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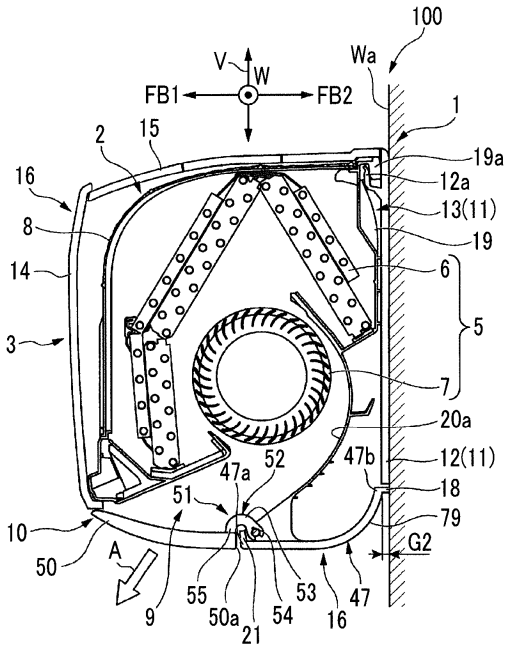
(54) **INDOOR UNIT OF AIR-CONDITIONER**

(57) An indoor unit (1) of an air conditioner is provided which comprises: a main body unit (2) comprising a base unit (11), which is fixed to a wall surface (Wa) and extends in the width direction (W) along the wall surface (Wa), and an air conditioner (5) which is attached to the front (FB1) of the base unit (11) and which comprises a heat exchanger (6), a blower fan (7), and a plate-shape flap (10) that has a back edge extending in the width direction; and a bottom panel (16) covering the bottom of the main body unit (2) and comprising a front end (47a) which extends along the back edge (50a) of the flap (10) provided at the bottom of the main body unit (2), a curved part (79) which curves upwards from the front end (47a) towards the back end and which is positioned with the back end (47b) forwards of the back surface of the base unit (11), and a first rib (18) which projects towards the back from the back end of the curved part (79).

FIG. 2



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Description

Technical Field

[0001] The present invention relates to an indoor unit of an air conditioner.

[0002] Priority is claimed on Japanese Patent Application No. 2016-235972, filed on December 5, 2016, the content of which is incorporated herein by reference.

Background Art

[0003] In the related art, an air conditioner is known which has a main body unit internally accommodating a heat exchanger and a blower fan, and a cover portion having a front panel covering the main body unit. The air conditioner configured in this way performs indoor air-conditioning by suctioning indoor air, adjusting temperature and humidity of the air, and then discharging the air (for example, refer to PTL 1).

[0004] Recently, for the indoor unit of the air conditioner, in particular, the design for not giving a user a feeling of pressure is regarded as important. In this regard, a technique of reducing the feeling of pressure by adopting a design in which a space is provided between the indoor unit and a wall part to which the indoor unit is attached is known.

Citation List

Patent Literature

[0005] [PTL 1] Japanese Unexamined Patent Application Publication No. 9-60916

Summary of Invention

Technical Problem

[0006] By the way, there is a problem that the indoor unit tends to be tilted to the front due to a self-weight by adopting a design that does not give the user the feeling of pressure as described above.

[0007] An object of the present invention is to provide an indoor unit of an air conditioner which prevents the indoor unit from being tilted to the front due to the self-weight.

Solution to Problem

[0008] According to a first aspect of the invention, there is provided an indoor unit of an air conditioner. The indoor unit includes a main body unit having a base unit fixed to a wall surface and extending in a width direction along the wall surface, and an air-conditioning device which is attached to a front of the base unit, and has a heat exchanger, a blower fan, and a flap that has a plate shape and has a back edge extending in the width direction; and a bottom panel covering a bottom surface of the main body unit, and having a front end extending along a back edge of the flap disposed in a lower portion of the main body unit, a curved part which curves upwards from the front end towards a back and which is positioned with a back end forwards of a back surface of the base unit, and a first rib protruding to the back from the back end of the curved part.

[0009] According to this configuration, the curved part is disposed in the bottom panel. In this manner, the indoor unit can be designed so as not to give a user a feeling of pressure. In addition, the first rib is disposed in the bottom panel. Accordingly, when the indoor unit is tilted to the front due to the self-weight, the first rib is pushed against the wall surface. In this manner, it is possible to prevent the indoor unit from being tilted to the front.

[0010] The indoor unit of an air conditioner may further include a bottom panel fastening structure that fastens the bottom panel to the base unit. The bottom panel fastening structure may have a screw hole disposed in the base unit, an opening portion disposed on a main surface of the bottom panel, and having a linear first edge and a linear second edge disposed on a side opposite to the first edge, a cap portion covering the opening portion, a fastening target plate portion connected to the first edge, tilted upwards as the fastening target plate portion is separated from the first edge, and having a through-hole corresponding to the screw hole, and a baffle member connecting an upper side end portion of the fastening target plate portion and the second edge of the opening portion to each other.

[0011] According to this configuration, the baffle member is disposed in the bottom panel. In this manner, when the opening portion is covered using the cap portion after the bottom panel is fastened to the base unit, it is possible to prevent the cap portion from entering the inside of the bottom panel.

[0012] In the indoor unit of an air conditioner, the bottom panel may have a second rib protruding upwards from the front end of the bottom panel such that wind generated by the blower fan collides with the second rib.

[0013] According to the configuration, the dew condensation can be prevented by the second rib blocking the cold air when the cooling is performed. That is, it is possible to prevent a bottom panel and a flap from being cooled due to the cold air blowing out from between the bottom panel and the flap when the cooling is performed.

[0014] The indoor unit of an air conditioner may further include a first engagement portion disposed in the base unit and having a first base portion protruding downwards and extending in the width direction, and a first protruding portion protruding to one side in a front-back direction from a lower end of the first base portion; and a second engagement portion disposed on an upper surface of the bottom panel, engaging with the first engagement portion, and having a second base portion protruding upwards and extending in the width direction, and a second protruding portion protruding to the other side in the front-

back direction from an upper end of the second base portion.

[0015] The bottom panel extends in the width direction. Accordingly, the bottom panel thermally expands so as to increase the width in the width direction. In a case where the first engagement portion and the second engagement portion are formed such that the first protruding portion of the first engagement portion and the second protruding portion of the second engagement portion protrude in the width direction, the bottom panel thermally expands in the width direction. In this manner, an engagement margin decreases, and both the engagement portions are likely to disengage from each other.

[0016] On the other hand, according to the configuration of the present invention, the first protruding portion of the first engagement portion and the second protruding portion of the second engagement portion protrude in the front-back direction. In this manner, it is possible to prevent the first engagement portion and the second engagement portion from insufficiently engaging with each other by the bottom panel thermally expanding in the width direction. That is, even in a case where the bottom panel thermally expands in the width direction, there is no influence on the engagement margin in the front-back direction. Therefore, it is possible to prevent the disengagement.

[0017] In the indoor unit of an air conditioner, the bottom panel may have a cross rib having a third rib disposed on an upper surface of the bottom panel, extending along the upper surface and in a direction tilted to the width direction, and protruding upwards, and a fourth rib crossing the third rib, extending along the upper surface and in the direction tilted to the width direction, and protruding upwards.

[0018] According to the configuration, it is possible to cause the bottom panel to have a strong structure. That is, even in a case where the bottom panel has a long shape in the width direction, the strength can be improved without increasing the plate thickness of the bottom panel.

[0019] The indoor unit of an air conditioner may further include a pair of third engagement portions having third base portions respectively disposed in both ends of the base unit in the width direction, and third protruding portions each protruding inward in the width direction from each of the third base portions; and a pair of fourth engagement portions that is disposed in both ends of the bottom panel in the width direction, that engages with the third engagement portions, and that has fourth base portions extending upwards, and fourth protruding portions each protruding outward in the width direction from an upper portion of each of the fourth base portions.

[0020] According to the configuration, it is possible to prevent both end portions of the bottom panel from being lowered downwards.

[0021] According to a second aspect of the invention, there is provided an indoor unit of an air conditioner. The indoor unit includes: a main body unit having a base unit fixed to a wall surface and extending in a width direction along the wall surface, and an air-conditioning device which is attached to a front of the base unit, and has a heat exchanger, a blower fan, and a flap that has a plate shape; a bottom panel covering a bottom surface of the main body unit; and a bottom panel fastening structure that fastens the bottom panel to the base unit. The bottom panel fastening structure has a screw hole disposed in the base unit, an opening portion disposed on a main surface of the bottom panel, and having a linear first edge and a linear second edge disposed on a side opposite to the first edge, a cap portion covering the opening portion, a fastening target plate portion connected to the first edge, tilted upwards as the fastening target plate portion is separated from the first edge, and having a through-hole corresponding to the screw hole, and a baffle member connecting an upper side end portion of the fastening target plate portion and the second edge of the opening portion to each other.

[0022] According to the configuration, the baffle member is disposed in the bottom panel. In this manner, when the opening portion is covered using the cap portion after the bottom panel is fastened to the base unit, it is possible to prevent the cap portion from entering the inside of the bottom panel.

[0023] According to a third aspect of the invention, there is provided an indoor unit of an air conditioner. The indoor unit includes: a main body unit having a base unit fixed to a wall surface and extending in a width direction along the wall surface, and a heat exchanger and a blower fan which are attached to a front of the base unit; and a bottom panel covering a bottom surface of the main body unit. The base unit has a base unit main body, and a first engagement portion having a first base portion protruding downwards from the base unit main body and extending in a width direction, and a first protruding portion protruding to one side in a front-back direction from a lower end of the first base portion. The bottom panel has a bottom panel main body having a plate shape, a second engagement portion that is disposed on an upper surface of the bottom panel main body, engages with the first engagement portion, and has a second base portion protruding upwards and extending in the width direction, and a second protruding portion protruding to the other side in the front-back direction from an upper end of the second base portion.

[0024] According to the configuration, it is possible to prevent the first engagement portion and the second engagement portion from insufficiently engaging with each other by the bottom panel thermally expanding in the width direction. That is, even in a case where the bottom panel thermally expands in the width direction, there is no influence on the engagement margin in the front-back direction. Therefore, it is possible to prevent the disengagement.

[0025] According to a fourth aspect of the invention, there is provided an indoor unit of an air conditioner. The indoor unit includes: a main body unit that extends in a

width direction and has an air-conditioning device having a heat exchanger and a blower fan; and a bottom panel covering a bottom surface of the main body unit, and having a bottom panel main body extending in the width direction and having a plate shape, and a cross rib having a third rib that is disposed on an upper surface of the bottom panel main body, extends along the upper surface and in a direction tilted to the width direction, and protrudes upwards, and a fourth rib that crosses the third rib, extends along the upper surface and in the direction tilted to the width direction, and protrudes upwards.

[0026] According to the configuration, it is possible to cause the bottom panel to have a strong structure. That is, even in a case where the bottom panel has a long shape in the width direction, the strength can be improved without increasing the plate thickness of the bottom panel.

[0027] According to a fifth aspect of the invention, there is provided an indoor unit of an air conditioner. The indoor unit includes: a main body unit having a base unit fixed to a wall surface and extending in a width direction along the wall surface, and an air-conditioning device which is attached to a front of the base unit, and has a heat exchanger and a blower fan; and a bottom panel covering a bottom surface of the main body unit. The base unit has a base unit main body, and a pair of third engagement portions having third base portions respectively disposed in both ends of the base unit main body in the width direction, and third protruding portions each protruding inward in the width direction from each of the third base portions. The bottom panel has a bottom panel main body extending in the width direction and having a plate shape, a pair of fourth engagement portions that is disposed in both ends of the bottom panel main body in the width direction, that engages with the third engagement portions, and that has fourth base portions extending upwards, and fourth protruding portions each protruding outward in the width direction from an upper portion of each of the fourth base portions.

[0028] According to the configuration, it is possible to prevent both end portions of the bottom panel from being lowered downwards.

Advantageous Effects of Invention

[0029] According to the present invention, it is possible to adopt a design for not giving a user a feeling of pressure by disposing the curved part in the bottom panel. In addition, the first rib is disposed in the bottom panel. Accordingly, when the indoor unit is tilted to the front due to the self-weight, the first rib is pushed against the wall surface. In this manner, it is possible to prevent the indoor unit from being tilted to the front.

Brief Description of Drawings

[0030] Fig. 1 is an exploded perspective view of an indoor unit of an air conditioner according to an embodiment of the present invention.

Fig. 2 is a side sectional view of the indoor unit of the air conditioner according to the embodiment of the present invention.

Fig. 3 is a perspective view of a base unit and a bottom panel according to the embodiment of the present invention.

Fig. 4 is a perspective view of a first engagement portion of a base and a second engagement portion of the bottom panel according to the embodiment of the present invention.

Fig. 5 is a perspective view of a third engagement portion of the base and a fourth engagement portion of the bottom panel according to the embodiment of the present invention.

Fig. 6 is a perspective view of a support structure of a flap according to the embodiment of the present invention.

Fig. 7 is a perspective view of a bottom panel fastening structure according to the embodiment of the present invention.

Fig. 8 is a view when the bottom panel fastening structure according to the embodiment of the present invention is viewed from below.

Fig. 9 is a perspective view of a cap portion according to the embodiment of the present invention. Description of Embodiments

[0031] An air conditioner 100 includes an indoor unit 1 disposed indoor and an outdoor unit (not illustrated) disposed outdoor. The indoor unit 1 and the outdoor unit are connected to each other by using a pipe.

[0032] The indoor unit 1 performs indoor air-conditioning by suctioning air, adjusting temperature and humidity of the air, and then discharging the air.

[0033] Hereinafter, the indoor unit 1 according to an embodiment of the present invention will be described in detail with reference to the drawings.

[0034] In the following description, a front surface, an upper surface, a bottom surface, a back surface, and side surfaces are surfaces expressed based on a state where the indoor unit 1 is attached to a wall surface Wa. The front surface means a front side surface, the upper surface means an indoor ceiling side surface, the bottom surface means an indoor floor side surface, the back surface means a surface on the indoor wall surface Wa side, and the side surfaces mean right and left surfaces facing the indoor wall surface Wa side in a width direction W.

[0035] As illustrated in Figs. 1 and 2, the indoor unit 1 includes a main body unit 2 having an air-conditioning device 5, and a cover portion 3 covering the main body unit 2.

[0036] The main body unit 2 has a base unit 11 fixed to the wall surface Wa and extending in the width direction W along the wall surface Wa, and the air-conditioning device 5 attached to a front FB1 of the base unit 11. An

air intake port 8 is disposed in an upper portion of a front surface of the main body unit 2. A discharge outlet 9 is disposed in a lower portion of the main body unit 2.

[0037] The cover portion 3 has a front panel 14 covering the front surface of the main body unit 2, a top panel 15 covering an upper surface of the main body unit 2, a bottom panel 16 covering a bottom surface of the main body unit 2, and a pair of side panels 17 respectively covering right and left side portions of the main body unit 2.

[0038] A back surface of the base unit 11 is in surface contact with the wall surface Wa. The base unit 11 has an installation plate 12 formed of metal, and a base 13 to be fixed to the installation plate 12 by using a fastening member such as a bolt, for example.

[0039] The installation plate 12 has a rectangular plate shape, and has a plurality of attachment holes (not illustrated) or a hook 12a (refer to Fig. 2) for hanging the base unit 11. The installation plate 12 is fixed to the wall surface Wa by using a wood screw, for example.

[0040] The base 13 supports the air-conditioning device 5, and is a member to which the cover portion 3 is attached. The base 13 is formed of a resin.

[0041] As illustrated in Figs. 2 and 3, the base 13 has a rectangular support portion 19 extending in the width direction W, an air-conditioning device holder 20 (base unit main body) disposed on the front FB1 of the support portion 19, first engagement portions 23 (refer to Fig. 4) disposed in a lower portion of the air-conditioning device holder 20 at intervals in the width direction W, a pair of third engagement portions 38 disposed in both ends of the support portion 19 in the width direction W, and a plurality of screw holes 22 for attaching the bottom panel 16.

[0042] The support portion 19 is a member forming a back surface of the main body unit 2 together with the installation plate 12, and has a hook 19a hooked on the hook of the installation plate 12. The air-conditioning device holder 20 has a cylindrical inner peripheral surface 20a. The air-conditioning device 5 is held by the air-conditioning device holder 20.

[0043] As illustrated in Fig. 4, a lower portion of the air-conditioning device holder 20 of the base 13 is provided with the first engagement portion 23 that supports the bottom panel 16 in cooperation with the second engagement portion 32 disposed in the bottom panel 16, and a pair of movement regulators 27.

[0044] The first engagement portion 23 has a first plate portion 24 protruding to the back FB2 from the air-conditioning device holder 20, a first base portion 25 protruding downwards from a back end of the first plate portion 24, and a first protruding portion 26 protruding to the front FB1 from a lower end of the first base portion 25.

[0045] The first plate portion 24 is a plate-shaped member formed such that a main surface of the first plate portion 24 is orthogonal to a vertical direction V.

[0046] The first base portion 25 is a plate-shaped member formed such that a main surface of the first base portion 25 is orthogonal to a front-back direction FB.

[0047] The first protruding portion 26 has a triangular shape when viewed in the width direction W. The first protruding portion 26 has a first engagement surface 28 extending along the width direction W and facing upwards, and a first introduction surface 29 connecting the front end of the first engagement surface 28 and a tip of the first base portion 25 to each other. The first introduction surface 29 is tilted to the front FB1 as the first introduction surface 29 faces upwards.

[0048] The pair of movement regulators 27 is a portion regulating the movement of the second engagement portion 32, which engages with the first engagement portion 23, in the width direction W. The movement regulator 27 is a plate-shaped member formed such that a main surface of the movement regulator 27 is orthogonal to the width direction W. The movement regulator 27 is provided in the front and back of the first protruding portion 26 with a predetermined interval.

[0049] Three first engagement portions 23 are formed at intervals in the width direction W.

[0050] As illustrated in Fig. 5, each of both ends of the base 13 in the width direction W is provided with a third engagement portions 38 supporting the bottom panel 16 in cooperation with a fourth engagement portion 44 of the bottom panel 16 (only one of the third engagement portions 38 is illustrated in Fig. 5).

[0051] The third engagement portion 38 has a wall-shaped third base portion 39 disposed in an edge of each of both ends of the support portion 19 in the width direction W, and a third protruding portion 40 disposed in a lower end of the third base portion 39. The third base portion 39 is a plate shape portion protruding to the front FB1 from an end portion of the support portion 19 in the width direction W.

[0052] The third protruding portion 40 is a member that is disposed in the lower end of the third base portion 39 and protrudes inward in the width direction W. The third protruding portion 40 has a third engagement surface 41 facing upwards, and a third introduction tilting surface 42 that connects a tip of the third engagement surface 41 and the lower end of the third base portion 39 to each other and is gradually increased inward in the width direction W.

[0053] As illustrated in Fig. 3, a lower portion of the air-conditioning device holder 20 of the base 13 is provided with the plurality of screw holes 22 for attaching the bottom panel 16. The screw holes 22 are configuration elements of a bottom panel fastening structure 64 which will be described later.

[0054] The screw hole 22 is formed in a screw hole plate portion 30 protruding to the front FB1 from the air-conditioning device holder 20.

[0055] The air-conditioning device 5 has a heat exchanger 6, a blower fan 7, and a flap 10.

[0056] The blower fan 7 is a cross flow fan extending in the width direction W.

[0057] The heat exchanger 6 is disposed to surround

the blower fan 7 from an outer periphery.

[0058] In the lower portion of the air-conditioning device 5, the discharge outlet 9 for blowing the air from the blower fan 7 into a room is disposed facing downwards, facing obliquely downwards, or facing forwards.

[0059] The flap 10 that covers the discharge outlet 9 from the outer side such that the discharge outlet 9 can be opened and closed is disposed on the downstream side of the discharge outlet 9. When the air conditioner 100 is operated, the flap 10 is in an open state and can adjust the tilting angle thereof in order to adjust the direction of the air from the discharge outlet 9 in the vertical direction V. When the air conditioner 100 is stopped, the flap 10 is in a closed state and can cover the discharge outlet 9 together with the surface of the cover portion 3 that is around the flap 10.

[0060] As shown in Figs. 2 and 6, the flap 10 has a flap main body 50 having a plate shape and a support structure 51 supporting the flap main body 50. The flap main body 50 is formed of a molded body formed in a substantially plate shape. The length of the flap main body 50 in the width direction W corresponds to the discharge outlet 9. A back edge 50a of the flap main body 50 extends in the width direction W. The flap 10 can adjust the size of the opening portion of the discharge outlet 9 by a rotation mechanism (not illustrated).

[0061] The support structure 51 is disposed on a back end side of the flap main body 50.

[0062] The support structure 51 includes an arm 52 supporting the flap 10 such that the flap 10 is rotatable around the base 13. The arm 52 has an arm main body 53, a rotation connector 54 that is disposed in one end of the arm main body 53 and is connected to the base 13 so as to be rotatable, and a fixing portion 55 that is disposed in the other end of the arm main body 53 and is fixed to the back end of the flap main body 50.

[0063] The arm main body 53 is formed to be greatly curved in a semicircular shape when viewed in the width direction W. The arm main body 53 is convex upwards when the air conditioner 100 is in an operation state (the flap 10 is in an open state).

[0064] The rotation connector 54 has a cutout portion 54a. The cutout portion 54a of the rotation connector 54 is disposed in the lower portion of the base 13, and can be fitted to a rotation shaft (not illustrated) rotated around an axis extending in the width direction W. The cutout portion 54a of the rotation connector 54 is formed in a substantially C-shape. An opening of the cutout portion 54a of the rotation connector 54 faces downwards when the air conditioner 100 is in the operation state (the flap 10 is in the open state).

[0065] Next, the cover portion 3 covering the main body unit 2 will be described.

[0066] As illustrated in Fig. 1, the front panel 14 is detachably disposed on the front surface of the main body unit 2. The front panel 14 covers the front surface of the main body unit 2, and the air is suctioned into the main body unit 2 from a space between the front panel 14 and the main body unit 2.

[0067] The top panel 15 is detachably disposed on the upper surface of the main body unit 2. The top panel 15 covers the upper surface of the main body unit 2.

[0068] The pair of side panels 17 is detachably disposed in the respective right and left side portions of the main body unit 2. The pair of side panels 17 covers the side surfaces of the main body unit 2.

[0069] The bottom panel 16 is detachably disposed on the bottom surface of the main body unit 2. The bottom panel 16 covers the bottom surface of the main body unit 2.

[0070] As illustrated in Figs. 2 and 3, the bottom panel 16 has a bottom panel main body 47, a pair of stay portions 48 extending upwards from both ends of the bottom panel main body 47 in the width direction W, three second engagement portions 32 disposed on the upper surface of the bottom panel main body 47, a plurality of cross ribs 57 disposed on the upper surface of the bottom panel main body 47, a first rib 18 protruding to the back FB2 from a back end of the bottom panel main body 47, and a second rib 21 protruding upwards from a front end of the bottom panel main body 47. A front end 47a of the bottom panel main body 47 extends along the back edge 50a of the flap main body 50. A gap is formed in the width direction W between the front end 47a of the bottom panel main body 47 and the back edge 50a of the flap main body 50.

[0071] The second rib 21 is formed such that wind generated by the blower fan 7 collides with the second rib 21.

[0072] As illustrated in Fig. 4, the second engagement portion 32 that supports the bottom panel 16 in cooperation with the first engagement portion 23 disposed in the base 13 is disposed on the upper surface of the bottom panel main body 47. The second engagement portion 32 has a second base portion 33, and a second protruding portion 34 protruding to the back FB2 from an upper end of the second base portion 33.

[0073] The second base portion 33 is a member protruding upwards and extending in the width direction W.

[0074] The second protruding portion 34 has a triangular shape when viewed in the width direction W. The second protruding portion 34 has a second engagement surface 35 extending along the width direction W and facing downwards, and a second introduction surface 36 connecting the back end of the second engagement surface 35 and a tip of the second base portion 33 to each other. The second introduction surface 36 is tilted to the front FB1 as the second introduction surface 36 faces upwards.

[0075] Three second engagement portions 32 are formed at intervals in the width direction W. The second engagement portion 32 is formed at a position corresponding to the first engagement portion 23.

[0076] As illustrated in Fig. 5, each of the stay portions 48 has a stay portion main body 49, and a fourth engagement portion 44 disposed in an upper end of the stay portion main body 49. The fourth engagement portion 44

is a member supporting both ends of the bottom panel 16 in the width direction W in cooperation with the third engagement portion 38 of the base 13.

[0077] The stay portion main body 49 is a plate-shaped member extending in the vertical direction V. The main surface of the stay portion main body 49 is oriented in the front-back direction FB.

[0078] The fourth engagement portion 44 has a fourth base portion 45 protruding upwards together with the stay portion main body 49, and a fourth protruding portion 46 protruding outward in the width direction W from an upper end of the fourth base portion 45.

[0079] The fourth base portion 45 has a plate shape, and is formed to protrude to the front FB1 from the front surface of the stay portion main body 49. The main surface of the fourth base portion 45 is oriented in the width direction W.

[0080] The fourth protruding portion 46 has a fourth engagement surface 61 facing downwards, and a fourth introduction tilting surface 62 that connects a tip of the fourth engagement surface 61 and the upper end of the fourth base portion 45 to each other and is gradually lowered outward in the width direction W.

[0081] As illustrated in Figs. 7, 8, and 9, the bottom panel main body 47 of the bottom panel 16 is attached to the base 13 by using the bottom panel fastening structure 64.

[0082] The bottom panel fastening structure 64 has the plurality of screw holes 22 (refer to Fig. 3) disposed in the base 13, an opening portion 65 (refer to Fig. 8) formed in the bottom panel 16, a fastening target plate portion 66 (refer to Fig. 7), a baffle member 67, and a cap portion 68 covering the opening portion 65.

[0083] The opening portion 65 is disposed at a position corresponding to the screw hole 22. The opening portion 65 has a rectangular shape. The opening portion 65 has a linear first edge 65a and a linear second edge 65b disposed on a side opposite to the first edge 65a.

[0084] The cap portion 68 is a component for concealing a screw used in the bottom panel fastening structure 64. The cap portion 68 can be attached to the opening portion 65. The cap portion 68 can be rotated around a rotation shaft portion 73 attached to the first edge 65a of the opening portion 65.

[0085] The fastening target plate portion 66 has a plate shape formed to be tilted with respect to the main surface of the bottom panel main body 47. The fastening target plate portion 66 is connected to the first edge 65a of the opening portion 65, and is tilted upwards as the fastening target plate portion 66 is separated from the first edge 65a.

[0086] A through-hole 72 into which a shaft portion of the screw, which fastens the bottom panel 16, is inserted is formed in a central portion of the fastening target plate portion 66.

[0087] The fastening target plate portion 66 is connected to the bottom panel main body 47 by using a first connection plate 69 and a pair of second connection plates 70. The first connection plate 69 connects an upper end 66a of the fastening target plate portion 66 and the second edge 65b to each other, the second edge 65b being disposed on the opposite side of the opening portion 65 from the first edge 65a. The pair of second connection plates 70 connects a lateral side 66c of the fastening target plate portion 66 and a side edge 65c of the opening portion 65 to each other.

[0088] A gap G1 is formed between a lower edge 66b which is disposed on the opposite side of the fastening target plate portion 66 from a portion connected to the first connection plate 69, and the first edge 65a of the opening portion 65. The second connection plate 70 has an engagement hole 71 with which a cap projection 74 (to be described later) engages.

[0089] As illustrated in Fig. 9, the cap portion 68 is a rectangular plate-shaped member corresponding to the opening portion 65. The rotation shaft portion 73 is formed on a first side 68a of the cap portion 68. The rotation shaft portion 73 protrudes in a direction extending along the first side 68a of the cap portion 68. The rotation shaft portion 73 is rotatably supported by bearing portions (not illustrated) formed on the pair of second connection plates 70.

[0090] A pair of cap projections 74 protruding in a direction extending along the second side 68b is formed on a second side 68b that is disposed on the opposite side of the cap portion 68 from the first side 68a. The cap projection 74 is a hemispherical projection engaging with the engagement hole 71 of the second connection plate 70.

[0091] The bottom panel fastening structure 64 according to the present embodiment has the baffle member 67 connecting the first edge 65a of the opening portion 65 and the lower edge 66b of the fastening target plate portion 66 to each other. The baffle member 67 is formed to close a part of the gap G1 between the lower edge 66b of the fastening target plate portion 66 and the first edge 65a of the opening portion 65.

[0092] As illustrated in Figs. 3 and 7, the upper surface of the bottom panel main body 47 has a fifth rib 76 extending in the width direction W, and a plurality of sixth ribs 77 orthogonal to the fifth rib 76 and extending in the front-back direction FB.

[0093] The fifth rib 76 is a plate-shaped member protruding upwards from the upper surface of the bottom panel main body 47. The main surface of the fifth rib 76 is orthogonal to the upper surface of the bottom panel main body 47. The fifth rib 76 is formed on the front side of the bottom panel main body 47.

[0094] The plurality of sixth ribs 77 is formed on the back FB2 of the fifth rib 76. The plurality of sixth ribs 77 is formed at an interval in the width direction W.

[0095] The cross rib 57 has a third rib 58 and a fourth rib 59 which are formed to cross each other.

[0096] The third rib 58 is a plate-shaped member protruding upwards from the upper surface of the bottom panel main body 47. The third rib 58 extends along the

upper surface of the bottom panel main body 47 and in a direction tilted to the width direction W. The main surface of the third rib 58 is orthogonal to the upper surface of the bottom panel main body 47.

[0097] Similar to the third rib 58, the fourth rib 59 is a plate-shaped member protruding upwards from the upper surface of the bottom panel main body 47. The fourth rib 59 extends along the upper surface of the bottom panel main body 47 and in the direction tilted to the width direction W. The main surface of the fourth rib 59 is orthogonal to the upper surface of the bottom panel main body 47.

[0098] The cross rib 57 is formed in a rectangular region formed by the two adjacent sixth ribs 77 and the fifth rib 76. The third rib 58 and the fourth rib 59 which configure the cross rib 57 are formed so as to form diagonal lines of the above-described rectangular region.

[0099] The height of the cross rib 57 from the upper surface of the bottom panel main body 47 can be set to 3 mm, for example. The height of the cross rib 57 from the upper surface of the bottom panel main body 47 can be appropriately changed in accordance with the thickness of the bottom panel main body 47. In order to facilitate molding of the bottom panel 16, a circular rib may be disposed in a cross point of the cross rib 57.

[0100] The number of the cross ribs 57 can be appropriately changed. However, in order to improve strength, it is preferable that the cross ribs 57 are disposed as many as possible.

[0101] As illustrated in Figs. 2 and 3, the bottom panel main body 47 of the bottom panel 16 has a front end 47a extending along the back edge 50a of the flap main body 50, and a curved part 79 which curves upwards from the front end 47a towards the back FB2. The curved part 79 is formed such that a gap G2 between a back end 47b of the curved part 79 and the wall surface Wa is evenly disposed in the width direction W. In other words, the back end 47b of the curved part 79 is located on the front side of the back surface of the base unit 11.

[0102] The bottom panel 16 has the first rib 18 protruding to the back FB2 from the back end 47b of the curved part 79. The first rib 18 is a plate-shaped member extending in the width direction W. The main surface of the first rib 18 is substantially horizontal. The first rib 18 is formed such that an angle formed between the front end of the first rib 18 and the back end of the curved part 79 of the bottom panel main body 47 is from 90° to 150°. The first rib 18 is formed to cover the gap G2 between the curved part 79 and the wall surface Wa.

[0103] The bottom panel main body 47 of the bottom panel 16 has the second rib 21 protruding upwards from the front end 47a of the bottom panel main body 47.

[0104] The second rib 21 is a plate-shaped member extending in the width direction W. The main surface of the second rib 21 is oriented to the front FB1. The second rib 21 is formed such that an angle formed between the lower end of the second rib 21 and the back end of the front end 47a of the bottom panel main body 47 is from 90° to 120°. As illustrated in Fig. 4, the second rib 21 is formed to have an escape portion 80 in order to avoid interference with the arm 52 of the flap 10.

[0105] Next, a method of attaching the bottom panel 16 of the indoor unit 1 of the air conditioner 100 according to the present embodiment will be described.

[0106] The bottom panel 16 is attached by causing the first engagement portion 23 disposed in the lower portion of the base 13 and the second engagement portion 32 disposed on the upper surface of the bottom panel main body 47 to engage with each other, causing the third engagement portion 38 disposed in both ends of the base 13 in the width direction W and the fourth engagement portion 44 disposed in the stay portion 48 of the bottom panel 16 to engage with each other, and fastening the bottom panel main body 47 to the base 13 by using the bottom panel fastening structure 64.

[0107] The bottom panel main body 47 is supported by engagement between the first protruding portion 26 of the first engagement portion 23 and the second protruding portion 34 of the second engagement portion 32.

[0108] Both ends of the bottom panel main body 47 in the width direction W are supported by engagement between the third protruding portion 40 of the third engagement portion 38 and the fourth protruding portion 46 of the fourth engagement portion 44. The fourth engagement portion 44 is inserted from below the third engagement portion 38, thereby enabling the third engagement portion 38 and the fourth engagement portion 44 to engage with each other.

[0109] In this case, the fourth introduction tilting surface 62 of the fourth engagement portion 44 slides on the third introduction tilting surface 42 of the third engagement portion 38, and the fourth base portion 45 of the fourth engagement portion 44 is elastically deformed. The fourth base portion 45 has a plate shape, and the main surface of the fourth base portion 45 is oriented in the width direction W. Accordingly, the fourth base portion 45 is easily deformed inward in the width direction W.

[0110] The bottom panel main body 47 can be fastened to the base unit 11 by using the bottom panel fastening structure 64. Specifically, the fastening target plate portion 66 of the bottom panel main body 47 is fastened to the screw hole plate portion 30 of the base 13 by using a screw. In this manner, the bottom panel main body 47 can be fixed to the base 13.

[0111] After the bottom panel main body 47 is fixed, the opening portion 65 of the bottom panel main body 47 can be closed by using the cap portion 68.

[0112] Next, an operation of the first rib 18 will be described.

[0113] The curved part 79 is disposed in the bottom panel main body 47 according to the present embodiment. Accordingly, the indoor unit 1 can be designed so as not to give a user a feeling of pressure. The first rib 18 is formed in the curved part 79. Accordingly, the strength of the curved part 79 can be improved. In addition, when the indoor unit 1 is tilted to the front FB1 due

to the self-weight, the first rib 18 is pushed against the wall surface Wa.

[0114] Next, an operation of the second rib 21 will be described.

[0115] When cooling is performed, cold air is discharged from the discharge outlet 9. In this case, when the second rib 21 is not provided, the cold air is blown out from a gap between the flap 10 and the bottom panel 16. Accordingly, dew condensation may occur. Since the second rib 21 is disposed in the bottom panel 16 according to the present embodiment, the cold air blown from the gap between the flap 10 and the bottom panel 16 is blocked.

[0116] According to the embodiment, the curved part 79 is disposed in the bottom panel main body 47. Accordingly, the indoor unit 1 can be designed so as not to give a user a feeling of pressure. In addition, the first rib 18 is disposed in the bottom panel 16. Accordingly, when the indoor unit 1 is tilted to the front FB1 due to the self-weight, the first rib 18 is pushed against the wall surface Wa, and thereby it is possible to prevent the indoor unit 1 from being tilted to the front FB1.

[0117] In addition, the baffle member 67 is disposed in the bottom panel 16. Accordingly, when the opening portion 65 is covered using the cap portion 68 after the bottom panel 16 is fastened to the base unit 11, it is possible to prevent the cap portion 68 from entering the inside of the bottom panel 16.

[0118] In addition, the second rib 21 blocks cold air when cooling is performed. In this manner, dew condensation can be prevented. That is, it is possible to prevent the bottom panel 16 and the flap 10 from being cooled due to the cold air blowing out from between the bottom panel 16 and the flap 10 when the cooling is performed.

[0119] In addition, the bottom panel 16 extends in the width direction W. Accordingly, the bottom panel 16 thermally expands so as to increase the width in the width direction W. In a case where the first engagement portion 23 and the second engagement portion 32 are formed such that the first protruding portion 26 of the first engagement portion 23 and the second protruding portion 34 of the second engagement portion 32 protrude in the width direction W, the bottom panel 16 thermally expands in the width direction W. In this manner, an engagement margin decreases, and both the engagement portions are likely to disengage from each other.

[0120] On the other hand, according to the configuration of the present invention, the first protruding portion 26 of the first engagement portion 23 and the second protruding portion 34 of the second engagement portion 32 protrude in the front-back direction FB. In this manner, it is possible to prevent the first engagement portion 23 and the second engagement portion 32 from insufficiently engaging with each other by the bottom panel 16 thermally expanding in the width direction W. That is, even in a case where the bottom panel 16 thermally expands in the width direction W, there is no influence on the engagement margin in the front-back direction FB. Therefore, it is possible to prevent the disengagement.

[0121] In addition, the cross rib 57 is disposed on the upper surface of the bottom panel main body 47. Accordingly, the bottom panel 16 can have a strong structure. That is, even in a case where the bottom panel 16 has a long shape in the width direction W, the strength can be improved without increasing the plate thickness of the bottom panel 16.

[0122] In addition, the third engagement portion 38 disposed in both ends of the base 13 in the width direction W and the fourth engagement portion 44 disposed in both ends of the bottom panel 16 are caused to engage with each other. In this manner, it is possible to prevent both end portions of the bottom panel 16 from being lowered downwards.

[0123] Hitherto, the embodiment according to the present invention has been described in detail with reference to the drawings. However, the specific configurations are not limited to this embodiment. The present invention also includes any design change within the scope not departing from the gist of the present invention.

[0124] The above-described embodiment adopts a configuration in which the first protruding portion 26 of the first engagement portion 23 disposed in the base 13 protrudes to the front FB1 in the front-back direction FB and the second protruding portion 34 of the second engagement portion 32 disposed in the bottom panel 16 protrudes to the back FB2 in the front-back direction FB. However, the present invention is not limited thereto. That is, a configuration in which the first protruding portion 26 of the first engagement portion 23 protrudes to the back FB2 in the front-back direction FB, and the second protruding portion 34 of the second engagement portion 32 protrudes to the front FB1 in the front-back direction FB may be adopted.

Industrial Applicability

[0125] According to the present invention, it is possible to adopt a design for not giving a user a feeling of pressure by disposing the curved part in the bottom panel. In addition, the first rib is disposed in the bottom panel. Accordingly, when the indoor unit is tilted to the front due to the self-weight, the first rib is pushed against the wall surface. In this manner, it is possible to prevent the indoor unit from being tilted to the front.

Reference Signs List

[0126]

1 indoor unit
2 main body
3 cover portion
5 air-conditioning device
6 heat exchanger
7 blower fan
8 intake port

9 discharge outlet
10 flap
11 base unit
12 installation plate
13 base
14 front panel
15 top panel
16 bottom panel
17 side panel
18 first rib
19 support portion
20 air-conditioning device holder (base unit main body)
21 second rib
22 screw hole
23 first engagement portion
24 first plate portion
25 first base portion
26 first protruding portion
27 movement regulator
28 first engagement surface
29 first introduction surface
30 screw hole plate portion
32 second engagement portion
33 second base portion
34 second protruding portion
35 second engagement surface
36 second introduction surface
38 third engagement portion
39 third base portion
40 third protruding portion
41 third engagement surface
42 third introduction tilting surface
44 fourth engagement portion
45 fourth base portion
46 fourth protruding portion
47 bottom panel main body
48 stay portion
49 stay portion main body
50 flap main body
50a back edge
51 support structure
52 arm
53 arm main body
54 rotation connector
55 fixing portion
57 cross rib
58 third rib
59 fourth rib
61 fourth engagement surface
62 fourth introduction tilting surface
64 bottom panel fastening structure
65 opening portion
66 fastening target plate portion
67 baffle member
68 cap portion
69 first connection plate
70 second connection plate
71 engagement hole
72 through-hole
73 rotation shaft portion
74 cap projection
76 fifth rib
77 sixth rib
79 curved part
80 escape portion
100 air conditioner
FB front-back direction
FB1 front
FB2 back
V vertical direction
W width direction
Wa wall surface

Claims

1. An indoor unit of an air conditioner, comprising:

a main body unit having

a base unit fixed to a wall surface and extending in a width direction along the wall surface, and
an air-conditioning device which is attached to a front of the base unit, and has a heat exchanger, a blower fan, and a flap that has a plate shape and has a back edge extending in the width direction; and

a bottom panel covering a bottom surface of the main body unit, and having

a front end extending along a back edge of the flap disposed in a lower portion of the main body unit,
a curved part which curves upwards from the front end towards a back and which is positioned with a back end forwards of a back surface of the base unit, and
a first rib protruding to the back from the back end of the curved part.

2. The indoor unit of an air conditioner according to Claim 1, further comprising:

a bottom panel fastening structure that fastens the bottom panel to the base unit,
wherein the bottom panel fastening structure has

a screw hole disposed in the base unit,
an opening portion disposed on a main surface of the bottom panel, and having a linear first edge and a linear second edge disposed on a side opposite to the first edge,

a cap portion covering the opening portion,
a fastening target plate portion connected to the first edge, tilted upwards as the fastening target plate portion is separated from the first edge, and having a through-hole corresponding to the screw hole, and
a baffle member connecting an upper side end portion of the fastening target plate portion and the second edge of the opening portion to each other.

3. The indoor unit of an air conditioner according to Claim 1 or 2,
wherein the bottom panel has a second rib protruding upwards from the front end of the bottom panel such that wind generated by the blower fan collides with the second rib.

4. The indoor unit of an air conditioner according to any one of Claims 1 to 3, further comprising:

a first engagement portion disposed in the base unit and having

a first base portion protruding downwards and extending in the width direction, and
a first protruding portion protruding to one side in a front-back direction from a lower end of the first base portion; and

a second engagement portion disposed on an upper surface of the bottom panel, engaging with the first engagement portion, and having

a second base portion protruding upwards and extending in the width direction, and
a second protruding portion protruding to the other side in the front-back direction from an upper end of the second base portion.

5. The indoor unit of an air conditioner according to any one of Claims 1 to 4,
wherein the bottom panel has a cross rib having

a third rib disposed on an upper surface of the bottom panel, extending along the upper surface and in a direction tilted to the width direction, and protruding upwards, and
a fourth rib crossing the third rib, extending along the upper surface and in the direction tilted to the width direction, and protruding upwards.

6. The indoor unit of an air conditioner according to any one of Claims 1 to 5, further comprising:

a pair of third engagement portions having

third base portions respectively disposed in both ends of the base unit in the width direction, and
third protruding portions each protruding inward in the width direction from each of the third base portions; and

a pair of fourth engagement portions that is disposed in both ends of the bottom panel in the width direction, that engages with the third engagement portions, and that has

fourth base portions extending upwards, and
fourth protruding portions each protruding outward in the width direction from an upper portion of each of the fourth base portions.

7. An indoor unit of an air conditioner, comprising:

a main body unit having

a base unit fixed to a wall surface and extending in a width direction along the wall surface, and
an air-conditioning device which is attached to a front of the base unit, and has a heat exchanger, a blower fan, and a flap that has a plate shape;

a bottom panel covering a bottom surface of the main body unit; and
a bottom panel fastening structure that fastens the bottom panel to the base unit,
wherein the bottom panel fastening structure has

a screw hole disposed in the base unit,
an opening portion disposed on a main surface of the bottom panel, and having a linear first edge and a linear second edge disposed on a side opposite to the first edge,
a cap portion covering the opening portion,
a fastening target plate portion connected to the first edge, tilted upwards as the fastening target plate portion is separated from the first edge, and having a through-hole corresponding to the screw hole, and
a baffle member connecting an upper side end portion of the fastening target plate portion and the second edge of the opening portion to each other.

8. An indoor unit of an air conditioner, comprising:

a main body unit having

a base unit fixed to a wall surface and ex-

tending in a width direction along the wall surface, and
a heat exchanger and a blower fan which are attached to a front of the base unit; and

a bottom panel covering a bottom surface of the main body unit,
wherein the base unit has

a base unit main body, and
a first engagement portion having a first base portion protruding downwards from the base unit main body and extending in a width direction, and a first protruding portion protruding to one side in a front-back direction from a lower end of the first base portion, and

wherein the bottom panel has

a bottom panel main body having a plate shape,
a second engagement portion that is disposed on an upper surface of the bottom panel main body, engages with the first engagement portion, and has a second base portion protruding upwards and extending in the width direction, and a second protruding portion protruding to the other side in the front-back direction from an upper end of the second base portion.

9. An indoor unit of an air conditioner, comprising:

a main body unit that extends in a width direction and has an air-conditioning device having a heat exchanger and a blower fan; and
a bottom panel covering a bottom surface of the main body unit, and having

a bottom panel main body extending in the width direction and having a plate shape, and
a cross rib having a third rib that is disposed on an upper surface of the bottom panel main body, extends along the upper surface and in a direction tilted to the width direction, and protrudes upwards, and a fourth rib that crosses the third rib, extends along the upper surface and in the direction tilted to the width direction, and protrudes upwards.

10. An indoor unit of an air conditioner, comprising:

a main body unit having

a base unit fixed to a wall surface and extending in a width direction along the wall surface, and
an air-conditioning device which is attached to a front of the base unit, and has a heat exchanger and a blower fan; and

a bottom panel covering a bottom surface of the main body unit,
wherein the base unit has

a base unit main body, and
a pair of third engagement portions having third base portions respectively disposed in both ends of the base unit main body in the width direction, and third protruding portions each protruding inward in the width direction from each of the third base portions, and

wherein the bottom panel has

a bottom panel main body extending in the width direction and having a plate shape,
a pair of fourth engagement portions that is disposed in both ends of the bottom panel main body in the width direction, that engages with the third engagement portions, and that has
fourth base portions extending upwards, and
fourth protruding portions each protruding outward in the width direction from an upper portion of each of the fourth base portions.

Amended claims under Art. 19.1 PCT

1. (Amended) An indoor unit of an air conditioner, comprising:

a main body unit having

a base unit fixed to a wall surface and extending in a width direction along the wall surface, and
an air-conditioning device which is attached to a front of the base unit, and has a heat exchanger, a blower fan, and a flap that has a plate shape and has a back edge extending in the width direction; and

a bottom panel covering a bottom surface of the main body unit, and having

a front end extending along a back edge of the flap disposed in a lower portion of the main body unit,
a curved part which curves upwards from the front end towards a back and which is positioned with a back end forwards of a

back surface of the base unit, and
a first rib protruding to the back from the back end of the curved part and is in contact with the wall surface.

2. The indoor unit of an air conditioner according to Claim 1, further comprising:

a bottom panel fastening structure that fastens the bottom panel to the base unit,
wherein the bottom panel fastening structure has

a screw hole disposed in the base unit,
an opening portion disposed on a main surface of the bottom panel, and having a linear first edge and a linear second edge disposed on a side opposite to the first edge,
a cap portion covering the opening portion,
a fastening target plate portion connected to the first edge, tilted upwards as the fastening target plate portion is separated from the first edge, and having a through-hole corresponding to the screw hole, and
a baffle member connecting an upper side end portion of the fastening target plate portion and the second edge of the opening portion to each other.

3. The indoor unit of an air conditioner according to Claim 1 or 2,
wherein the bottom panel has a second rib protruding upwards from the front end of the bottom panel such that wind generated by the blower fan collides with the second rib.

4. The indoor unit of an air conditioner according to any one of Claims 1 to 3, further comprising:

a first engagement portion disposed in the base unit and having

a first base portion protruding downwards and extending in the width direction, and
a first protruding portion protruding to one side in a front-back direction from a lower end of the first base portion; and

a second engagement portion disposed on an upper surface of the bottom panel, engaging with the first engagement portion, and having

a second base portion protruding upwards and extending in the width direction, and
a second protruding portion protruding to the other side in the front-back direction from an upper end of the second base portion.

5. The indoor unit of an air conditioner according to any one of Claims 1 to 4,
wherein the bottom panel has a cross rib having

a third rib disposed on an upper surface of the bottom panel, extending along the upper surface and in a direction tilted to the width direction, and protruding upwards, and
a fourth rib crossing the third rib, extending along the upper surface and in the direction tilted to the width direction, and protruding upwards.

6. The indoor unit of an air conditioner according to any one of Claims 1 to 5, further comprising:

a pair of third engagement portions having

third base portions respectively disposed in both ends of the base unit in the width direction, and
third protruding portions each protruding inward in the width direction from each of the third base portions; and

a pair of fourth engagement portions that is disposed in both ends of the bottom panel in the width direction, that engages with the third engagement portions, and that has

fourth base portions extending upwards, and
fourth protruding portions each protruding outward in the width direction from an upper portion of each of the fourth base portions.

7. An indoor unit of an air conditioner, comprising:

a main body unit having

a base unit fixed to a wall surface and extending in a width direction along the wall surface, and
an air-conditioning device which is attached to a front of the base unit, and has a heat exchanger, a blower fan, and a flap that has a plate shape;

a bottom panel covering a bottom surface of the main body unit; and
a bottom panel fastening structure that fastens the bottom panel to the base unit,
wherein the bottom panel fastening structure has

a screw hole disposed in the base unit,
an opening portion disposed on a main surface of the bottom panel, and having a linear first edge and a linear second edge dis-

posed on a side opposite to the first edge,
a cap portion covering the opening portion,
a fastening target plate portion connected to the first edge, tilted upwards as the fastening target plate portion is separated from the first edge, and having a through-hole corresponding to the screw hole, and
a baffle member connecting an upper side end portion of the fastening target plate portion and the second edge of the opening portion to each other.

8. An indoor unit of an air conditioner, comprising:

a main body unit having

a base unit fixed to a wall surface and extending in a width direction along the wall surface, and
a heat exchanger and a blower fan which are attached to a front of the base unit; and

a bottom panel covering a bottom surface of the main body unit,
wherein the base unit has

a base unit main body, and
a first engagement portion having a first base portion protruding downwards from the base unit main body and extending in a width direction, and a first protruding portion protruding to one side in a front-back direction from a lower end of the first base portion, and

wherein the bottom panel has

a bottom panel main body having a plate shape,
a second engagement portion that is disposed on an upper surface of the bottom panel main body, engages with the first engagement portion, and has a second base portion protruding upwards and extending in the width direction, and a second protruding portion protruding to the other side in the front-back direction from an upper end of the second base portion.

9. [Delete]

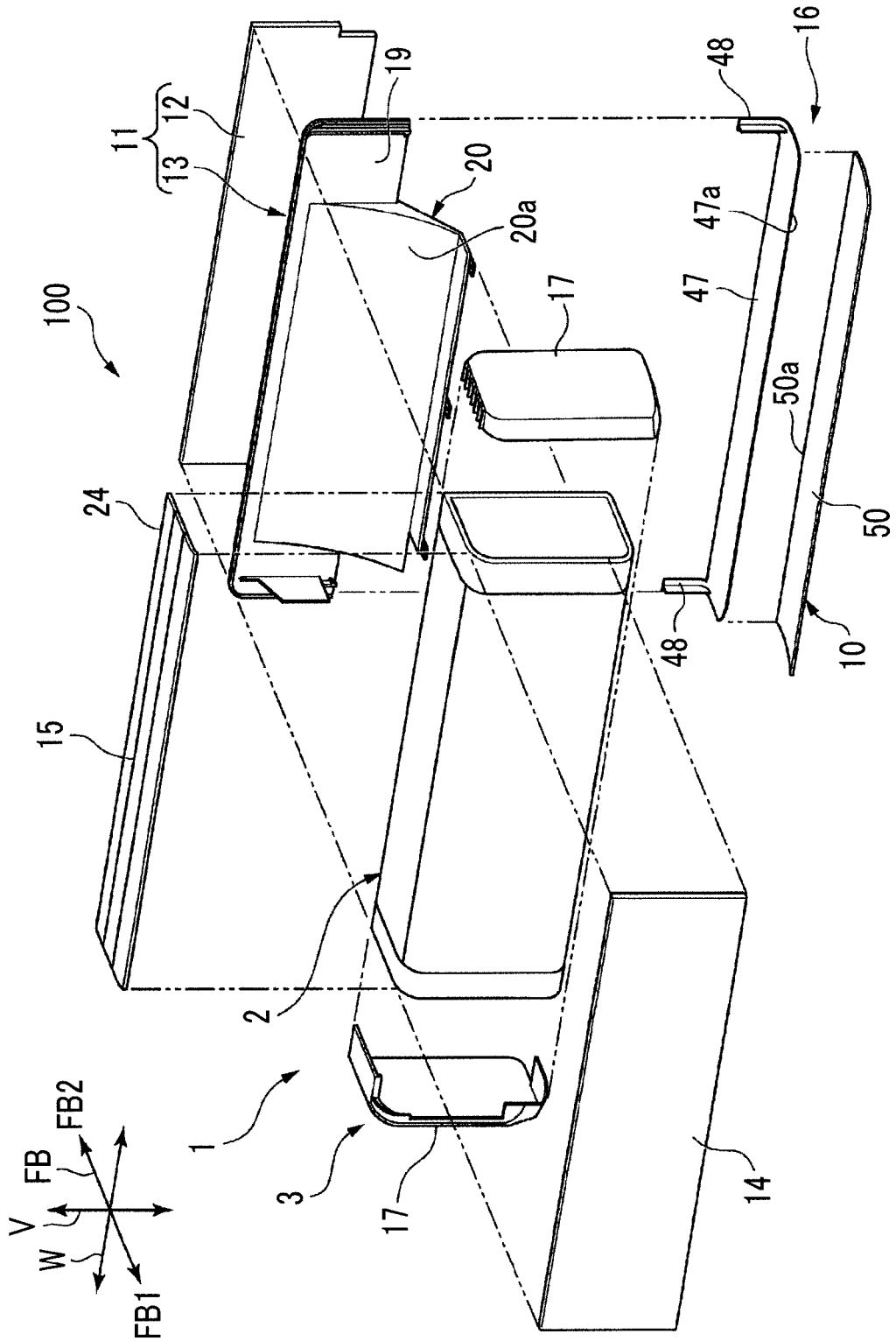
10. [Delete]

Statement under Art. 19.1 PCT

Claim 1 in Claims is amended as per the attached sheet. That is, the description of "is in contact with the wall surface" is added to Claim 1 in initially filed Claims. This amendment is based on paragraph [0070] of the specification and Fig. 2, and does not correspond to addition of new matter.

Claims 9 and 10 are deleted.

FIG. 1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16
48
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50
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48
10
15
2
1
3
17
14
FB2
FB
V
W
FB1

FIG. 2

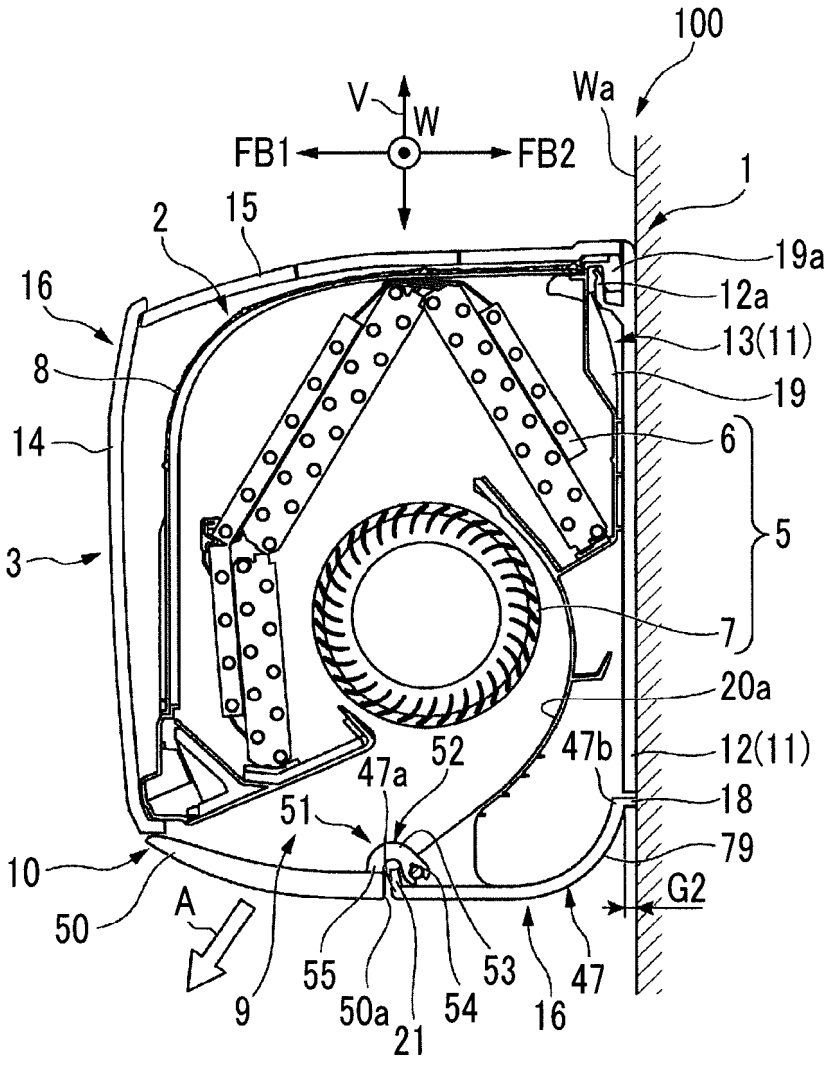

100
Wa
V
W
FB1
FB2
1
2
15
19a
16
12a
13(11)
8
19
14
6
5
3
7
20a
52
47b
12(11)
47a
18
51
79
10
G2
A
50
55
53
47
9
50a
54
16
21

FIG. 3

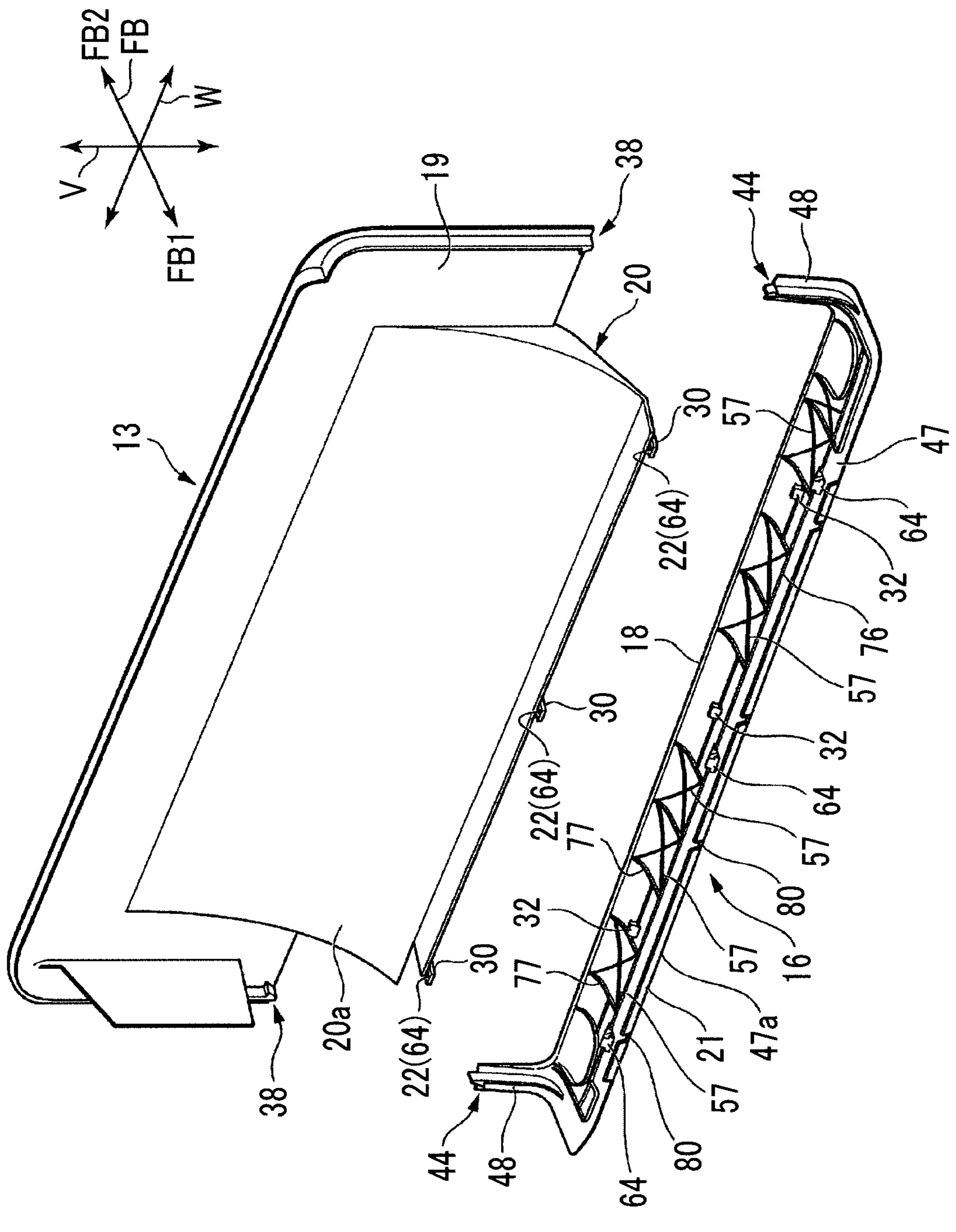

FB2
FB
W
V
FB1
13
19
38
20
30
22(64)
18
57
47
64
32
76
44
48
20a
77
80
16
21
47a

FIG. 4

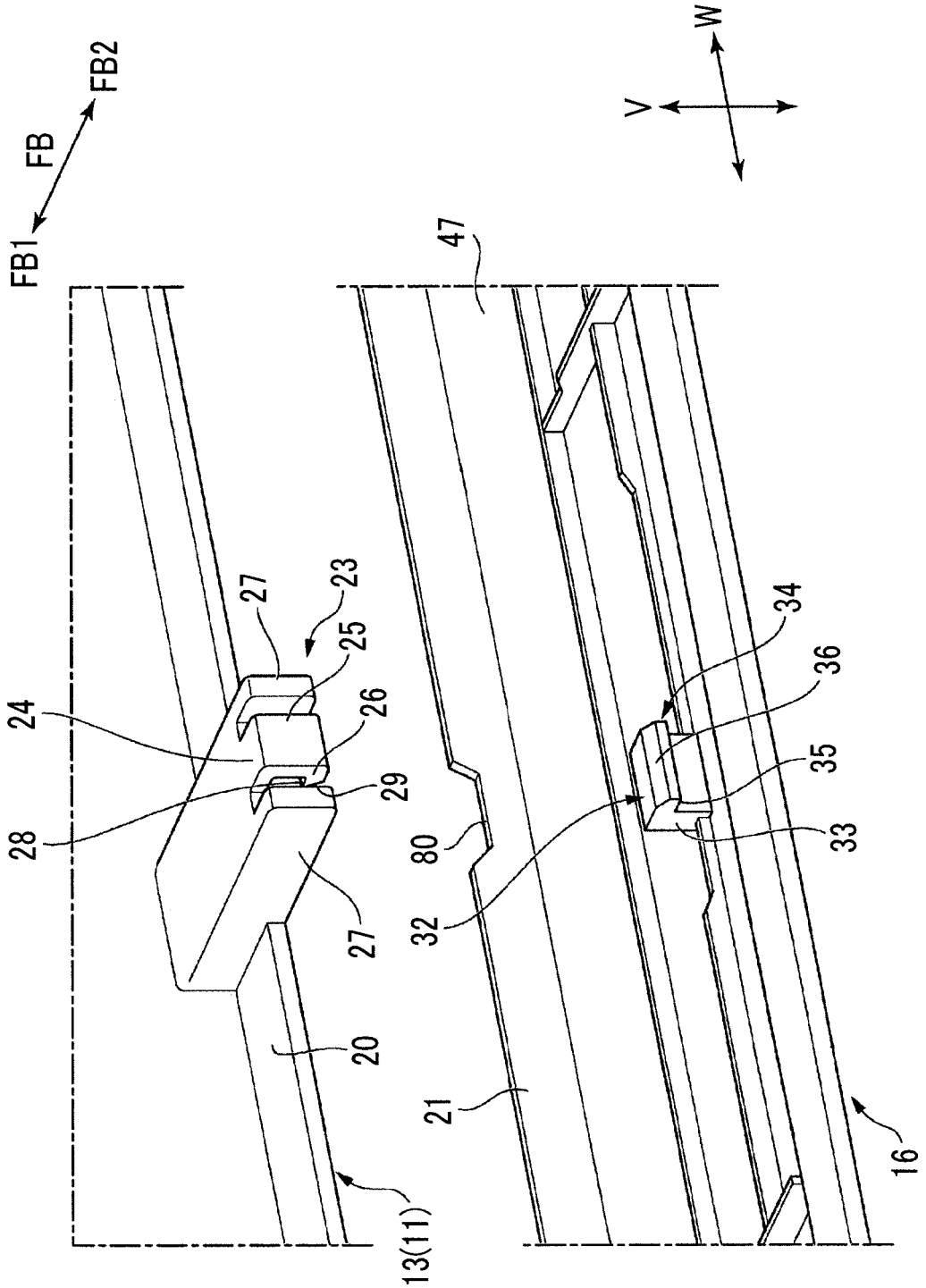

FB
FB1
FB2
V
W
47
27
23
25
24
26
28
29
27
80
32
34
36
35
33
20
21
13(11)
16

FIG. 5

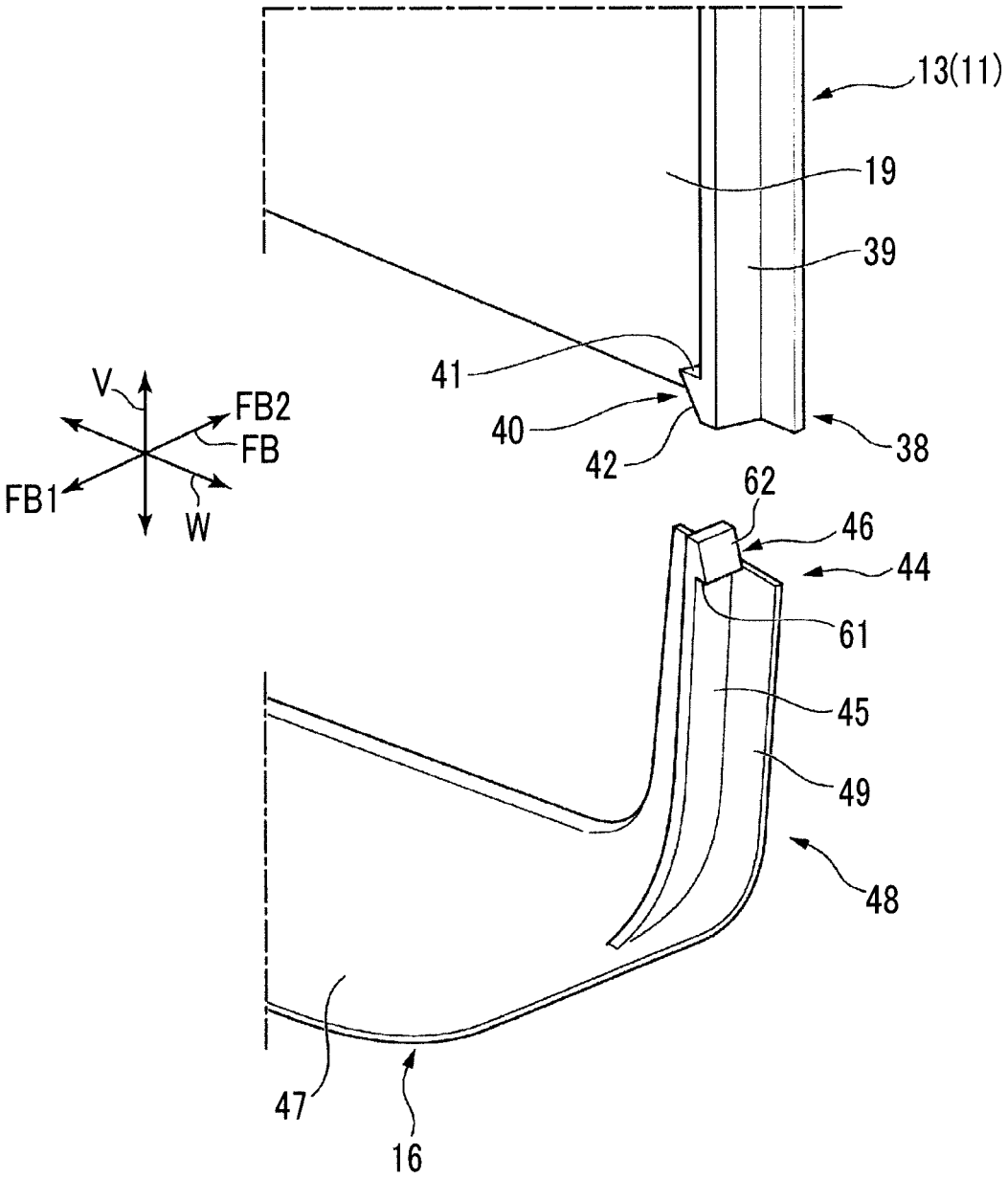


FIG. 6

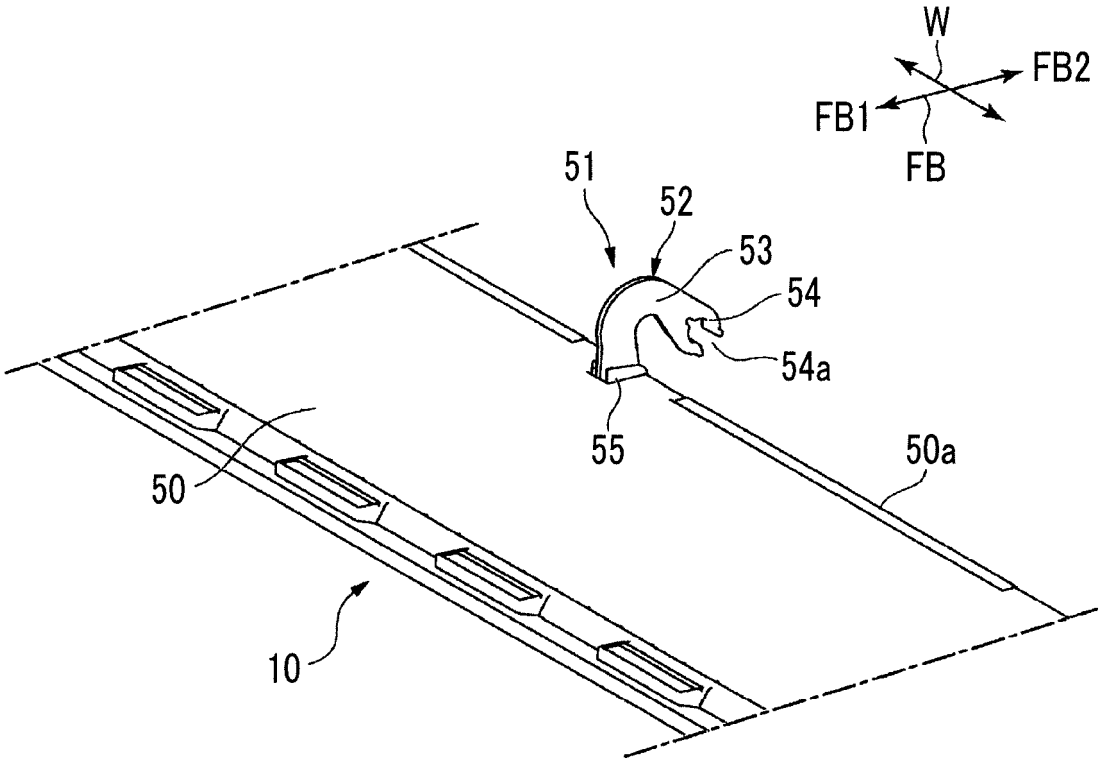


FIG. 7

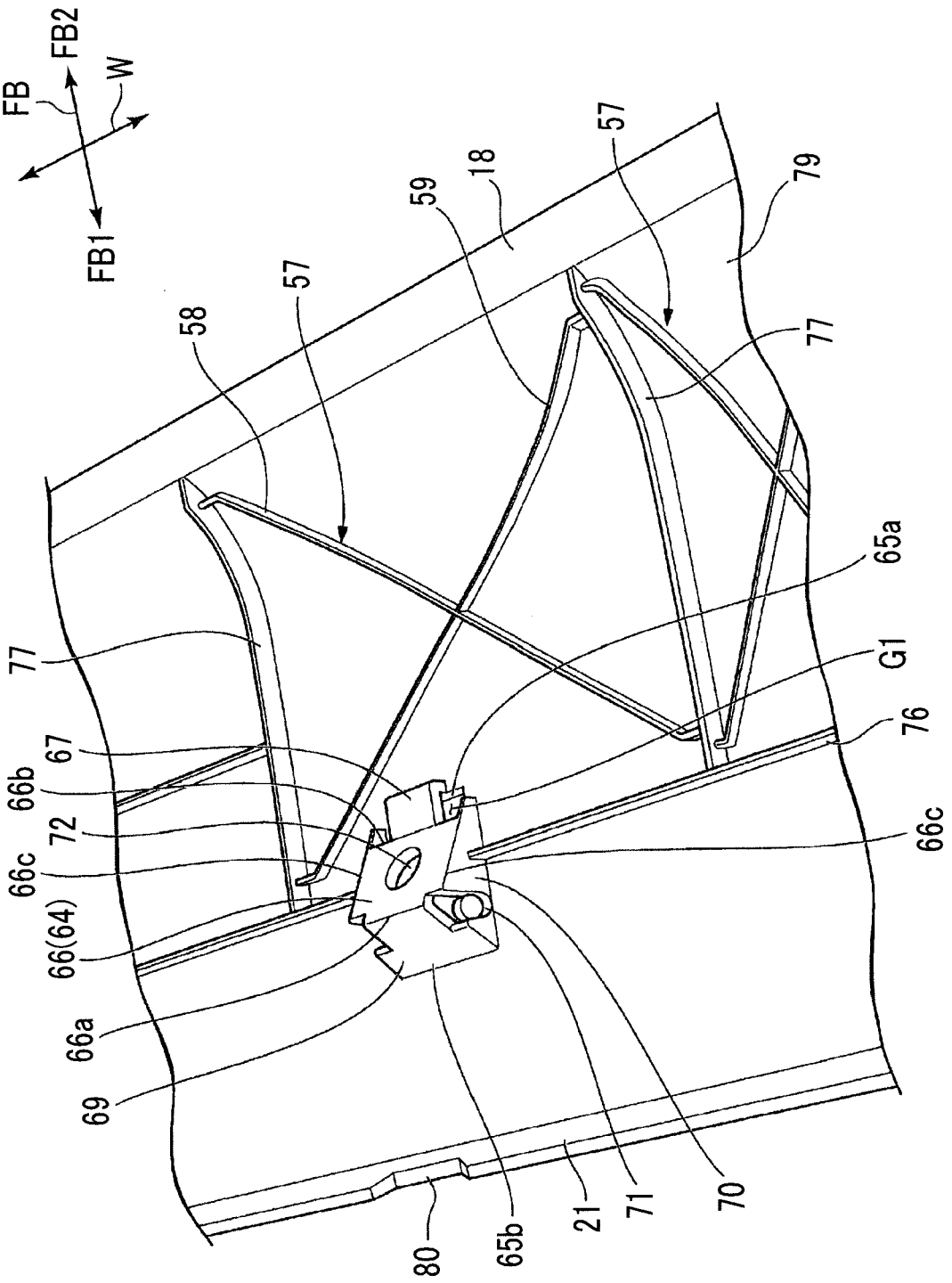

FB
FB2
W
FB1
57
59
18
57
79
58
57
77
77
65a
G1
76
67
66b
72
66c
66(64)
66a
69
66c
80
65b
21
71
70

FIG. 8

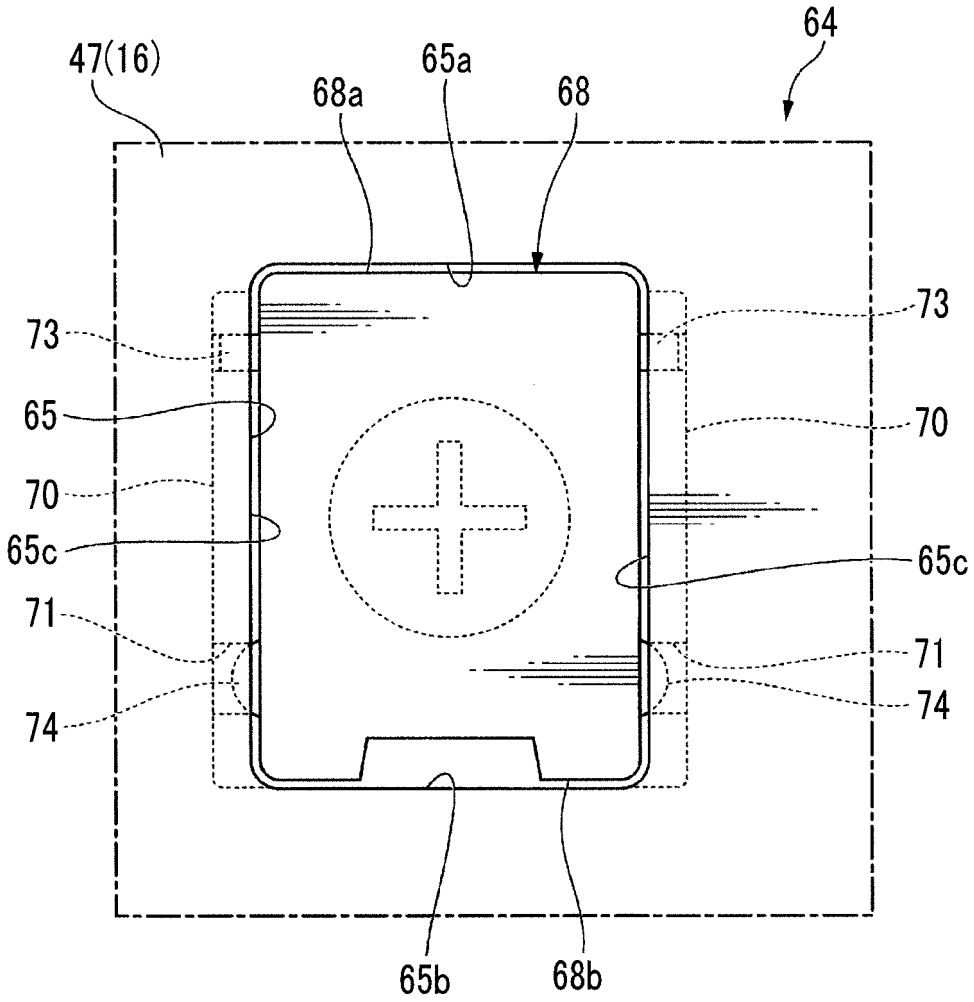
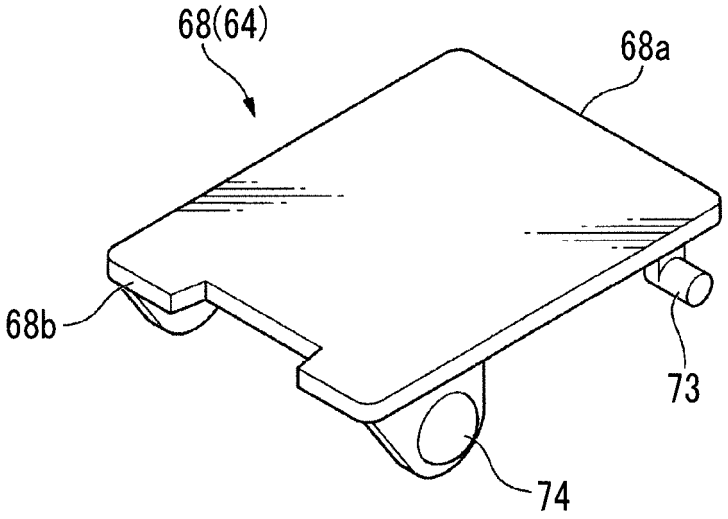


FIG. 9



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2017/043474

A. CLASSIFICATION OF SUBJECT MATTER
Int.Cl. F24F13/20(2006.01)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)
Int.Cl. F24F13/20

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	1971-2018
Registered utility model specifications of Japan	1996-2018
Published registered utility model applications of Japan	1994-2018

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 59-134439 A (SANYO ELECTRIC CO., LTD.) 02 August 1984, p. 2, upper left column, line 5 to page 2, lower right column, line 9, fig. 1-2 (Family: none)	1, 5-6, 9-10 2-4, 7-8
Y A	JP 2001-193958 A (SHARP CORP.) 17 July 2001, paragraphs [0022]-[0040], fig. 1-14 (Family: none)	1, 5-6, 10 2-4, 7-8
Y	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 183006/1979 (Laid-open No. 102714/1981 (KASAI KOGYO CO., LTD.) 12 August 1981, p. 4, line 2 to p. 8, line 12, fig. 1-6 (Family: none)	5-6, 9
Y	JP 2005-16746 A (DAIKIN INDUSTRIES, LTD.) 20 January 2005, paragraphs [0017]-[0043], fig. 1-11 (Family: none)	6, 10

☐ Further documents are listed in the continuation of Box C.

☐ See patent family annex.

* Special categories of cited documents:
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Date of the actual completion of the international search 22 February 2018 (22.02.2018)	Date of mailing of the international search report 06 March 2018 (06.03.2018)
Name and mailing address of the ISA/ Japan Patent Office 3-4-3, Kasumigaseki, Chiyoda-ku, Tokyo 100-8915, Japan	Authorized officer Telephone No.

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

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Patent documents cited in the description

- JP 2016235972 A **[0002]**
- JP 9060916 A **[0005]**