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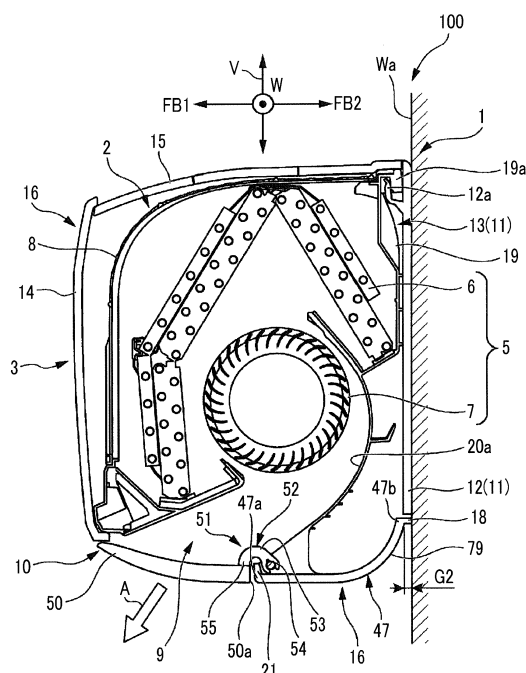
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(54) **INDOOR UNIT OF AIR-CONDITIONER**

(57) An indoor unit (1) of an air conditioner is provided which comprises: a main body (2) having an air conditioner (5) that comprises a heat exchanger (6), a blower fan (7), and a plate-shape flap (10) that has a back edge (50a) extending in the width direction; and a bottom panel (16) covering the bottom surface of the main body (2), and comprising a plate-shape bottom panel main body (47), which extends in the width direction (W) and has a front end (47a) along the back edge (50a) of the flap provided at the bottom of the main body (2), and a wind-blocking rib (21), which projects upwards from the front end (47a) of the bottom panel main body (47) so that wind generated by the blowing fan (7) collides therewith.

FIG. 2



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. 2016-235973, 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 internally accommodating a heat exchanger and a blower fan, and a cover portion having a front surface panel covering the main body. The air-conditioner configured in this way performs indoor air-conditioning by suctioning indoor air, adjusting temperature and humidity of the air, and by then discharging the air (for example, refer to PTL 1).

[0004] In an indoor unit of the air-conditioner configured in this way, a flap for covering a discharge outlet from outside so as to be openable and closeable is generally disposed on a downstream side of the discharge outlet for discharging the air. The flap and the cover portion are formed so that an outer surface of the flap and the cover portion around the flap are flush with each other.

Citation List

Patent Literature

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

Summary of Invention

Technical Problem

[0006] Incidentally, the indoor unit of the air-conditioner as described above has the following problem. When cooling is performed, cold air blows out from between the cover portion for covering the main body and the flap, and the cover portion and the flap are cooled, thereby resulting in dew condensation.

[0007] This invention aims to provide an indoor unit of an air-conditioner which can prevent dew condensation from occurring due to cold air blowing out from between a bottom surface panel and a flap when cooling is performed. **Solution to Problem**

[0008] According to a first aspect of the present invention, there is provided an indoor unit of an air-conditioner. The indoor unit includes a main body that has an air-conditioning device having a heat exchanger, a blower fan, and a plate-shaped flap having a back edge extending in a width direction, and a bottom surface panel that covers a bottom surface of the main body, and that has

a plate-shaped bottom surface panel main body which has a front end portion along a back edge of the flap disposed in a lower portion of the main body, and which extends in the width direction, and a wind-blocking rib which protrudes upward from a front end portion of the bottom surface panel main body so that wind generated by the blower fan collides with the wind-blocking rib.

[0009] According to this configuration, the wind-blocking rib blocks cold air when cooling is performed. In this manner, dew condensation can be prevented. That is, it is possible to prevent the bottom surface panel and the flap from being cooled by the cold air blowing out from between the bottom surface panel and the flap when the cooling is performed.

[0010] In the indoor unit of the air-conditioner, the main body may have a base portion which is fixed to a wall surface, which extends in the width direction along the wall surface, and to which the air-conditioning device is attached forward. The bottom surface panel may have a curved portion which is curved upward as the curved portion faces backward from the front end portion, and a back end portion of which is located on a forward side of a rear surface of the base portion, and a first rib which protrudes backward from a back end portion of the curved portion.

[0011] According to this configuration, the curved portion is disposed in the bottom surface 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 surface panel. In this manner, when the indoor unit tends to be tilted forward due to a self-weight thereof, it is possible to prevent the indoor unit from being tilted forward by the first rib pushed against the wall surface.

[0012] The indoor unit of the air-conditioner may further include a bottom surface panel fastening structure that fastens the bottom surface panel to the base portion. The bottom surface panel fastening structure may have a screw hole disposed in the base portion, an opening portion disposed on a main surface of the bottom surface 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 upward 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.

[0013] According to this configuration, the baffle member is disposed in the bottom surface panel. In this manner, when the opening portion is covered using the cap portion after the bottom surface panel is fastened to the base portion, it is possible to prevent the cap portion from entering the inside of the bottom surface panel.

[0014] The indoor unit of the air-conditioner may further include a first engagement portion that is disposed in the base portion, and that has a first base portion protruding

downward and extending in a width direction, and a first protruding portion protruding to one side in a forward-backward direction from a lower end of the first base portion, and a second engagement portion that is disposed on an upper surface of the bottom surface panel, that engages with the first engagement portion, and that has a second base portion protruding upward, and extending in the width direction, and a second protruding portion protruding to the other side from an upper end of the second base portion in the forward-backward direction.

[0015] The bottom surface panel extends in the width direction. Accordingly, the bottom surface panel thermally expands so as to increase a width in the width direction. In a case where the first engagement portion and the second engagement portion are formed so 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 surface 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 a 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 a forward-backward direction. In this manner, it is possible to prevent the first engagement portion and the second engagement portion from insufficiently engaging with each other due to the bottom surface panel thermally expanding in the width direction. That is, even in a case where the bottom surface panel thermally expands in the width direction, there is no influence on the engagement margin in the forward-backward direction. Therefore, it is possible to prevent disengagement.

[0017] The indoor unit of the air-conditioner may further include a pair of third engagement portions that has third base portions respectively disposed in both ends of the base portion in the width direction, and third protruding portions protruding inward in the width direction from the third base portion, and a pair of fourth engagement portions that is disposed in both ends of the bottom surface panel in the width direction, that engages with the respective third engagement portions, and that has fourth base portions extending upward and fourth protruding portions protruding outward in the width direction from an upper portion of the fourth base portion.

[0018] According to this configuration, it is possible to prevent both end portions of the bottom surface panel from being lowered downward.

[0019] In the indoor unit of the air-conditioner, the bottom surface panel may have a cross rib having a third rib disposed on an upper surface of the bottom surface panel, extending along the upper surface and in a direction tilted to the width direction, and protruding upward, and a fourth rib crossing the third rib, extending along the upper surface and in the direction tilted to the width direction, and protruding upward.

[0020] According to this configuration, the bottom surface panel can have a strong structure. That is, even in a case where the bottom surface panel has a long shape in the width direction, strength can be improved without increasing a plate thickness of the bottom surface panel.

Advantageous Effects of Invention

[0021] According to the present invention, a wind-blocking rib blocks cold air when cooling is performed. In this manner, dew condensation can be prevented. That is, it is possible to prevent a bottom surface panel and a flap from being cooled due to the cold air blowing out from between the bottom surface panel and the flap when the cooling is performed.

Brief Description of Drawings

[0022]

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 portion and a bottom surface panel according to the embodiment of the present invention.

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

Fig. 8 is a view when the bottom surface 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

[0023] An air-conditioner 100 includes an indoor unit 1 to be 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.

[0024] The indoor unit 1 performs indoor air-conditioning by suctioning air, adjusting temperature and humidity of the air, and then discharging the air.

[0025] Hereinafter, the indoor unit 1 according to an

embodiment of the present invention will be described in detail with reference to the drawings.

[0026] In the following description, a front surface, an upper surface, a bottom surface, a rear 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 rear 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.

[0027] As illustrated in Figs. 1 and 2, the indoor unit 1 includes a main body 2 having an air-conditioning device 5 and a cover portion 3 covering the main body 2.

[0028] The main body 2 has a base portion 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 forward FB1 of the base portion 11. An air intake port 8 is disposed in an upper portion of a front surface of the main body 2. A discharge outlet 9 is disposed in a lower portion of the main body 2.

[0029] The cover portion 3 has a front surface panel 14 covering a front surface of the main body 2, a top surface panel 15 covering an upper surface of the main body 2, a bottom surface panel 16 covering a bottom surface of the main body 2, and a pair of side surface panels 17 respectively covering right and left side portions of the main body 2.

[0030] A rear surface of the base portion 11 is in surface contact with the wall surface Wa. The base portion 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.

[0031] 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 portion 11. The installation plate 12 is fixed to the wall surface Wa by using a wood screw, for example.

[0032] 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.

[0033] 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 portion main body) disposed forward FB1 of the support portion 19, a first engagement portion 23 (refer to Fig. 4) disposed in a lower portion of the air-conditioning device holder 20 at an interval 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 surface panel 16.

[0034] The support portion 19 is a member forming a rear surface of the main body 2 together with the installation plate 12, and has a hook 19a hooked on 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.

tioning device 5 is held by the air-conditioning device holder 20.

[0035] 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 supporting the bottom surface panel 16 in cooperation with the second engagement portion 32 disposed in the bottom surface panel 16, and a pair of movement regulators 27.

[0036] The first engagement portion 23 has a first plate portion 24 protruding backward FB2 from the air-conditioning device holder 20, a first base portion 25 protruding downward from a back end of the first plate portion 24, and a first protruding portion 26 protruding forward FB1 from a lower end of the first base portion 25.

[0037] The first plate portion 24 is a plate-shaped member formed so that a main surface is orthogonal to a vertical direction V.

[0038] The first base portion 25 is a plate-shaped member formed so that the main surface is orthogonal to a forward-backward direction FB.

[0039] 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 in the width direction W and facing upward, and a first introduction surface 29 connecting a 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 a surface tilted forward FB1 as the first introduction surface 29 faces upward.

[0040] The pair of movement regulators 27 regulates movement in the width direction W of the second engagement portion 32 engaging with the first engagement portion 23. The movement regulators 27 are plate-shaped members formed so that the main surface is orthogonal to the width direction W. The movement regulators 27 are at a predetermined interval in the front and the rear of the first protruding portion 26.

[0041] Three first engagement portions 23 are formed at an interval in the width direction W.

[0042] As illustrated in Fig. 5, both ends of the base 13 in the width direction W are respectively provided with third engagement portions 38 supporting the bottom surface panel 16 in cooperation with a fourth engagement portion 44 of the bottom surface panel 16 (only one of the third engagement portions 38 is illustrated in Fig. 5).

[0043] The third engagement portion 38 has a wall-shaped third base portion 39 disposed in an edge 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 forward FB1 from an end portion of the support portion 19 in the width direction W.

[0044] The third protruding portion 40 is a member disposed in a lower end of the third base portion 39, and protruding inward in the width direction W. The third protruding portion 40 has a third engagement surface 41 facing upward, and a third introduction tilting surface 42

connecting a tip of the third engagement surface 41 and the lower end of the third base portion 39 to each other, and gradually raised inward in the width direction W.

[0045] 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 surface panel 16. The screw holes 22 are configuration elements of a bottom surface panel fastening structure 64 (to be described later).

[0046] The screw hole 22 is formed in a screw hole plate portion 30 protruding forward FB1 from the air-conditioning device holder 20.

[0047] The air-conditioning device 5 has a heat exchanger 6, a blower fan 7, and a flap 10.

[0048] The blower fan 7 is a cross flow fan extending in the width direction W.

[0049] The heat exchanger 6 is disposed so as to surround the blower fan 7 from an outer periphery.

[0050] 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 downward, facing obliquely downward, or facing forward.

[0051] The flap 10 covering the discharge outlet 9 from the outside so as to be openable and closeable is located on a downstream side of the discharge outlet 9. The flap 10 is brought into an open state when the air-conditioner 100 is operated, and can adjust a tilting angle in order to adjust an orientation in the vertical direction V of the air blown out from the discharge outlet 9. The flap 10 is brought into a closed state when the air-conditioner 100 is stopped, and can cover the discharge outlet 9 together with a surface of the cover portion 3 disposed around the discharge outlet 9.

[0052] As illustrated in Figs. 2 and 6, the flap 10 has a plate-shaped flap main body 50 and a support structure 51 supporting the flap main body 50. The flap main body 50 includes a molded body formed into a substantially a plate shape. A 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 a size of an opening portion of the discharge outlet 9 by using a rotation mechanism (not illustrated).

[0053] The support structure 51 is disposed on a back end side of the flap main body 50.

[0054] The support structure 51 includes an arm 52 supporting the flap 10 so as to be rotatable around the base 13. The arm 52 has an arm main body 53, a rotation connector 54 disposed in one end of the arm main body 53 and connected to the base 13 so as to be rotatable, and a fixing portion 55 disposed in the other end of the arm main body 53 and fixed to a back end portion of the flap main body 50.

[0055] The arm main body 53 is formed to be greatly curved into a semicircular shape when viewed in the width direction W. The arm main body 53 projects upward when the air-conditioner 100 is in an operation state (the flap 10 is in an open state).

[0056] 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, the opening faces downward when the air-conditioner 100 is in the operation state (the flap 10 is in the open state).

[0057] Next, the cover portion 3 covering the main body 2 will be described.

[0058] As illustrated in Fig. 1, the front surface panel 14 is detachably disposed on the front surface of the main body 2. The front surface panel 14 covers the front surface of the main body 2, and can suction the air into the main body 2 from between the main body 2 and the front surface panel 14.

[0059] The top surface panel 15 is detachably disposed on the upper surface of the main body 2. The top surface panel 15 covers the upper surface of the main body 2.

[0060] The pair of side surface panels 17 is detachably disposed in the respective right and left side portions of the main body 2. The pair of side surface panels 17 covers the side surface of the main body 2.

[0061] The bottom surface panel 16 is detachably disposed on the bottom surface of the main body 2. The bottom surface panel 16 covers the bottom surface of the main body 2.

[0062] As illustrated in Figs. 2 and 3, the bottom surface panel 16 has a bottom surface panel main body 47, a pair of stay portions 48 extending upward from both ends of the bottom surface panel main body 47 in the width direction W, three second engagement portions 32 disposed on the upper surface of the bottom surface panel main body 47, a plurality of cross ribs 57 disposed on the upper surface of the bottom surface panel main body 47, a first rib 18 protruding backward FB2 from a back end of the bottom surface panel main body 47, and a wind-blocking rib 21 protruding upward from a front end of the bottom surface panel main body 47. A front end portion 47a of the bottom surface 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 portion 47a of the bottom surface panel main body 47 and the back edge 50a of the flap main body 50.

[0063] The wind-blocking rib 21 is formed so that wind generated by the blower fan 7 collides with the wind-blocking rib 21.

[0064] As illustrated in Fig. 4, the upper surface of the bottom surface panel main body 47 is provided with the second engagement portion 32 supporting the bottom surface panel 16 in cooperation with the first engagement portion 23 disposed in the base 13. The second engagement portion 32 has a second base portion 33 and a second protruding portion 34 protruding backward FB2 from the upper end of the second base portion 33.

[0065] The second base portion 33 is a member protruding upward and extending in the width direction W.

[0066] 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 downward, and a second introduction surface 36 connecting the back end of the second engagement surface 35 and the tip of the second base portion 33 to each other. The second introduction surface 36 is tilted forward FB1 as the second introduction surface 36 faces upward.

[0067] Three second engagement portions 32 are formed at an interval in the width direction W. The second engagement portion 32 is formed at a position corresponding to the first engagement portion 23.

[0068] 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 the upper end of the stay portion main body 49. The fourth engagement portion 44 is a member supporting both ends of the bottom surface panel 16 in the width direction W in cooperation with the third engagement portion 38 of the base 13.

[0069] 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 forward-backward direction FB.

[0070] The fourth engagement portion 44 has a fourth base portion 45 protruding upward together with the stay portion main body 49, and a fourth protruding portion 46 protruding outward in the width direction W from the upper end of the fourth base portion 45.

[0071] The fourth base portion 45 has a plate shape, and is formed to protrude forward 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.

[0072] The fourth protruding portion 46 has a fourth engagement surface 61 facing downward, and a fourth introduction tilting surface 62 connecting the tip of the fourth engagement surface 61 and the upper end of the fourth base portion 45 to each other and gradually lowered outward in the width direction W.

[0073] As illustrated in Figs. 7, 8, and 9, the bottom surface panel main body 47 of the bottom surface panel 16 is attached to the base 13 by using the bottom surface panel fastening structure 64.

[0074] The bottom surface panel fastening structure 64 has a 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 surface 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.

[0075] 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.

[0076] The cap portion 68 is a component for conceal-

ing a screw used in the bottom surface panel fastening structure 64. The cap portion 68 can be attached to the opening portion 65. The cap portion 68 can be rotated around the rotation shaft portion 73 attached to the first edge 65a of the opening portion 65.

[0077] The fastening target plate portion 66 has a plate shape formed to be tilted to the main surface of the bottom surface 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 upward as the fastening target plate portion 66 is separated from the first edge 65a.

[0078] A through-hole 72 into which a shaft portion of the screw fastening the bottom surface panel 16 is inserted is formed in a central portion of the fastening target plate portion 66.

[0079] The fastening target plate portion 66 is connected to the bottom surface panel main body 47 by using a first connection plate 69 connecting an upper end 66a of the fastening target plate portion 66 and a second edge 65b disposed on a side opposite to the first edge 65a of the opening portion 65 to each other, and a pair of second connection plates 70 connecting a lateral side 66c of the fastening target plate portion 66 and a side edge 65c of the opening portion 65 to each other.

[0080] A gap G1 is formed between a lower edge 66b of the fastening target plate portion 66 which is disposed on a side opposite to a connector of 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.

[0081] As illustrated in Fig. 9, the cap portion 68 is a rectangular plate-shaped member corresponding to the opening portion 65. A first side 68a of the cap portion 68 has a rotation shaft portion 73. 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.

[0082] A second side 68b disposed on a side opposite to the first side 68a of the cap portion 68 has the pair of cap projections 74 protruding in a direction extending along the second side 68b. The cap projection 74 is a hemispherical projection engaging with the engagement hole 71 of the second connection plate 70.

[0083] The bottom surface 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 portion 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.

[0084] As illustrated in Figs. 3 and 7, the upper surface of the bottom surface 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 forward-backward direction FB.

[0085] The fifth rib 76 is a plate-shaped member protruding upward from the upper surface of the bottom surface panel main body 47. The main surface of the fifth rib 76 is orthogonal to the upper surface of the bottom surface panel main body 47. The fifth rib 76 is formed on the front side of the bottom surface panel main body 47.

[0086] The plurality of sixth ribs 77 are formed backward FB2 of the fifth rib 76. The plurality of sixth ribs 77 are formed at an interval in the width direction W.

[0087] The cross rib 57 has a third rib 58 and a fourth rib 59 which are formed so as to cross each other.

[0088] The third rib 58 is a plate-shaped member protruding upward from the upper surface of the bottom surface panel main body 47. The third rib 58 extends along the upper surface of the bottom surface 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 surface panel main body 47.

[0089] Similar to the third rib 58, the fourth rib 59 is a plate-shaped member protruding upward from the upper surface of the bottom surface panel main body 47. The fourth rib 59 extends along the upper surface of the bottom surface 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 surface panel main body 47.

[0090] The cross rib 57 is formed in a rectangular region formed by the two sixth rib 77 and fifth rib 76 which are adjacent to each other. The third rib 58 and the fourth rib 59 which configure the cross rib 57 are formed so as to form a diagonal line of the above-described rectangular region.

[0091] The height of the cross rib 57 from the upper surface of the bottom surface 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 surface panel main body 47 can be appropriately changed in accordance with the thickness of the bottom surface panel main body 47. In order to facilitate molding of the bottom surface panel 16, a circular rib may be disposed in a cross point of the cross rib 57.

[0092] 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.

[0093] As illustrated in Figs. 2 and 3, the bottom surface panel main body 47 of the bottom surface panel 16 has a front end portion 47a extending along the back edge 50a of the flap main body 50, and a curved portion 79 curved upward as the curved portion 79 goes backward FB2 from the front end portion 47a. The curved portion 79 is formed so that a gap G2 between a back end portion 47b of the curved portion 79 and the wall surface Wa is evenly disposed in the width direction W. In other words, the back end portion 47b of the curved portion 79 is located on the forward side of the rear surface of the base portion 11.

[0094] The bottom surface panel 16 has the first rib 18

protruding backward FB2 from the back end portion 47b of the curved portion 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 so that an angle formed between the front end of the first rib 18 and the back end of the curved portion 79 of the bottom surface panel main body 47 is from 90° to 150°. The first rib 18 is formed to cover the gap G2 between the curved portion 79 and the wall surface Wa.

[0095] The bottom surface panel main body 47 of the bottom surface panel 16 has the wind-blocking rib 21 protruding upward from the front end portion 47a of the bottom surface panel main body 47.

[0096] The wind-blocking rib 21 is a plate-shaped member extending in the width direction W. The main surface of the wind-blocking rib 21 faces forward FB1. The wind-blocking rib 21 is formed so that an angle formed between the lower end of the wind-blocking rib 21 and the back end of the front end portion 47a of the bottom surface panel main body 47 is from 90° to 120°. As illustrated in Fig. 4, the wind-blocking rib 21 is formed to have an escape portion 80 in order to avoid interference with the arm 52 of the flap 10.

[0097] Next, a method of attaching the bottom surface panel 16 of the indoor unit 1 of the air-conditioner 100 according to the present embodiment will be described.

[0098] The bottom surface panel 16 is attached as follows. 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 surface panel main body 47 are caused to engage with each other, and 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 surface panel 16 are caused to engage with each other. The bottom surface panel 16 is attached by using the bottom surface panel fastening structure 64 and fastening the bottom surface panel main body 47 to the base 13.

[0099] The bottom surface 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.

[0100] Both ends of the bottom surface 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.

[0101] 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.

[0102] The bottom surface panel main body 47 can be fastened to the base portion 11 by using the bottom surface panel fastening structure 64. Specifically, the fastening target plate portion 66 of the bottom surface 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 surface panel main body 47 can be fixed to the base 13.

[0103] After the bottom surface panel main body 47 is fixed, the opening portion 65 of the bottom surface panel main body 47 can be closed by using the cap portion 68.

[0104] Next, an operation of the first rib 18 will be described.

[0105] The curved portion 79 is disposed in the bottom surface 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 portion 79. Accordingly, the strength of the curved portion 79 can be improved. In addition, when the indoor unit 1 is tilted forward FB1 due to the self-weight, the first rib 18 is pushed against the wall surface Wa.

[0106] Next, an operation of the wind-blocking rib 21 will be described.

[0107] When cooling is performed, cold air is discharged from the discharge outlet 9. In a case where the wind-blocking rib 21 is not present at this time, the cold air is blown out from a gap between the flap 10 and the bottom surface panel 16. In this manner, dew condensation may occur. Since the wind-blocking rib 21 is disposed in the bottom surface panel 16 according to the present embodiment, the cold air blown from the gap between the flap 10 and the bottom surface panel 16 is blocked.

[0108] According to the above-described embodiment, the dew condensation can be prevented by the wind-blocking rib 21 which blocks the cold air when the cooling is performed. That is, it is possible to prevent the bottom surface panel 16 and the flap 10 from being cooled due to the cold air blowing out from between the bottom surface panel 16 and the flap 10 when the cooling is performed.

[0109] In addition, the curved portion 79 is disposed in the bottom surface 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 surface panel 16. Accordingly, when the indoor unit 1 is tilted forward FB1 due to the self-weight, the first rib 18 is pushed against the wall surface Wa. In this manner, it is possible to prevent the indoor unit 1 from being tilted forward FB1.

[0110] In addition, the baffle member 67 is disposed in the bottom surface panel 16. Accordingly, when the opening portion 65 is covered using the cap portion 68

after the bottom surface panel 16 is fastened to the base portion 11, it is possible to prevent the cap portion 68 from entering the inside of the bottom surface panel 16.

[0111] In addition, the bottom surface panel 16 extends in the width direction W. Accordingly, the bottom surface 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 so 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 surface 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.

[0112] 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 forward-backward 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 due to the bottom surface panel 16 thermally expanding in the width direction W. That is, even in a case where the bottom surface panel 16 thermally expands in the width direction W, there is no influence on the engagement margin in the forward-backward direction FB. Therefore, it is possible to prevent the disengagement.

[0113] In addition, the cross rib 57 is disposed on the upper surface of the bottom surface panel main body 47. Accordingly, the bottom surface panel 16 can have a strong structure. That is, even in a case where the bottom surface panel 16 has a long shape in the width direction W, the strength can be improved without increasing the plate thickness of the bottom surface panel 16.

[0114] 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 surface panel 16 are caused to engage with each other. In this manner, it is possible to prevent both end portions of the bottom surface panel 16 from being lowered downward.

[0115] 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.

[0116] 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 forward FB1 in the forward-backward direction FB and the second protruding portion 34 of the second engagement portion 32 disposed in the bottom surface panel 16 protrudes backward FB2 in the forward-backward direction FB. However, the present invention is not

limited thereto. That is, a configuration may be adopted as follows. The first protruding portion 26 of the first engagement portion 23 protrudes backward FB2 side in the forward-backward direction FB, and the second protruding portion 34 of the second engagement portion 32 protrudes forward FB1 side in the forward-backward direction FB.

Industrial Applicability

[0117] According to the present invention, dew condensation can be prevented by a wind-blocking rib blocking cold air when cooling is performed. That is, it is possible to prevent a bottom surface panel and a flap from being cooled due to the cold air blowing out from between the bottom surface panel and the flap when the cooling is performed.

Reference Signs List

[0118]

1 indoor unit	
2 main body	
3 cover portion	
5 air-conditioning device	5
6 heat exchanger	
7 blower fan	
8 intake port	
9 discharge outlet	
10 flap	10
11 base portion	
12 installation plate	
13 base	
14 front surface panel	
15 top surface panel	15
16 bottom surface panel	
17 side surface panel	
18 first rib	
19 support portion	
20 air-conditioning device holder (base portion main body)	20
21 wind-blocking rib	
22 screw hole	
23 first engagement portion	
24 first plate portion	
25 first base portion	25
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	35
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	45
46 fourth protruding portion	
47 bottom surface 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 surface 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 portion	
80 escape portion	
100 air-conditioner	
FB forward-backward direction	
FB1 forward	
FB2 backward	
V vertical direction	
W width direction	
Wa wall surface	

Claims

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

a main body that has an air-conditioning device having a heat exchanger, a blower fan, and a plate-shaped flap having a back edge extending in a width direction; and
a bottom surface panel that covers a bottom surface of the main body, and that has a plate-shaped bottom surface panel main body which has a front end portion along a back edge of the

- flap disposed in a lower portion of the main body, and which extends in the width direction, and a wind-blocking rib which protrudes upward from a front end portion of the bottom surface panel main body so that wind generated by the blower fan collides with the wind-blocking rib. 5
2. The indoor unit of an air-conditioner according to Claim 1, wherein the main body has a base portion which is fixed to a wall surface, which extends in the width direction along the wall surface, and to which the air-conditioning device is attached forward, and wherein the bottom surface panel has a curved portion which is curved upward as the curved portion faces backward from the front end portion, and a back end portion of which is located on a forward side of a rear surface of the base portion, and a first rib which protrudes backward from a back end portion of the curved portion. 10 15 20
3. The indoor unit of an air-conditioner according to Claim 2, further comprising:
- a bottom surface panel fastening structure that fastens the bottom surface panel to the base portion, wherein the bottom surface panel fastening structure has
- a screw hole disposed in the base portion, an opening portion disposed on a main surface of the bottom surface 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 upward 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. 25 30 35 40 45
4. The indoor unit of an air-conditioner according to Claim 2 or 3, further comprising:
- a first engagement portion that is disposed in the base portion, and that has a first base portion protruding downward and extending in a width direction, and a first protruding portion protruding to one side in a forward-backward direction from a lower end of the first base portion; and a second engagement portion that is disposed on an upper surface of the bottom surface panel, that engages with the first engagement portion, and that has a second base portion protruding upward, and extending in the width direction, and a second protruding portion protruding to the other side from an upper end of the second base portion in the forward-backward direction. 5
5. The indoor unit of an air-conditioner according to any one of Claims 2 to 4, further comprising:
- a pair of third engagement portions that has third base portions respectively disposed in both ends of the base portion in the width direction, and third protruding portions protruding inward in the width direction from the third base portion; and a pair of fourth engagement portions that is disposed in both ends of the bottom surface panel in the width direction, that engages with the respective third engagement portions, and that has fourth base portions extending upward and fourth protruding portions protruding outward in the width direction from an upper portion of the fourth base portion. 10 15 20 25
6. The indoor unit of an air-conditioner according to any one of Claims 1 to 5, wherein the bottom surface panel has a cross rib having
- a third rib disposed on an upper surface of the bottom surface panel, extending along the upper surface and in a direction tilted to the width direction, and protruding upward, and a fourth rib crossing the third rib, extending along the upper surface and in the direction tilted to the width direction, and protruding upward. 30 35 40 45

Amended claims under Art. 19.1 PCT

1. (Amended) An indoor unit of an air-conditioner comprising:
- a main body that has an air-conditioning device having a heat exchanger, a blower fan, and a plate-shaped flap having a back edge extending in a width direction; and a bottom surface panel that covers a bottom surface of the main body, and that has a plate-shaped bottom surface panel main body which has a front end portion along a back edge of the flap disposed in a lower portion of the main body, and which extends in the width direction, and a wind-blocking rib which protrudes upward from a front end portion of the bottom surface panel main body so that wind generated by the blower fan collides with the wind-blocking rib, wherein the main body has a base portion which

is fixed to a wall surface, which extends in the width direction along the wall surface, and to which the air-conditioning device is attached forward, and

wherein the bottom surface panel has a curved portion which is curved upward as the curved portion faces backward from the front end portion, and a back end portion of which is located on a forward side of a rear surface of the base portion, and a first rib which protrudes backward from a back end portion of the curved portion.

2. (Deleted)

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

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

a screw hole disposed in the base portion, an opening portion disposed on a main surface of the bottom surface 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 upward 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.

4. The indoor unit of an air-conditioner according to Claim 2 or 3, further comprising:

a first engagement portion that is disposed in the base portion, and that has a first base portion protruding downward and extending in a width direction, and a first protruding portion protruding to one side in a forward-backward direction from a lower end of the first base portion; and a second engagement portion that is disposed on an upper surface of the bottom surface panel, that engages with the first engagement portion, and that has a second base portion protruding upward, and extending in the width direction, and a second protruding portion protruding to the other side from an upper end of the second base portion in the forward-backward direction.

5. The indoor unit of an air-conditioner according to any

one of Claims 2 to 4, further comprising:

a pair of third engagement portions that has third base portions respectively disposed in both ends of the base portion in the width direction, and third protruding portions protruding inward in the width direction from the third base portion; and

a pair of fourth engagement portions that is disposed in both ends of the bottom surface panel in the width direction, that engages with the respective third engagement portions, and that has fourth base portions extending upward and fourth protruding portions protruding outward in the width direction from an upper portion of the fourth base portion.

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

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

FIG. 1

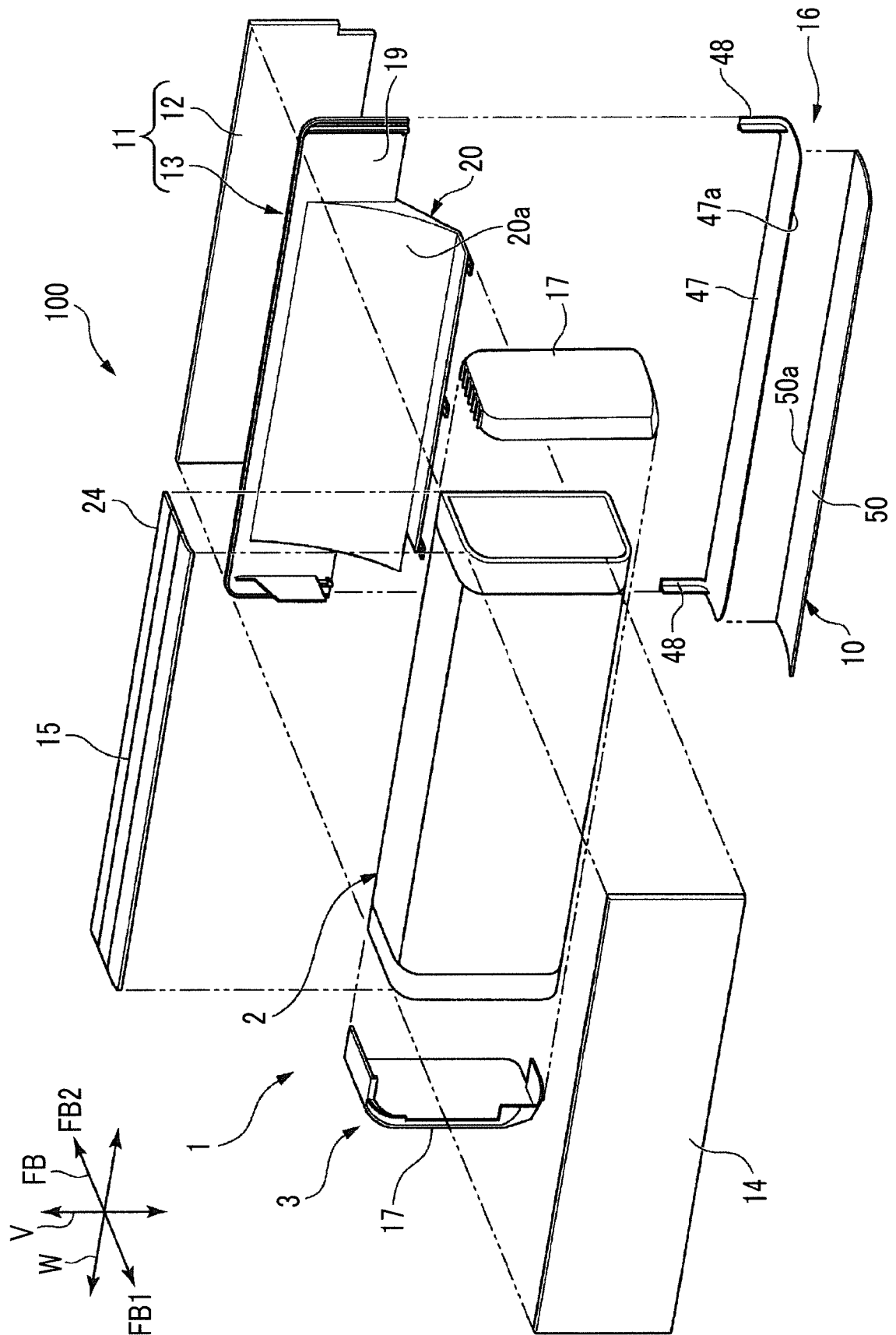


FIG. 2

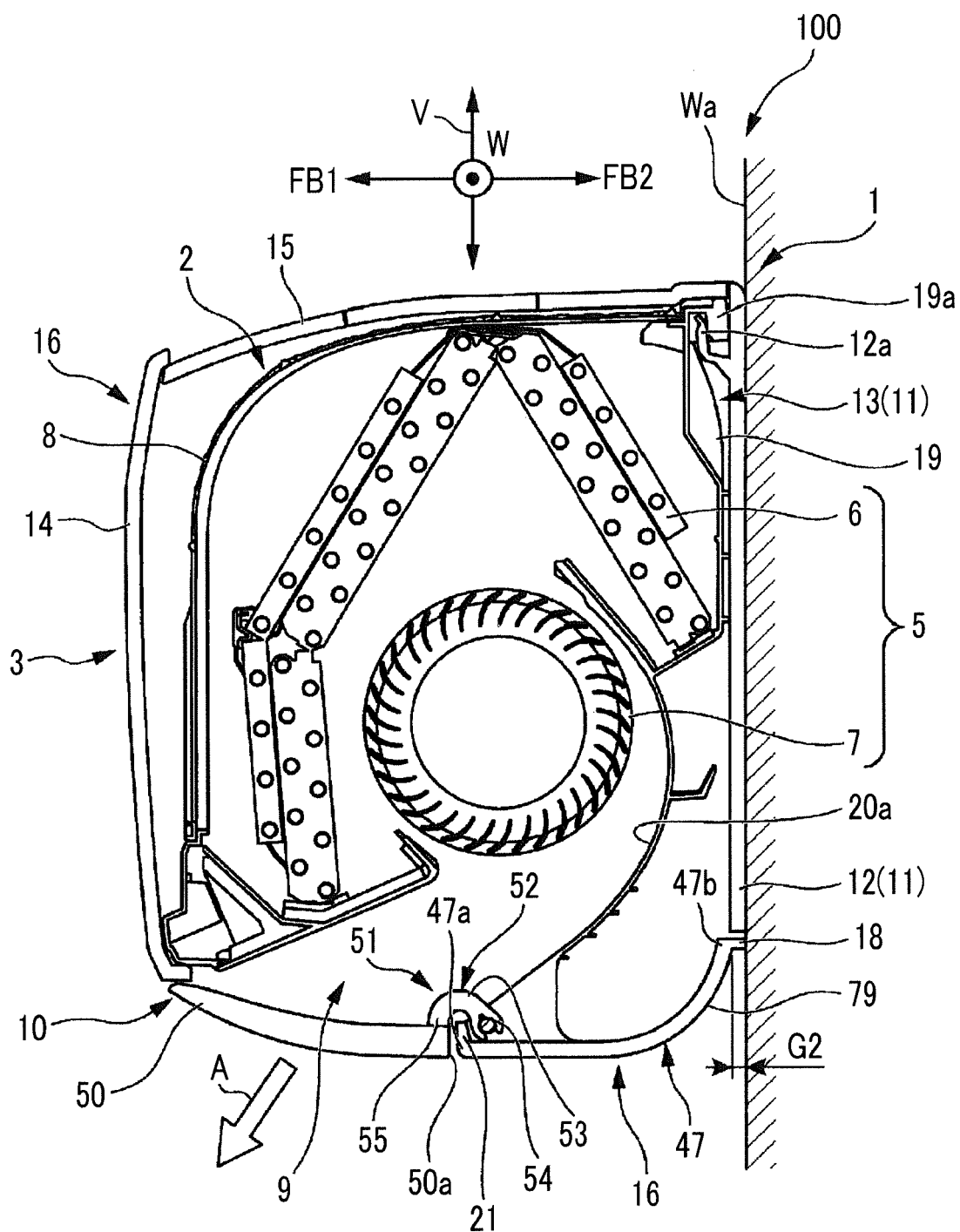


FIG. 3

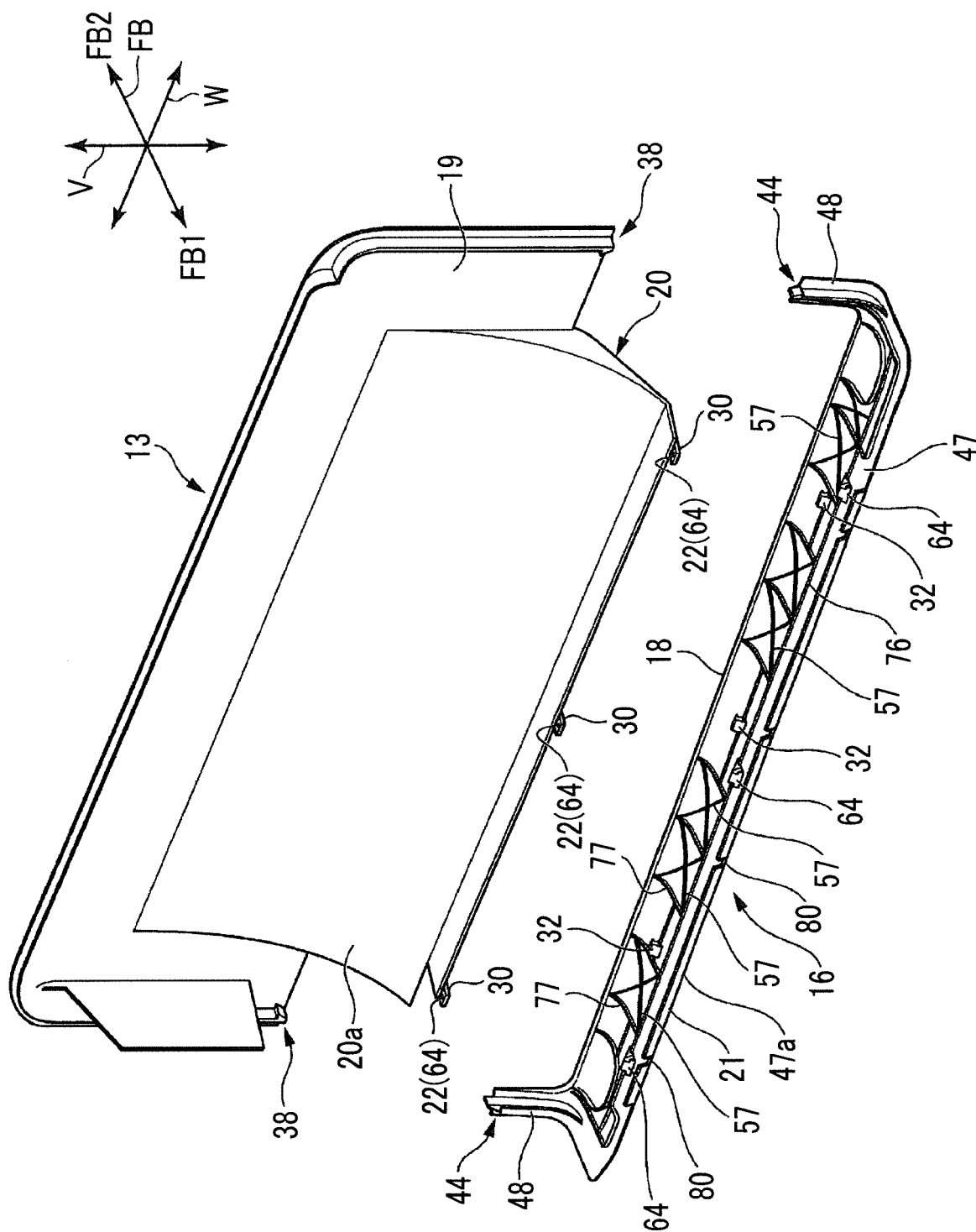


FIG. 4

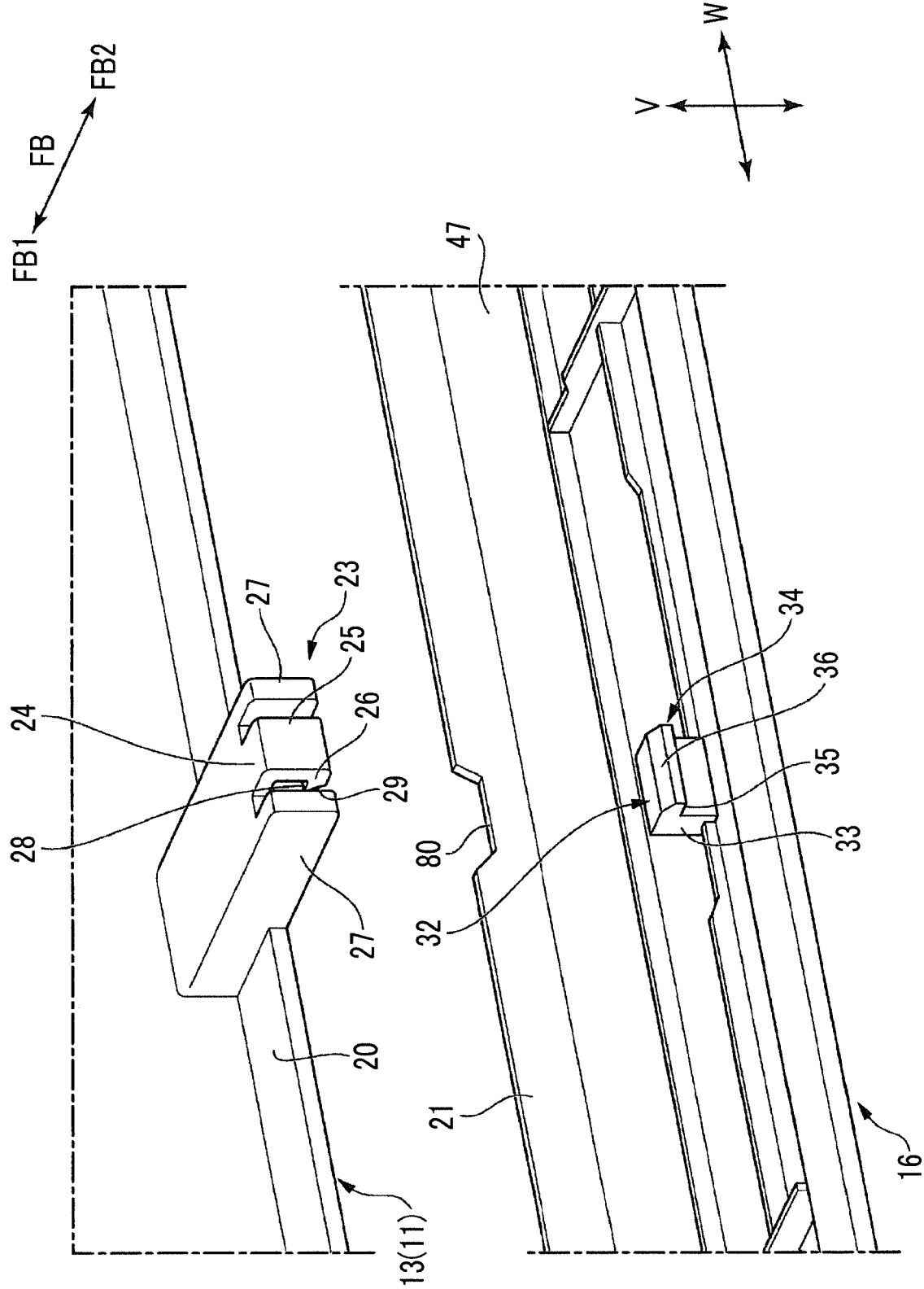


FIG. 5

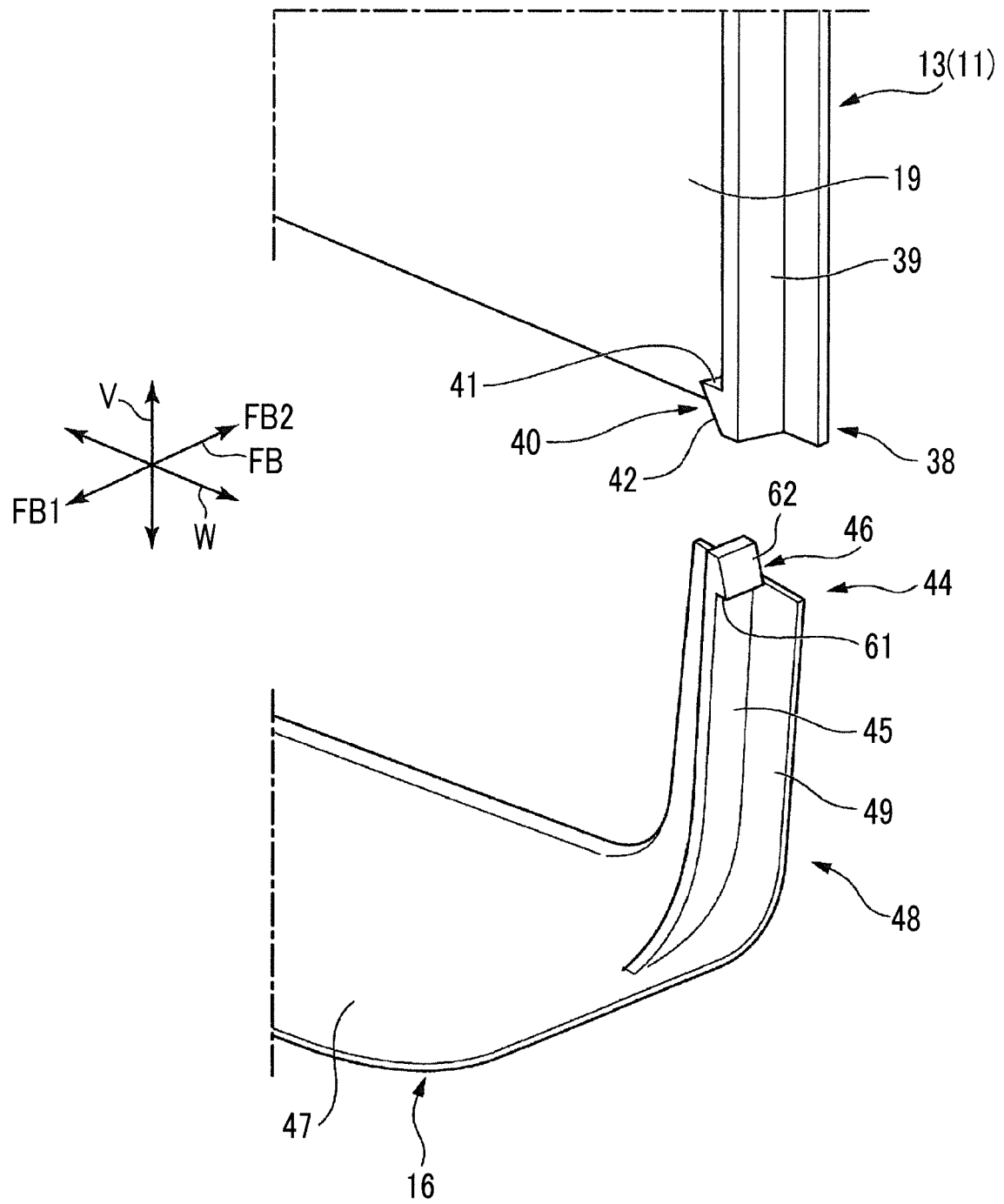


FIG. 6

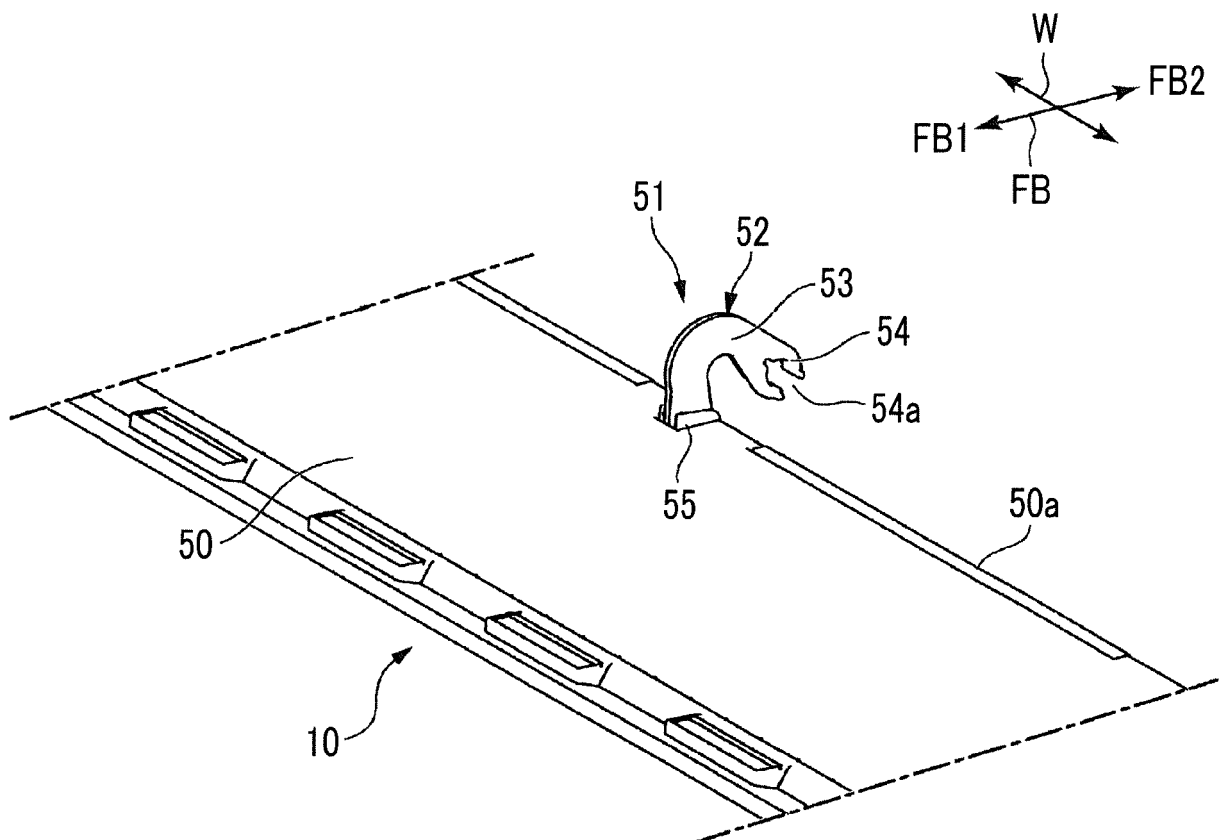


FIG. 7

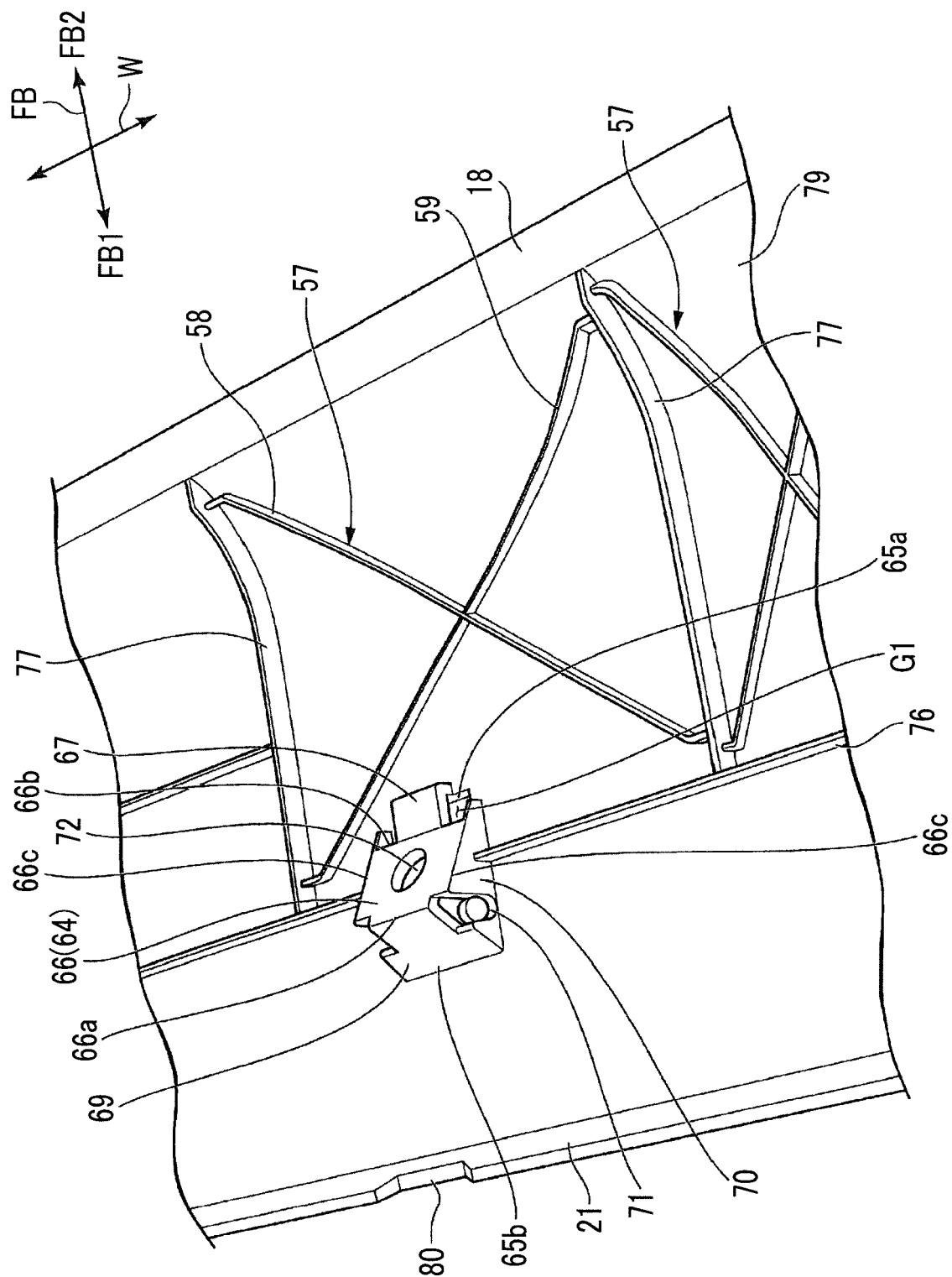


FIG. 8

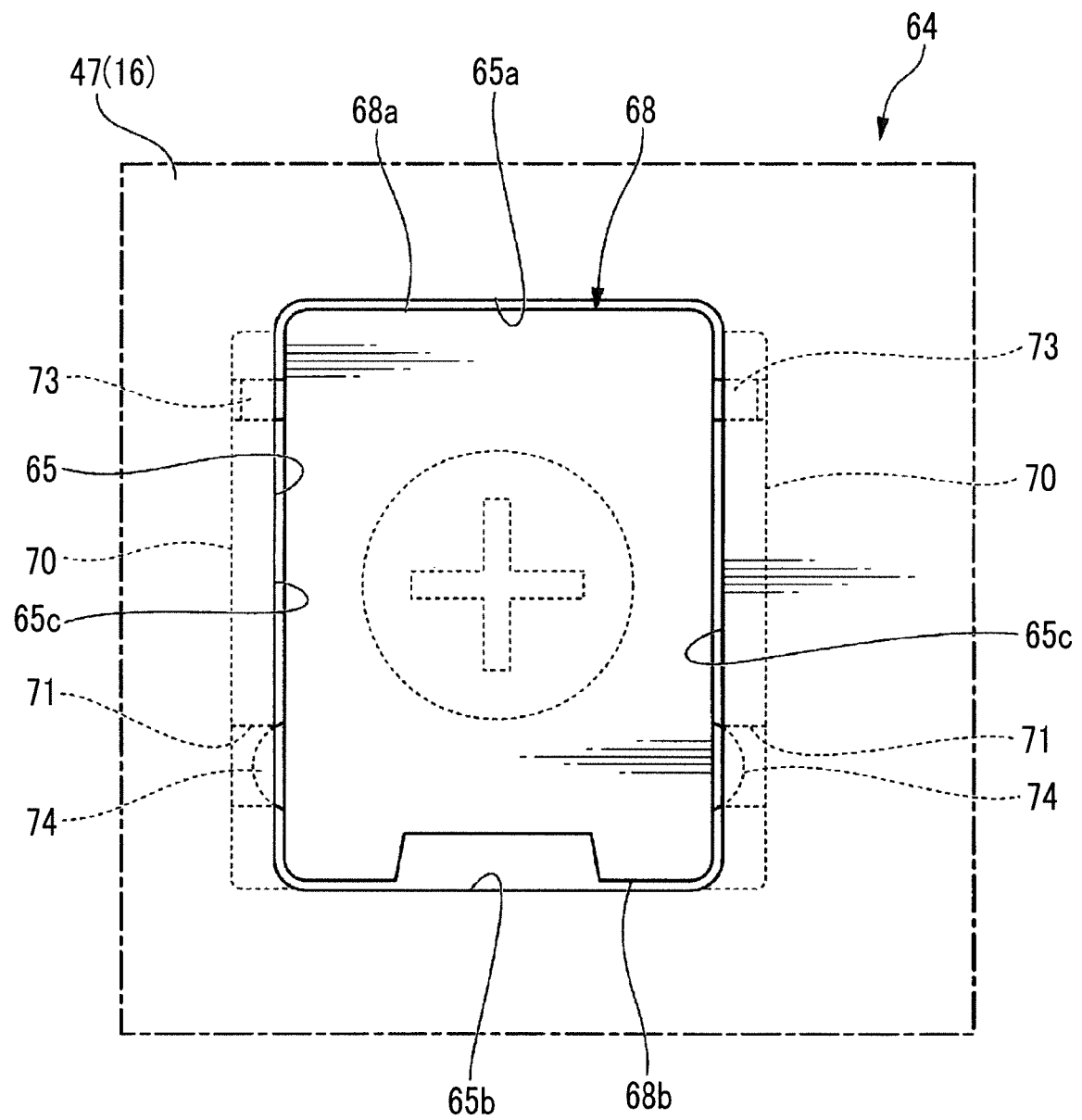
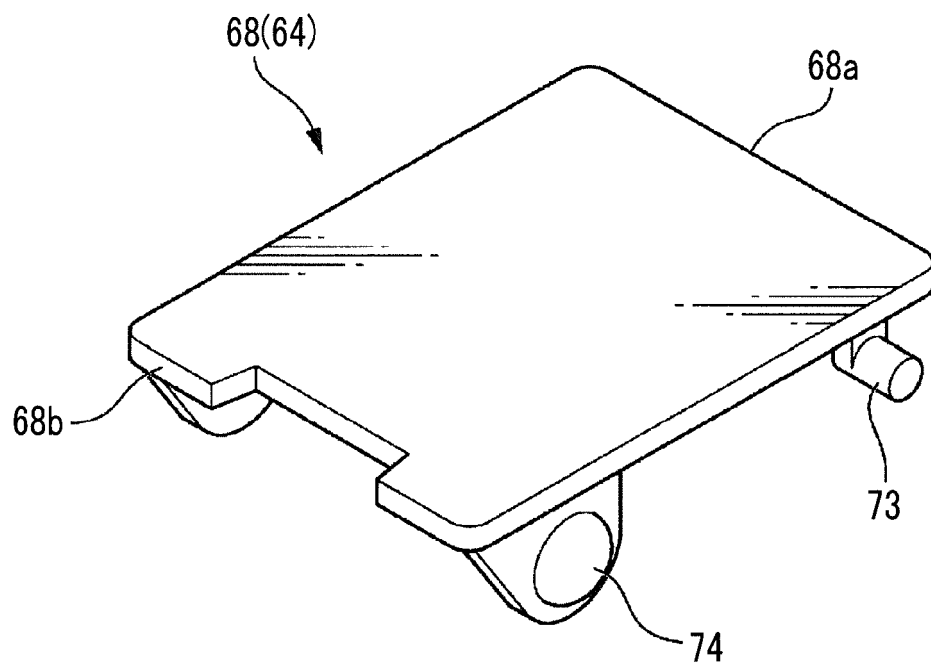


FIG. 9



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2017/043463

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 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.
X	JP 2014-196882 A (PANASONIC CORPORATION) 16 October	1
Y	2014, paragraphs [0001]-[0008], [0023]-[0055], fig.	6
A	1, 8 (Family: none)	2-5
A	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 28060/1990 (Laid-open No. 118434/1991) (DAIKIN INDUSTRIES, LTD.) 06 December 1991, entire text, all drawings (Family: none)	2



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

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later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

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document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&"

document member of the same patent family

Date of the actual completion of the international search

22 January 2018

Date of mailing of the international search report

30 January 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.

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2017/043463

C (Continuation).	DOCUMENTS CONSIDERED TO BE RELEVANT	
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP 61-44236 A (HITACHI, LTD.) 03 March 1986, page 2, upper left column, line 15 to upper right column, line 1, fig. 1, 2 (Family: none)	6
Y	JP 2011-241654 A (SEKISUI CHEMICAL CO., LTD.) 01 December 2011, paragraphs [0001], [0009]-[0014], [0044], [0045], fig. 1, 4 (Family: none)	6
Y	JP 2015-4189 A (KIYOH INDUSTRY CO., LTD.) 08 January 2015, paragraphs [0001], [0012]-[0015], fig. 5 (Family: none)	6
Y	JP 8-189186 A (NSP CORP.) 23 July 1996, paragraphs [0001], [0013]-[0021], fig. 1, 2 (Family: none)	6
A	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 76281/1981 (Laid-open No. 188034/1982) (MITSUBISHI HEAVY INDUSTRIES, LTD.) 29 November 1982, entire text, all drawings (Family: none)	1-6
A	JP 9-145139 A (MITSUBISHI ELECTRIC CORPORATION) 06 June 1997, entire text, all drawings & US 5771708 A, entire text, all drawings & EP 774628 A2 & KR 10-208318 B1 & CN 1158968 A	1-6
A	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 117268/1975 (Laid-open No. 30652/1977) (SANYO ELECTRIC CO., LTD.) 03 March 1977, entire text, all drawings (Family: none)	1-6
A	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 111406/1978 (Laid-open No. 28821/1980) (SANYO ELECTRIC CO., LTD.) 25 February 1980, entire text, all drawings (Family: none)	1-6

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REFERENCES CITED IN THE DESCRIPTION

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