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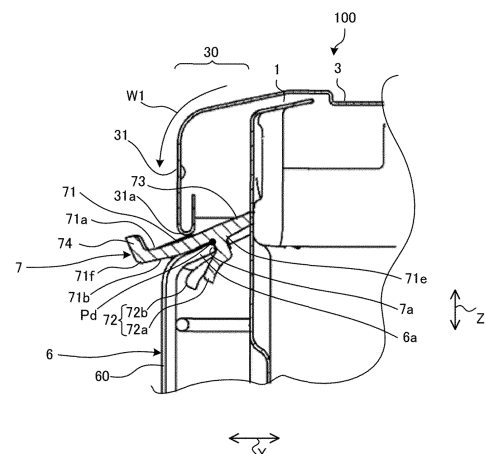
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(54) **OUTDOOR UNIT FOR AIR CONDITIONER**

(57) An outdoor unit for an air-conditioning apparatus has a casing that has a front panel in which an opening hole is opened, a fan provided to the casing and configured to blow out air to an outside through the opening hole, a roof part installed at a front of the front panel and above the opening hole and extending in a width direction of the casing, and an outlet grille fixed to the casing and covering the opening hole. The roof part has a main roof portion that extends further forward than the front panel, and a sub-roof portion that extends downward and forward from the main roof portion and has a recession formed between a bottom face of the main roof portion and the sub-roof portion. The outlet grille is located such that an upper end portion of the outlet grille is in contact with the recession. The front panel and the upper end portion of the outlet grille hold the roof part such that the front panel and the upper end portion of the outlet grille sandwich the roof part.

FIG. 15



Description

Technical Field

[0001] The present disclosure relates to an outdoor unit for an air-conditioning apparatus that has a fan.

Background Art

[0002] An outdoor unit for an air-conditioning apparatus has a casing in which a fan is installed that drives and thus causes outdoor air to pass through an opening hole opened in a side panel of the casing and to then circulate. To the casing, an outlet grille or a fan guard, hereinafter, referred to as an outlet grille and other barrier, is attached to cover the opening hole for safety. While the air-conditioning apparatus is operating, drops of water on the surface of the side panel, which are caused by rain, snow, or other factor, flow down along the surface of a front panel. Also, snow accumulated on a top plate melts into drops of water, which then flow down along the surfaces of the top plate and the side panel. As described above, drops of water flow down along the casing and, when the drops of water reach the opening hole, flow through between the fan and the edge of the opening hole. In a case in which the outdoor air temperature is low, the drops of water flowing through between the fan and the edge of the opening hole freeze into ice. Then, in a case in which the amount of the drops of water flowing through between the fan and the edge of the opening hole is large, the resultant ice may interfere with a rotation of the fan.

[0003] To solve this problem, an outdoor unit has been proposed in which a bracket part that serves as a roof part is attached to above an opening hole and above an outlet grille and other barrier, which is also referred as a fan guard, to prevent drops of water that flow down along the surface of a side panel from flowing through the inside of the edge of the opening hole (see, for example, Patent Literature 1).

Citation List

Patent Literature

[0004] Patent Literature 1: Japanese Unexamined Patent Application Publication No. 2012-102971

Summary of Invention

Technical Problem

[0005] A configuration is described in Patent Literature 1 in which a bracket part has a plate portion and a leg portion in which a through-hole is opened and the bracket part is attached to a casing by a screw that passes through the through-hole in the leg portion and a through-hole in a fan guard. For this reason, for an outdoor unit described in Patent Literature 1, it is complicated to attach

the bracket part, which serves as the roof part, to the casing because the position of the through-hole in the bracket part and the position of the through-hole in the fan guard are required to correspond to a fixed position for the casing.

[0006] The present disclosure is made to solve such a problem described above, and an object of the present disclosure is to provide an outdoor unit for an air-conditioning apparatus that requires easier work than does some outdoor unit in prevention of water from flowing through between the fan and the edge of the opening hole. Solution to Problem

[0007] An outdoor unit for an air-conditioning apparatus according to an embodiment of the present disclosure has a casing that has a front panel in which an opening hole is opened, a fan provided to the casing and configured to blow out air to an outside through the opening hole, a roof part installed at a front of the front panel and above the opening hole and extending in a width direction of the casing, and an outlet grille fixed to the casing and covering the opening hole. The roof part has a main roof portion that extends further forward than the front panel, and a sub-roof portion that extends downward and forward from the main roof portion and has a recession formed between a bottom face of the main roof portion and the sub-roof portion. The outlet grille is located such that an upper end portion of the outlet grille is in contact with the recession. The front panel and the upper end portion of the outlet grille hold the roof part such that the front panel and the upper end portion of the outlet grille sandwich the roof part.

Advantageous Effects of Invention

[0008] In an outdoor unit for an air-conditioning apparatus according to an embodiment of the present disclosure, in a state in which the outlet grille is fixed to the casing, the roof part is installed above the opening hole in the front panel such that the roof part is sandwiched by the front panel and the upper end portion of the outlet grille, which is in contact with a portion of the roof part located between the main roof portion and the sub-roof portion. Unlike some outdoor unit in which the position of the through-hole in the roof part and the position of the through-hole in the fan guard are required to correspond to a fixed position for the casing, positioning with such high accuracy is thus not required. An outdoor unit according to an embodiment of the present disclosure therefore requires easier work than does some outdoor unit in prevention of water from flowing through between the fan and the edge of the opening hole.

Brief Description of Drawings

[0009]

[Fig. 1] Fig. 1 is a front perspective view that illustrates an outdoor unit according to Embodiment 1.

[Fig. 2] Fig. 2 is an exploded perspective view that illustrates the outdoor unit illustrated in Fig. 1.

[Fig. 3] Fig. 3 is a front view that illustrates the outdoor unit illustrated in Fig. 1.

[Fig. 4] Fig. 4 is a sectional view that illustrates the outdoor unit taken along line I-I illustrated in Fig. 3.

[Fig. 5] Fig. 5 is a perspective view that illustrates a roof part of the outdoor unit illustrated in Fig. 2, and the roof part is viewed from the front right.

[Fig. 6] Fig. 6 is a perspective view that illustrates the roof part of the outdoor unit illustrated in Fig. 2, and the roof part is viewed from above.

[Fig. 7] Fig. 7 is a perspective view that illustrates a schematic configuration of the roof part illustrated in Fig. 6, and the roof part is viewed in the direction of an arrow A illustrated in Fig. 6.

[Fig. 8] Fig. 8 is a side view that illustrates the schematic configuration of the roof part illustrated in Fig. 6, and the roof part is viewed in the direction of an arrow B illustrated in Fig. 6.

[Fig. 9] Fig. 9 is a perspective view that illustrates a schematic configuration of an outlet grille of the outdoor unit illustrated in Fig. 2.

[Fig. 10] Fig. 10 is an exploded perspective view that illustrates a state before the outlet grille and the roof part in the outdoor unit illustrated in Fig. 1 are assembled with each other.

[Fig. 11] Fig. 11 is a perspective view that illustrates a state after the outlet grille and the roof part in the outdoor unit illustrated in Fig. 1 are assembled with each other, and the outlet grille and the roof part are viewed in the direction of an arrow C illustrated in Fig. 10.

[Fig. 12] Fig. 12 is a perspective view that illustrates a positional relation between a front panel and the outlet grille in the outdoor unit illustrated in Fig. 1.

[Fig. 13] Fig. 13 is a sectional view that illustrates the outdoor unit taken along line III-III illustrated in Fig. 3 in a state after the front panel and the outlet grille illustrated in Fig. 12 are attached.

[Fig. 14] Fig. 14 is a sectional view that illustrates the outdoor unit taken along line II-II illustrated in Fig. 3.

[Fig. 15] Fig. 15 is a partially-enlarged view that illustrates a positional relation between a top plate, the outlet grille, and the roof part in the outdoor unit illustrated in Fig. 14.

[Fig. 16] Fig. 16 is a partially-enlarged view that illustrates a positional relation between the front panel and the roof part in the outdoor unit illustrated in Fig. 3.

[Fig. 17] Fig. 17 is a perspective view that illustrates a modification of the roof part according to Embodiment 1.

Description of Embodiment

Embodiment 1

5 **[0010]** Fig. 1 is a front perspective view that illustrates an outdoor unit according to Embodiment 1. An outdoor unit for an air-conditioning apparatus, hereinafter, referred to as an outdoor unit 100, is connected to an un-illustrated indoor unit by a connection pipe and thus forms a refrigeration cycle. Hereinafter, the outdoor unit 100 is described with reference to the drawings and with an example case in which the outdoor unit 100 is installed on the floor of air-conditioning target space. In the drawings, the direction of an arrow X indicates a width direction of the outdoor unit 100, the direction of an arrow Y indicates a front-rear direction of the outdoor unit 100, and the direction of an arrow Z indicates a height direction of the outdoor unit 100.

[0011] The present disclosure is not limited to any forms illustrated in the drawings described below. Further, in following description, directional terms, such as "upper", "lower", "right", "left", "front", and "rear", used as appropriate for ease of comprehension are merely for explanation, and the present disclosure is not limited by such directional terms. These directional terms are each referred to as a direction in a case in which the outdoor unit 100 is viewed from the front unless other specific description is provided. Further, elements given identical reference signs in each drawing are identical or equivalent elements, and these reference signs are common throughout the whole description of the specification.

[0012] The outdoor unit 100 has a casing 100a, which is a shell of the outdoor unit 100. The casing 100a includes a front panel 1, side panels 2, a top plate 3, and a base 4. The side panels 2 each serve as a side face of the casing 100a, the front panel 1 serves as the front face of the casing 100a, the top plate 3 serves as the top face of the casing 100a, and the base 4 serves as the bottom face of the casing 100a. The front panel 1 has an opening hole 1a, which is substantially circular-shaped, passes through the inside and the outside of the casing 100a, and serves as an air outlet.

[0013] Fig. 2 is an exploded perspective view that illustrates the outdoor unit illustrated in Fig. 1. As illustrated in Fig. 2, the outdoor unit 100 has an outlet grille 6 and a roof part 7. The outlet grille 6 prevents the fingers of people from entering the opening hole 1a. The roof part 7 prevents water caused by rain, snow, or other factor from flowing through the opening hole 1a. The outlet grille 6 includes a plurality of iron bars or other parts and is located at the front of the front panel 1 such that the outlet grille 6 covers the opening hole 1a. The roof part 7 includes a metal sheet or other part that extends in the width direction of the outdoor unit 100, which is also referred to as the direction of the arrow X. The roof part 7 is located at the front of the front panel 1 and above the opening hole 1a.

[0014] The front panel 1 has a bell mouth 1b, which

protrudes from the edge of the opening hole 1a in the front panel 1 rearward and toward the center of the opening hole 1a. The front panel 1 also has screw holes 1c and insertion holes 11, which are opened around the outer circumference of the opening hole 1a and through which the outlet grille 6 is attached. The screw holes 1c are opened at the respective left and right portions below the outer circumference of the opening hole 1a in the front panel 1. The insertion holes 11 are opened at the respective left and right portions above the outer circumference.

[0015] The outlet grille 6 has grille extension portions 62 and fixation portions 63. The grille extension portions 62 are located at upper portions of the outlet grille 6 and extend upward. The fixation portions 63 are located at lower portions of the outlet grille 6 and have respective screw holes 63a. The grille extension portions 62 of the outlet grille 6 are inserted into the insertion holes 11 in the front panel 1, fixing screws 9 are fixed to the front panel 1 through the screw holes 63a of the fixation portions 63 of the outlet grille 6 and the screw holes 1c in the front panel 1, and the outlet grille 6 is thus fixed to the front panel 1.

[0016] Fig. 3 is a front view that illustrates the outdoor unit illustrated in Fig. 1. Fig. 4 is a sectional view that illustrates the outdoor unit taken along line I-I illustrated in Fig. 3. An internal configuration of the outdoor unit 100 is described below with reference to Fig. 2 and Fig. 4.

[0017] The outdoor unit 100 also has other components such as a compressor 16, a heat exchanger 13, an air-sending device 15, and a controller 8. The compressor 16 compresses refrigerant. The heat exchanger 13 allows refrigerant and air to exchange heat with each other. The air-sending device 15 sends air to the heat exchanger 13. In addition, as illustrated in Fig. 4, the outdoor unit 100 also has a partition plate 10 and a support portion 14. The partition plate 10 partitions the inside of the casing 100a into two spaces. The support portion 14 supports the air-sending device 15.

[0018] The compressor 16 sucks refrigerant, compresses the refrigerant into high temperature and high pressure. The compressor 16 is, for example, an inverter compressor that has a controllable capacity. The heat exchanger 13 is, for example, a fin-and-tube heat exchanger. As illustrated in Fig. 4, the air-sending device 15 has a fan 15a, which has a plurality of blades, and a motor 15b, which rotates and thus drives the fan 15a. The air-sending device 15 generates, by a rotation of the fan 15a, an airflow that passes through the heat exchanger 13. The support portion 14 is attached to the base 4 and the heat exchanger 13. The support portion 14 supports the motor 15b such that the rotational face of the fan 15a faces the opening hole 1a in the front panel 1 in the height direction, which is also referred to as the direction of the arrow Z, and the width direction, which is also referred to as the direction of the arrow X. In an example illustrated in Fig. 2 and Fig. 4, the air-sending device 15 is installed at the left inside the casing 100a

by use of the support portion 14 and the compressor 16 is installed at the right inside the casing 100a.

[0019] In the example illustrated in Fig. 2 and Fig. 4, the heat exchanger 13 is L-shaped in plan view and serves as the left portion of the rear face of the casing 100a and the rear portion of the left side face of the casing 100a. Also in the example illustrated in Fig. 2 and Fig. 4, a side panel 2a of the side panels 2 on the right serves as the right face of the casing 100a and the right portion of the rear face of the casing 100a. On the other hand, a side panel 2b of the side panels 2 on the left serves as the left face of the casing 100a. The side panel 2b on the left has a plurality of opening ports.

[0020] As illustrated in Fig. 2, the controller 8 includes components such as a plurality of electric parts and controls the refrigeration cycle. Specifically, the controller 8 controls the frequency of the compressor 16 and the rotation frequency of the air-sending device 15. The compressor 16 is fixed to the base 4 and the controller 8 is located above the compressor 16.

[0021] As illustrated in Fig. 4, the partition plate 10 is installed on the base 4 of the casing 100a and partitions the inside of the casing 100a into a machine chamber M and an air-sending chamber F. The machine chamber M houses components such as the compressor 16 and the air-sending chamber F houses components such as the air-sending device 15. In the machine chamber M, components such as an unillustrated refrigerant pipe and the controller 8 illustrated in Fig. 2 are provided. In the air-sending chamber F, components such as the heat exchanger 13 and the support portion 14 are located.

[0022] When the air-sending device 15 is driven and the fan 15a thus rotates, air is sucked into the casing 100a through the plurality of opening ports opened in the side panel 2b and the heat exchanger 13 and guided out from the opening hole 1a along the bell mouth 1b formed in the front panel 1.

[0023] Fig. 5 is a perspective view that illustrates the roof part of the outdoor unit illustrated in Fig. 2, and the roof part is viewed from the front right. Fig. 6 is a perspective view that illustrates the roof part of the outdoor unit illustrated in Fig. 2, and the roof part is viewed from above. Fig. 7 is a perspective view that illustrates a schematic configuration of the roof part illustrated in Fig. 6, and the roof part is viewed in the direction of an arrow A illustrated in Fig. 6. Fig. 8 is a side view that illustrates the schematic configuration of the roof part illustrated in Fig. 6, and the roof part is viewed in the direction of an arrow B illustrated in Fig. 6. The structure of the roof part 7 is described below with reference to Fig. 5 to Fig. 8.

[0024] As illustrated in Fig. 5, the roof part 7 has a main roof portion 71 and a sub-roof portion 72. The main roof portion 71 is belt-shaped. The sub-roof portion 72 is located below the main roof portion 71. As illustrated in Fig. 2 and Fig. 3, the main roof portion 71 has the horizontal width, which is larger than or equal to a diameter Do, which is illustrated in Fig. 2, of the opening hole 1a in the front panel 1. The roof part 7 is installed in the front

panel 1 such that the longitudinal direction of the roof part 7 coincides with the width direction of the casing 100a, which is also referred to as the direction of the arrow X. Hereinafter, the longitudinal direction of the roof part 7 may be also referred to as a horizontal width direction.

[0025] As illustrated in Fig. 5, the sub-roof portion 72 extends downward and forward from the main roof portion 71. The sub-roof portion 72 forms, together with a bottom face 71b of the main roof portion 71 illustrated in Fig. 8, recessions 7a. In Embodiment 1, as illustrated in Fig. 7, the sub-roof portion 72 has a configuration in which the sub-roof portion 72 extends downward and forward from a tail end 71e of the main roof portion 71. The configuration described above in which the sub-roof portion 72 extends downward and forward from the main roof portion 71 is, more specifically, as illustrated in Fig. 8, a configuration in which the sub-roof portion 72 is inclined from the main roof portion 71 such that the sub-roof portion 72 is further away from the bottom face 71b of the main roof portion 71 further toward a distal end of the sub-roof portion 72. The sub-roof portion 72 is only required to be located such that the recessions 7a are formed between the bottom face 71b of the main roof portion 71 and the sub-roof portion 72. The sub-roof portion 72 may be located between a front end 71f and the tail end 71e in the bottom face 71b of the main roof portion 71.

[0026] In an example illustrated in Fig. 5, the sub-roof portion 72 are three protrusions provided in the longitudinal direction of the main roof portion 71, which is also referred to as the direction of the arrow X. A first protrusion 72b is provided to the central portion in the longitudinal direction of the main roof portion 71, which is also referred to as the direction of the arrow X. Second protrusions 72a are provided at both respective sides of the central portion of the main roof portion 71. The numbers of protrusions in the sub-roof portion 72 is not limited to three. For example, the sub-roof portion 72 may be one first protrusion 72b, two second protrusions 72a, or four or more protrusions.

[0027] The roof part 7 also has extension ribs 73 and a front-end protrusion 74. The extension ribs 73 each extend from the tail end 71e of the main roof portion 71. The front-end protrusion 74 is located at the front end 71f of the main roof portion 71 and is shaped such that the front-end protrusion 74 protrudes upward. The roof part 7 also has tail-end protrusions 75 provided at the tail end 71e of the main roof portion 71 and shaped such that the tail-end protrusions 75 each protrude downward.

[0028] The extension ribs 73 are each located such that the extension ribs 73 are each continuous with the tail end 71e of the main roof portion 71 and the top face of each of the extension ribs 73 and a top face 71a of the main roof portion 71 form a continuous flat surface. In the example illustrated in Fig. 5, the extension ribs 73 are located at two respective left and right portions of the main roof portion 71 such that the extension ribs 73 cor-

respond to the respective locations of the second protrusions 72a. Between the extension ribs 73, a gap is left. The extension ribs 73 each has a distal end portion, which is curved-shaped such that the distal end portion is narrower in shape as the distal end portion is further away from the main roof portion 71. The number of the extension ribs 73 and the positions in which the extension ribs 73 are located are not limited to those described above.

[0029] The front-end protrusion 74 is located such that the front-end protrusion 74 has substantially the same length as the main roof portion 71 in the longitudinal direction of the roof part 7, which is also referred to as the direction of the arrow X. The tail-end protrusions 75 are preferably located such that, as illustrated in Fig. 7, in the longitudinal direction of the main roof portion 71, which is also referred to as the direction of the arrow X, no tail-end protrusion 75 is provided at the central portion at which the first protrusion 72b is located and the tail-end protrusions 75 are located at respective left and right sides of the central portion. The tail-end protrusions 75 are each located as described above and the minimum possible space is thus required at a portion in which the roof part 7 is installed above the uppermost portion of the opening hole 1a in the front panel 1 illustrated in Fig. 1. The tail-end protrusions 75 may also be omitted.

[0030] The roof part 7 also has, as illustrated in Fig. 7, notches 7b and regulation ribs 76. The notches 7b are located at respective left and right portions in the longitudinal direction of the main roof portion 71, which is also referred to as the direction of the arrow X. The regulation ribs 76 are located in the bottom face 71b of the main roof portion 71 and at portions next to the respective outside edges of the notches 7b. The notches 7b are each provided by cutting the corresponding one of the tail-end protrusions 75 and the tail end of the main roof portion 71. To the notches 7b, the grille extension portions 62 illustrated in Fig. 2 are attached. The notches 7b and the regulation ribs 76 are used to position the roof part 7 and the outlet grille 6 illustrated in Fig. 2, which are being assembled with each other, in fixed positions. The grille extension portions 62 are regulated in movement in their longitudinal direction and in their forward direction by the inner walls of the notches 7b. The grille extension portions 62 are also regulated in outward movement in their longitudinal direction by the regulation ribs 76.

[0031] Fig. 9 is a perspective view that illustrates a schematic configuration of the outlet grille of the outdoor unit illustrated in Fig. 2. The structure of the outlet grille 6 is described below with reference to Fig. 9. The grille extension portions 62 described above are located at upper portions of the outlet grille 6 and extend rearward. The fixation portions 63 described above are located at lower portions of the outlet grille 6.

[0032] The outlet grille 6 is a plurality of iron bars 60, such as a plurality of vertical bars 60a and a plurality of horizontal bars 60b. The plurality of vertical bars 60a are arranged in the horizontal direction, which is also referred to as the direction of the arrow X. The plurality of hori-

zontal bars 60b intersect the plurality of vertical bars 60a and are arranged in the vertical direction, which is also referred to as the direction of the arrow Z. The plurality of vertical bars 60a and the plurality of horizontal bars 60b are joined with each other by welding or other method. The outlet grille 6 also has a grille body 61 obtained by joining the plurality of iron bars 60 with each other such that the grille body 61 is, for example, grid-shaped. The grille extension portions 62 described above are located at respective left and right upper ends of the grille body 61. The fixation portions 63 described above are located at respective left and right lower ends of the grille body 61.

[0033] The grille body 61 is square-shaped as a whole. The plurality of vertical bars 60a each have the upper end and the lower end, which are each bent rearward. The plurality of horizontal bars 60b each have the left end and the right end, which are also each bent rearward. In following description, the upper end of the grille body 61, which are the upper ends of the plurality of vertical bars 60a, may be also referred to as an upper end portion 6a of the outlet grille 6. The upper end portion 6a of the outlet grille 6 extends rearward and upward.

[0034] The grille extension portions 62 each extend further rearward than the upper end portion 6a of the grille body 61. As illustrated in Fig. 2, when the outlet grille 6 is attached to the front panel 1, the grille extension portions 62 are inserted into the respective insertion holes 11 in the front panel 1 and are hung on the front panel 1. As illustrated in Fig. 9, the grille extension portions 62 are each, for example, one of the upper ends of the plurality of iron bars 60 included as the grille body 61. The grille extension portions 62 each have a proximal portion 62a and an insertion distal portion 62b. The proximal portions 62a each extend rearward and upward from the upper end portion 6a of the grille body 61. The insertion distal portions 62b are each located at the rear end of the corresponding one of the proximal portions 62a and extend upward.

[0035] The fixation portions 63 located at a lower portion of the grille body 61 are each located further rearward than the lower end of the grille body 61. The fixation portions 63 are each located further forward than the insertion distal portions 62b of the grille extension portions 62 in the front-rear direction, which is also referred to as the direction of the arrow Y. The fixation portions 63 are each, for example, one of the lower ends of the plurality of iron bars 60 included as the grille body 61. The screw holes 63a are each obtained by bending the one of the lower ends of the plurality of iron bars 60 into a circular shape.

[0036] Fig. 10 is an exploded perspective view that illustrates a state before the outlet grille and the roof part in the outdoor unit illustrated in Fig. 1 are assembled with each other. Fig. 11 is a perspective view that illustrates a state after the outlet grille and the roof part in the outdoor unit illustrated in Fig. 1 are assembled with each other, and the outlet grille and the roof part are viewed in the direction of an arrow C illustrated in Fig. 10. Before the

outlet grille 6 is attached to the outdoor unit 100 as illustrated in Fig. 1, the outlet grille 6 and the roof part 7 are assembled with each other as illustrated in Fig. 10. A procedure to assemble the outlet grille 6 and the roof part 7 with each other is described below with reference to Fig. 10 and Fig. 11.

[0037] Into the notches 7b cut in the roof part 7, the respective grille extension portions 62 of the outlet grille 6 are inserted from below. In a state in which the grille extension portions 62 are inserted into the respective notches 7b, the roof part 7 is attached to the outlet grille 6 in an attachment direction indicated by a white arrow illustrated in Fig. 10. At this time, the upper end portion 6a of the outlet grille 6 is fitted into the recessions 7a formed between the main roof portion 71 and the sub-roof portion 72 illustrated in Fig. 7. With this procedure, the upper ends of the plurality of vertical bars 60a that are the upper end portion 6a of the grille body 61 are held such that the upper ends of the plurality of vertical bars 60a are sandwiched by the main roof portion 71 and the protrusions that are the sub-roof portion 72, which are the first protrusion 72b and the second protrusions 72a.

[0038] When the roof part 7 is attached to the outlet grille 6, the grille extension portions 62 are in contact with the two respective notches 7b and the two respective regulation ribs 76 located in the roof part 7, and the roof part 7 is thus prevented from moving from the outlet grille 6 in the left-right direction, which is also referred to as the direction of the arrow X. With this procedure, the roof part 7 is attached to the outlet grille 6 in a predetermined position in the horizontal direction.

[0039] Fig. 12 is a perspective view that illustrates a positional relation between the front panel and the outlet grille in the outdoor unit illustrated in Fig. 1. Fig. 13 is a sectional view that illustrates the outdoor unit taken along line III-III illustrated in Fig. 3 in a state after the front panel and the outlet grille illustrated in Fig. 12 are attached.

[0040] As illustrated in Fig. 12, the insertion holes 11 are each substantially U-shaped. As illustrated in Fig. 13, the front panel 1 has insertion spaces 12 above the insertion holes 11 and further inside than the insertion holes 11, in which the insertion distal portions 62b of the grille extension portions 62 are located. The insertion spaces 12 communicate with the respective insertion holes 11. Rear walls 11a of the insertion holes 11 are connected to respective rear walls 12a of the insertion spaces 12. The rear walls 11a of the insertion holes 11 and the rear walls 12a of the insertion spaces 12 are substantially parallel to the surface of the front panel 1. Side walls 11b, which connect the surface of the front panel 1 and the rear walls 11a of the insertion holes 11, are located at lower portions of the insertion holes 11. The side walls 11b are each taper-shaped such that the side wall 11b is further inclined upward as the side wall 11b is further rearward. The side walls 11b at the lower portions of the insertion holes 11, the rear walls 11a of the insertion holes 11, and the rear walls 12a of the insertion spaces 12 are used to guide the grille extension portions 62 inserted

into the insertion holes 11 to the insertion spaces 12.

[0041] Fig. 14 is a sectional view that illustrates the outdoor unit taken along line II-II illustrated in Fig. 3. A procedure to attach the outlet grille 6 to the front panel 1 is described below with reference to Fig. 13 and Fig. 14. As illustrated in Fig. 13, the insertion distal portions 62b of the grille extension portions 62 are inserted into the insertion holes 11, which are opened at portions above the outer circumference of the opening hole 1a in the front panel 1, and the insertion distal portions 62b are thus located in the insertion spaces 12 in the front panel 1. With this procedure, the grille extension portions 62 are hung on the front panel 1. When the insertion distal portions 62b are inserted into the insertion holes 11, the insertion distal portions 62b are guided to the insertion spaces 12, which are located above the insertion holes 11 and further inside than the insertion holes 11, while the angles of the insertion distal portions 62b are being changed by the side walls 11b and the rear walls 11a of the insertion spaces 12. The insertion distal portions 62b are thus located in the insertion spaces 12 such that the insertion distal portions 62b are substantially parallel to the surface of the front panel 1.

[0042] While the insertion distal portions 62b are being inserted from the insertion holes 11 to the further inside, the angle of the outlet grille 6 to the front panel 1 is changed. As illustrated in Fig. 14, the lower portion of the outlet grille 6 thus moves closer to the front panel 1. As illustrated in Fig. 13, when the insertion distal portions 62b of the grille extension portions 62 are fully inserted into the insertion holes 11, the proximal portions 62a of the grille extension portions 62 are in contact with edge portions 11c of the insertion holes 11 and the insertion distal portions 62b stops moving upward. In this state, the front panel 1 and the outlet grille 6 are positioned. When the front panel 1 and the outlet grille 6 are positioned, as illustrated in Fig. 14, the screw holes 63a located at the fixation portions 63 of the outlet grille 6, which are illustrated in Fig. 9, and the screw holes 1c in the front panel 1, which are illustrated in Fig. 2, coincide with each other in the front-rear direction of the casing 100a, which is also referred to as the direction of the arrow Y. The fixing screws 9 are inserted and fixed into the screw holes 63a of the fixation portions 63 and the screw holes 1c in the front panel 1, and the outlet grille 6 is thus fixed to the front panel 1.

[0043] Fig. 15 is a partially-enlarged view that illustrates a positional relation between the top plate, the outlet grille, and the roof part in the outdoor unit illustrated in Fig. 14. The outlet grille 6 is fixed to the front panel 1 as illustrated in Fig. 14, the roof part 7 attached to the outlet grille 6 is thus sandwiched by the front panel 1 and the outlet grille 6 and the roof part 7 is hence fixed to the front panel 1 as illustrated in Fig. 15. In a state in which the outlet grille 6 is fixed to the front panel 1, the main roof portion 71 is inclined downward along the upper end portion 6a of the outlet grille 6, which are bent. Also in

this state, the main roof portion 71 is located such that the main roof portion 71 is inclined further downward as the main roof portion 71 is further away from the front panel 1.

[0044] Specifically, when the outlet grille 6 is fixed to the front panel 1, the grille extension portions 62 are supported by the front panel 1 and force is applied rearward to the roof part 7 from the upper end portion 6a of the outlet grille 6 through the recessions 7a. This force thus presses the extension ribs 73, which are located at portions of the tail end 71e of the main roof portion 71, against the front panel 1. At the same time, a stress is applied forward to the extension ribs 73 from the front panel 1. In other words, when the outlet grille 6 is fixed to the front panel 1, the roof part 7 is held such that the roof part 7 is sandwiched by the front panel 1 and the outlet grille 6.

[0045] With this configuration, a fastening part, such as a screw, is not used to fasten the roof part 7, and easier work is required to attach the roof part 7. In addition, since a fastening part is not used to fasten the roof part 7, which is used for drainage, the same configuration of the front panel 1 may be used for products to be shipped to cold regions, in which water is easily frozen, and products to be shipped to temperate regions, which are different from cold regions. Product management is thus facilitated.

[0046] Alternatively, a configuration may also be used in which no extension ribs 73 are provided to the roof part 7 and the tail end 71e of the main roof portion 71 is in contact with the front panel 1. In this case, in a state in which the outlet grille 6 is fixed to the front panel 1, the length of the proximal portions 62a of the grille extension portions 62 is only required to be specified with which the tail end 71e of the main roof portion 71 is pressed against the front panel 1.

[0047] However, in a case in which the extension ribs 73 are provided, in comparison with a case in which no extension ribs 73 are provided, pressure applied to a location at which the roof part 7 and the front panel 1 are in contact with each other is larger and the roof part 7 is more stably held such that the roof part 7 is thus further pressed against the front panel 1. While an air-conditioning apparatus is operating, components such as the compressor 16 and the air-sending device 15, which are illustrated in Fig. 4, drive and vibrations are thus produced at the outdoor unit 100. With the configuration in which the extension ribs 73 are provided and are pressed against the front panel 1, the outlet grille 6, which is the plurality of iron bars 60, is warped and generates repulsion, which prevents the roof part 7 from being wobbled by vibrations and thus prevents a vibration sound produced by the roof part 7.

[0048] The structure of the top plate 3 is described below with reference to Fig. 15. The top plate 3 has a top-plate extension portion 30, which extends further forward than the front panel 1 in the front-rear direction, which is also referred to as the direction of the arrow Y. The top-plate extension portion 30 extends further forward than the tail end 71e of the main roof portion 71. The top plate

3 covers the upper end of the front panel 1 and also covers a portion of the roof part 7 that is in the vicinity of the front panel 1. The top-plate extension portion 30 has a flange portion 31, which protrudes downward. In an example illustrated in Fig. 15, the length of the flange portion 31 is specified with which a lower edge 31a of the flange portion 31 and the top face 71a of the main roof portion 71 are in contact with each other.

[0049] Fig. 16 is a partially-enlarged view that illustrates a positional relation between the front panel and the roof part in the outdoor unit illustrated in Fig. 3. An arrow W1 illustrated in Fig. 15 indicates a flow of water along the top-plate extension portion 30. Arrows W2 illustrated in Fig. 16 indicate flows of water at opposite respective ends of the roof part 7 in the horizontal width direction, which is also referred to as the direction of the arrow X.

[0050] As illustrated in Fig. 15, water flows from an upper portion of the top-plate extension portion 30 along the flange portion 31 and then, at the lower edge 31a of the flange portion 31, moves onto the top face 71a of the main roof portion 71 and toward the front end 71f. Water that flows along a front portion of the top plate 3 is thus prevented from flowing around the lower edge 31a of the flange portion 31 toward the front panel 1. Water is hence prevented from flowing through the opening hole 1a opened in the front panel 1.

[0051] Water having moved from the flange portion 31 onto the top face 71a of the main roof portion 71 flows on the top face 71a, which is inclined downward, toward the front end 71f. Water having reached the front end 71f of the main roof portion 71 is blocked by the front-end protrusion 74 and is separated into the left and the right. The water then flows on the top face 71a of the main roof portion 71 along the front-end protrusion 74 and is discharged, as illustrated in Fig. 16, from both opposite ends of the main roof portion 71 in the horizontal width direction, which is also referred to as the direction of the arrow X.

[0052] In a state in which the outlet grille 6 is fixed to the front panel 1 as illustrated in Fig. 14, the length of the main roof portion 71 in the front-rear direction, which is also referred to as the direction of the arrow Y, is also specified with which the front end 71f of the main roof portion 71 is located further forward than the sub-roof portion 72 and the outlet grille 6. Even in a case in which water having reached the front end 71f of the main roof portion 71 flows over the front-end protrusion 74 and flows forward, the water merely drips from the front-end protrusion 74. Water is therefore prevented from moving along the outlet grille 6 onto the front panel 1.

[0053] Also, as described above, the main roof portion 71 has the horizontal width, which is larger than or equal to the diameter D_o of the opening hole 1a in the front panel 1, and the main roof portion 71 is inclined further downward as the main roof portion 71 is further away from the front panel 1. Drops of water that are blocked by the front-end protrusion 74 and flow separately in the

left-right direction thus drip from the front portion of the main roof portion 71. Water discharged from the roof part 7 is therefore prevented from flowing from the opposite ends of the roof part 7 along the outdoor unit 100. In particular, at the front face of the casing 100a, water discharged from the roof part 7 is therefore prevented from flowing through the upper portion of the edge of the opening hole 1a in the front panel 1 and into the inside of the opening hole 1a in the front panel 1. With this configuration, water is also prevented from flowing through between the bell mouth 1b and the fan 15a illustrated in Fig. 4. Even when the outdoor air temperature is so low that water is frozen, such less resultant ice is thus less likely to interfere with a rotation of the fan. Even when the outdoor air temperature is so low that the temperature of air blown out from the fan 15a is below freezing point, water located between the fan 15a and the bell mouth 1b and other components is therefore prevented from being frozen. Such less resultant ice is less likely to interfere with a rotation of the fan 15a and extraordinary noise, which may be caused by such interference, is thus prevented from being generated.

[0054] Also, as illustrated in Fig. 15, the top face 71a of the main roof portion 71 and the lower edge 31a of the flange portion 31 are in contact with each other at a location further forward than a bifurcation point Pd at which the sub-roof portion 72 branches from the main roof portion 71 in the front-rear direction, which is also referred to as the direction of the arrow Y. Furthermore, the top face 71a of the main roof portion 71 and the lower edge 31a of the flange portion 31 are preferably in contact with each other at a location further forward than the bifurcation point Pd and further rearward than the front face of the grille body 61 in the front-rear direction, which is also referred to as the direction of the arrow Y.

[0055] With this configuration, the roof part 7 is sandwiched by the upper end portion 6a of the outlet grille 6 and the front panel 1 in the front-rear direction, which is also referred to as the direction of the arrow Y, the roof part 7 is also sandwiched by the upper end portion 6a of the outlet grille 6 and the lower edge 31a of the flange portion 31 in the height direction, which is also referred to as the direction of the arrow Z, and the roof part 7 is therefore more stably held. Such an event that the roof part 7 is wobbled, as described above, is therefore prevented and a vibration sound produced when the roof part 7 is wobbled is also prevented.

[0056] Fig. 17 is a perspective view that illustrates a modification of the roof part according to Embodiment 1. As illustrated in Fig. 17, the main roof portion 71 of the modification is inclined downward from a center Pc, which is the center in the horizontal width direction, which is also referred to as the direction of the arrow X, toward both end portions Pe, which are opposite to each other in the horizontal width direction, which is also referred to as the direction of the arrow X. Other components of the roof part 7 in the modification are the same as the roof part 7 illustrated in Fig. 6, and their description is thus

omitted.

[0057] With this configuration, water that flows along the flange portion 31 and moves onto the top face 71a of the main roof portion 71 as illustrated in Fig. 15 is moved toward the left or right end portion Pe and is sped up by gravity. The water is therefore prevented from stagnating on the main roof portion 71 and the water on the roof part 7 is thus discharged from at least either one of the end portions Pe with more certainty.

[0058] In an example illustrated in Fig. 17, the main roof portion 71 is bent at the center Pc in the horizontal width direction, which is also referred to as the direction of the arrow X, portions on the left and right of the center Pc are thus each inclined. Alternatively, for example, by varying the thickness of the main roof portion 71 in the horizontal width direction, which is also referred to as the direction of the arrow X, portions on the left and right of the center Pc may be each inclined. Specifically, portions on the left and right of the center Pc on the top face 71a of the main roof portion 71 may be each inclined such that the bottom face 71b of the main roof portion 71 is flat and the thickness of the main roof portion 71 is gradually reduced from the center Pc in the horizontal width direction, which is also referred to as the direction of the arrow X, toward each of the end portions Pe in the horizontal width direction, which is also referred to as the direction of the arrow X.

[0059] Also, when the main roof portion 71 is inclined downward from the center Pc in the horizontal width direction, which is also referred to as the direction of the arrow X, toward both the end portions Pe in the horizontal width direction, which is also referred to as the direction of the arrow X, a configuration may be used in which the main roof portion 71 is located horizontally in the front-rear direction, which is also referred to as the direction of the arrow Y, and the front-end protrusion 74 is omitted. In this configuration, the upper end portion 6a of the outlet grille 6 extends horizontally rearward and thus extends along the main roof portion 71.

[0060] As described above, the outdoor unit 100 for an air-conditioning apparatus according to Embodiment 1 has the casing 100a, which has the front panel 1 in which the opening hole 1a is opened, the fan 15a provided to the casing 100a and configured to blow out air to the outside through the opening hole 1a, the roof part 7, and the outlet grille 6. The roof part 7 is installed at the front of the front panel 1 and above the opening hole 1a and extends in the width direction of the casing 100a, which is also referred to as the direction of the arrow X. The outlet grille 6 is fixed to the casing 100a and covers the opening hole 1a. The roof part 7 has the main roof portion 71, which extends further forward than the front panel 1, and the sub-roof portion 72, which extends downward and forward from the main roof portion 71 and has the recessions 7a formed between the bottom face 71b of the main roof portion 71 and the sub-roof portion 72. The outlet grille 6 has the upper end portion 6a, which is in contact with the recessions 7a. The front panel 1 and the

upper end portion 6a of the outlet grille 6 hold the roof part 7 such that the front panel 1 and the upper end portion 6a of the outlet grille 6 sandwich the roof part 7.

[0061] With this configuration, water is discharged toward a location away from the opening hole 1a through the roof part 7, which is in contact with the front panel 1. Also, the upper end portion 6a of the outlet grille 6, which is located between the main roof portion 71 and the sub-roof portion 72, and the front panel 1 hold the roof part 7 in a predetermined position. To attach the roof part 7, the outdoor unit 100 therefore requires easier work than does some outdoor unit in prevention of water from flowing through between the fan 15a and the opening hole 1a in the front panel 1.

[0062] The casing 100a also has the top plate 3 located on top of the front panel 1. The top plate 3 has the top-plate extension portion 30, which extends further forward than the tail end 71e of the main roof portion 71 and covers a portion of the roof part 7 that is in the vicinity of the front panel 1. With this configuration, drops of water flow on the top-plate extension portion 30 of the top plate 3 and then flow on a portion of the roof part 7 located further forward than a gap between the roof part 7 and the front panel 1. Water is therefore prevented from flowing, through the gap between the roof part 7 and the front panel 1, through the edge of the opening hole 1a and into the inside of the opening hole 1a.

[0063] Also, the top-plate extension portion 30 has the flange portion 31, which protrudes downward. The top face 71a of the main roof portion 71 and the lower edge 31a of the flange portion 31 are in contact with each other in a state in which the outlet grille 6 is fixed to the casing 100a. Water is thus prevented from flowing around rearward of the top-plate extension portion 30. Water is therefore prevented from flowing through the edge of the opening hole 1a and into the inside of the opening hole 1a.

[0064] Also, in a state in which the outlet grille 6 is fixed to the casing 100a, the top face 71a of the main roof portion 71 and the lower edge 31a of the flange portion 31 are in contact with each other at a location further forward than a location at which the sub-roof portion 72 branches from the main roof portion 71. With this configuration, the main roof portion 71 is sandwiched by the upper end portion 6a of the outlet grille 6 and the lower edge 31a of the flange portion 31 in the height direction, which is also referred to as the direction of the arrow Z, and the main roof portion 71 is therefore more stably held. Since the main roof portion 71 is more stably held, a vibration sound caused when the roof part 7 is wobbled is also prevented.

[0065] The roof part 7 also has the extension ribs 73, which each extend from portions of the tail end 71e of the main roof portion 71 toward the front panel 1. In a state in which the outlet grille 6 is fixed to the casing 100a, the extension ribs 73 are pressed against the front panel 1. With this configuration, a portion of the roof part 7 that is in vicinity of the front panel 1 is provided with a portion at which the roof part 7 is in contact with the front panel

1 and a portion at which the roof part 7 is not in contact with the front panel 1. With high pressure applied on the portion at which the roof part 7 is in contact with the front panel 1, the roof part 7 is therefore more stably held. Since the main roof portion 71 is more stably held, a vibration sound caused when the roof part 7 is wobbled is also prevented.

[0066] Also, the main roof portion 71 is inclined further downward as the main roof portion 71 is further away from the front panel 1. The main roof portion 71 has the horizontal width, which is larger than or equal to an opening-hole diameter, which is also referred to as the diameter Do, of the opening hole 1a in the front panel 1. The roof part 7 also has the front-end protrusion 74 provided at the front end 71f of the main roof portion 71 and shaped such that the front-end protrusion 74 protrudes upward. With this configuration, water that flows forward on the top face 71a of the main roof portion 71 is blocked by the front-end protrusion 74 and is made flow in the horizontal width direction, which is also referred to as the direction of the arrow X, and then is discharged from both opposite ends of the main roof portion 71 in the horizontal width direction. Drainage from the front is thus prevented. The blocked water is thus also made flow away from the opening hole 1a in the horizontal width direction, which is also referred to as the direction of the arrow X, and is then discharged. Water is therefore prevented from flowing into the opening hole 1a.

[0067] Also, the top face 71a of the main roof portion 71 is inclined downward from the center Pc in the horizontal width direction, which is also referred to as the direction of the arrow X, toward both the end portions Pe in the horizontal width direction. With this configuration, water on the top face 71a of the main roof portion 71 is moved toward the left or right end portion Pe and is sped up by gravity. The water is therefore prevented from stagnating on the main roof portion 71 and the water on the roof part 7 is thus discharged from at least either one of the end portions Pe with more certainty.

[0068] The outlet grille 6 also has the grille body 61, which is the plurality of iron bars 60, the grille extension portions 62, and the fixation portions 63. The grille extension portions 62 are located at respective left and right upper ends of the grille body 61. The grille extension portions 62 each extend further rearward than the upper end portion 6a of the outlet grille 6. The fixation portions 63 are located at respective left and right lower ends of the grille body 61. The fixation portions 63 are fixed to the front panel 1 by the fixing screws 9. Also, at portions above the outer circumference of the opening hole 1a, the insertion holes 11 through which the grille extension portions 62 are inserted, are opened in the front panel 1.

[0069] With this configuration, when the outlet grille 6 is fixed to the front panel 1, the grille extension portions 62 are inserted into the insertion holes 11. The outlet grille 6 is thus positioned to the front panel 1 and fastening the fixing screws 9 is hence facilitated.

[0070] Also, the front panel 1 has the bell mouth 1b,

which protrudes from the edge of the opening hole 1a in the front panel 1 rearward and toward the center of the opening hole 1a. With this configuration, also in a case in which the bell mouth 1b is located at the edge of the opening hole 1a in the front panel 1, water is prevented from flowing through between the fan 15a and the bell mouth 1b. Also, since water is prevented from flowing through the inside, even when the outdoor air temperature is low, water is prevented from being frozen between the fan 15a and the bell mouth 1b. Such less resultant ice is less likely to interfere with a rotation of the fan 15a and extraordinary noise, which may be caused by such interference, is thus prevented from being generated.

[0071] The configuration of the outdoor unit 100 for an air-conditioning apparatus is not limited to the embodiments described above, and the configuration may be modified or partly omitted as needed. In the example illustrated in Fig. 15, the main roof portion 71 is inclined and extends downward from the front panel 1.

Alternatively, for example, the main roof portion 71 may extend from the front panel 1 horizontally forward. In addition, the lower edge 31a of the flange portion 31 and the top face 71a of the main roof portion 71 are not strictly required to be in contact with each other. As long as water is prevented from flowing around rearward of the lower edge 31a of the flange portion 31, a gap may be left, to some extent, between the lower edge 31a of the flange portion 31 and the top face 71a of the main roof portion 71.

Reference Signs List

[0072] 1: front panel, 1a: opening hole, 1b: bell mouth, 1c: screw hole, 2, 2a, 2b: side panel, 3: top plate, 4: base, 6: outlet grille, 6a: upper end portion, 7: roof part, 7a: recession, 7b: notch, 8: controller, 9: fixing screw, 10: partition plate, 11: insertion hole, 11a: rear wall, 11b: side wall, 11c: edge portion, 12: insertion space, 12a: rear wall, 13: heat exchanger, 14: support portion, 15: air-sending device, 15a: fan, 15b: motor, 16: compressor, 30: top-plate extension portion, 31: flange portion, 31a: lower edge, 60: iron bar, 60a: vertical bar, 60b: horizontal bar, 61: grille body, 62: grille extension portion, 62a: proximal portion, 62b: insertion distal portion, 63: fixation portion, 63a: screw hole, 71: main roof portion, 71a: top face, 71b: bottom face, 71e: tail end, 71f: front end, 72: sub-roof portion, 72a: second protrusion, 72b: first protrusion, 73: extension rib, 74: front-end protrusion, 75: tail-end protrusion, 76: regulation rib, 100: outdoor unit, 100a: casing, A: arrow, B: arrow, Do: diameter, F: air-sending chamber, M: machine chamber, Pc: center, Pd: bifurcation point, Pe: end portion

Claims

1. An outdoor unit for an air-conditioning apparatus, the outdoor unit comprising:

- a casing that has a front panel in which an opening hole is opened;
a fan provided to the casing and configured to blow out air to an outside through the opening hole;
a roof part installed at a front of the front panel and above the opening hole and extending in a width direction of the casing; and
an outlet grille fixed to the casing and covering the opening hole,
the roof part having
a main roof portion that extends further forward than the front panel, and
a sub-roof portion that extends downward and forward from the main roof portion and has a recession formed between a bottom face of the main roof portion and the sub-roof portion,
the outlet grille being located such that an upper end portion of the outlet grille is in contact with the recession,
the front panel and the upper end portion of the outlet grille holding the roof part such that the front panel and the upper end portion of the outlet grille sandwich the roof part.
2. The outdoor unit for an air-conditioning apparatus of claim 1, wherein
- the casing has a top plate provided on top of the front panel, and
the top plate has a top-plate extension portion that extends further forward than a tail end of the main roof portion and covers a portion of the roof part that is in the vicinity of the front panel.
3. The outdoor unit for an air-conditioning apparatus of claim 2, wherein
- the top-plate extension portion has a flange portion that protrudes downward, and
a top face of the main roof portion and a lower edge of the flange portion are in contact with each other in a state in which the outlet grille is fixed to the casing.
4. The outdoor unit for an air-conditioning apparatus of claim 3, wherein, in a state in which the outlet grille is fixed to the casing, the top face of the main roof portion and the lower edge of the flange portion are in contact with each other at a location further forward than a location at which the sub-roof portion branches from the main roof portion.
5. The outdoor unit for an air-conditioning apparatus of any one of claims 1 to 4, wherein
- the roof part has an extension rib that extends from a portion of a tail end of the main roof portion
- toward the front panel, and
in a state in which the outlet grille is fixed to the casing, the extension rib is pressed against the front panel.
6. The outdoor unit for an air-conditioning apparatus of any one of claims 1 to 5, wherein
- the main roof portion is inclined further downward as the main roof portion is further away from the front panel,
the main roof portion has a horizontal width that is larger than or equal to an opening-hole diameter of the opening hole in the front panel, and
the roof part has a front-end protrusion provided at a front end of the main roof portion and shaped such that the front-end protrusion protrudes upward.
7. The outdoor unit for an air-conditioning apparatus of any one of claims 1 to 6, wherein a top face of the main roof portion is inclined downward from a center in a horizontal width direction toward both end portions in the horizontal width direction.
8. The outdoor unit for an air-conditioning apparatus of any one of claims 1 to 7, wherein
- the outlet grille has
a grille body that is a plurality of iron bars,
grille extension portions provided at respective left and right upper ends of the grille body, the grille extension portions each extending further rearward than the upper end portion of the outlet grille, and
fixation portions provided at respective left and right lower ends of the grille body, the fixation portions being fixed to the front panel by screws, and,
at portions above an outer circumference of the opening hole, insertion holes through which the grille extension portions are inserted are opened in the front panel.
9. The outdoor unit for an air-conditioning apparatus of any one of claims 1 to 8, wherein the front panel has a bell mouth that protrudes, from an edge of the opening hole in the front panel, rearward and toward a center of the opening hole.

FIG. 1

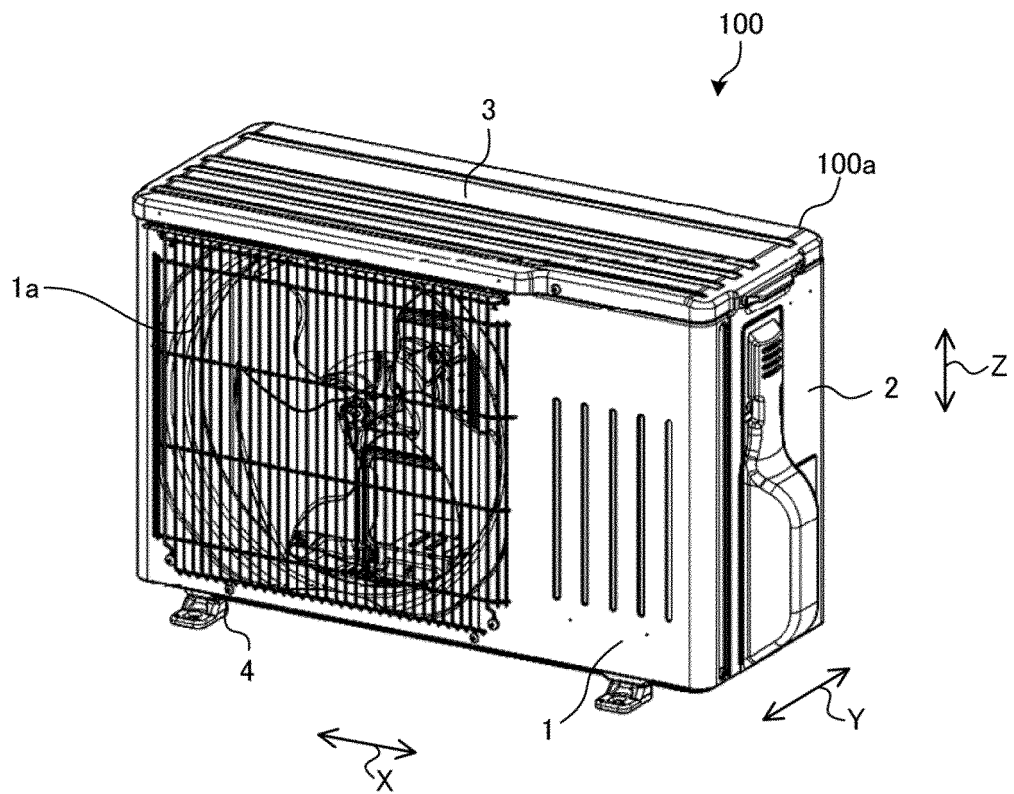


FIG. 2

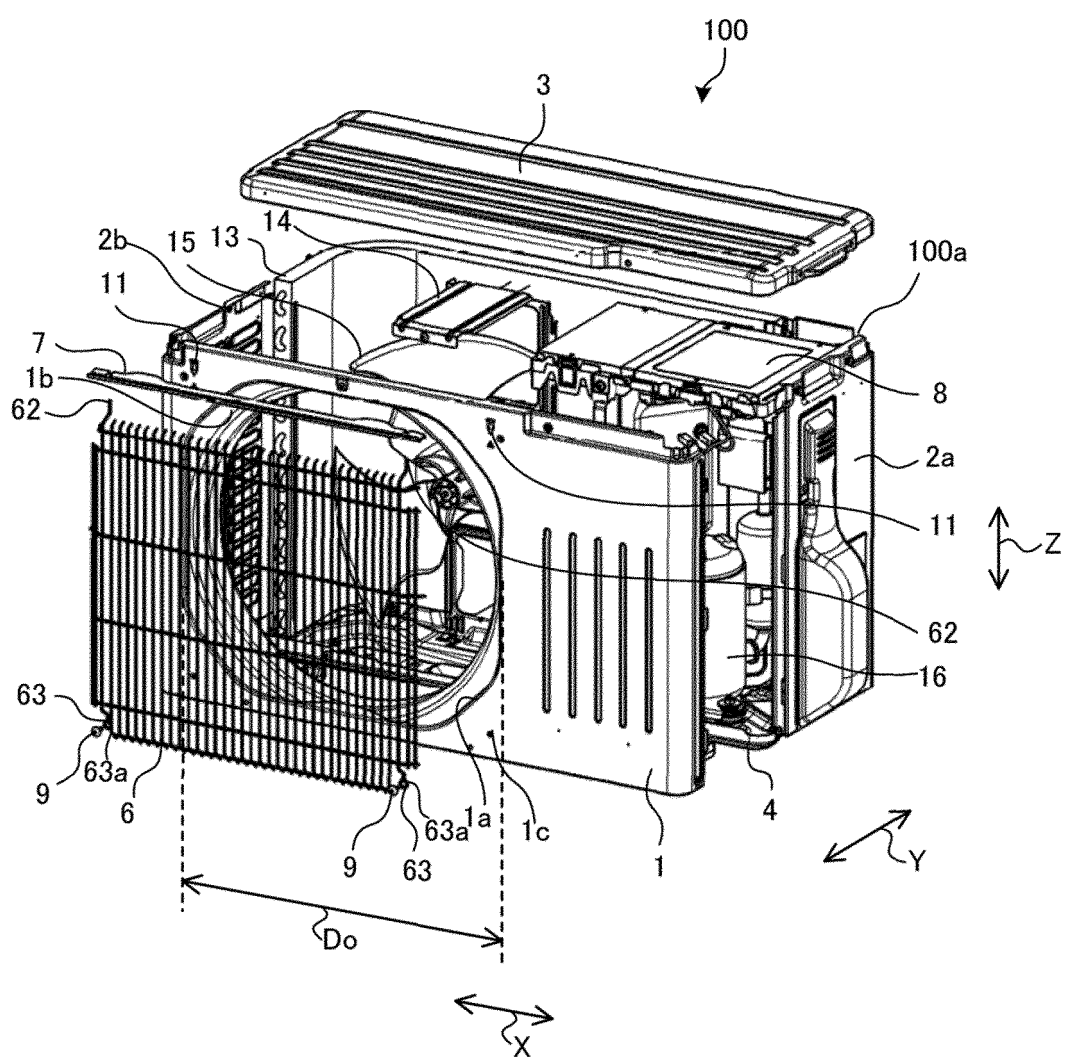


FIG. 3

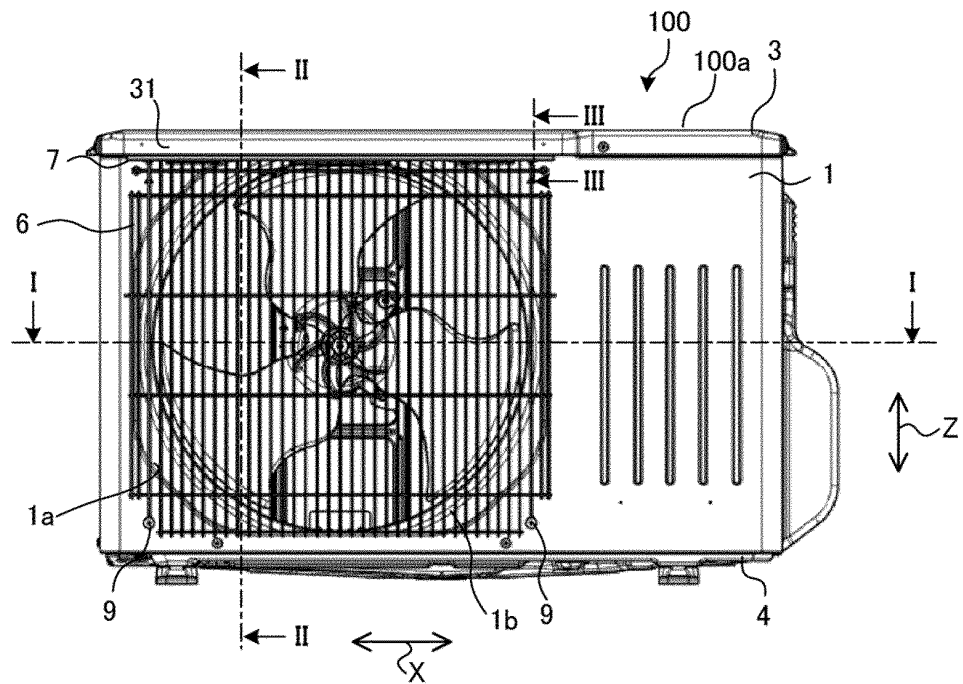


FIG. 4

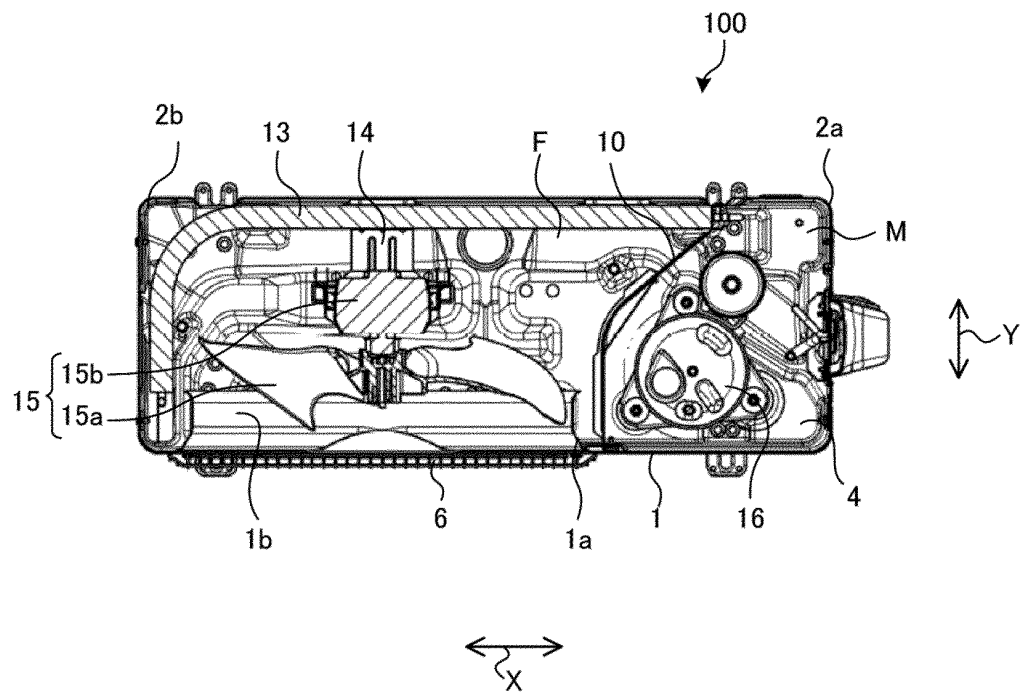


FIG. 5

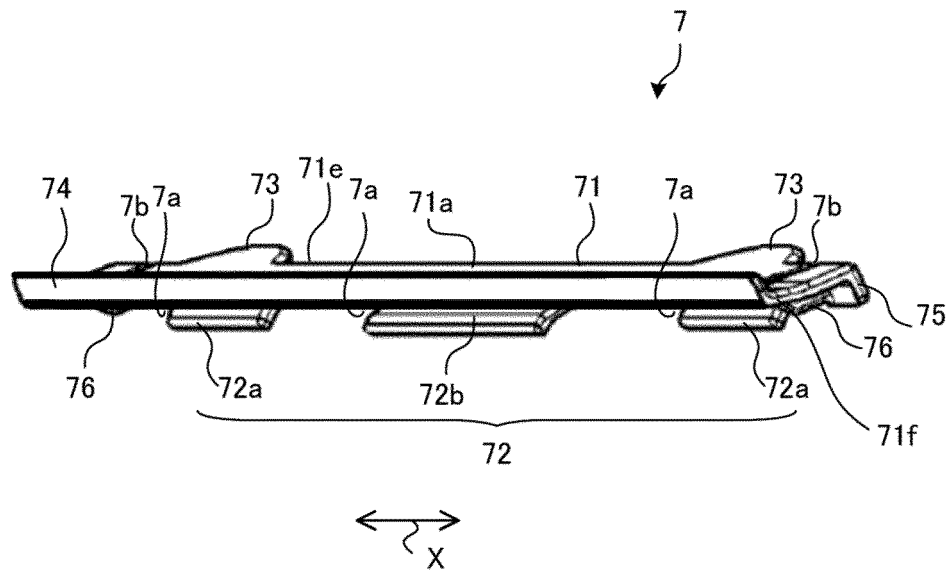


FIG. 6

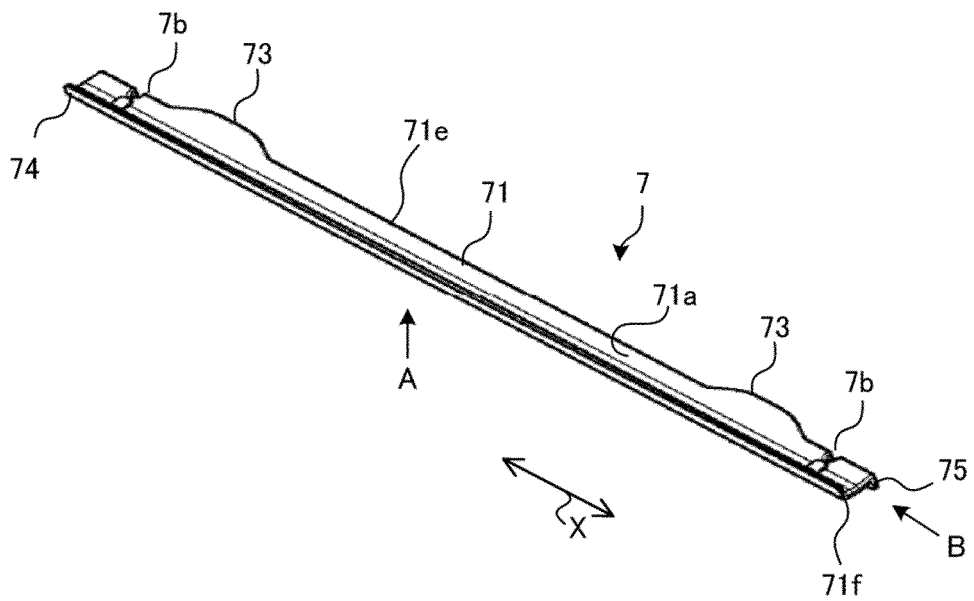


FIG. 7

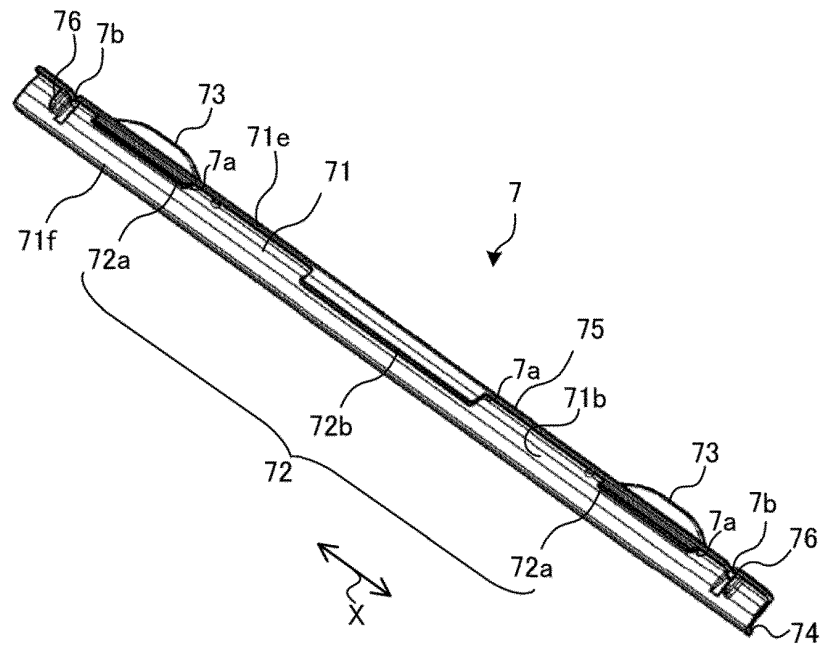


FIG. 8

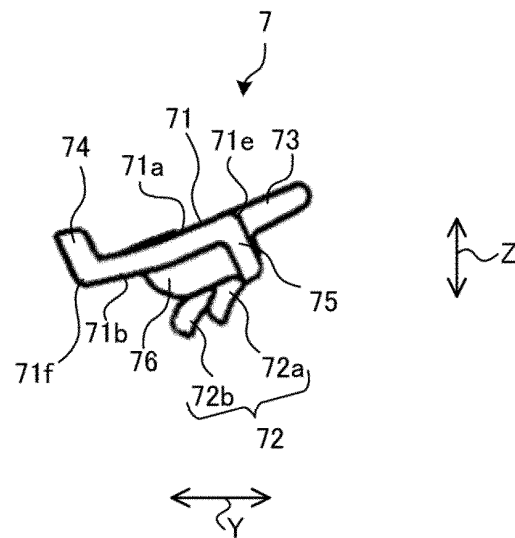


FIG. 9

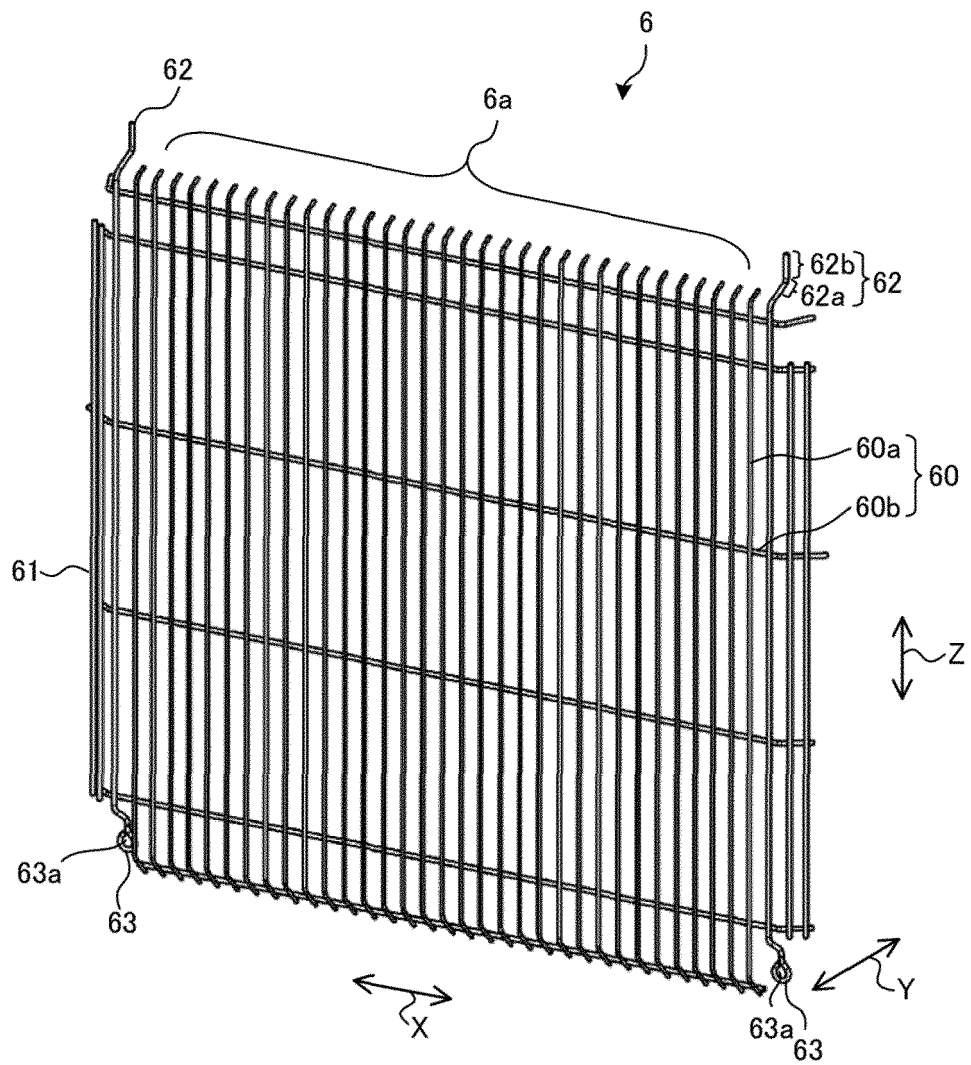


FIG. 10

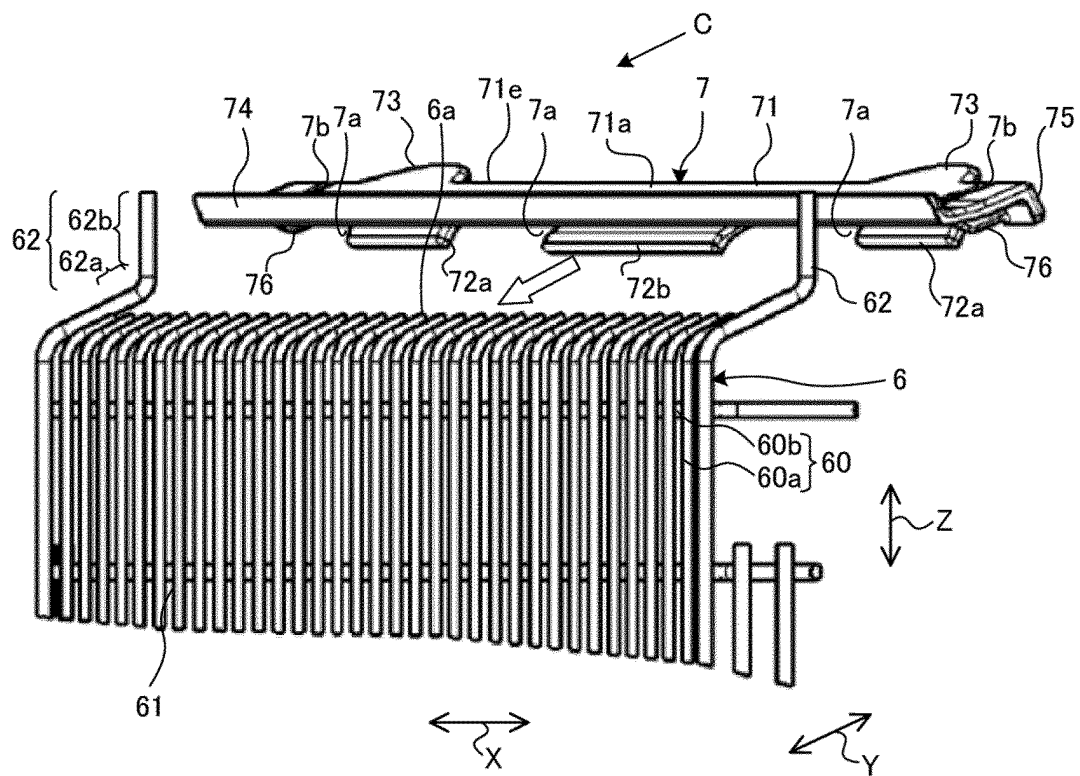


FIG. 11

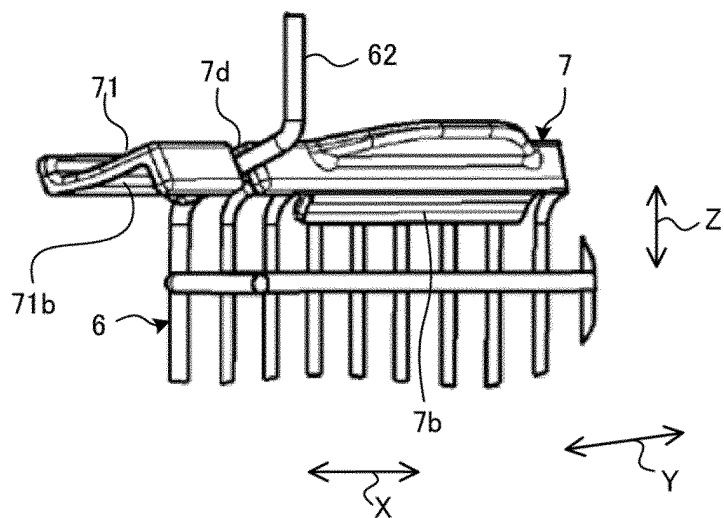


FIG. 12

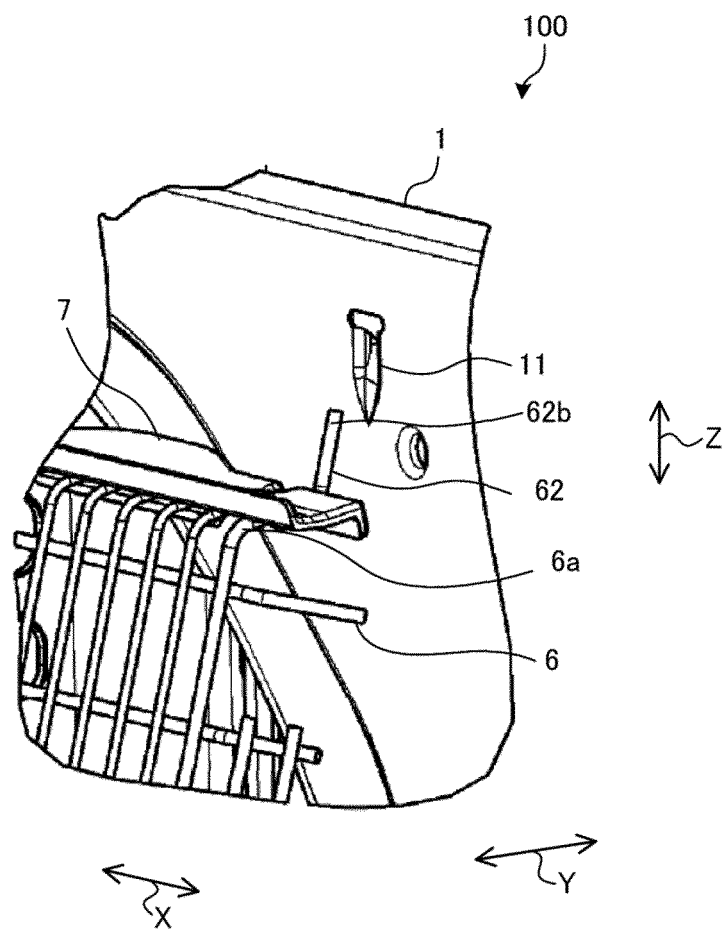


FIG. 13

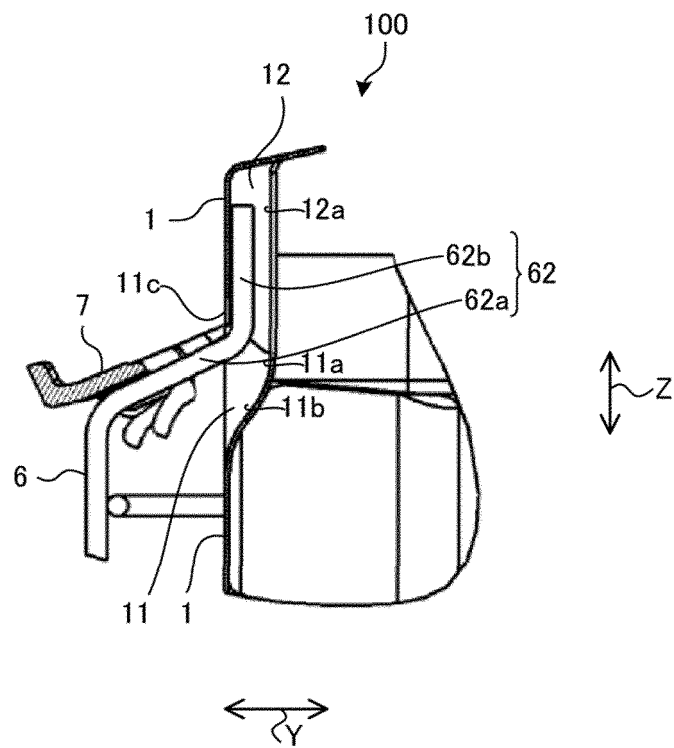


FIG. 14

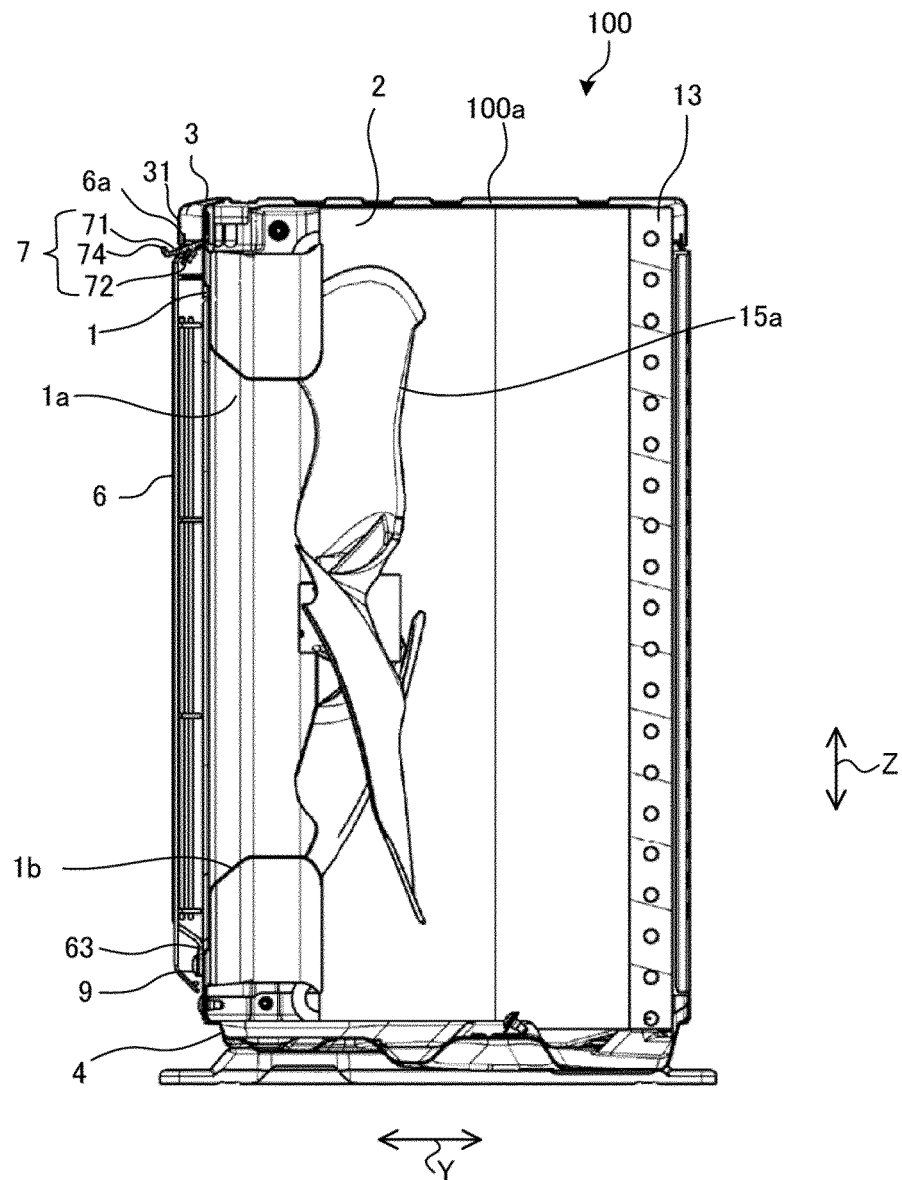


FIG. 15

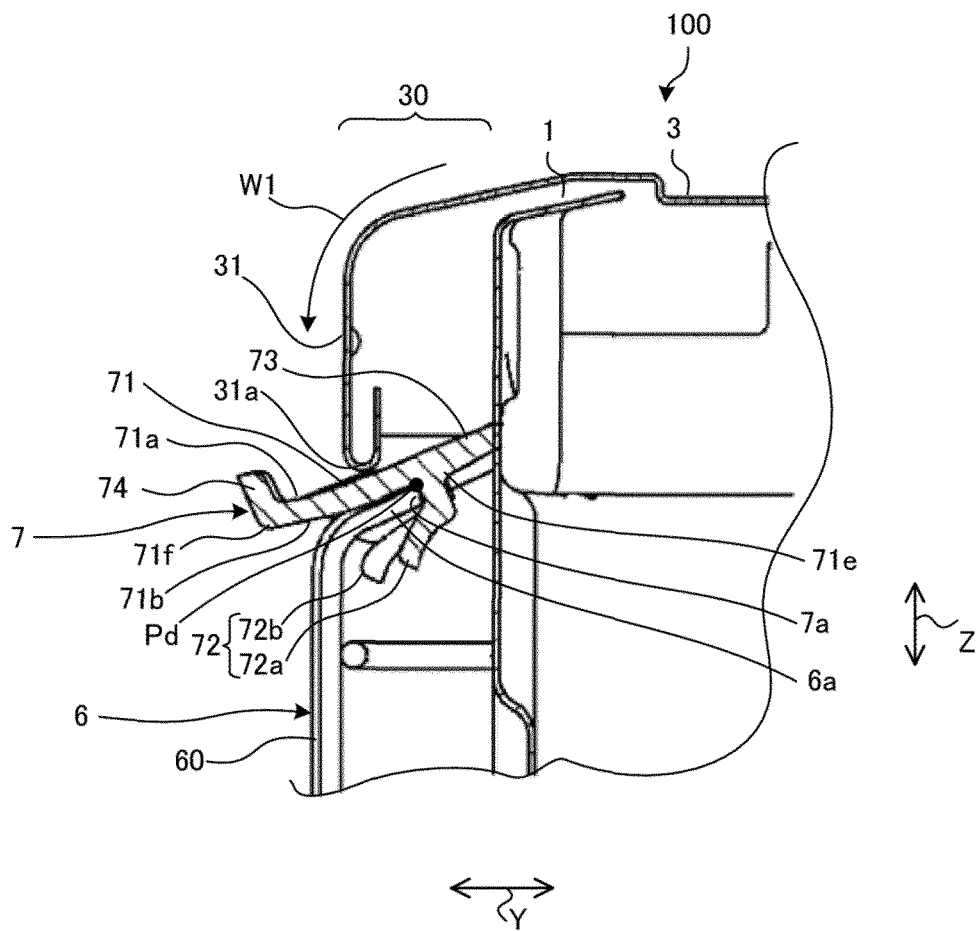


FIG. 16

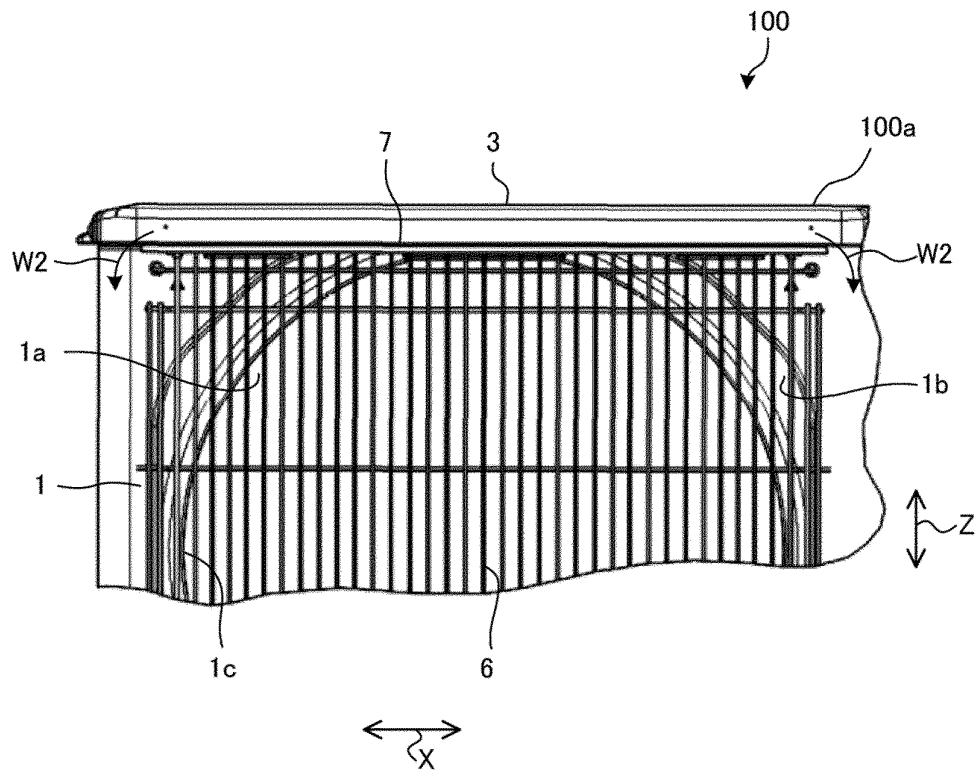
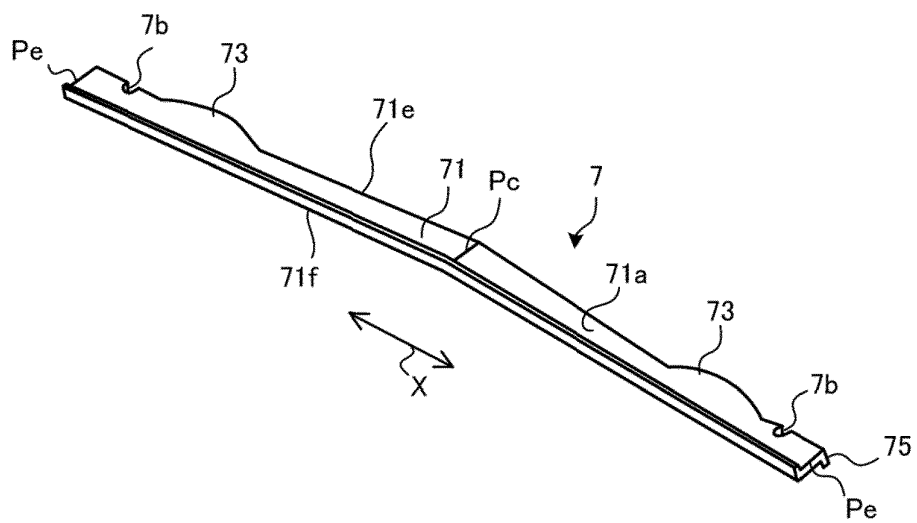


FIG. 17



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INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2020/037715

10

A. CLASSIFICATION OF SUBJECT MATTER

F24F 1/58 (2011.01) i

FI: F24F1/58

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

15

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

F24F1/56-F24F1/58

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

Published examined utility model applications of Japan 1922-1996

Published unexamined utility model applications of Japan 1971-2020

Registered utility model specifications of Japan 1996-2020

Published registered utility model applications of Japan 1994-2020

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

20

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP 2011-94919 A (MITSUBISHI ELECTRIC CORP.) 12 May	1
Y	2011 (2011-05-12) paragraphs [0009]-[0011], [0013]-	2, 6-9
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 ☒ See patent family annex.

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