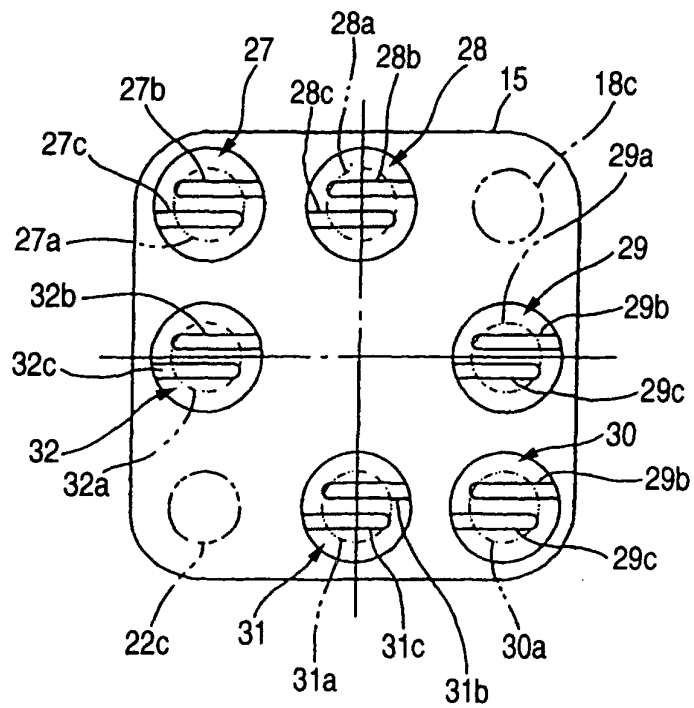


FIG. 5

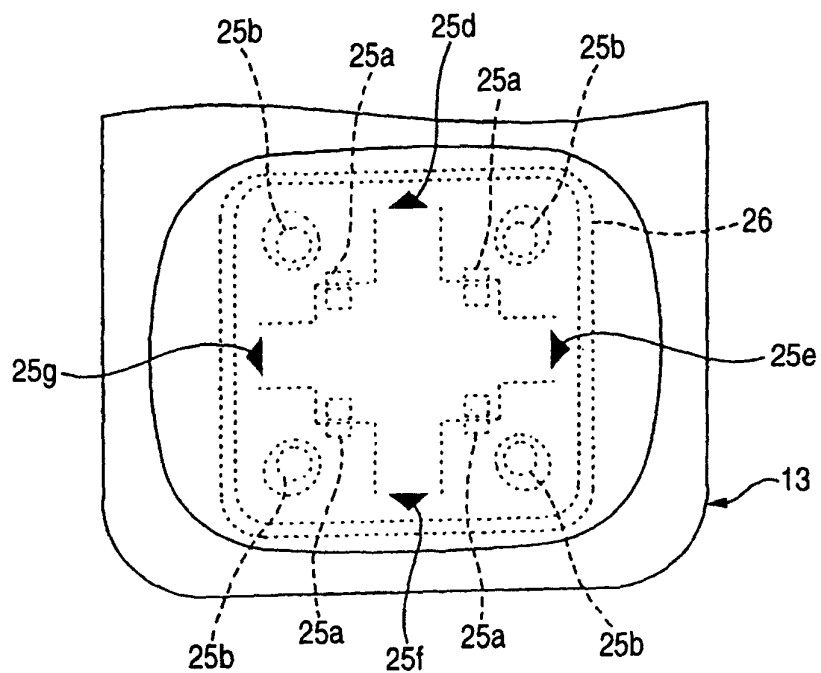


FIG. 6A

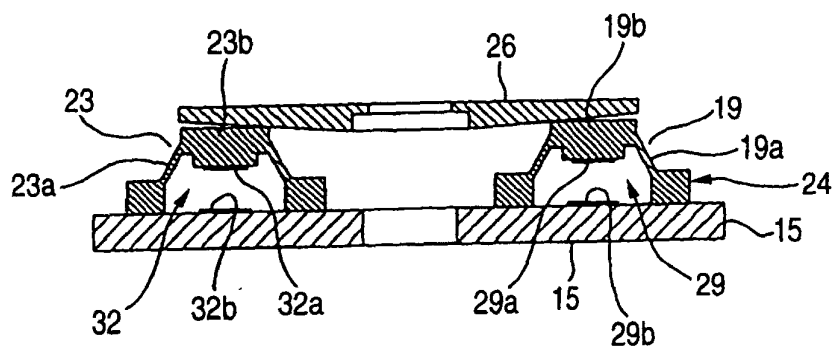


FIG. 6B

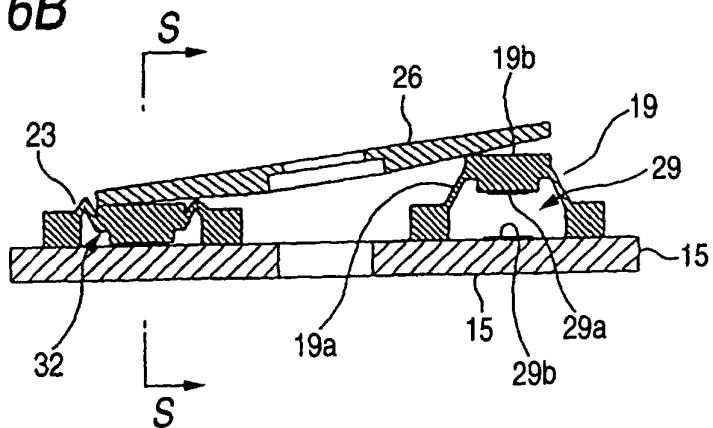


FIG. 7

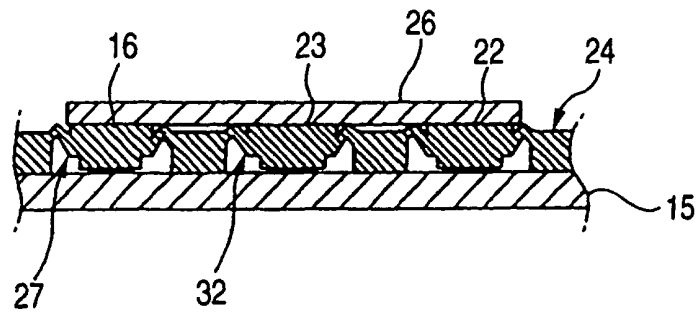


FIG. 8

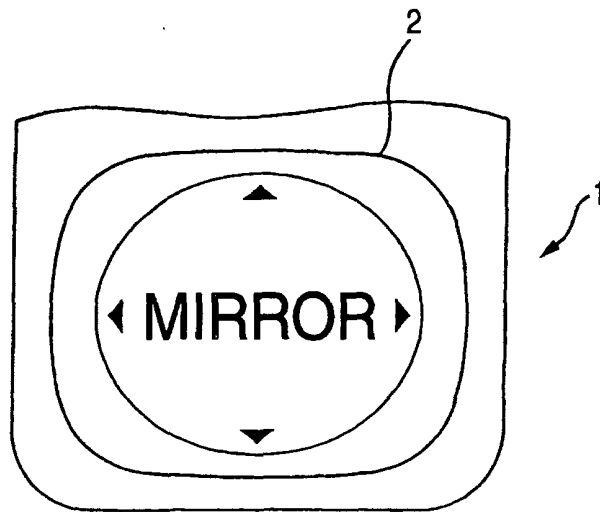


FIG. 9

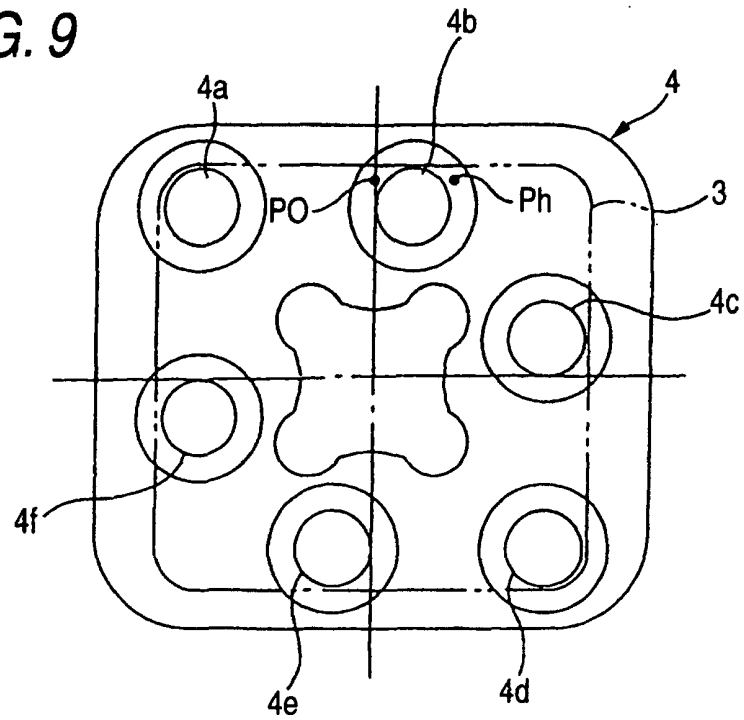


FIG. 10

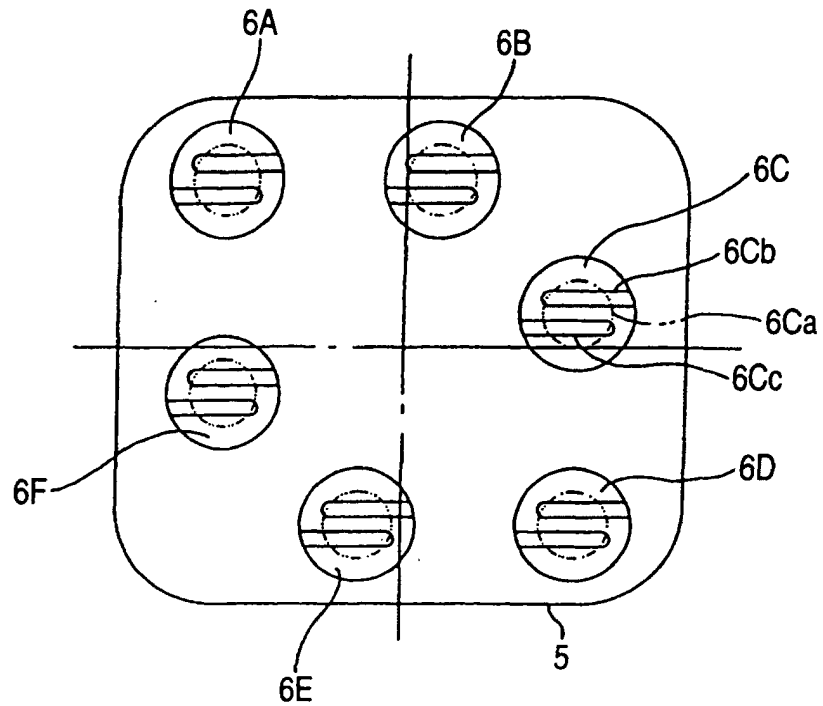
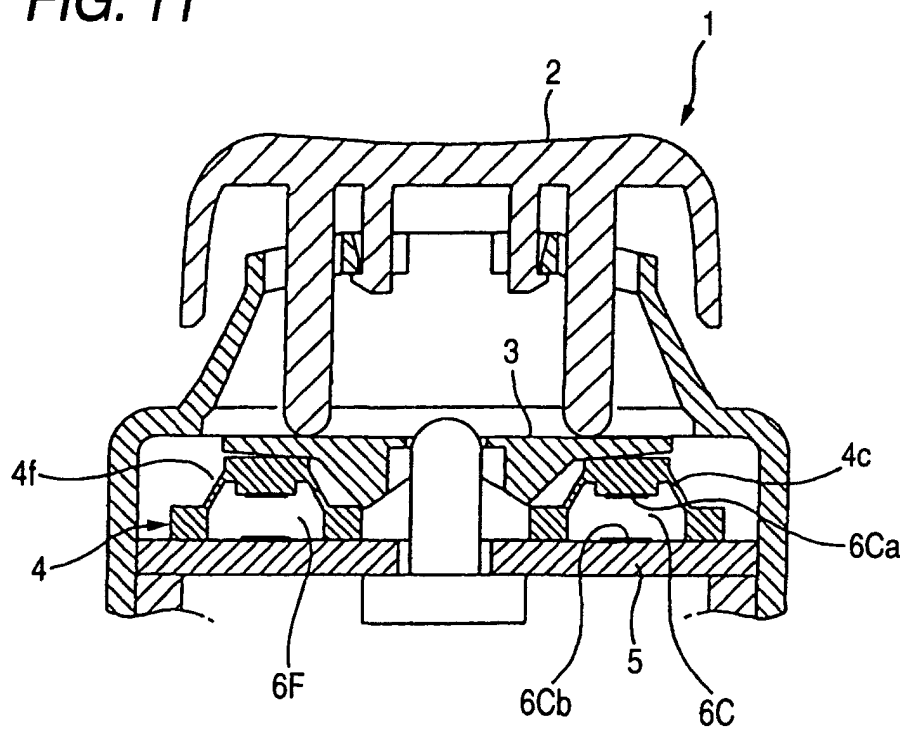


FIG. 11





European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 02 02 4971

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
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			H01H
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 10 February 2003	Examiner Ramírez Fueyo, M
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 02 02 4971

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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10-02-2003

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