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(54) **OPERATING UNIT AND LANDING STAGE AND CAGE OF ELEVATOR COMPRISING IT**

(57) The invention is directed toward an operating device disposed in an elevator hall apparatus and in a passenger car of an elevator system. A lock (2) whose lock operation section (2c) projects from a rear surface (1b) of a face plate (1) toward a front surface (1a) is fitted to a fitting section (8) provided on a case (6) by means of operation of the lock operation section (2c). As a result, a third party other than a service engineer who can operate the lock operation section (2c) cannot remove the face plate (1) from the case (6) of the operating device, thereby preventing a malicious third party from causing failures.

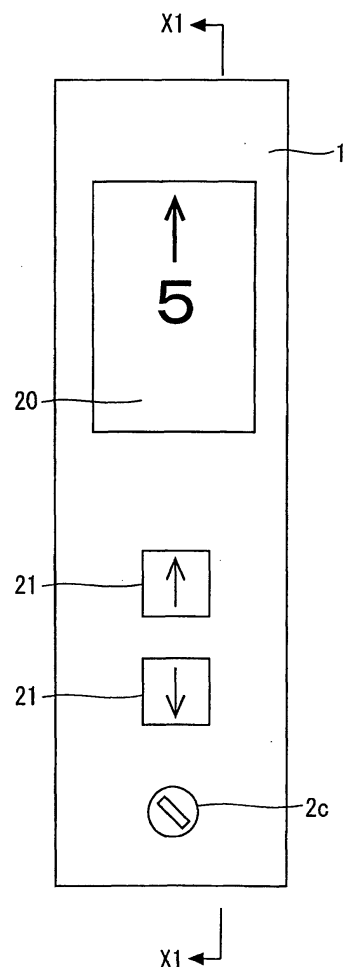


Fig. 1

Description**TECHNICAL FIELD**

[0001] The invention relates to an operating device, an elevator hall device equipped with the operating device, and a passenger car equipped with the operating device. In particular, the invention relates to an operating device having operation buttons to be used for controlling a passenger car of an elevator system, an elevator hall device equipped with the operating device, and a passenger car equipped with the operating device.

BACKGROUND ART

[0002] There has hitherto been known an operating device (hall appliance) of an elevator hall apparatus, wherein a face plate having operating buttons (call buttons) is removably attached to a case embedded in an area on a wall in the vicinity of an elevator hall.

[0003] More specifically, a technique for fastening a face plate to a case embedded in a wall section with screws by way of a mount plate is described in, e.g., Japanese Utility Model Application Laid-Open No. 6359/1994. Further, a technique for providing a case embedded in a wall section with stationary pins and providing a face plate with leaf springs which are to be engaged with the stationary pins is described in, e.g., Japanese Utility Model Application No. 89372/1993.

[0004] An operating device whose face plate is formed so as to be removably attached to a case enables easy maintenance and inspection of the operating device. Specifically, operating buttons or display sections are provided on the face plate of the operating device so as to project from the rear to the front thereof. Operating buttons provided on the rear of the face plate and an electrical component section of the display section are usually housed in the case. When maintenance and inspection of those operating buttons or the electrical component section of the display section are required, the face plate is removed from the case, thereby enabling operation.

[0005] Development of an elevator system which does not have any machine room has recently been pursued, with an aim towards space savings. Appliances for maintenance and adjustment purposes which have hitherto been placed in an elevator machine room are increasingly housed in the case. Therefore, removal of the face plate may be required on occasions other than maintenance and inspection of operating buttons or the like provided on the face plate.

[0006] However, the related-art technique encounters a first problem of a third party other than service engineers who actually perform maintenance and inspection operation being able to readily remove a face plate from the case. In the worst case, a malicious third party removes a face plate, thereby breaking electrical compo-

nents housed in the case.

[0007] The related-art technique also encounters a second problem of chance of a service engineer damaging wires of electrical components, such as operation buttons, when removing the face plate from the case. Specifically, wires (harnesses) extending from a power supply section and those extending from a control section, both sections being located outside the case, are connected to the electrical component section provided on the back of the face plate. The wires have limited lengths. If the face plate and the case are removed from a position where the case is to fit to the case, with force greater than required and to a distance longer than required, wires may become disconnected.

[0008] The foregoing related-art technique encounters a third problem of water droplets entering the case by way of a clearance existing between the face plate and an upper portion of the case, thereby imposing damage to an electrical component section and appliances housed in the case. More specifically, a clearance exists between the face plate and the case. For instance, water droplets produced by dewing may enter the case by way of the clearance and migrate to electrical components provided in the apparatus, thereby possibly resulting in occurrence of electrical short-circuit. In particular, the face plate provided in an elevator hall located outdoors is exposed to wind and weather, thereby inducing occurrence of such failures with a high probability.

[0009] The above-described problem also applies to an operating device disposed in a passenger car of an elevator system other than to an operating device disposed in an elevator hall apparatus to be used for entering and exiting a passenger car which is caused to ascend or descend within a hoistway.

[0010] The invention has been conceived to solve the problem and aims at providing an operating device which prohibits a third party other than a service engineer who performs maintenance and inspection from removing a face plate; which lessens damage to wires which would otherwise be caused by removal of the face plate, and which lessens a probability of occurrence of failures which would otherwise be caused by intrusion of water droplets into a case, and as well as to an elevator hall apparatus and a passenger car.

DISCLOSURE OF THE INVENTION

[0011] According to the invention, a lock whose lock operation section is projected from a rear surface of a face plate to a front surface of the same is fitted to a fitting section formed in a case by means of operation of the lock operation section. As a result, a third party other than a service engineer capable of operating the lock operation section cannot remove a face plate from a case of the operating device. Thus, the operating device can prohibit a malicious third party from causing failures.

[0012] The invention is directed toward the thus-im-

proved operating device which further comprises an auxiliary fitting section for fitting the face plate to the case. As a result, the operating device enables fitting of the face plate to the case in a well-balanced manner, along with the fitting section, by use of a single key.

[0013] According to the invention, an auxiliary fitting section of the thus-improved operating device is formed from a mount plate having an upright section and a fitting plate having another upright section to fit to the upright section. As a result, the operating device enables fitting of the face plate to the case in a well-balanced manner by way of a comparatively simple construction.

[0014] According to the invention, the upright section provided on the mount plate is placed in an inclined upright position. As a result, the operating device enables smooth removal of the face plate from the case.

[0015] The invention is directed toward the operating device which further has a stopper section for limiting an extent over which the face plate is to move at the time of removal of the face plate from the case. As a result, a wire is not pulled to a greater distance than required, which would otherwise be caused in association with movement of the face plate. Hence, the operating device can prevent infliction of damage on a wire connected to a rear surface of the face plate, which would otherwise be caused by a service engineer at the time of maintenance and inspection.

[0016] The invention is directed toward the operating device, wherein the stopper section is formed from a pin provided on a case and a stopper plate provided on the face plate. Further, the device has a fitting section formed from a lock and an auxiliary fitting section. As a result, a service engineer does not inflict damage to a wire connected to the rear surface of the face plate, which would otherwise be caused by a service engineer at the time of inspection and maintenance. The operating device can prevent occurrence of failures, which would otherwise be caused when a malicious third party other than a service engineer removes the face plate.

[0017] The invention is also directed toward the operating device, wherein the stopper plate is provided on the face plate via a hinge. As a result, an opening section of a case can be opened while the face plate is retained by the case. Thus, the operating device can improve ease of maintenance and inspection on the part of the service engineer.

[0018] The invention is also directed toward the operating device, wherein a receiving section for receiving intruded water droplets is placed at an upper edge of the face plate. A side plate for guiding the water droplets received by the receiving section to the lower end of the face plate by way of side edges is provided on side edge sections of the face plate. As a result, intrusion of water droplets into the center of the inside of the case can be prevented. Hence, the operating device can prevent occurrence of failures in components, such as electrical components housed in the case.

[0019] Further, the invention is directed toward the op-

erating device, wherein the receiving section acts also as a portion of the auxiliary fitting section and further has a fitting section using a lock. As a result, occurrence of failures in components, such as electrical components, housed in the case can be prevented. Further, the operating device can prevent occurrence of failures, which would otherwise be caused when a malicious third party other than a service engineer removes the face plate.

[0020] The invention is further directed toward the operating device, wherein the operating device is provided on an elevator hall apparatus. As a result, the operating device can prevent a malicious third party other than the service engineer from removing the face plate; prevent infliction of damage to a wire, which would otherwise be caused by a service engineer at the time of maintenance and inspection; and prevent occurrence of failures in components, such as an electrical component section housed in the case.

[0021] The invention is also directed toward the operating device, wherein the operating device is provided on a passenger car of an elevator system. As a result, the operating device can prevent occurrence of failures, which would otherwise be caused when a malicious third party other than a service engineer removes a face plate; prevent damage to a wire, which would otherwise be caused by a service engineer at the time of maintenance and inspection; and prevent occurrence of failures in components, such as an electrical component section, housed in the case.

BRIEF DESCRIPTION OF THE DRAWINGS

[0022]

Fig. 1 is a schematic front view of a first preferred operating device of the invention;

Fig. 2 is a schematic cross-sectional view of the operating device taken along line X1-X1 shown in Fig. 1;

Fig. 3 is a schematic cross-sectional view of the operating device taken along line Y1-Y1 shown in Fig. 2;

Fig. 4 is a schematic cross-sectional view of the operating device taken along line Z1-Z1 shown in Fig. 2;

Fig. 5 is a schematic cross-sectional view showing that the operating device shown in Fig. 2 has deactivated a lock;

Fig. 6 is a schematic cross-sectional view showing processes during which a face plate is removed from the operating device shown in Fig. 2;

Fig. 7 is a schematic cross-sectional view showing a state in which removal of the face plate from the case of the operating device shown in Fig. 2 has been completed;

Fig. 8 is a schematic front view showing a second preferred operating device of the invention;

Fig. 9 is a schematic cross-sectional view of the operating device taken along line X2-X2 shown in Fig. 8;

Fig. 10 is a schematic cross-sectional view showing processes during which a face plate is removed from a case of the operating device shown in Fig. 9; Fig. 11 is a schematic front view showing a third preferred operating device of the invention;

Fig. 12 is a schematic cross-sectional view of the operating device taken along line X3-X3 shown in Fig. 11;

Fig. 13 is a schematic cross-sectional view showing processes during which a face plate is removed from a case of the operating device shown in Fig. 12;

Fig. 14 is a schematic cross-sectional view showing a state in which removal of the face plate from the case of the operating device shown in Fig. 12 has been completed;

Fig. 15 is a schematic front view showing a fourth preferred operating device of the invention;

Fig. 16 is a schematic cross-sectional view of the operating device taken along line Y4-Y4 shown in Fig. 15; and

Fig. 17 is a schematic cross-sectional view of the operating device taken along line W-W shown in Fig. 16.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0023] In order to describe the invention in more detail, the invention will be described by reference to the accompanying drawings. Herein, identical or corresponding elements are assigned the same reference numerals, and their repeated explanations are simplified or omitted, as required.

[0024] The configuration of an operating device according to a first embodiment of the invention will be described by reference to Figs. 1 through 4.

[0025] Fig. 1 is a schematic front view showing an operating device of the first embodiment. Specifically, Fig. 1 is a view showing a surface of a face plate of the operating device. In the drawing, reference numeral 1 designates a face plate which seals an opening section of a case; 2c designates a keyway section which serves as a lock operation section into which a service engineer inserts a key at the time of inspection and maintenance; 20 designates a display section for informing passengers standing in a hall of a traveling status of a passenger car; and 21 designates an operation button (call button) for causing the passenger car to stop at an elevator hall and to ascend or descend in a desired direction.

[0026] Fig. 2 is schematic cross-sectional view of the operating device taken along line X1-X1 shown in Fig. 1. In the drawing, reference numeral 1a designates a front surface of the face plate 1 serving as a surface which is to be operated by passengers; 1b designates

a rear surface of the face plate 1 opposing the case; 2 designates a lock having the keyway 2c projecting from the rear surface 1b toward the front surface 1a; 2a designates a latch section of the lock 2 which can move so as to fit to a fitting section by means of actuation of a key inserted into the keyway 2c; 3 designates a fitting plate which is provided on an upper end of the face plate 1 and has an upright section 3a standing upright so as to face the upper end; 4a designates a bolt for holding the fitting plate 3 onto the rear surface 1b of the face plate 1; 4b designates a bolt for retaining a mount plate onto an upper end section of a case 6; 4c designates a bolt for retaining operation buttons 21 on the face plate 1; 5a designates a nut which fits onto the bolt 4a and retains the fitting plate 3 on the face plate 1; 5b designates a nut which fits onto the bolt 4b and retains the mount plate to the face plate 1; 5c designates a nut which fits onto the bolt 4c and retains the operation buttons 21 on the face plate 1; 6 designates a case which has opening sections and is embedded into a wall section located in the vicinity of an elevator hall; 6b designates an upper end of the case 6; 6c designates a lower end of the case 6; 7 designates a mount plate which is provided at the upper end 6b of the case 6 and has an upright section 7a standing upright so as to face the lower end 6c; 8 designates a fitting section which is provided on the lower end 6c of the case 6 and fits on the lock 2; 8a designates a fitting hole of a fitting section 8 into which the latch section 2a of the lock 2 fits; 20a designates an electrical component section of the display section 20 housed in the case 6; and 21a designates an electrical component section for the operation buttons 21 housed in the case.

[0027] As mentioned previously, the lock 2 and the fitting section 8 fit together at the lower end 6c which serves as a longitudinal end of the case 6. In contrast, the fitting plate 3 serving as an auxiliary fitting section and the mount plate 7 fit together at the upper end 6b serving as the other longitudinal end of the case 6. The bolt 4a penetrates through the fitting plate 3, and the bolt 4c penetrates through the electrical component section 21a. The bolts are fastened into female screw sections (blind sections) formed in the rear surface 1b of the face plate 1. The bolt 4b penetrates through the mount plate 7 and is fastened to a female section provided in the upper end 6b of the case 6.

[0028] Fig. 3 is a schematic cross-sectional view of the operating device taken along line Y1-Y1 shown in Fig. 2. Specifically, Fig. 3 is a view showing the rear surface 1b of the face plate 1 of the operating device of the first embodiment. In the drawing, reference numeral 4d designates a bolt which penetrates through the electrical component section 20a for retaining the face plate 1 to the face plate 1 and is fastened to a female section (blind section) of the rear surface 1b; 4f designates a bolt which penetrates through a main body section of the lock 2 for retaining the lock 2 to the face plate 1 and is fastened to a female section (blind section) of the rear

surface 1b; 5d designates a nut fitting onto the bolt 4d; and 5f designates a nut which fits onto the bolt 4f.

[0029] Fig. 4 is a schematic cross-sectional view of the operating device taken along line Z1-Z1 shown in Fig. 2. Specifically, Fig. 4 is a front view showing the inside of the case 6 of the operating device according to the first embodiment. In the drawing, 4g designates a bolt which penetrates through a retaining plate for retaining the fitting section 8 on the lower end 6c and is fastened to the female section of the case 6; 5g designates a nut fitting onto the bolt 4g; 6a designates a through hole for wiring purpose provided in the rear surface of the case 6; 6d designates a rear surface of the case 6; and 8b designates a retaining plate of the fitting section 8.

[0030] The retaining plate 8b of the fitting section 8 shown in Fig. 4 is omitted from Fig. 2, and is disposed so as to come into contact with the lock 2. As a result, the vertical (longitudinal) position of the face plate 1 relative to the case 6 is substantially determined. As shown in Fig. 3, the horizontal length of the fitting plate 3 is determined so as to become slightly shorter than the horizontal (lateral) length of the inside of the case 6, thereby substantially determining the horizontal position of the face plate 1 with respect to the case 6.

[0031] As shown in Fig. 2, in the operating device having the foregoing configuration, the face plate 1 seals an opening section of the case 6 by means of the lock 2 fitting to the fitting section 8 and the fitting plate 3 serving as an auxiliary fitting section fitting to the mount plate 7. The operating device of the elevator hall apparatus is disposed such that the face plate 1 is provided along the surface of a wall section of a building located in the vicinity of the elevator hall (or an entrance door). As shown in Fig. 1, a passenger operates an operation button 21 of the plate 1 exposed on the wall section, thereby causing a passenger car of the elevator system-into which the passenger desires to enter-to ascend or descend.

[0032] The operation of the operating device having the foregoing configuration which is performed at the time of maintenance and inspection of the operating device will now be described by reference to Figs. 5 through 7. Figs. 5 through 7 are schematic cross-sectional views showing the operating device from a state in which the face plate 1 fits to the case 6 (i.e., the status shown in Fig. 2) until a state in which the face plate 1 is removed from the case 6.

[0033] When performing maintenance and inspection of the operating device, a service engineer inserts a key 2b into the keyway 2c of the lock 2. As shown in Fig. 5, the latch section 2a of the lock 2 is released from the fitting hole 8a of the fitting section 8 when the key 2b is rotated in a predetermined direction. Specifically, the lock 2 is disengaged from the fitting section 8, thereby rendering the face plate 1 removable from the case 6. In Fig. 5, reference numeral 14 designates a wall section located in the vicinity of an elevator hall of the elevator

hall apparatus; and 14a designates a surface (i.e., an exposed surface located in a building) of the wall section 14.

[0034] As shown in Fig. 6, the face plate 1 that has become removable is withdrawn in a direction indicated by an arrow in the drawing. Here, the fitting plate 3 serving as an auxiliary fitting section remains fitted with the mount plate 7 at the upper end of the face plate 1 and that of the case 6. Hence, a limitation is imposed on removal of the upper end of the face plate 1. In other words, the face plate 1 is removed while being rotated about an upper end thereof. The standup section 7a of the mount plate 7 to be disposed on the case 6 is formed so as to stand upright while being inclined toward the lower end 6c in accordance with rotative removal of the face plate 1. Specifically, the upright section 7a of the mount plate 7 stands upright so as to face the opening section of the case 6. Therefore, when the face plate 1 is removed, the upright section 7a of the mount plate 7 does not interfere with the upright section 3a of the fitting plate 3, and not to hinder movement of the face plate 1.

[0035] Finally, the face plate 1 is withdrawn to a position where the fitting between the fitting plate 3 and the mount plate 7 is able to be released. As shown in Fig. 7, the face plate 1 is moved in a direction indicated by an arrow in the drawing. As a result, removal of the face plate 1 from the case 6 of the operating device is completed.

[0036] Procedures for removal of the face plate 1 from the case 6 of the operating device 1 have been described by reference to Figs. 5 through 7. Attachment of the face plate 1 to the case 6 is achieved by reversing the procedures described above.

[0037] As has been described, according to the operating device of the first embodiment, only a service engineer who needs to remove the face plate 1 possesses a key matching the lock 2. Hence, third parties other than a service engineer cannot attach or remove the face plate 1. Consequently, a malicious third party can be reliably prohibited from touching the inside of the operating section.

[0038] In the first embodiment, the invention has been applied to an operating device to be placed in an elevator hall apparatus. However, the invention is not limited to this embodiment; the invention can also be applied to an operating device to be installed in a passenger car of an elevator system or to an operating device to be used for controlling a machine other than the passenger car.

[0039] In the first embodiment, an exposed keyway is provided as a lock operation section on the surface 1a of the face plate 1. However, the lock operation section is not limited to the keyway; various forms of key operation sections, such as a key operation section which enables entry of a password, can also be applied to the lock operation section. Similarly, various forms, such as a hook-shaped form, can also be applied to the latch section 2a of the lock 2.

[0040] In the first embodiment, the lock 2 and the fitting section 8 are disposed at the lower end of the operating device, and the auxiliary fitting section is provided at the upper end of the operating device. However, they may be inverted; namely, the lock 2 and the fitting section 8 may be provided at the upper end of the operating device, and the auxiliary fitting section may be provided at the lower end of the operating device. Further, they may be disposed on either side of the operating device.

[0041] In the first embodiment, the lock 2 and the fitting section 8 are disposed at the lower end of the operating device, and the auxiliary fitting section is disposed at the upper end of the same. In contrast, a plurality of locks 2 can be disposed on the operating device. Specifically, the lock 2 and the fitting section 8 can be disposed at respective upper and lower ends of the operating device, and even such an arrangement yields the same advantage as that of the first embodiment.

[0042] An operating device according to a second embodiment of the invention will now be described by reference to Figs. 8 through 10.

[0043] Fig. 8 is a schematic front view showing an operating device of the second embodiment. Fig. 9 is a schematic cross-sectional view of the operating device taken along line X2-X2 shown in Fig. 8. The second embodiment differs from the first embodiment in that stopper plates 9 and pins 10 are provided on the operating device.

[0044] As shown in Figs. 8 and 9, reference numeral 9 designates stopper plates provided on the rear surface 1b of the face plate 1; 10 designates pins provided on both sides of the case 6; and 19 designates wires connected to an electrical component section 20a of the display section 20. Wires connected to the operation buttons 21 are simple and therefore omitted from the drawings.

[0045] The wires 19 are electrically connected to a power supply section and a control section disposed outside the case 6, by way of a through hole 6a.

[0046] The stopper plates 9 are fixed to centers of respective side sections of the rear surface 1b of the face plate 1 through use of, e.g., bolts or nuts. The pins 10 are press-fitted into, e.g., both side sections of the case 6, so as to stand upright and face mutually-opposing side sections of the case 6. The stopper plates 9 and the pins 10 constitute a stopper section for limiting an extent over which the face plate 1 is moved when being removed from the case 6.

[0047] The operation of the operating device having the foregoing construction will now be described by reference to Fig. 10. First, when performing maintenance and inspection operations, a service engineer inserts a key into the keyway 2c, thereby releasing the lock 2 from the fitting section 8. Subsequently, as shown in Fig. 10, the face plate 1 is moved in a direction indicated by an arrow in the drawing. As the face plate 1 travels, the pins 10 of the case 6 are brought into contact with upright

sections 9a of the respective stopper plates 9 of the face plate 1, thereby limiting movement of the face plate 1.

[0048] After the display device 20 and a wire 19 have been disconnected from each other (they are connected by way of, e.g., a connector) at a position where a limitation is imposed on movement of the face plate 1, the face plate 1 is withdrawn downward, thereby completing removal of the face plate 1 from the case 6.

[0049] As has been described, the operating device of the second embodiment reliably prevents disconnection of the wire 19, as well as yielding the advantage yielded in the first embodiment. Specifically, the pins 10 and the stopper plates 9, which act as the stopper section, prevent movement of the wire 19 from moving over a longer distance than required, which would otherwise be caused in association with movement of the face plate 1. Hence, development of tensile stress exceeding allowable stress in the wire 19 can be prevented.

[0050] By means of working of the stopper section, the minimum required length of the wire 19 can be shortened. More specifically, a margin for cutting of the wire 19 is improved without fail, thereby enabling setting of a length required for removing the face plate 1 without consideration for disconnection of the wire. Consequently, the length of the wire 19 is shortened, thereby enabling cost cutting and effective utilization of internal space of the case 6. In the second embodiment, the stopper section for limiting an extent over which the face plate 1 is to be removed is constituted by means of the pins 10 and the stopper plates 9. Alternatively, for instance, the stopper section can be formed by placing L-shaped plates on the face plate 1 and on the case 6.

[0051] In this case, upright sections of the L-shaped plate materials come into collision at the time of removal of the face plate 1, thereby yielding the same advantage as that yielded in the second embodiment.

[0052] In the second embodiment, the face plate 1 and the case 6 are fitted together by means of the lock 2 and the auxiliary fitting sections. In contrast, even the aforementioned conventional fitting method; for example, a fitting method employing screw fastening or leaf springs, enables mounting of the stopper section of the invention.

[0053] An operating device according to a third embodiment of the invention will now be described by reference to Figs. 11 through 14.

[0054] Fig. 11 is a schematic front view showing a third preferred operating device of the invention. Fig. 12 is a schematic cross-sectional view of the operating device taken along line X3-X3 shown in Fig. 11. The third embodiment greatly differs from the second embodiment in that the stopper section is provided with a hinge.

[0055] In Figs. 11 and 12, reference numerals 10a, 10b, and 10c designate pins provided on one side section of the case 6; 12 designates a stopper plate provided on one side section of the rear surface 1b of the face plate 1; and 12a designates a hinge provided on the stopper plate 12.

[0056] Here, the hinge 12a of the stopper plate 12 has two surface sections that are pivotable about the hinge 12a. One face section is retained by the stopper plate 12. The other face section is retained by the rear surface 1b of the face plate 1. The face plate 1 can pivot about the hinge 12a with respect to the stopper plate 12.

[0057] As shown in Fig. 12, an upper surface section 12b and a lower surface section 12c of the stopper plate 12 are each formed into a stepped geometry. The stopper plate 12 is provided such that a principal surface of the stopper plate 12 is aligned with one side surface of the case 6.

[0058] As a result, the pins 10a, 10b, and 10c are provided in upright positions so as to face the other side section of the case 6. As shown in Fig. 12, the pin 10a is provided at a position higher than the upper surface section 12b of the stopper 12; and the pins 10b, 10c are provided at positions lower than the lower surface section 12c. The stopper plate 12 and the pins 10a, 10b, and 10c constitute a stopper section which limits the extent over which the face plate 1 is moved when being removed from the case 6.

[0059] The operation of the operating device having the foregoing construction will now be described by reference to Figs. 13 and 14. First, when performing maintenance and inspection, a service engineer inserts a key into the keyway 2c, to thereby release the lock 2 from the fitting section 8 in the same manner as in the previous embodiments. Subsequently, as shown in Fig. 13, the face plate 1 is moved in a direction indicated by an arrow shown in the drawing. At this time, the pin 10a of the case 6 comes into contact with the stepped portion of the upper surface section 12b of the stopper plate 12. As a result, movement of the face plate 1 is limited.

[0060] As shown in Fig. 14, after having been moved in the direction indicated by the arrow shown in the drawing, the face plate 1 is retained by the case 6. Specifically, the face plate 1 is moved downward from the position where a limitation has been imposed on movement of the face plate 1 (i.e., the position shown in Fig. 13). At this time, the pin 10a is disengaged from the upper surface section 12b of the stopper plate 12. Subsequently, the face plate 1 is further moved horizontally (i.e., a leftward direction on the drawing sheet). More specifically, the face plate 1 is moved horizontally while the lower surface section 12c slides over the pin 10b. Then, the pin 10c comes into contact with a side edge 12d of the stopper plate 12 simultaneously with the pin 10b having fitted into an indentation of the lower surface section 12c. In this way, a limitation is imposed on horizontal movement of the face plate 1, and the face plate 1 is held in its present form in the case 6 by way of the pins 10b, 10c and the stopper plate 12.

[0061] As shown in Fig. 14, the face plate 1 retained by the case 6 is rotated in a direction indicated by an arrow (designated by broken lines) in the drawing by means of action of the previously-mentioned hinge 12a, thereby releasing the opening section of the case 6.

[0062] As has been described, the operating device of the third embodiment enables a service engineer to perform maintenance and inspection by opening the opening section of the case 6 while the face plate 1 is retained by the case 6, as well as yielding the advantages yielded in the embodiments. Hence, ease of operation is improved.

[0063] In the third embodiment, one stopper section having the hinge 12a is provided on one side surface section. Alternatively, a plurality of stopper sections, each having the hinge 12a, may be provided on one side surface. Even such a case yields the same advantage as that yielded by the third embodiment.

[0064] An operating device according to a fourth embodiment of the invention will now be described by reference to Figs. 15 through 17.

[0065] Fig. 15 is a schematic front view showing a fourth preferred operating device of the invention; Fig. 16 is a schematic cross-sectional view of the operating device taken along line Y4-Y4 shown in Fig. 15; and Fig. 17 is a schematic cross-sectional view of the operating device taken along line W-W shown in Fig. 16. The fourth embodiment greatly differs from the first embodiment in that the face plate 1 is provided with side plates 13a, 13b.

[0066] In Figs. 15 through 17, reference numeral 3 designates a fitting plate serving as a portion of a receiving section and that of an auxiliary fitting section; and 13a, 13b designate side plates provided on respective side edges of the rear surface 1b of the face plate 1.

[0067] As shown in Figs. 15 and 16, the fitting plate 3 is provided at an upper end of the rear surface 1b of the face plate 1 so as to come into close contact with the face plate 1. In contrast, the side plates 13a, 13b are provided along side edges but at respective positions closer to the inside than to the side edges defining a width A of the fitting plate 3. Specifically, as shown in Figs. 16 and 17, the side plates 13a, 13b are provided so as to come into substantial intimate contact with the rear surface 1b of the face plate 1 such that a dimension B defined between outside edges of the two side plates 13a, 13b becomes smaller than the width A of the fitting plate 3. Further, the side plates 13a, 13b are placed so as to come into contact with the fitting plate 3.

[0068] Flow of water droplets which have intruded into the operation device having the foregoing configuration will now be described. As designated by an arrow shown in Fig. 15, a portion of the water droplets that have flowed along the surface 14a of the wall section 14 reach the fitting plate 3 serving as a receiving section while passing through a clearance existing between the upper end of the face plate 1 and the surface 14a and a clearance existing between the upper end of the face plate 1 and the case 6. Subsequently, the water droplets that have reached the fitting plate 3 having a predetermined width A reach the lower end of the operating device while passing through the outside of the side plates 13a, 13b from the end section of the fitting plate 3. Subse-

quently, the water droplets are discharged to the outside of the device from a clearance existing at the lower end of the operating device.

[0069] As has been described, according to the operating device of the fourth embodiment, even when water droplets have intruded into the case 6, the fitting plate 3 receives and guides the water droplets to the lower end thereof while side edges thereof are taken as channels by means of the side plates 13a, 13b. Hence, there is prevented occurrence of failures, which would otherwise be caused when water droplets come into contact with the electrical component sections 20a, 21a or the like housed in the center of the inside of the case 6.

[0070] In the fourth embodiment, the face plate 1 and the case 6 are fitted together by means of the lock 2, the auxiliary fitting section, and the like. The fitting plate 3 serving as a portion of the auxiliary fitting section is formed as a water-droplet receiving section. In this respect, even the foregoing related-art fitting method; for example, a fitting method using screw-fastening or plate springs, enables mounting of the fitting plate 3 serving as a receiving section of the invention. In this case, the fitting plate 3 acts solely as a water-droplet receiving section and does not act as a portion of the auxiliary fitting section.

[0071] In such a case, the receiving section can be inclined to any one of the side edge sections, thereby limiting a channel through which water droplets are to flow to one side edge section. Consequently, in this case, the only requirement is to mount a side plate on only one side corresponding to the channel.

[0072] As is obvious, the present invention is not limited to the previous embodiments, and the embodiments are susceptible to modifications falling within the technical scope of the present invention other than those suggested previously, as required. The constituent elements are not limited to those described in connection with the previous embodiments in terms of number, position, and shape. The constituent elements may be embodied in number, position, and shape preferable for implementing the present invention.

INDUSTRIAL APPLICABILITY

[0073] As has been described, in an operating device according to the invention, a lock whose lock operation section is projected from a rear surface of a face plate to a front surface of the same is fitted to a fitting section formed in a case, by means of operation of the lock operation section. As a result, a third party other than a service engineer capable of operating the lock operation section cannot remove a face plate from a case of the operating device. Thus, the operating device is useful as a device capable of prohibiting a malicious third party from causing failures.

[0074] The operating device of the invention further comprises an auxiliary fitting section for fitting the face plate to the case. As a result, the operating device is

useful as a device capable of fitting the face plate to the case in a well-balanced manner, along with the fitting section, by use of a single key.

[0075] In the operating device of the invention, an auxiliary fitting section is formed from a mount plate having an upright section and a fitting plate having another upright section to fit to the upright section. As a result, the operating device is useful as a device capable of fitting the face plate to the case in a well-balanced manner by use of a comparatively simple construction.

[0076] In the operating device of the invention, the upright section provided on the mount plate is placed in an inclined upright position. As a result, the operating device is useful as a device which enables smooth removal of the face plate from the case.

[0077] The operating device of the invention has a stopper section for limiting an extent over which the face plate is to move at the time of removal of the face plate from the case. As a result, a wire is not pulled to a greater length than required, which would otherwise be caused in association with movement of the face plate. Hence, the operating device is useful as a device which can prevent infliction of damage on a wire connected to a rear surface of the face plate, which would otherwise be caused by a service engineer at the time of maintenance and inspection.

[0078] In the operating device of the invention, the stopper section is formed from a pin provided on a case and a stopper plate provided on the face plate. Further, the device has a fitting section formed from a lock and an auxiliary fitting section. As a result, a service engineer prevents infliction of damage to a wire connected to the rear surface of the face plate, which would otherwise be caused by a service engineer at the time of inspection and maintenance. The operating device is useful as a device capable of preventing occurrence of failures, which would otherwise be caused when a malicious third party other than a service engineer removes the face plate.

[0079] In the operating device of the invention, the stopper plate is provided on the face plate via a hinge. As a result, an opening section of a case can be opened while the face plate is retained by the case. Thus, the operating device is useful as a device capable of improving ease of maintenance and inspection of the service engineer.

[0080] In the operating device of the invention, a receiving section for receiving intruded water droplets is placed at an upper edge of the face plate. A side plate for guiding the water droplets received by the receiving section to the lower end of the face plate by way of side edges is provided on side edge sections of the face plate. As a result, intrusion of water droplets into the center of the inside of the case can be prevented. Hence, the operating device is useful as a device capable of preventing occurrence of failures in components, such as electrical components housed in the case.

[0081] Further, in the operating device of the inven-

tion, the receiving section acts also as a portion of the auxiliary fitting section and further has a fitting section using a lock. As a result, occurrence of failures in components, such as electrical components, housed in the case can be prevented. Further, the operating device is useful as a device capable of preventing occurrence of failures, which would otherwise be caused when a malicious third party other than a service engineer removes the face plate.

[0082] In the operating device of the invention, the operating device is provided on an elevator hall apparatus. As a result, the operating device is useful as an elevator hall apparatus capable of preventing a malicious third party other than the service engineer from removing the face plate; preventing infliction of damage to a wire, which would otherwise be caused by a service engineer at the time of maintenance and inspection; and occurrence of failures in components, such as an electrical component section housed in the case.

[0083] In the operating device of the invention, the operating device is provided on a passenger car of an elevator system. As a result, the operating device is useful as a device capable of preventing occurrence of failures, which would otherwise be caused when a malicious third party other than a service engineer removes a face plate; capable of preventing infliction of damage to a wire, which would otherwise be caused by a service engineer at the time of maintenance and inspection; and capable of preventing occurrence of failures in components, such as an electrical component section, housed in the case.

Claims

1. An operating device including
 - a case having an opening section; and
 - a face plate which has operation buttons projecting from a rear surface to a front surface and is to be removably disposed on the case so as to seal the opening section while the rear surface is oriented toward the case, wherein
 - the face plate has a lock whose lock operation section projects from the rear surface to the front surface, and
 - the case has a fitting section to fit the lock of the face plate by means of manipulation of the lock operation section.
2. The operating device according to claim 1, wherein the face plate and the case have an auxiliary fitting section to be used for fitting the face plate and the case together, in addition to the lock and the fitting section.
3. The operating device according to claim 2, wherein the auxiliary fitting section comprises a mount plate which has upright section provided at one longitu-

dinal end of the case and standing upright toward the other longitudinal end, and fitting plate which has an upright section standing upright toward the one longitudinal end, the fitting plate is to be disposed at one longitudinal end of the face plate and to fit the mount plate;

the lock is placed at the other longitudinal end of the face plate; and

the fitting section is placed at the other longitudinal end of the case.

4. The operating device according to claim 3, wherein the upright section of the mount plate stands while remaining inclined toward the other longitudinal end in association with removal and attachment of the face plate from and to the case.
5. An operating device including
 - a case having an opening section, and
 - a face plate which has operation buttons projecting from a rear surface to a front surface and is to be removably disposed on the case so as to seal the opening section while the rear surface is oriented toward the case, wherein the operating device further comprises:
 - a stopper section for limiting an extent over which the face plate is to move at the time of removal of the face plate from the case.
6. The operating device according to claim 5, wherein the stopper section is constituted of pins provided on a side section in the case and a stopper plate provided on a rear surface of the face plate so as to come into contact with the pins at the time of removal of the face plate;
 - the face plate has a lock whose lock operation section projects from the rear surface to the front surface;
 - the case has a fitting section which is to be fitted with the lock of the face plate by means of operation of the lock operation section; and
 - the face plate and the case further have an auxiliary fitting section to be used for fitting the face plate and the case together, in addition to the lock and the fitting section.
7. The operating device according to claim 6, wherein the stopper plate is placed on the face plate via a hinge; and
 - the face plate pivots about the hinge, thereby releasing the opening section of the case.
8. An operating device including
 - a case having an opening section, and
 - a face plate which has operation buttons projecting from a rear surface to a front surface and is to be removably attached to the case so as to seal

the opening section while the rear surface is oriented toward the case, wherein:

the face plate has

a receiving section which is provided at an upper end on a rear surface of the face plate and receives, within a predetermined width, water droplets having intruded via a clearance between the face plate and the case; and

a side plate which is placed at a side edge of the face plate and at a position located toward the inside from a predetermined width of the receiving section, and guides the water droplets received by the receiving section to a lower end of the face plate while the side edge is taken as a channel.

9. The operating device according to claim 8, wherein the face plate has a lock whose lock operation section projects from the rear surface to the front surface;

the case has a fitting section which is to be fitted with the lock of the face plate by means of operation of the lock operation section;

the face plate and the case further have an auxiliary fitting section to be used for fitting the face plate and the case together, in addition to the lock and the fitting section; and

the receiving section of the face plate is a part of the auxiliary fitting section.

10. An elevator hall apparatus comprising:

an operating device as defined in anyone of claims 1 through 9 which is placed at a position on a wall section in the vicinity of a hall, wherein a passenger car of an elevator system into which a passenger desires to enter is caused to ascend or descend by operation of the operation buttons at the hall.

11. A passenger car of an elevator system in which an operating device as defined in any one of claims 1 through 9 is placed, wherein the passenger car into which a passenger enters is caused to ascend or descend by operation of the operation button within the passenger car.

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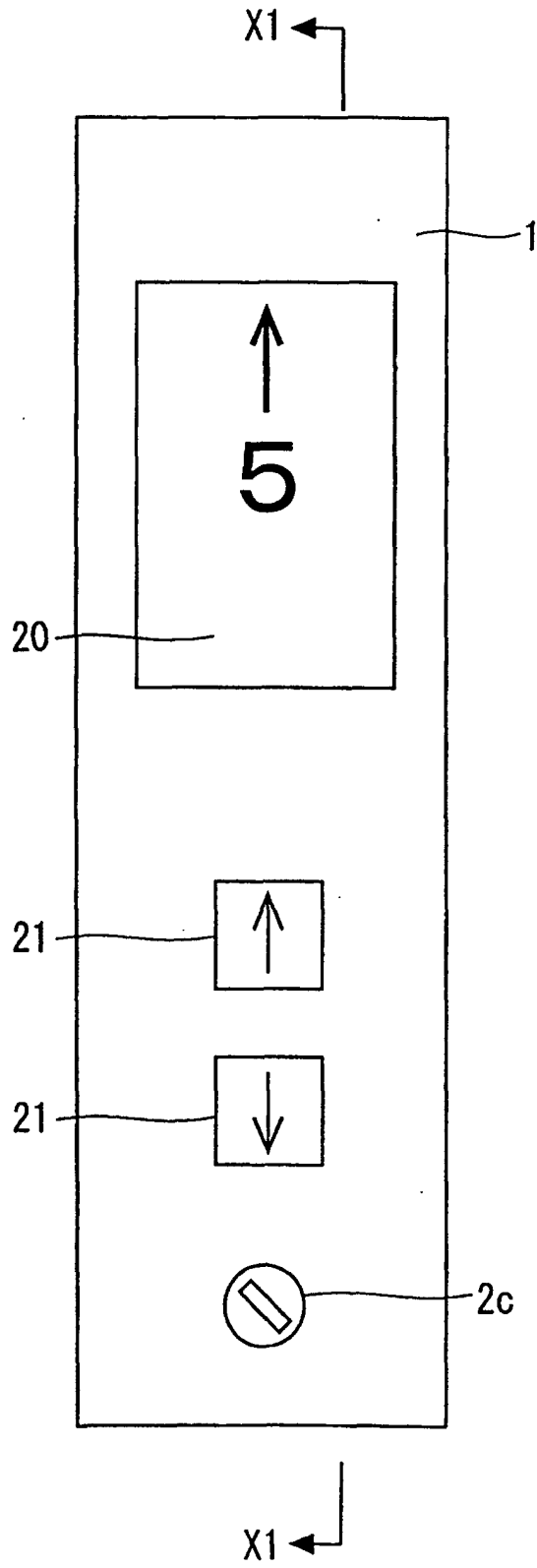


Fig. 1

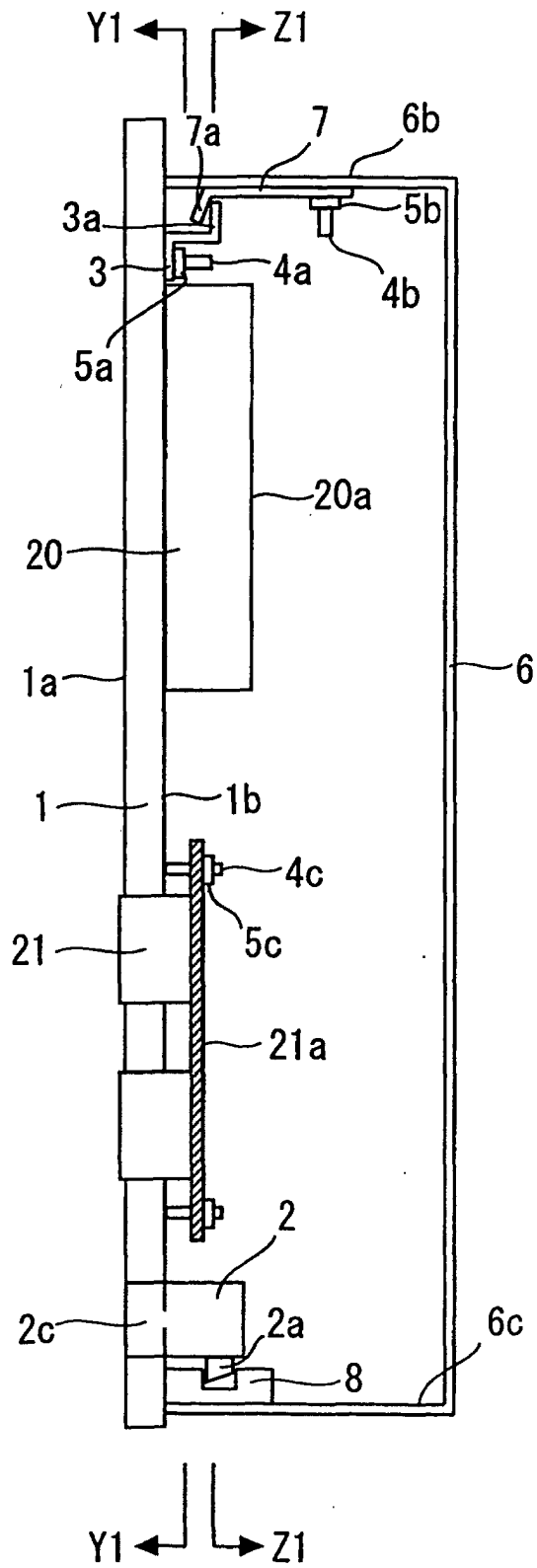


Fig. 2

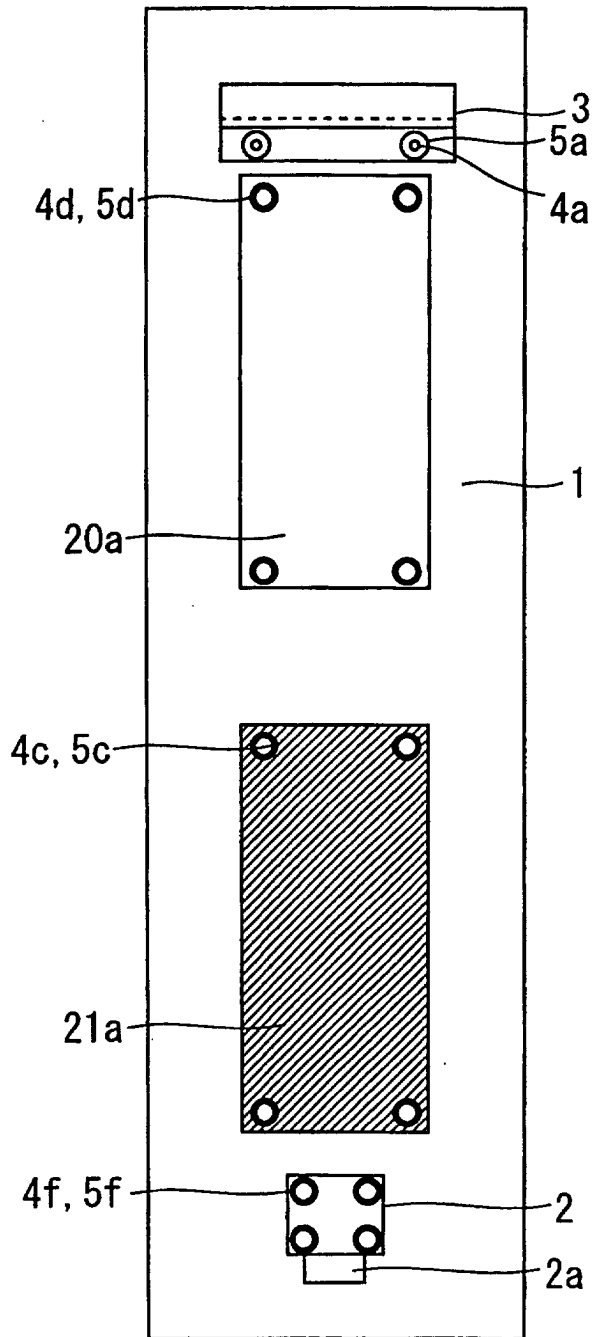


Fig. 3

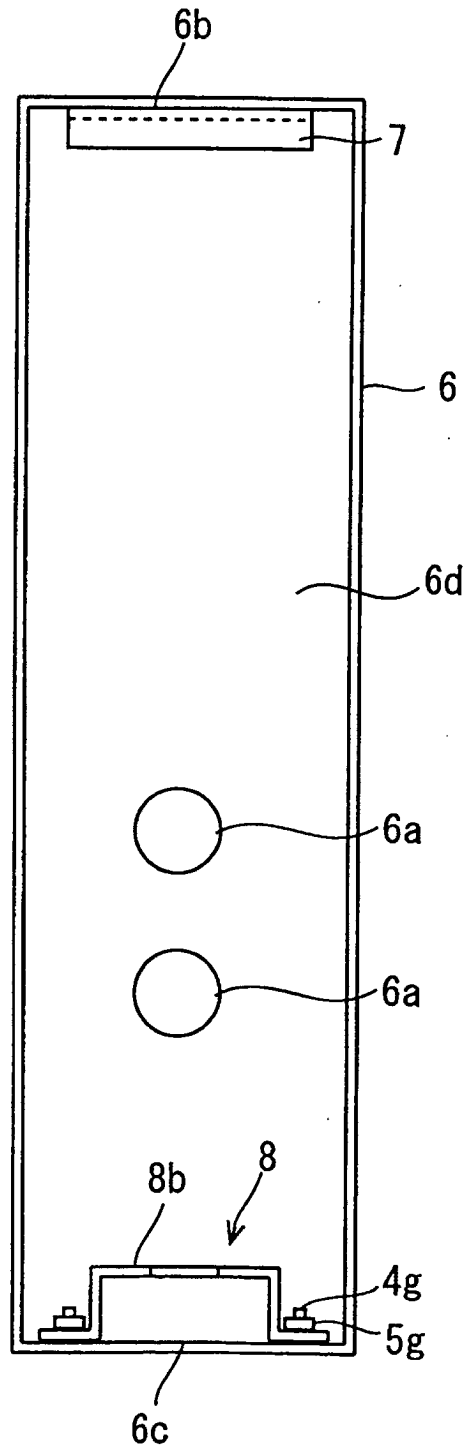


Fig. 4

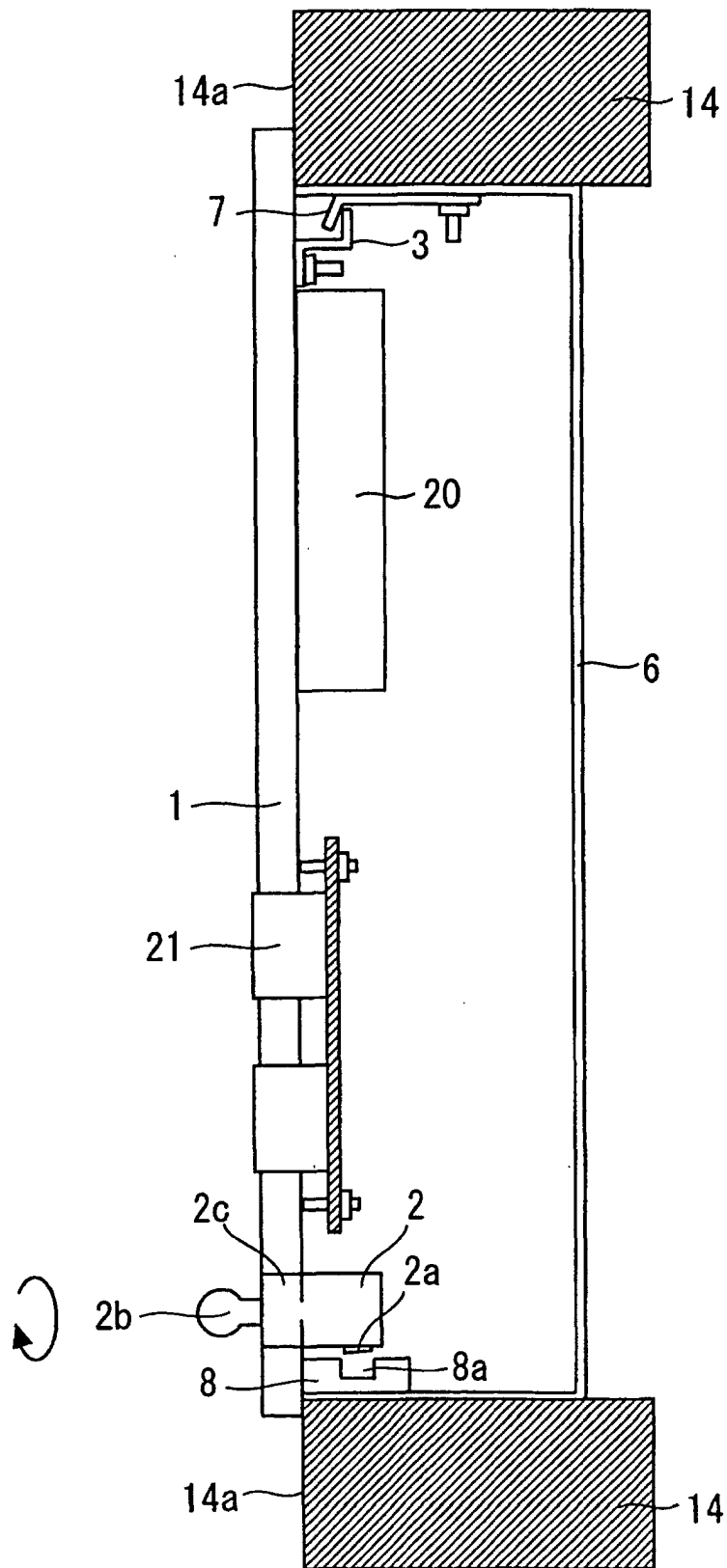


Fig. 5

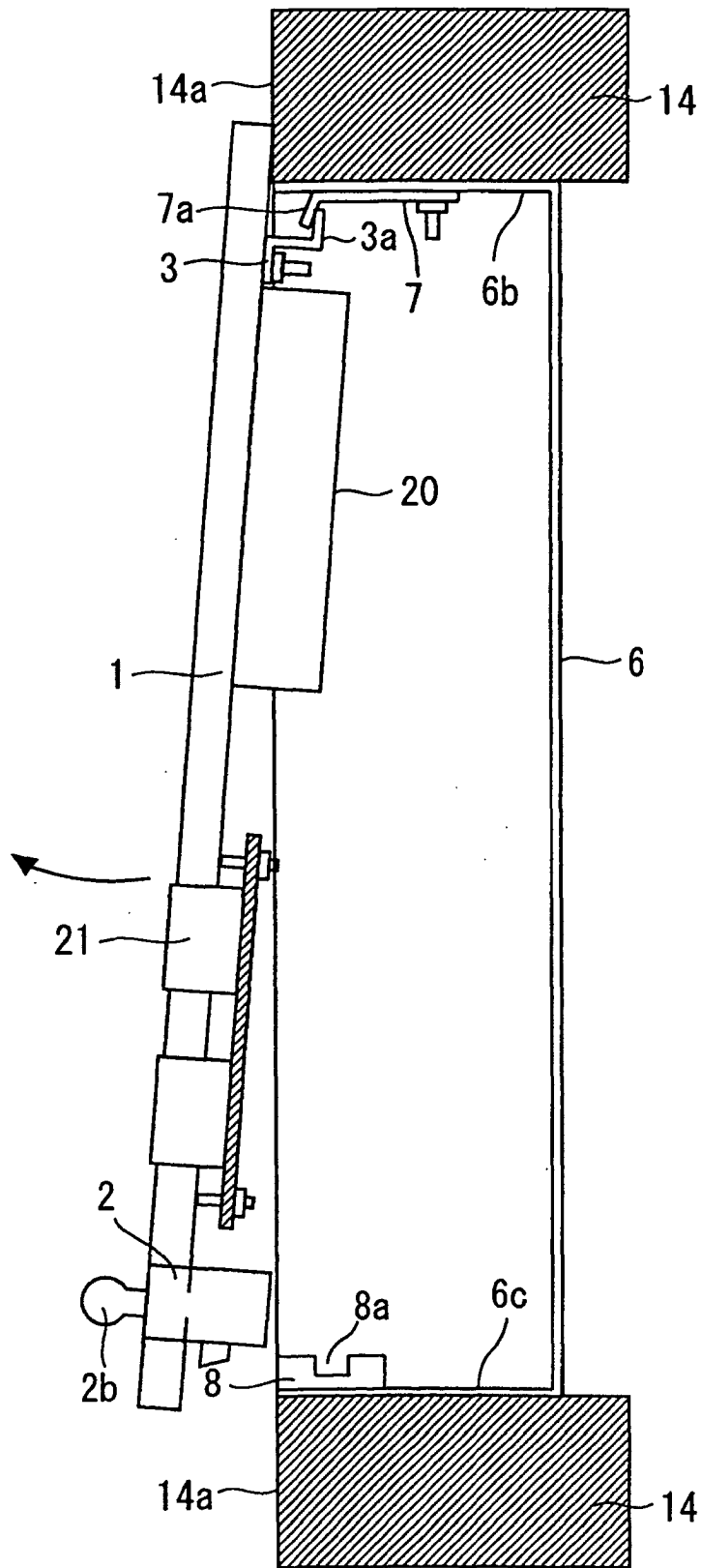


Fig. 6

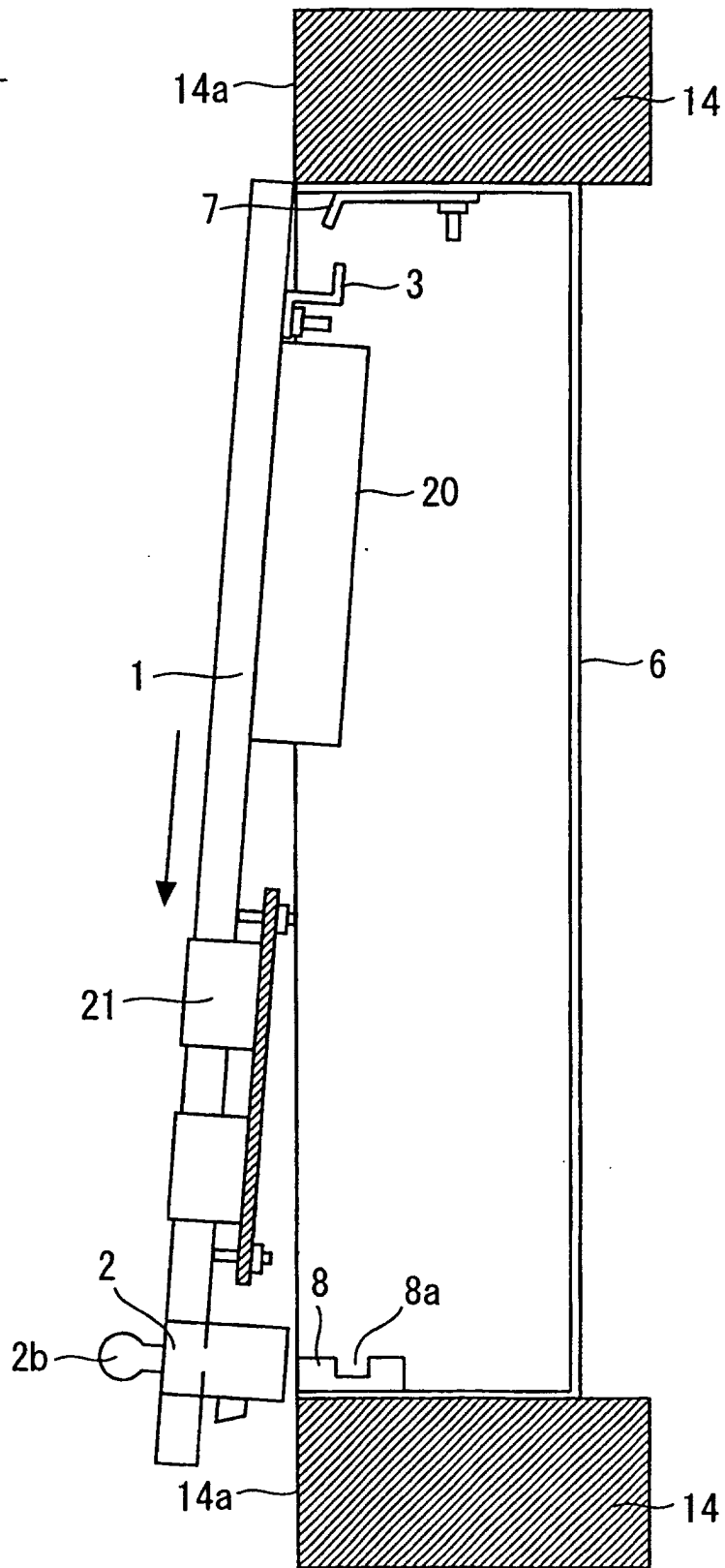


Fig. 7

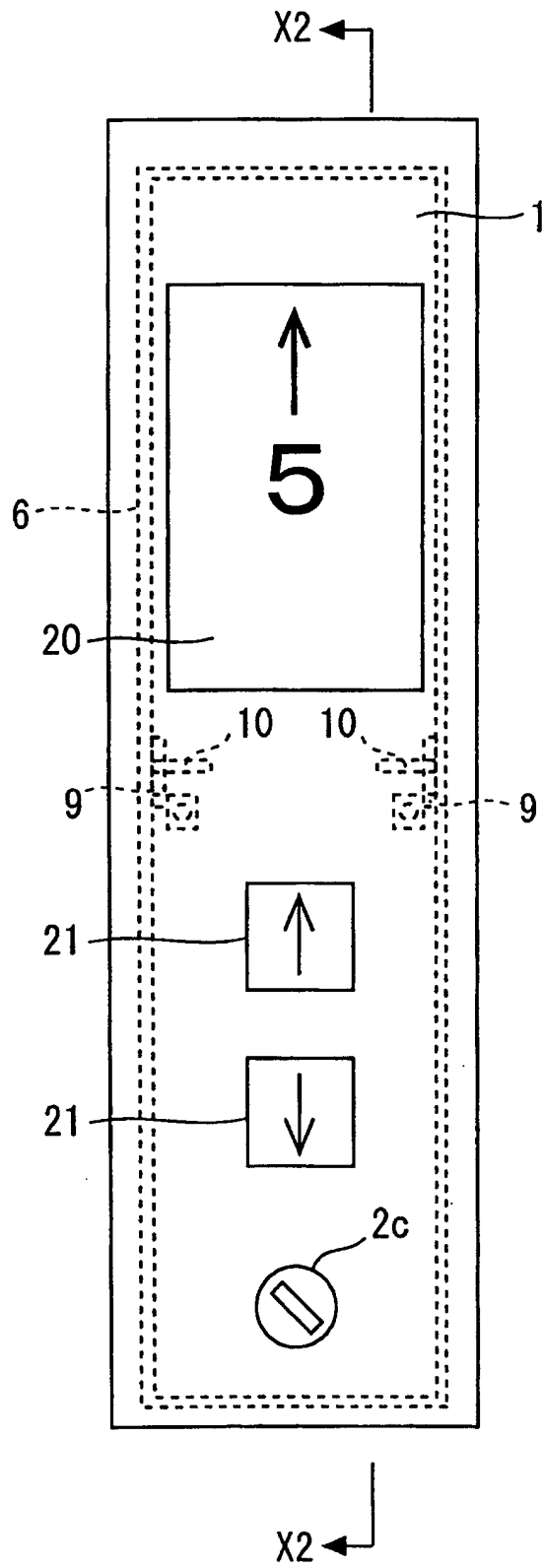


Fig. 8

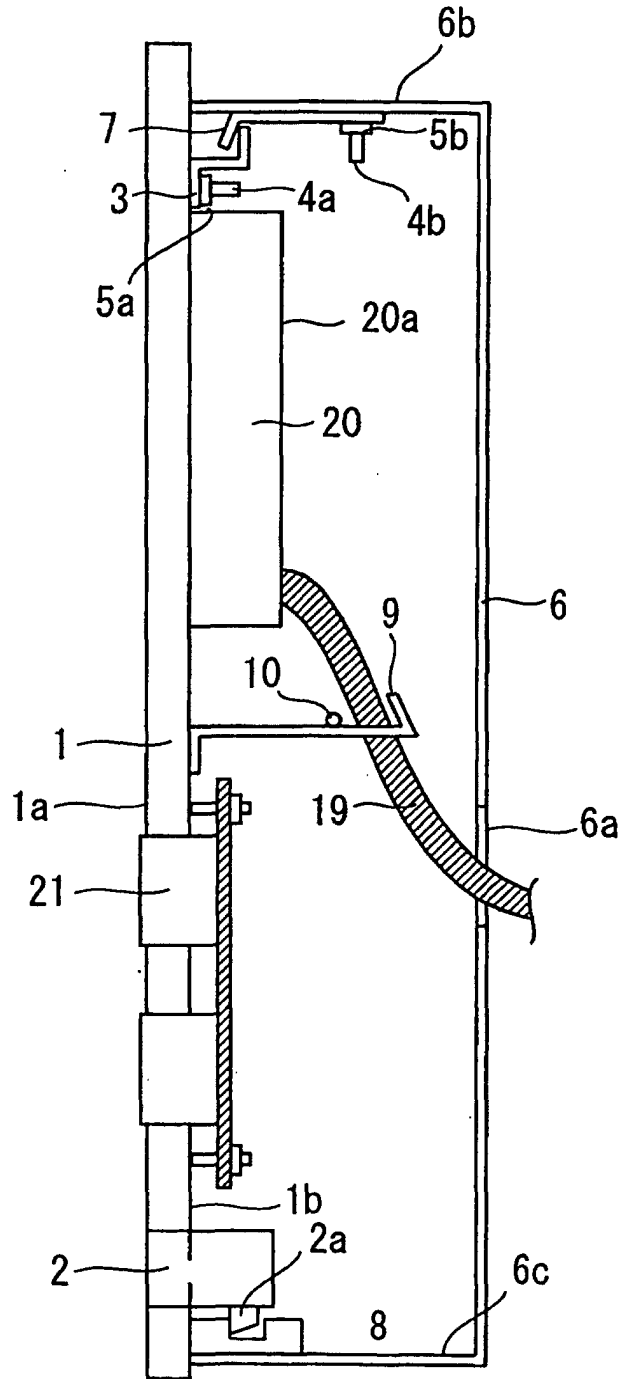


Fig. 9

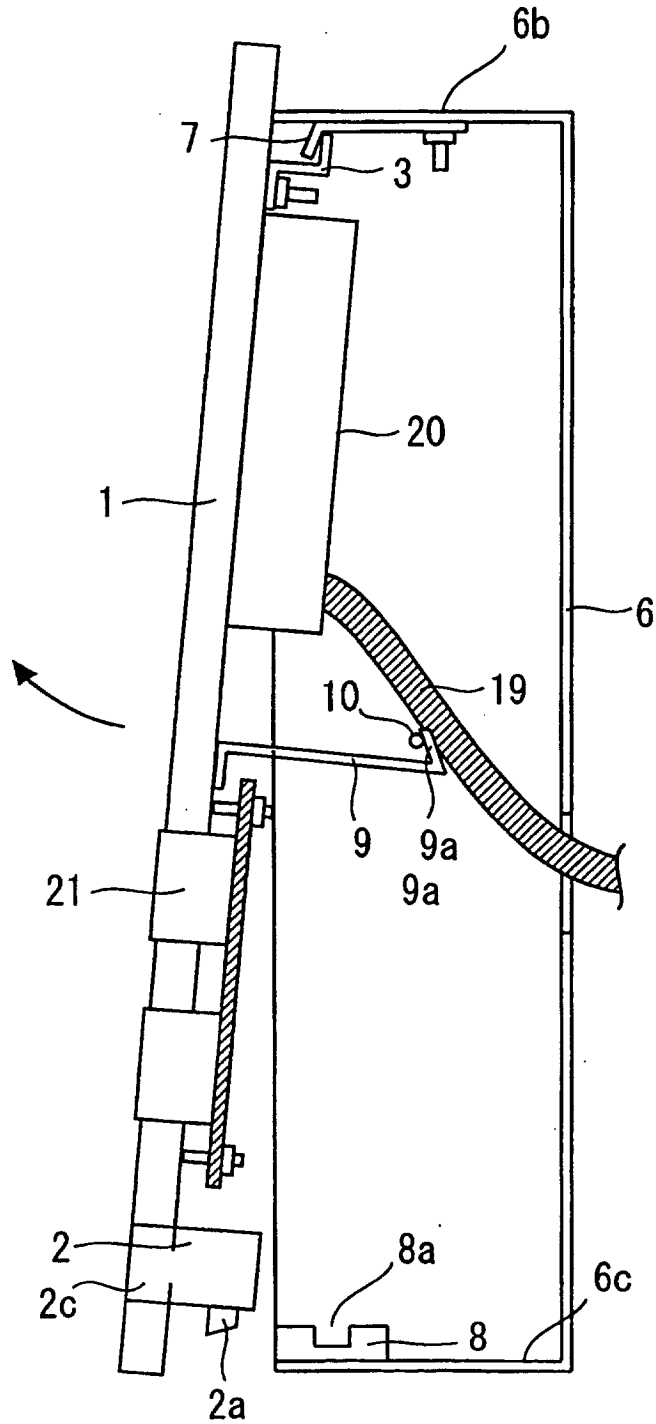


Fig. 10

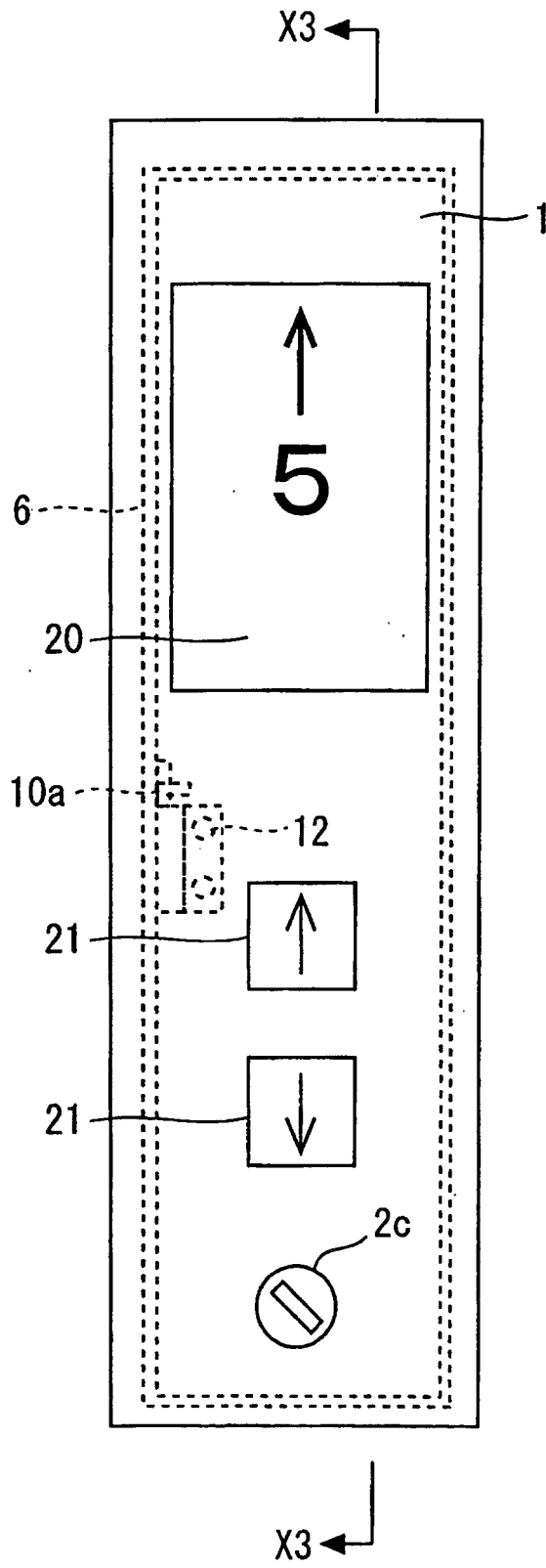


Fig. 11

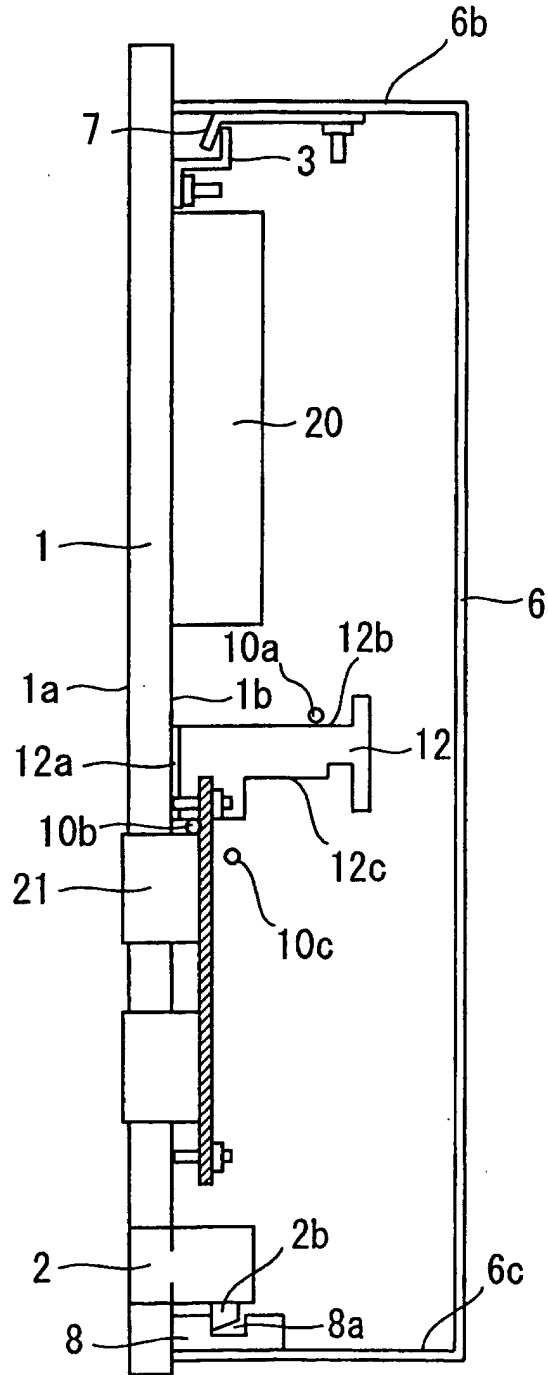


Fig. 12

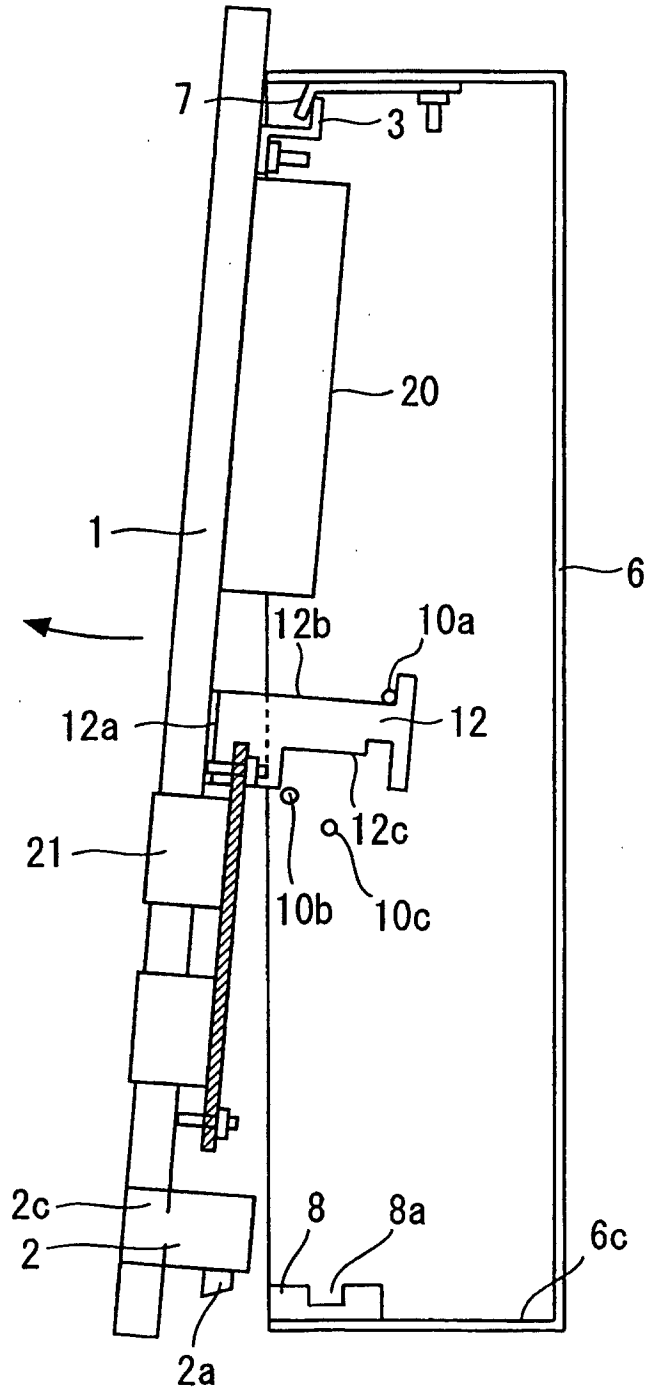


Fig. 13

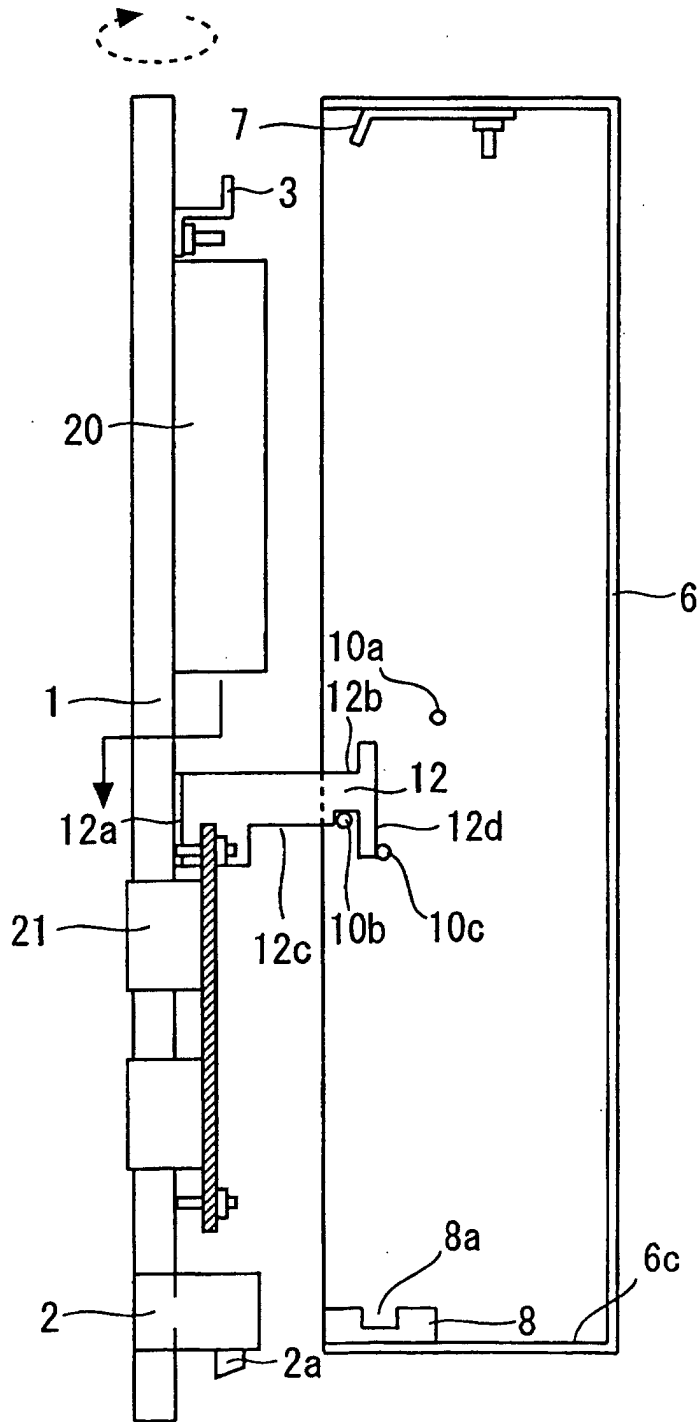


Fig. 14

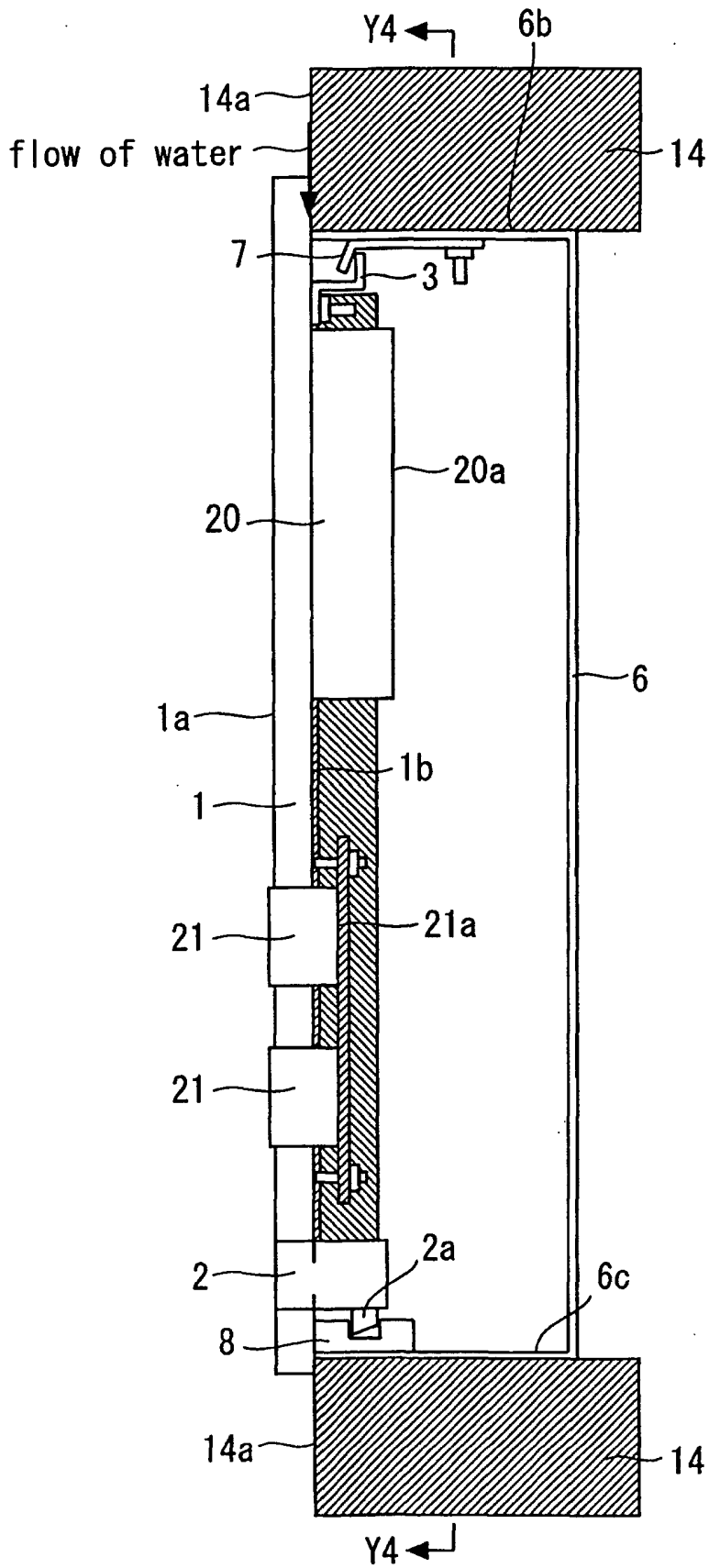


Fig. 15

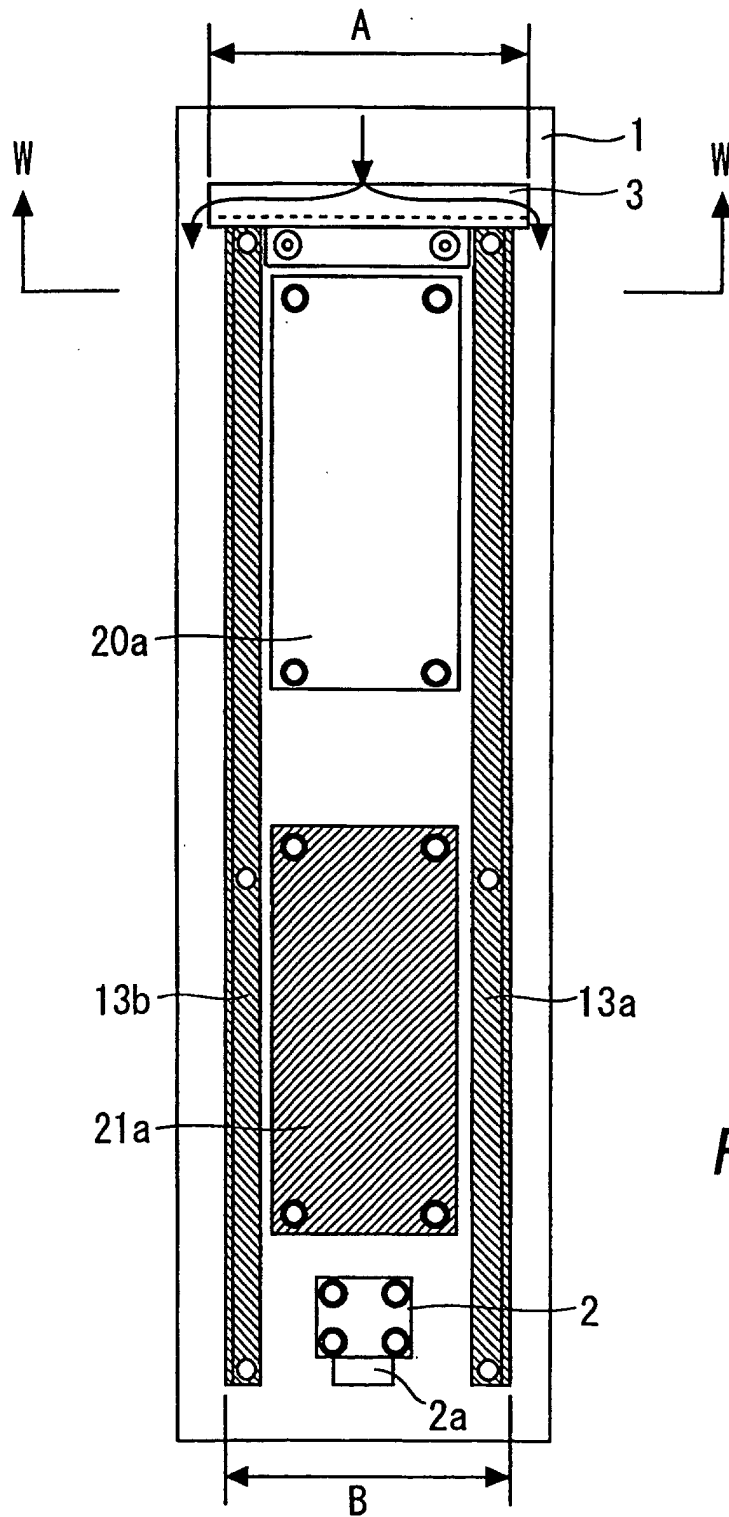


Fig. 16

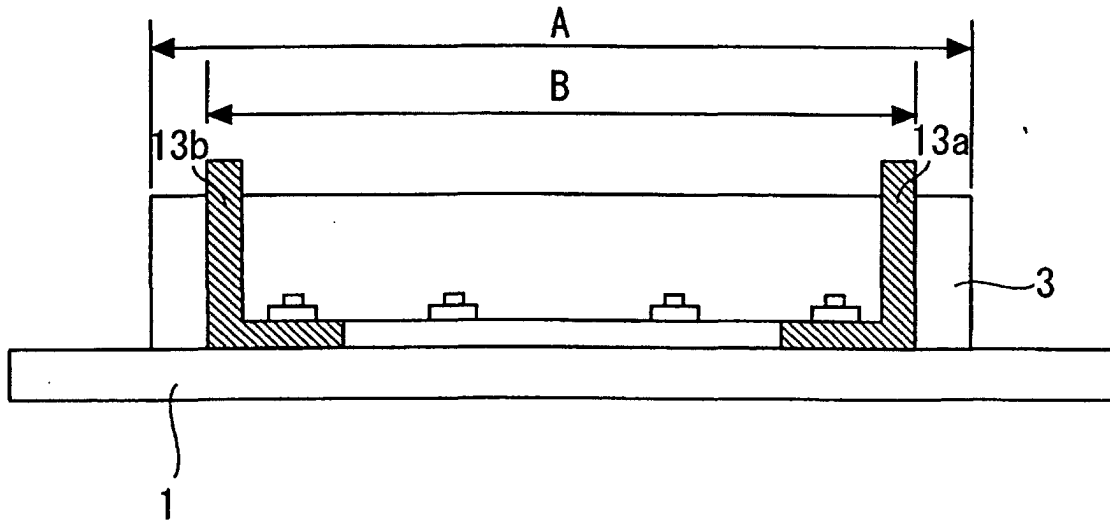


Fig. 17.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP01/07367

A. CLASSIFICATION OF SUBJECT MATTER Int.Cl ⁷ B66B1/46, H01H13/04, H01H9/02		
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) Int.Cl ⁷ B66B1/00-B66B11/08, H01H		
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 1996-2002 Kokai Jitsuyo Shinan Koho 1971-2002 Toroku Jitsuyo Shinan Koho 1994-2002		
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 Y	JP 10-67473 A (Kone Oy), 10 March, 1998 (10.03.98), & FI 961748 A & EP 0803461 A2 & CN 1182948 A & US 5889240 A	1, 10-11 2-4, 6-9
X Y	JP 6-271220 A (Toshiba Corp.), 27 September, 1994 (27.09.94), (Family: none)	5 2, 6-7, 9
X Y	JP 5-278973 A (Mitsubishi Electric Corp.), 26 October, 1993 (26.10.93), (Family: none)	5 2-4, 6-7, 9
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> See patent family annex.		
* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "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) "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 "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 "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 "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 "&" document member of the same patent family		
Date of the actual completion of the international search 23 May, 2002 (23.05.02)		Date of mailing of the international search report 11 June, 2002 (11.06.02)
Name and mailing address of the ISA/ Japanese Patent Office		Authorized officer
Facsimile No.		Telephone No.

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP01/07367

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	CD-ROM of the specification and drawings annexed to the request of Japanese Utility Model Application No. 87925/1991 (Laid-open No. 32367/1993) (Hitachi Building System Eng. & Service Co., Ltd.), 27 April, 1993 (27.04.93), (Family: none)	8-9
E, X	JP 2001-240345 A (Mitsubishi Electric Corp.), 04 September, 2001 (04.09.01), (Family: none)	1-7, 10-11

Form PCT/ISA/210 (continuation of second sheet) (July 1998)