(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 3 076 095 A1**

(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
05.10.2016 Bulletin 2016/40

(21) Application number: **14865300.9**

(22) Date of filing: **26.11.2014**

(51) Int Cl.:
F24F 13/20 *(2006.01)* ***F24F 1/00*** *(2011.01)*

(86) International application number:
PCT/JP2014/081288

(87) International publication number:
WO 2015/080170 (04.06.2015 Gazette 2015/22)

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME

(30) Priority: **26.11.2013 JP 2013244417**
26.11.2013 JP 2013244418
26.11.2013 JP 2013244419
26.11.2013 JP 2013244420
27.12.2013 JP 2013271801

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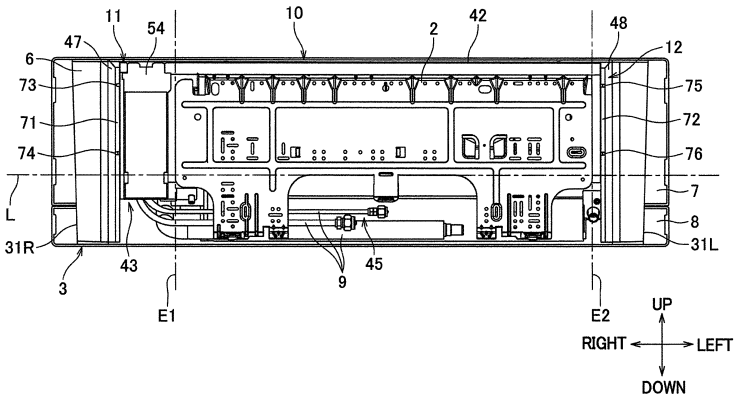
(54) INDOOR UNIT

(57) In a known indoor unit, a casing may move away from a wall surface and a gap may be formed between the casing and the wall surface, with the result that the design of the indoor unit may be deteriorated.

An indoor unit includes a mounting board 2 fixed to a wall surface and a bottom frame 10 (casing) attached to the mounting board 2. The bottom frame 10 (casing) has screw holes 73 to 76 (screw fixing portions) for fixing the bottom frame 10 (casing) to the wall surface of the room.

FIG.6



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Description

[Technical Field]

[0001] The present invention relates to an indoor unit used in, for example, an air conditioner.

[Background Art]

[0002] There is a known indoor unit which is a wall mounted type mounted on a wall surface of a room. This indoor unit includes a mounting board fixed to the wall surface of the room and a casing mounted on the mounting board.

[0003] In the known indoor unit, the mounting board is often screwed onto the wall surface of the room at upper and lower end portions, and the casing is often fixed to the mounting board at fitting portions (claw portions) provided at upper and lower end portions of the mounting board. In addition to the above, in the known indoor unit, a pipe connected with an outdoor unit is typically provided between the mounting board and the casing.

[Citation List]

[Patent Literatures]

[0004] [Patent Literatures 1] Japanese Unexamined Patent Publication No. 10-185298

[Summary of Invention]

[Technical Problem]

[0005] In the indoor unit above, when, for example, the mounting board has a notch portion which is at a lower part of the mounting board so as not to oppose the back surface of the casing, the pipe connected with the outdoor unit may protrude toward the wall surface from the notch portion of the mounting board. In this connection, when the lower part of the mounting board cannot be screwed onto the wall surface of the room on account of a recess formed in the wall surface to oppose the lower part of the mounting board or when screwing the lower part of the mounting board onto the wall surface is forgotten, the casing may move away from the wall surface together with the mounting board to form a gap between the casing and the wall surface, with the result that the design of the indoor unit may be deteriorated.

[0006] When, for example, the mounting board and the casing are loosely fitted, the casing may move away from the mounting board on account of the weight of the indoor unit and a gap may be formed between the casing and the wall surface, with the result that the design of the indoor unit may be deteriorated.

[0007] An object of the present invention is to provide an indoor unit which does not allow the formation of a gap between a casing and a wall surface.

[Solution to Problem]

[0008] According to the first aspect of the invention, an indoor unit includes: a mounting board fixed to a wall surface; and a casing attached to the mounting board, the casing having a screw fixing portion for fixing the casing to the wall surface.

[0009] In this indoor unit, because the casing is screwed onto the wall surface of the room, it is possible to prevent a gap from being formed between the casing and the wall surface. The design of the indoor unit is therefore improved.

[0010] According to the second aspect of the invention, the indoor unit of the first aspect is arranged such that the screw fixing portion is provided outside an end portion in a longitudinal direction of the mounting board.

[0011] In this indoor unit, because the screw fixing portion is provided outside of the end portion in the longitudinal direction of the mounting board, the mounting board is less likely to be viewable in side view when the casing is fixed to the wall surface of the room.

[0012] According to the third aspect of the invention, the indoor unit of the second aspect is arranged such that the casing includes a protrusion which is provided outside in the longitudinal direction of the end portion of the mounting board and protrudes toward the back surface side.

[0013] In this indoor unit, because of the presence of the mounting board between the casing and the wall surface of the room, a gap is formed between the casing and the wall surface of the room, at a position outside the end portion in the longitudinal direction of the mounting board. In this regard, because the protrusion of the casing is supported by the wall surface when the casing is fixed to the wall surface of the room, it is possible to prevent the outer part of the casing from warping toward the wall surface side. Furthermore, the mounting board is less likely to be viewable in side view.

[0014] According to the fourth aspect of the invention, the indoor unit of the third aspect is arranged such that the screw fixing portion is provided in the protrusion.

[0015] In this indoor unit, the outer part of the casing is less likely to warp toward the wall surface side as compared to cases where the screw fixing portion is provided outside in the longitudinal direction of the protrusion.

[0016] According to the fifth aspect of the invention, the indoor unit of the third aspect is arranged such that the screw fixing portion is provided between the end portion in the longitudinal direction of the mounting board and the protrusion.

[0017] In this indoor unit, the outer part of the casing is less likely to warp toward the wall surface side as compared to cases where the screw fixing portion is provided outside in the longitudinal direction of the protrusion.

[0018] According to the sixth aspect of the invention, the indoor unit of any one of the third to fifth aspects is arranged such that the protrusion covers substantially entire width of the casing in a height direction.

[0019] In this indoor unit, because the protrusion covers the substantially entire width of the casing in the height direction, the mounting board is less likely to be viewable in side view.

[0020] According to the seventh aspect of the invention, the indoor unit of any one of the second to sixth aspects is arranged such that, in the casing, a notch extending along the height direction and provided for drawing out a pipe is formed outside in the longitudinal direction of the end portion of the mounting board and on the back surface side of the casing, and the screw fixing portion is provided outside in the longitudinal direction of the notch.

[0021] In this indoor unit, because a part of the casing which part is outside in the longitudinal direction of the notch for drawing out the pipe is low in rigidity, the gap between the casing and the wall surface tends to be wide in that outer part in the longitudinal direction. In this regard, because the screw fixing portion is formed at that outer part in the longitudinal direction, it is possible to prevent the gap between the casing and the wall surface from widening at that part.

[0022] According to the eighth aspect of the invention, the indoor unit of any one of the first to seventh aspects is mounted on a wall surface having a recess opposing a lower part of the mounting board, the mounting board including, at an upper end portion, a mounting board fixing portion for fixing the mounting board to the wall surface, and in the height direction, the screw fixing portion being provided between the mounting board fixing portion and the recess.

[0023] In this indoor unit, because the lower part of the mounting board cannot be screwed onto the wall surface of the room, the gap between the lower part of the indoor unit and the wall surface of the room tends to be wide. In this regard, because the screw fixing portion is provided between the mounting board fixing portion provided at the upper end portion of the mounting board and the recess of the wall surface in the height direction, it is possible to prevent the gap between the lower part of the indoor unit and the wall surface from widening.

[Advantageous Effects of Invention]

[0024] As described hereinabove, the present invention brings about the following effects.

[0025] According to the first aspect of the invention, because the casing is screwed onto the wall surface of the room, it is possible to prevent a gap from being formed between the casing and the wall surface. The design of the indoor unit is therefore improved.

[0026] According to the second aspect of the invention, because the screw fixing portion is provided outside in the longitudinal direction of the end portion of the mounting board, the mounting board is less likely to be viewable in side view when the casing is fixed to the wall surface of the room.

[0027] According to the third aspect of the invention, because of the presence of the mounting board between the casing and the wall surface of the room, a gap is formed between the casing and the wall surface of the room, at a position outside the end portion in the longitudinal direction of the mounting board. In this regard, because the protrusion of the casing is supported by the wall surface when the casing is fixed to the wall surface of the room, it is possible to prevent the outer part of the casing from warping toward the wall surface side. Furthermore, the mounting board is less likely to be viewable in side view.

[0028] According to the fourth aspect of the invention, the outer part of the casing is less likely to warp toward the wall surface side as compared to cases where the screw fixing portion is provided outside in the longitudinal direction of the protrusion.

[0029] According to the fifth aspect of the invention, the outer part of the casing is less likely to warp toward the wall surface side as compared to cases where the screw fixing portion is provided outside in the longitudinal direction of the protrusion.

[0030] According to the sixth aspect of the invention, because the protrusion covers the substantially entire width of the casing in the height direction, the mounting board is less likely to be viewable in side view.

[0031] According to the seventh aspect of the invention, because a part of the casing which part is outside in the longitudinal direction of the notch for drawing out the pipe is low in rigidity, the gap between the casing and the wall surface tends to be wide in that outer part in the longitudinal direction. In this regard, because the screw fixing portion is formed at that outer part in the longitudinal direction, it is possible to prevent the gap between the casing and the wall surface from widening at that part.

[0032] According to the eighth aspect of the invention, because the lower part of the mounting board cannot be screwed onto the wall surface of the room, the gap between the lower part of the indoor unit and the wall surface of the room tends to be wide. In this regard, because the screw fixing portion is provided between the mounting board fixing portion provided at the upper end portion of the mounting board and the recess of the wall surface in the height direction, it is possible to prevent the gap between the lower part of the indoor unit and the wall surface from widening.

[Brief Description of Drawings]

[0033]

[FIG. 1] FIG. 1A is an oblique perspective of an indoor unit of an embodiment of the present invention during operation stop, FIG. 1B is an oblique perspective of the indoor unit during operation, and FIG. 1C is an oblique perspective of the indoor unit from which a front panel and an outlet panel have been detached.
[FIG. 2] FIG. 2A is a front elevation of the indoor unit during operation stop, whereas FIG. 2B is a front elevation of the indoor unit during operation.
[FIG. 3] FIG. 3A is a right side view of the indoor unit during operation stop, whereas FIG. 3B is a right side view of the indoor unit during operation.
[FIG. 4] FIG. 4 is a front elevation of the indoor unit from which the front panel and the outlet panel have been detached.
[FIG. 5] FIG. 5 schematically shows a vertical cross section of the indoor unit.
[FIG. 6] FIG. 6 is a back elevation of the indoor unit.
[FIG. 7] FIG. 7 is a front elevation of only a mounting board.
[FIG. 8] FIG. 8 is a back elevation of the mounting board and a bottom frame.
[FIG. 9] FIG. 9 is a front elevation of the mounting board and the bottom frame.
[FIG. 10] FIG. 10 is a top view of the mounting board and the bottom frame.
[FIG. 11] FIG. 11A is a right side view of the bottom frame, whereas FIG. 11B is a right side view of the frame main body after a decorative plate is removed from the bottom frame.
[FIG. 12] FIG. 12 is a schematic side view of the indoor unit attached to a wall surface having a recess opposing a lower part of the mounting board.
[FIG. 13] FIGs. 13A to 13C show how the indoor unit is mounted on the wall surface having the recess opposing the lower part of the mounting board. FIG. 13A shows the wall surface before the attachment of the indoor unit, FIG. 13B shows the wall surface after the attachment of the mounting board, and FIG. 13C shows the wall surface after the mounting of the indoor unit.
[FIG. 14] FIG. 14 is a back elevation of a mounting board and a bottom frame of an indoor unit of a modification of the present invention.

[Description of Embodiments]

[0034] The following will describe an indoor unit of an air conditioner of an embodiment of the present invention.

[Overall Structure of Air Conditioner]

[0035] The air conditioner of the embodiment of the present invention is formed of an indoor unit 1 shown in FIG. 1 and an unillustrated outdoor unit. The indoor unit 1 is on the whole narrow in shape in one direction, and is attached to a wall surface of a room so that the length thereof is horizontal. Hereinafter, a direction of protrusion from the wall surface on which the indoor unit 1 is provided will be referred to as "forward", and a direction opposite to the forward will be referred to as "backward". Furthermore, a left-right direction shown in FIG. 1 will be simply referred to as "left-right direction", and an up-down direction shown in FIG. 1 will be simply referred to as "up-down direction".

[Structure of Indoor Unit]

[0036] As shown in FIG. 6, the indoor unit 1 includes a mounting board 2 fixed to a wall surface of a room and an indoor unit main body 3 attached to the mounting board 2.

[Mounting Board]

[0037] As shown in FIG. 7, the mounting board 2 is a substantially rectangular metal plate and is provided with two legs at the lower part. At an upper end of the mounting board 2, three fitting portions 81 (claw portions) are provided to be fitted with a later-described bottom frame 10 of the indoor unit main body 3. At lower ends of the two legs 84 of the

mounting board 2, fitting portions 82 (claw portions) are provided to be fitted with the later-described bottom frame 10 of the indoor unit main body 3. At an upper end portion around the upper end of the mounting board 2, screw holes (mounting board fixing portions) are formed to fix the mounting board 2 to a wall surface of a room. The screw holes (mounting board fixing portions) are provided along the horizontal direction. In FIG. 7, for the sake of convenience, reference numbers are assigned only to three screw holes 85 (mounting board fixing portions) which are actually used among the screw holes (mounting board fixing portions), and no reference numbers are assigned to the remaining screw holes (mounting board fixing portions). Furthermore, in the legs 84 which are the lower part of the mounting board 2, screw holes are formed to fix the mounting board 2 to the wall surface of the room. In the present embodiment of the present invention, the lower part of the mounting board 2 indicates a region below a horizontal line L which is along the upper end of a notch portion 83 formed between the two legs 84.

[Indoor Unit Main Body]

[0038] As shown in FIGs. 1 to 5, the indoor unit main body 3 mainly includes members such as a main body 4, a front panel 7, an outlet panel 8, a wind direction changing plate 50, and an auxiliary wind direction changing plate 52.

[Main Body]

[0039] As shown in FIG. 4 and FIG. 5, the main body 4 includes a case main body 5 including a front grill 6 and a bottom frame 10 (casing), and an indoor heat exchanger 20, a cross flow fan 21 (hereinafter, this may be simply referred to as a fan 21), a fan motor, and an electric component box 40, which are housed inside the case main body 5.

[0040] As shown in FIG. 5, the indoor heat exchanger 20 and the fan 21 are attached to the bottom frame 10. The indoor heat exchanger 20 and the fan 21 are arranged such that the fan 21 is provided at a substantial center of the indoor unit 1 in cross section and the indoor heat exchanger 20 which is inverse V-shaped is provided to surround an upper half of the fan 21.

[0041] As shown in FIG. 4, the electric component box 40 is provided to the right of the indoor heat exchanger 20 and the fan 21 in front elevation. The electric component box 40 houses a controller therein for controlling components of the indoor unit 1 required for operations such as cooling and warming. This controller is connected with the fan motor driving the fan 21, a drive motor of a driver of an opening mechanism 61 for opening the front panel 7 and the outlet panel 8, and a flap motor and an auxiliary flap motor for driving the wind direction changing plate 50 and the auxiliary wind direction changing plate 52, to control the fan 21, the driver, the wind direction changing plate 50, and the auxiliary wind direction changing plate 52.

[0042] The front grill 6 is attached to the bottom frame 10 from the front side, and covers the front, sides, top, and bottom of the main body 4. The front grill 6 is formed by molding a resin material, is thin and rectangular parallelepiped in shape, and is entirely open at the back. As shown in FIG. 4, this front grill 6 includes a top plate portion 30, a front surface 31, and a bottom surface 32.

[0043] The substantially entirety of the top plate portion 30 functions as a first inlet port 23 (inlet port) for sucking air inside the room. The front surface 31 (front surface of the casing 5) has ends 31L and 31R, and is substantially rectangular and long in the left-right direction in front elevation, as shown in FIG. 4. The front panel 7 and the outlet panel 8 are attached to the front surface 31, and the opening mechanism 61 for opening and closing the front panel 7 and the outlet panel 8 is provided. As shown in FIG. 1A, etc., during operation stop of the indoor unit 1, the upper part of the front surface 31 is closed by the front panel 7, whereas the lower part of the front surface 31 is closed by the outlet panel 8. In the meanwhile, during operation of the indoor unit 1, as shown in FIG. 1B, a gap is formed between the front panel 7 and the front surface 31 as the front panel 7 is moved substantially horizontally forward by the opening mechanism 61, with the result that the second inlet port 26 for sucking the room air is formed. Furthermore, as the outlet panel 8 is moved to a position between the front panel 7 and the front grill 6, the outlet port 27 is opened.

[0044] The outlet port 27 is formed at a position below the front surface 31 and forward of the bottom surface 32. This outlet port 27 is a port for blowing out wind from the fan 21 into the room, and is horizontally long in shape in front elevation, as shown in FIG. 2B. The front surface of this outlet port 27 is closed by the outlet panel 8 during operation stop of the indoor unit 1. The bottom surface of this outlet port 27 is closed by the wind direction changing plate 50 attached to the bottom frame 10, during operation stop of the indoor unit 1.

(Bottom Frame)

[0045] The bottom frame 10 (casing) is made of a resin material and is shaped to cover the bottom, back, and the sides of the fan 21. As shown in FIG. 8, the bottom frame 10 includes a frame main body 42 and decorative plates 47 and 48 (see also FIG. 3) attached to the left and right ends of the frame main body 42, respectively. The frame main body 42 fixes the indoor heat exchanger 20 and the fan 21, and is attached to the above-described mounting board 2.

[0046] As shown in FIG. 8 and FIG. 11, the bottom frame 10 is provided with, at its lower part (region below the above-described horizontal line L), a recess 45 which extends along the longitudinal direction (left-right direction) and is for drawing out a pipe. In this recess 45, as shown in FIG. 6, pipes 9 (e.g., an auxiliary pipe or a local pipe connected with the indoor heat exchanger 20) connected with the outdoor unit are provided. Furthermore, as shown in FIG. 8, the bottom frame 10 is provided with a first outer portion 11 and a second outer portion 12 provided outside in the longitudinal direction of the end portions in the longitudinal direction of the mounting board 2. The first outer portion 11 is a portion to the right of a vertical line E1 which extends along the right end of the mounting board 2, whereas the second outer portion 12 is a portion to the left of a vertical line E2 which extends along the left end of the mounting board 2. In the back surface of the first outer portion 11, a notch 43 (hutched part in FIG. 8) is formed to extend in the height direction for drawing out the pipe. In this notch 43, the pipes 9 (e.g., an auxiliary pipe connected with the indoor heat exchanger 20) connected with the outdoor unit are provided. As shown in FIG. 6, the notch 43 for drawing out the pipe is closed by a lid 54 provided on the back surface side of the notch 43, when viewed from the back surface side.

[0047] As shown in FIG. 8, the first outer portion 11 and the second outer portion 12 have a first protrusion 71 and a second protrusion 72 protruding toward the back surface side, respectively. The first protrusion 71 and the second protrusion 72 are provided to cover the substantially entire width of the bottom frame 10 in the height direction. As shown in FIG. 10, the first protrusion 71 and the second protrusion 72 protrude toward the wall surface S side (back surface side) from the back surface 44 of the frame main body 42. The protruding length W1 of the second protrusion 72 is substantially identical with or slightly less than the thickness W2 of the mounting board 2, for example. In a manner similar to the protruding length W1 of the second protrusion 72, the protruding length of the first protrusion 71 is substantially identical with or slightly less than the thickness W2 of the mounting board 2, for example.

[0048] As shown in FIG. 8, the first protrusion 71 and the second protrusion 72 have screw holes 73 to 76 (screw fixing portions) for fixing the bottom frame 10 to the wall surface of the room. The screw holes 73 and 74 are formed in the first protrusion 71, whereas the screw holes 75 and 76 are formed in the second protrusion 72. The screw holes 73 and 75 are formed at around the upper ends of the first protrusion 71 and the second protrusion 72, respectively. The screw holes 73 and 75 are substantially identical in the height direction with the screw holes 85 (mounting board fixing portions) of the mounting board 2. The screw holes 74 and 76 are provided below the screw holes 73 and 75, respectively. As shown in FIG. 12, when the indoor unit 1 is attached to the wall surface S having the recess D opposing the lower part of the mounting board 2, the screw hole 74 (and the screw hole 76) is positioned in an interval W3 between the screw hole 85 (mounting board fixing portion) at the upper end portion of the mounting board 2 and the recess D in the height direction. The screw holes 74 and 76 are preferably closer to the recess D than to the screw hole 85 in the height direction.

[0049] As shown in FIG. 9, at parts where the screw holes 73 to 76 are formed, the frame main body 42 of the bottom frame 10 overlaps the decorative plate 47 in the front-back direction and the frame main body 42 of the bottom frame 10 overlaps the decorative plate 48 in the front-back direction. For this reason, the screw holes 73 and 74 are each formed of holes formed in the bottom frame 10 and the decorative plate 47, and the screw holes 75 and 76 are each formed of holes formed in the bottom frame 10 and the decorative plate 48. Therefore, as screws P (see FIG. 10) are inserted into the screw holes 73 to 76 and the screws P are tightened onto the wall surface of the room, the frame main body 42 and the decorative plate 47 are tightened to each other and the frame main body 42 and the decorative plate 48 are tightened to each other.

[0050] As shown in FIG. 8, the first protrusion 71 is provided outside in the longitudinal direction of the notch 43 for drawing out the pipe, which is formed in the back surface of the first outer portion 11. The screw holes 73 and 74 of the first protrusion 71 are therefore outside in the longitudinal direction of the notch 43 for drawing out the pipe.

[0051] Now, referring to FIG. 13, the following will describe how the indoor unit 1 is attached to the wall surface S having the recess D opposing the lower part of the mounting board 2.

[0052] FIG. 13A shows the wall surface S before the attachment of the indoor unit 1. As shown in FIG. 13A, the recess D is a recess extending along the horizontal direction. As shown in FIG. 13B, to begin with, the mounting board 2 is attached to the wall surface S so that the recess D opposes the lower part of the mounting board 2. As shown in FIG. 13B, because the mounting board 2 is in contact with the wall surface S at a portion above the lower part of the mounting board 2 (i.e. , the region below the horizontal line L), the mounting board 2 is screwed onto the wall surface S at the screw holes 85 (mounting board fixing portions) formed at around the upper end of the mounting board 2. In the meanwhile, at the lower part of the mounting board 2 (i.e. , the region below the horizontal line L), the mounting board 2 is not in contact with the wall surface S, and hence the mounting board 2 is not screwed onto the wall surface S at the lower part of the mounting board 2 (e.g., at the two legs 84). As shown in FIG. 13C, the indoor unit main body 3 is then attached to the mounting board 2. As shown in FIG. 13C, in the recess 45 of the bottom frame 10 of the indoor unit main body 3, the pipes 9 are provided to be connected with the outdoor unit.

[0053] In this regard, depending on the arrangement of the pipe 9 to be connected with the outdoor unit, the pipes 9 may protrude toward the wall surface S from the notch portion 83 of the mounting board 2. In such a case, when the lower part of the mounting board 2 cannot be screwed onto the wall surface S because the wall surface has the recess

D opposing the lower part of the mounting board 2, the bottom frame 10 may move away from the wall surface S together with the mounting board 2 due to force F1 (indicated by the arrow in FIG. 13) applied to the lower part of the bottom frame 10, with the result that a gap may be formed between the bottom frame 10 and the wall surface S and the design of the indoor unit 1 may be deteriorated. In this regard, in the indoor unit 1, because the screw holes 74 and 76 are provided in the interval W3 between the screw hole 85 (mounting board fixing portion) at the upper end portion of the mounting board 2 and the recess D of the wall surface S in the height direction, the bottom frame 10 does not move away from the wall surface S even if the lower part of the bottom frame 10 receives the force F1, and hence the gap between the bottom frame 10 and wall surface S is not widened.

<Characteristics of Indoor Unit of Present Embodiment>

[0054] In the indoor unit 1 of the present embodiment, as the bottom frame 10 (casing) attached to the mounting board 2 has the screw holes 73 to 76 (screw fixing portions) for fixing the bottom frame 10 to the wall surface, the bottom frame 10 is screwed onto the wall surface of the room. It is therefore possible to prevent the design of the indoor unit 1 from being deteriorated due to the formation of a gap between the bottom frame 10 and the wall surface.

[0055] In addition to the above, in the indoor unit 1 of the present embodiment, because the screw holes 73 to 76 (screw fixing portions) are formed in the first outer portion 11 and the second outer portion 12 of the bottom frame 10 (casing) which are provided outside in the longitudinal direction of the end portions in the longitudinal direction of the mounting board 2, the mounting board 2 is less likely to be viewable in side view when the bottom frame 10 is fixed to the wall surface of the room.

[0056] In addition to the above, in the indoor unit 1 of the present embodiment, because of the presence of the mounting board 2 between the bottom frame 10 (casing) and the wall surface of the room, a gap is formed between the first outer portion 11 and the second outer portion 12 of the bottom frame 10 and the wall surface of the room. In this regard, because the first protrusion 71 and the second protrusion 72 of the bottom frame 10 are supported by the wall surface when the bottom frame 10 is fixed to the wall surface of the room, it is possible to prevent the first outer portion 11 and the second outer portion 12 of the bottom frame 10 from warping toward the wall surface side. Furthermore, the mounting board 2 is less likely to be viewable in side view.

[0057] In addition to the above, in the indoor unit 1 of the present embodiment, because the screw holes 73 to 76 (screw fixing portions) are formed in the first protrusion 71 and the second protrusion 72, the first outer portion 11 and the second outer portion 12 of the bottom frame 10 (casing) are less likely to warp toward the wall surface as compared to cases where the screw holes 73 to 76 are formed outside in the longitudinal direction of the first protrusion 71 and the second protrusion 72.

[0058] In addition to the above, in the indoor unit 1 of the present embodiment, because the first protrusion 71 and the second protrusion 72 are provided to cover the substantially entire width of the bottom frame 10 (casing) in the height direction, the mounting board 2 is less likely to be viewable in side view.

[0059] In addition to the above, in the indoor unit 1 of the present embodiment, because a part of the first outer portion 11 of the bottom frame 10 (casing) which part is outside in the longitudinal direction of the notch 43 for drawing out the pipe is low in rigidity, the gap between the bottom frame 10 and the wall surface tends to be wide in that outer part in the longitudinal direction. In this regard, because the screw holes 73 to 76 (screw fixing portions) are formed at that outer part in the longitudinal direction, it is possible to prevent the gap between the bottom frame 10 and the wall surface from widening at that part.

[0060] In addition to the above, in the indoor unit 1 of the present embodiment, as shown in FIG. 12, because the wall surface S has the recess D opposing the lower part of the mounting board 2, the lower part of the mounting board 2 cannot be screwed onto the wall surface S of the room. The gap between the lower part of the indoor unit main body 3 and the wall surface S of the room tends to be wide for this reason. In this regard, because the screw holes 74 and 76 (screw fixing portions) are provided between the screw hole 85 (mounting board fixing portion) provided at the upper end portion of the mounting board 2 and the recess D of the wall surface S in the height direction, it is possible to prevent the gap between the lower part of the bottom frame 10 and the wall surface S from widening.

[0061] Thus, the embodiment of the present invention is described hereinabove. However, the specific structure of the present invention shall not be interpreted as to be limited to the above described embodiments. The scope of the present invention is defined not by the above embodiment but by claims set forth below, and shall encompass the equivalents in the meaning of the claims and every modification within the scope of the claims.

[Modification]

[0062] Now, an indoor unit according to a modification will be described with reference to FIG. 14. In the indoor unit 1 of the embodiment above the screw holes 73 to 76 (screw fixing portions) are formed at the first protrusion 71 and the second protrusion 72. The indoor unit of the modification is different from the indoor unit 1 in that a screw hole 173 and

a screw 174 (screw fixing portions) are provided between the end portion in the longitudinal direction of the mounting board 2 (i.e., the vertical line E1 along the right end of the mounting board 2) and the first protrusion 71, and a screw hole 175 and a screw 176 (screw fixing portion) are provided between the end portion in the longitudinal direction of the mounting board 2 (i.e., the vertical line E2 along the left end of the mounting board 2) and the second protrusion 72.

[0063] In the indoor unit of the modification, because the screw holes 173 to 176 (screw fixing portions) are provided between the end portions in the longitudinal direction of the mounting board 2 and the first protrusion 71 and the second protrusion 72, the first outer portion 11 and the second outer portion 12 of the bottom frame 10 (casing) are less likely to warp toward the wall surface side as compared to cases where the screw holes 173 to 176 are formed outside in the longitudinal direction of the first protrusion 71 and the second protrusion 72.

[Other Modifications]

[0064] While in the embodiment above the screw holes 73 to 76 (screw fixing portions) are formed in the first outer portion 11 and the second outer portion 12, these screw holes 73 to 76 may be formed at any parts of the bottom frame 10 on condition that the bottom frame 10 can be screwed onto the wall surface of the room.

[0065] While in the embodiment above the screw holes 73 to 76 (screw fixing portions) are formed at two parts of each of the first outer portion 11 and the second outer portion 12, the number of the screw fixing portions formed in each of the first outer portion 11 and the second outer portion 12 may be one, or at least three. Furthermore, the screw fixing portions may be formed only in one of the first outer portion 11 and the second outer portion 12.

[0066] While in the embodiment above the first protrusion 71 and the second protrusion 72 are provided in the first outer portion 11 and the second outer portion 12, respectively, a protrusion may be provided in only one of the first outer portion 11 and the second outer portion 12, or may not be provided.

[0067] In addition to the above, while in the embodiment above the first protrusion 71 and the second protrusion 72 are provided to cover the substantially entire width of the bottom frame 10 (casing) in the height direction, the first protrusion 71 and the second protrusion 72 may cover a part of the bottom frame 10 in the height direction.

[0068] While in the embodiment above the screw holes 73 to 76 (screw fixing portions) are formed in the first protrusion 71 and the second protrusion 72, screw fixing portions may be provided between the end portions in the longitudinal direction of the mounting board 2 and the first protrusion 71 and the second protrusion 72 as described in the modification above, or may be provided outside in the longitudinal direction of the first protrusion 71 and the second protrusion 72.

[0069] While in the embodiment above the notch 43 for drawing out the pipe is formed in the back surface of the first outer portion 11 to extend along the height direction and the screw holes 73 and 74 (screw fixing portions) are provided outside in the longitudinal direction of the notch 43 for drawing out the pipe, the screw fixing portions may be provided on the inner side in the longitudinal direction of the notch 43 for drawing out the pipe, or provided at the notch 43 for drawing out the pipe. Alternatively, the notch 43 for drawing out the pipe may not be formed.

[0070] While in the embodiment above the bottom frame 10 (casing) includes the first outer portion 11 and the second outer portion 12, the bottom frame may include only one of the first outer portion and the second outer portion, or may not include the outer portions provided outside in the longitudinal direction of the end portions of the mounting board 2.

[0071] In the embodiment above, the screw hole 74 and the screw hole 76 (screw fixing portions) are provided in the interval W3 between the screw hole 85 (mounting board fixing portion) at the upper end portion of the mounting board 2 and the recess D in the height direction. The disclosure, however, is not limited to this arrangement.

[0072] While the embodiment above describes the indoor unit 1 mounted on the wall surface S having the recess D opposing the lower part of the mounting board 2, the wall surface on which the indoor unit 1 is mounted may not have a recess.

[0073] While the embodiment above describes the case where the mounting board 2 does not exist between the screw holes 73 to 76 (screw fixing portions) of the bottom frame 10 (casing) and the wall surface of the room, the mounting board 2 may exist between the screw holes 73 to 76 of the bottom frame 10 and the wall surface of the room.

[0074] The present invention makes it possible to prevent the formation of a gap between a casing and a wall surface.

[Reference Signs List]

[0075]

1	INDOOR UNIT
2	MOUNTING BOARD
10	BOTTOM FRAME (CASING)
43	NOTCH FOR DRAWING OUT PIPE
71	FIRST PROTRUSION
72	SECOND PROTRUSION

73 to 76, 173 to 176	SCREW HOLES (SCREW FIXING PORTIONS)
85	SCREW HOLE (MOUNTING BOARD FIXING PORTION)
S	WALL SURFACE
D	RECESS

Claims

1. An indoor unit comprising:

a mounting board fixed to a wall surface; and
a casing attached to the mounting board,

the casing having a screw fixing portion for fixing the casing to the wall surface.

2. The indoor unit according to claim 1, wherein, the screw fixing portion is provided outside of an end portion in a longitudinal direction of the mounting board.

3. The indoor unit according to claim 2, wherein, the casing includes a protrusion which is provided outside of the end portion in the longitudinal direction of the mounting board and protrudes toward the back surface side.

4. The indoor unit according to claim 3, wherein, the screw fixing portion is provided in the protrusion.

5. The indoor unit according to claim 3, wherein, the screw fixing portion is provided between the end portion in the longitudinal direction of the mounting board and the protrusion.

6. The indoor unit according to any one of claims 3 to 5, wherein, the protrusion covers substantially entire width of the casing in a height direction.

7. The indoor unit according to any one of claims 2 to 6, wherein, in the casing, a notch extending along a height direction and provided for drawing out a pipe is formed outside the end portion in the longitudinal direction of the mounting board and on the back surface side of the casing, and
the screw fixing portion is provided outside in the longitudinal direction of the notch.

8. The indoor unit according to any one of claims 1 to 7, which is mounted on a wall surface having a recess opposing a lower part of the mounting board,
the mounting board including, at an upper end portion, a mounting board fixing portion for fixing the mounting board to the wall surface, and
in a height direction, the screw fixing portion being provided between the mounting board fixing portion and the recess.

FIG.1A

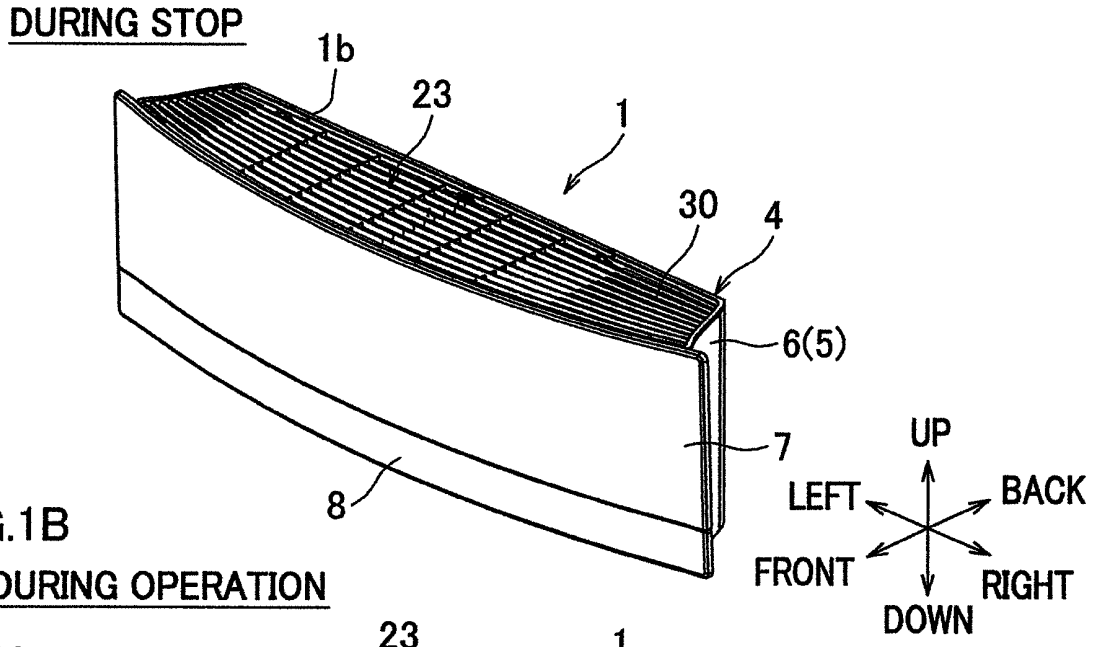


FIG.1B

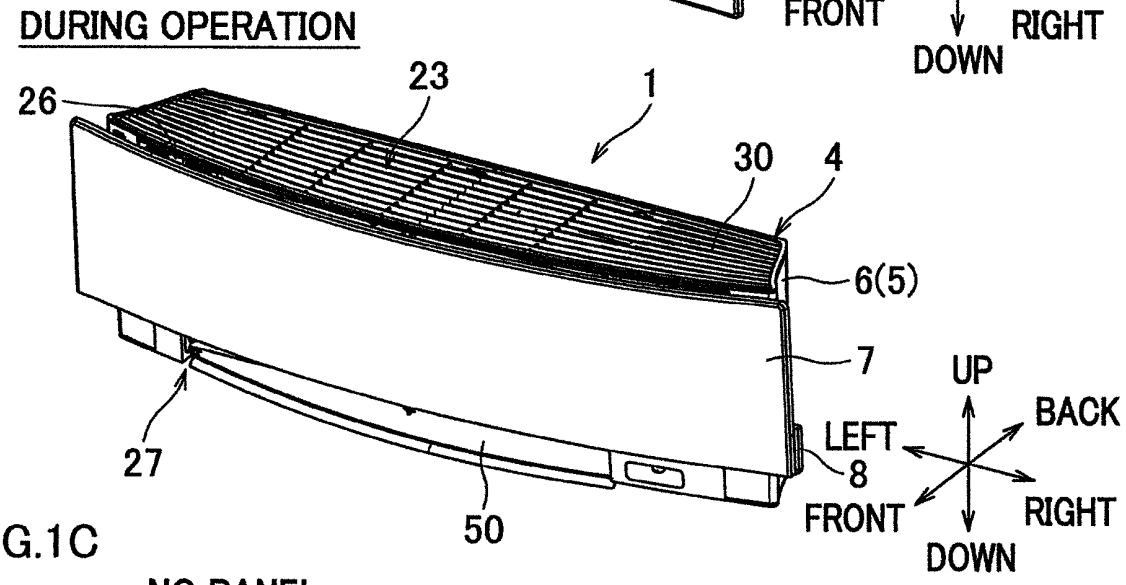


FIG.1C

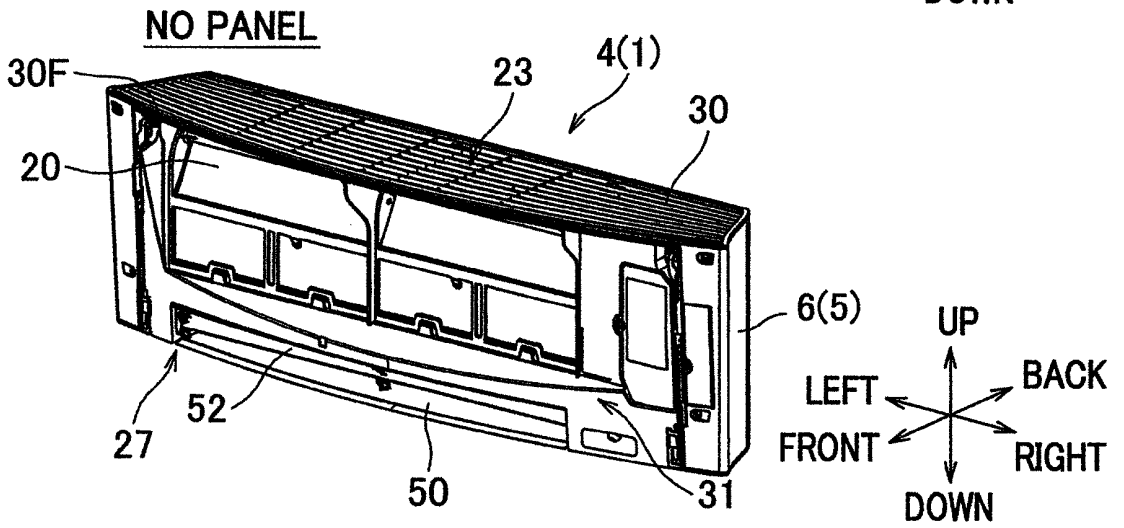


FIG.2A

DURING STOP

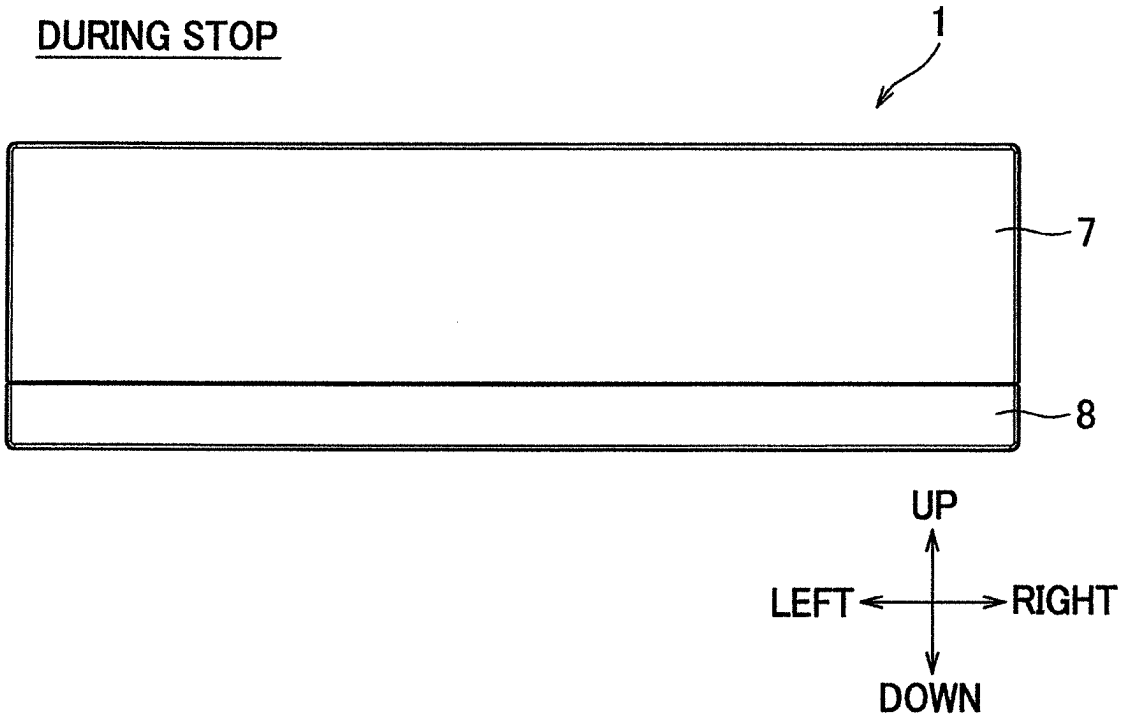


FIG.2B

DURING OPERATION

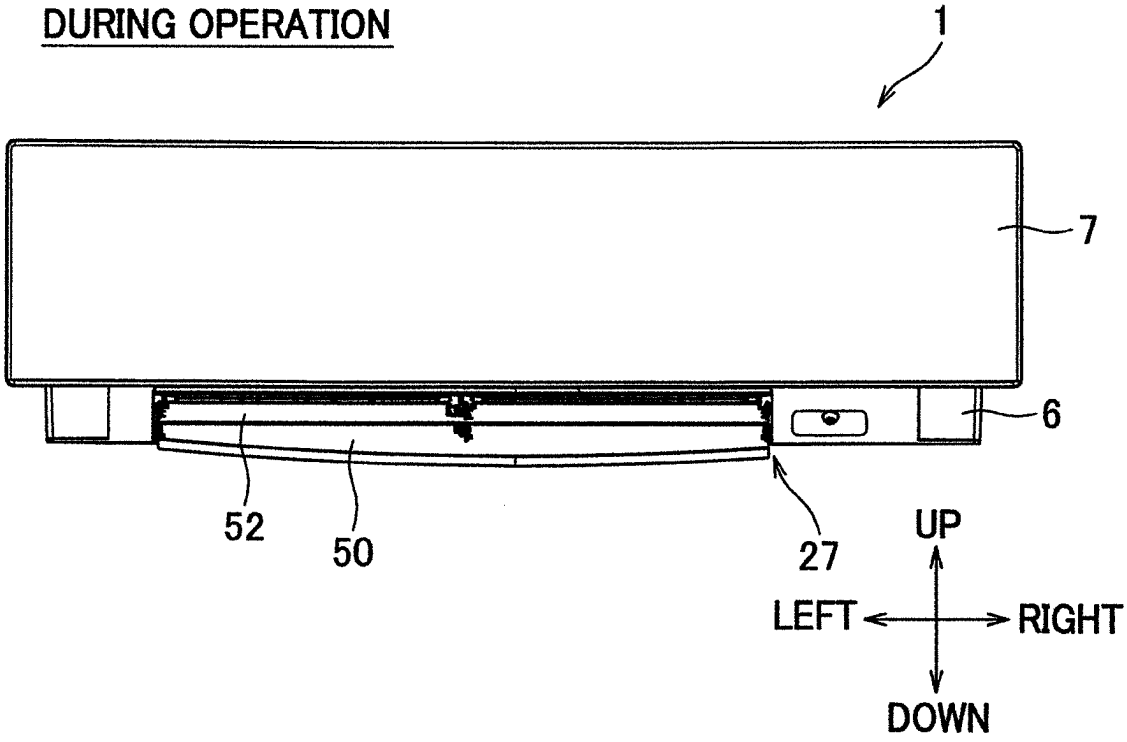


FIG.3A DURING STOP

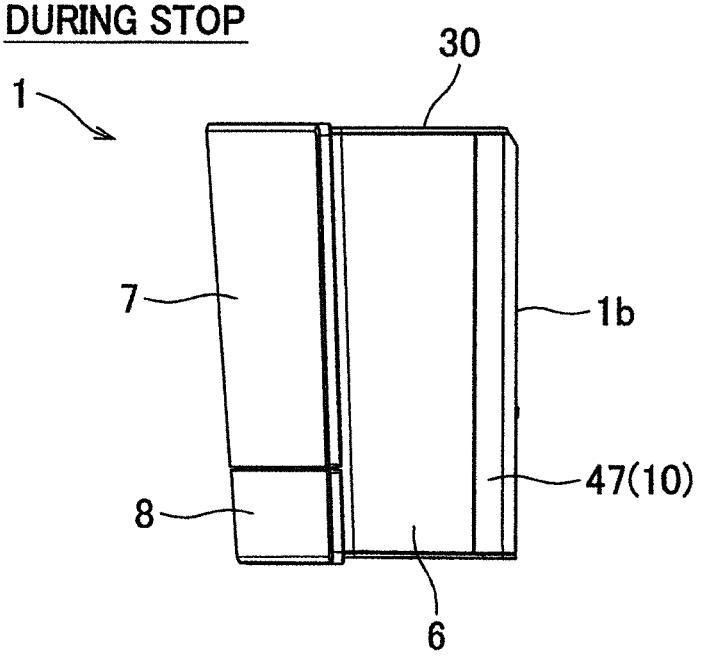


FIG.3B DURING OPERATION

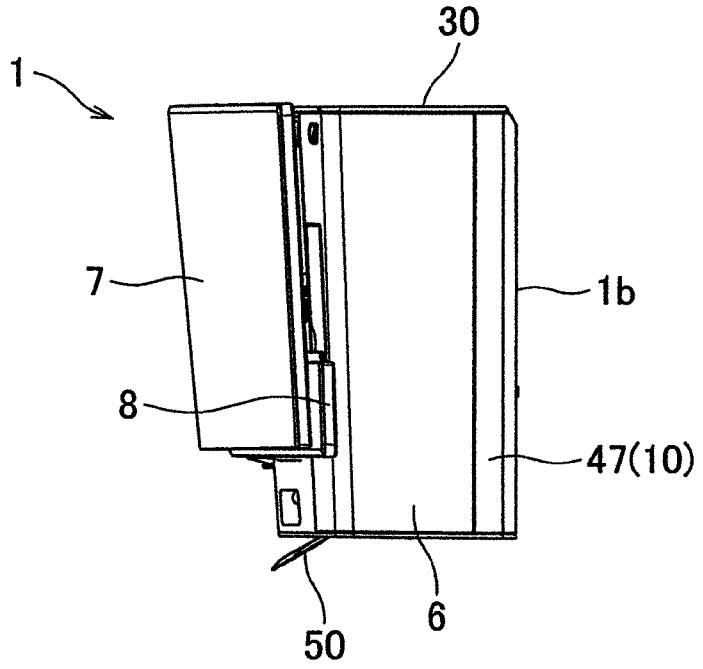
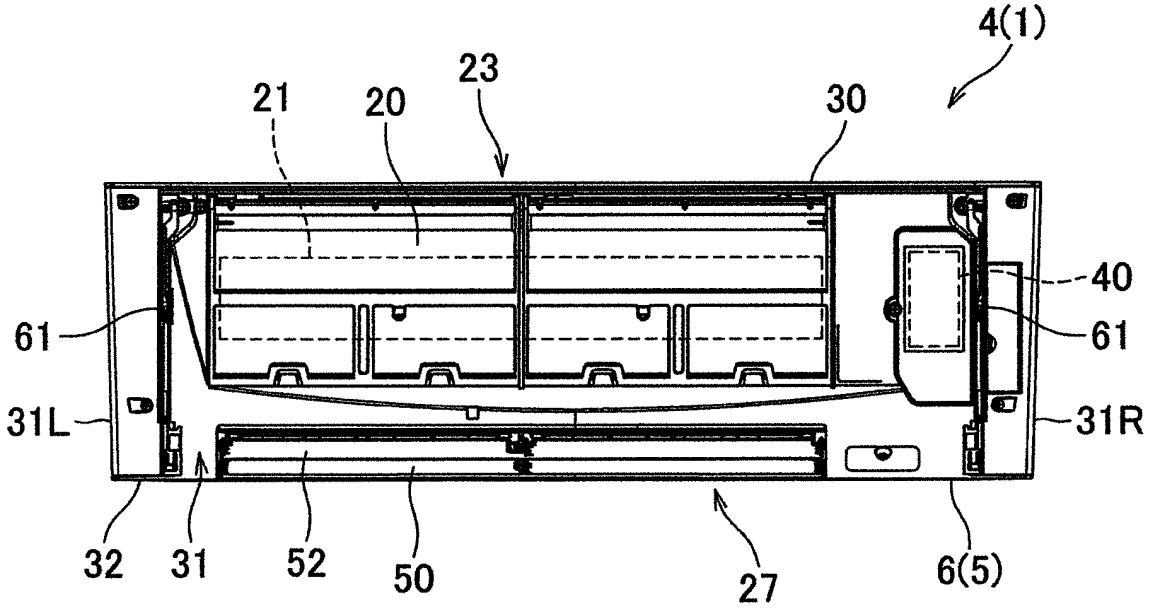


FIG.4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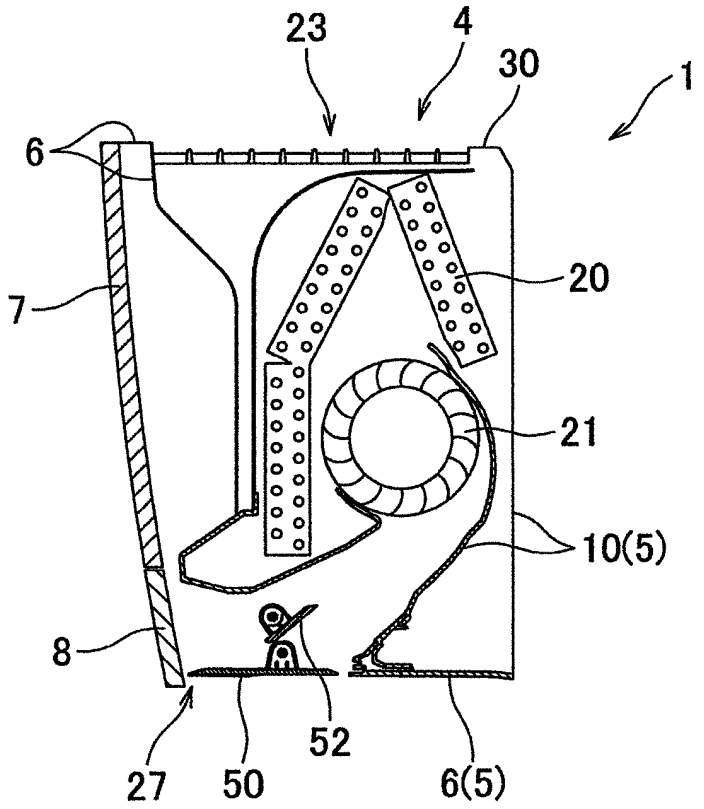
23
21
20
30
40
61
61
31L
31R
32
31
52
50
27
6(5)

FIG.5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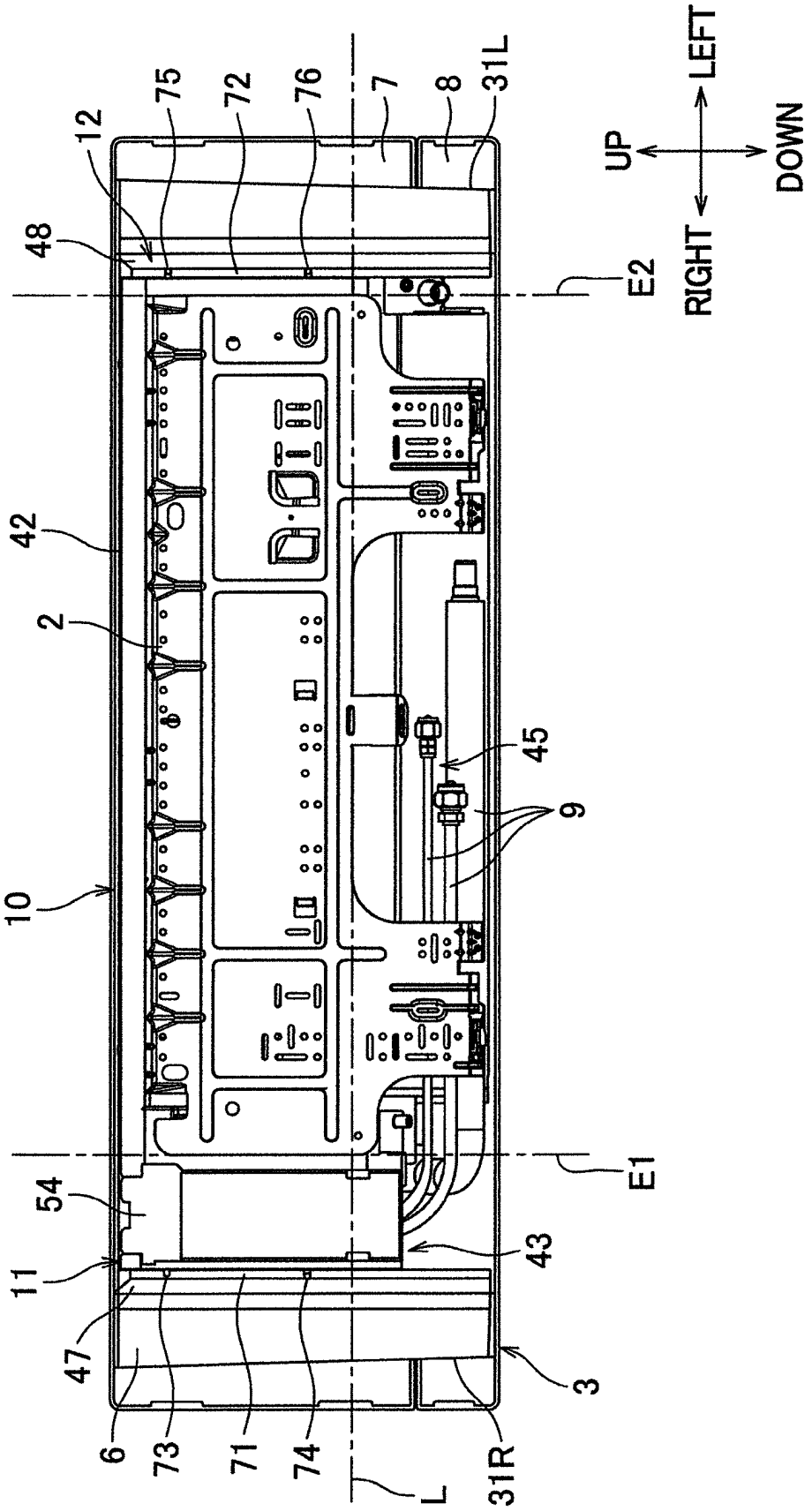
6(5)

FIG.6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DOWN
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75
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76
7
8
31L
48
E2
42
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11
43
47
3
6
73
71
74
L
31R
E1

FIG.7

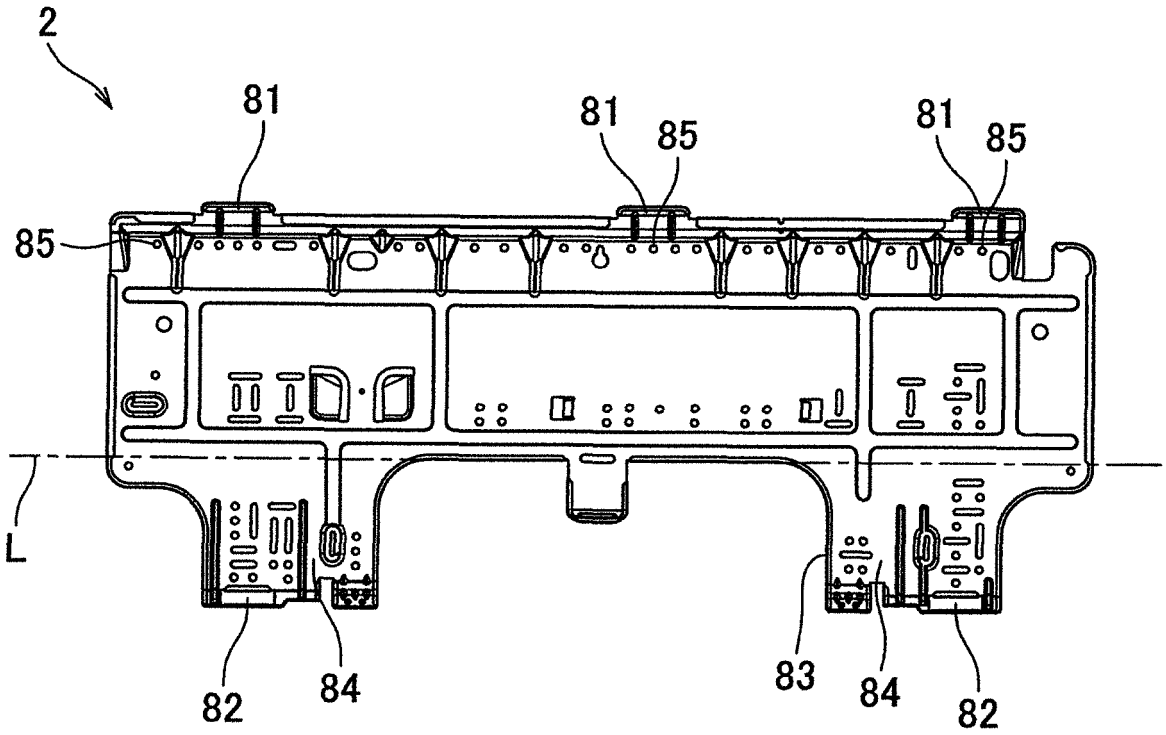
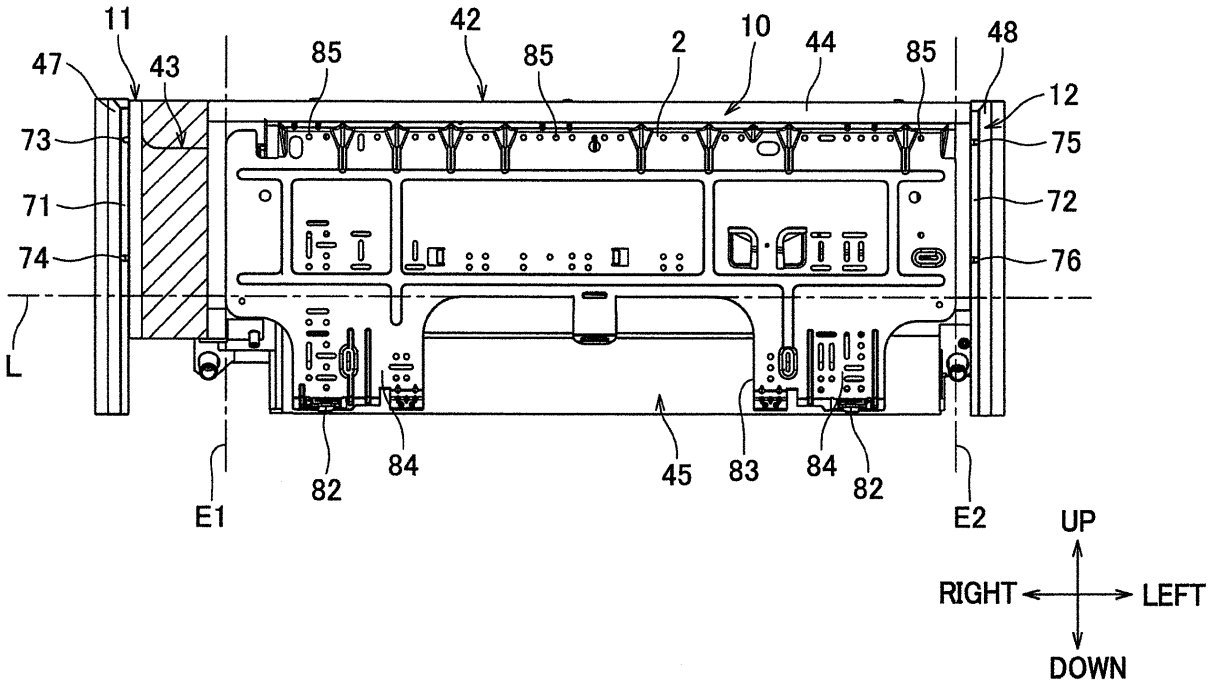


FIG.8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47
43
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85
2
85
12
73
75
71
72
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76
L
82
84
45
83
84
82
E1
E2
UP
RIGHT
LEFT
DOWN

FIG.9

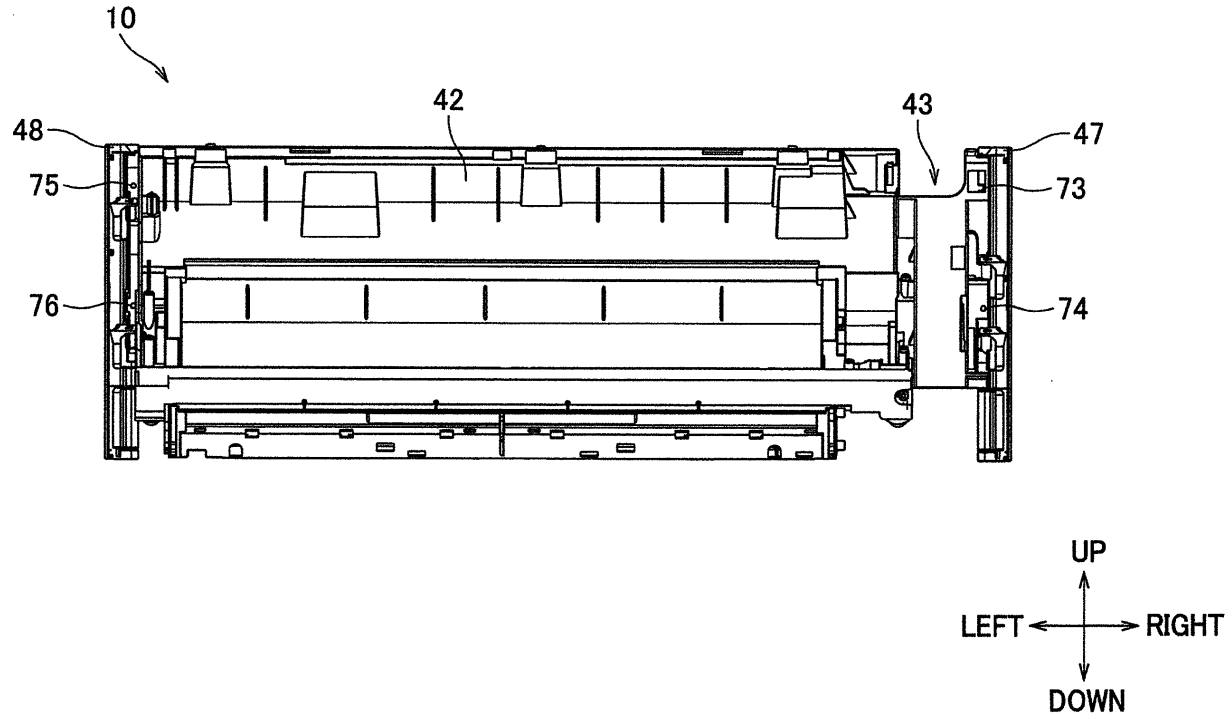


FIG.10

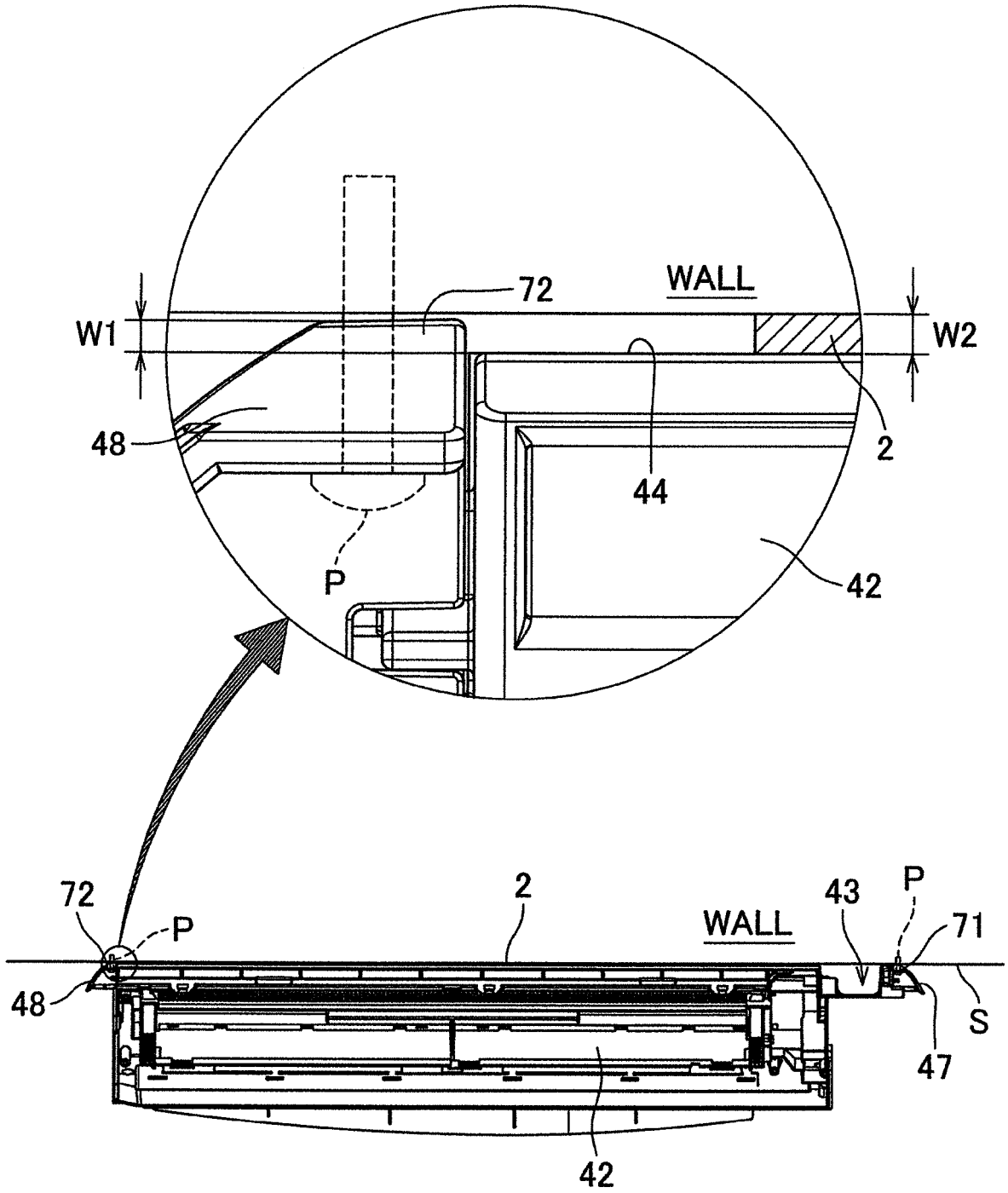


FIG.11A

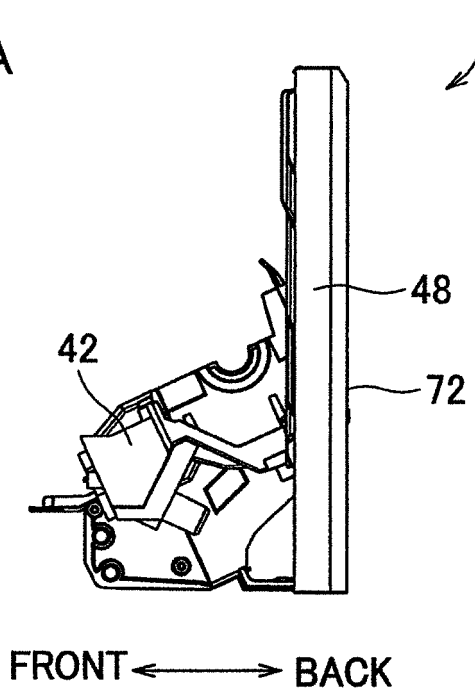


FIG.11B

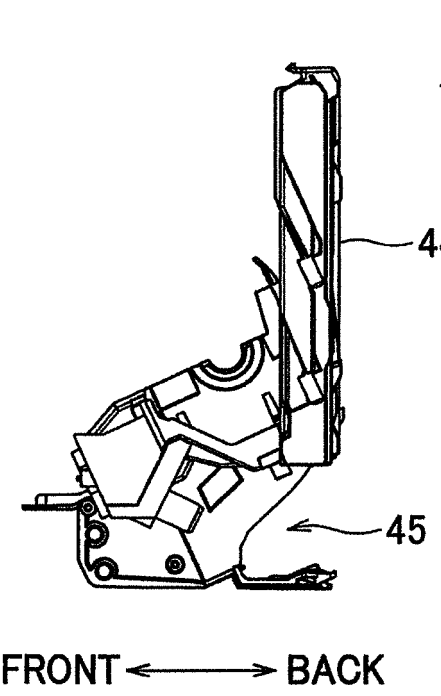


FIG.12

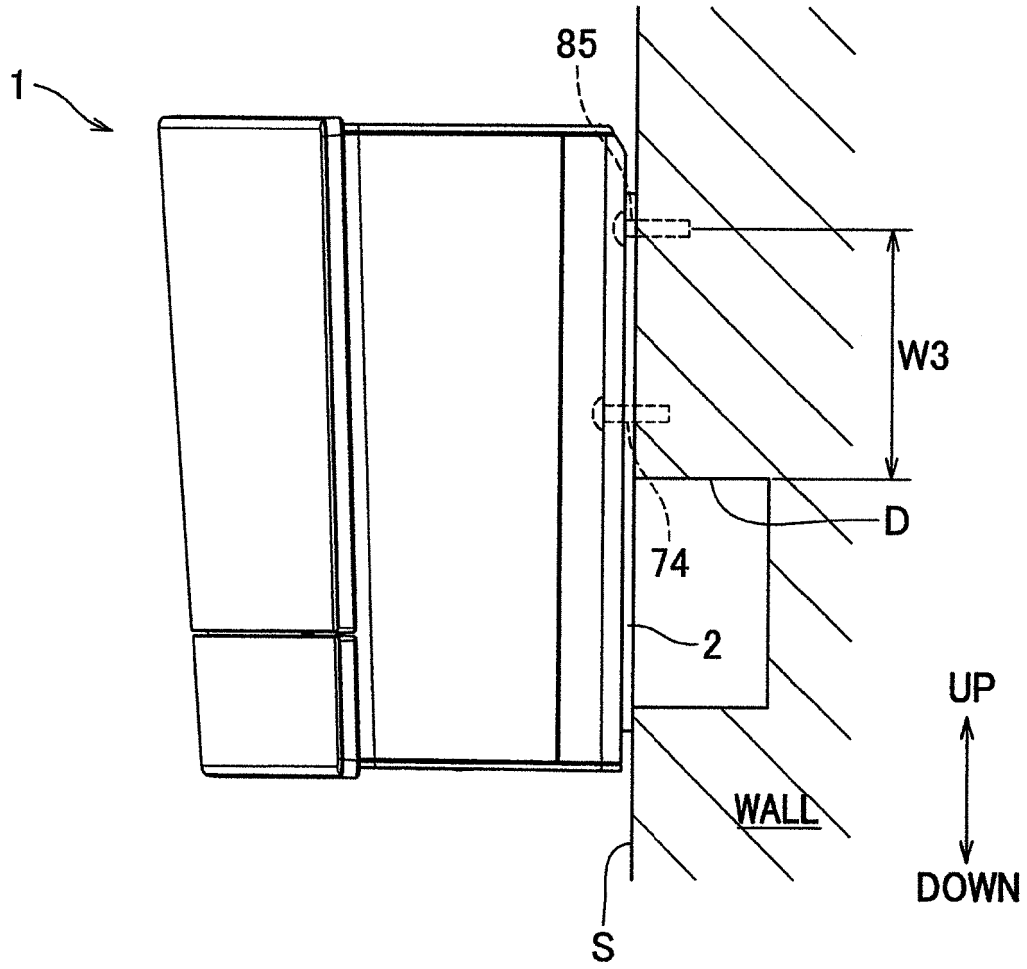


FIG.13A

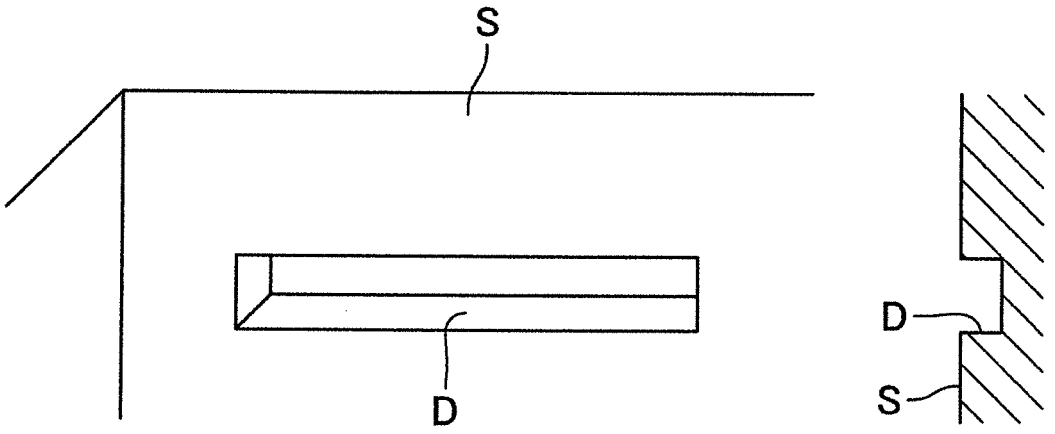


FIG.13B

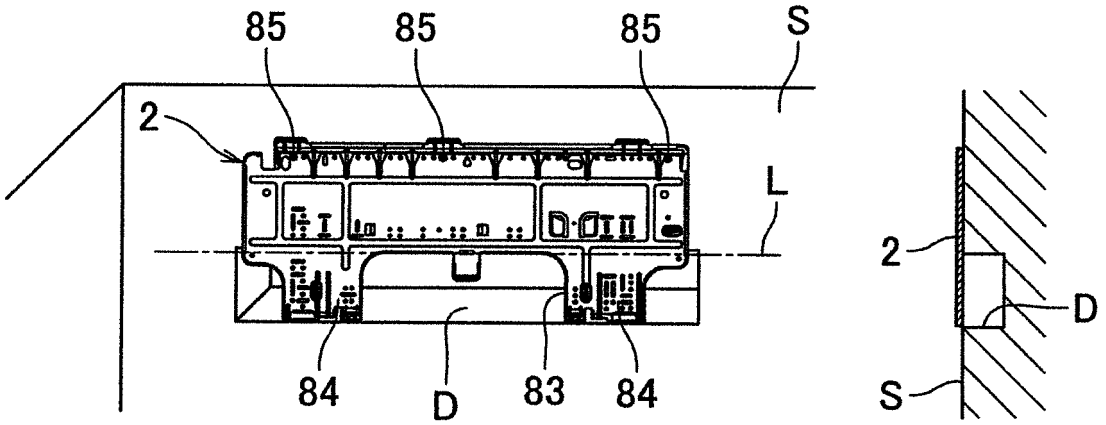


FIG.13C

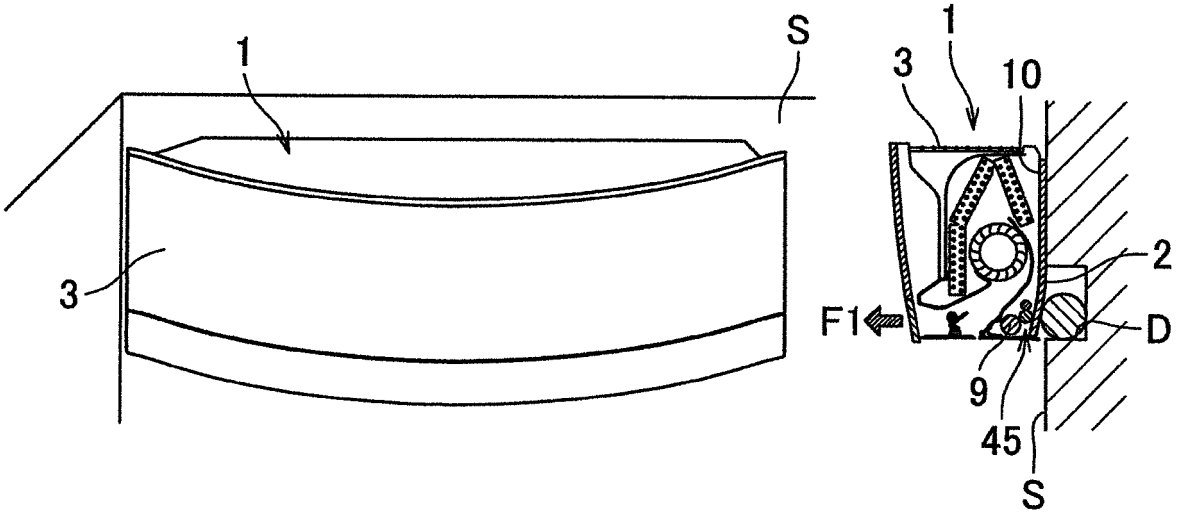
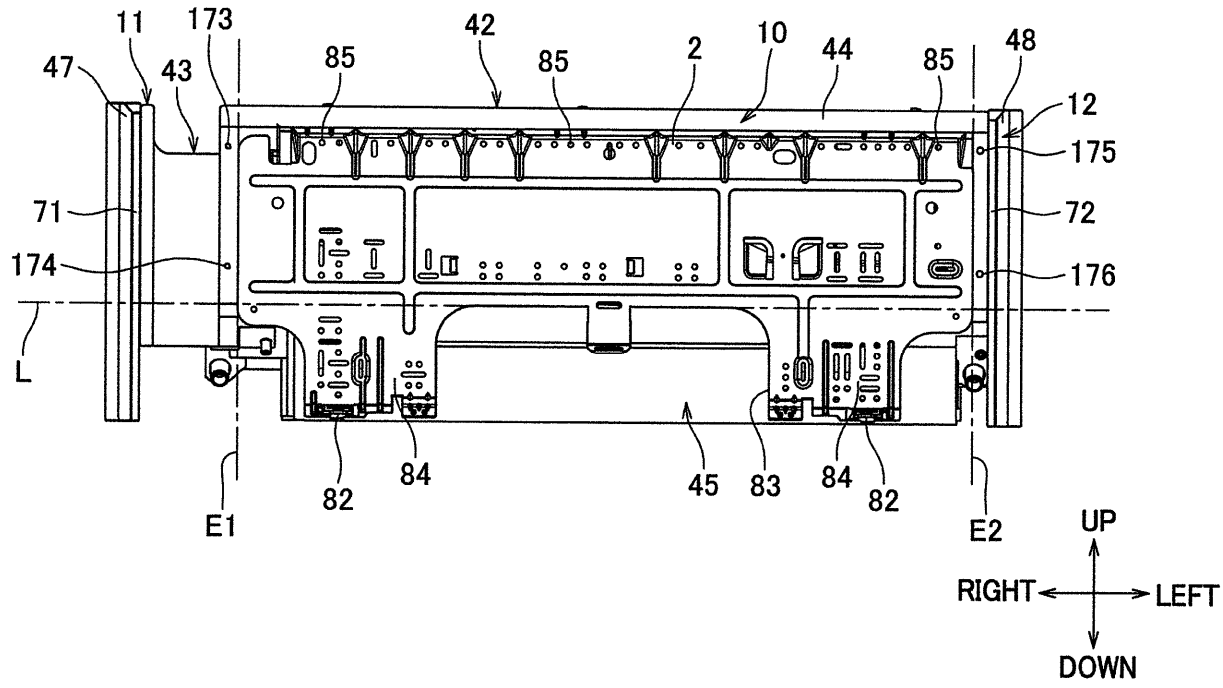


FIG.14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173
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48
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43
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2
85
12
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71
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174
176
L
E1
82
84
45
83
84
82
E2
UP
RIGHT
LEFT
DOWN

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2014/081288

A. CLASSIFICATION OF SUBJECT MATTER
F24F13/20(2006.01)i, *F24F1/00*(2011.01)i

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
F24F13/20, F24F1/00

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 1996-2015
Kokai Jitsuyo Shinan Koho 1971-2015 Toroku Jitsuyo Shinan Koho 1994-2015

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 A	JP 2009-287854 A (Hitachi Appliances, Inc.), 10 December 2009 (10.12.2009), paragraphs [0001], [0006] to [0008], [0012], [0023] to [0035]; fig. 4 to 6 & CN 101592372 A	1-4,6 5,7-8
Y	JP 48-26534 Y1 (Mitsubishi Electric Corp.), 02 August 1973 (02.08.1973), page 1, right column, lines 10 to 35; fig. 1 to 3 (Family: none)	1-4,6-8

☒ 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	Date of mailing of the international search report
05 February 2015 (05.02.15)	24 February 2015 (24.02.15)
Name and mailing address of the ISA/ Japan Patent Office 3-4-3,Kasumigaseki,Chiyoda-ku, Tokyo 100-8915,Japan	Authorized officer Telephone No.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2014/081288

C (Continuation). 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. 143101/1985(Laid-open No. 50417/1987) (Matsushita Seiko Co., Ltd.), 28 March 1987 (28.03.1987), specification, page 3, line 13 to page 4, line 20; figures (Family: none)	1-4,6-8
Y	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 180750/1984(Laid-open No. 96228/1986) (Toshiba Corp.), 20 June 1986 (20.06.1986), specification, page 3, line 16 to page 6, line 13; fig. 1, 3 to 6 (Family: none)	1-4,6-8
Y A	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 64552/1989(Laid-open No. 3631/1991) (Sanyo Electric Co., Ltd.), 16 January 1991 (16.01.1991), specification, page 3, line 13 to page 7, line 13; fig. 3 (Family: none)	1-2,7 3-6,8
Y A	JP 2002-213811 A (Fujitsu General Ltd.), 31 July 2002 (31.07.2002), paragraphs [0001] to [0022]; fig. 1 (Family: none)	1-2,8 3-7
Y	JP 56-44985 Y2 (Daikin Industries, Ltd.), 21 October 1981 (21.10.1981), page 1, left column, line 28 to page 2, right column, line 18; fig. 1 to 3 (Family: none)	6
Y	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 71137/1981(Laid-open No. 182019/1982) (Matsushita Refrigeration Co.), 18 November 1982 (18.11.1982), specification, page 1, line 14 to page 6, line 16; fig. 7 (Family: none)	7

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 10185298 A **[0004]**