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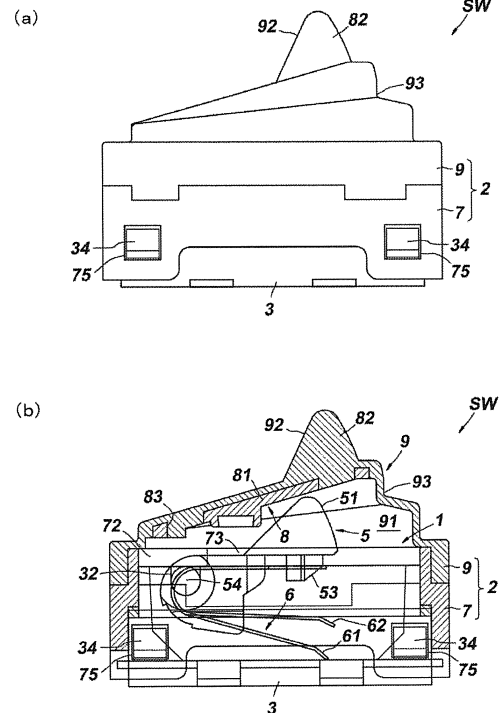
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(54) **WATERPROOF AND DUST PROTECTED SWITCH**

(57) [Problem] To provide a waterproof and dust protected switch having superior shape retention characteristics, durability, and operating stability. [Solution] This waterproof and dust protected switch (SW) is provided with a switch mechanism unit (1) that switches contacts by the operation of an outside force and a switch case (2) that protects the switch mechanism unit (1). The switch case (2) is constituted of a case main body (7) formed from a hard material that accommodates the switch mechanism unit (1) and a cover (9) that covers the case main body (7) and is formed from a soft material. The case main body (7) and cover (9) are integrated by two-color molding, and also a reinforcing rib (8) is provided integrated with the case main body (7) or separately on a part where the outside force operates on the cover (9).

[Fig. 8]



Description

Technical Field

[0001] The present invention relates to a waterproof and dust protected switch used as a power supply switch in electronic devices such as, for example, electronic book terminals, mobile phone devices, etc., capable of preventing the intrusion of water drops, dust, etc. particularly into a switch mechanism unit or the inside of electronic devices.

Background of the Invention

[0002] Heretofore, a waterproof switch applied by the present applicant in the past is known as a switch comprising characteristics such as those described above (refer to following Patent Document 1). In this waterproof switch, the switch main body part is accommodated within a switch case with a two-layer structure comprising a waterproof cover and a case body, molded with two colors on the outer surface thereof. Furthermore, regarding the switch case, part of the waterproof cover is projected from the outer surface of the case body in a dome shape, with a knob of the switch main body part arranged inside the dome. Therefore, because the knob of the switch main body is completely covered by the dome which is a part of the waterproof cover, this waterproof switch is capable of preventing water from entering the switch case from the periphery of the knob.

Prior Art Document

Patent Documents

[0003] Patent Document 1: Japanese Unexamined Patent Application Publication 2005-209527

Summary of the Invention

Problems to be solved by the Invention

[0004] Incidentally, in the waterproof switch of Patent Document 1, when the knob is pressed, the dome making up part of the waterproof cover is supposed to stretch integrally with the knob. For this reason, in order to maintain the stretching properties of the dome, the thickness of the resin constituting the dome has to be molded thinner than other portions of the waterproof cover (refer to Fig. 1 or Fig. 7 of Patent Document 1). Therefore, there has been a problem in that after repetitive pressing operations of the knob, wear and tear, etc. is generated in the resin of the thin portion of the dome, rendering the switch operation no longer stable.

[0005] The present invention is designed to solve such problems with the purpose of providing a waterproof and dust protected switch capable of preventing the intrusion of water drops or dust, etc. into the switch case without

fail and maintaining stable switch operations for a long period of time by enhancing durability.

Means for Solving the Problems

[0006] In order to achieve said purpose, the waterproof and dust protected switch in the present invention is provided with a switch mechanism unit that switches contacts by the operation of outside force along with a switch case that protects said switch mechanism unit. Said switch case is constituted of a case main body formed from a hard material that accommodates said switch mechanism unit and a cover that covers said case main body and is formed from a soft material. Said case main body and said cover are integrated by two-color molding, and a reinforcing rib is also provided integrally with said case main body or separately on the part where outside force operates on said cover.

[0007] In the waterproof and dust protected switch in the present invention, it is possible for said switch case to adopt a configuration in which a plate spring is formed by the top plate of said case main body and said reinforcing rib inclining with respect to the top plate.

[0008] Furthermore, in the waterproof and dust protected switch in the present invention, regarding said switch case, when outside force acts on said cover, said reinforcing rib is preferably arranged at a position to press the operation body of said switch mechanism unit.

[0009] Moreover, in the waterproof and dust protected switch in the present invention, it is possible to adopt a configuration for said switch case such that said case main body is formed from polyamide resin and said cover is formed from silicon rubber.

[0010] Furthermore, in the waterproof and dust protected switch in the present invention, a configuration of a lever switch that switches contacts by an inclining movement of the lever may also be adopted for said switch mechanism unit.

Effects of the Invention

[0011] According to the waterproof and dust protected switch in the present invention, the switch is configured such that the case main body and the cover are integrated by two-color molding and the cover is tightly attached to the case main body so as to completely close the switch mechanism unit, providing an effect of preventing the intrusion of water drops or dust from outside so as to protect the switch mechanism unit without fail. Furthermore, a reinforcing rib is provided integrally or separately with respect to the case main body at the location in which outside force acts on the cover, further providing an effect such that the shape retention characteristics may favourably be maintained without causing wear and tear, etc. on the cover as a result of repetitive use and smooth and stable operations may be realized for a long period of time with excellent durability.

Brief Description of the Drawings

[0012]

[Fig. 1] depicts the outer appearance of the waterproof and dust protected switch in Embodiment 1, in which (a) is a plane drawing and (b) is the front view.

[Fig. 2] is an exploded cross-section drawing of the waterproof and dust protected switch in Fig. 1.

[Fig. 3] depicts a base consisting of the waterproof and dust protected switch in Fig. 1, in which (a) is a plane drawing before being cut, (b) is the front view, (c) is a cross-section drawing along A-A, (d) is a right side section drawing, (e) is a cross-section drawing along B-B, and (f) is a plane drawing after being cut.

[Fig. 4] depicts a contact pattern consisting of the waterproof and dust protected switch in Fig. 1, in which (a) is a plane drawing, (b) is the front view, and (c) is a cross-section drawing along A-A.

[Fig. 5] depicts a lever consisting of the waterproof and dust protected switch in Fig. 1, in which (a) is a plane drawing, (b) is a right side section drawing, (c) is the front view, (d) is a cross-section drawing along A-A, and (e) is the front view of a state in which a contact spring piece has been fit in.

[Fig. 6] depicts the state at the time of primary molding of a switch case consisting of the waterproof and dust protected switch in Fig. 1, in which (a) is a plane drawing, (b) is the front view, (c) is a cross-section drawing along A-A, (d) is a right side section drawing, (e) is a cross-section drawing along B-B, and (f) is a cross-section drawing along C-C.

[Fig. 7] depicts the state at the time of secondary molding of the switch case consisting of the waterproof and dust protected switch in Fig. 1, in which (a) is a plane drawing, (b) is the front view, (c) is a cross-section drawing along A-A, (d) is a right side section drawing, and (e) is a cross-section drawing along B-B.

[Fig. 8] depicts a still state of the waterproof and dust protected switch in Fig. 1, in which

(a) is the outer appearance and (b) is a cross-section drawing.

[Fig. 9] depicts the operation state of the waterproof and dust protected switch in Fig. 1, in which (a) is the outer appearance and (b) is a cross-section drawing.

[Fig. 10] depicts the outer appearance of a waterproof and dust protected switch according to Embodiment 2, in which (a) is a plane drawing and (b) is the front view.

[Fig. 11] depicts the state at the time of primary molding of the switch case consisting of the waterproof and dust protected switch of Fig. 10, in which (a) is a plane drawing, (b) is the front view, (c) is a cross-section drawing along A-A, (d) is a right side section

drawing, (e) is a cross-section drawing along B-B, and (f) is a cross-section drawing along C-C.

[Fig. 12] depicts the state at the time of secondary molding of the switch case consisting of the waterproof and dust protected switch of Fig. 10, in which (a) is a plane drawing, (b) is the front view, (c) is a cross-section along A-A, (d) is a right side section drawing, and (e) is a cross-section drawing along B-B.

Detailed Description of the Invention

[0013] Hereinafter, embodiments for implementing the present invention are described with reference to the drawings.

[0014] As depicted in Fig. 1, waterproof and dust protected switch SW in the present embodiment is a small size switch that can be used as a power supply switch for electronic devices such as, for example, electronic book terminals, mobile phones, etc. This switch is characterized in that a waterproof and dust protected structure is adopted for switch case 2 in order to prevent the intrusion of water drops, dust, etc. into internal switch mechanism unit 1 or an electronic device main body at the time of usage. It should be noted that the power supply switch that is shown as an example is merely one example and the present invention is applicable in other switches used for environments in which waterproof properties or dust protective properties are required.

[0015] As exploded and depicted in Fig. 2, waterproof and dust protected switch SW comprises switch mechanism unit 1 and switch case 2. Switch mechanism unit 1 switches contacts by operating an outside force (for example, by pressing with a finger) and a lever switch that switches contacts via an inclining operation of lever 5 which makes up an operation body is adopted in the present embodiment. Switch case 2 protects switch mechanism unit 1 and is structured so as to completely encapsulate the internal switch mechanism unit 1 by a double structure comprising case main body 7 and cover 9 in the present embodiment.

[0016] Herein, the structure of switch mechanism unit 1 is described. Fig. 3 depicts base 3 constituting switch mechanism unit 1. Base 3 is molded from a resin material that has insulating properties (polyamide resin in the present embodiment), while space 31 for internally accommodating parts in a flat box-shaped main body is provided mounted on a substrate. Concave part 32 for installing lever 5 to be described later is formed on the front and back surfaces of the main body, while seat 33, which is one step higher, is formed on the inner bottom surface of the main body. Furthermore, locking pawls 34 for attaching switch case 2 to be described later are provided on the external wall surface of the main body.

[0017] Fig. 4 depicts a contact pattern 4 constituting switch mechanism unit 1. Contact pattern 4 is formed by punching out a metal sheet (phosphor bronze plate in the present embodiment) having conductive properties

and comprises two rows of fixed contacts 41, 42 arranged in the center thereof with a predetermined interval in between. Furthermore, each of fixed contacts 41, 42 is provided with four connection terminals 43, 43, bent like a stair so as to be one step lower.

[0018] Regarding this contact pattern 4, by insertion molding at the time of molding base 3 as depicted in Fig. 3, two rows of fixed contacts 41, 42 are fixed onto the inner bottom surface of base 3, while four connection terminals 43, 43, connected to fixed contacts 41, 42, are formed outside base 3 in a projected manner. It should be noted that after insertion molding, the two rows of fixed contacts 41, 42 are brought into a state such that they are separated from each other as depicted in Fig. 3 (f) by cut processing the dotted portion indicated in Fig. 3 (a).

[0019] Fig. 5 depicts lever 5 that constitutes switch mechanism unit 1. Lever 5 is molded from resin material (polyamide resin in this embodiment) that has insulating properties and comprises operation part 51 to receive an outside force, holder part 52 for holding contact spring piece 6, and cam part 53 for transmitting the outside force to contact spring piece 6. As depicted in Fig. 5 (e), in this lever 5, contact spring piece 6 is fit into holder part 52 such that it is fixed while being in an energy accumulated state. With regard to contact spring piece 6, a metal piece is bent into a U-shape providing resilient power and the end part thereof is divided into two to form a pair of leg parts, with the tip ends thereof becoming independent movable contacts 61, 62, respectively. As depicted in Fig. 2, by inserting shaft part 54 provided on the outer wall surface into concave part 33 of base 3, lever 5, onto which this contact spring piece 6 has been fixed, is rotatably supported by shaft part 54 which is a fulcrum point.

[0020] Next, the structure of switch case 2 is described. Fig. 6 and Fig. 7 depict switch case 2 following molding steps. Switch case 2 has a double structure consisting of case main body 7 that is molded in the primary molding as depicted in Fig. 6 and cover 9 that is molded in the secondary molding as depicted in Fig. 7.

[0021] As depicted in Fig. 6, case main body 7 is formed from a hard material that has insulating properties (polyamide resin in the present embodiment) and is molded into a flat box shape as depicted in the figure by heating, melting, and injection molding the hard material. This case main body 7 is for protecting switch mechanism part 1 by covering base 3, for which space 71 for accommodating lever 5 inside the main body is provided and opening part 73 for inserting lever 5 therein is formed in top plate 72 on the upper surface of the main body. Attaching piece 74 for securing purposes is provided on base 3 on the front and back surfaces of the main body, while locking hole 75 to be fitted with locking pawl 34 of base 3 is formed in attaching piece 74.

[0022] Furthermore, reinforcing rib 8 made from the same hard material as case main body 7 is provided as frame of cover 9. As depicted in Fig. 6 (b) (c), reinforcing rib 8 is arranged in an inclining state with respect to top plate 72 of case main body 7, while reinforcing rib 8 and

top plate 72 constitute plate spring part 81 that has resilient force. Moreover, as depicted in Fig. 6 (d) (e) (f), two rows of projection parts 82, 82 molded in the same mountain shape as lever 5 are provided at one end of reinforcing rib 8. Furthermore, round hole 83 for securing a contact area with cover 9 is provided at the other end of reinforcing rib 8 as depicted in Fig. 6 (a) (c). It should be noted that reinforcing rib 8 is provided as a separate body from case main body 7 in the present embodiment; however, alternatively, reinforcing rib 8 may also be provided integrally by connecting to top plate 72 of case main body 7.

[0023] As depicted in Fig. 7, cover 9 is made from a soft material (silicon rubber in the present embodiment) that has insulating properties such as elastomer resin, etc. and is molded into a dome shape with cavity 91 inside thereof as illustrated, by heating, melting and injection molding the soft material. During the molding step, first, a die is opened after molding case main body 7 and only the top mold is replaced with a top mold for cover molding (reinforcing rib 8 has been set within the mold) subsequently followed by clamping the mold. Thereafter, liquid silicon rubber is injected into the die and finally cooled to harden. As described, by two-color molding with a hard material (polyamide resin) and a soft material (silicon rubber), switch case 2 is molded with case main body 7 and cover 9 integrated.

[0024] As depicted in Fig. 8, two-color molded switch case 2 is mounted on base 3 where lever 5 has been installed. Switch case 2 covers over base 3, and base 3 as well as switch case 2 are secured by hooking locking pawl 34 of base 3 into locking hole 75 of case main body 7 as in the drawing.

[0025] Because cover 9 covering over case main body 7 is integrated by two-color molding, cover 9 is closely attached to case main body 7 and said switch case 2 is capable of completely blocking the intrusion of water drops or dust from outside. Furthermore, regarding the locations at which an outside force acts, reinforcing rib 8 made from a hard material is bonded to cover 9 that is made from a soft material, significantly enhancing the performance of shape retention characteristics, durability, operating stability, etc. of cover 9. Furthermore, as in Fig. 7 (c), silicon rubber composing cover 9 is inserted into round hole 83 of reinforcing rib 8 and, as in Fig. 7 (d) (e), projection part 92 formed from silicon rubber that constitutes cover 9 is also inserted between two rows of projection parts 82 and 82 at the tip end of the reinforcing rib so as to be bonded. Thereby, the contact area of case main body 7 and cover 9 is largely ensured, further enhancing the bonding properties of both.

[0026] Finally, the operations of waterproof and dust protected switch SW in the present embodiment will be described. In the still state depicted in Fig. 8, shaft part 54 of lever 5 is sandwiched between concave part 32 of base 3 and top plate 72 of case main body 7 to prevent it from coming off, while operation part 51 of lever 5 is projected from opening part 73 of case main body 7. Fur-

thermore, projected operation part 51 is accommodated within space 71 of case main body 7 and arranged at the opposite position facing reinforcing rib 8 that comprises plate spring part 81. At this time, one movable contact 61 of contact spring piece 6 is in contact with fixed contact 41, but the other movable contact 62 is not in contact with fixed contact 42. For this reason, fixed contacts 41 and 42 are not conductive to each other and the switch is in an OFF state.

[0027] On the other hand, in the operation state depicted in Fig. 9, when projection part 92 of cover 9 is pressed with a finger, etc. the entire cover 9 made from silicon rubber sinks resulting in deformation, compressing plate spring part 81 of reinforcing rib 8 that has been integrated into cover 9. Herein, when the compressed plate spring part 81 presses operation part 51 of lever 5 and lever 5 rotates with shaft 54 as a fulcrum and falls, operation part 51, upon which an outside force is received, thereby functions as the stress point and cam part 53 abutting contact spring piece 6 as the operating point. At this time, contact piece 6 is pressed by cam part 53 and compressed, while the other movable contact 62 comes into contact with fixed contact 42. Consequently, fixed contacts 41 and 42 become conductive to each other via contact spring piece 6, switching the state of the switch to ON.

[0028] It should be noted that when the pushing power is released by removing the finger, lever 5 that has fallen is lifted up by the resilient returning force of contact spring piece 6. Furthermore, accompanying this, cover 9 that has been sunk is also lifted up to the original position by the resilient returning force of plate spring part 81. Thereby, the other movable contact 62 of contact spring piece 6 moves away from fixed contact 42 and the conductivity between fixed contacts 41 and 42 is cut off, switching the state of the switch to OFF.

[0029] As described, according to waterproof and dust protected switch SW of the present embodiment, not only is the intrusion of water drops or dust from outside prevented, but the shape retention characteristics of cover 9 may also be favourably maintained without generating wear and tear after repetitive use by bonding and integrating reinforcing rib 8 that is made from a hard material and cover 9 that is made from silicon rubber. Furthermore, projection part 92, upon which an outside force acts, is protected by being sandwiched by thick projection part 82 made from a hard material, providing excellent durability. It should be noted that cover 9 made from silicon rubber is provided with a stair-like step 93 which acts as a trigger point of the cavity when pressed with a finger and is easily deformed while giving strength thereto, allowing smooth and stable operations to be realized for a long period of time.

[0030] It should be noted that in said embodiment, case main body 7 and reinforcing rib 8 constituting switch case 2 are separate bodies; however, alternatively, case main body 7 and reinforcing rib 8 may also be provided as one body. In the waterproof and dust protected switch SW

depicted in Fig. 10, switch case 2 is configured as a double structure consisting of case main body 7 that is molded in the primary molding depicted in Fig. 11 and cover 9 that is molded in the secondary molding depicted in Fig. 12.

[0031] As depicted in Fig. 11, in the present embodiment, reinforcing rib 8 is connected to top plate 72 of case main body 7 that is made of a hard material (polyamide resin in the present embodiment) and the connected portion thereof constitutes plate spring part 81 that has resilient force. As described in Fig. 12, dome-shaped cover 9 comprising cavity part 91 therein is molded by heating, melting, and injection molding a soft material such as elastomer resin, etc. (silicon rubber in the present embodiment). As described, switch case 2 with integrated case main body 7 and cover 9 is configured by two-color molding of a hard material (polyamide resin) and a soft material (silicon rubber).

[0032] Also in the waterproof and dust protected switch SW in the present embodiment, cover 9 is closely attached to case main body 7 that constitutes switch case 2, enabling the protection of switch mechanism unit 1 without fail by completely blocking the intrusion of water drops or dust, etc. from outside. Furthermore, particularly in the present embodiment, because case main body 7 and reinforcing rib 8 are connected and the connected portion constitutes plate spring 81, the compressing and resilient returning operations of plate spring 81 are conducted smoothly, making it possible to realize favourably responsive and stable switch operations as an advantageous point.

[0033] In the embodiments described thus far, although a lever switch is adopted as switch mechanism unit 1 constituting waterproof and dust protected switch SW, switches in other structures such as a push switch or a sliding switch, etc. may also be adopted without being limited to this. Furthermore, also with regard to case main body 7 and cover 9 constituting switch case 2, the shape and the material are not necessarily limited to the above embodiment, with appropriate modifications possible within the normal creative capability of those in the industry within the scope of the present invention.

Explanation of the Symbols

[0034]

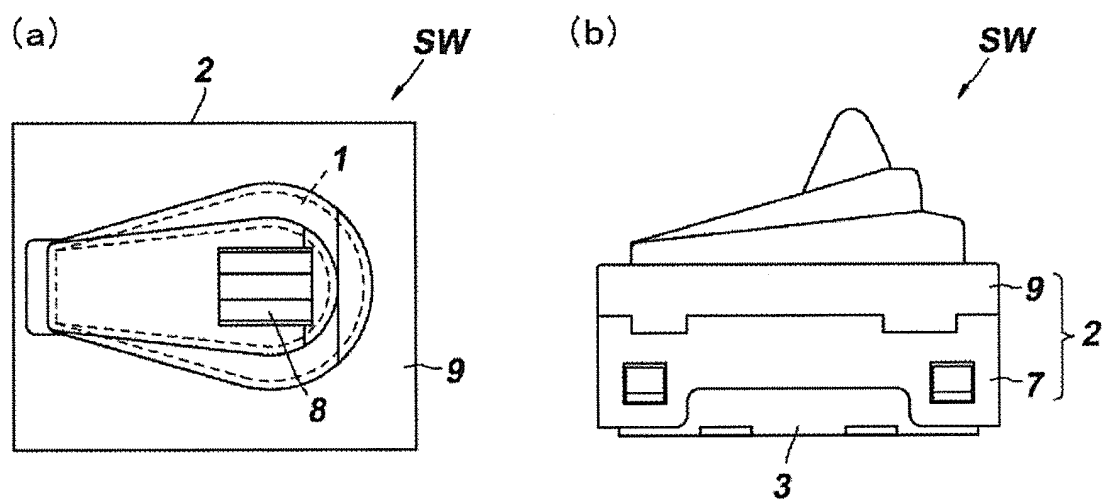
SW...waterproof and dust protected switch

- 1... switch mechanism unit
- 2... switch case
- 3...base

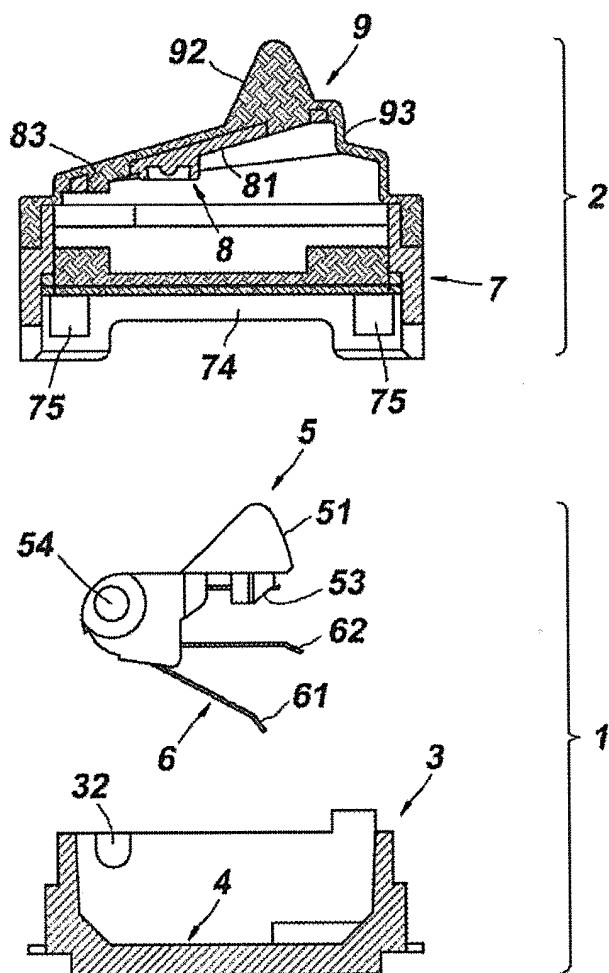
- 31...space
- 32... concave part
- 33...seat
- 34...locking pawl

4...contact pattern		
41... fixed contact		
42... fixed contact		
43...connection terminal	5	
5...lever		
51...operation part		
52...holder part	10	
53...cam part		
54...shaft part		
6... contact spring piece		
61...movable contact	15	
62...movable contact		
7...case main body		
71... space	20	
72...top plate		
73... opening part		
74...attaching piece		
75...locking hole	25	
8...reinforcing rib		
81...plate spring part		
82...projection part	30	
83...round hole		
9... cover		
91... cavity	35	
92...projection part		
93...step		
Claims	40	
1. A waterproof and dust protected switch, comprising a switch mechanism unit that switches contacts by the operation of an outside force, and a switch case that protects said switch mechanism unit, wherein said switch case comprises:	45	
a case main body formed from a hard material for accommodating said switch mechanism unit; and	50	
a cover formed from a soft material covering said case main body, and said case main body and said cover are inte- grated by two-color molding and a reinforcing rib is provided integrally or separately with re- spect to said case main body for a portion of said cover upon which outside force acts.	55	

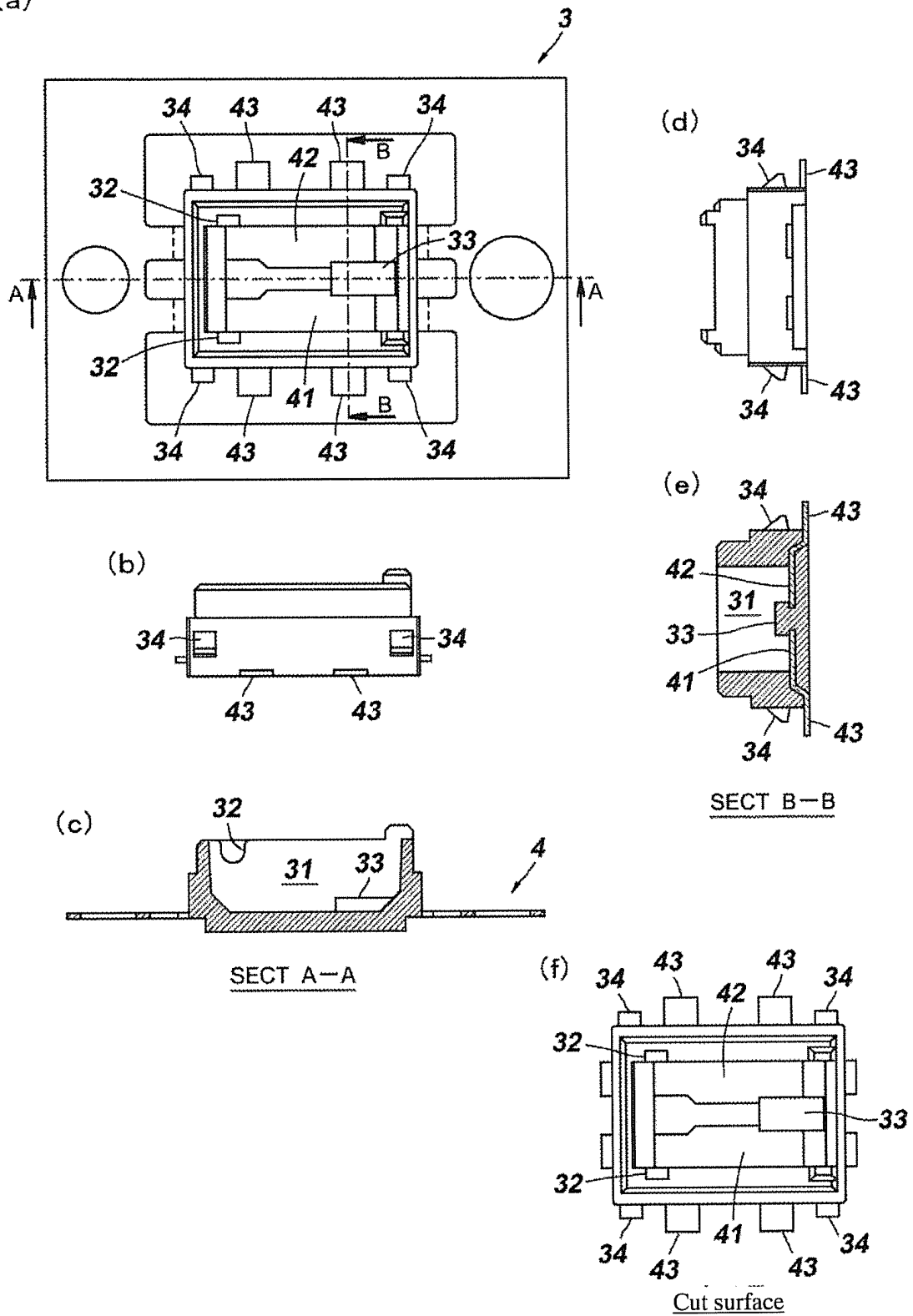
[Fig. 1]



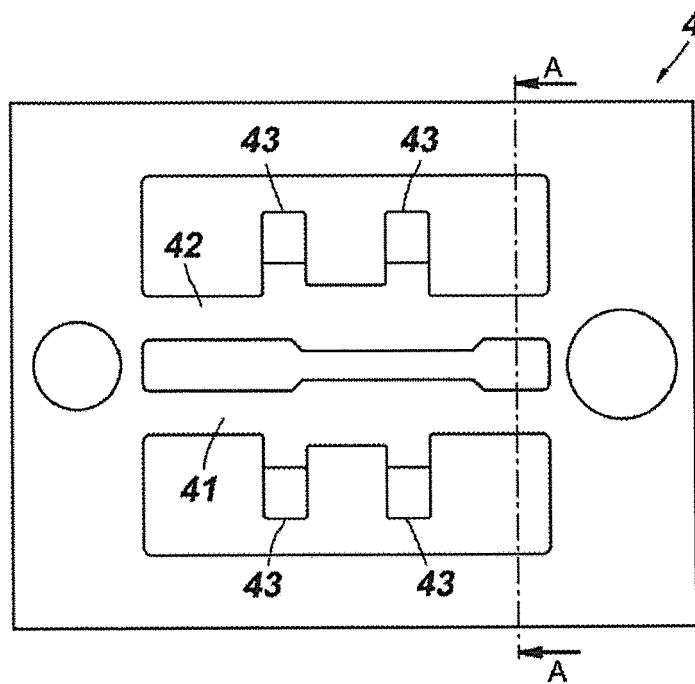
[Fig. 2]



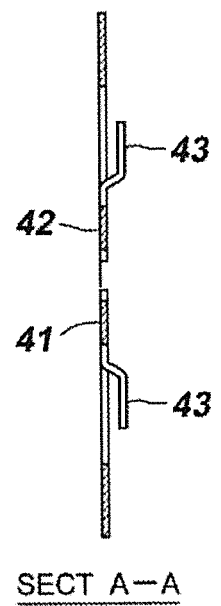
[Fig. 3]
(a)



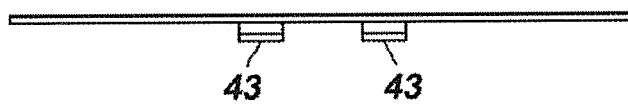
[Fig. 4]
(a)



(c)

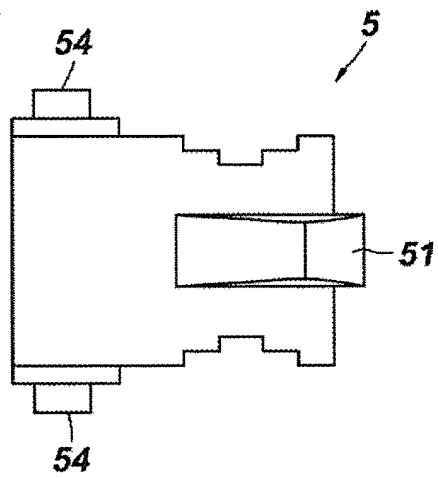


(b)

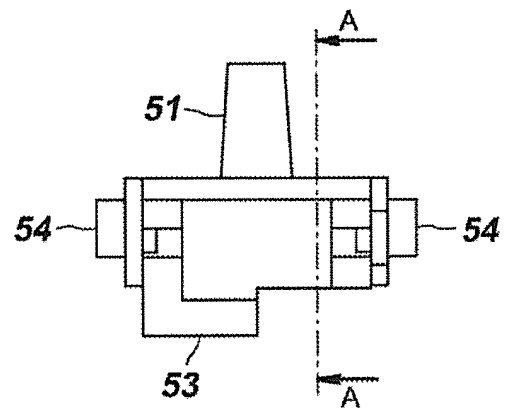


[Fig. 5]

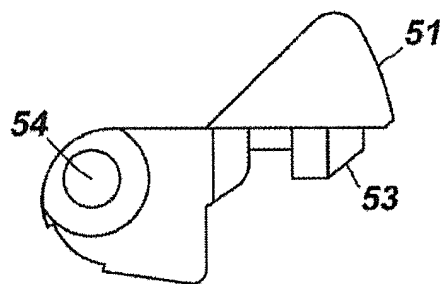
(a)



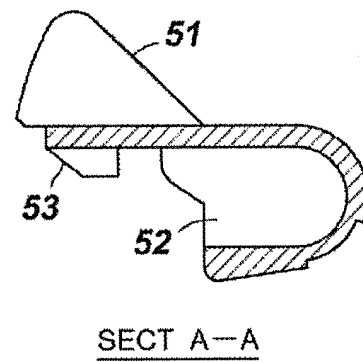
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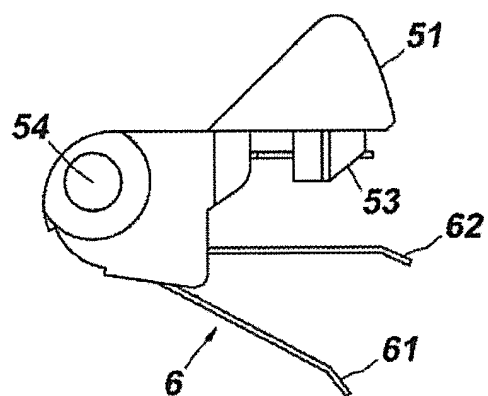
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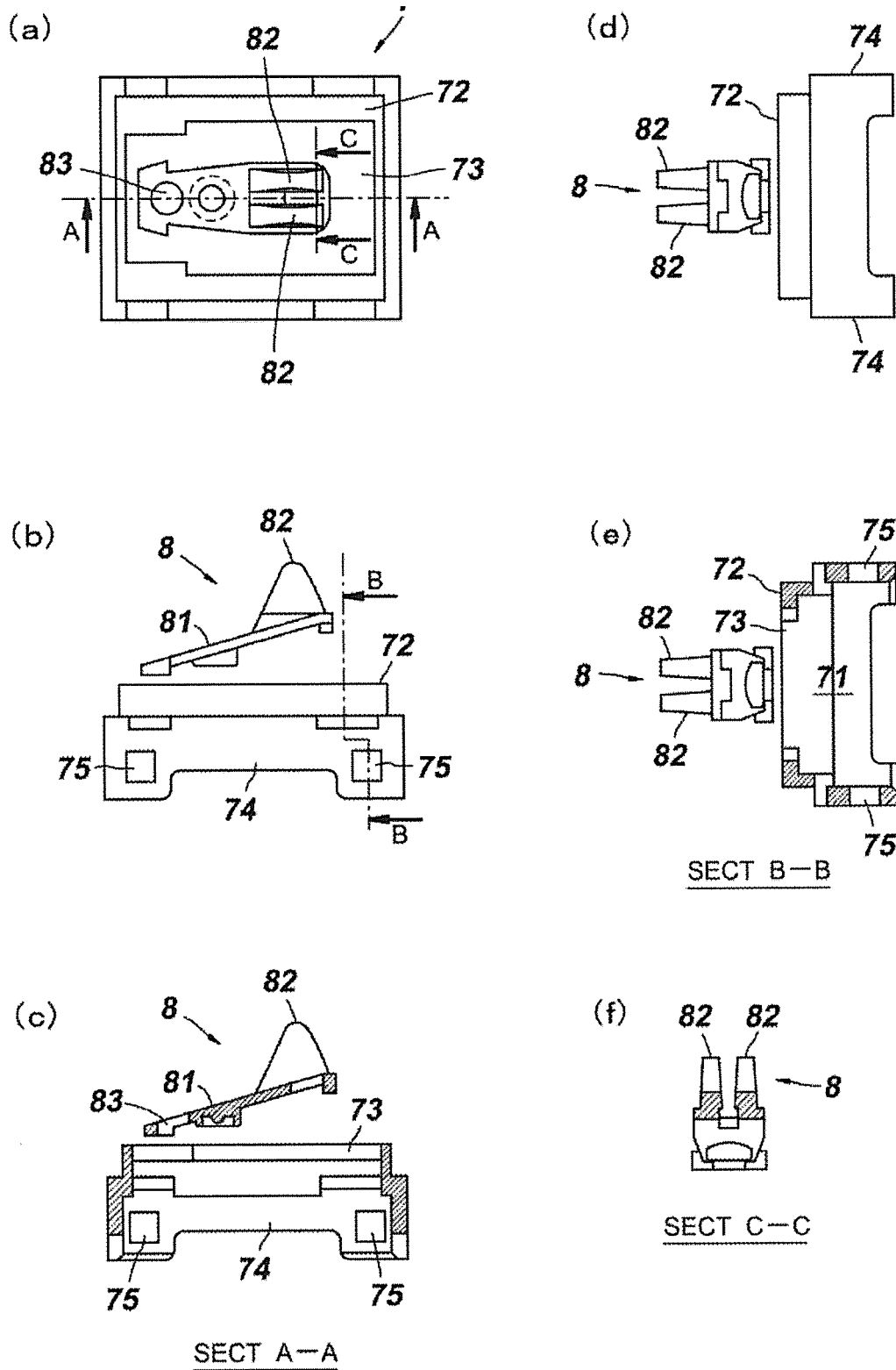
(d)



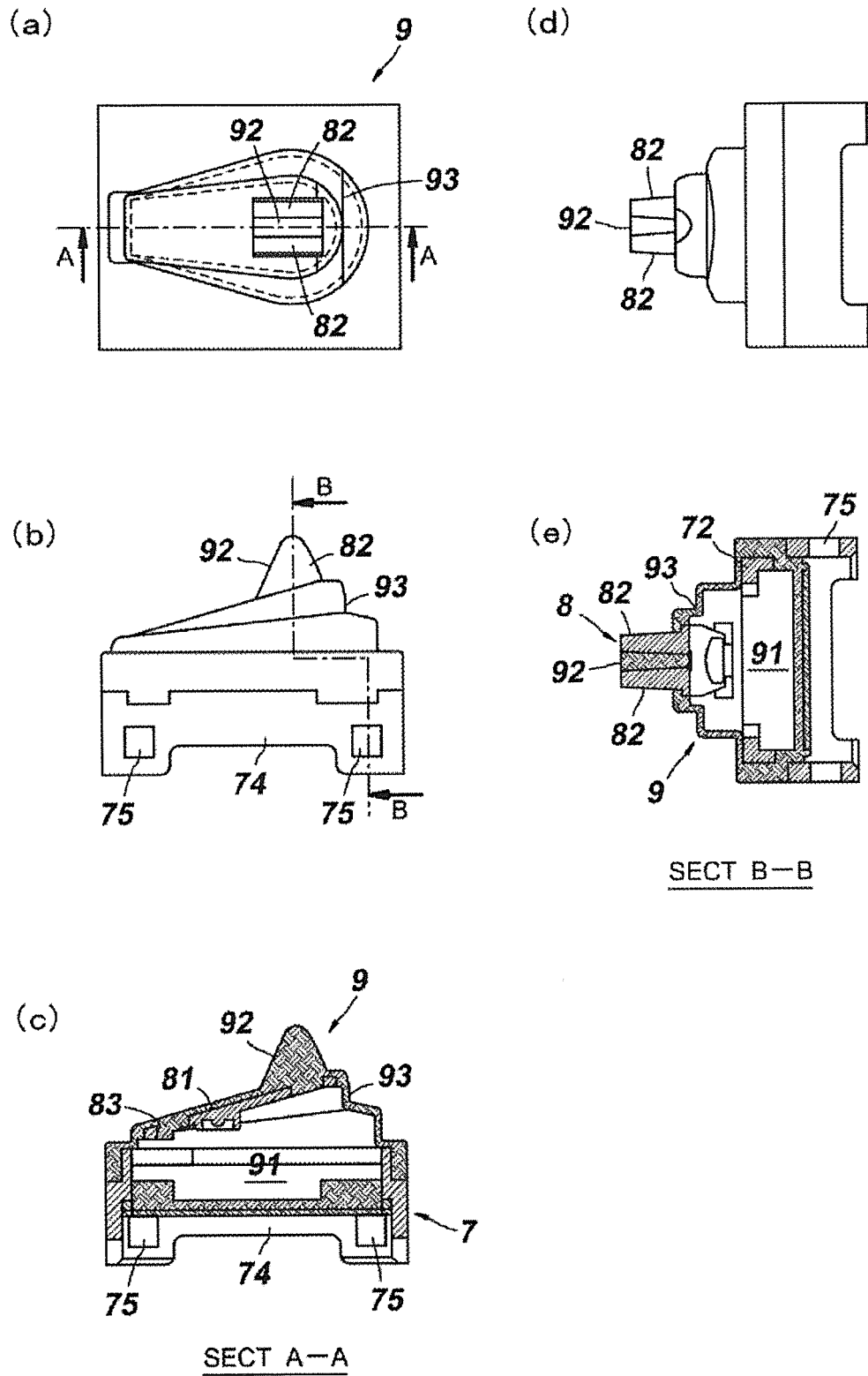
(e)



[Fig. 6]

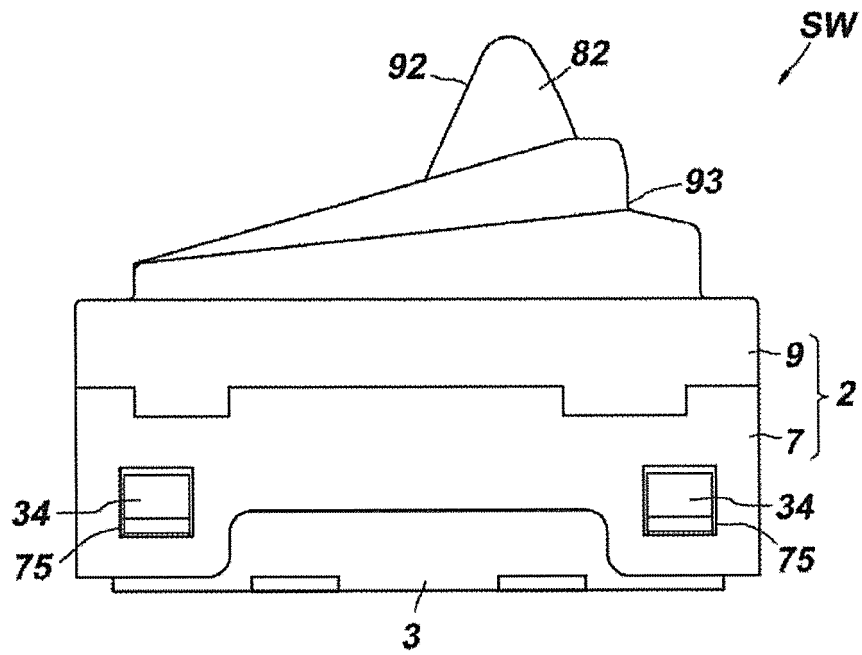


[Fig. 7]

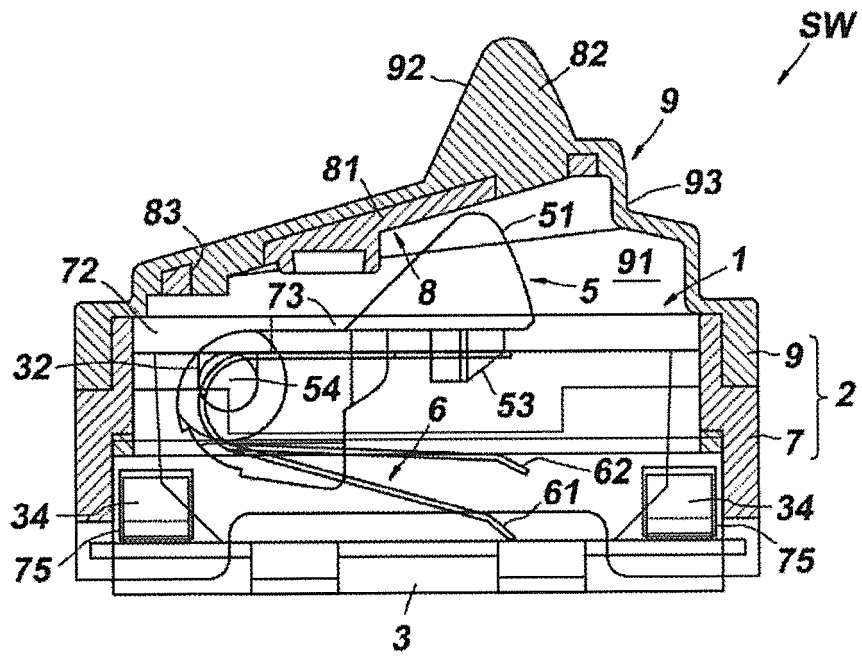


[Fig. 8]

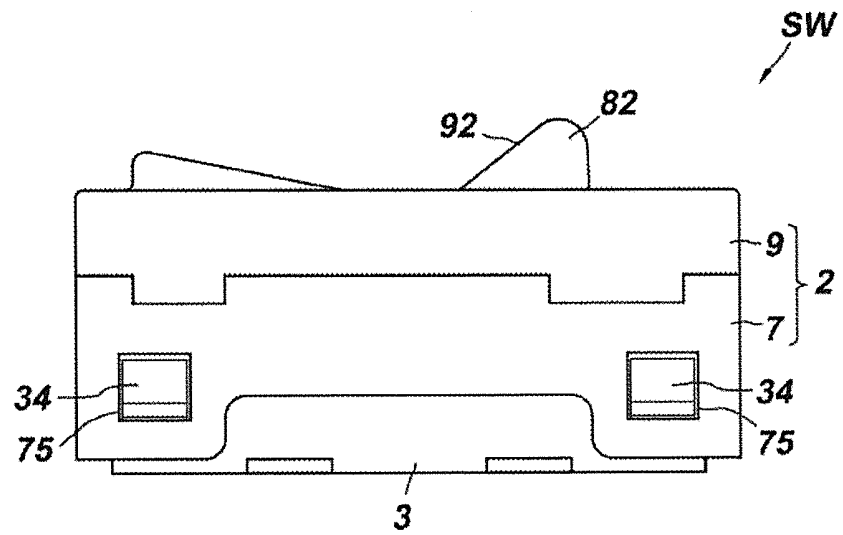
(a)



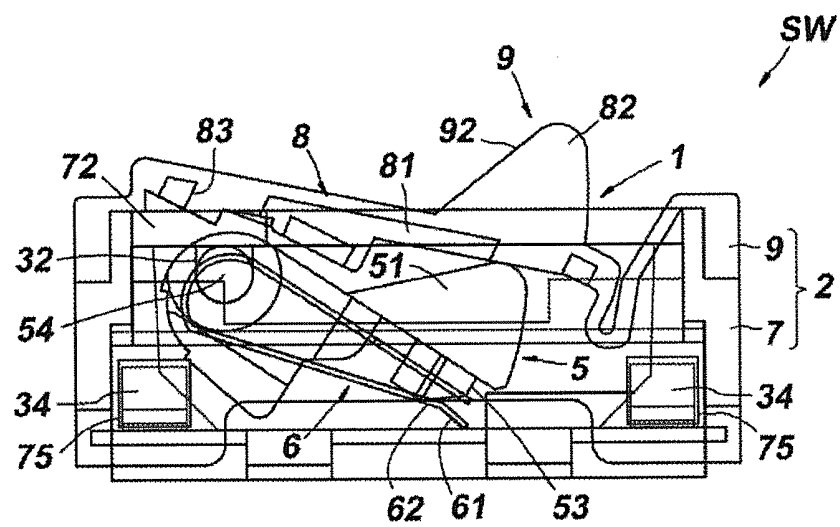
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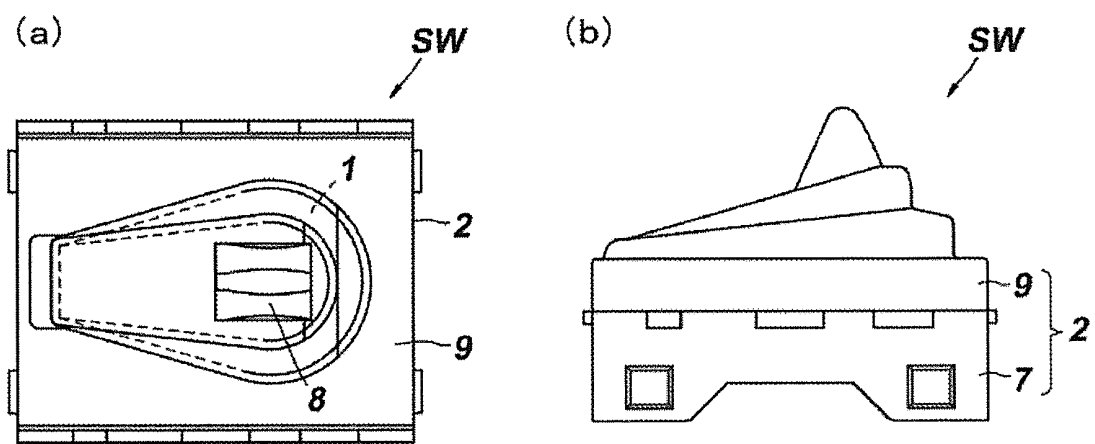
[Fig. 9]
(a)



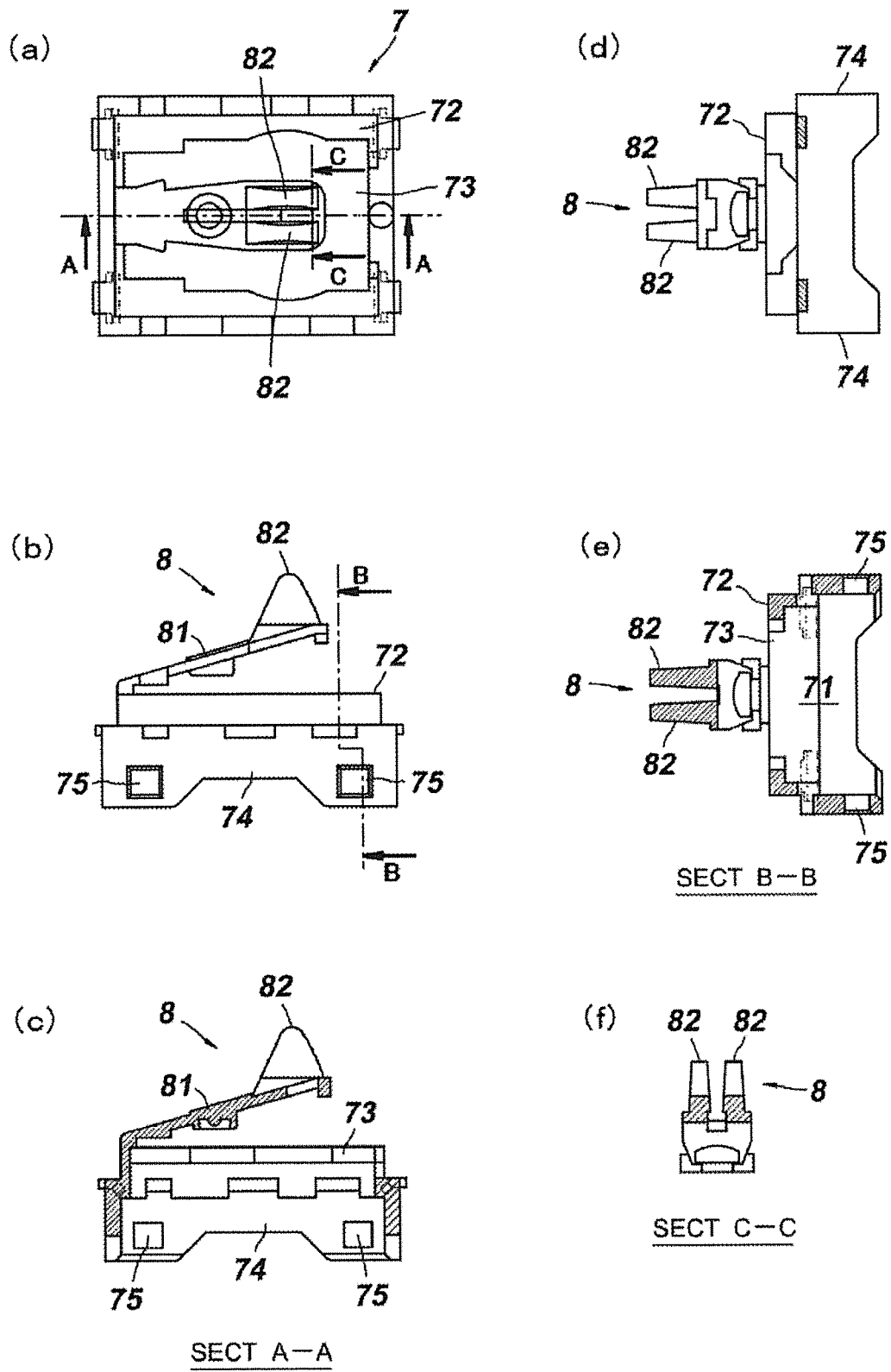
(b)



[Fig. 10]

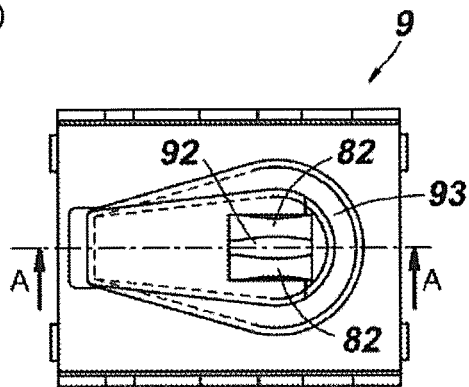


[Fig. 11]

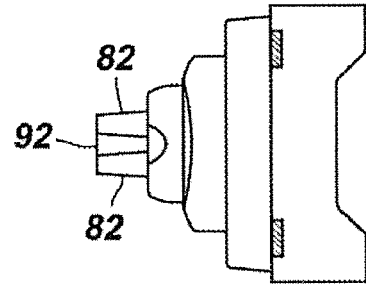


[Fig. 12]

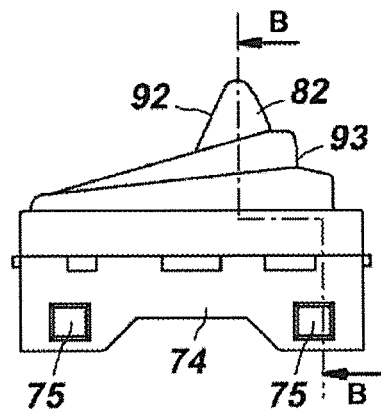
(a)



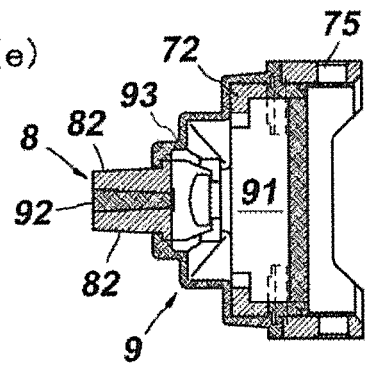
(d)



(b)

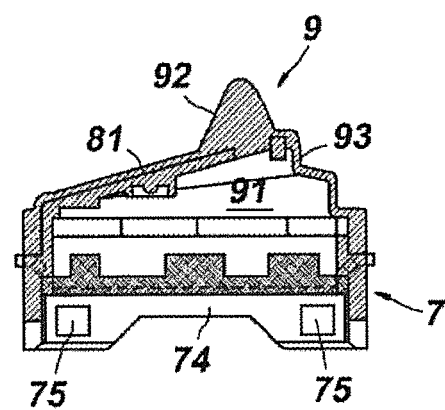


(e)



SECT B-B

(c)



SECT A-A

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2012/062586

A. CLASSIFICATION OF SUBJECT MATTER
H01H9/04 (2006.01) i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
H01H9/04, H01H13/06

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2012
Kokai Jitsuyo Shinan Koho 1971-2012 Toroku Jitsuyo Shinan Koho 1994-2012

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	Microfilm of the specification and drawings	1
Y	annexed to the request of Japanese Utility	4
A	Model Application No. 007330/1991 (Laid-open No. 099643/1992) (Sharp Corp.), 28 August 1992 (28.08.1992), paragraphs [0002] to [0005]; fig. 3 (Family: none)	2
Y	JP 09-001678 A (Shin-Etsu Polymer Co., Ltd.),	4
A	07 January 1997 (07.01.1997), paragraphs [0011] to [0012] (Family: none)	2, 3

☒ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E" earlier application or patent but published on or after the international filing date	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&" document member of the same patent family
"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search
10 August, 2012 (10.08.12)

Date of mailing of the international search report
21 August, 2012 (21.08.12)

Name and mailing address of the ISA/
Japanese Patent Office

Authorized officer

Facsimile No.

Telephone No.

INTERNATIONAL SEARCH REPORT

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PCT/JP2012/062586

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 47-015412 Y1 (Matsushita Electric Works, Ltd.), 31 May 1972 (31.05.1972), entire text; all drawings (Family: none)	1-5
A	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 184976/1979 (Laid-open No. 100828/1981) (Matsushita Electric Works, Ltd.), 08 August 1981 (08.08.1981), entire text; fig. 3 to 4 (Family: none)	3

Form PCT/ISA/210 (continuation of second sheet) (July 2009)

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2005209527 A [0003]