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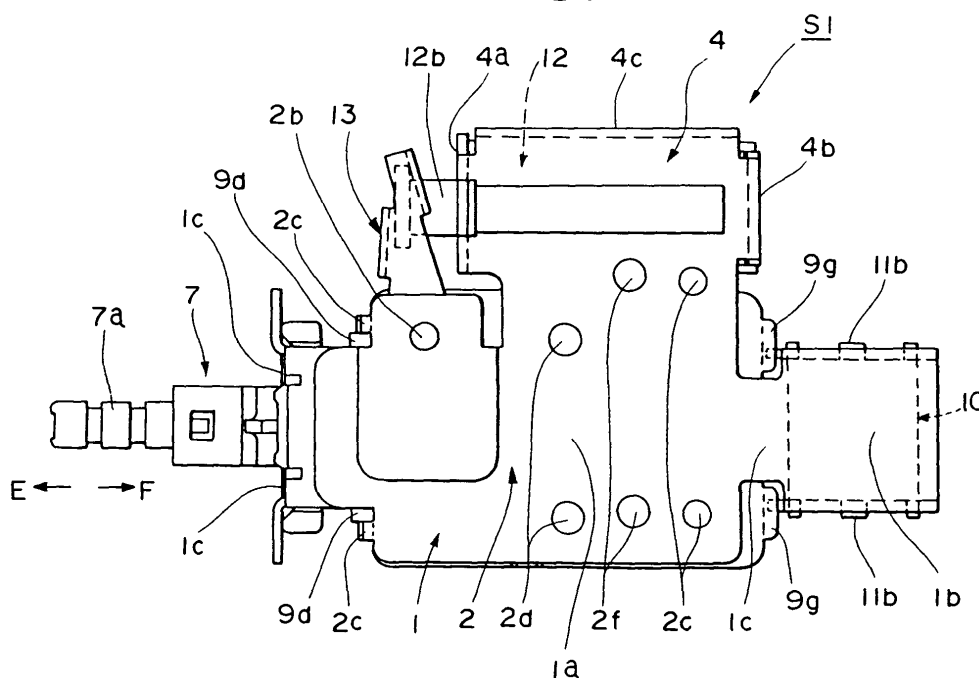
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(54) **Switching device**

(57) A switching device comprises a frame, an AC circuit switch capable of ON/OFF operation by holding in a locked or unlocked state a slidable operating member disposed inside of a casing, and a driving power source capable of sliding said operating member. The AC circuit switch has a cover attached on said casing to cover an open section formed in said casing, said cover includes

a front locking portion protruding out of the front side of said casing, and a rear locking portion protruding out of the rear side of said casing. A bent portion having a retaining portion is provided on the rear side of said frame, and said rear locking portion of said cover is retained in said retaining portion to attach said AC circuit switch. Said AC circuit switch and said driving power source are mounted as one unit on said frame.

FIG. 1

Description

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] This invention relates to a switching device suitable for use as a power switch of electronic equipment such as televisions, monitors, etc. and, more particularly, to a switching device having an automatically breaking function.

Description of Related Art

[0002] A conventional switching device will be explained with reference to Figs. 13 and 14. First, the conventional switching device has a first frame 20, which is provided with an AC switch section 20a and a solenoid section 20b. There are formed first caulking portions 20c in the upper part in the drawing of the AC switch section 20a of the first frame 20, and openings 20d between the AC switch section 21a close to the lower part in the drawing and the solenoid section 20b. In these openings 20d, a pair of second caulking portions 20e are formed. In the left lower part in the drawing of the first frame 20, there is provided a projection 20f protrusively formed.

[0003] A casing 21a is caulked by the first and second caulking portions 20c and 20e, and an AC switch 21 is attached to the first frame 20.

[0004] On the solenoid section 20b is attached a solenoid 22 comprising a coil 22a and a plunger 22b.

[0005] In the drawing, a second frame 23 separate from the first frame 20 is located on the right side of the AC switch section 20a. First caulking portions 23b are formed on the left wide portion 23a in the drawing of the second frame 23, and second caulking portions 23d are formed on the narrow portion 23c on the right in the drawing.

[0006] A DC switch 24 is attached by caulking the second caulking portions 23d.

[0007] Then, the AC switch 21 and the DC switch 24 are integrally connected by caulking the first caulking portions 23b in such a manner as to embrace the casing 21a of the AC switch 21. At the second caulking portions 23d of the second frame 23, the DC switch 24 is caulked to the second frame 23 as shown in Fig. 13. And the AC switch 21, solenoid 22, and DC switch 24 are connected as one body.

[0008] In the casing 21a of the AC switch 21 is disposed an operating member 25 capable of turning the AC switch 21 and the DC switch 24 on and off. An operating shaft 25a formed unitarily with the operating member 25 protrudes from the first frame 20 to the left side in the drawing.

[0009] The operating member 25 is constantly elastically pressed in the direction of the arrow A. The operating member 25, when pushed in the direction of the arrow B against the elastic force, is locked by an unillustrated

lock member, and both the AC switch 21 and the DC switch 24 are actuated to ON.

[0010] Reversely when the operating member 25 is operated to unlock from the locked position, the operating shaft 25a which is in the initial state in the leftmost position in the drawing operates both the AC switch 21 and the DC switch 24 to OFF.

[0011] One end of a driving member 26 is engaged with the forward end of a plunger 22b of the solenoid 22 and the other end not shown of the driving member 26 is positioned in an unillustrated cam section formed on a part of the operating member 25 which is enclosed within the first frame 20. That is, the driving member 26 is rotatably mounted on the first frame 20 so as to rotate on the center of the projection 20f.

[0012] Also when the operating shaft 25a is pushed in the direction of the arrow B from the unlocked position in the initial state, the AC switch 20a and the DC switch 24 are actuated to ON and at the same time the movement of the operating member 25 is restricted to the locked state.

[0013] To unlock the operating member 25, the solenoid 22 is energized to attract the plunger 22a in the direction of the arrow B, to thereby turn the driving member 26. The other end of the driving member 26 thus turned moves an unillustrated lock member from the locked position, thereby unlocking the operating member 25.

[0014] The operating member 25 thus unlocked is moved in the direction of the arrow A by the elastic force of the elastic member, automatically recovering the initial state to turn both the AC switch 21 and the DC switch 24 off.

[0015] In the conventional switching device heretofore described, the first and second frames 20 and 23 are separate members; therefore the AC switch 21 and the DC switch 24 are mounted separately. Besides, it is necessary to caulk the second frame 23 on which the DC switch 24 has been mounted, to the casing 21a of the AC switch 21. The conventional switching device, therefore, needs much time for assembling, resulting in a lowered assembly operation efficiency.

[0016] Furthermore, because the opening 20d is formed in the first frame 20 to caulk the casing 21a of the AC switch 21 to the first frame 20, there arises such a problem that foreign substances enter the device through the opening 20d.

SUMMARY OF THE INVENTION

[0017] In view of the above-described problem, it is an object of this invention to provide a switching device which ensures a satisfactory assembly operation efficiency while preventing entrance of foreign substances into the device.

[0018] As the first means of solution to the problem, the switching device of this invention is comprised of a frame, an AC circuit switch capable of breaking and mak-

ing the AC circuit by holding in a locked or unlocked state a slidable member disposed in a first casing; a DC circuit switch disposed in the second casing and capable of ON/OFF operation of the DC circuit in interlock with the sliding motion of the operating member; and a driving power source capable of sliding the operating member. The AC circuit switch, the DC circuit switch, and the driving power source are attached as one unit on the frame.

[0019] As the second means of solution to the problem, the switching device is of such a constitution that the frame has a wide first mounting section and a narrow second mounting section; in the wide first mounting section the AC circuit switch and the driving power source are juxtaposed, and in the narrow second mounting section the DC circuit switch is mounted.

[0020] As the third means of solution to the problem, the switching device is of such a constitution that the first mounting section of the frame has a first locking portion for locking the front side of the AC circuit switch, while the second mounting section has a retaining portion for retaining the rear side of the AC circuit switch; that is, the AC circuit switch is mounted by the first locking portion and the engagement section.

[0021] Furthermore, as the fourth means of solution to the problem, the switching device is of such a constitution that the AC circuit switch is provided with a cover attached on the first casing for covering an opening section formed in the first casing; the cover has a front locking portion protruding out of the front side of the first casing, and a rear locking portion protruding out of the rear side of the first casing; and the AC circuit switch is mounted to the frame with the front locking portion locked to the first engagement section of the frame and with the rear locking portion inserted for retaining by the retaining portion.

[0022] As the fifth means of solution to the problem, the switching device is of such a constitution that the DC circuit switch has a projection protruding out of the side wall of the second casing; and the frame is provided with the second engagement section formed in the second mounting section, to thereby attach the DC circuit switch to the frame by engaging the projection with the second engagement section.

[0023] Furthermore as the sixth means of solution, the switching device is comprised of the frame, the AC circuit switch capable of breaking and making the AC circuit by holding, in the locked or unlocked state, the slidable operating member disposed within the casing, and the driving power source capable of sliding the operating member; the AC circuit switch and the driving power source are juxtaposed on the frame.

[0024] Furthermore, as the seventh means of solution to the problem, the switching device is of such a constitution that the AC circuit switch has a cover, which is attached on the casing to open and close the opening section formed in the casing. The cover has a front locking portion protruding out of the front side of the casing and a rear locking portion protruding out of the rear side of the casing. On the rear side of the frame, there is pro-

vided a bent portion having a retaining portion. The AC circuit switch is attached by retaining the rear locking portion of the cover with this retaining portion.

[0025] Other objects, features and advantages of this invention will be apparent from the following detailed description taken in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0026]

Fig. 1 is a top view of a switching device pertaining to the first embodiment of this invention;

Fig. 2 is a front view of the switching device pertaining to the first embodiment of this invention;

Fig. 3 is a left side view of a frame pertaining to the first embodiment of this invention;

Fig. 4 is a top view of the frame pertaining to the first embodiment of this invention;

Fig. 5 is a front view of the frame pertaining to the first embodiment of this invention;

Fig. 6 is a top view of an AC circuit switch pertaining to the first embodiment of this invention;

Fig. 7 is a front view of the AC circuit switch pertaining to the first embodiment of this invention;

Fig. 8 is a perspective view of a major part explaining the AC circuit switch cover mounting structure pertaining to the first embodiment of this invention;

Fig. 9 is a bottom view of the frame mounted with a driving power source and a DC circuit switch pertaining to the first embodiment of this invention;

Fig. 10 is a front view of a switching device of the second embodiment according to this invention;

Fig. 11 is a front view of a frame pertaining to the second embodiment of this invention;

Fig. 12 is a top view of the frame pertaining to the second embodiment of this invention;

Fig. 13 is a top view of a conventional switching device; and

Fig. 14 is a front view of the conventional switching device.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0027] Referring to the accompanying drawings, preferred embodiments of a switching device of this invention will be explained. Fig. 1 is a top view showing the first embodiment of the switching device according to this invention; Fig. 2 is a front view thereof; Fig. 3 is a left side view of a frame pertaining to the first embodiment of this invention; Fig. 4 is a top view thereof; Fig. 5 is a front view thereof; Fig. 6 is a top view of an AC circuit switch pertaining to the first embodiment of this invention; Fig. 7 is front view thereof; Fig. 8 is a perspective view of a major part explaining the AC circuit switch cover mounting structure; Fig. 9 is a bottom view of the frame mounted with a driving power source and a DC circuit switch; and

Figs. 10 to 12 are views explaining the second embodiment of this invention.

[0028] In a switching device S1 of the first embodiment according to this invention, a frame 1 made of a metal plate produced by punching on a press is disposed in the upper part as shown in Fig. 1 and Fig. 2. The frame 1 has a wide first mounting section 1a and a narrow second mounting section 1b as shown in Fig. 3 to Fig. 5; between the first and second mounting sections 1a and 1b, a connecting section 1c is formed.

[0029] In the wide first mounting section 1a, an AC switch section 2 in which a later-described AC circuit switch 6 is mounted and a driving power source mounting section 4 for mounting a later-described driving power source 12 are juxtaposed.

[0030] The narrow second mounting section 1b is provided with a DC switch section 3 for mounting a later-described DC circuit switch 10.

[0031] The AC switch section 2 has a stepped portion 2a partly raised in the form of a level platform of a specific height. The stepped portion 2a is provided with a projection 2b formed downwardly protruding to a specific size.

[0032] On the left front side of the AC switch section 2 shown in Fig. 4, tongue-like first caulking portions 2c, 2c are formed in two places, upper and lower. The first caulking portions 2c, 2c are formed at a space of the size J and bent downwardly as shown in Fig. 5.

[0033] The first engagement section 2g is formed within the range of the space of the size J between the first caulking portions 2c, 2c. The front locking portion 9d of a later-described cover 9 is engaged for locking with the first engagement section 2g.

[0034] On the surface of the AC switch section 2 a pair of downwardly protruding projections 2d and a pair of upwardly protruding projections 2e are formed; and between the projections 2d and the projections 2e there are formed a pair of positioning holes 2f, 2f through the plate.

[0035] The frame 1 has the DC switch section 3 formed in the second mounting section 1b as shown in Fig. 4. In the DC switch section 3 a pair of side plates 3b, 3b provided at a space of the size C are bent into a gate-like form.

[0036] On the pair of side plates 3b are formed tongue-like second caulking portions 3c, 3c, between which there is formed a second engagement section 3d is formed for locking a later-described DC casing 11.

[0037] The second mounting section 1b of the frame 1 is designed to be cut off along the cutting line 1d indicated by a two-dot chain line with the connecting section 1c left.

[0038] The second mounting section 1b is formed by cutting with the retaining portions 3e in a position where the side plate 3b and the connecting section 1c meet, for retaining the rear part of a later-described AC circuit switch 5. The retaining portions 3e are formed, with a clearance of the size D provided, between the side plates 3b and the underside of the connecting section 1c. The clearance of the size D is formed slightly larger than the

plate thickness of a later-described cover 9.

[0039] The driving power source mounting section 4 is formed by bending the front plate 4a forwardly, the rear plate 4b rearwardly, and the side plate 4c upwardly as shown in Fig. 4.

[0040] The front plate 4a is provided, as shown in Fig. 3, with a plunger relief portion 4d cut out in an approximately semicircular form for relieving a plunger 12b of the driving power source 12 which is composed of a later-described solenoid.

[0041] The first caulking portions 2c, 2c formed on the frame 1, side plates 3b, 3b, front plate 4b, rear plate 4c, and side plate 4d are bent downwardly in the same direction as shown in Fig. 5.

[0042] Referring to Fig. 6 to Fig. 8, the AC circuit switch 5 to be attached to the AC switch section 2 of the frame 1 will be explained. First, the first casing 6 shown in Fig. 7 is made of a resin material, and has an open section not depicted which is open in the upper part.

[0043] In the first casing 6 a body 6a having an unillustrated switch comprising a plurality of contact portions is formed in the open section. On the left of the body 6a in Fig. 7, a guide section 6b is protrusively formed to guide the sliding motion of a later-described operating member 7. In the outside surface of this guide section 6b a recess 6c is formed in the lower part in the drawing. The recess 6c is formed by cutting into a triangular form.

[0044] In the first casing 6 there is provided the operating member 7 slidable in the directions of the arrows E and F to turning on and off the switch mounted inside.

[0045] On the operating member 7 is formed an operating shaft 7a protruding out of the first casing 6. The operating shaft 7a is provided inside with an unillustrated elastic member for elastically forcing the operating member 7 constantly in the direction of the arrow E.

[0046] The operating member 7, as shown in Fig. 6, has a cam recess 7b formed to a specific depth in a part where the opening section 9a of the later-described cover 9 is located; the lock member 8 is disposed in the cam recess 7b.

[0047] When the operating shaft 7a is pushed in the direction of the arrow F against the elastic force of an elastic member not shown, the lock member 8 swings within the cam recess 7b to come into contact with an unillustrated lock wall formed in the cam recess 7b. As the lock member 8 contacts the lock wall, the operating member 7 is locked in a locked state so as to be restricted from moving in the direction of the arrow E. When the operating member 7 is locked in the locked state, the switch located inside is turned on.

[0048] When the operating member 7 is pushed from the locked state a little in the direction of the arrow F, the lock member 8 moves away from the lock wall not shown to swing in the cam recess 7b, thus releasing the operating member 7 from the locked state and accordingly unlocking the operating member 7. The operating member 7, when unlocked, is moved in the direction of the arrow E by the operation of the elastic member, thereby

turning off the switch inside.

[0049] That is, in the switching device S2 of this invention are arranged an AC circuit switch 5 and a DC circuit switch 10 which can make ON/OFF operation by holding the operating member 7 in the locked or unlocked state.

[0050] In the upper part of the first casing 6, a cover 9 made of a metal plate is disposed to cover an unillustrated open section formed in the first casing 6. In the cover 9 the square opening 9a is formed in the left part thereof as shown in Fig. 6, to give the operator a view to the cam recess 7b of the operating member 7 located below.

[0051] On the front (towards the operating shaft 7a) of the opening 9a, there are formed a pair of substrate mounting portions 9b and front caulking portions 9c which are bent downwardly in the drawing. On the right in the drawing of the front caulking portions 9 shown in Fig. 9, a front locking portion 9d of the width G is formed protruding out from the front side of the body 6a of the first casing 6. The width G of the front locking portion 9d is formed slightly smaller than the clearance of the size J of the first caulking portions 2c, 2c of the AC switch section 2 mounted on the frame 1.

[0052] The cover 9 is provided with two round and oval positioning holes 9e and 9f formed through the cover plate.

[0053] On the left rear side in the drawing of the cover 9, a pair of rear locking portions 9g, 9g are formed at a space of the size H, protruding out from the rear side of the first casing 6. The space of the size H formed between the pair of rear locking portions 9g, 9g is equal to, or smaller than, the space of the size C of the frame 1.

[0054] In the part where the space of the size H is formed, a rear caulking portion 9h bent downwardly is provided; the rear caulking portion 9h is bifurcated at the forward end.

[0055] The cover 9 has a square operating hole 9j formed at the rear, so that the operating rod 10a of a later-described DC circuit switch 10 is inserted in the operating hole 9j.

[0056] The cover 9 of the above-described constitution is attached to the first casing 6 by the following procedure. The cover 9 is set on the first casing 6, and subsequently, as shown in Fig. 6, the front caulking portion 9c is bent into the recess 6c of the first casing 6, and, as shown in Fig. 8, the bifurcated forward end of the rear caulking portion 9h inserted between the extended portions 6d, 6d formed at the rear part of the first casing 6 is spread outwardly, thereby attaching the cover 9 to the first casing 6.

[0057] In the DC switch section 3 of the second mounting section 1b in the frame 1, the DC circuit switch 10 is attached. The DC circuit switch 10 has a second casing 11 produced of a resin material. A projection 11b is formed, protruding out of the side wall 11a of the second casing 11 as shown in Fig. 9.

[0058] From the DC circuit switch 10, the operating rod 10a is protruding out to the left front side shown in Fig. 9. The operating rod 10a is designed to elastically contact

the rear end portion of the operating member 7 and turn in interlock with the sliding motion of the operating member 7, thereby enabling the ON/OFF operation of an unillustrated switch in the DC circuit switch 10.

[0059] To install the DC circuit switch 10 to the frame 1, the second casing 11 is positioned between the gate-type side plates 3b, 3b and the projection 11b is positioned in the second engagement section 3d. Then the second caulking portions 3c, 3c are caulked to lock the projection 11b to the second engagement section 3d, thus completing the installation of the DC switch section 3 to the frame 1.

[0060] In the driving power source mounting section 4 of the first mounting section 1a in the frame 1, there is mounted a driving power source 12 consisting of a solenoid for automatically breaking the switching device S1. The driving power source 12 is comprised of a coil 12a and a plunger 12b as shown in Fig. 9. The coil 12a is held between the front plate 4a and rear plate 4b of the frame 1, and the driving power source 12 is mounted in the driving power source mounting section 4 of the frame 1.

[0061] As the coil 12a is excited from the non-excited state in the initial position, the plunger 12b is drawn in the direction of the arrow P by a predetermined attraction.

[0062] At the forward end of the plunger 12b, a driving member 13 is engaged. The driving member 13 has an engagement section 13a on one end which engages with the plunger 12b, and a cam face 13b formed on the other portion by combining two oblique surfaces; and a support hole 13c is formed between the engagement section 13a and the cam face 12b. The driving member 13 is rotatably mounted on the frame 1 so as to rotate on the center of the support hole 13c with the engagement section 12a engaged with the forward end of the plunger 12b and with the projection 2b of the frame 1 inserted in the support hole 13c.

[0063] Therefore, the cam face 13b of the driving member 13 rotates in interlock with the attracting motion of the plunger 12b in the direction of the arrow P.

[0064] The switching device S1 of this invention, as shown in Fig. 9, is assembled by mounting the driving power source 12 and the frame 1 mounted with the driving member 13, on an assembling jig not shown.

[0065] At this time, it is possible to position the frame 1 on the assembling jig by inserting positioning pins not shown of the assembling jig into the positioning holes 2f, 2f.

[0066] Next, the pair of projections 11b of the DC circuit switch 10 are positioned in the second locking portions 3d of the DC switch section 3 of the cover 1, then the DC circuit switch 10 is placed on the frame 1. Subsequently, the rear locking portions 9g, 9g of the AC circuit switch 5 are inserted for locking into the locking portion 3e of the second mounting section 1b. In this state, the AC circuit switch 5 is mounted in the AC switch section 2.

[0067] When the AC circuit switch 5 is mounted on the frame 1, the projecting portions 2d, 2d of the AC switch

section 2 are inserted into the positioning holes 9e and 9f of the cover 9, thereby positioning the AC circuit switch 5 on the cover 9. At this time the operating rod 10a protruding out to the front side from the DC circuit switch 10 is designed to be positioned within the operating hole 9j in the cover 9.

[0068] Next, the first caulking portions 2c, 2c are caulked in such a manner as to decrease the clearance of the size J by using a caulking jig not depicted. Also the second caulking portions 3c, 3c are caulked in a direction in which the clearance of the second engagement section 3d will be decreased. Now the AC circuit switch 5 and the DC circuit switch 10 can be mounted as one unit on the frame 1 mounted with the driving power source 12.

[0069] Because of the aforesaid structure that both the DC circuit switch 10 and the AC circuit switch 5 are mounted on the common frame 1, these switches can properly be positioned, thereby improving the ON/OFF operation accuracy of the DC circuit switch 10 which is actuated through the operating member 7 of the AC circuit switch 5.

[0070] Next, referring to Fig. 10 to Fig. 12, the second embodiment of the switching device S2 according to this invention will be explained.

[0071] A difference between the switching device S2 of this invention and the switching device S1 explained in the first embodiment is the absence of the DC circuit switch 10 as shown in Fig. 10.

[0072] A frame 15 of the switching devices 2 is not provided with the DC switch section 3, which has been cut off along the cutting line 1d expressed by a two-dot chain line of the unillustrated frame 1 explained in the first embodiment. Therefore, it should be noted that the same members as those explained in the frame of the first embodiment are designated by the same reference numerals, and will not be described.

[0073] First, the frame 15, with the DC switch section 3 cut off from the frame 1 as shown in Figs. 11 and 12, has a connecting portion 15c at the rear, which is bent in the same direction as the first caulking portion 2c to thereby form a bent portion 2h. The bent portion 2h has retaining portions 2j, 2j formed on both upper and lower sides in the drawing. There is provided a clearance of the size D between the end face of the retaining portion 2j and the underside of the connecting portion 1c.

[0074] That is, the switching device S2 of this invention, as shown in Fig. 10, includes the frame 15, an AC circuit switch 5 capable of ON/OFF operation by holding in a locked or unlocked state the slidable operating member 7 disposed within the first casing 6, and a driving power source 12 capable sliding the operating member 7, so that the AC circuit switch 5 and the driving power source 12 may be adjacently mounted on the frame 15.

[0075] The AC circuit switch 5 has a cover 9 which is attached to the first casing 6 to cover an unillustrated open section formed in the first casing 6. The cover 9 has a front locking portion 9d protruding out of the front side of the first casing 6 and a rear locking portion 9g

protruding out of the rear side of the first casing 6. The bent portion 2h having the retaining portion 2j is provided on the rear side of the frame 15, and the rear locking portion 9g of the cover 9 is engaged with the retaining portion 2j, to thereby mount the AC circuit switch 5.

[0076] This invention, therefore, can provide an easy-to-assemble switching device, in which the AC circuit switch, the DC circuit switch, and the driving power source are mounted as one unit on a common frame. It is, therefore, possible to caulk the AC circuit switch and the DC circuit switch to the frame by a single caulking process using an assembling jig.

[0077] Because the frame has no opening, entry of foreign substances into the switching device can be prevented.

[0078] Furthermore, since the AC circuit switch and the DC circuit switch are supported on a common frame, it is possible to ensure high-accuracy ON/OFF operation of the DC circuit switch with respect to ON/OFF operation of the AC circuit switch.

[0079] The frame has a wide first mounting section and a narrow second mounting section. The AC circuit switch and the driving power source are juxtaposed in the wide first mounting section, and the DC circuit switch is mounted in the narrow second mounting section; therefore the AC circuit switch and the DC circuit switch can readily be actuated to ON or OFF by driving the driving power source.

[0080] The first mounting section of the frame has a first engagement section for locking the front side of the AC circuit switch; and the second mounting section has a retaining portion for retaining the rear side of the AC circuit switch, so that the AC circuit switch may be mounted by means of the first locking portion and the retaining portion. The AC circuit switch can be installed to the frame simply by caulking the first caulking portion of the first engagement section, thus achieving a good assembling efficiency.

[0081] It is, therefore, possible to provide an easy-to-assemble switching device in which the AC circuit switch has a cover attached on the first casing for covering the open section which is formed in the first casing; the cover has a front locking portion protruding out of the front side of the first casing, and a rear locking portion protruding out of the rear side of the first casing, to thereby mount the AC circuit switch to the frame by locking the front locking portion to the first engagement section of the frame and the inserting the rear locking portion for retaining into the retaining portion.

[0082] The DC circuit switch has a projecting portion which protrudes out of the side wall of the second casing. In the frame the second engagement section is formed in the second mounting section, so that the projecting portion will engage with the second engagement section to thereby mount the DC circuit switch on the frame. Therefore, to mount the DC circuit switch on the frame, the switch can readily be assembled simply by caulking the second caulking section which forms the second en-

gement section.

[0083] Furthermore, it is possible to provide an easy-to-assemble switching device which has a frame, an AC circuit switch capable of ON/OFF operation by holding, in the locked or unlocked state, the slidable operating member disposed inside of the casing, and a driving power source capable of sliding the operating member. Since the AC circuit switch and the driving power source are adjacently mounted on the frame, assembling operation can be completed simply by mounting the driving power source and the AC circuit switch to the frame.

[0084] Furthermore, since the frame explained in the first embodiment of the switching device is employed, the switch becomes usable after cutting off along the cutting line the second mounting section for mounting the DC circuit switch. According to this invention, only a single type of frame die is commonly usable, thereby enabling to produce different types of low-cost switching devices without using different types of expensive dies.

[0085] Furthermore, according to this invention, it is possible to provide an easy-to-assemble switching device because of such a constitution that the AC circuit switch has a cover attached on the casing to cover the open section formed in the casing; the cover has a front locking portion protruding out of the front side of the casing and the rear locking portion protruding out of the rear side of the casing; and the frame is provided at the rear side with a bent portion having a retaining portion, so that the rear locking portion of the cover may engage with the retaining portion, thereby to attach the AC circuit switch.

Claims

1. A switching device, comprising:
 - a frame,
 - an AC circuit switch capable of ON/OFF operation by holding in a locked or unlocked state a slidable operating member disposed inside of a casing, and
 - a driving power source capable of sliding said operating member;

wherein said AC circuit switch has a cover attached on said casing to cover an open section formed in said casing, said cover includes a front locking portion protruding out of the front side of said casing, and a rear locking portion protruding out of the rear side of said casing;

wherein a bent portion having a retaining portion is provided on the rear side of said frame, and said rear locking portion of said cover is retained in said retaining portion to attach said AC circuit switch, and wherein said AC circuit switch and said driving power source are mounted as one unit on said frame.
2. A switching device, comprising: a frame, an AC cir-

cuit switch capable of ON/OFF operation by holding in a locked or unlocked state a slidable operating member disposed inside of a first casing, a DC circuit switch disposed inside of a second casing and capable of ON/OFF operation in interlock with the sliding motion of said operating member, and a driving power source capable of sliding said operating member; said AC circuit switch, said DC circuit switch, and said driving power source being mounted as one unit on said frame.

3. A switching device according to claim 2, wherein said frame has a wide first mounting section and a narrow second mounting section; said AC circuit switch and said driving power source being juxtaposed in said wide first mounting section, and said DC switch is mounted in said narrow second mounting section.
4. A switching device according to claim 2 or 3, wherein said first mounting section of said frame has a first engagement section for locking the front side of said AC circuit switch, while said second mounting section has a retaining portion for retaining the rear side of said AC circuit switch, so that said AC circuit switch will be mounted by said first locking portion and said retaining portion.
5. A switching device according to claim 4, wherein said AC circuit switch has a cover attached on said first casing to cover an open section formed in said first casing; said cover having a front locking portion protruding out of the front side of said first casing, and a rear locking portion protruding out of the rear side of said first casing; and said front locking portion being locked in said first engagement section of said frame, and said rear locking portion being inserted and retained in said retaining portion, thus attaching said AC circuit switch on said frame.
6. A switching device according to claim 2 or 3, wherein said DC circuit switch has a projecting portion protruding out of a side wall of said second casing; in said frame a second engagement section is formed in said second mounting section, thereby to lock said projecting portion in said second engagement section to attach said DC circuit switch to said frame.
7. A switching device, comprising: a frame, an AC circuit switch capable of ON/OFF operation by holding in a locked or unlocked state a slidable operating member disposed inside of a casing, and a driving power source capable of sliding said operating member; said AC circuit switch and said driving power source being adjacently mounted on said frame.
8. A switching device according to claim 7, wherein said AC circuit switch has a cover attached on said casing to cover an open section formed in said casing; said

cover having a front locking portion protruding out of the front side of said casing, and a rear locking portion protruding out of the rear side of said casing; and a bent portion having a retaining portion is provided on the rear side of said frame, thereby retaining said rear locking portion of said cover in said retaining portion to attach said AC circuit switch.

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FIG. 1

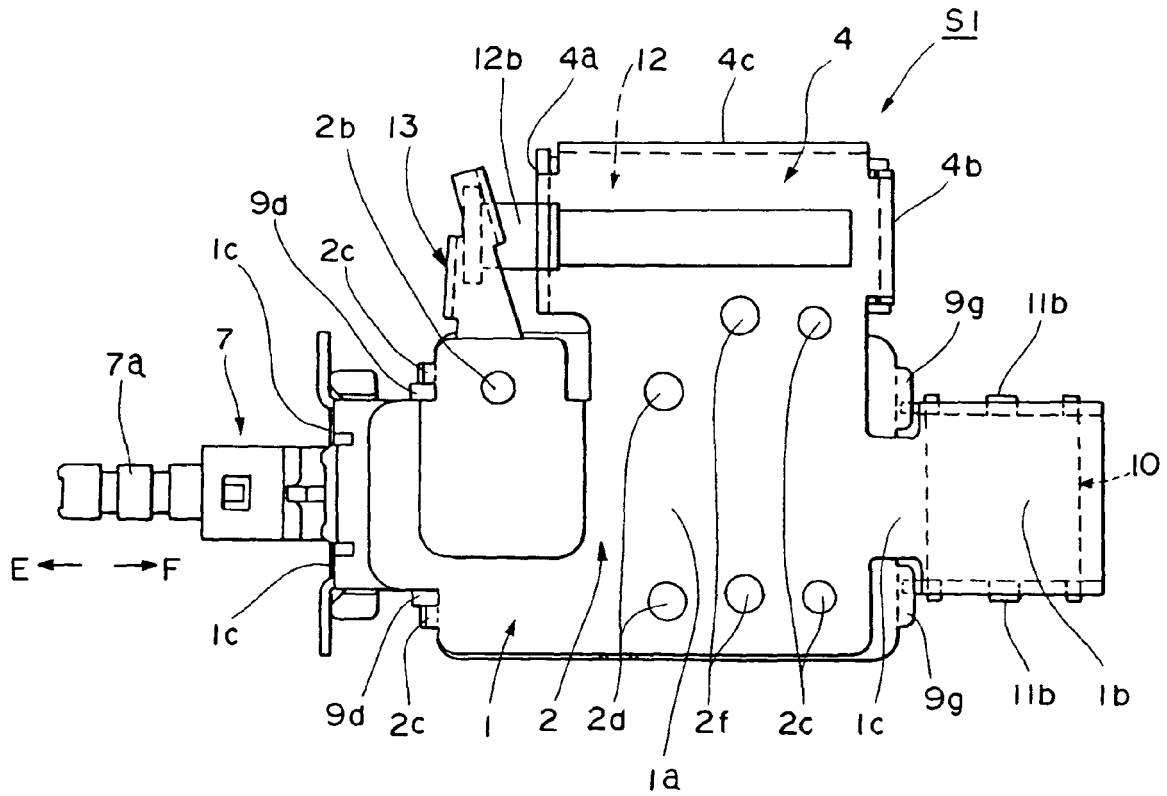


FIG. 2

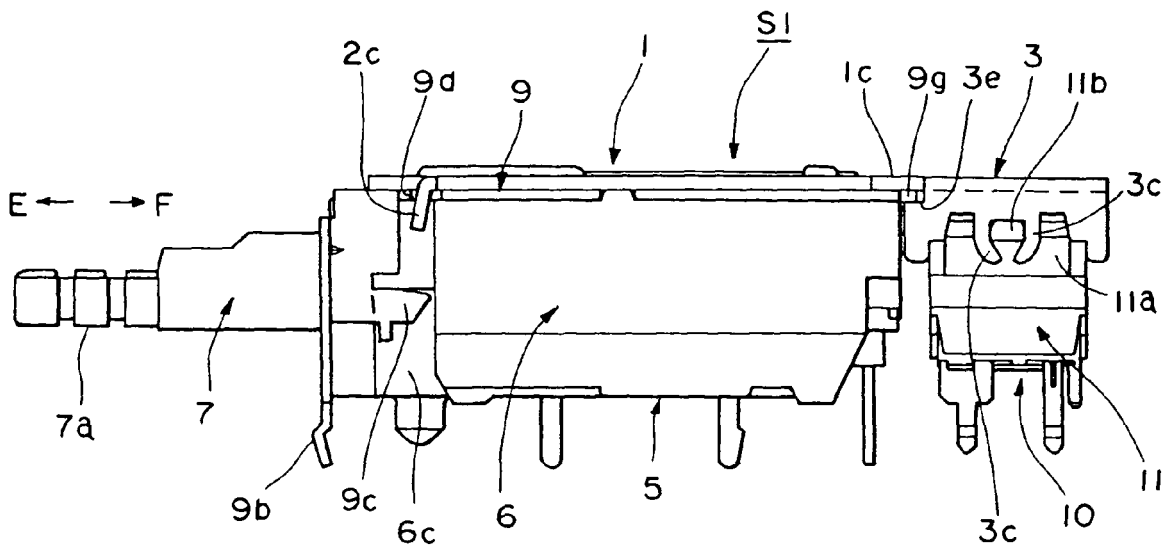


FIG. 3

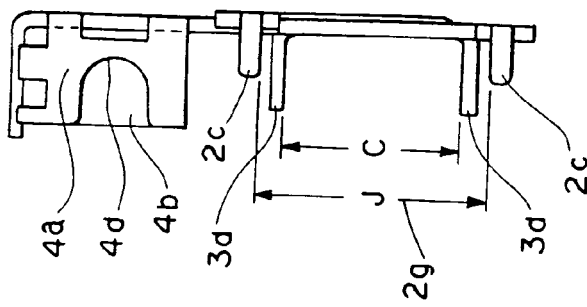


FIG. 4

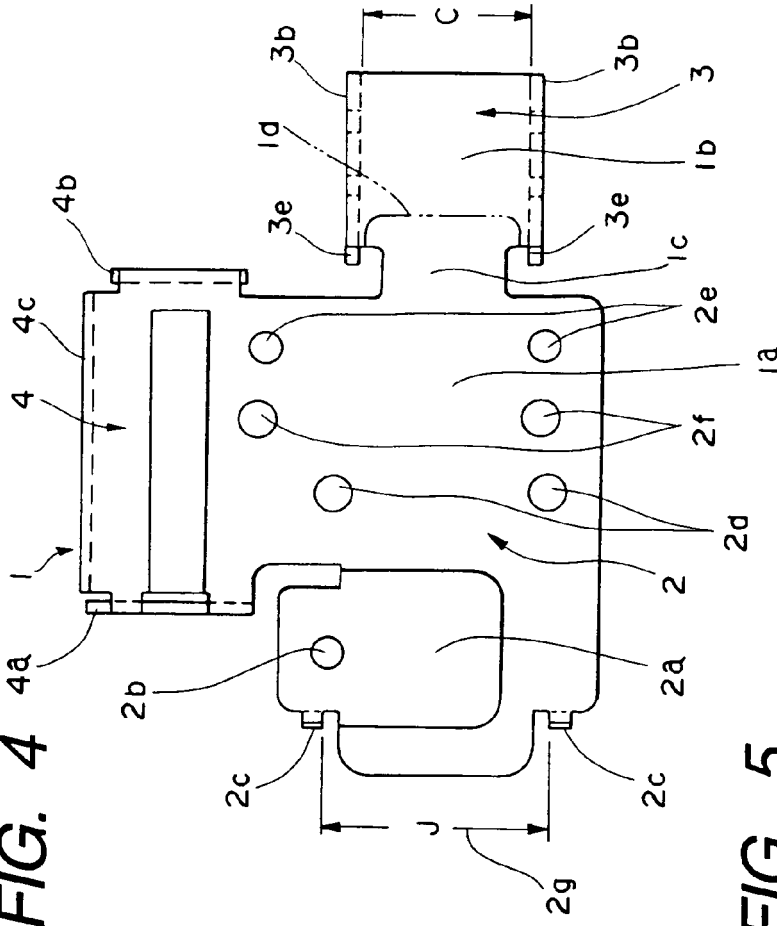


FIG. 5

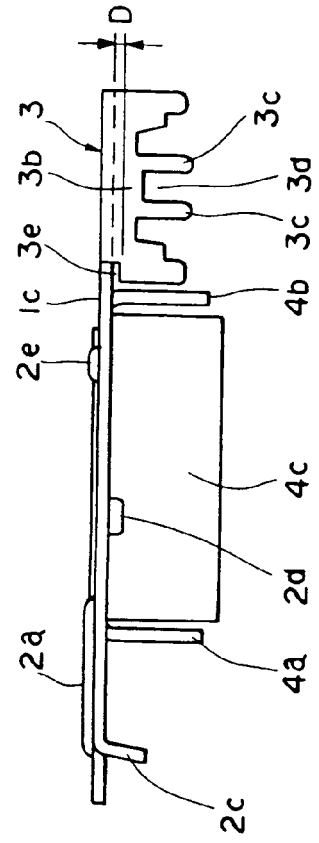


FIG. 6

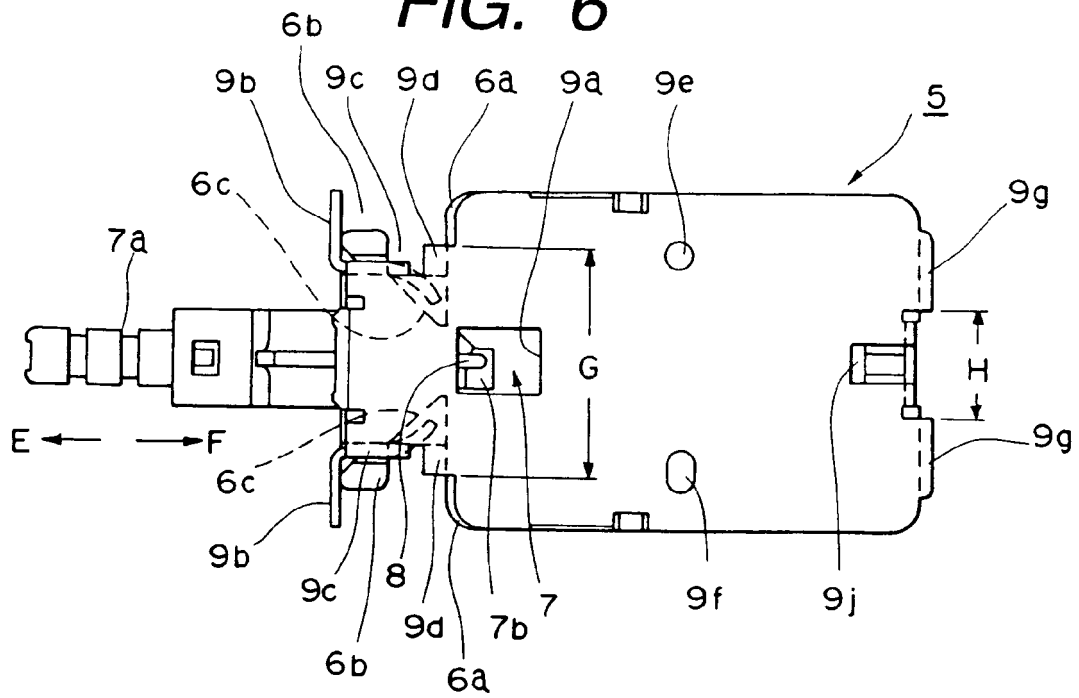


FIG. 7

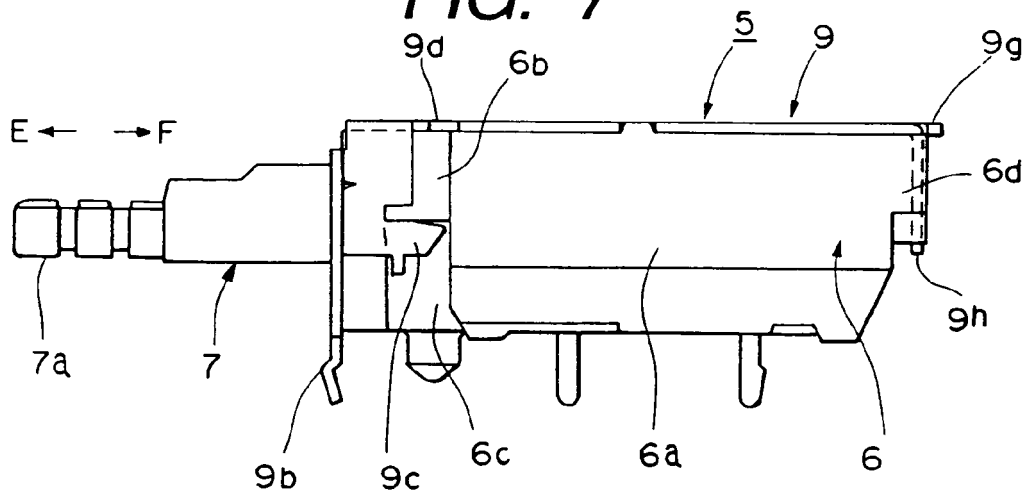


FIG. 8

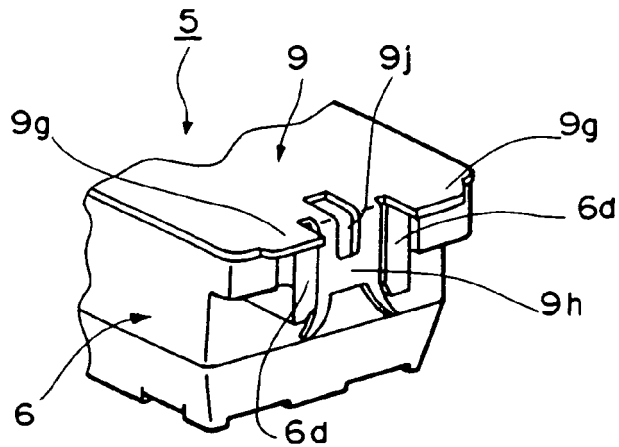


FIG. 9

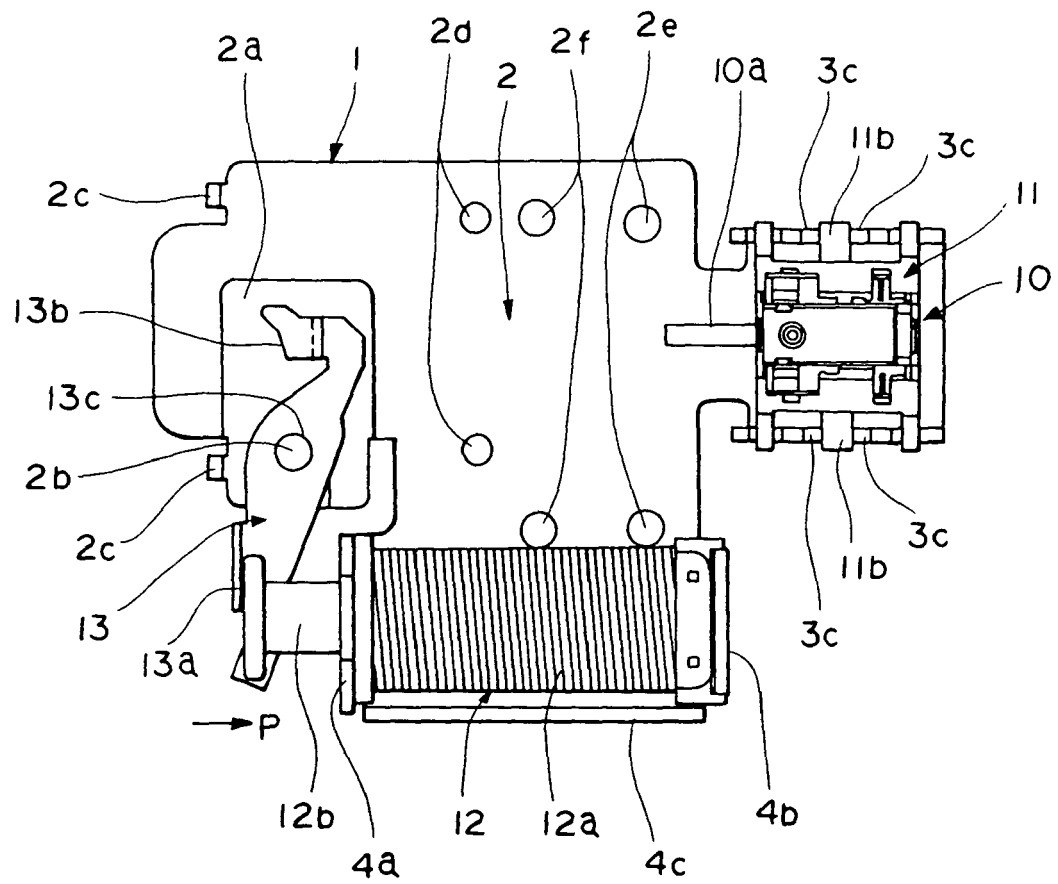


FIG. 10

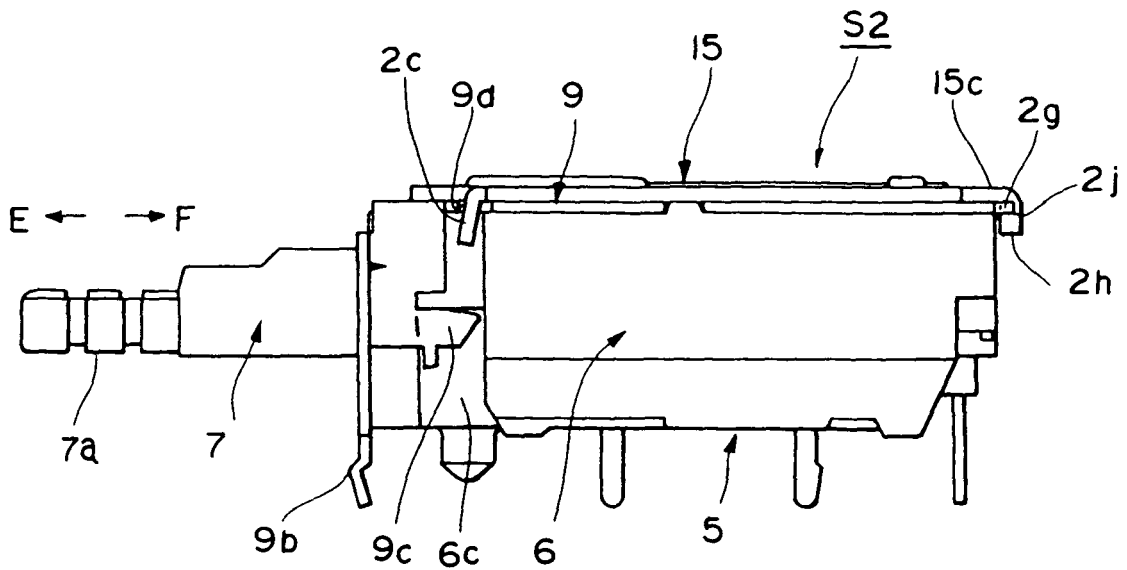


FIG. 11

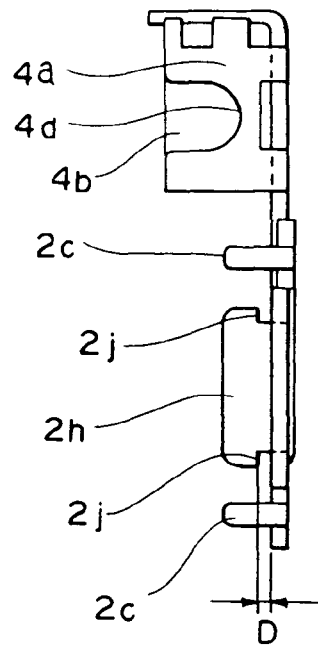


FIG. 12

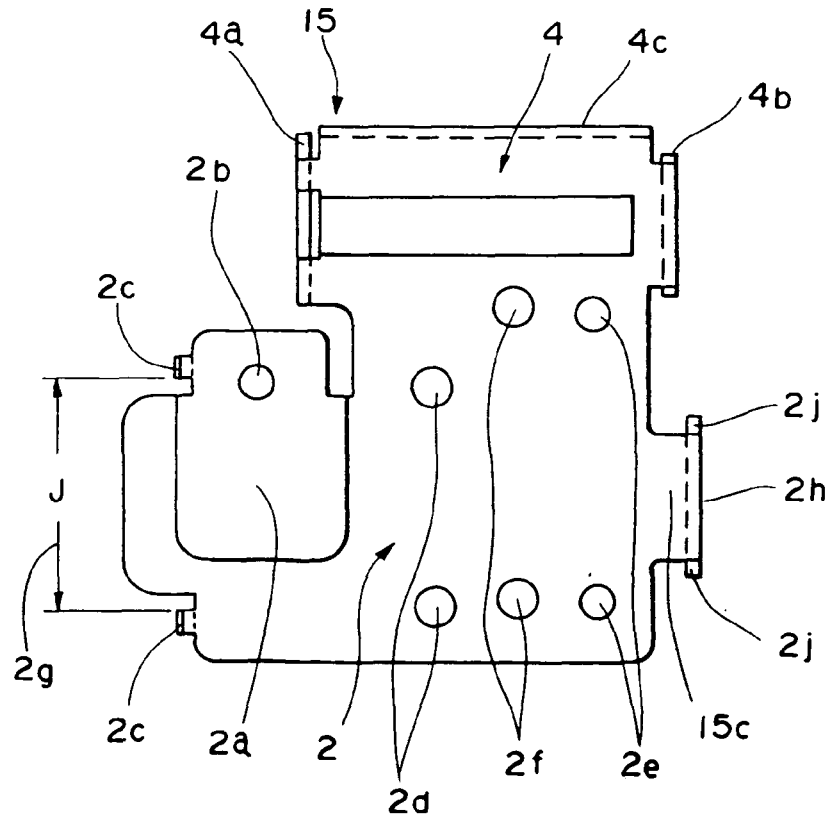


FIG. 13
PRIOR ART

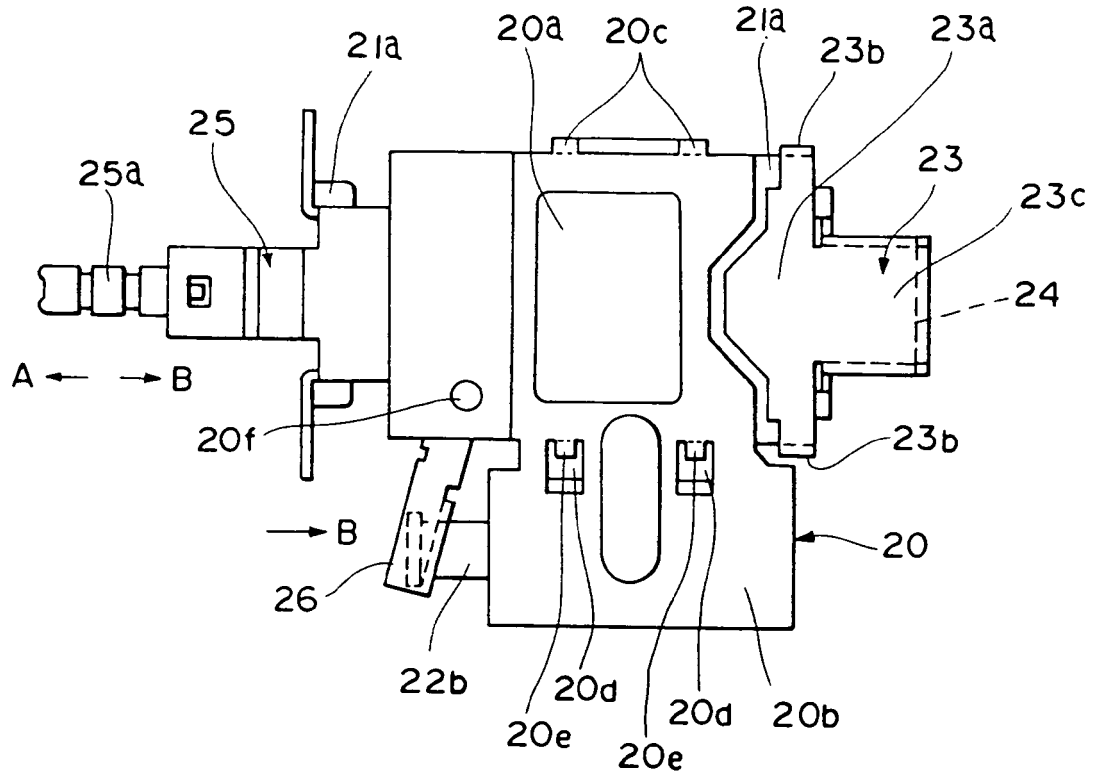
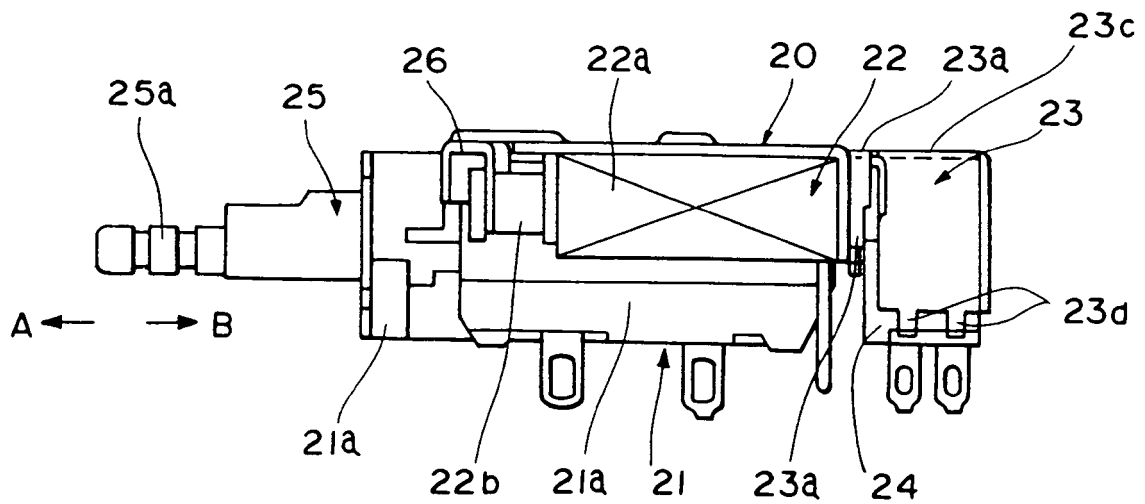


FIG. 14
PRIOR ART





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 06 00 3834

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Place of search Munich		Date of completion of the search 27 March 2006	Examiner Durand, F
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27-03-2006

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