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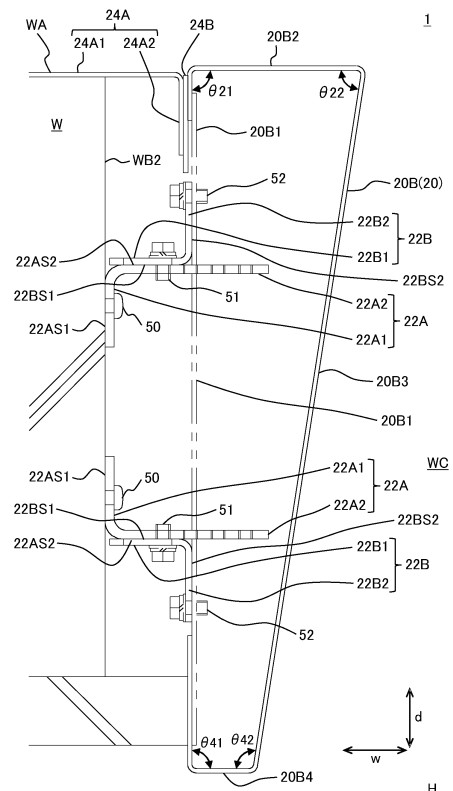
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(54) **ELEVATOR DEVICE AND JAMB MOUNTING STRUCTURE THEREFOR**

(57) The purpose of the invention is to increase an adjustment allowance of a connection component for connecting a jamb to a building wall corresponding to a building construction error. A structure for mounting a jamb 20 provided for an opening of a building wall includes vertical frames 20B constituting the jamb 20, which are disposed on both side edges WB2 of the opening WC of the building wall W, fixing members 22A, 22B for fixing the vertical frames 20B to the building wall W, and partition plates 24A, 24B for partitioning each gap between the building wall W and the vertical frame 20B. The fixing members 22A, 22B are separated into the first fixing member 22A disposed at a side of the building wall W, and the second fixing member 22B disposed at a side of the vertical frame 20B. The partition plates 24A, 24B are separated into the first partition plate 24A disposed at a side of the building wall W, and the second partition plate 24B disposed at a side of the vertical frame 20B.

FIG. 10



Description

Technical Field

[0001] The present invention relates to an elevator device, more specifically, a structure for mounting a jamb on a landing door device provided for the elevator device.

Background Art

[0002] A jamb installation structure disclosed in Japanese Patent Application Laid-Open No. 2014-69966 (PTL 1) has been known as a background art of the present invention.

[0003] The jamb installation structure as disclosed in PTL 1 relates to a structure for installing the jamb on the elevator landing doorway. The structure includes a connection unit which connects the vertical frame reinforcing material disposed on a back side of the vertical frame of the jamb for the purpose of engagement. The connection unit is detachably mounted onto a building wall part that has a space in which the jamb is placed. The connection unit includes a wall-side connecting member which is detachably disposed in the jamb placement opening formed in the building wall part, and a jamb-side connecting member which is engaged with the vertical frame reinforcing material while being locked to the wall-side connecting member. The position at which the jamb-side connecting member is locked to the wall-side connecting member is adjustable in a left-right direction to the opening (refer to Abstract and Figure 3).

[0004] The connection unit includes a closing plate which is provided for the building wall part so that a gap between the jamb placement opening and the jamb is closed (refer to paragraph 0015). An anchor bolt fixed to the wall part is inserted into the bolt insertion hole formed in the plate to be mounted so that the closing plate is threadedly connected to the anchor bolt of the wall part (refer to paragraph 0025). PTL 1 discloses that the bolt insertion hole is formed as a hole long in the left-right direction to allow a bolt fastening position of the closing plate to be adjustable in the left-right direction (refer to paragraph 0025).

Citation List

Patent Literature

[0005] PTL 1: Japanese Patent Application Laid-Open No. 2014-69966

Summary of Invention

Technical Problem

[0006] The connection unit of the jamb installation structure as disclosed in PTL 1 is composed of two components, that is, the wall-side connecting member and

the jamb-side connecting member. The position at which the jamb-side connecting member is locked to the wall-side connecting member is made adjustable in the left-right direction. Additionally, the bolt fastening position of the closing plate may be made adjustable in the left-right direction. The jamb installation structure disclosed in PTL 1 has the closing plate formed as a single component. The structure has been designed without considering the positional adjustment of the closing plate in the front-rear direction (direction in which passengers are going in and out).

[0007] Hereinafter, the closing plate will be explained as a partition plate.

[0008] An object of the present invention is to increase an adjustment allowance of a connection component for connecting the jamb to the building wall corresponding to a building construction error.

Solution to Problem

[0009] Aiming at attainment of the object, the jamb mounting structure according to the present invention provided for an opening of a building wall includes vertical frames constituting the jamb, which are disposed on both side edges of the opening of the building wall, a fixing member for fixing the vertical frame to the building wall, and a partition plate for partitioning a gap between the building wall and the vertical frame. The fixing member includes a first fixing member disposed at a side of the building wall and a second fixing member disposed at a side of the vertical frame, which are separated from each other. The partition plate includes a first partition plate disposed at a side of the building wall and a second partition plate disposed at a side of the vertical frame, which are separated from each other.

Advantageous Effects of Invention

[0010] According to the present invention, it is possible to increase the adjustment allowance of the connection component for connecting the jamb to the building wall corresponding to the building construction error.

[0011] Objects, structures, and advantageous effects other than those described above will be further clarified by explanations of embodiments as described below.

Brief Description of Drawings

[0012]

Figure 1 is a side view (vertical sectional view) schematically representing an elevator device 100 according to an example of the present invention.

Figure 2 is a top view (horizontal sectional view) schematically representing the elevator device 100 according to the example of the present invention.

Figure 3 is a horizontal sectional view of a mount structure 23-1 of a jamb 20-1 as an example of a

jamb 20 according to an example of the present invention.

Figure 4 is a partially enlarged view of a periphery of a vertical frame 20B of the jamb 20 as illustrated in Figure 3.

Figure 5 is a three-plane drawing illustrating a shape of a first fixing member 22A, which is represented by a front view (a), a side view (b), and a plan view (c) in accordance with a third angle projection method.

Figure 6 is a three-plane drawing illustrating a shape of a second fixing member 22B, which is represented by a front view (a), a side view (b), and a plan view (c) in accordance with the third angle projection method.

Figure 7 is a two-plane drawing illustrating a shape of a first partition plate 24A, which is represented by a front view (a) and a side view (b) in accordance with the third angle projection method.

Figure 8 is a two-plane drawing illustrating a shape of a second partition plate 24B, which is represented by a front view (a) and a plan view (b) in accordance with the third angle projection method.

Figure 9 is a horizontal sectional view illustrating a mount structure 21 of the jamb 20 as another example according to an example of the present invention.

Figure 10 is a partially enlarged view of a periphery of a vertical frame 20B of the jamb 20 as illustrated in Figure 9.

Figure 11 is a two-plane drawing illustrating a shape of a first fixing member 22A, which is represented by a front view (a) and a plan view (b) in accordance with the third angle projection method.

Figure 12 is a three-plane drawing illustrating a shape of a second fixing member 22B, which is represented by a front view (a), a side view (b), and a plan view (c) in accordance with the third angle projection method.

Figure 13 is a two-plane drawing illustrating a shape of a first partition plate 24A, which is represented by a front view (a) and a plan view (b) in accordance with the third angle projection method.

Figure 14 is a two-plane drawing illustrating a shape of a second partition plate 24B, which is represented by a front view (a) and a side view (b) in accordance with the third angle projection method.

Description of Embodiments

[0013] Embodiments of the elevator device according to the present invention will be described referring to Figures 1 to 10. A comparative example with respect to the present invention will be described referring to Figure 11. In the respective drawings, the same or similar structures will be designated with the same codes, and repetitive explanations thereof, thus will be omitted. The following explanations will be made by defining a lifting/lowering direction of a car 4 as a vertical (up-down) direction p

(see Figure 1), and a direction perpendicular to the vertical direction as a horizontal direction.

[0014] Referring to Figures 1 and 2, a structure of an elevator device 100 is described. Figure 1 is a schematic side view (vertical sectional view) of the elevator device 100 according to an example of the present invention. Figure 2 is a schematic top view (horizontal sectional view) of the elevator device 100 according to the example of the present invention. As Figure 2 illustrates, a horizontal direction parallel to a front surface 4A of the car 4 is defined as a width direction w, and a horizontal direction perpendicular to the width direction w is defined as a depth direction d.

[0015] The elevator device 100 includes the car 4 and a balance weight 5, which are lifted/lowered in a hoistway 1, a hoist 3 around which a not shown main rope is wound, car guide rails 6, 7 which extend through the hoistway 1 to guide lifting/lowering of the car 4, and balance weight guide rails 8, 9 which extend through the hoistway 1 to guide lifting/lowering of the balance weight 5.

[0016] The car 4 and the balance weight 5 are provided inside the hoistway 1 constructed in the building, and suspended in a well bucket style using a not shown main rope. In the illustrated example, the hoist 3 is disposed on a top of the hoistway 1. The position of the hoist 3 is not limited to the top section of the hoistway 1. The car guide rails 6, 7, and the balance weight guide rails 8, 9 extend in the up-down direction along a wall surface (inner wall) WA of a building wall W constituting the hoistway 1.

[0017] The elevator device 100 according to the example is of traction type, and lifts and lowers the car 4 vertically along the car guide rails 6, 7, and lifts and lowers the balance weight 5 vertically along the balance weight guide rails 8, 9 by the hoist 3 which frictionally drives the main rope.

[0018] The hoist 3 is placed in a machine chamber 1B at an upper section of the hoistway 1. A control panel 2 is also placed in the machine chamber 1B for controlling operations of the elevator device 100 as well as lifting/lowering operations of the car 4. The machine chamber 1B, the hoist 3, and the control panel 2 may be placed in a different manner other than the one according to the example.

[0019] The hoistway 1 is constructed in the building as an elevating space in which the car 4 and the balance weight 5 are lifted and lowered. The car 4 has an entrance door 4B formed in a front surface 4A, from which passengers board/leave the elevator. Accordingly, an opening WC is formed in the building wall W on a front side (side of a landing hall H) of the hoistway 1.

[0020] The car guide rail 6 is fixed to the wall surface WA of the hoistway 1 by a car rail bracket 12. The car guide rail 7 and the balance weight guide rail 8 are fixed to the wall surface WA of the hoistway 1 by a common rail bracket 11. The balance weight guide rail 9 is fixed to the wall surface WA of the hoistway 1 by a balance weight rail bracket 10.

[0021] A jamb 20 is fitted to three sections of the opening WC in the building wall W, that is, an upper edge (upper edge surface) WB1, and both side edges (inner wall surface of the opening WC) WB2, WB3. In other words, the jamb 20 includes an upper frame 20A to be fitted to the upper edge WB1, and vertical frames 20B, 20C to be fitted to both side edges WB2, WB3, respectively, by which a gate-like frame is formed.

[0022] Two types of the jamb 20 according to the example are described. The jamb 20 as one type is described referring to Figures 3 to 8, and the other type is described referring to Figures 9 to 14. The example is characterized by the structure for mounting the jamb 20. Accordingly, the structure of the jamb 20 by itself is not limited to the one to be described in the example.

[0023] Referring to Figures 3 to 8, the mount structure of the jamb 20 according to the embodiment is described. In the embodiment, an explanation is made about the mount structure of the jamb 20 (vertical frames 20B, 20C) with a small frame width.

[0024] Figure 3 is a horizontal sectional view of a mount structure 21 of the jamb 20 according to an example of the present invention.

[0025] Since the mount structure of the vertical frame 20B is similar to that of the vertical frame 20C, an explanation is made about the mount structure 21 at the side of the vertical frame 20B illustrated in Figure 3.

[0026] The vertical frame 20B of the jamb 20 according to the embodiment has a rectangular horizontal cross section, and is disposed at the far side (hoistway side) of the opening WC. The vertical frame 20B is fixed to the building wall W by a fixing member 22. A partition plate 24 partitions a gap between the building wall W and the vertical frame 20B. The mount structure 21 is composed of the fixing member 22 and the partition plate 24.

[0027] The fixing member 22 includes two members 22A and 22B. The fixing member 22 is composed of two separate members, that is, the first fixing member 22A to be fixed to the side of the building wall W, and the second fixing member 22B to be fixed to the side of the vertical frame 20B. The separate type structure is advantageous for assembly by adjusting the building construction error as described later.

[0028] The first fixing member 22A as the fixing member at the side of the building wall W is fixed to the inner wall surface (wall surface of the hoistway 1) WA of the building wall W by an anchor bolt 50. The second fixing member 22B as the fixing member at the side of the vertical frame 20B of the jamb 20 is fixed to the side of the building wall W through the first fixing member 22A. That is, the vertical frame 20B is fixed to the side of the building wall W through the second fixing member 22B and the first fixing member 22A.

[0029] The first fixing member 22A and the second fixing member 22B are fastened and fixed by a bolt 51. The second fixing member 22B is fastened and fixed to the vertical frame 20B by a bolt 52.

[0030] The partition plate 24 includes members 24A,

24B. The partition plate 24 is composed of two separate members, that is, a first partition plate 24A to be fixed to the side of the building wall W, and a second partition plate 24B to be fixed to the side of the vertical frame 30B.

5 The separate type structure is advantageous for assembly by adjusting the building construction error as described later.

[0031] The first partition plate 24A as the partition member at the side of the building wall W is fixed to an inner wall surface WB2 of the opening WC of the building wall W by an anchor bolt 53. The second partition plate 24B as the partition member is fixed to the vertical frame 20B of the jamb 20 by a bolt 54.

[0032] The first partition plate 24A and the second partition plate 24B are placed in contact with each other while being non-fixed. This may prevent interruption of assembly of the first partition plate 24A and the second partition plate 24B irrespective of the building construction error.

[0033] Referring to Figure 4, a detailed explanation is made about a structure of the vertical frame 20B of the jamb 20. Figure 4 is a partially enlarged view of a periphery of the vertical frame 20B of the jamb 20 as illustrated in Figure 3.

[0034] The vertical frame 20B of the jamb 20 has a mount part 20B1 for mounting the second fixing member 22B to the vertical frame 20B at one of four sides constituting a rectangular shape. The mount part 20B1 is formed on the side of the vertical frame 20B to face the inner wall surface WB2 of the opening WC.

[0035] The second fixing member 22B is fastened and fixed to the mount part 20B1 by the bolt 52. The mount part 20B1 has a screw hole processed to be threadably engaged with the bolt 52. Alternatively, the mount part 20B1 may have an insertion hole through which the bolt 52 is inserted so that a nut is fastened to the bolt 52.

[0036] The mount part 20B1 as a part of the vertical frame 20B will be referred to as the vertical frame, and described without differentiation.

[0037] Referring to Figures 4 and 5, a detailed explanation is made about the first fixing member 22A. Figure 5 as a three-plane drawing in accordance with the third angle projection method includes a front view (a), a side view (b), and a plan view (c). Figure 5(a) as the front view represents a shape of the first fixing member 22A as illustrated in Figure 4. Figure 5(c) as the plan view represents the first fixing member 22A of the front view (a) when seen from above. In Figure 5, an arrow AH denotes a horizontal direction, and an arrow AP denotes a vertical direction. The horizontal direction AH and the vertical direction AP will be marked in other drawings in a similar manner.

[0038] The first fixing member 22A has a bent shape, which includes a first planar section (first side) 22A1 and a second planar section (second side) 22A2, which are perpendicular to each other. That is, the first fixing member 22A includes the first planar section 22A1 as a long side, and the second planar section 22A2 as a short side to form an L-like bent shape. The first planar section (first

side) 22A1 is formed as the short side, and the second planar section (second side) 22A2 is formed as the long side.

[0039] The first planar section 22A1 has an insertion hole 61 through which the anchor bolt 50 is inserted, and is fixed to the inner wall surface WA that faces the hoistway 1 by the anchor bolt 50 for abutment on the inner wall surface WA of the building wall W. The second planar section 22A2 is bent from the first planar section 22A1 perpendicularly to the inner wall surface WA of the building wall W, and is placed parallel to the inner wall surface WB2 of the opening WC of the building wall W. Especially, in a modified example, the second planar section 22A2 of the first fixing member 22A is disposed at the inner side of the opening WC of the building wall W.

[0040] The second planar section 22A2 has multiple screw holes 62 with which the respective bolts 51 are threadedly engaged. The second planar section 22A2 abuts on the second fixing member 22B to allow the bolt 51 to be threadedly engaged with the screw hole 62. This fastens the second planar section 22A2 to the second fixing member 22B.

[0041] The multiple screw holes 62 are arranged in alignment parallel to a planar surface of the first planar section 22A1. The thus formed screw holes 62 make it possible to prevent positional deviation of the second fixing member 22B from the first fixing member 22A in the rotating direction. In the embodiment, two screw holes 62 by the minimum necessary number are formed.

[0042] In the embodiment, the bolt 51 is threadedly engaged with the screw hole 62 formed in the first fixing member 22A to attain reduction in the number of components, and simplification in the assembly work. Alternatively, the bolt 51 may be threadedly engaged with the nut.

[0043] The first fixing member 22A is placed so that a planar part 22AS1 faces the wall surface WA. The second planar section 22A2 facing the wall surface WA is positioned at the side of the landing hall H. The first fixing member 22A allows a planar surface opposite to the planar surface 22AS1 to face the wall surface WA. In such a case, the second planar section 22A2 of the first fixing member 22A is disposed at the outer side of the opening WC of the building wall W and at the inner side of the hoistway 1. Change in the direction of the first fixing member 22A allows the position of the second planar section 22A2 to be changed in the depth direction d.

[0044] In the embodiment, the first fixing member 22A may be directed to change (adjust) the position of the second fixing member 22B to be fixed to the second planar section 22A2. This allows components to be shared among the elevator devices 100 of diverse types.

[0045] Referring to Figures 4 and 6, a detailed explanation is made about the second fixing member 22B. Figure 6 as a three-plane drawing in accordance with the third angle projection method includes a front view (a), a side view (b), and a plan view (c) for representing a shape of the second fixing member 22B. Figure 6(c) as the plan

view represents the second fixing member 22B of the front view (a) when seen from below, indicating the shape of the second fixing member 22B as illustrated in Figure 4.

[0046] The second fixing member 22B includes a first planar section 22B1 and a second planar section 22B2, which are parallel to each other, and a stepped planar section 22B3. The second fixing member 22B includes the first planar section 22B1 which abuts on the second planar section 22A2 of the first fixing member 22A, and is fastened thereto, and the second planar section 22B2 which is parallel to the first planar section 22B1, and fixed to the vertical frame 30B.

[0047] The stepped planar section 22B3 causes a positional deviation between the first planar section 22B1 and the second planar section 22B2, which are parallel to each other in the direction perpendicular to each plane of the planar sections 22B1, 22B2. The first planar section 22B1 and the second planar section 22B2 are formed to extend toward opposite directions from the stepped planar section 22B3 in the vertical direction AP.

[0048] The second fixing member 22B is fastened to a planar surface 22AS2 of the first fixing member 22A by the bolt 51 so that a planar surface 22BS1 of the first planar section 22B1 comes in contact with the planar surface 22AS2 of the first fixing member 22A. The planar surfaces 22AS2 and 22AS1 constitute the upper and lower surfaces of the first fixing member 22A, respectively. The planar surface 22AS2 is continued to the planar surface opposite to that of the planar surface 22AS1.

[0049] The first planar section 22B1 has multiple insertion holes 63 through which the respective bolts 51 are inserted. The insertion hole 63 is formed as a long hole. The insertion hole 63 allows adjustment of a relative position of the second fixing member 22B to the first fixing member 22A in the horizontal direction as well as absorption of the positional deviation in the horizontal direction between the first fixing member 22A and the second fixing member 22B owing to the building construction error.

[0050] The number of insertion holes 63 to be formed is equal to at least the number of bolts 51. In other words, the number of the insertion holes 63 is equal to the number of screw holes 62 threadedly screwed with the bolts 51. In the embodiment, two insertion holes 63 are formed corresponding to two bolts 51.

[0051] The second fixing member 22B is fastened to the vertical frame 20B (mount part 20B1) by the bolt 52 while having a planar surface 22BS2 of the second planar section 22B2 in contact with the vertical frame 20B (mount part 20B1). Like the planar surface 22BS1, the planar surface 22BS2 constitutes an outer surface (outer peripheral surface) of the second fixing member 22B.

[0052] The second planar section 22B2 has multiple insertion holes 64 through which the respective bolts 52 are inserted. In the embodiment, two insertion holes 64 are formed. A length L22B2 of the second planar section 22B2 in the depth direction w is short compared with a length L22B1 of the first planar section 22B1 having the

long hole 63 for absorbing the building construction error in the depth direction w . This allows reduction in the material cost of the second fixing member 22B as well as its weight, resulting in easy assembly.

[0053] In the embodiment, the second fixing member 22B of the fixing member 22 has the long hole 63 through which the bolt 51 is inserted. The first fixing member 22A of the fixing member 22 has the screw hole 62 threadedly engaged with the bolt 51 inserted through the long hole 63. Alternatively, the insertion hole (long hole) 63 for accommodating insertion of the bolt 51 may be formed in either the first fixing member 22A or the second fixing member 22B of the fixing member 22. The screw hole 62 threadedly engaged with the bolt 51 may be formed in the other fixing member. The member in which the screw hole 62 is formed has to be thick to a certain degree, resulting in a weight increase. It is advantageous to form the screw hole 62 in the first fixing member 22A positioned at the side of the building wall W as the fixing member (support member) of the jamb 20 in terms of the structure for supporting the jamb 20.

[0054] Referring to Figures 4 and 7, a detailed explanation is made about the first partition plate 24A. Figure 7 as a two-plane drawing in accordance with the third angle projection method includes a front view (a) and a side view (b) for representing a shape of the first partition plate 24A. Figure 7 omits the plan view, and Figure 7(a) as the front view represents the shape of the first partition plate 24A as illustrated in Figure 4.

[0055] The first partition plate 24A has a bent shape, which includes a first planar section (first side) 24A1 and a second planar section (second side) 24A2, which are perpendicular to each other. In other words, the first partition plate 24A has an L-like shape constituted by the first planar section 24A1 and the second planar section 24A2. The first planar section 24A1 has an insertion hole 65 through which the anchor bolt 53 is inserted, and is fixed to the inner wall surface WB2 of the opening WC of the building wall W by the anchor bolt 53. The second planar section 24A2 is bent perpendicularly to the first planar section 24A1. In this case, the L-like shape is formed by the first planar section 24A1 of the first partition plate 24A having a long side, and the second planar section 24A2 of the first partition plate 24A having a short side.

[0056] Specifically, multiple insertion holes (through holes) 65 for accommodating insertion of the respective anchor bolts 53 are formed in the first planar section 24A1. The first planar section 24A1 is fixed to the inner wall surface WB2 of the opening WC of the building wall W by the anchor bolts 53 for abutment thereon. The insertion holes 65 are aligned in the vertical direction p . The first partition plate 24A is fixed to the building wall W by the anchor bolts 53 to prevent the positional deviation toward the rotating direction during assembly. In the embodiment, two insertion holes 65 by the minimum necessary number are formed.

[0057] The second planar section 24A2 is bent from

the first planar section 24A1 perpendicularly to the inner wall surface WB2 of the opening WC. The second planar section 24A2 has multiple through holes 66. Those through holes 66 are arranged at the same intervals as those of the multiple insertion holes 65. This makes it possible to exchange the first planar section 24A1 with the second planar section 24A2 from the state as illustrated in Figure 4 so that the first partition plate 24A is fastened to the inner wall surface WB2.

[0058] A length L24A1 of the first planar section 24A1 in the horizontal direction is different from a length L24A2 of the second planar section 24A2 in the horizontal direction. In the embodiment, the length L24A1 is longer than the length L24A2. That is, the first planar section 24A1 as the long side and the second planar section 24A2 as the short side form the L-like shape.

[0059] Referring to Figure 4, the position exchange between the first planar section 24A1 and the second planar section 24A2 allows change in the length of an extending part of the first partition plate 24A from the inner wall surface WB2 of the opening WC. This makes it possible to cope with the building construction error by adjusting the length of the extending part of the first partition plate 24A from the inner wall surface WB2 of the opening WC.

[0060] Referring to Figures 4 and 8, a detailed explanation is made about the second partition plate 24B. Figure 8 as a two-plane drawing in accordance with the third angle projection method includes a front view (a) and a plan view (b) for representing a shape of the second partition plate 24B. Figure 8 omits the side view, and Figure 8(b) as the plan view represents the shape of the second partition plate 24B as illustrated in Figure 4.

[0061] The second partition plate 24B includes a first planar section 24B1 and a second planar section 24B2, which are parallel to each other, and a stepped planar section 24B3. The second partition plate 24B includes the first planar section 24B1 which is fixed to the vertical frame 30B, the second planar section 24B2 in contact with the second planar section 24A1 of the first partition plate 24A while being non-fixed, and the stepped planar section 24B3 which connects the first planar section 24B1 and the second planar section 24B2 of the second partition plate 24B parallel to each other.

[0062] The first planar section 24B1 and the second planar section 24B2, which are parallel to each other are positionally deviated in the direction perpendicular to each plane of the respective planar sections 24B1, 24B2. The first planar section 24B1 and the second planar section 24B2 are formed to extend toward opposite directions from the stepped planar section 24B3 in the depth direction d (horizontal direction AH).

[0063] The first planar section 24B1 has multiple screw holes 67 which are threadedly engaged with the respective bolts 54. The second partition plate 24B is fastened to the vertical frame 20B of the jamb 20 as the bolts 54 set on the vertical frame 20B of the jamb 20 are threadedly engaged with the screw holes 67. In the embodiment, two screw holes 67 are formed.

[0064] Instead of the screw hole 67 formed in the first planar section 24B1, a nut to be threadedly engaged with the bolt 54 may be used to fasten the first planar section 24B1 to the vertical frame 20B.

[0065] The first partition plate 24A and the second partition plate 24B have the second planar section 24A2 and the second planar sections 24B2 in contact with each other while being non-fixed. In this case, the second planar section 24A2 of the first partition plate 24A and the second planar section 24B2 of the second partition plate 24B are in contact with each other in an overlapped state in the direction parallel to the wall surface WB2 of the building wall W, that is, the direction parallel to the first planar section 24A1 of the first partition plate 24A.

[0066] In the embodiment, the first planar section 24A1 of the first partition plate 24A abuts on the wall surface WB2 of the building wall W. The second planar section 24A2 is fixed to the building wall W while extending from the wall surface WB2. Alternatively, the first partition plate 24A may be structured to have the through hole 66 formed in the second planar section 24A2 to exchange positions between the first planar section 24A1 and the second planar section 24A2. That is, the first partition plate 24A may be fixed to the building wall W by abutting the second planar section 24A2 on the wall surface WB2 of the building wall W, and allowing the first planar section 24A1 to extend from the wall surface WB2.

[0067] In the above-described case, the difference in the length between L24A1 and L24A2 allows change in the length of the extending part of the partition plate 24A from the wall surface WB2. In the case where the insufficient length L24A2 of the second planar section 24A2 generates a gap between the second planar section 24A2 of the first partition plate 24A and the second planar section 24B2 of the second partition plate 24B, the first partition plate 24A is placed so that positions of the planar sections are exchanged between the first planar section 24A1 and the second planar section 24A2. This makes it possible to prevent generation of the gap between the second planar section 24A2 of the first partition plate 24A and the second planar section 24B2 of the second partition plate 24B.

[0068] In the above-described circumstance, the first partition plate 24A may be structured to equalize a length L65 between a bent point and the insertion hole 65 to a length L66 between the bent point and the through hole 66. This secures the contact between the first partition plate 24A and the second partition plate 24B in the depth direction d.

[0069] Like the first partition plate 24A, the second partition plate 24B may be structured to allow exchange of the positions between the first planar section 24B1 and the second planar section 24B2. In this case, the second partition plate 24B is formed to have a screw hole in the second planar section 24B2 to make a length L24B1 of the first planar section 24B1 different from a length L24B2 of the second planar section 24B2 in the horizontal direction.

[0070] Referring to Figures 9 to 14, another embodiment of the mount structure of the jamb 20 is described.

[0071] Figure 9 is a horizontal sectional view of a mount structure 21 of the jamb 20 as another embodiment of the present invention.

[0072] In the embodiment, since the mount structure of the vertical frame 20B is similar to that of the vertical frame 20C, the mount structure 21 at the side of the vertical frame 20B is illustrated in Figure 9. An explanation is made about the mount structure 21 at the side of the vertical frame 20B.

[0073] The vertical frame 20B of the jamb 20 according to the embodiment has a trapezoidal horizontal cross section, and is disposed entirely over the inner wall surface WB2 of the opening WC of the building wall W. An entire area of the wall surface WB2 is covered by the vertical frame 20B in the depth direction d. In the embodiment, the mount structure 21 is composed of the fixing member 22 and the partition plate 24. The vertical frame 20B is fixed to the building wall W through the fixing member 22. The partition plate 24 partitions the gap between the building wall W and the vertical frame 20B.

[0074] The fixing member 22 includes two members 22A and 22B. The fixing member 22 is composed of two separate members, that is, the first fixing member 22A to be fixed to the side of the building wall W and the second fixing member 22B to be fixed to the side of the vertical frame 20B.

[0075] Two pairs of first fixing member 22A and second fixing member 22B are placed along the inner wall surface WB2 of the opening WC of the building wall W in the horizontal direction. Each pair of the fixing members 22 has the similar structure. The two pairs of fixing members 22 are separately placed in the depth direction (along the inner wall surface WB2 in the horizontal direction) d. One of pairs of the fixing members 22 is placed at the side of the landing hall H in the depth direction d, and the other is placed at the side of the hoistway 1 in the depth direction d. The vertical frame 20B of the embodiment is long in the depth direction d. The two pairs of fixing members 22 allow the vertical frame 20B to be fixed in a stable state by suppressing oscillation of the vertical frame 20B.

[0076] The first fixing member 22A as the fixing member at the side of the building wall W is fixed to a wall surface WB of the opening WC of the building wall W by the anchor bolt 50. The second fixing member 22B as the fixing member at the side of the vertical frame 20B of the jamb 20 is fixed to the side of the building wall W through the first fixing member 22A. That is, the vertical frame 20B is fixed to the side of the building wall W through the second fixing member 22B and the first fixing member 22A.

[0077] The first fixing member 22A and the second fixing member 22B are fastened and fixed by the bolt 51. The second fixing member 22B is fastened and fixed to the vertical frame 20B by the bolt 52.

[0078] The partition plate 24 includes two members

24A, 24B. The partition plate 24 is composed of two separate members, that is, the first partition plate 24A to be fixed to the side of the building wall W, and the second partition plate 24B to be fixed to the side of the vertical frame 30B. The first partition plate 24A as the partition member at the side of the building wall W is fixed to the inner wall surface (wall surface of the hoistway 1) WA of the building wall W by the anchor bolt 53. The second partition plate 24B as the partition member to be mounted on the side of the vertical frame 20B of the jamb 20 is fixed to the vertical frame 20B through the welding process in the embodiment. The method for mounting the second partition plate 24B onto the side of the vertical frame 20B is not limited to the welding process. When welding the second partition plate 24B to the vertical frame 20B, the welding process is required to be finished before bringing the elevator device 100 to the installation place.

[0079] In the embodiment, the first partition plate 24A and the second partition plate 24B are placed in contact with each other while being non-fixed. This may prevent interruption of assembly of the first partition plate 24A and the second partition plate 24B irrespective of the building construction error. In the embodiment, the second planar section 24A2 of the first partition plate 24A and the second partition plate 24B are in contact with each other in an overlapped state in the direction perpendicular to the wall surface WB2, that is, the direction parallel to the first planar section 24A1 of the first partition plate 24A.

[0080] Referring to Figure 10, a detailed explanation is made about a structure of the vertical frame 20B of the jamb 20. Figure 10 is a partially enlarged view of a periphery of the vertical frame 20B of the jamb 20 as illustrated in Figure 9.

[0081] The vertical frame 20B of the jamb 20 has the mount part 20B1 on one of four sides constituting a trapezoidal shape, by which the second fixing member 22B is mounted onto the vertical frame 20B. The mount part 20B1 in the form of the leg 20B1 as one of legs of the trapezoid is provided on the side facing the wall surface WB2 of the building wall W. In the embodiment, interior angles θ_{21} , θ_{41} at the side of the wall surface WB2, each formed between the leg and a base (lower base) 20B2, and between the leg and the other base (upper base) 20B4 are set to 90° , respectively. The other interior angle θ_{22} of the lower bottom 20B2 is set to an acute angle ($\theta_{22} < 90^\circ$), and the other interior angle θ_{42} of the upper bottom 20B4 is set to an obtuse angle ($\theta_{42} > 90^\circ$). As a result, the leg 20B1 of the trapezoid comes in contact with the wall surface WB2 parallel to each other, and the other leg 20B3 is inclined to be positioned at the center of the opening WC from the side of the landing hall H toward the hoistway 1.

[0082] The second fixing member 22B is fastened and fixed to the mount part 20B1 by the bolt 52. The mount part 20B1 has a screw hole processed to be threadedly engaged with the bolt 52. Alternatively, the mount part

20B1 may have an insertion hole through which the bolt 52 is inserted so that a nut is fastened to the bolt 52.

[0083] The mount part 20B1 as a part of the vertical frame 20B will be referred to as the vertical frame, and described without differentiation.

[0084] Referring to Figures 10 and 11, a detailed explanation is made about the first fixing member 22A according to the embodiment. Figure 11 as a two-plane drawing in accordance with the third angle projection method includes a front view (a) and a plan view (b) for representing a shape of the first fixing member 22A. Figure 5(a) as the front view represents the shape of the first fixing member 22A as illustrated in Figure 10. Figure 11(b) as the plan view represents the first fixing member 22A of the front view (a) when seen from above. Figure 11 omits a side view.

[0085] The first fixing member 22A has a bent shape, which includes a first planar section (first side) 22A1 and a second planar section (second side) 22A2, which are perpendicular to each other. That is, the first fixing member 22A includes the first planar section 22A1 (first side) as a short side, and the second planar section 22A2 (second side) as a long side to form an L-like bent shape.

[0086] The first planar section 22A1 has an insertion hole 61 through which the anchor bolt 50 is inserted, and is fixed to the wall surface WB2 by the anchor bolt 50 so that the first planar section 22A1 abuts on the wall surface WB2 of the building wall W. At this time, the planar surface 22AS1 of the first fixing member 22A abuts on the wall surface WB2. The second fixing member 22B is fixed to the planar surface 22AS1 of the first fixing member 22A. The planar surfaces 22AS2 and 22AS1 are continued on either upper or lower surface of the first fixing member 22A.

[0087] The second planar section 22A2 is bent from the first planar section 22A1 at an angle in a direction perpendicular to the wall surface WB2. In this case, the second planar section 22A2 is placed perpendicularly to the inner wall surface WB2 of the opening WC of the building wall W. The second planar section 22A2 has multiple screw holes 62 with which the respective bolts 51 are threadedly engaged. The second planar section 22A2 abuts on the second fixing member 22B to allow the bolt 51 to be threadedly engaged with the screw hole 62. This fastens the second planar section 22A2 to the second fixing member 22B.

[0088] The multiple screw holes 62 are arranged in alignment parallel to a planar surface of the first planar section 22A1 in the direction perpendicular to the planar surface of the first planar section 22A1. The bolts 51 are provided in the direction parallel to the planar surface of the first planar section 22A1 to prevent positional deviation of the second fixing member 22B from the first fixing member 22A in the rotating direction. The screw holes 62 may be arranged in a row perpendicularly to the planar surface of the first planar section 22A1 so long as there is no problem with the positional deviation of the second fixing member 22B from the first fixing member 22A in

the rotating direction.

[0089] In the embodiment, two bolts 51 are employed, and correspondingly, two screw holes 62 may be formed. However, four pairs of screw holes 62 are arranged in the direction perpendicular to the planar surface of the first planar section 22A1 to adjust the mount position of the second fixing member 22B. This makes it possible to absorb the building construction error by adjusting the mount position of the second fixing member 22B.

[0090] In the embodiment, the bolt 51 is threadedly engaged with the screw hole 62 formed in the first fixing member 22A to attain reduction in the number of components, and simplification in the assembly work. Alternatively, the bolt 51 may be threadedly engaged with the nut.

[0091] The position at which the second fixing member 22B is fixed to the vertical frame 20B may be changed (adjusted) by reversing the direction of the planar surface 22AS1 of the second planar section 22A2 of the first fixing member 22A. This makes it possible to absorb the building construction error and to share components among the elevator devices 100 of diverse types.

[0092] Referring to Figures 10 and 12, a detailed explanation is made about the second fixing member 22B. Figure 12 as a three-plane drawing in accordance with the third angle projection method includes a front view (a), a side view (b), and a plan view (c) for representing a shape of the second fixing member 22B. Figure 6(c) as the plan view represents the second fixing member 22B of the front view (a) when seen from above, indicating the shape of the second fixing member 22B as illustrated in Figure 10.

[0093] The second fixing member 22B includes a first planar section 22B1 and a second planar section 22B2, which are perpendicular to each other. That is, the second fixing member 22B includes the first planar section 22B1 which abuts on the second planar section 22A2 of the first fixing member 22A, and is fastened thereto, and the second planar section 22B2 which is perpendicular to the first planar section 22B1, and fixed to the vertical frame 30B.

[0094] The second fixing member 22B is fastened to a planar surface 22AS2 of the first fixing member 22A by the bolt 51 so that the planar surface 22BS1 of the first planar section 22B1 comes in contact with the planar surface 22AS2 of the first fixing member 22A.

[0095] The first planar section 22B1 has multiple insertion holes 63 through which the respective bolts 51 are inserted. The insertion hole 63 is formed as a long hole. The insertion hole 63 allows adjustment of a relative position of the second fixing member 22B to the first fixing member 22A in the horizontal direction as well as absorption of the positional deviation in the horizontal direction between the first fixing member 22A and the second fixing member 22B owing to the building construction error.

[0096] The number of insertion holes 63 to be formed is equal to at least the number of bolts 51. In the embod-

iment, two insertion holes 63 are formed corresponding to two bolts 51.

[0097] The second fixing member 22B is fastened to the vertical frame 20B (mount part 20B1) by the bolt 52 while having a planar surface 22BS2 of the second planar section 22B2 in contact with the vertical frame 20B (mount part 20B1). The second planar section 22B2 has multiple insertion holes 64 through which the respective bolts 52 are inserted. In the embodiment, two insertion holes 64 are formed.

[0098] The planar surfaces 22BS2 and 22BS1 are continued on either upper or lower surface of the second fixing member 22B.

[0099] In the embodiment, the second fixing member 22B of the fixing member 22 has the long hole 63 through which the bolt 51 is inserted. The first fixing member 22A has the screw hole 62 threadedly engaged with the bolt 51 inserted through the long hole 63. Alternatively, the insertion hole (long hole) 63 for accommodating insertion of the bolt 51 may be formed in either the first fixing member 22A or the second fixing member 22B. The screw hole 62 threadedly engaged with the bolt 51 may be formed in the other fixing member. Based on the reason as described above, it is advantageous to form the screw hole 62 in the first fixing member 22A in terms of the structure for supporting the jamb 20.

[0100] Referring to Figures 10 and 13, a detailed explanation is made about the first partition plate 24A. Figure 13 as a two-plane drawing in accordance with the third angle projection method includes a front view (a) and a plan view (b) for representing a shape of the first partition plate 24A. Figure 13 omits the side view, and Figure 13(a) as the front view represents the shape of the first partition plate 24A as illustrated in Figure 10.

[0101] The first partition plate 24A has a bent shape, which includes a first planar section (first side) 24A1 and a second planar section (second side) 24A2, which are perpendicular to each other. In other words, the first partition plate 24A has an L-like shape constituted by the first planar section 24A1 as a long side and the second planar section 24A2 as a short side. The first partition plate 24A has the insertion hole 65 through which the anchor bolt 53 is inserted, and is fixed to the inner wall surface WB2 of the opening WC of the building wall W by the anchor bolt 53.

[0102] Specifically, the first planar section 24A1 has multiple insertion holes 65 for accommodating insertion of the respective anchor bolts 53, and is fixed to the inner wall surface WA of the building wall W by the multiple anchor bolts 53 for abutment thereon. The insertion holes 65 are aligned in the vertical direction p. The first partition plate 24A is fixed to the building wall W by the anchor bolts 53 to prevent the positional deviation toward the rotating direction during assembly. In the embodiment, two insertion holes 65 by the minimum necessary number are formed.

[0103] Like the second planar section 22A2 of the first fixing member 22A as illustrated in Figure 5, the bent

direction of the second planar section 24A2 is changed only by turning over the first partition plate 24A. This makes it possible to provide the similar effect to the one derived from the first fixing member 22A as illustrated in Figure 5 by turning over the first partition plate 24A.

[0104] The second planar section 24A2 is bent from the first planar section 24A1 so that the bent part becomes parallel to the wall surface WB2 of the building wall W.

[0105] Referring to Figures 10 and 14, a detailed explanation is made about the second partition plate 24B. Figure 14 as a two-plane drawing in accordance with the third angle projection method includes a front view (a) and a side view (b) for representing a shape of the second partition plate 24B. Figure 14 omits the plan view, and Figure 14(b) as the side view represents the shape of the second partition plate 24B as illustrated in Figure 10.

[0106] As the second partition plate 24B is a flat plate member, and fixed to the vertical frame 20B through the welding process in the embodiment, no bolt insertion holes, nor screw holes are formed.

[0107] As described above, the fixing member 22 is composed of two members, that is, the first fixing member 22A and the second fixing member 22B. The partition plate 24 is composed of two members, that is, the first partition plate 24A and the second partition plate 24B. Additionally, the insertion hole 63 formed in the second fixing member 22B is in the form of the long hole for fastening the first fixing member 22A and the second fixing member 22B. The above-described structure allows one of the members constituting the fixing member 22, and one of the members constituting the partition plate 24 to be overturned for easy usage depending on the condition of the building. This makes it possible to be adaptable to variously configured buildings, and the building with a large construction error.

[0108] In the above-described example, the jamb 20 can be fixed in spite of a large adjustment allowance to the building construction error and a large building construction error. It is also possible to simplify fixation of the jamb 20 with a small frame width.

[0109] The present invention which is not limited to the above-described examples includes various kinds of modifications. For example, the examples have been described in detail for easy understanding of the present invention. Therefore, it is not necessarily limited to be configured to have all the components as described above. It is possible to replace a part of the structure of one example with the structure of another example. It is further possible to add, remove, and replace the other structure to, from and with a part of the structure of the examples.

Reference Signs List

[0110]

1... hoistway,

20... jamb,
20B... vertical frame,
22... fixing member,
22A... first fixing member,
22A1... first planar section of the first fixing member 22A,
22A2... second planar section of the first fixing member 22A,
22B... second fixing member,
22B1... first planar section of the second fixing member 22B,
22B2... second planar section of the second fixing member 22B,
24... partition plate,
24A... first partition plate,
24A1... first planar section of the first partition plate 24A,
24A2... second planar section of the first partition plate 24A,
24B... second partition plate,
24B1... first planar section of the second partition plate 24B,
24B2... second planar section of the second partition plate 24B,
24B3... stepped planar section of the second partition plate 24B,
50... anchor bolt,
51... bolt,
53... anchor bolt,
61... insertion hole,
62... screw hole,
63... long hole,
65... insertion hole,
W... building wall,
WA... inner wall surface facing the hoistway 1,
WB2... inner wall surface of opening WC of the building wall W

Claims

1. A jamb mounting structure provided for an opening of a building wall, comprising:

vertical frames constituting the jamb, the vertical frames being disposed on both side edges of the opening of the building wall;
a fixing member for fixing the vertical frame to the building wall; and
a partition plate for partitioning a gap between the building wall and the vertical frame, wherein the fixing member includes a first fixing member disposed at a side of the building wall and a second fixing member disposed at a side of the vertical frame, which are separated from each other; and
the partition plate includes a first partition plate

disposed at a side of the building wall and a second partition plate disposed at a side of the vertical frame, which are separated from each other.

2. The jamb mounting structure according to claim 1, wherein a long hole through which a bolt is inserted is formed in one of the first fixing member and the second fixing member of the fixing member, and a screw hole threadedly engaged with the bolt is formed in the other fixing member.

3. The jamb mounting structure according to claim 1,

wherein the first partition plate is fixed to the building wall;
the second partition plate is fixed to the vertical frame; and
the first partition plate and the second partition plate are in contact with each other in a non-fixed state.

4. The jamb mounting structure according to claim 3, wherein the first partition plate and the second partition plate are in contact with each other in an overlapped state parallel to a wall surface of the building wall to which the first partition plate is fixed.

5. The jamb mounting structure according to claim 4, wherein a long hole through which a bolt is inserted is formed in the second fixing member of the fixing member, and a screw hole threadedly engaged with the bolt inserted through the long hole is formed in the first fixing member.

6. The jamb mounting structure according to claim 5,

wherein the first fixing member includes a first planar section as a long side and a second planar section as a short side, which form an L-like bent shape;
the first planar section is fixed to an inner wall surface which faces a hoistway;
the second planar section is placed parallel to an inner wall surface of the opening of the building wall;
the second fixing member includes a first planar section which abuts on the second planar section of the first fixing member and is fastened to the second planar section, and a second planar section which is parallel to the first planar section and fixed to the vertical frame;
the first partition plate includes a first planar section which has an insertion hole through which an anchor bolt is inserted and is fixed to the inner wall surface of the opening of the building wall by the anchor bolt, and a second planar section which is bent perpendicularly to the first planar

section; and

the second partition plate includes a first planar section to be fixed to the vertical frame, a second planar section in contact with the second planar section of the first partition plate in a non-fixed state, and a stepped planar section which connects the first planar section of the second partition plate and the second planar section of the second partition plate, parallel to each other.

7. The jamb mounting structure according to claim 6,

wherein the first planar section as the long side of the first partition plate and the second planar section as the short side of the first partition plate form the L-like shape; and
the second planar section of the first partition plate has a through hole which allows insertion of the anchor bolt.

8. The jamb mounting structure according to claim 6, wherein the second planar section of the first fixing member is placed at an inner side of the opening of the building wall.

9. The jamb mounting structure according to claim 6, wherein the second planar section of the first fixing member is placed at an outer side of the opening of the building wall, and at an inner side of the hoistway.

10. The jamb mounting structure according to claim 5,

wherein the first fixing member includes a first planar section as a short side and a second planar section as a long side, which form an L-like bent shape;

the first planar section is fixed to an inner wall surface of the opening of the building wall;

the second planar section is placed perpendicularly to the inner wall surface of the opening of the building wall;

the second fixing member includes a first planar section which abuts on the second planar section of the first fixing member and is fastened to the second planar section, and a second planar section which is formed perpendicularly to the first planar section and fixed to the vertical frame;

the first partition plate includes a first planar section as a long side and a second planar section as a short side, which form an L-like bent shape, and the first planar section of the first partition plate is fixed to the inner wall surface of the opening of the building wall by an anchor bolt inserted through an insertion hole formed in the first planar section of the first partition plate;
the second partition plate in the form of a flat plate is fixed to the vertical frame;

the first partition plate and the second partition plate are in contact with each other in an overlapped state perpendicularly to a wall surface of the building wall to which the first partition plate is fixed; and

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two pairs of the first and the second fixing members are provided horizontally in a direction along the inner wall surface of the opening of the building wall.

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11. An elevator device comprising a car and a balance weight, which are lifted/lowered in a hoistway, a hoist around which a main rope is wound, guide rails extending through the hoistway 1 for guiding lifting/lowering of the car and the balance weight, and a jamb provided for an opening of a building wall, wherein the jamb mounting structure according to any one of claims 1 to 10 is provided.

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FIG. 1

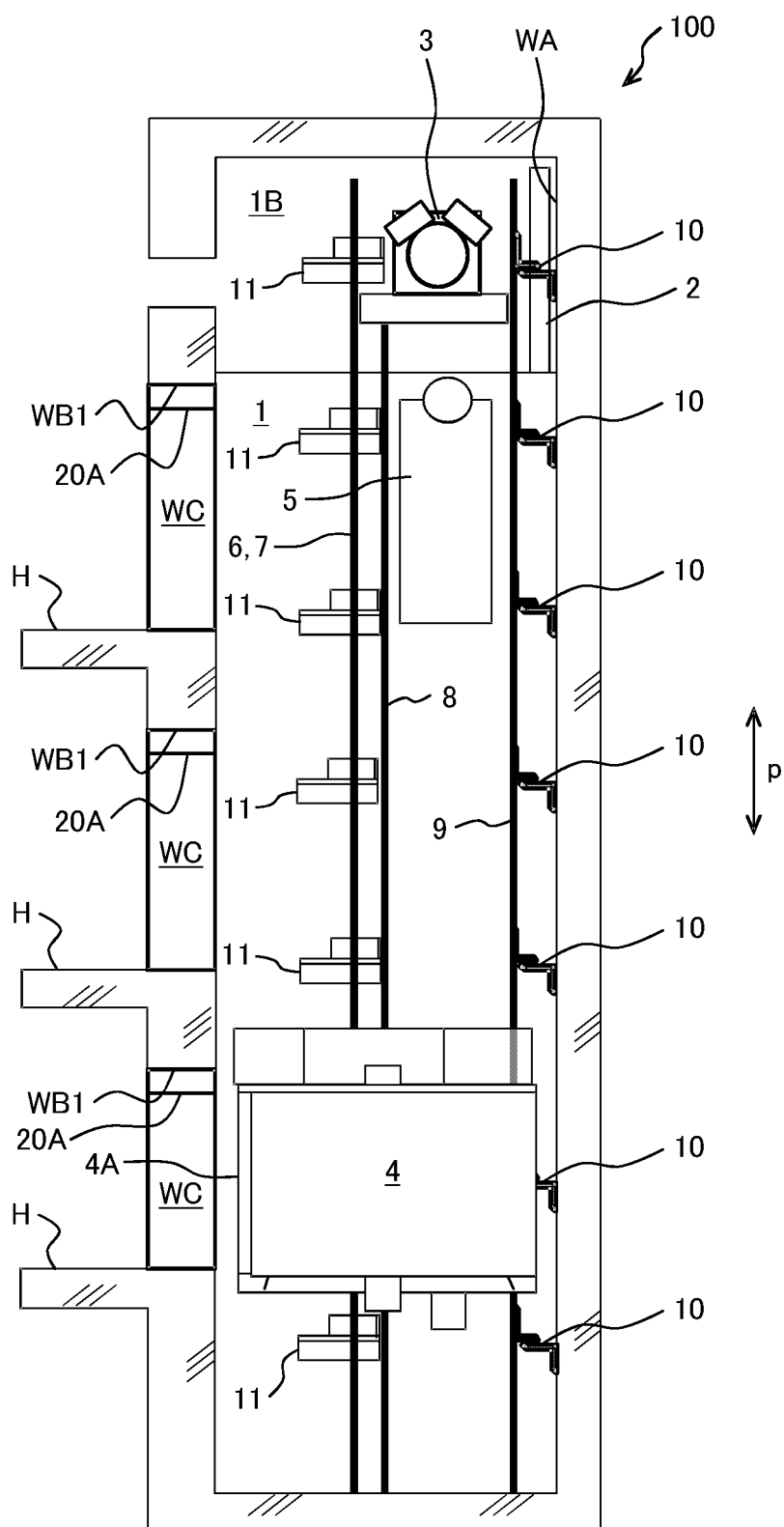


FIG. 2

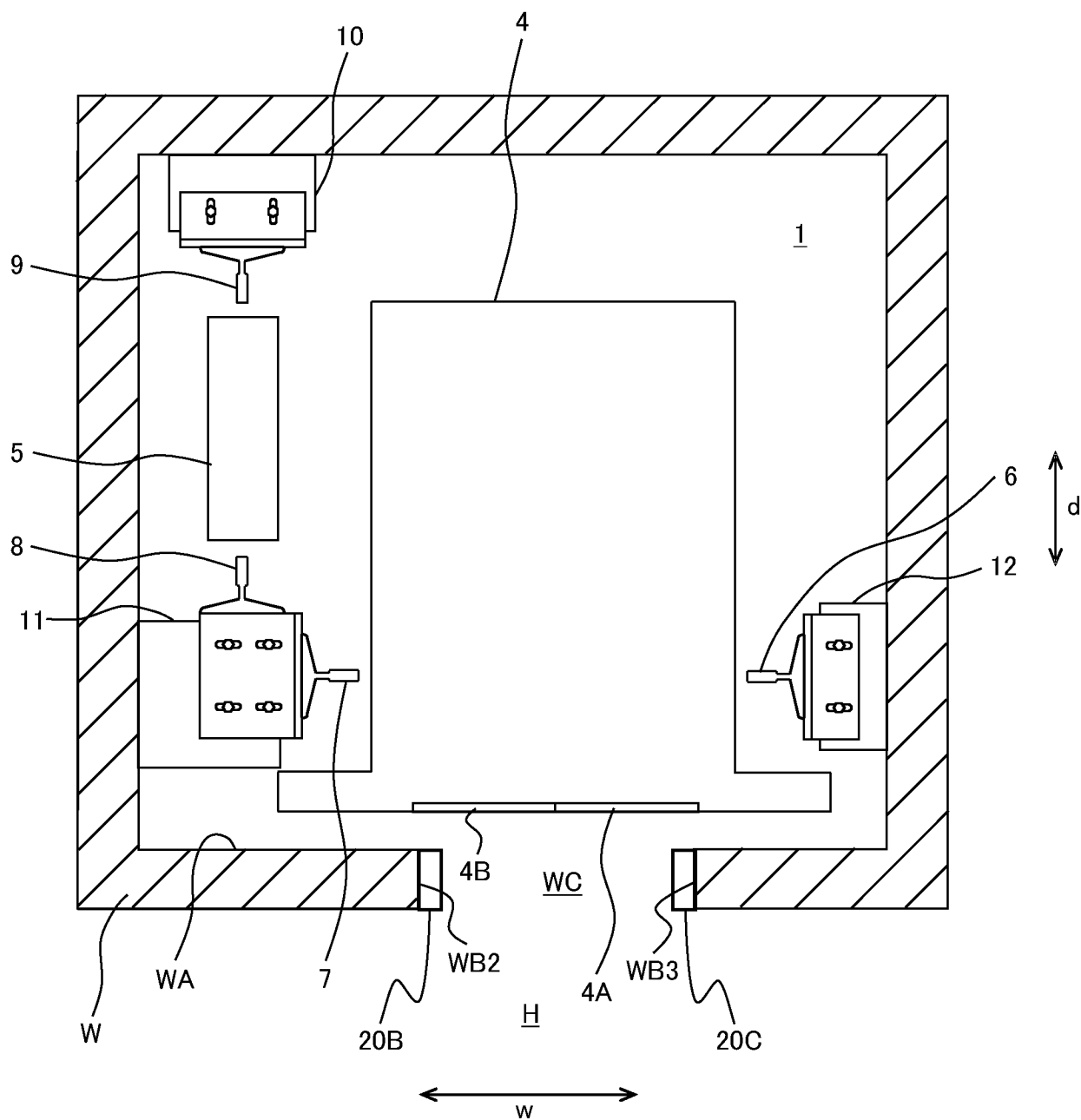


FIG. 3

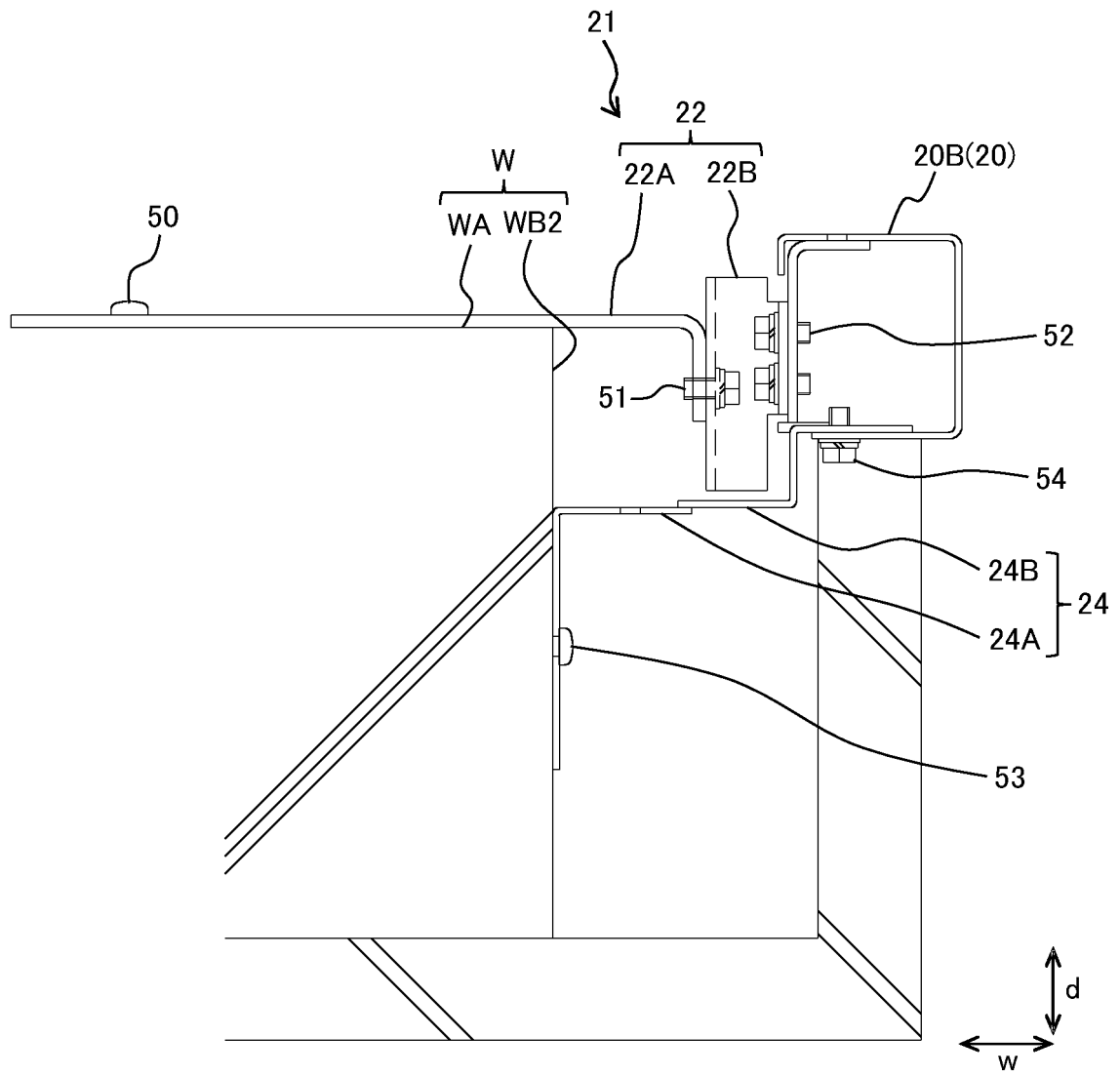


FIG. 4

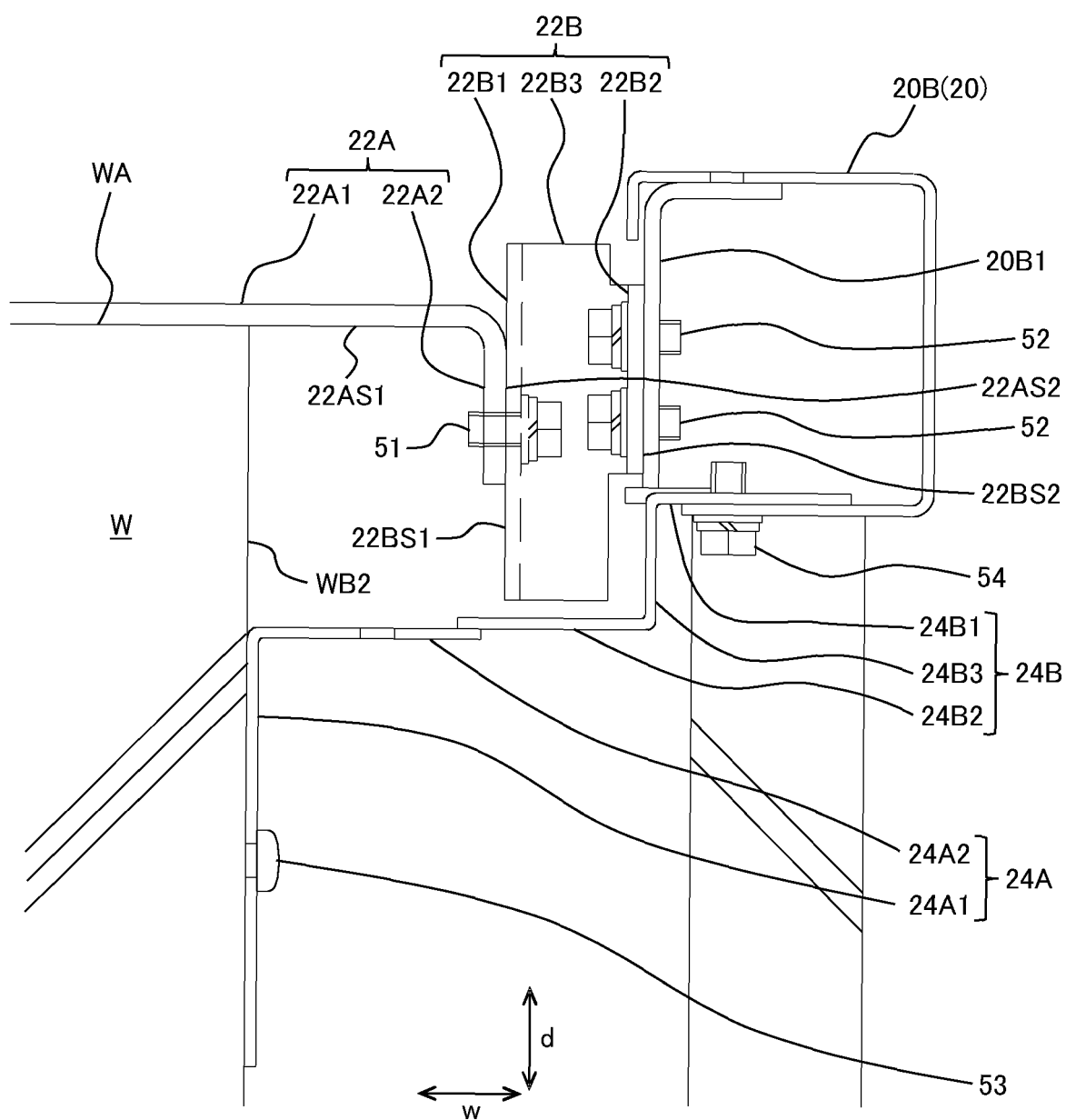


FIG. 5

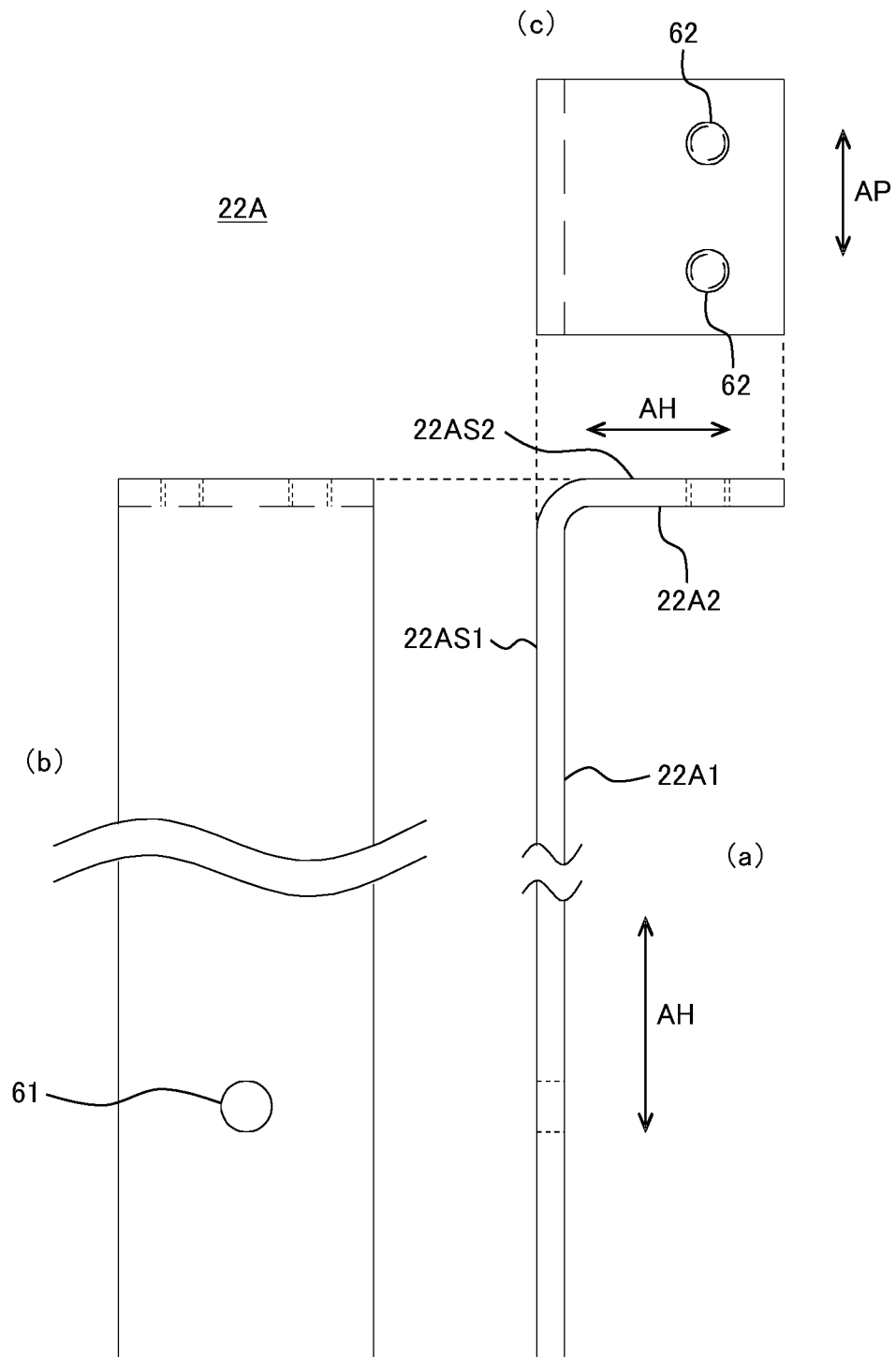


FIG. 6

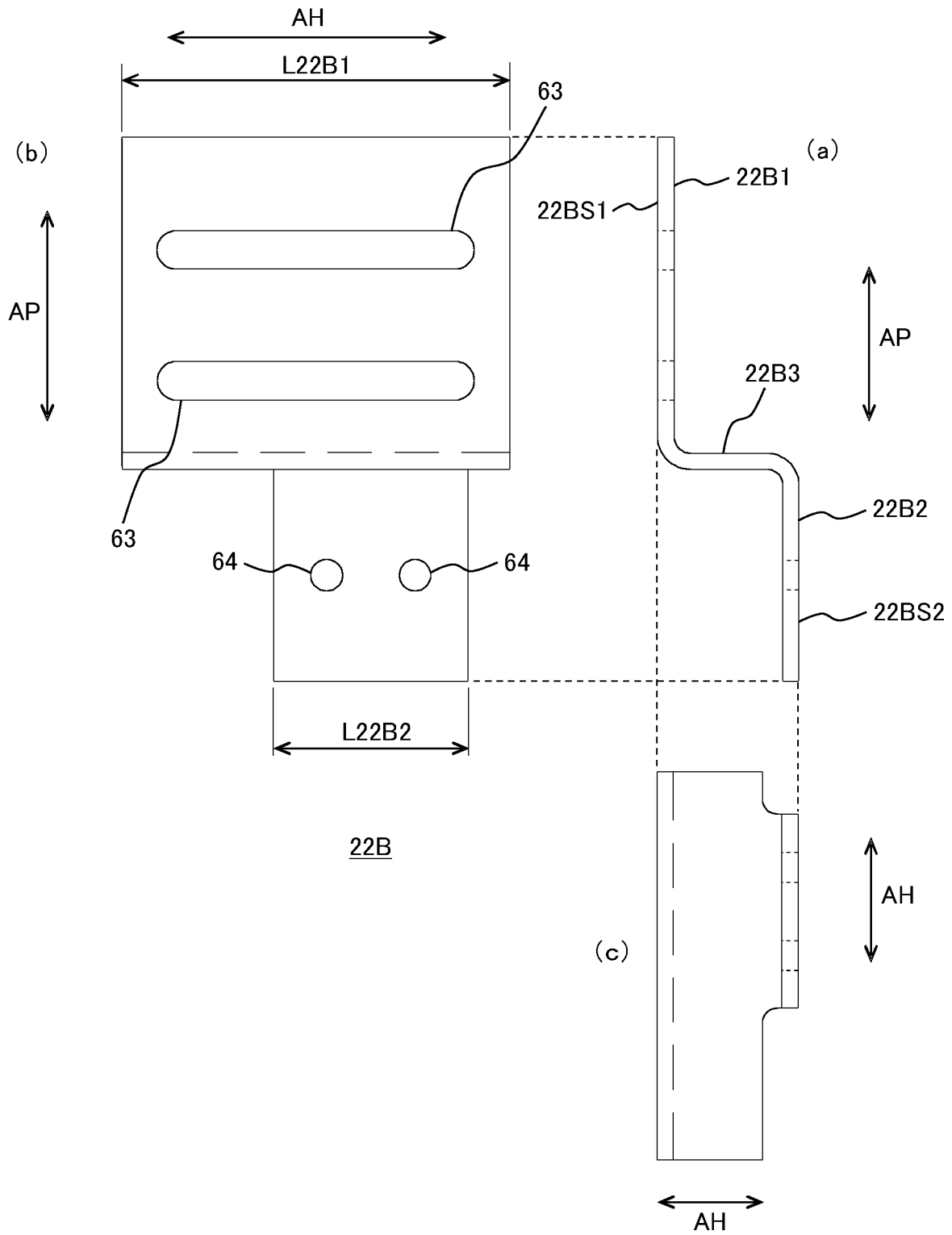


FIG. 7

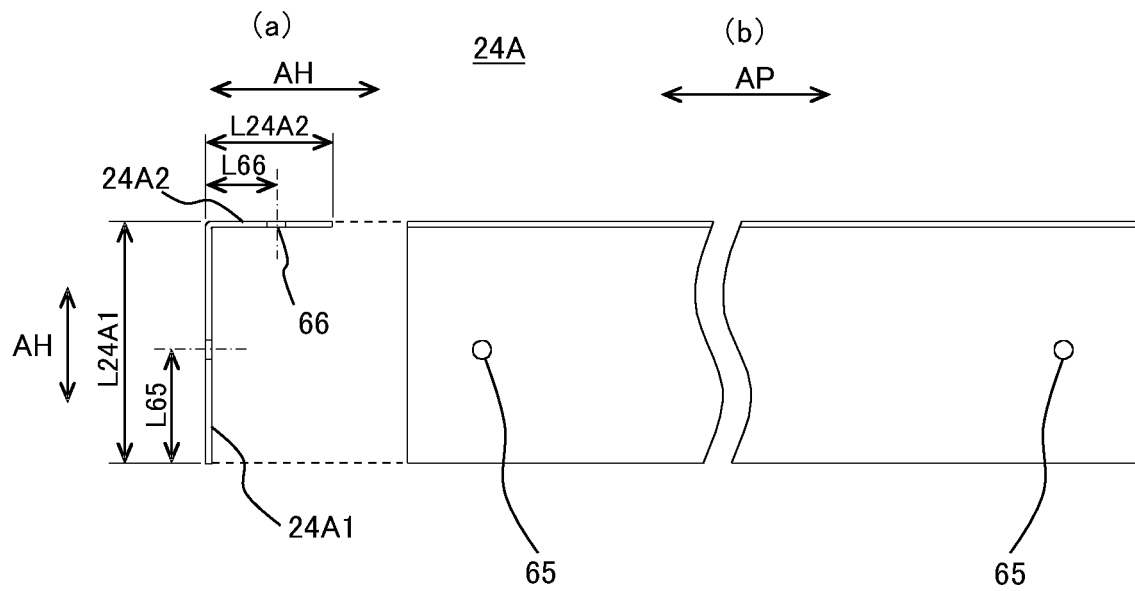


FIG. 8

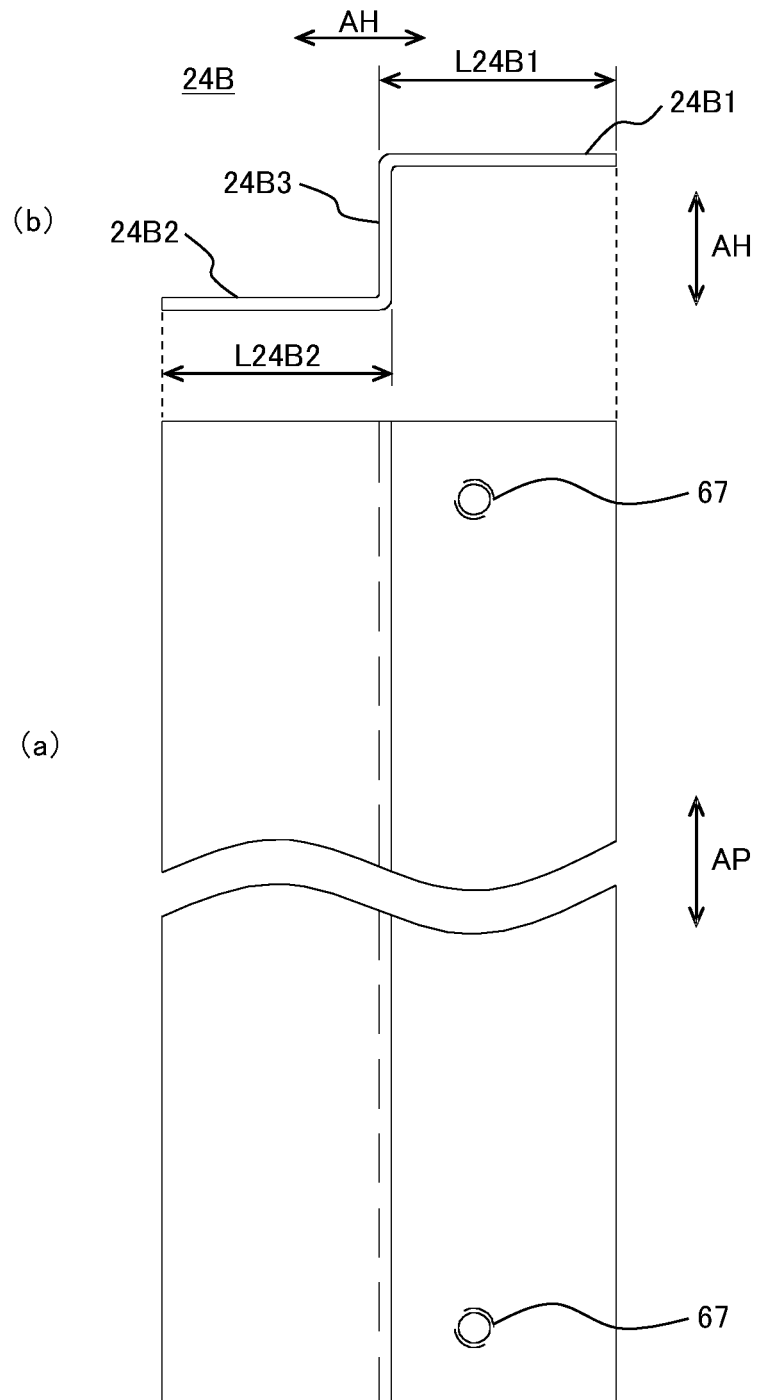


FIG. 9

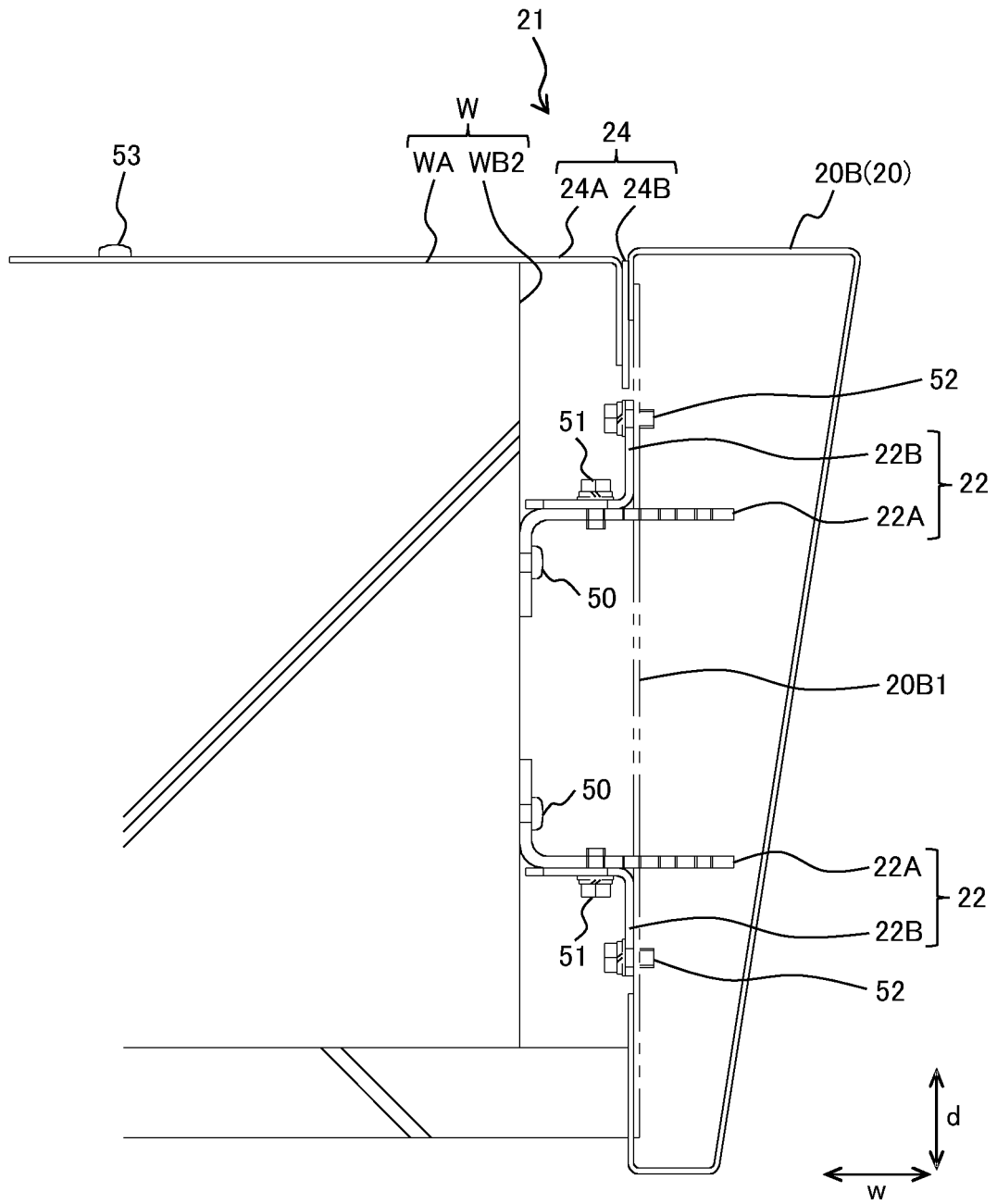


FIG. 10

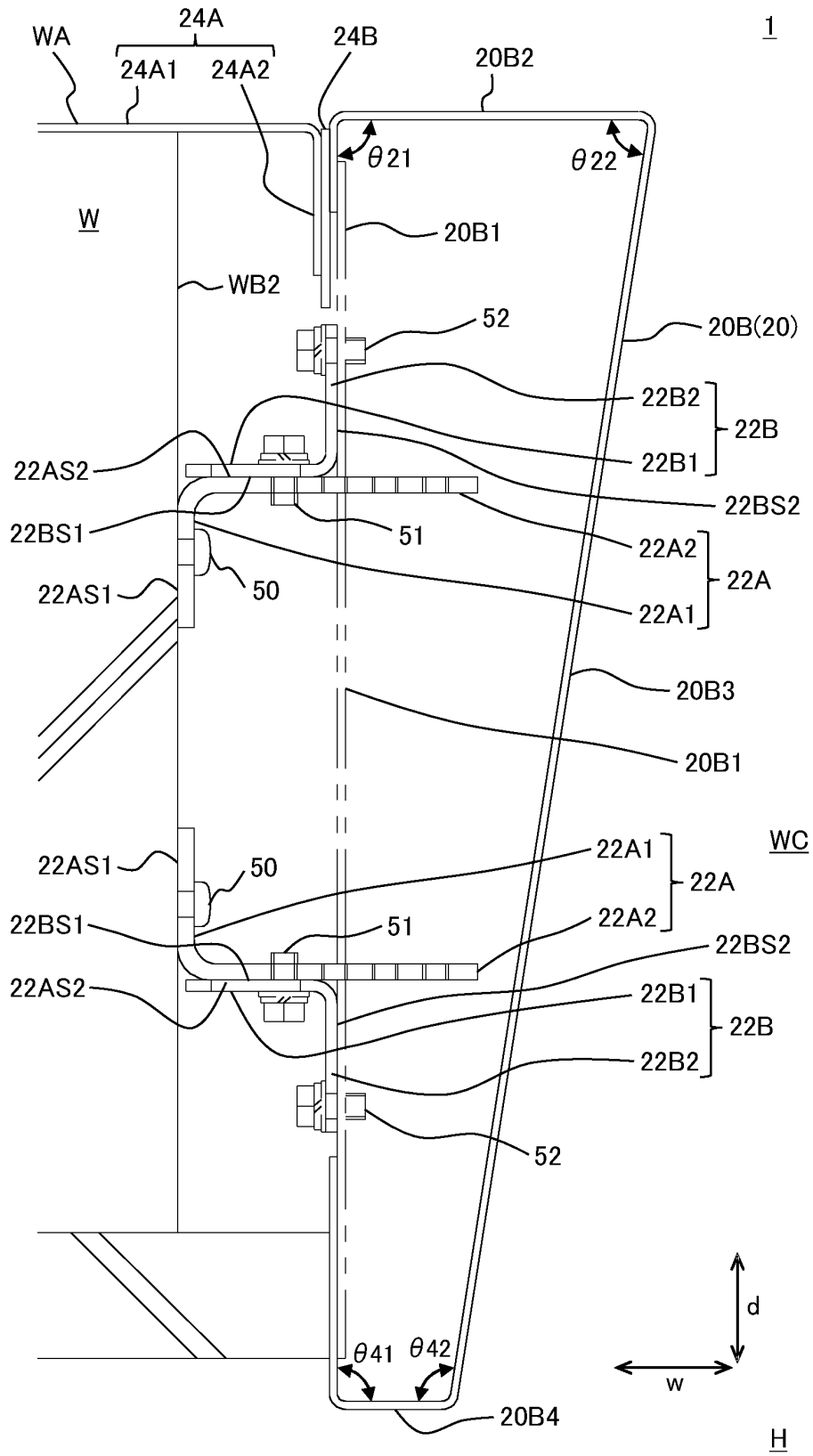


FIG. 11

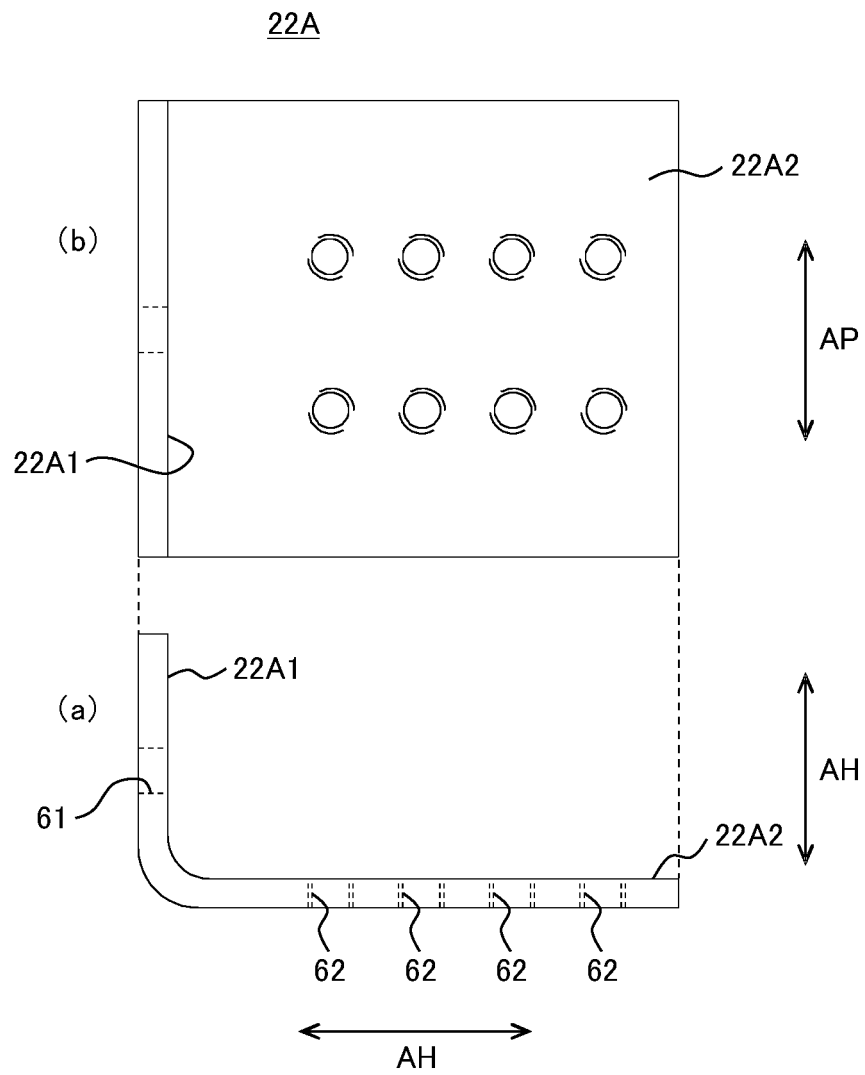


FIG. 12

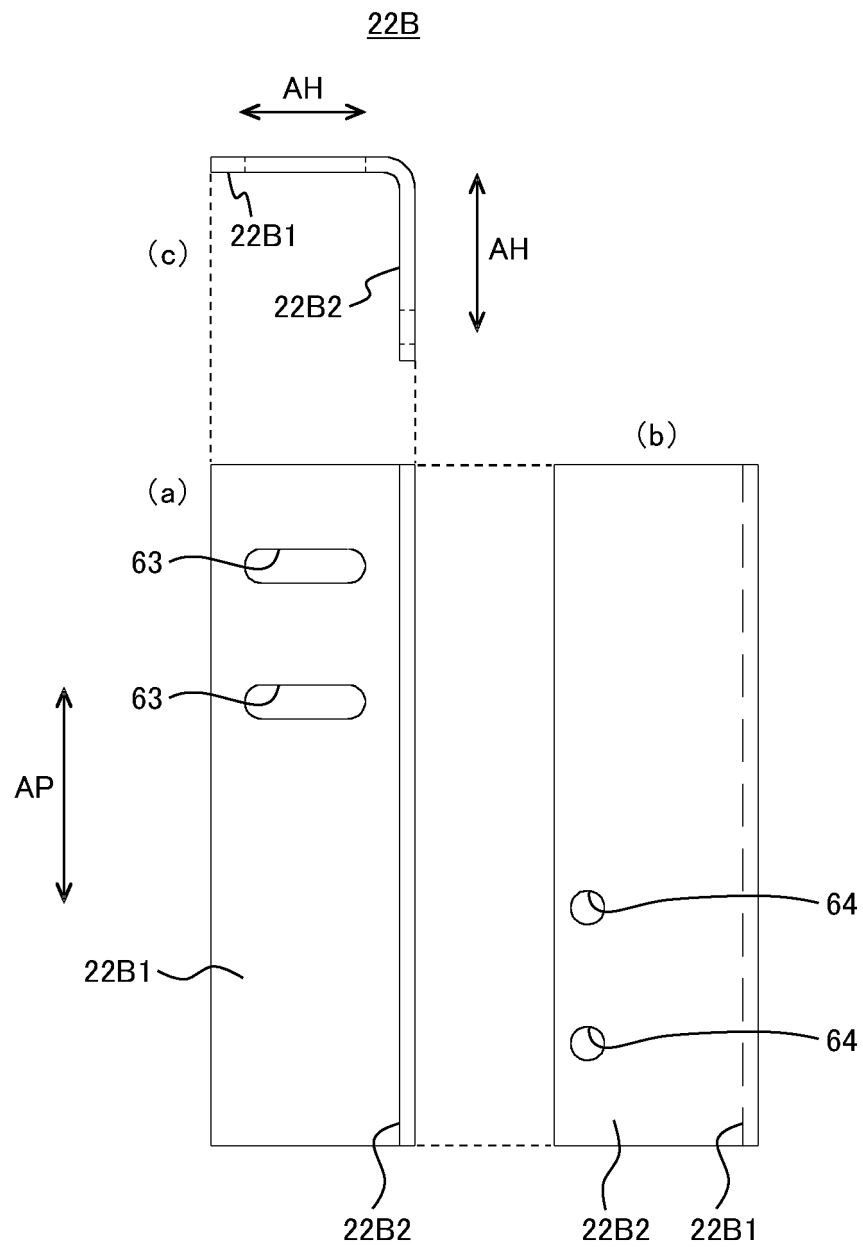


FIG. 13

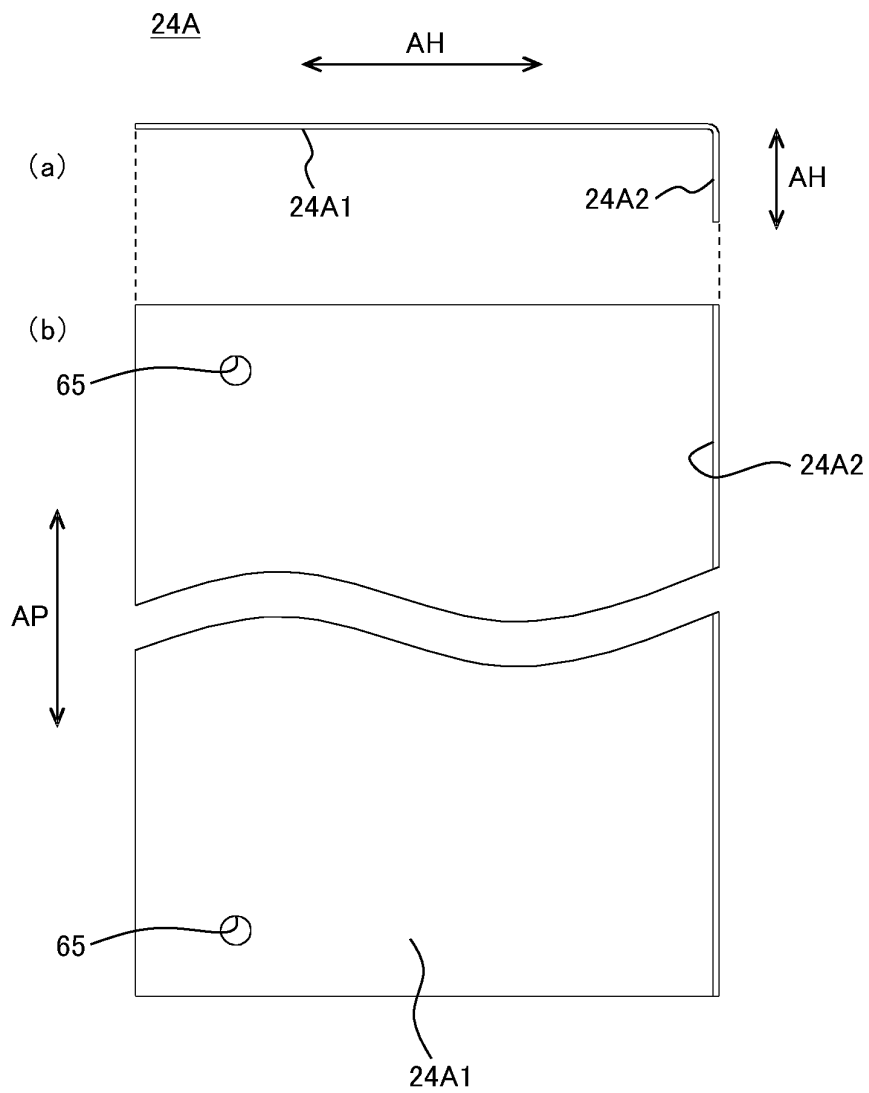
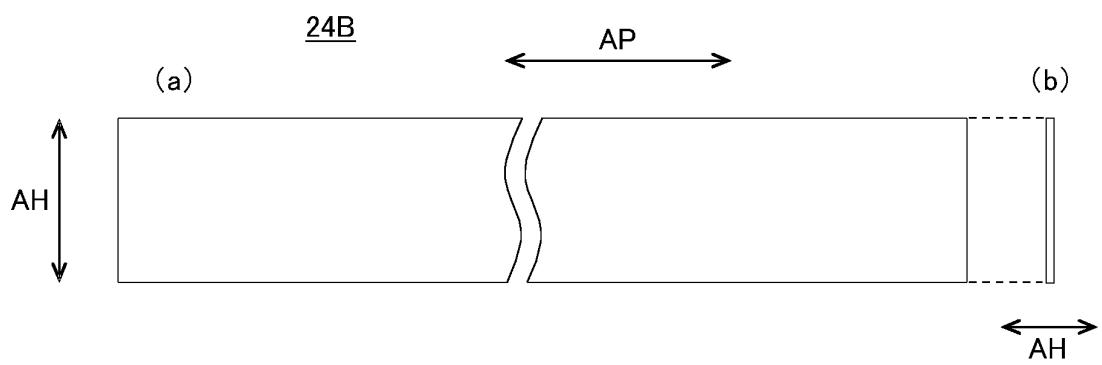


FIG. 14



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2020/019013

A. CLASSIFICATION OF SUBJECT MATTER
Int. Cl. B66B13/30 (2006.01) i
FI: B66B13/30 H

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. B66B13/30

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Published examined utility model applications of Japan 1922-1996
Published unexamined utility model applications of Japan 1971-2020
Registered utility model specifications of Japan 1996-2020
Published registered utility model applications of Japan 1994-2020

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.
Y	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 104017/1980 (Laid-open No. 26578/1982) (TOKYO SHIBAURA ELECTRIC CO., LTD.) 12 February 1982, description, p. 4, line 14 to p. 6, line 9, fig. 5-8	1-11
Y	JP 2014-69966 A (TOSHIBA ELEVATOR AND BUILDING SYSTEMS CORP.) 21 April 2014, paragraphs [0011]-[0020], fig. 1-3	1-11
Y	JP 3-31189 A (HITACHI ELEVATOR ENGINEERING & SERVICE CO LTD) 08 February 1991, p. 2, lower right column, line 8 to p. 3, lower left column, line 5, fig. 4	6-11

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

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Date of the actual completion of the international search
04.08.2020

Date of mailing of the international search report
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Tokyo 100-8915, Japan

Authorized officer

Telephone No.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2020/019013

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 10-7356 A (HITACHI, LTD.) 13 January 1998, entire text, all drawings	1-11
A	JP 2009-120314 A (MITSUBISHI ELECTRIC CORP.) 04 June 2009, entire text, all drawings	1-11
A	JP 2006-248632 A (MITSUBISHI ELECTRIC CORP.) 21 September 2006, entire text, all drawings	1-11

Form PCT/ISA/210 (continuation of second sheet) (January 2015)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/JP2020/019013

Patent Documents referred to in the Report	Publication Date	Patent Family	Publication Date
JP 57-26578 U1	12.02.1982	(Family: none)	
JP 2014-69966 A	21.04.2014	(Family: none)	
JP 3-31189 A	08.02.1991	(Family: none)	
JP 10-7356 A	13.01.1998	(Family: none)	
JP 2009-120314 A	04.06.2009	(Family: none)	
JP 2006-248632 A	21.09.2006	WO 2006/095562 A1	
		EP 1857400 A1	
		CN 1968887 A	
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REFERENCES CITED IN THE DESCRIPTION

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