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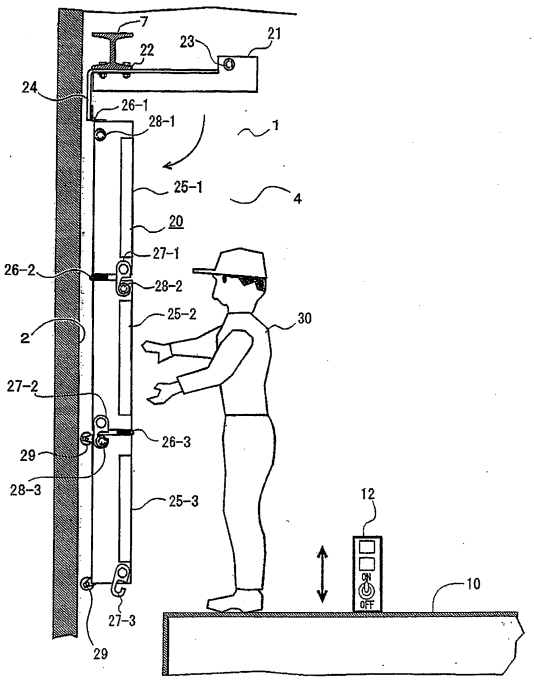
(54) CONTROL BOARD FOR ELEVATOR

(57) Provided is an elevator control panel 20 to be installed within a shaft 1, which is constructed in such a manner that multiple partial control panels 25-1, 25-2, 25-3 in which control equipment 42 is housed are swingably connected to each other by hinge metal fittings 26-126-2, 26-3, and during inspection, with the partial control panels 25-1, 25-2, 25-3 suspended to between a shaft side wall 2 and a car 10, a maintenance person 30 inspects the partial control panels 25-1, 25-2, 25-3 while moving up and down by operating the car 10. At a normal time when the elevator is operating, the partial control panels 25-1, 25-2, 25-3 are engaged to the top portion of the shaft in a stacked condition, with connections thereof bent.

Fig.6



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Description

Technical Field

[0001] The present invention relates to the construction of an elevator control panel installed within a shaft.

Background Art

[0002] As an elevator control panel installed within a shaft, there is available an elevator control panel which is constituted by a front unit and a rear unit, which are attached to a wall of the shaft by being mutually pivotably supported by hinges. In the case of maintenance and inspection, the control panel is opened by rotating the front unit and causing the front unit to protrude toward the center side of the shaft. (Refer to Patent Document 1, for example.)

[0003] Patent Document 1: Japanese Patent Laid-Open No. 2004-231351

Disclosure of the Invention

Problems to be Solved by the Invention

[0004] In a case where a control panel is installed within a shaft, the space in which the control panel can be installed is limited because a car, a counterweight, guide rails, a governor, a hall-door closing device and the like are provided within the shaft. When a control panel is installed within a shaft, the car top or the pit floor becomes a scaffold for the work. Beams, a car-door closing device and a cab lighting device are provided on the car top. A buffer and pulleys for a governor are provided in the pit. For this reason, the work space becomes limited and narrow.

Maintenance and inspection is indispensable to an elevator control panel. For this reason, it is necessary that an elevator control panel permit easy maintenance and inspection. When a control panel is installed within a shaft, both the installation space and the work space are subject to constraints as described above.

[0005] Under the above-described circumstances, a conventional elevator control panel installed within a shaft is provided in a protruding manner on a wall of the shaft and, therefore, it is necessary to install the elevator control panel within a range which avoids the interference with the ascending and descending region of the car. For this reason, the protruding size of the control panel is also limited.

Furthermore, when the control panel is opened by rotating the front unit, the control panel protrudes to the ascending and descending region of the car, and therefore when the control panel is open, it is impossible to cause the car to ascend and descend to the region where the control panel is installed. For this reason, an elevator maintenance person cannot perform the inspection work of the control panel while moving up and down using the car. And inevitably, the height of the control panel is limited to a range appropriate to the height of maintenance personnel.

As described above, a conventional elevator control panel has had the problem that because of its limited outer dimensions, control equipment capable of being housed is inevitably limited.

Furthermore, since the control panel is opened by horizontally rotating the front unit, the control equipment to be inspected is horizontally developed. For this reason, a maintenance person must move right and left on the work floor, thereby posing the problem that it is difficult to perform maintenance and inspection work.

[0006] The present invention has been made to solve the above-described problems, and the object of the invention is to provide an elevator control panel capable of easily increasing and decreasing the housing space according to the quantity of control equipment.

The object of the present invention is also to provide an elevator control panel which permits easy maintenance and inspection work.

Means for Solving the Problems

[0007] The elevator control panel related to the present invention is a control panel to be installed within a shaft which is constructed in such a manner that multiple partial control panels in which control equipment is housed are swingably connected to each other, that during inspection the partial control panels are suspended to between a side wall of a shaft and a car, and that at a normal time, the partial control panels are engaged to a top portion of the shaft in a stacked condition, with connections thereof bent.

Advantages of the Invention

[0008] Since in the elevator control panel related to the present invention, partial control panels are connected to each other as described above, this produces the advantage that the number of the partial control panels can be easily increased and decreased according to the quantity of control equipment which is housed.

Since in the inspection of the control panel, the partial control panels are suspended to between a side wall of a shaft and a car, a maintenance person can inspect the partial control panels while moving up and down by operating the car. For this reason, this produces the advantage that the maintenance person can easily reach necessary places and perform inspection by raising and lowering the car even when the partial control panels are suspended and longitudinally developed in a wide range.

Brief Description of the Drawings

[0009]

Figure 1 is a cross-sectional view of a top portion of

a shaft in which an elevator control panel in Embodiment 1 of the present invention is housed;
Figure 2 is a front view of the elevator control panel in a folded condition, which is taken along the arrowed line II-II of Figure 1;
Figure 3 is a side view of the elevator control panel, which is taken along the arrowed section line III-III of Figure 2;
Figure 4 is a side view of the elevator control panel in Embodiment 1 of the present invention;
Figure 5 is a side view of the elevator control panel in Embodiment 1 of the present invention;
Figure 6 is a side view of the elevator control panel in a completely suspended condition in Embodiment 1 of the present invention;
Figure 7 is a side view of an elevator control panel in Embodiment 2 of the present invention;
Figure 8 is a sectional view taken along the arrowed section line VIII-VIII of Figure 7;
Figure 9 is a side view of the elevator control panel which is being suspended in Embodiment 2 of the present invention;
Figure 10 is a side view of the elevator control panel in a completely suspended condition in Embodiment 2 of the present invention;
Figure 11 is a side view of an elevator control panel in Embodiment 3 of the present invention;
Figure 12 is a side view of the elevator control panel in a half-open condition in Embodiment 3 of the present invention;
Figure 13 is a side view of the elevator control panel in a completely suspended condition in Embodiment 3 of the present invention;
Figure 14 is a side view of an elevator control panel in a horizontally laid condition in Embodiment 4 of the present invention;
Figure 15 is a side view of the elevator control panel which is being suspended in Embodiment 4 of the present invention;
Figure 16 is a side view of the elevator control panel in a completely suspended condition in Embodiment 4 of the present invention;
Figure 17 is a side view of an elevator control panel in a completely open condition in Embodiment 5 of the present invention;
Figure 18 is a front view of the elevator control panel, which is taken along the arrowed line XVIII- XVIII of Figure 17;
Figure 19 is a plan view of the elevator control panel, which is taken along the arrowed line XIX- XIX of Figure 18;
Figure 20 is a side view of the elevator control panel in a folded condition in Embodiment 5 of the present invention;
Figure 21 is a side view of the elevator control panel which is being suspended in Embodiment 5 of the present invention; and
Figure 22 is a side view of the elevator control panel in a completely suspended condition in Embodiment 5 of the present invention.

Description of Symbols

[0010] 1 Shaft, 2 Shaft side wall, 3 Shaft ceiling, 4 Top gap, 5 Machine beam, 6 Traction machine, 7 Cross beam, 8 Cross beam, 9 Car guide rail, 10 Car, 11 Pulley, 12 Car-station operation switch, 13 Counterweight, 14 Weight guide rail, 15 Pulley, 16 Rope hitch plate, 17 Rope hitch plate, 18 Main rope, 19 Hall, 20 Control panel, 21 Support arm, 22 Bolt, 23 Pin, 24 Hanger plate, 25 Partial control panel, 26 Hinge metal fitting, 27 Hook, 28 Pin, 29 Roller, 30 Maintenance person, 31 Mounting plate, 32 Pulley, 33 Control-panel guide rail, 34 Weight guide rail, 35 Bracket, 36 Rope, 37 Weight, 38 Rope hitch plate, 39 Swing arm, 40 Engaging arm, 41 Roller, 42 Control equipment, 51 Housing, 52 Anchor bolt, 53 Lid body, 54 Hinge metal fitting, 55 Bolt, 61 Hanger plate, 62 Partial control panel, 63 Hinge metal fitting, 64 Hanging metal fitting, 65 Pin, 66 Hook, 67 Spacer, 71 Housing, 72 Bottom plate, 73 Lid body, 74 Hinge metal fitting, 75 First side plate, 76 Hinge metal fitting, 77 First mounting plate, 78 Second mounting plate, 79 Hinge metal fitting, 80 Second mounting plate, 91 Handle, 92 Pivot shaft, 93 Arm, 94 Grip, 95 Stopper, 96 Stationary shaft

Best Mode for Carrying Out the Invention

[0011] In examples of the present invention, descriptions will be given by taking a control panel of an elevator having no machine room as an example.

[0012] Hereinafter, the embodiments of the present invention will be described by referring to the drawings. In each of the drawings, same numerals refer to same parts and overlaps of descriptions of these parts are omitted.

Embodiment 1

[0013] Figures 1 to 6 show Embodiment 1 of the present invention.
Figures 1 and 2 show a shaft 1 of an elevator having no machine room, Figure 1 being a cross-sectional view of a top portion of the shaft and Figure 2 being a longitudinal sectional view which is taken along the line II-II of Figure 1.
Upon a shaft side wall 2 of the top portion of the shaft 1, a machine beam 5 which traverses the shaft 1 is hanged across. Upon the right and left shaft side walls 2, cross beams 7, 8 are hanged across. A traction machine 6 is installed on the machine beam 5, and a main rope 18 is wound on the traction machine 6. Car guide rails 9 are installed in a standing manner along right and left shaft side walls 2, and top end portions thereof are each fixed to the cross beams 7, 8. Similarly, a weight guide rail 14 is installed in a standing manner along the shaft side wall 2 on the right side.

[0014] A pulley 11 is attached to right and left bottom

surfaces of the car 10. One end of the main rope 18 which falls from the traction machine 6 is wound on the pulley 11, rises and is engaged to a rope hitch plate 16 which is firmly fixed to the cross beam 7. The other end of the main rope 18 is wound on a pulley 15 attached to a counterweight 13, rises and is engaged to a rope hitch plate 17 which is firmly fixed to the cross beam 8.

The car 10 and a counterweight 13 ascend and descend via the main ropes 18 by the rotation of the traction machine 6, whereby the car stops at a hall 19.

[0015] A control panel 20 is attached to a left shaft-top portion on which the counterweight 13 is not held in a suspended manner. This control panel 20 is constituted by multiple partial control panels 25-1, 25-2, 25-3, in which control equipment is housed, and is engaged to a hanger plate 24 suspended from the cross beam 7 and to a support arm 21 which is firmly fixed, at an end thereof, to the cross beam 7 and which is horizontally installed. The control panel 20 is constituted by the multiple partial control panels 25-1, 25-2, 25-3 in which the control equipment is housed. Hereinafter, the multiple partial control panels refer to the partial control panels 25 when generically named.

Figure 3 is a side view of the control panel 20, which is taken along the arrowed section line III-III of Figure 2 and shows the control panel 20 at a normal time when the elevator is operating. The construction of the control panel 20 will be described by referring to Figure 3 along with Figure 2.

The partial control panel 25-1 present in the highest tier is swingably engaged by a hinge metal fitting 26-1, at one end thereof on the shaft side wall 2 side, to the hanger plate 24. A hook 27-1 is swingably engaged at the other end of the partial control panel 25-1 and is engaged to a pin 23 which is implanted in the support arm 21. Thus the partial control panel 25-1 is horizontally laid by the hinge metal fitting 26-1 and the hook 27-1.

[0016] The other end of the partial control panel 25-2 is swingably engaged by a hinge metal fitting 26-2 to the other end of the partial control panel 25-1 present in the highest tier. A hook 27-2 is swingably attached to one end of this partial control panel 25-2, and is engaged to a pin 28-1 which is implanted in one end of the partial control panel 25-1. For this reason, the partial control panel 25-2 swings via the hinge metal fitting 26-2 and is horizontally laid, with the partial control panel 25-1 superposed thereon.

One end of the partial control panel 25-3 is swingably engaged by a hinge metal fitting 26-3 to one end of the partial control panel 25-2. A hook 27-3 is swingably attached to the end of this partial control panel 25-3, and is engaged to a pin 28-2 which is implanted in the other end of the partial control panel 25-2. For this reason, the partial control panel 25-3 swings via the hinge metal fitting 26-3 and is horizontally laid, with the partial control panel 25-2 superposed thereon.

That is, at a normal time when the elevator is operating, each of the partial control panels 25 is engaged to the support arm 21 and the hanger plate 24 attached to the shaft top portion in a stacked condition by being folded in a zigzag manner, with connections thereof bent.

[0017] Next, a description will be given of a method of suspending each of the folded partial control panels 25 to between the shaft side wall 2 and the car 10 on the basis of Figures 4 to 6.

As shown in Figure 4, in order to move the partial control panels 25 away from the shaft side wall 2, a maintenance person 30 detaches the hook 27-2 from the pin 28-1 and causes the partial control panels 25-2 and 25-3 to swing via the hinge metal fitting 26-2.

Next, as shown in Figure 5, the maintenance person 30 detaches the hook 27-3 from the pin 28-2 and causes a roller 29 to move onto the car 10. Furthermore, after the removal of the hook 27-1 from the pin 23, the maintenance person 30 causes the car 10 to descend. With the car 10 descending, the partial control panel 25-1 swings via the hinge metal fitting 26-1 and as shown in Figure 6, each of the partial control panels 25 is suspended to between the shaft side wall 2 and the car 10. At this time, the hook 27-1 is engaged to the pin 28-2 and the hook 27-2 is engaged to the pin 28-3. The maintenance person 30 causes the car 10 to ascend and descend, with the partial control panels 25 suspended, approaches target positions and performs maintenance and inspection.

[0018] Next, the above-described operation is reversed in causing the suspended partial control panels 25 in a zigzag folded condition to be engaged to the support arm 21 and hanger plate 24 which are attached to the shaft top portion.

That is, the partial control panel 25-3 present in the lowest position is moved onto the car 10. The car-station operation switch 12 is operated to ascend the car 10, whereby the roller 29 is caused to move onto the car 10. Furthermore, after the car 10 is caused to ascend and each of the partial control panels 25 is folded in a zigzag manner, the hook 27-1 is engaged to the pin 223, the hook 27-2 is engaged to the pin 28-1, and the hook 27-3 is engaged to the pin 28-2.

[0019] According to Embodiment 1 of the present invention described above, the elevator control panel 20 is constituted by the partial control panels 25 which are connected together in a column and, therefore, it is possible to easily increase and decrease the number of the partial control panels 25. For this reason, even when the quantity of control equipment which is housed differs from an elevator type to an elevator type, it is possible to easily adapt to this difference.

Also, since the control panel 20 is constituted by the multiple partial control panels 25, it is possible to improve the productivity of the control panel 20 by standardizing the partial control panels 25.

Furthermore, since the partial control panels 25 are suspended to between the shaft side wall 2 and the car 10 when inspection is performed, even when the partial control panels 25 are longitudinally developed in a wide range, it is possible for a maintenance person to easily

reach and inspect necessary places while standing in a fixed position on the car 10 by causing the car 10 to ascend and descend.
Furthermore, since the roller 29 of the partial control panel 25-3 is caused to move onto the car 10, by causing the car 10 to ascend and descend, it is possible to easily develop the folded partial control panels 25 and suspend the partial control panels 25 and to fold the partial control panels in a zigzag manner.

Embodiment 2

[0020] Figures 7 to 10 show Embodiment 2 of the present invention.
In Embodiment 2, guide rails are installed in a standing manner along a shaft side wall, the side of one ends of partial control panels is caused to engage with the guide rails, one end of a rope is caused to rise by being engaged to a partial control panel present in the lowest position, and is reversed by being wound on a pulley, and the other end is engaged to a weight, whereby a part of the weight of the partial control panels is canceled out thereby to bend and stretch the partial control panels.
That is, Figure 7 is a side view of an elevator control panel 20 in which partial control panels 25 are folded in a zigzag manner and stacked in four tiers, and corresponds to a sectional view taken along the arrowed section line VII-VII of Figure 8. Figure 8 is a sectional view taken along the arrowed section line VIII-VIII of Figure 7, and control equipment 42 is housed inside.
[0021] A bracket 35 is horizontally installed on a shaft side wall 2 in a protruding manner at a prescribed spacing and a control-panel guide rail 33 and a weight guide rail 34, the section of which is formed in the shape of the letter II, are attached in a pair to the bracket 35. A swing arm 39 which is bent in crank shape is installed in a protruding manner on both side surfaces of a partial control panel 25-1 present in the highest tier on the shaft end portion 2 side and swingably supported on the control-panel guide rail 33. An engaging arm 40-2 which is bent in crank shape is attached to both side surfaces of a partial control panel 25-2 of the next tier on the shaft side wall 2 side, and a rotatable roller 41-2 is attached to an end of the engaging arm 40-2. This roller 41-2 engages with a groove of the control-panel guide rail 33. Similarly, an engaging arm 40-4 is attached also to a partial control panel 25-4 present in the lowest tier, and a rotatable roller 41-4 is attached to an end of the engaging arm 40-4. This roller 41-4 engages with the groove of the control-panel guide rail 33.
A weight 37 engages with the weight guide rail 34 and moves up and down. A rope hitch plate 38 is installed in a protruding manner on the partial control panel 25-4 present in the lowest tier toward the shaft side wall 2 side. The weight guide rail 34 and the rope hitch plate 38 are connected by a rope 36, which is wound on a pulley 32 attached to a cross beam 7 via a mounting plate 31 and suspended. That is, the weight 37 cancels out the weight of the partial control panels 25.
[0022] At a normal time when the elevator is operating, the weight 37 descends and the partial control panels 25 are folded in a zigzag manner. The partial control panel 25-1 present in the highest tier is horizontally laid, with one end thereof engaged to the control-panel guide rail 33 via the swing arm 39, and the other end engaged to a support arm 21 via a hook 27-1 and a pin 23. Each of the partial control panels 25 following the one in the highest tier is folded in a zigzag manner and stacked by bending connections, and housed in the shaft top portion, each with a hook 27 engaged to a pin 28 of the partial control panel 25 immediately above the partial control panel 25 in question.
[0023] Next, a description will be given of a method of suspending each of the folded and stacked partial control panels 25 to between the shaft side wall 2 and the car 10 on the basis of Figures 9 and 10.
As shown in Figure 9, a maintenance person 30 detaches each of the hooks 27-1 to 27-4 respectively from the pins 23, 28-1 to 28-3.
The partial control panel 25-1 swings via the swing arm 39 and suspends. The partial control panel 25-2 in the next tier suspends by being guided by the control-panel guide rail 33. Similarly, the partial control panel 25-4 in the lowest tier suspends also by being guided by the control-panel guide rail 33. The partial control panel 25-3 suspends also by being guided by the control-panel guide rail 33 via the engaging arm 40-2 of the partial control panel 25-2. The weight 37 rises gradually by the suspension of the partial control panels 25.
[0024] When each of the partial control panels 25 suspends and extends from a zigzag bent condition to a straight condition, as shown in Figure 10, the hook 27-1 is engaged to the pin 28-2, the hook 27-2 is engaged to the pin 28-2, and the hook 27-3 is engaged to the pin 28-4. As a result of this engagement, each of the partial control panels 25 is engaged to the control-panel guide rail 33 via the swing arm 39 and an engaging arm 40 and is suspended to between the car 10 and the shaft side wall 2.
The maintenance person 30 approaches target places of the partial control panels 25 which suspend vertically by causing the car 10 to ascend and descend, and performs maintenance and inspection.
[0025] Next, in order to zigzag bend and stack each of the suspended partial control panels 25, in Figure 10, the hooks 27-1, 27-2 and 27-3 are respectively detached from the pins 28-2, 28-3 and 28-4 and bent as shown in Figure 9. Furthermore, hinge metal fittings 26-2, 26-3 and 26-4 which respectively connect the partial control panels 25 are bent. Finally, as shown in Figure 7, the hooks 27-1, 27-2, 27-3 and 27-4 are respectively engaged to the pins 23, 28-1, 28-2 and 28-3, and each of the partial control panels 25 is stacked and housed in a top gap 4.
[0026] Also in Embodiment 2 described above, in the same way as with Embodiment 1, it is possible to easily adapt to a difference in the quantity of the control equip-

ment 42 which is housed.
Also, it is possible to improve the productivity of the control panel 20 by standardizing the partial control panels 25.
Furthermore, even when the partial control panels 25 are longitudinally developed in a wide range, it is possible for a maintenance person to easily reach and inspect necessary places while standing in a fixed position on the car 10 by causing the car 10 to ascend and descend. Since particularly the partial control panels 25 are bent and stretched by being guided by the control-panel guide rail 33 and the weight is canceled out by the weight 37, the stretching and bending work of the partial control panels 25 is easily performed.

Embodiment 3

[0027] Figures 11 to 13 show Embodiment 3 of the present invention.
Figure 11 is a side view of an elevator control panel in which a housing 51 is attached to a shaft ceiling 3 by anchor bolts 52, with an opening thereof facing downward. At a normal time, the opening of the housing 51 is closed by a lid body 53, which is swingably attached via a hinge metal fitting 54, and securely tightened by a bolt 55. Control equipment 42 is attached to the lid body 53.
Figure 12 shows how the lid body 53 swings by the removal of the bolt 55 in a half-open condition.
Figure 13 shows how the lid body 53 further swings and suspends along a shaft side wall 2 via the hinge metal fitting 54. The control equipment 42, which is attached to the lid body 53, is exposed.
Also in Embodiment 3 described above, the control equipment 42 is suspended while being attached to the lid body 53, thereby making it easy to perform maintenance and inspection work.

Embodiment 4

[0028] Figures 14 to 16 show Embodiment 4 of the present invention.
Figure 14 is a side view of an elevator control panel 20 in which partial control panels 62-1, 62-2 and 62-3 are stacked in a horizontally laid condition and engaged to a shaft ceiling 3.
A hanger plate 61 which suspends along a shaft side wall 2 is attached to the shaft ceiling 3 by anchor bolts 52. The partial control panel 62-1 is horizontally laid, with one end of the partial control panel 62-1 swingably attached to the hanger plate 61 via a hinge metal fitting 63-1 and at the other end of the partial control panel 62-1, a hook 66 engaged to a pin 65 which is provided in a protruding manner from a hanging metal fitting 64 suspended from the shaft ceiling 3. The other end of the partial control panel 62-1 is attached to a hinge metal fitting 63-2. The other end of the partial control panel 62-2 is attached to this hinge metal fitting 63-2, and the partial control panel 62-2 is horizontally laid, above the partial control panel 62-1 with a prescribed spacing. On end of the partial control panel 62-2 is attached to a hinge metal fitting 63-3. This hinge metal fitting 63-3 is attached to one end of the partial control panel 62-3, and the partial control panel 62-3 is horizontally laid between the partial control panel 62-1 and the partial control panel 62-2 and spaced from the partial control panel 62-1 by a spacer 67.
[0029] Figure 15 is a side view which shows how the partial control panels 62 which are horizontally laid in a stacked condition and engaged to the shaft ceiling 3 are being suspended along the shaft side wall 2.
That is, the hinge metal fitting 63-1 is swung in the arrowed direction as shown in the figure (clockwise direction) by disengaging the hook 66 and the pin 65, and the partial control panels 62 are suspended in a stacked condition. Next, the hinge metal fitting 63-2 is swung in the arrowed direction as shown in the figure and reversed. Furthermore, the hinge metal fitting 63-3 is swung in the arrowed direction as shown in the figure and reversed. As described above, by swinging the hinge metal fittings 63-1 to 63-3 clockwise as illustrated in the figure, the partial control panels 62-1 to 62-3 are suspended along the shaft side wall 2.
[0030] Figure 16 shows the partial control panels 62-1 to 62-3 suspended along the shaft side wall 2. A maintenance person 30 approaches target places of the partial control panels 25 which have been vertically suspended by causing a car 10 to ascend and descend by the operation of a car-station operation switch 12 and performs maintenance and inspection.
[0031] Next, in order to cause the suspended partial control panels 62-1 to 62-3 to be stacked and to house the partial control panels 62-1 to 62-3 in a horizontally laid condition in the shaft top portion as shown in Figure 14, first, the partial control panel 62-3 is reversed anticlockwise and caused to superpose on the partial control panel 62-2 above the partial control panel 62-3 and adjacent thereto. Furthermore, the partial control panel 62-2 and the partial control panel 62-3 in a stacked condition are reversed anticlockwise and caused to superpose on the partial control panel 62-1 above the partial control panel 62-2 and the partial control panel 62-3 and adjacent thereto. That is, the condition shown in Figure 15 is produced. The stacked partial control panels 62-1 to 62-3 are horizontally laid in the condition shown in Figure 14 and housed in the shaft top portion.
That is, the multiple partial control panels 62 are swingably connected to each other by the hinge metal fittings 63. During inspection, as shown in Figure 16, the partial control panels 62 are suspended to between a shaft side wall 2 and a car 10 and opened, and at a normal time when the elevator is operating, the partial control panel 62-3 suspended in the lowest position during inspection is reversed by bending the hinge metal fittings 63 and superposed on the partial control panel 62-2 suspended in a position just above the partial control panel in the lowest position and adjacent thereto. The partial control panels are sequentially reversed in the same direction

and superposed on the partial control panel 62-1 in the highest position, then horizontally laid by being engaged to the hanging metal fitting 64 and housed in the shaft top portion.

[0032] Also in Embodiment 4 described above, in the same way as with Embodiment 1, it is possible to easily adapt to a difference in the quantity of the control equipment 42 which is housed.

Also, it is possible to improve the productivity of the control panel 20 by standardizing the partial control panels 62.

Furthermore, even when the partial control panels 62 are longitudinally developed in a wide range, it is possible for a maintenance person to easily reach and inspect necessary places while standing in a fixed position on the car 10 by causing the car to ascend and descend.

Since particularly the partial control panels 62 are stacked by being reversed in the same direction, it is possible to stack the partial control panels 62 by anticlockwise reversing the partial control panels 62 one by one and also it is possible to extend the stacked partial control panels 62 by clockwise reversing the partial control panels 62 one by one. Therefore, it is easy to extend and stack the partial control panels 62. Embodiment 5

[0033] Figures 17 to 19 show Embodiment 5 of the present invention.

Figure 17 is a side view of an elevator control panel in a completely open condition in Embodiment. Figure 18 is a front view of the elevator control panel, which is taken along the arrowed line XVIII- XVIII of Figure 17. Figure 19 is a plan view of the elevator control panel, which is taken along the arrowed line XIX-XIX of Figure 18.

A bottom plate 72 of a housing 71 is attached to a shaft ceiling 3 by anchor bolts 52. A lid body 73 is swingably attached to the housing 71 by a hinge metal fitting 74 so as to open and close an opening of the housing 71. At a normal time, the lid body 73 closes the opening by being securely tightened by a bolt 55.

[0034] A first side plate 75 is provided in a standing manner on one side of the inner face of the lid body 73. A first mounting plate 77 which is bent in the shape of the letter L is swingably attached to this first side plate 75 by a hinge metal fitting 76. For this reason, the first mounting plate 77 is spaced from the inner face of the lid body 73 by a first prescribed spacing, which is the size of the first side plate 75 as provided in a standing manner. A second side plate 78 which protrudes more than the first side plate 75 is provided in a standing manner on the other side of the inner face of the lid body 73. A second mounting plate 80 which is bent in the shape of the letter L is swingably attached to this second side plate 78 by a hinge metal fitting 79. For this reason, the second mounting plate 80 is spaced from the inner face of the lid body 73 by a second prescribed spacing, which is the size of the second side plate 78 as provided in a standing manner, and opposed to the inner face of the lid body 73 via the first mounting plate 77.

That is, the inner face of the lid body 73, the first mounting plate 77 and the second mounting plate 80 are mutually spaced and control equipment 42 is attached each to the inner face of the lid body, the first mounting plate and the second mounting plate. Therefore, as shown in Figure 19, by opening the lid body 73, by opening the first mounting plate 77 and by opening the second mounting plate 80, the control equipment 42 is exposed along a shaft side wall 2.

[0035] Also in Embodiment 5 described above, the control equipment 42 is attached each to the lid body 73, the first mounting plate 77 and the second mounting plate 80 and during maintenance and inspection, the control equipment is opened and exposed. Therefore, a maintenance person can easily reach target control equipment 42 from a car 10. Particularly, because the control equipment 42 can be attached to many surfaces, the present invention can be used also in an elevator provided with many pieces of control equipment 42.

Embodiment 6

[0036] Figures 20 to 22 show Embodiment 6 of the present invention.

Figure 20 is a side view of a control panel 20 which is stacked in a folded condition and housed in a top gap 4 of a shaft 1, the figure corresponding to Figure 3. Figure 21 is a side view of the control panel 20 which shows the condition in which each of stacked partial control panels 25 is being suspended to between a shaft side wall 2 and a car 10. Figure 22 is a side view of the elevator control panel 20 in a completely suspended condition.

[0037] In Figure 20, a hanger plate 61 and a hanging metal fitting 64 are attached to a shaft ceiling 3 by anchor bolts 52. One end of a partial control panel 25-1 in the highest tier on the shaft side wall 2 side is swingably engaged to the hanger plate 61 by a hinge metal fitting 26-1. A hook 27-1 is swingably engaged to the other end of the partial control panel 25-1 and is engaged to a pin 65 implanted in a hanging metal fitting 64. That is, the partial control panel 25-1 is horizontally laid by the hinge metal fitting 26-1 and the hook 27-1.

[0038] As with Embodiment 1, the other end of the partial control panel 25-2 is swingably engaged to the other end of the partial control panel 25-1 by a hinge metal fitting 26-2. A hook 27-2 is swingably attached to one end of the partial control panel 25-2 and is engaged to a pin 28-1 implanted in one end of the partial control panel 25-1. For this reason, the partial control panel 25-2 swings via the hinge metal fitting 26-2 and horizontally laid, with the partial control panel 25-1 superposed thereon.

Similarly, the partial control panel 25-3 is engaged to the partial control panel 25-2 by a hinge metal fitting 26-3 and a hook 27-3 and horizontally laid, with the partial control panel 25-2 superposed thereon. The partial control panel 25-4 is engaged to the partial control panel 25-3 by a hinge metal fitting 26-4 and a hook 27-4 and horizontally laid, with the partial control panel 25-3 su-

perposed thereon.

[0039] A handle 91-1 is attached to a side surface of the partial control panel 25-1. This handle 91-1 is constituted by an arm 93 which is swingably supported on the above-described side surface by a pivot shaft 92 and a grip 94 which is provided in a protruding manner in an end portion of the arm 93. When the partial control panel 25-1 is horizontally laid, the handle 91-1 is suspended. A stopper 95 is firmly fixed to the side surface of the partial control panel 25-1. This stopper abuts against the arm 93 and controls swing when the arm 93 has turned toward the longitudinal direction of the partial control panel 25-1, that is, when the grip 94 has moved in the direction in which the arm 93 moves away from the hinge metal fitting 26-1.

A handle 91-3 of the same construction is attached also to the partial control panel 25-3.

A handle 91-2 is attached to a side surface of the partial control panel 25-2. This handle 91-2 is constituted by an arm 93 which is rotatably supported by a stationary shaft 93 and a grip 94 which is provided in a protruding manner in an end portion of the arm 93. The arm 93 is provided in a protruding manner in a direction orthogonal to the longitudinal direction of the partial control panel 25-2, and the handle 91-2 faces downward when the partial control panel 25-2 is horizontally laid.

[0040] Next, a description will be given of a method of suspending each of the folded and stacked partial control panels 25 to between the shaft side wall 2 and the car 10 on the basis of Figures 21 and 22.

Also in Embodiment 6, in the same way as with Embodiment 1, a maintenance person 30 first pushes the handle 91-2 toward the shaft side wall 2 and detaches the hook 27-2 from the pin 28-1, and as shown in Figure 3, causes the partial control panels 25-2, 25-3 and 25-4 to swing, via the hinge metal fitting 26-2, in the direction in which the partial control panels 25-2, 25-3 and 25-4 move away from the shaft side wall 2.

Next, the hook 27-4 and the pin 28-3 are disengaged and a roller 29 is caused to move onto the car 10. Furthermore, the handle 91-3 is caused to abut against the stopper 95, the partial control panel 25-3 is raised and the hook 27-3 is engaged to the pin 28-2. Lastly, the handle 91-1 is caused to abut against the stopper 95, the partial control panel 25-1 is raised, the hook 27-1 and the pin 65 are disengaged, and as shown in Figure 21, the partial control panels 25 in a bent condition are placed onto the car 10.

[0041] By causing the car 10 to descend, the bent partial control panels 25 are caused to extend. First, by operating the handle 91-2, the partial control panel 25-2 is caused to swing and the hook 27-1 is engaged to the pin 28-2. By similarly operating the handle 91-2, the partial control panel 25-2 is caused to swing and the hook 27-2 is engaged to pin 28-3. Then, the partial control panels 25-1, 25-2 and 25-3 are caused to extend in a line.

Furthermore, the car 10 is caused to descend and at the same time, the partial control panels 25 are caused to gradually approach the shaft side wall 2 by grasping the handle 91-3. When the roller 29 has left the car 10, the hook 27-3 is engaged to the pin 28-4. As a result of this engagement, the partial control panels 25 extend in a line and are suspended to between the shaft side wall 2 and the car 10. In this state, the operator 30 causes the car 10 to ascend and descend and performs the inspection work of target control equipment 42.

[0042] Next, the above operation is reversed in folding the suspended partial control panels 25 in a zigzag manner and housing the suspended partial control panels 25 in the shaft top portion as shown in Figure 20.

That is, the partial control panels 25 are drawn onto the car 10 by grasping the handle 91-3, and the hook 27-3 and the pin 28-4 are disengaged. The car 10 is caused to ascend, the roller 29 is caused to move onto the car 10, and the partial control panel 25-4 is bent.

Next, by operating the handle 91-2, the hook 27-2 and the pin 28-3 are disengaged and the hook 27-1 and the pin 28-2 are disengaged. By causing the car 10 to ascend, the partial control panel 25-3 and the partial control panel 25-2 are bent. By drawing the handle 91-2 or the handle 91-1 to the center side of the shaft 1, the partial control panel 25-2 and the partial control panel 25-1 are bent and come to the state shown in Figure 21.

[0043] In Figure 21, the partial control panel 25-1 is raised by grasping the handle 91-1 and the hook 27-1 is engaged to the pin 65. Next, the hook 27-2 of the partial control panel 25-2 is engaged to the pin 28-1 by pushing the handle 91-2 toward the shaft side wall 2 side. Furthermore, the partial control panel 25-3 is raised by grasping the handle 91-3 and the hook 27-3 is engaged to the pin 28-2. Lastly, the hook 27-4 is engaged to the pin 28-3. That is, the partial control panels 25 are bent and folded in a zigzag manner and housed in the shaft top portion.

[0044] Also in Embodiment 6 described above, in the same way as with Embodiment 1, it is possible to easily adapt to a difference in the quantity of the control equipment 42 which is housed. Also, the partial control panels 25 may be standardized. Further, by moving the car 10 up and down, any control equipment can be easily reached and inspected.

Since particularly the handle 91 is attached to the partial control panels 25, it is possible to easily fold the partial control panels 25 in a zigzag manner and to cause the partial control panels 25 to expand.

Embodiment 6 described above corresponds to the case where the handle 91 is attached to the control panel 20 shown in Figure 3. However, also in a case where the handle 91 is attached to the control panel 20 shown in Figure 14, folding and expansion become similarly easy.

Industrial Applicability

[0045] As described above, the construction of the elevator control panel according to the present invention can be used in elevator control panels for which it is necessary to take measures to adapt to an increase or a

decrease in the quantity of control equipment to be housed.

Claims

1. An elevator control panel, wherein multiple partial control panels in which control equipment is housed are swingably connected to each other, wherein during inspection the partial control panels are suspended to between a shaft side wall and a car, and wherein at a normal time, the partial control panels are engaged to a top portion of the shaft in a stacked condition by being folded in a zigzag manner, with connections thereof bent.

2. The elevator control panel according to claim 1, wherein guide rails are installed in a standing manner along the shaft side wall, wherein the side of one ends of the partial control panels is caused to engage with the guide rails, wherein one end of a rope is caused to rise by being engaged to a partial control panel present in the lowest position, and is reversed by being wound on a pulley, and wherein the other end is engaged to a weight, whereby the weight of the partial control panels is canceled out.

3. An elevator control panel, wherein a housing is attached to a ceiling of a shaft, with an opening of the housing facing downward, wherein control equipment is attached to a lid body which is swingably attached to the housing and opens and closes the opening, and wherein at a normal time the lid body is closed and the control equipment is housed in the housing, whereas during inspection the lid body is swung and opened and the control equipment is exposed.

4. An elevator control panel, wherein multiple partial control panels in which control equipment is housed are swingably connected to each other, wherein during inspection the partial control panels are suspended to between a shaft side wall and a car, wherein at a normal time, a partial control panel suspended in the lowest position during inspection is reversed by bending connections and superposed on a partial control panel suspended in a position just above the partial control panel in the lowest position and adjacent thereto, and wherein the partial control panels are sequentially reversed in the same direction and superposed each on a partial control panel in the highest position, then horizontally laid and engaged to a top portion of a shaft in a stacked condition.

5. An elevator control panel, wherein a housing is attached to a ceiling of a shaft, with an opening of the housing facing downward, wherein the housing comprises a lid body which is swingably attached thereto and opens and closes the opening, a first mounting plate which is swingably attached to one side of an inner face of the lid body with a first prescribed spacing and is opposed to the inner face of the lid body, and a second mounting plate which is swingably attached to the other side of the inner face of the lid body with a second prescribed spacing larger than the first prescribed spacing and is opposed to the inner face of the lid body via the first mounting plate, and wherein control equipment is attached each to the inner face of the lid body, the first mounting plate and the second mounting plate.

6. An elevator control panel, wherein on a side surface of each of the partial control panels of the elevator control panel according to claim 1 or 4, a grip is provided in a protruding manner toward a direction parallel to a pivot shaft.

7. The elevator control panel according to claim 6, wherein the grip is attached to the side surface of the partial control panel via an arm, and wherein the arm reversely moves the grip by swing in a direction moving away from a spindle of the partial control panel.

Fig.1

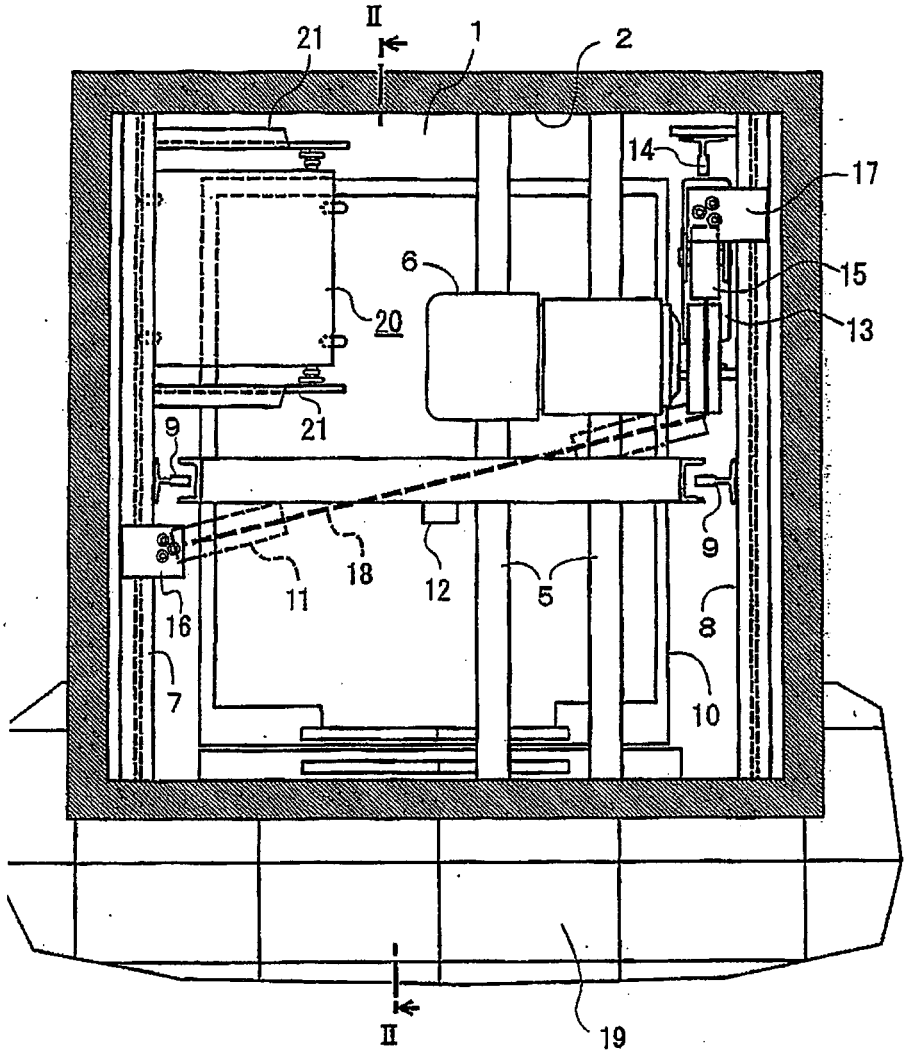

Fig.2

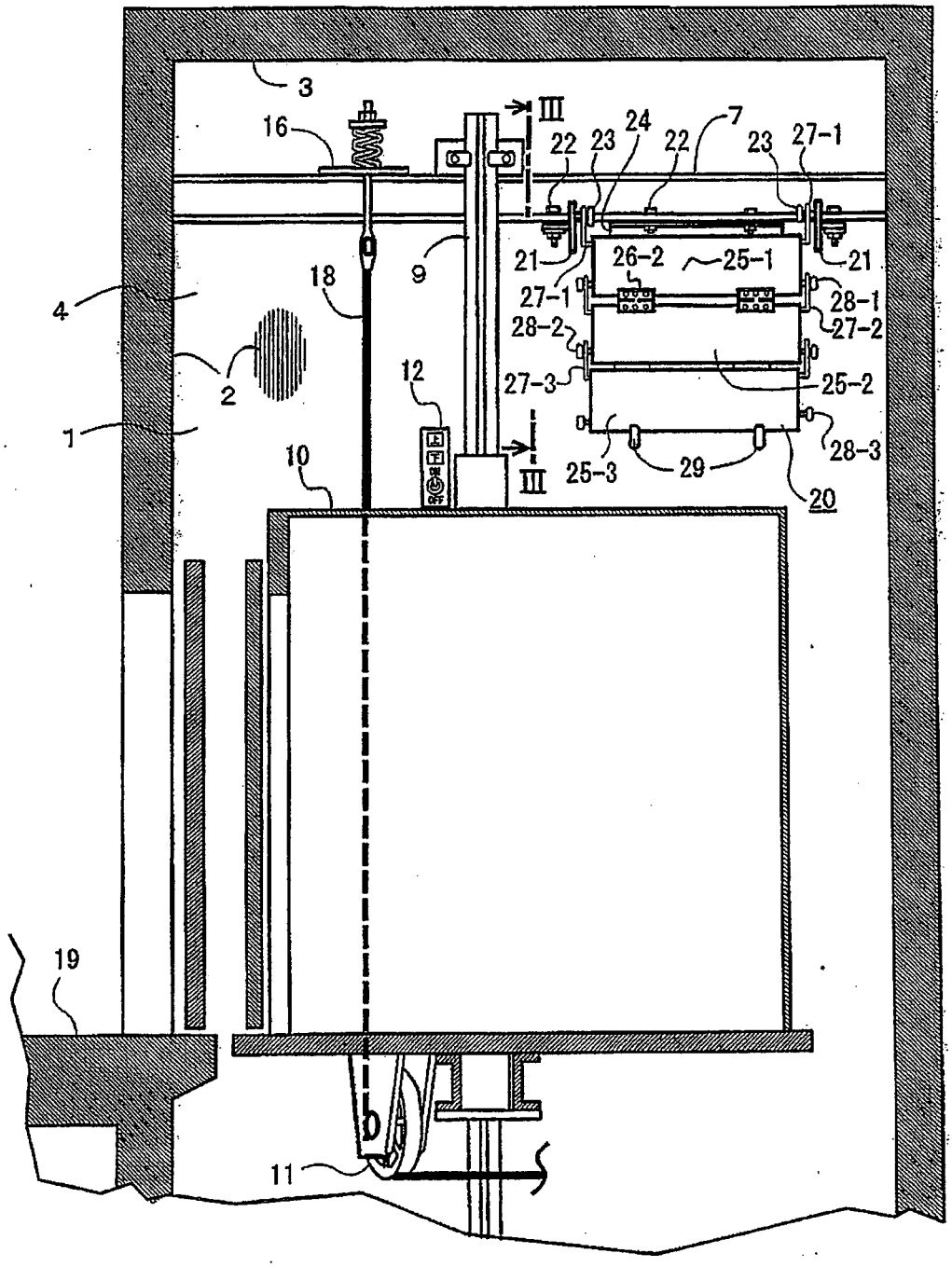
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Fig.3

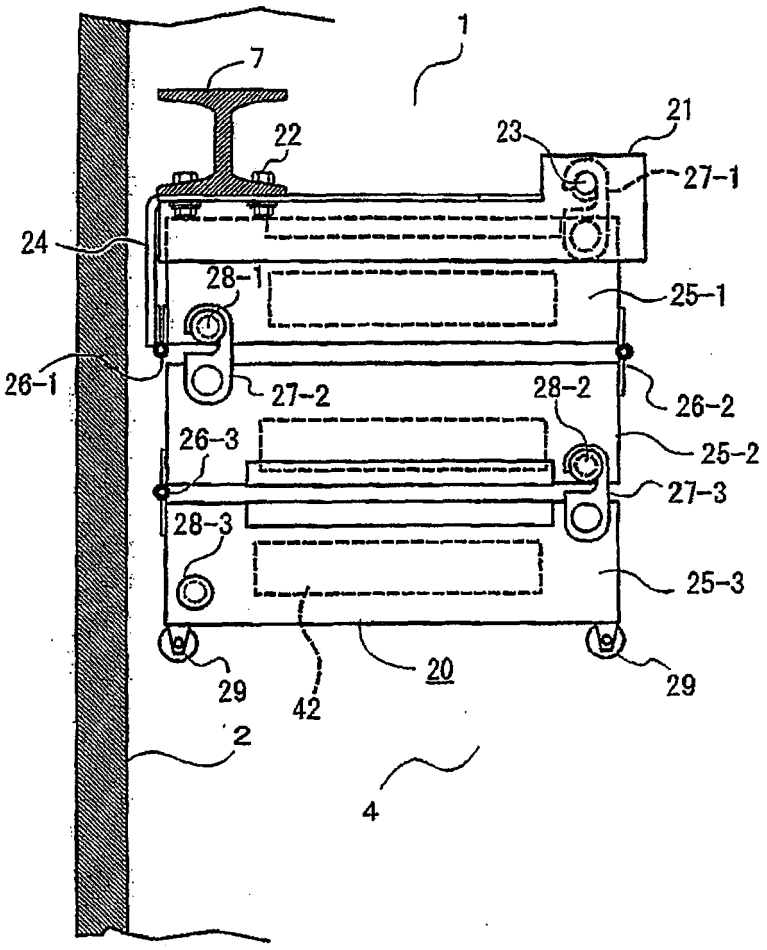
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Fig.4

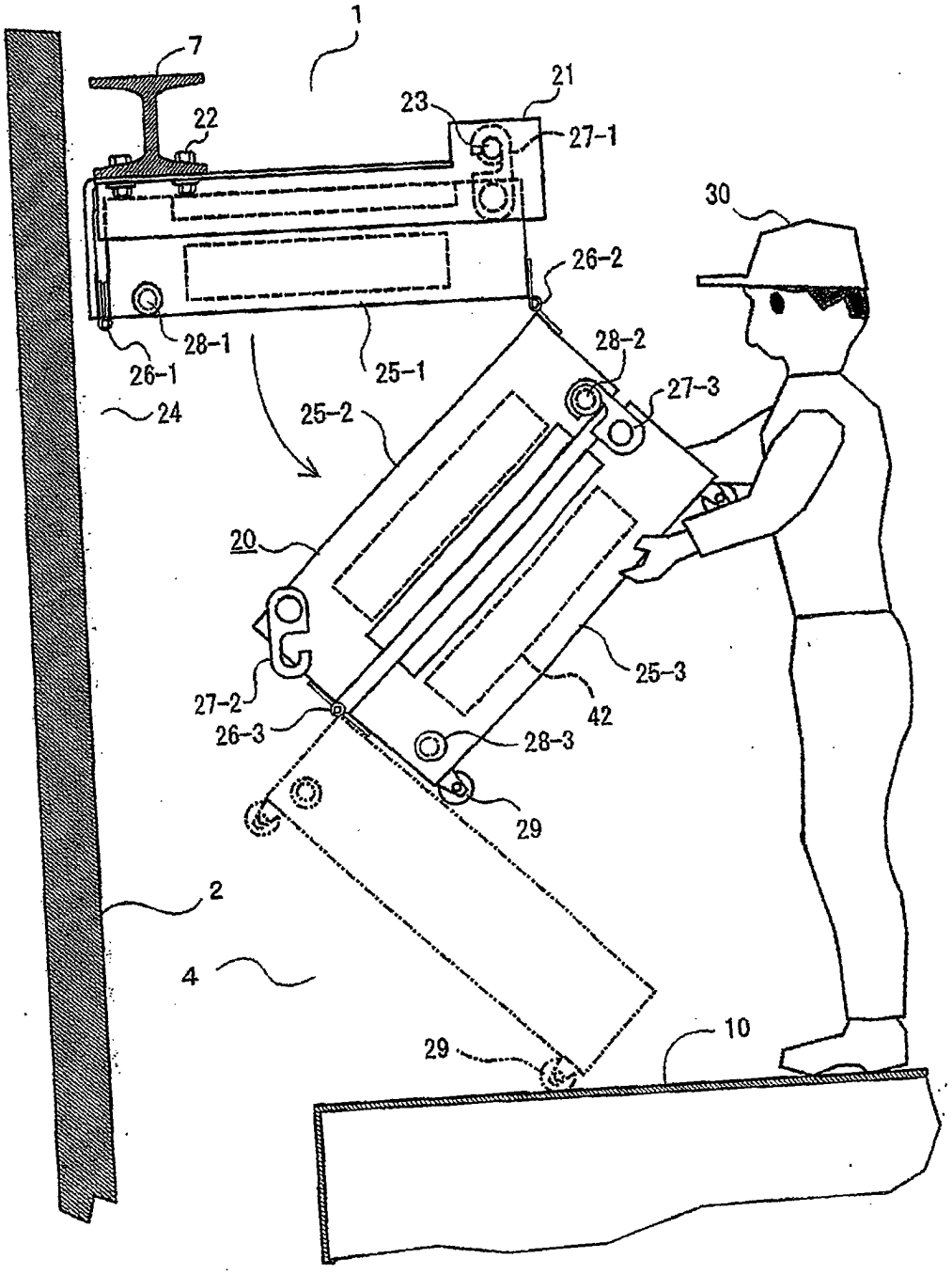
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Fig.5

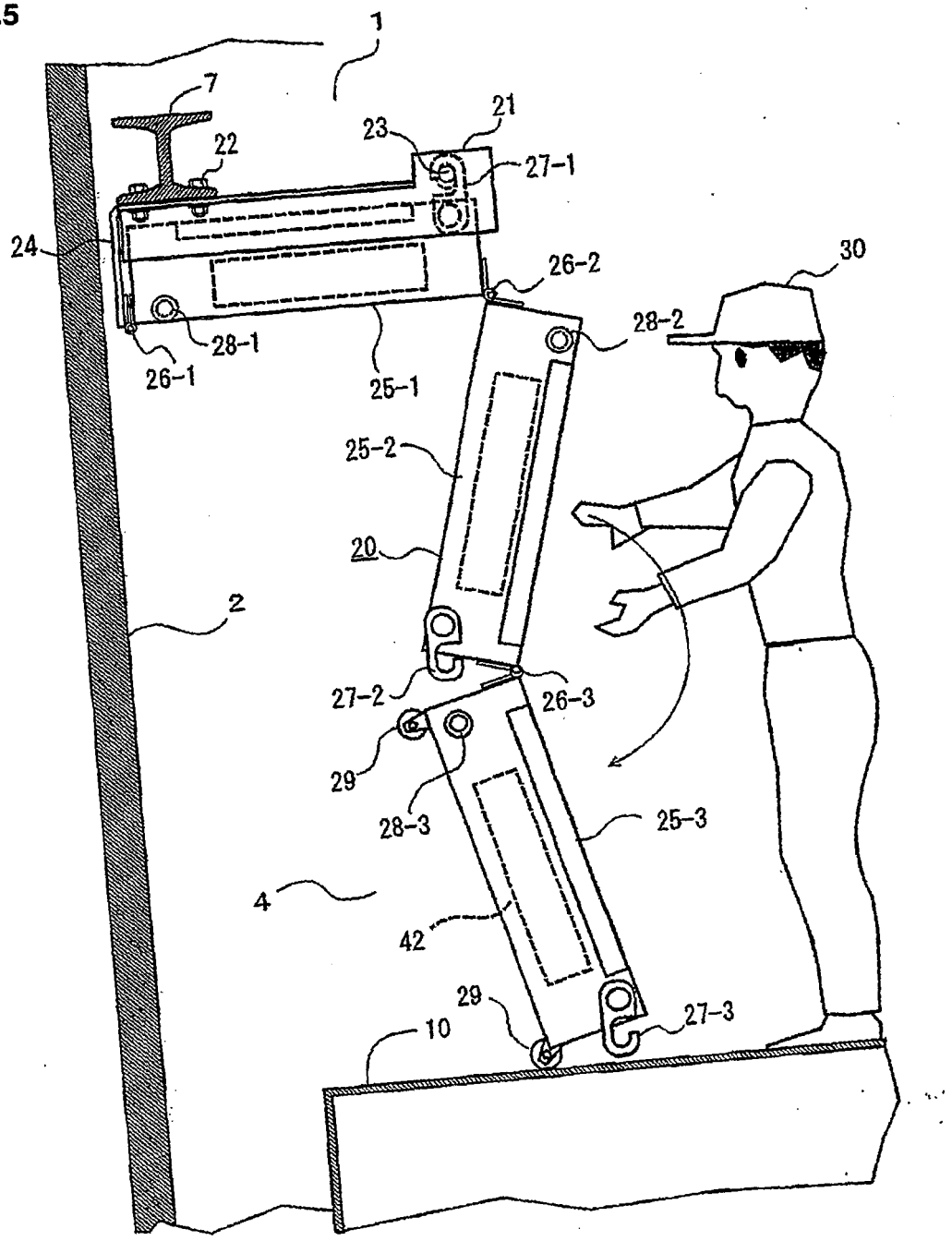
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Fig.6

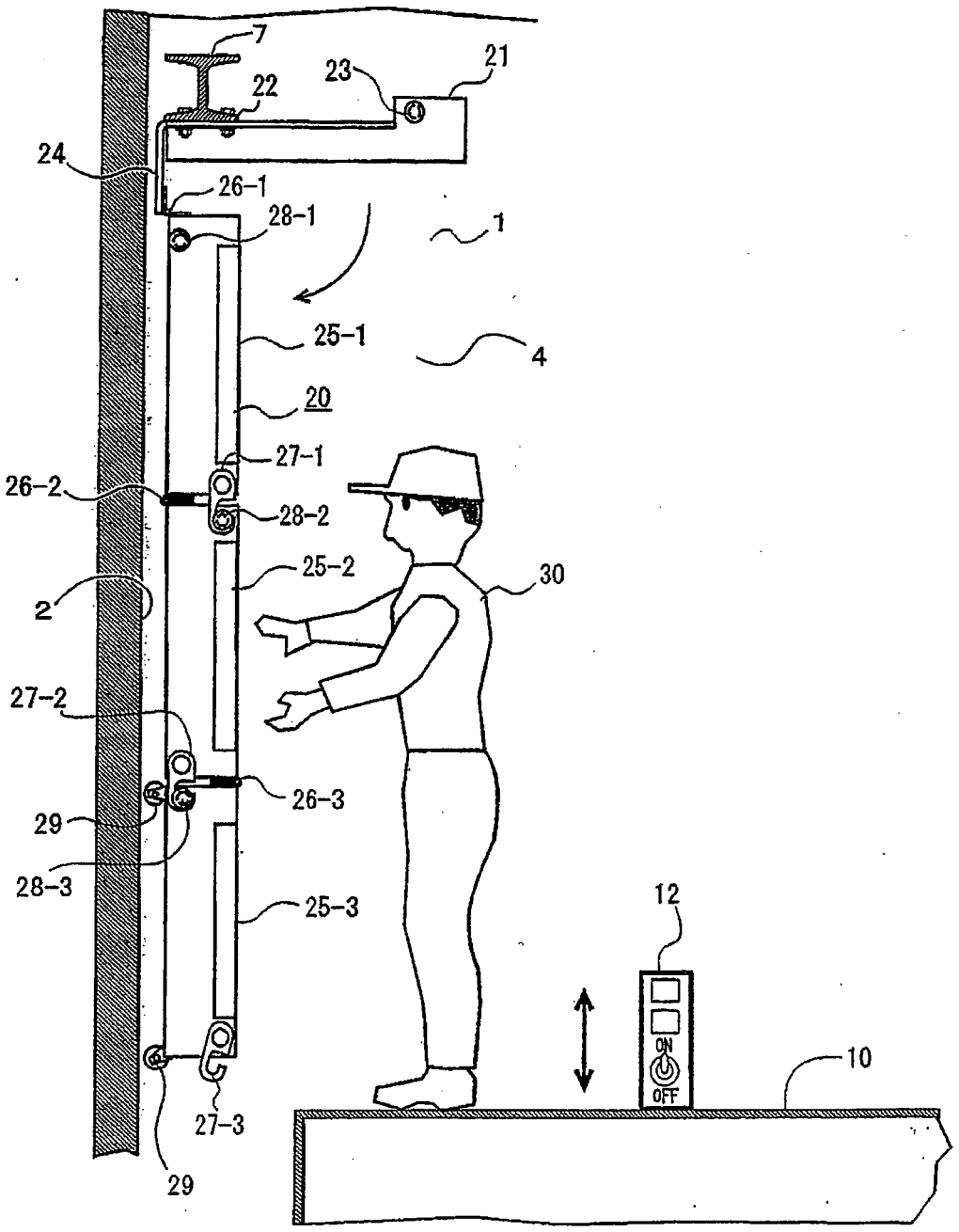
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Fig.7

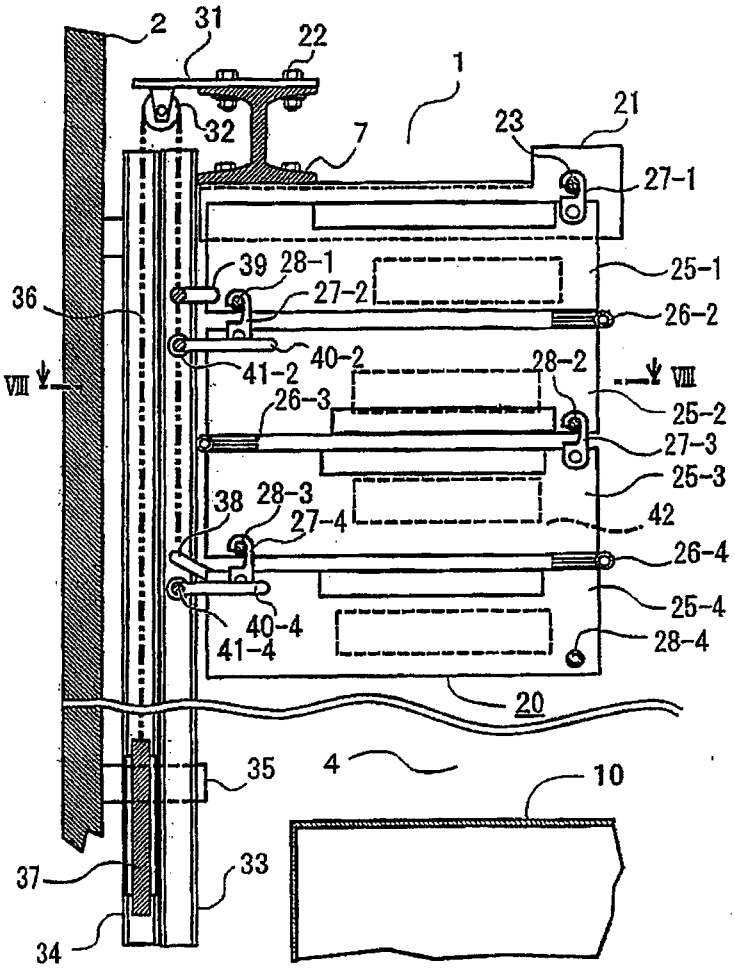
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Fig.8

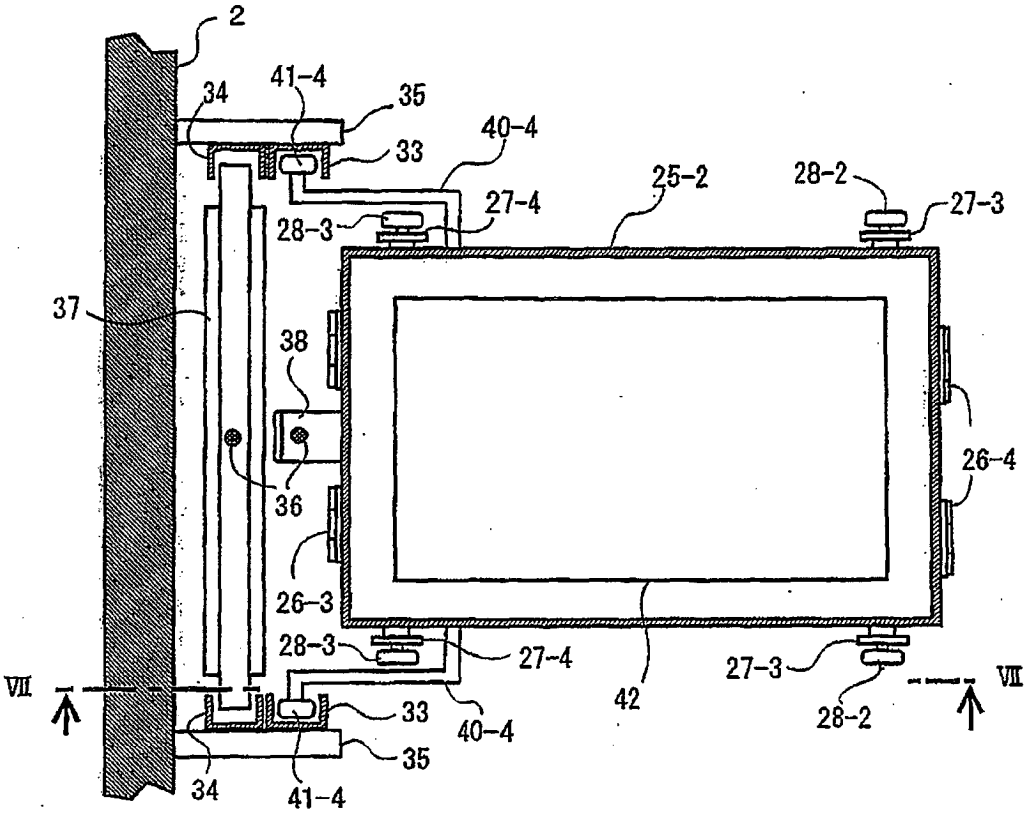
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Fig.9

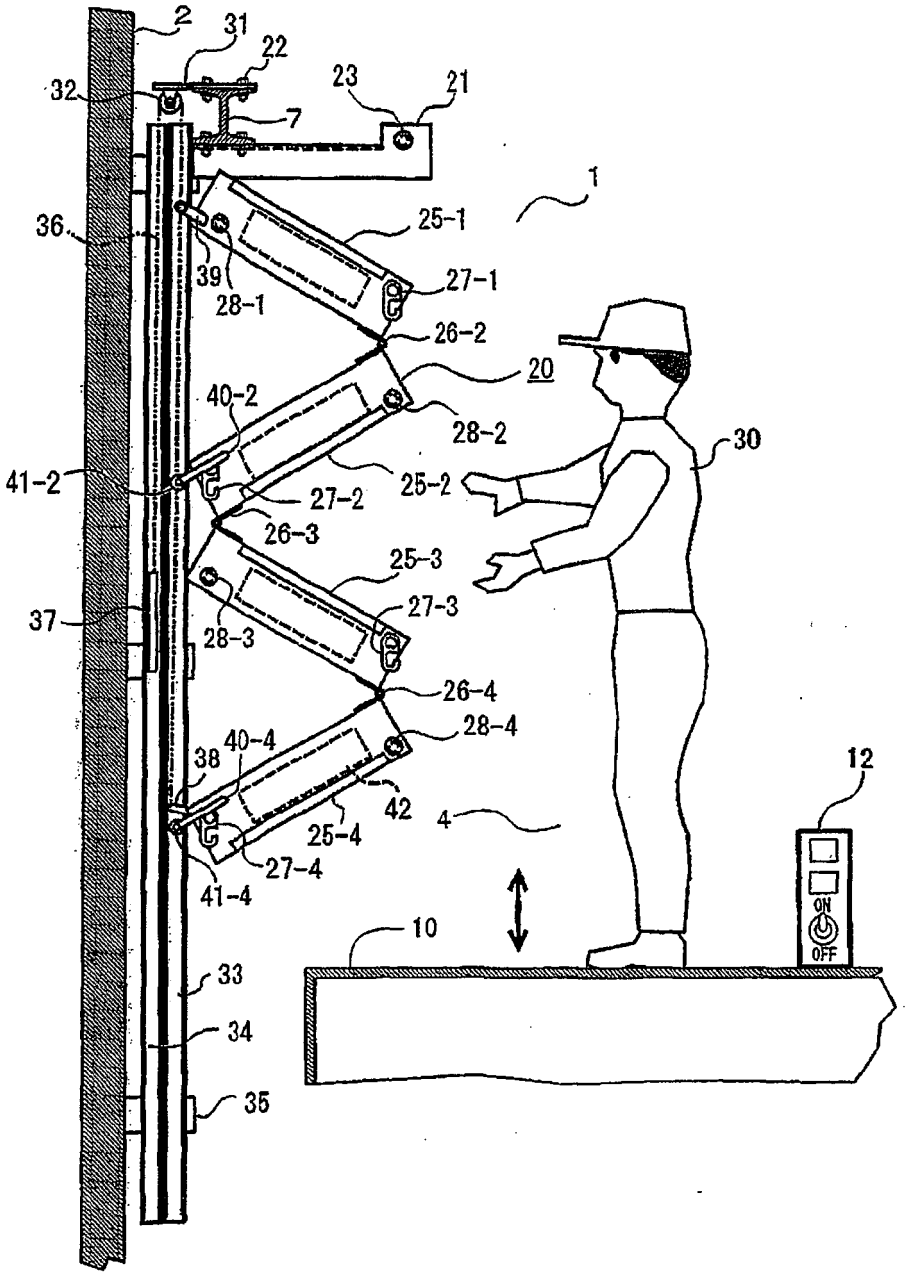
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Fig.10

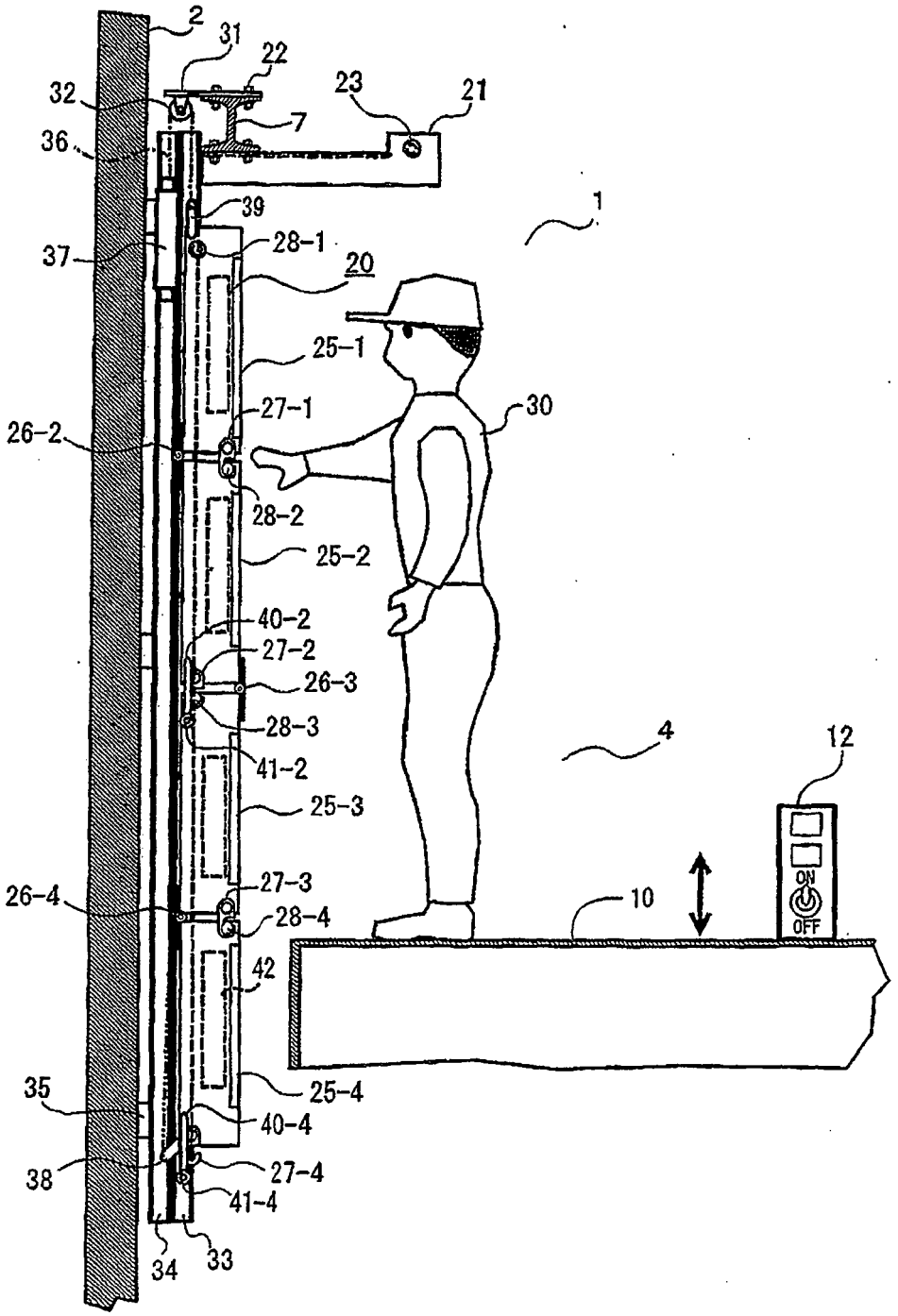
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Fig.11

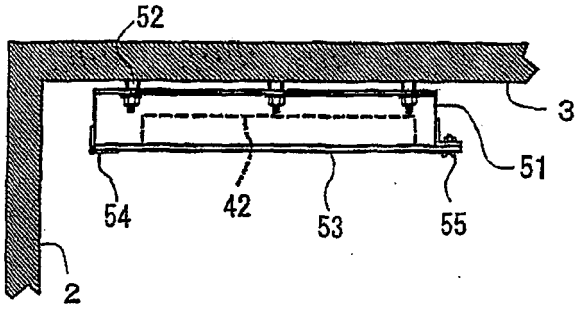

Fig.12

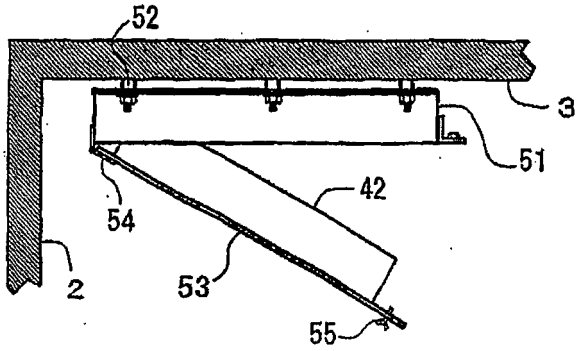

Fig.13

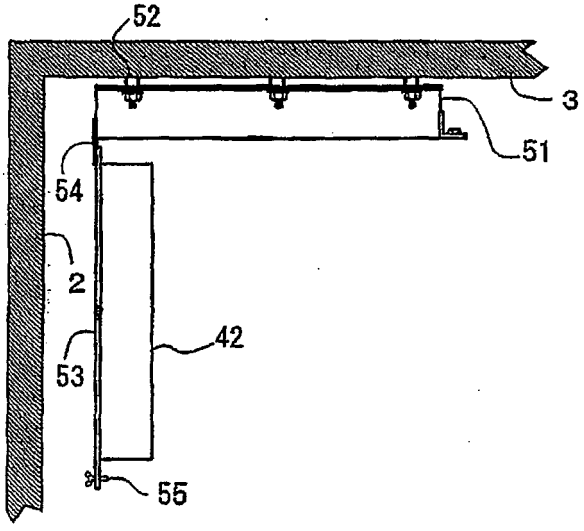

Fig.14

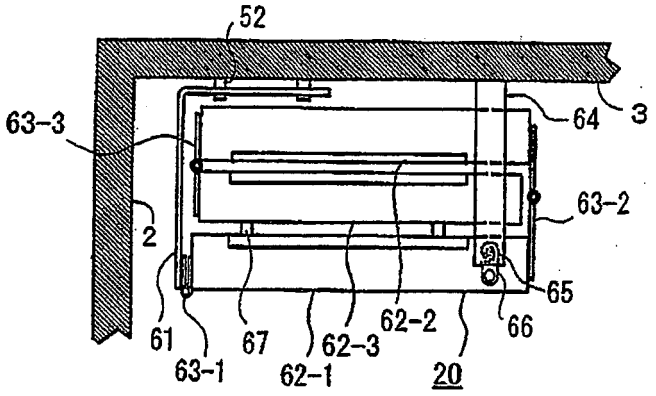
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Fig.15

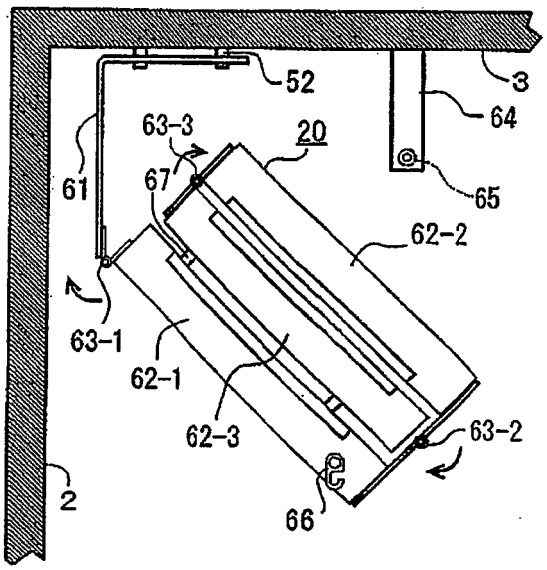
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Fig.16

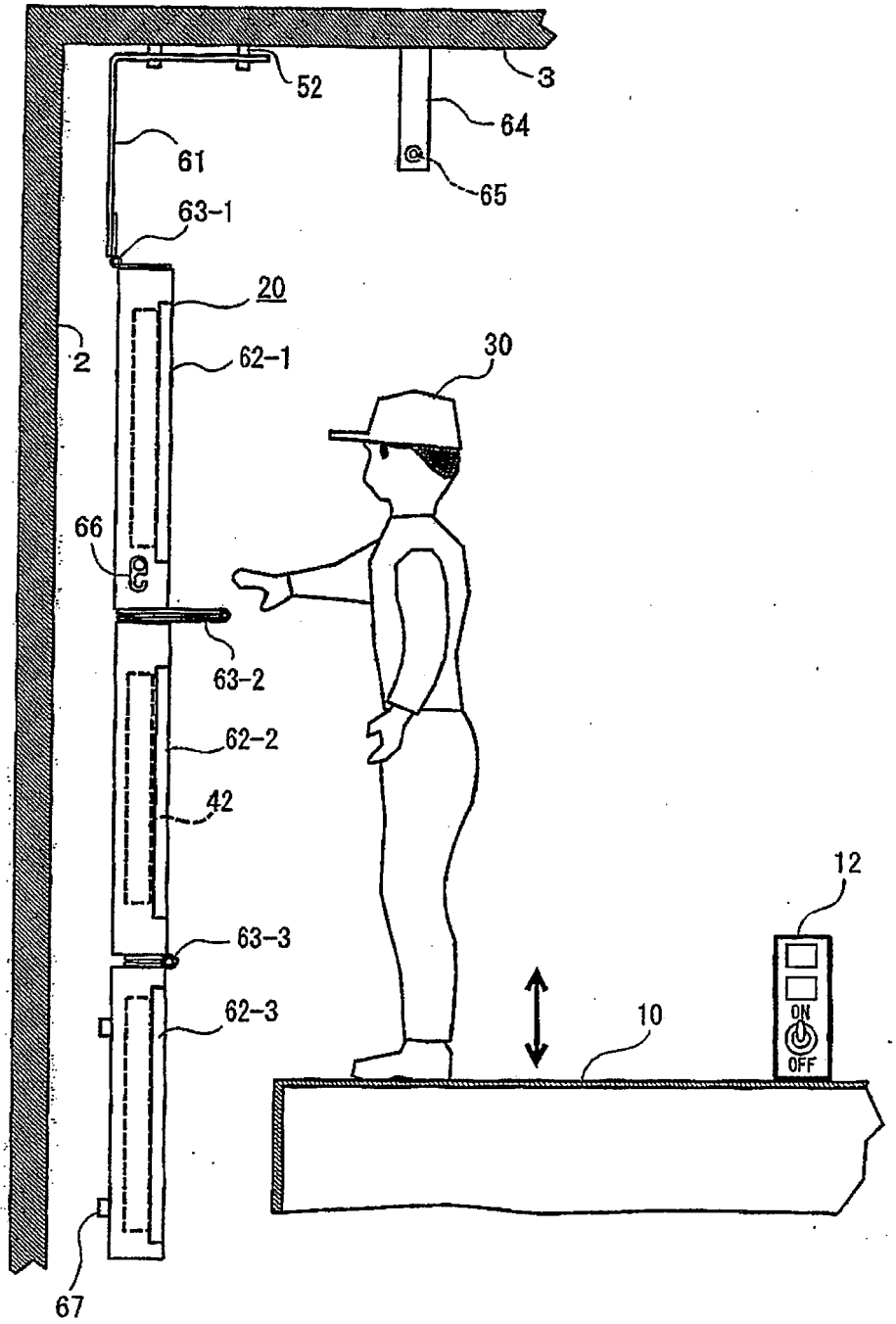

Fig.17

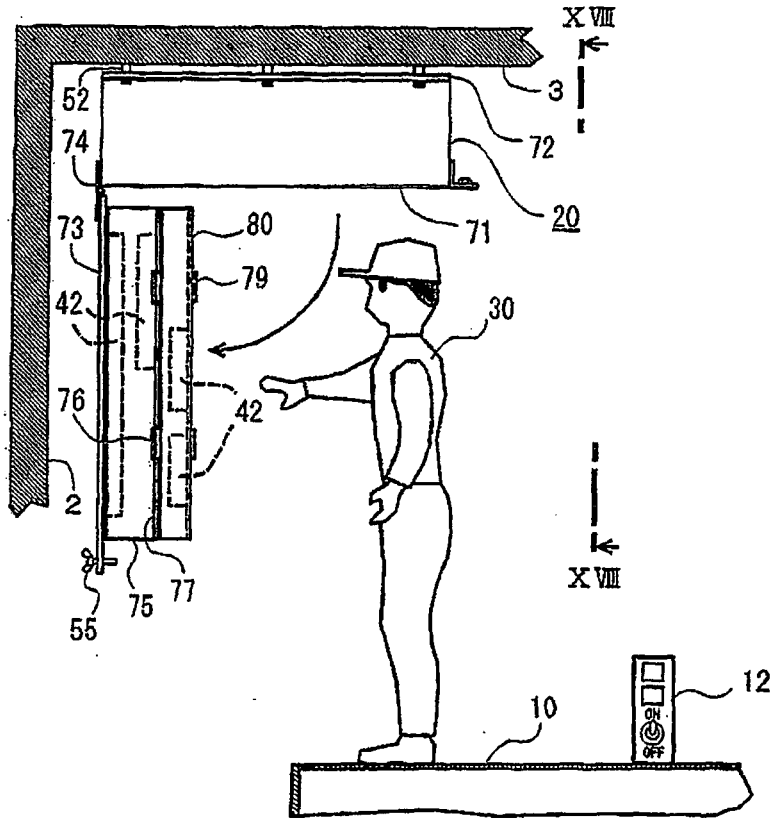
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Fig.18

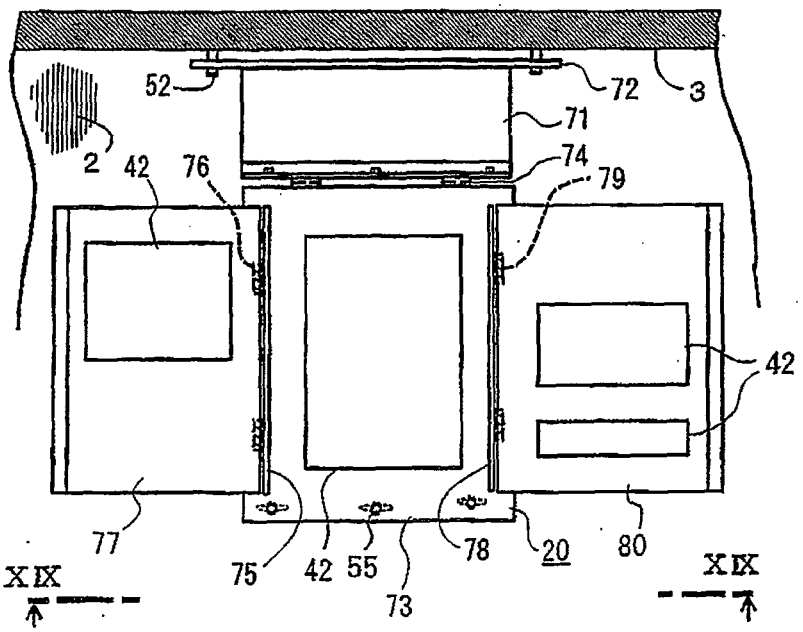
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Fig.19

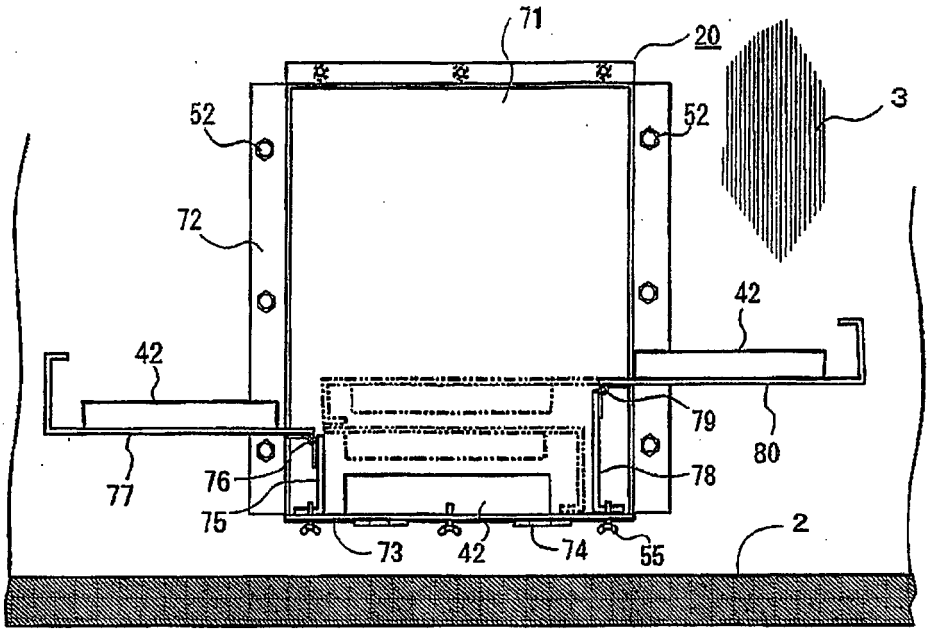
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Fig.20

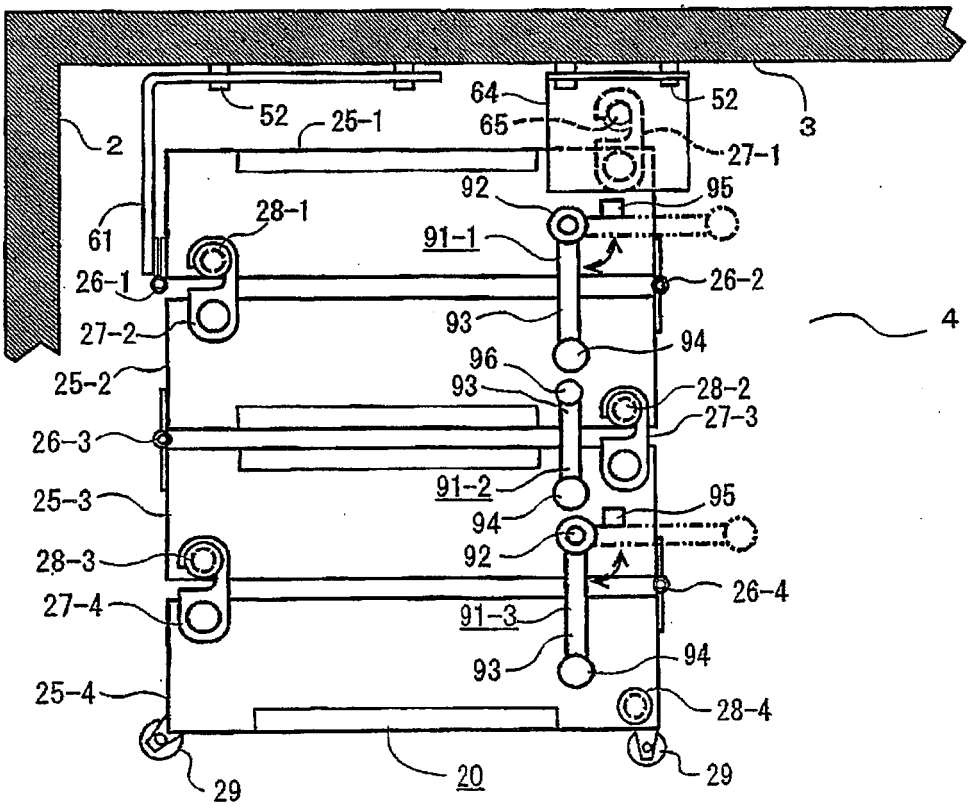
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Fig.21

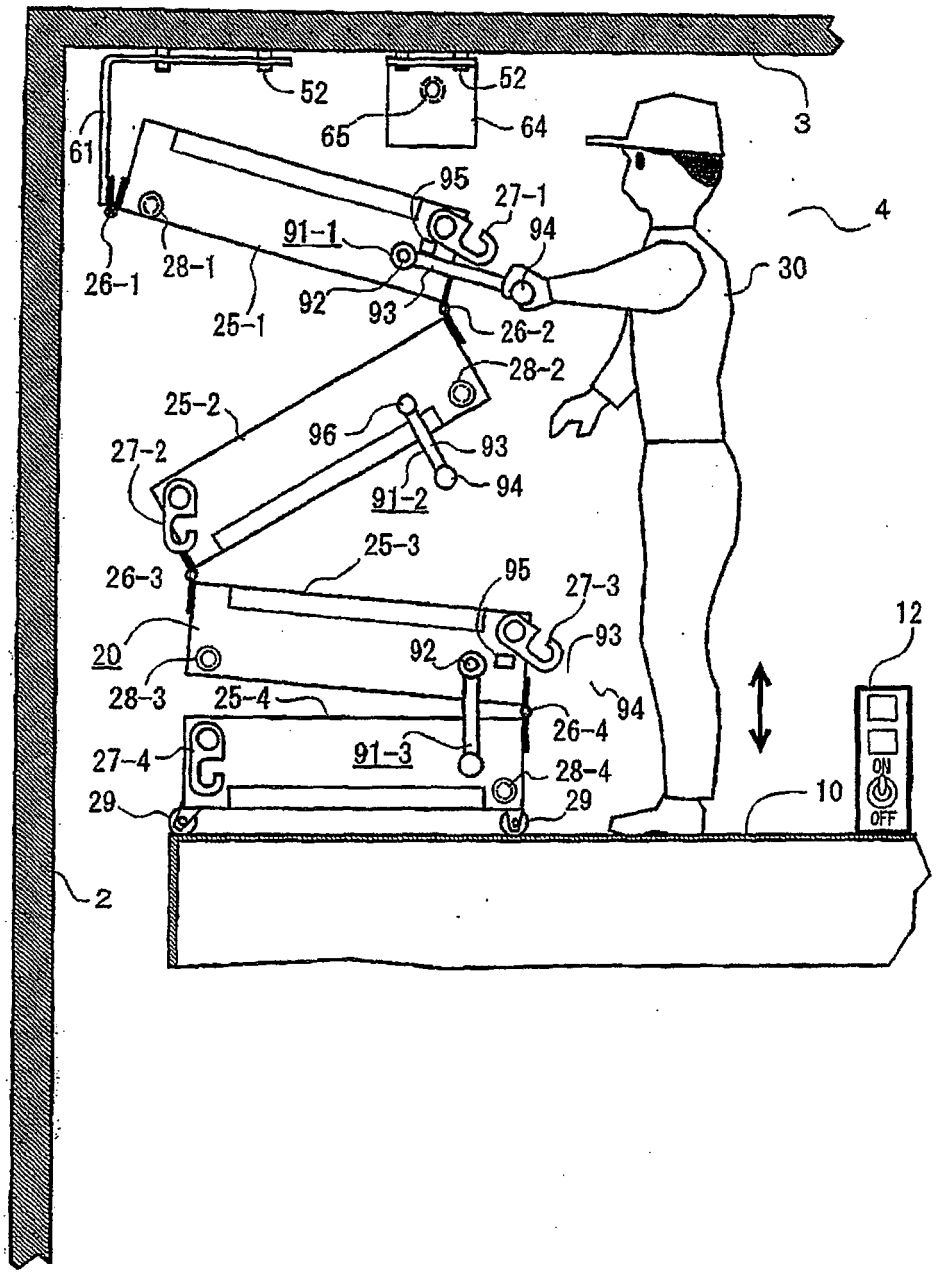
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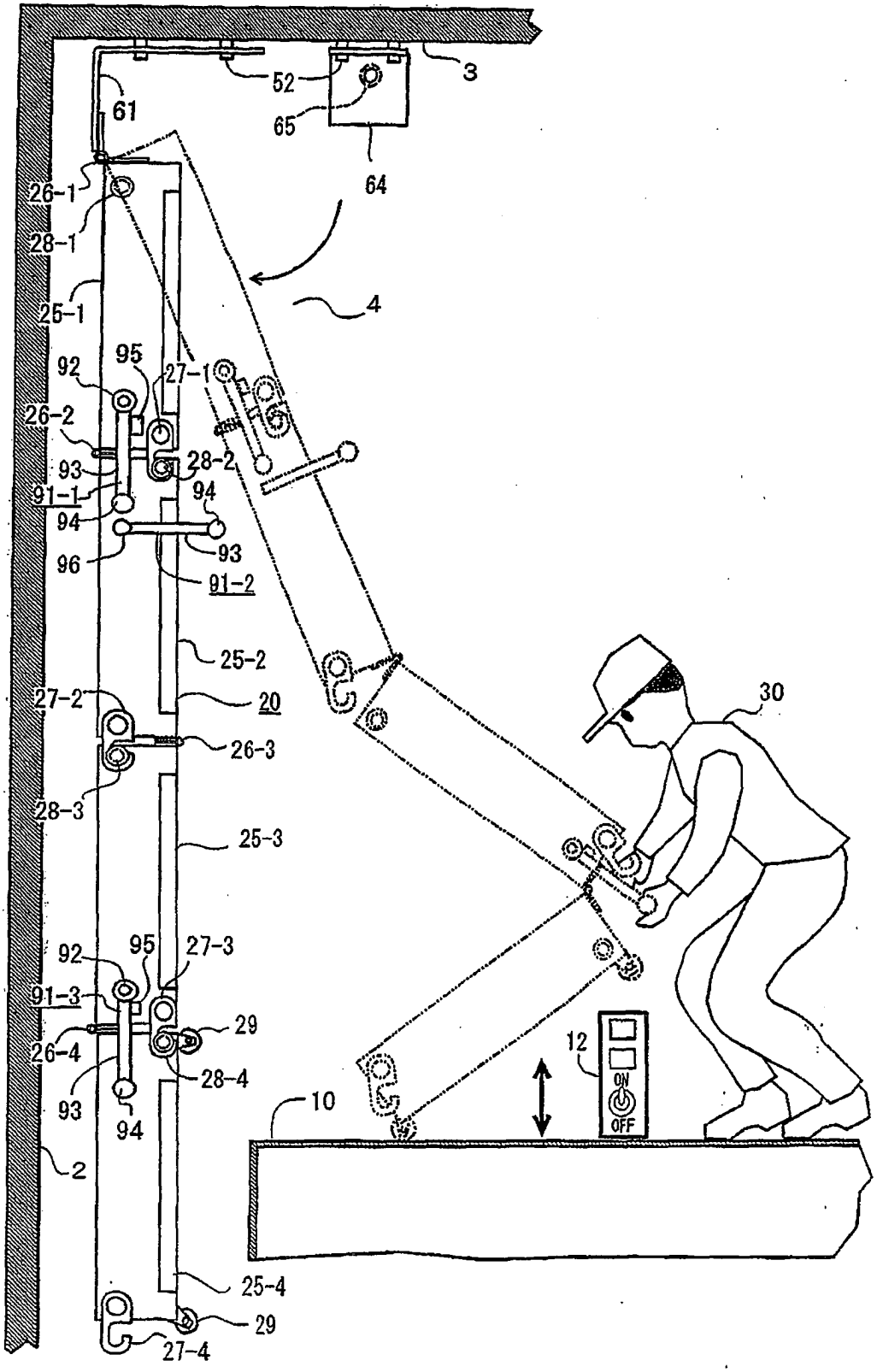
Fig.22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INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2006/306351

A. CLASSIFICATION OF SUBJECT MATTER
B66B1/34(2006.01)

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)
B66B1/00(2006.01)-***B66B11/08***(2006.01)

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 1996-2006
Kokai Jitsuyo Shinan Koho 1971-2006 Toroku Jitsuyo Shinan Koho 1994-2006

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.
A	WO 2004/074156 A1 (Mitsubishi Electric Corp.), 02 September, 2004 (02.09.04), Claim 1 (Family: none)	1-7
A	JP 2004-231351 A (Mitsubishi Electric Corp.), 19 August, 2004 (19.08.04), Claims 1 to 3 (Family: none)	1-7
E,A	JP 2005-132572 A (Mitsubishi Electric Corp.), 26 May, 2005 (26.05.05), Par. Nos. [0029] to [0045]; Figs. 6 to 8 (Family: none)	1-7

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

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"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
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Date of the actual completion of the international search	Date of mailing of the international search report
10 July, 2006 (10.07.06)	18 July, 2006 (18.07.06)
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Patent documents cited in the description

- JP 2004231351 A **[0003]**