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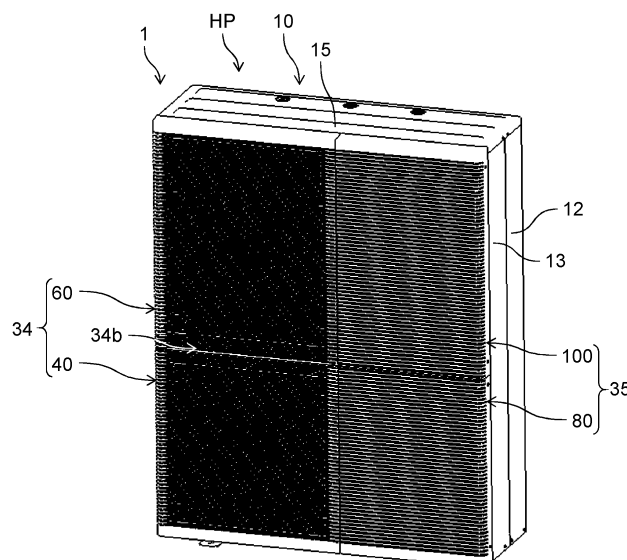
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(54) OUTDOOR UNIT AND HEAT PUMP DEVICE

(57) An outdoor unit according to the present disclosure includes: a refrigerant circuit including a compressor and a heat source-side heat exchanger; an air blower that generates a wind passing through the heat source-side heat exchanger; a housing that houses the refrigerant circuit and the air blower; and a first grille and a second grille each covering the housing. The first grille and the second grille are disposed by being joined to each other to form an integrated grille appearance shape. The first

grille includes a back side including a first insertion rib protruding toward the second grille to be in contact with a back side of the second grille. The second grille includes the back side including a second insertion rib protruding toward the first grille to be in contact with the back side of the first grille. The first insertion rib and the second insertion rib are alternately formed along a seam between the first grille and the second grille.

FIG. 1

Description**BRIEF DESCRIPTION OF THE DRAWINGS****BACKGROUND****[0008]**

1. Technical Field

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[0001] The present disclosure relates to an outdoor unit and a heat pump device.

2. Description of the Related Art

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[0002] PTL 1 discloses a heat source machine including a body internally provided with a compressor and a blower, a first grille covering the compressor from the front, and a second grille disposed in parallel with the first grille to cover the blower from the front. PTL 1 discloses also a technique of causing a fastening member to be less likely to be seen from the front by laterally engaging the first grille with the second grille, and fastening the first grille to the body from laterally outside using fastening means.

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Citation List

Patent Literature

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[0003] PTL 1: Unexamined Japanese Patent Publication No. 2022-187051

SUMMARY

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[0004] The present disclosure provides an outdoor unit and a heat pump device that are excellent in design in which a seam of grilles is less noticeable.

[0005] An outdoor unit according to the present disclosure includes: a refrigerant circuit including a compressor and a heat source-side heat exchanger; an air blower that generates a wind passing through the heat source-side heat exchanger; a housing that houses the refrigerant circuit and the air blower; and a first grille and a second grille each covering the housing. The first grille and the second grille are disposed by being joined to each other to form an integrated grille appearance shape. The first grille includes a back side including a first insertion rib protruding toward the second grille to be in contact with a back side of the second grille. The second grille includes the back side including a second insertion rib protruding toward the first grille to be in contact with the back side of the first grille. The first insertion rib and the second insertion rib are alternately formed along a seam between the first grille and the second grille.

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[0006] The heat pump device according to the present disclosure includes the outdoor unit described above.

[0007] The present disclosure enables providing an outdoor unit excellent in design in which a seam of grilles is less noticeable and a heat pump device.

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DETAILED DESCRIPTIONS

(Underlying knowledge and the like of present disclosure)

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[0009] At the time when the inventors have conceived the present disclosure, there has been a technique of covering a housing of an outdoor unit with a plurality of grilles. The inventors have found a problem that a seam between grilles is likely to be noticeable unfortunately in the conventional technique, and thus having constituted the subject of the present disclosure to solve the problem.

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[0010] Thus, the present disclosure provides an outdoor unit excellent in design in which a seam of grilles is

less noticeable.

[0011] Hereinafter, an exemplary embodiment will be described in detail with reference to the drawings. However, unnecessarily detailed description may not be described. For example, a detailed description of already well-known matters or a duplicated description of a substantially identical configuration may not be described. This is to avoid unnecessary redundancy in the following description and to facilitate understanding of those skilled in the art.

[0012] The accompanying drawings and the following description are presented only to help those skilled in the art fully understand the present disclosure and are not intended to limit the subject matters described in the scope of claims.

(First exemplary embodiment)

[0013] Hereinafter, a first exemplary embodiment will be described with reference to Figs. 1 to 14.

[1-1. Configuration]

[1-1-1. Configuration of outdoor unit of heat pump device]

[0014] Fig. 1 is a perspective view of outdoor unit 1 of heat pump device HP according to the first exemplary embodiment.

[0015] Heat pump device HP includes outdoor unit 1 installed outdoors. Outdoor unit 1 includes housing 10 in the shape of a substantially rectangular parallelepiped. Each part of housing 10 according to the present exemplary embodiment is made of a steel plate. Housing 10 supports air blowing chamber grille 34 and decorative grille 35 with which the front (a front side) of housing 10 is covered.

[0016] Fig. 2 is an exploded perspective view of housing 10, air blowing chamber grille 34, decorative grille 35 of outdoor unit 1 of heat pump device HP according to the first exemplary embodiment.

[0017] Housing 10 includes bottom surface panel 11 constituting a bottom surface of housing 10, rear side surface panel 12 covering a right side (one side in a left-right direction) of housing 10 from behind, front side surface panel 13 covering the right side (one side in the left-right direction) of housing 10 from the front, front surface panel 14 covering a left side (the other side in the left-right direction) of housing 10 from the front, and top plate 15 covering an upper surface of housing 10.

[0018] Housing 10 internally includes partition plate 16 disposed extending in a vertical direction. Partition plate 16 is in a rectangular shape and has a thickness in the left-right direction. Housing 10 includes an internal space partitioned into left and right by partition plate 16. Partition plate 16 is screwed and held on its back surface (rear side) to an end plate of air heat exchanger 25 (see Fig. 3), the end plate being disposed behind partition plate 16.

Partition plate 16 is also screwed and held on its lower surface to bottom surface panel 11. Partition plate 16 forms machine chamber 17 at the right and air blowing chamber 18 at the left inside housing 10.

[0019] Machine chamber 17 houses various devices constituting refrigerant circuit 20 (see Fig. 3) such as compressor 21 and water heat exchanger 23, and refrigerant pipe 26 (see Fig. 3) connecting these devices to each other. For example, a plate heat exchanger is used as water heat exchanger 23.

[0020] Machine chamber 17 is closed at its front surface by front side surface panel 13.

[0021] Air blowing chamber 18 is equipped with air heat exchanger 25 (see Fig. 3) constituting refrigerant circuit 20. Air heat exchanger 25 of the present exemplary embodiment extends along a height direction of housing 10 and is formed in a substantially L-shape to be exposed to a back surface and a side surface of housing 10. Specifically, air heat exchanger 25 includes a back surface part exposed to the back surface of housing 10 and a side surface part exposed to the side surface of housing 10. Air heat exchanger 25 is installed with the back surface part that is connected at its right end to a left end of rear side surface panel 12 of housing 10, and the side surface part that is connected at its front end to a left end of front surface panel 14 of housing 10. Although various heat exchangers used as a heat source-side heat exchanger of an outdoor unit of a general heat pump device can be used as air heat exchanger 25, a heat exchanger of a fin-tube type is used in the present exemplary embodiment, for example.

[0022] Back surface part of air heat exchanger 25 is provided at the front with air blower support 30 extending in the vertical direction. Air blower support 30 constitutes a left-and-right pair of air blower supports 30. Air blower supports 30 are bolted to and held by bottom surface panel 11 of housing 10. Air blower supports 30 are provided with a plurality of air blowers 31, 32 in the vertical direction. In the present exemplary embodiment, air blower supports 30 support lower air blower (first air blower) 31 and upper air blower (second air blower) 32 above lower air blower 31. Thus, housing 10 tends to be higher upward than when supporting one air blower 31, 32.

[0023] Air blowers 31, 32 include motors 31a, 32a, and fan blades 31b, 32b fixed to drive shafts of motors 31a, 32a, respectively. Although various fans used in an outdoor unit of a general heat pump device can be used as air blowers 31, 32, an axial fan including an impeller in the shape of a propeller is used in the present exemplary embodiment, for example.

[0024] Air blowing chamber 18 of the present exemplary embodiment is equipped with air heat exchanger 25, air blower support 30, and air blowers 31, 32.

[0025] Air blowing chamber 18 is closed at its front surface by front surface panel 14.

[0026] Housing 10 includes an upper interior in which electrical component box 33 is disposed. Electrical com-

ponent box 33 is disposed above upper air blower 32. Electrical component box 33 in the present exemplary embodiment is supported by partition plate 16 and air blower supports 30. Electrical component box 33 houses a controller (not illustrated). This controller controls respective units housed in outdoor unit 1 of heat pump device HP, such as air blowers 31, 32, compressor 21, four-way valve 22 (see Fig. 3), and expansion device 24 (see Fig. 3). This controller is also connected to sensors attached to respective parts on refrigerant circuit 20 and water supply pipe 27 (see Fig. 3) to receive output signals transmitted from the sensors. Specifically, the controller receives output signals from pressure sensors PS1, PS2 (see Fig. 3), temperature sensors TS1, TS2 (see Fig. 3), refrigerant sensor RS1 (see Fig. 3), and the like.

[0027] front surface panel 14 in front of housing 10 is provided with two openings 14a, 14b corresponding to positions of air blowers 31, 32. Air blowers 31, 32 are exposed forward from openings 14a, 14b, respectively. Lower opening 14a is provided at its periphery with four (a plurality of) fixing parts 14c to which air blowing chamber grille 34 is fixed. Upper opening 14b is provided at its periphery with four (a plurality of) fixing parts 14d to which air blowing chamber grille 34 is fixed. The number of fixing parts 14c, 14d is not limited to four, and may be two or more.

[0028] At the right of front surface panel 14, front side surface panel 13 is provided at its right end part (outer end part in the left-right direction) with fastening parts 13a, 13b to which decorative grille 35 is fastened. Specifically, front side surface panel 13 includes a lower half that is provided in its lower part with an upper and lower pair of fastening parts 13a. Front side surface panel 13 includes also an upper half that is provided in its upper part with an upper and lower pair of fastening parts 13b.

[0029] Outdoor unit 1 of heat pump device HP includes front surface panel 14 to which air blowing chamber grille 34 is attached. Decorative grille 35 is attached to front side surface panel 13. Thus, the front of air blowing chamber 18 of housing 10 is covered with air blowing chamber grille 34, and the front of machine chamber 17 of housing 10 is covered with decorative grille 35. Air blowing chamber grille 34 and decorative grille 35 are molded with resin in the present exemplary embodiment, for example. Air blowing chamber grille 34 is formed in a lattice shape allowing ventilation. Thus, air is blown into and out of air blowing chamber 18 through air blowing chamber grille 34 and openings 14a, 14b.

[0030] Air blowing chamber grille 34 in the present exemplary embodiment includes lower grille 40 and upper grille 60. In other words, air blowing chamber grille 34 has a divided structure of lower grille 40 and upper grille 60. Decorative grille 35 includes lower grille 80 and upper grille 100. In other words, decorative grille 35 has a divided structure of lower grille 80 and upper grille 100. When each of air blowing chamber grille 34 and decorative grille 35, which are likely to increase in size, has the divided structure as described above, work of attaching

air blowing chamber grille 34 and decorative grille 35 to housing 10 can be facilitated due to improvement in portability and the like.

5 [1-1-2. Configuration of refrigerant circuit]

[0031] Fig. 3 is a refrigeration cycle circuit diagram of heat pump device HP according to the first exemplary embodiment.

10 **[0032]** As illustrated in Fig. 3, compressor 21, four-way valve 22, water heat exchanger (utilization-side heat exchanger) 23, expansion device 24, and air heat exchanger (heat source-side heat exchanger) 25 are annularly connected with predetermined refrigerant pipe 26 to constitute refrigerant circuit 20.

15 **[0033]** Water heat exchanger 23 is connected to predetermined water supply pipe 27 to perform heat exchange with a refrigerant circulating through refrigerant circuit 20 in water heat exchanger 23.

20 **[0034]** The refrigerant compressed by compressor 21 to be at a high temperature and under a high pressure flows as indicated by solid arrows in Fig. 3 to be fed to water heat exchanger 23, and exchanges heat with water flowing through water supply pipe 27 by using water heat exchanger 23. The water receives heat of the refrigerant to become hot water, and is supplied to a utilization-side device (not illustrated), for example.

25 **[0035]** The refrigerant discharged from water heat exchanger 23 is decompressed by expansion device 24 to be evaporated, and is subjected to heat exchange with external air by air heat exchanger 25. The refrigerant then becomes a gas refrigerant, and is returned to compressor 21 again.

30 **[0036]** Then, when four-way valve 22 is switched, the refrigerant is allowed to flow as indicated by broken line arrows in Fig. 3 to exchange heat with external air in air heat exchanger 25 and to be decompressed by expansion device 24. The refrigerant is then fed to water heat exchanger 23, so that water flowing through water supply pipe 27 can be cooled. The cold water is supplied to the utilization-side device (not illustrated).

35 **[0037]** The present exemplary embodiment allows a flammable refrigerant to be used as the refrigerant. As the flammable refrigerant, R32 can be used. Instead of R32, the flammable refrigerant may be a mixed refrigerant containing R32 in an amount of 70 weight percent or more. Instead of these, the flammable refrigerant may be propane. Alternatively, the flammable refrigerant may be a mixed refrigerant containing the propane, instead of the propane. The R32 and the propane are each a refrigerant having a low GWP to have a small environmental load.

40 **[0038]** Refrigerant circuit 20 is provided with sensors for detecting various physical quantities. Each part of refrigerant pipe 26 is provided with a temperature sensor (not illustrated) for measuring temperature of a pipe surface. Compressor 21 is provided on its suction side and discharge side with pressure sensors PS1, PS2 for measuring pressure of a refrigerant, respectively. Water sup-
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ply pipe 27 is provided with temperature sensors TS1, TS2 for detecting water temperature, respectively, on an upstream side and a downstream side of water heat exchanger 23. Near air heat exchanger 25, refrigerant sensor RS1 for detecting leakage of a refrigerant from air heat exchanger 25 is provided.

[0039] Expansion device 24 and four-way valve 22 are provided with respective actuators for driving them.

[0040] In the present exemplary embodiment, each device constituting refrigerant circuit 20, and a part of water supply pipe 27, are disposed in housing 10. Thus, outdoor unit 1 includes compressor 21, water heat exchanger 23, and air heat exchanger 25 constituting refrigerant circuit 20, and a part of water supply pipe 27.

[0041] In the present exemplary embodiment, heat pump device HP is a so-called heat pump water heater. Heat pump device HP according to the present exemplary embodiment thus includes not only outdoor unit 1, but also a hot water storage machine (a utilization-side device that is not illustrated) configured to be able to supply water to a water feed port while being connected to water supply pipe 27. Although the hot water storage machine is generally installed outdoors, it may be configured to be able to be installed indoors.

[1-1-3. Configuration of air blowing chamber grille]

[0042] Fig. 4 is an exploded perspective view of air blowing chamber grille 34 according to the first exemplary embodiment.

[0043] Air blowing chamber grille 34 in the present exemplary embodiment includes lower grille 40 and upper grille 60. Lower grille 40 and upper grille 60 each have a substantially rectangular shape in appearance when viewed from the front. Lower grille 40 and upper grille 60 are substantially equal in size to each other. Lower grille 40 is formed in a substantially rectangular shape larger than lower opening 14a of front surface panel 14. Upper grille 60 is formed in a substantially rectangular shape larger than upper opening 14b of front surface panel 14.

[1-1-4. Configuration of first grille]

[0044] Lower grille (first grille) 40 includes lower frame part 41 extending in the left-right direction. Lower frame part 41 has a block shape. Lower frame part 41 has a substantially flat U-shape in a section (the shape is referred to below as a "predetermined sectional shape") orthogonal to the vertical direction (joining direction). Lower frame part 41 is provided at its left rear end with outer side frame part 42 extending upward. Lower frame part 41 is provided at its right rear end with inner side frame part 43 (see Fig. 2) extending upward. Outer side frame part 42 and inner side frame part 43 each include an upper end part provided at its front end with upper frame part 44.

[0045] Upper frame part 44 has a plate shape having a

thickness in the vertical direction and extending in the left-right direction. Upper frame part 44 includes a rear part with a predetermined sectional shape that tapers backward. Upper frame part 44 includes a front part with a predetermined sectional shape similar to the sectional shape of lower frame part 41. That is, the front part of upper frame part 44 has a predetermined sectional shape of a substantially flat U-shape. Lower frame part 41, outer side frame part 42, inner side frame part 43, and upper frame part 44 surround a part provided with an opening passing through in a front-rear direction to allow ventilation. This opening is covered with grille part 45 in a lattice shape.

[0046] Fig. 5 is a diagram corresponding to a main part of Fig. 4. Fig. 6 is a diagram corresponding to a main part of Fig. 4 different from Fig. 5.

[0047] Grille part 45 includes a plurality of lateral plates (plates extending in a direction orthogonal to the joining direction) 45a and longitudinal plates (plates extending in the joining direction) 45b disposed between corresponding lateral plates 45a.

[0048] Lateral plate 45a has a thickness in the vertical direction and extends in the left-right direction. As with upper frame part 44 and lower frame part 41, lateral plate 45a has a predetermined sectional shape of a substantially flat U-shape. Lateral plates 45a are disposed at predetermined intervals in the vertical direction. Lateral plate 45a is supported in a state of straddling between the front end of outer side frame part 42 and the front end of inner side frame part 43.

[0049] Longitudinal plate 45b extending in the vertical direction is disposed between lateral plates 45a adjacent to each other. Longitudinal plates 45b are disposed at predetermined intervals in the left-right direction. Longitudinal plates 45b are formed in the vertical direction alternately for each step. Longitudinal plate 45b connects corresponding lateral plates 45a to each other. Longitudinal plate 45b maintains a distance between corresponding lateral plates 45a. Longitudinal plate 45b is formed at a rear end part of lateral plate 45a.

[0050] Lateral plates 45a and longitudinal plates 45b constitute grille part 45 in a lattice shape of the present exemplary embodiment. Grille part 45 is supported by lower frame part 41, outer side frame part 42, inner side frame part 43, and upper frame part 44.

[0051] Lower grille 40 includes virtual outer surface 40a that is flat without unevenness and is formed by an outer end surface of lower frame part 41, an outer end surface of outer side frame part 42, an outer end surface of inner side frame part 43, an outer end surface of upper frame part 44, and an outer end surface of lateral plate 45a (see Figs. 8, 9, and 12 to 14).

[0052] Grille part 45 of lower grille 40 is provided with a plurality of fastening parts 46 (see Fig. 4) through which respective fastening members are inserted, and that is formed corresponding to fixing parts 14c on a lower side of front surface panel 14 of housing 10. Inner side frame part 43 is provided with a plurality of engaging recesses

43a (see Fig. 2) each having a shape cut out forward from a rear end of inner side frame part 43.

[1-1-5. Configuration of first insertion rib]

[0053] Fig. 7 is a rear view of seam 34b of air blowing chamber grille 34 according to the first exemplary embodiment. Fig. 8 is a sectional view taken along line VIII-VIII in Fig. 7. Fig. 9 is a sectional view taken along line IX-IX in Fig. 7. Fig. 10 is an enlarged view of a part indicated by arrow X in Fig. 7.

[0054] As illustrated in Figs. 4 to 6, lower grille 40 is provided with joint wall part 47 in a wall shape rising upward from a front end of upper frame part 44. Joint wall part 47 extends in the left-right direction at the front end of upper frame part 44 to extend to an outer end of outer side frame part 42 and an outer end of inner side frame part 43. Joint wall part 47 includes: outer end surface 47a rising upward from outer ends of upper frame part 44, outer side frame part 42, and inner side frame part 43; chamfered surface 47b inclined backward of lower grille 40 upward from an upper end of outer end surface 47a; and contact surface 47c that is flat and extends backward of lower grille 40 from an upper end of chamfered surface 47b.

[0055] As illustrated in Figs. 4 and 5, joint wall part 47 includes a rear surface (back side, inner surface) provided with insertion rib (first insertion rib) 48 in front, protruding upward at a position corresponding to upper frame part 44. Insertion rib 48 in front is located at a central part of upper frame part 44 in the left-right direction. Insertion rib 48 in the present exemplary embodiment overlaps a vertical line (not illustrated) passing through drive shafts of motors 31a, 32a of air blowers 31, 32 in front view.

[0056] As illustrated in Fig. 7, insertion rib 48 in front in the present exemplary embodiment includes base part 48a formed on joint wall part 47 and extending along joint wall part 47, body 48b supported by base part 48a, and tapered parts 48c formed at opposite longitudinal ends of body 48b. Tapered parts 48c each incline inward in the left-right direction from base part 48a toward a distal end of insertion rib 48. Insertion rib 48 in front has a substantially trapezoidal shape when viewed from the front.

[0057] Insertion rib 48 in front is away from upper frame part 44. That is, base part 48a is away from upper frame part 44. In other words, joint wall part 47 includes a back surface provided with groove 48d (see Figs. 8 and 10) surrounded by joint wall part 47, base part 48a, and upper frame part 44.

[0058] As illustrated in Figs. 4 and 6, joint wall part 47 includes a right surface (back side, inner surface) provided with insertion rib (first insertion rib) 49 on the side, protruding upward at a position corresponding to outer side frame part 42. Insertion rib 49 on the side is located at a central part of an upper end part of outer side frame part 42 in the front-rear direction. Insertion rib 49 on the side extends in the front-rear direction. Insertion rib 49 on the

side is provided at its opposite longitudinal ends with tapered parts 49c. Tapered parts 49c each incline inward in the front-rear direction toward a distal end of insertion rib 49. Insertion rib 49 on the side has a substantially trapezoidal shape when viewed from the left.

[1-1-6. Configuration of second grille]

[0059] Upper grille (second grille) 60 is substantially formed symmetrically up and down with respect to lower grille 40 except for configurations related to insertion ribs 48, 49. As illustrated in Figs. 4 to 10, upper grille 60 specifically includes outer surface 60a, upper frame part 61, outer side frame part 62, inner side frame part 63, engaging recess 63a (see Fig. 2), lower frame part 64, grille part 65, lateral plate 65a, longitudinal plate 65b, fastening part 66, joint wall part 67, outer end surface 67a, chamfered surface 67b, and contact surface 67c, corresponding to outer surface 40a, lower frame part 41, outer side frame part 42, inner side frame part 43, engaging recess 43a, upper frame part 44, grille part 45, lateral plate 45a, longitudinal plate 45b, fastening part 46, joint wall part 47, outer end surface 47a, chamfered surface 47b, and contact surface 47c of lower grille 40.

[0060] More specifically, upper grille 60 is provided with joint wall part 67 in a wall shape formed hanging down from a front end of lower frame part 64. Joint wall part 67 extends in the left-right direction at the front end of lower frame part 64 to extend to an outer end of outer side frame part 62 and an outer end of inner side frame part 63. As illustrated in Figs. 5 and 6, joint wall part 67 includes: outer end surface 67a hanging down from outer ends of lower frame part 64, outer side frame part 62, and inner side frame part 63; chamfered surface 67b inclined backward of upper grille 60 downward from a lower end of outer end surface 67a; and contact surface 67c that is flat and extends backward of upper grille 60 from a lower end of chamfered surface 67b.

[0061] Contact surface 67c is formed parallel to contact surface 47c of lower grille 40.

[1-1-7. Configuration of second insertion rib]

[0062] As illustrated in Figs. 4 and 5, joint wall part 67 includes a rear surface (back side, inner surface) provided with insertion ribs 68, 69 protruding downward at a position corresponding to lower frame part 64. Insertion ribs 68, 69 are paired and formed on lower frame part 64 in the left-right direction.

[0063] As illustrated in Figs. 7 and 10, insertion rib (second insertion rib) 68 in front includes base part 68a formed on joint wall part 67 and extending along joint wall part 67, body 68b supported by base part 68a, and tapered part 68c formed at a left end (one longitudinal end) of body 68b. Tapered part 68c inclines inward in a longitudinal direction of body 68b from base part 68a toward a distal end of insertion rib 68.

[0064] As illustrated in Figs. 7 and 9, insertion rib

(second insertion rib) 69 in the middle includes base part 69a formed on joint wall part 67 and extending along joint wall part 67, body 69b supported by base part 69a, and tapered part 69c (see Figs. 5 and 6) formed at opposite longitudinal ends of body 69b. Tapered part 69c inclines inward in a longitudinal direction of body 69b from base part 69a toward a distal end of insertion rib 69 in the middle.

[0065] Here, insertion ribs 68, 69 are away from lower frame part 64. That is, base parts 68a, 69a are away from lower frame part 64. In other words, joint wall part 67 includes a back surface provided with grooves 68d, 69d (see Figs. 9 and 10) surrounded by joint wall part 67, base parts 68a, 69a and lower frame part 64.

[0066] As illustrated in Figs. 4 and 6, joint wall part 67 includes a right surface (back side, inner surface) provided with insertion rib (second insertion rib) 70 on the side, protruding downward at a position corresponding to outer side frame part 62. Insertion rib 70 on the side is formed at a rear end part of outer side frame part 62. Insertion rib 70 on the side extends in the front-rear direction. Insertion rib 70 on the side is provided at its front end (the other longitudinal end) with tapered part 70c (see Fig. 6). Tapered part 69c inclines inward in the front-rear direction toward a distal end of insertion rib 69.

[1-1-7. Configuration of first and second insertion ribs]

[0067] Fig. 11 is a perspective view illustrating the vicinity of seam 34b of outer side frame parts 42, 62 of air blowing chamber grille 34 according to the first exemplary embodiment from behind air blowing chamber grille 34. Fig. 12 is a side view illustrating the vicinity of seam 34b of outer side frame parts 42, 62 of air blowing chamber grille 34 according to the first exemplary embodiment from behind air blowing chamber grille 34. Fig. 13 is a sectional view taken along line XIII-XIII in Fig. 12. Fig. 14 is a sectional view taken along line XIV-XIV in Fig. 12.

[0068] Joint wall part 47 of lower grille 40 and joint wall part 67 of upper grille 60 are joined together to form air blowing chamber grille 34. Thus, air blowing chamber grille 34 includes outer surface 34a (see Figs. 8, 9, and 12 to 14) formed by outer surface 40a of lower grille 40 and outer surface 60a of upper grille 60. Air blowing chamber grille 34 includes seam 34b formed as a boundary between joint wall part 47 of lower grille 40 and joint wall part 67 of upper grille 60.

[0069] At seam 34b, contact surface 47c of joint wall part 47 of lower grille 40 is in contact with contact surface 67c of joint wall part 67 of upper grille 60.

[0070] Behind seam 34b, insertion ribs 48, 49 of lower grille 40 are held in contact with a back side of joint wall part 67 of upper grille 60, and insertion ribs 68, 69, 70 of upper grille 60 are held in contact with a back side of joint wall part 47 of lower grille 40.

[0071] In the present exemplary embodiment, insertion ribs 48, 49 of lower grille 40 and insertion ribs 68, 69, 70 of upper grille 60 are provided away from each other

when lower grille 40 and upper grille 60 are joined to each other. That is, insertion ribs 48, 49 of lower grille 40 and insertion ribs 68, 69, 70 of upper grille 60 are provided with gap S0 (see Figs. 10 and 12) therebetween when joined to each other. This configuration facilitates suppressing interference between insertion ribs 48, 49 of lower grille 40 and insertion ribs 68, 69, 70 of upper grille 60 when lower grille 40 and upper grille 60 are joined to each other.

[1-1-7. Configuration of machine chamber grille]

[0072] Decorative grille (machine chamber grille) 35 in the present exemplary embodiment includes lower grille 80 and upper grille 100. Lower grille 80 and upper grille 100 each have a substantially rectangular shape in appearance when viewed from the front. Lower grille 80 and upper grille 100 are substantially equal in size to each other. Lower grille 80 and upper grille 100 are respectively equivalent in vertical size to lower grille 40 and upper grille 60 of air blowing chamber grille 34.

[0073] As illustrated in Fig. 2, lower grille 80 includes outer side frame part 82 and inner side frame part (not illustrated) that extend in the vertical direction. Outer side frame part 82 is provided with fastening part 82a fixed to front side surface panel 13. The inner side frame part (not illustrated) is provided with a fitting part (not illustrated) that engages with engaging recess 43a of air blowing chamber grille 34.

[0074] Upper grille 100 includes outer side frame part 102 and inner side frame part (not illustrated) that extend in the vertical direction. Outer side frame part 102 is provided with fastening part 102a fixed to front side surface panel 13. The inner side frame part (not illustrated) is provided with a fitting part (not illustrated) that engages with engaging recess 63a of air blowing chamber grille 34.

[1-1-8. Attachment configuration of air blowing chamber grille and decorative grille]

[0075] Next, an example of a method for attaching air blowing chamber grille 34 and decorative grille 35 to housing 10 of outdoor unit 1 will be described.

[0076] In the present exemplary embodiment, air blowing chamber grille 34 is first attached to housing 10 between air blowing chamber grille 34 and decorative grille 35.

[0077] Lower grille 40 of air blowing chamber grille 34 is first attached. Lower grille 40 with joint wall part 47 facing upward is installed covering opening 14a on the lower side of front surface panel 14. Into fastening part 46 of lower grille 40, a fastening member (not illustrated) is inserted from the front. The fastening member is fastened to fixing part 14c on the lower side of front surface panel 14. The fastening member is a screw, for example. As a result, lower grille 40 is attached to housing 10.

[0078] After lower grille 40 is attached to housing 10,

upper grille 60 of air blowing chamber grille 34 is attached to housing 10. That is, upper grille 60 with joint wall part 67 facing downward is installed covering opening 14b on an upper side of front surface panel 14.

[0079] At this time, upper grille 60 is positioned to insert insertion ribs 48, 49 of lower grille 40 into corresponding gaps among insertion ribs 68, 69, 70 on a front surface of front surface panel 14. Then, upper grille 60 is moved toward lower grille 40 along the front surface of front surface panel 14. As a result, insertion ribs 48, 49 of lower grille 40 are inserted into the corresponding gaps among insertion ribs 68, 69, 70 of upper grille 60, and insertion ribs 48, 49 of lower grille 40 then come into contact with the back side of joint wall part 67 of upper grille 60. Insertion ribs 68, 69, 70 of upper grille 60 are inserted into positions where insertion ribs 48, 49 of lower grille 40 are not formed, and insertion ribs 68, 69, 70 of upper grille 60 then come into contact with the back side of joint wall part 47 of lower grille 40.

[0080] Thus, lower grille 40 and upper grille 60 are joined to each other with positional deviation suppressed. At this time, contact surface 47c of joint wall part 47 of lower grille 40 is in contact with contact surface 67c of joint wall part 67 of upper grille 60. Outer end surface 47a of joint wall part 47 of lower grille 40 and outer end surface 67a of joint wall part 67 of upper grille 60 form a part of outer surface 34a having an integral shape.

[0081] When upper grille 60 is joined to lower grille 40, a fastening member (not illustrated) is inserted into fastening part 66 of upper grille 60 from the front. The fastening member is fastened to fixing part 14d on the upper side of front surface panel 14. As a result, upper grille 60 is also attached to housing 10.

[0082] That is, air blowing chamber grille 34 including lower grille 40 and upper grille 60 is attached to housing 10.

[0083] After air blowing chamber grille 34 is attached to housing 10, decorative grille 35 is attached to housing 10. Lower grille 80 of decorative grille 35 is first attached. Lower grille 80 is disposed on a lower right part of a front surface of housing 10. Lower grille 80 is moved on front side surface panel 13 toward inner side frame part 43 of lower grille 40 of air blowing chamber grille 34 to fit a fitting part (not illustrated) into engaging recess 43a. As a result, lower grille 80 is positioned. Then, lower grille 80 is fastened to fastening part 13a of front side surface panel 13 with the fastening member inserted into fastening part 82a of outer side frame part 82 from the outside in the left-right direction. As a result, lower grille 80 of decorative grille 35 is attached to housing 10.

[0084] After lower grille 80 is attached to housing 10, upper grille 100 of decorative grille 35 is attached to housing 10. That is, upper grille 100 is disposed on an upper right part of the front surface of housing 10. Upper grille 100 is moved on front side surface panel 13 toward inner side frame part 63 of upper grille 60 of air blowing chamber grille 34 to fit a fitting part (not illustrated) into engaging recess 63a. As a result, upper grille 100 is

positioned. Then, upper grille 100 is fastened to fastening part 13b of front side surface panel 13 with the fastening member inserted into fastening part 102a of outer side frame part 102 from the outside in the left-right direction. As a result, upper grille 100 of decorative grille 35 is attached to housing 10.

[0085] That is, decorative grille 35 including lower grille 80 and upper grille 100 is attached to housing 10.

[0086] As described above, air blowing chamber grille 34 and decorative grille 35 are attached to housing 10 of outdoor unit 1.

[1-2. Operation]

[0087] Operation of outdoor unit 1 of heat pump device HP configured as described above will be described below.

[0088] When outdoor unit 1 of heat pump device HP is operated, compressor 21 is driven to circulate a refrigerant in refrigerant circuit 20, and air blowers 31, 32 are driven to allow a wind to pass through air heat exchanger 25 to exchange heat. At this time, the wind passing through air heat exchanger 25 is blown into and out of housing 10 through air blowing chamber grille 34 and openings 14a, 14b.

[0089] In the present exemplary embodiment, air blowing chamber grille 34 is installed on the front surface of housing 10 by joining lower grille 40 and upper grille 60 to each other. Lower grille 40 and upper grille 60 are fitted to each other using insertion ribs 48, 49, 68, 69, 70, so that joint wall part 47 of lower grille 40 and joint wall part 67 of upper grille 60 easily come into contact with each other while being less likely to have a gap generated between contact surface 47c and contact surface 67c. In particular, insertion ribs 48, 49, 68, 69, 70 extend in the front-rear direction and the left-right direction. As a result, insertion ribs 48, 49, 68, 69, 70 easily come into contact with lower grille 40 and upper grille 60 from a plurality of different directions, so that positional deviation in the plurality of directions is easily suppressed. Thus, a gap is less likely to be generated in seam 34b, so that air blowing chamber grille 34 easily gives an impression of an integrated appearance shape as compared with a seam causing a joint failure such as a gap or a step, and thus facilitating improvement in design of outdoor unit 1.

[0090] In particular, when grilles are identical in function, such as lower grille 40 and upper grille 60 that allow ventilation and constitute air blowing chamber grille 34 as in the present exemplary embodiment, the grilles having an appearance of an integrated shape is desirable from the viewpoint of improvement in design. The present exemplary embodiment is expected to give an impression of further improvement in design because lower grille 40 and upper grille 60 are joined to each other using insertion ribs 48, 49, 68, 69, 70.

[0091] Insertion ribs 48, 49, 68, 69, 70 are also provided with tapered parts 48c, 49c, 68c, 69c, 70c, respectively. This configuration facilitates positioning of each of

insertion ribs 48, 49, 68, 69, 70 because even when lower grille 40 and upper grille 60 come into contact with an insertion rib adjacent to any one of corresponding insertion ribs 48, 49, 68, 69, 70, or the like, during insertion, the insertion ribs are likely to be inserted while a positional relationship between lower grille 40 and upper grille 60 is adjusted.

[0092] Additionally, insertion ribs 48, 49, 68, 69, 70 are formed causing gap S0 therebetween. This configuration facilitates joining between lower grille 40 and upper grille 60 even when lower grille 40 and upper grille 60 are varied in shape during manufacturing, because gap S0 absorbs the variations.

[1-3. Effects, etc.]

[0093] As described above, outdoor unit 1 in the present exemplary embodiment includes: refrigerant circuit 20 including compressor 21 and air heat exchanger 25; air blowers 31, 32 each of which generates a wind passing through air heat exchanger 25; housing 10 that houses refrigerant circuit 20 and air blowers 31, 32; and lower grille 40 and upper grille 60 that are configured to cover housing 10. Lower grille 40 and upper grille 60 are disposed by being joined to each other to form outer surface 34a having an integrated grille appearance shape. Lower grille 40 includes a back side including insertion ribs 48, 49 protruding toward upper grille 60 to be in contact with a back side of upper grille 60. Upper grille 60 includes the back side including insertion ribs 68, 69, 70 protruding toward lower grille 40 to be in contact with the back side of lower grille 40. Insertion ribs 48, 49 and insertion ribs 68, 69, 70 are alternately formed along seam 34b between lower grille 40 and upper grille 60.

[0094] This configuration enables joint accuracy of lower grille 40 and upper grille 60, which are separated, to be easily ensured without depending on shape accuracy of lower grille 40 and upper grille 60. Thus, outdoor unit 1 excellent in design in which seam 34b of grilles is less noticeable can be provided.

[0095] As in the present exemplary embodiment, outdoor unit 1 may include: housing 10 provided with machine chamber 17 in which compressor 21 is disposed and air blowing chamber 18 in which air blowers 31, 32 are disposed; decorative grille 35 supported by housing 10 in front of machine chamber 17; and air blowing chamber grille 34 disposed in parallel with decorative grille 35 and supported by housing 10 in front of air blowing chamber 18. Air blowing chamber grille 34 may include lower grille 40 and upper grille 60. Lower grille 40 and upper grille 60 may be configured to allow ventilation.

[0096] This configuration enables design of the outer surface shape of air blowing chamber grille 34 to be easily ensured to enable design of outdoor unit 1 to be easily ensured even in a configuration in which lower grille 40 and upper grille 60 allow ventilation and are likely to be reduced in rigidity.

[0097] As in the present exemplary embodiment, outdoor unit 1 may include lower air blower 31 disposed in air blowing chamber 18, upper air blower 32 disposed above lower air blower 31, lower grille 40 disposed in front of lower air blower 31, and upper grille 60 disposed in front of upper air blower 32.

[0098] This configuration enables design of outdoor unit 1 to be ensured while ensuring easy attachment work to housing 10 by attaching air blowing chamber grille 34 while dividing it even when two or more air blowers 31, 32 are disposed in the vertical direction to increase height of housing 10.

[0099] As in the present exemplary embodiment, at least any one of ends of each of first insertion ribs 48, 49 and second insertion ribs 68, 69, 70 in a direction along seam 34b may be provided with corresponding one of tapered parts 48c, 49c, 68c, 69c, 70c.

[0100] This configuration enables tapered parts 48c, 49c, 68c, 69c, 70c to guide corresponding first insertion ribs 48, 49 and second insertion ribs 68, 69, 70, so that first insertion ribs 48, 49 and second insertion ribs 68, 69, 70 can be easily inserted.

[0101] As in the present exemplary embodiment, predetermined gap S0 may be formed between insertion ribs 48, 49 and corresponding insertion ribs 68, 69, 70 in the direction along seam 34b.

[0102] This configuration enables insertion ribs 48, 49 and corresponding insertion ribs 68, 69, 70 to be inserted into each other while allowing predetermined gap S0 to absorb manufacturing variations of the insertion ribs, so that a connection failure due to shape collision, such as a step on outer surface 40a of seam 34b between lower grille 40 and upper grille 60, can be suppressed.

[0103] As in the present exemplary embodiment, the back side of lower grille 40 may be provided with groove 48d formed close to a base end of insertion rib 48 in front, and the back side of upper grille 60 may be provided with grooves 68d, 69d formed close to a base end of insertion rib 68 in front and a base end of insertion rib 69 in the middle, respectively.

[0104] This configuration enables lower grille 40 and upper grille 60 to be easily prevented from causing appearance defects by suppressing an occurrence of sink marks and the like due to accumulation of material during resin molding.

[0105] As described above, heat pump device HP includes outdoor unit 1 described above in the present exemplary embodiment.

[0106] This configuration enables providing heat pump device HP including outdoor unit 1 excellent in design in which seam 34b of grilles is less noticeable.

(Other exemplary embodiments)

[0107] As described above, the first exemplary embodiment has been described as an example of techniques in the present disclosure. However, the techniques of the present disclosure are not limited to the first exemplary

embodiment, and may also be applied to exemplary embodiments in which change, substitution, addition, omission, and the like are made. Additionally, an additional exemplary embodiment can be made by combining each component described in the first exemplary embodiment.

[0108] Thus, other exemplary embodiments will be exemplified below.

[0109] Although the first exemplary embodiment shows an example of a configuration of a divided structure of two grilles in which air blowing chamber grille 34 is divided into lower grille 40 and upper grille 60, the present disclosure is not limited to this configuration. For example, air blowing chamber grille 34 may have a divided structure of three or more grilles by providing a third grille. Thus, air blowing chamber grille 34 may be configured such that an upper grille, an intermediate grille, and a lower grille are joined together, for example. That is, air blowing chamber grille 34 may be configured such that grilles in any integer number of two or more are joined together. In this case, the integer number above of air blowers and openings of each of the air blowers may be provided.

[0110] Although the first exemplary embodiment shows an example of a configuration in which air blowing chamber grille 34 includes lower grille and upper grille, and lower grille 40 and upper grille 60 are joined to each other in the vertical direction, the present disclosure is not limited this configuration. For example, the configuration of the insertion ribs of the first exemplary embodiment may be applied to a part where grilles are joined to each other in a configuration in which the grilles are joined to each other in the left-right direction.

[0111] Although the first exemplary embodiment describes the configuration in which lower grille 40 includes two insertion ribs 48, 49, and upper grille 60 includes three insertion ribs 68, 69, 70, the number of insertion ribs 48, 49, 68, 69, 70 is not limited to the number of the configuration described above. Thus, lower grille 40 may include three insertion ribs, and upper grille 60 may include two insertion ribs, for example. Alternatively, lower grille 40 may include two or more insertion ribs, and upper grille 60 may include two or more insertion ribs. That is, the number of the insertion ribs of each of lower grille 40 and upper grille 60 may be any number of one or more as long as the insertion ribs of lower grille 40 and upper grille 60 are formed alternately along the extending direction of seam 34b.

[0112] The first exemplary embodiment exemplifies the configuration in which heat pump device HP is a heat pump water heater, and describes the configuration in which water heat exchanger 23 as a utilization-side heat exchanger is installed in outdoor unit 1. That is, the configuration is exemplified in which heat pump device HP includes outdoor unit 1 and the hot water storage machine, and the configuration is described in which water heat exchanger 23 connected to the hot water storage machine with water supply pipe 27 is installed

in outdoor unit 1. However, the configuration of the heat pump device and the outdoor unit is not limited to the configuration of the first exemplary embodiment. For example, the heat pump device may be an air conditioning device. The outdoor unit may be an outdoor unit of the air conditioning device. Thus, although the configuration of outdoor unit 1 of the present exemplary embodiment is described in which water heat exchanger 23 as the utilization-side heat exchanger and air heat exchanger 25 as the heat source-side heat exchanger are installed, the outdoor unit only needs to be installed with the heat source-side heat exchanger, and thus may be installed without the utilization-side heat exchanger.

[0113] The exemplary embodiment described above is to exemplify the techniques in the present disclosure, and thus, various modifications, replacements, additions, omissions, and the like can be made in the scope of claims or in an equivalent scope of the claims.

(Note)

[0114] The above description of the exemplary embodiment discloses the following techniques.

[0115] (Technique 1) An outdoor unit of technique 1 includes: a refrigerant circuit including a compressor and a heat source-side heat exchanger; an air blower that generates a wind passing through the heat source-side heat exchanger; a housing that houses the refrigerant circuit and the air blower; and a first grille and a second grille each covering the housing. The first grille and the second grille are disposed by being joined to each other to form an integrated grille appearance shape. The first grille includes a back side including a first insertion rib protruding toward the second grille to be in contact with a back side of the second grille. The second grille includes the back side including a second insertion rib protruding toward the first grille to be in contact with the back side of the first grille. The first insertion rib and the second insertion rib are alternately formed along a seam between the first grille and the second grille.

[0116] This configuration enables joint accuracy of the first grille and the second grille, which are separated, to be easily ensured without depending on shape accuracy of the first grille and the second grille. Thus, the outdoor unit excellent in design in which the seam of the grilles is less noticeable can be provided.

[0117] (Technique 2) An outdoor unit of technique 2 in the outdoor unit of technique 1 includes: the housing provided with a machine chamber in which the compressor is disposed and an air blowing chamber in which the air blower is disposed; a machine chamber grille supported by the housing in front of the machine chamber; and an air blowing chamber grille disposed in parallel with the machine chamber grille and supported by the housing in front of the air blowing chamber. The air blowing chamber grille includes the first grille and the second grille. The first grille and the second grille are configured to allow ventilation.

[0118] This configuration enables design of the outer surface shape of the air blowing chamber grille to be easily ensured to enable design of the outdoor unit to be easily ensured even in a configuration in which the first grille and the second grille allow ventilation and are likely to be reduced in rigidity.

[0119] (Technique 3) An outdoor unit of technique 3 in the outdoor unit of technique 2 is configured such that the air blower includes a first air blower and a second air blower, the first air blower is disposed in the air blowing chamber, the second air blower is disposed above the first air blower, the first grille is disposed in front of the first air blower, and the second grille is disposed in front of the second air blower.

[0120] This configuration enables design of the outdoor unit to be ensured while ensuring easy attachment work to the housing by attaching the air blowing chamber grille while dividing it even when two or more air blowers are disposed in the vertical direction to increase height of the housing.

[0121] (Technique 4) An outdoor unit of technique 4 in the outdoor unit of any one of techniques 1 to 3 is configured such that at least any one of ends of each of the first insertion rib and the second insertion rib in a direction along the seam is provided with a tapered part.

[0122] This configuration enables the tapered part to guide the insertion ribs, so that the insertion rib can be easily inserted.

[0123] (Technique 5) An outdoor unit of technique 5 in the outdoor unit of any one of techniques 1 to 4 is configured such that a predetermined gap is formed between the first insertion rib and the second insertion rib in the direction along the seam.

[0124] This configuration enables the first insertion rib and the second insertion rib to be inserted into each other while allowing the predetermined gap to absorb manufacturing variations of the insertion ribs, so that a connection failure due to shape collision, such as a step on outer surface of the seam between the first grille and the second grille, can be suppressed.

[0125] (Technique 6) An outdoor unit of technique 6 in the outdoor unit of any one of techniques 1 to 5 is configured such that the back side of the first grille is provided with a groove formed close to a base end of the first insertion rib, and the back side of the second grille is provided with a groove formed close to a base end of the second insertion rib.

[0126] This configuration enables the first grille and the second grille to be easily prevented from causing appearance defects by suppressing an occurrence of sink marks and the like due to accumulation of material during resin molding.

[0127] (Technique 7) A heat pump device of technique 7 includes the outdoor unit according to any one of techniques 1 to 6.

[0128] This configuration enables providing the heat pump device including the outdoor unit excellent in design in which the seam of grilles is less noticeable.

[0129] The present disclosure is useful for various devices including an outdoor unit, and is particularly useful for a heat pump water heater, a heat pump hot water heater, and a heat pump air conditioning device, for example.

Claims

1. An outdoor unit comprising:

a refrigerant circuit including a compressor and a heat source-side heat exchanger;
an air blower that generates a wind passing through the heat source-side heat exchanger;
a housing that houses the refrigerant circuit and the air blower; and
a first grille and a second grille each covering the housing,
the first grille and the second grille being disposed by being joined to each other to form an integrated grille appearance shape,
the first grille including a back side including a first insertion rib protruding toward the second grille to be in contact with a back side of the second grille,
the second grille including the back side including a second insertion rib protruding toward the first grille to be in contact with the back side of the first grille, and
the first insertion rib and the second insertion rib being alternately formed along a seam between the first grille and the second grille.

2. The outdoor unit according to Claim 1, further comprising:

a machine chamber in which the compressor is disposed and an air blowing chamber in which the air blower is disposed, the machine chamber and the air blowing chamber being provided in the housing;
a machine chamber grille supported by the housing in front of the machine chamber; and
an air blowing chamber grille disposed in parallel with the machine chamber grille and supported by the housing in front of the air blowing chamber,
the air blowing chamber grille including the first grille and the second grille, and
the first grille and the second grille being configured to allow ventilation.

3. The outdoor unit according to Claim 2, wherein

the air blower includes a first air blower and a second air blower,
the first air blower is disposed in the air blowing

chamber,
the second air blower is disposed above the first
air blower,
the first grille is disposed in front of the first air
blower, and
the second grille is disposed in front of the
second air blower.

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4. The outdoor unit according to any one of Claims 1 to 3, wherein at least any one of ends of each of the first insertion rib and the second insertion rib in a direction along the seam includes a tapered part. 10

5. The outdoor unit according to any one of Claims 1 to 3, wherein between the first insertion rib and the second insertion rib, a predetermined gap is formed in the direction along the seam. 15

6. The outdoor unit according to any one of Claims 1 to 3, wherein 20

the back side of the first grille includes a groove formed close to a base end of the first insertion rib, and

the back side of the second grille includes a groove formed close to a base end of the second insertion rib. 25

7. A heat pump device comprising the outdoor unit according to any one of Claims 1 to 3. 30

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FIG. 1

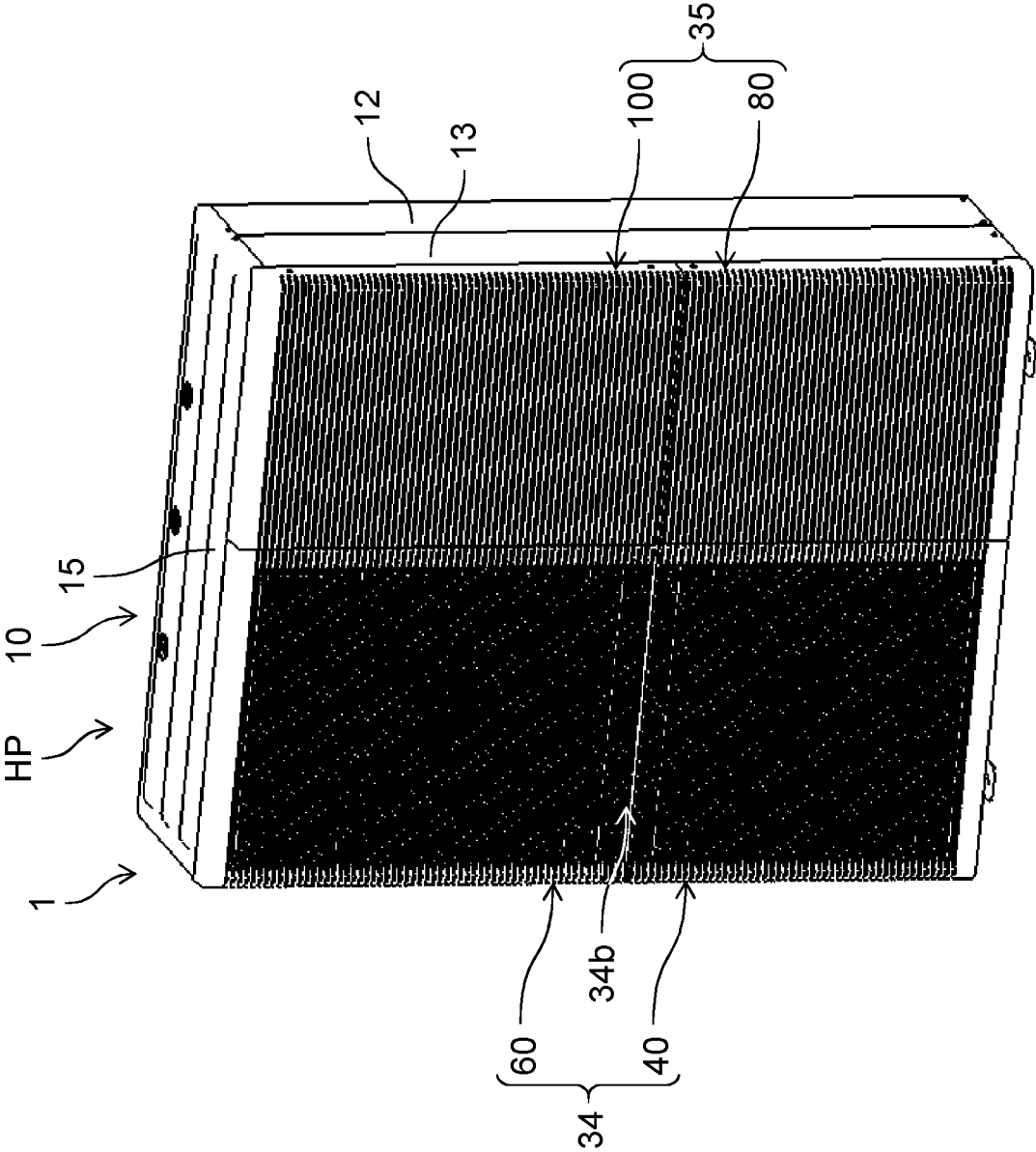


FIG. 2

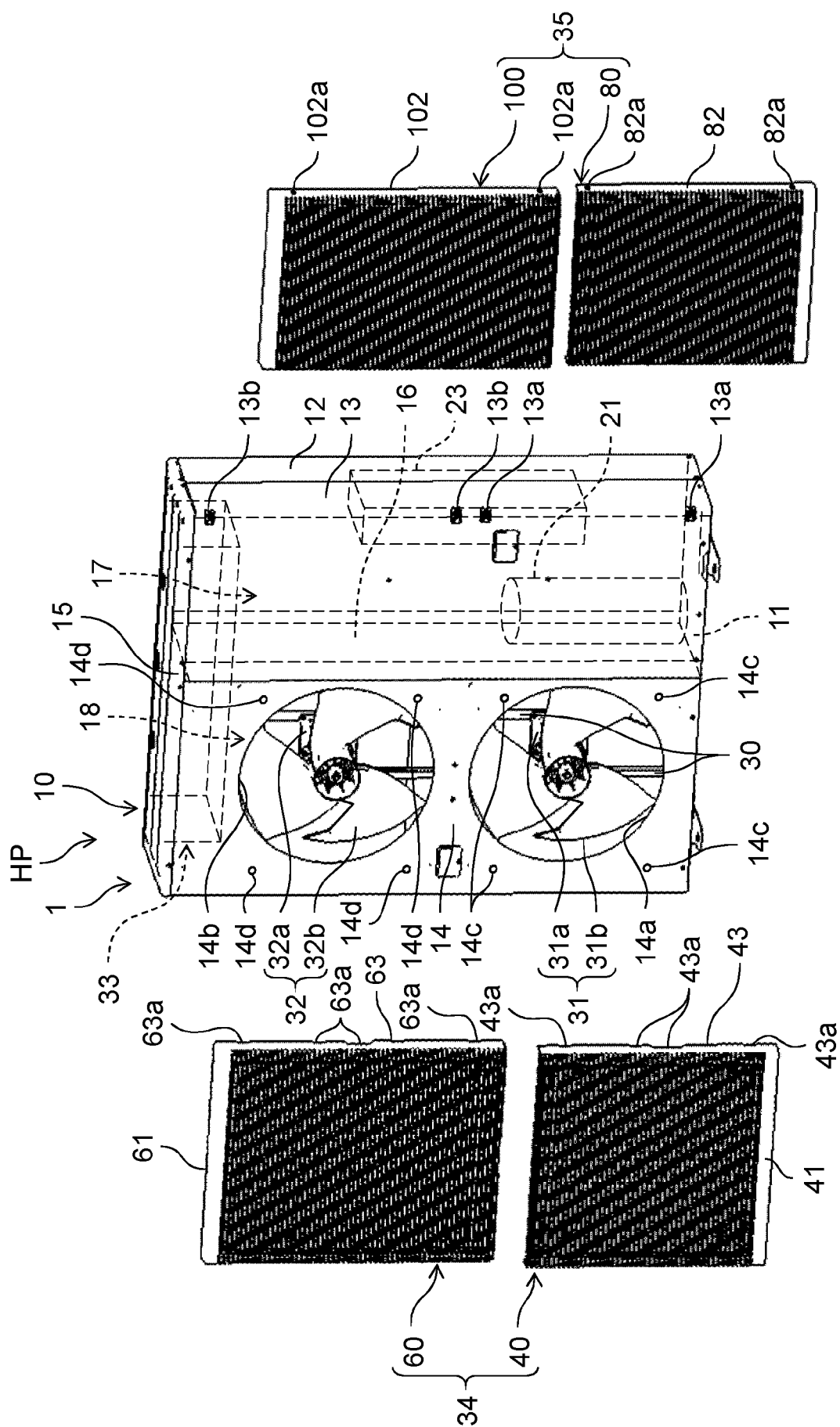


FIG. 3

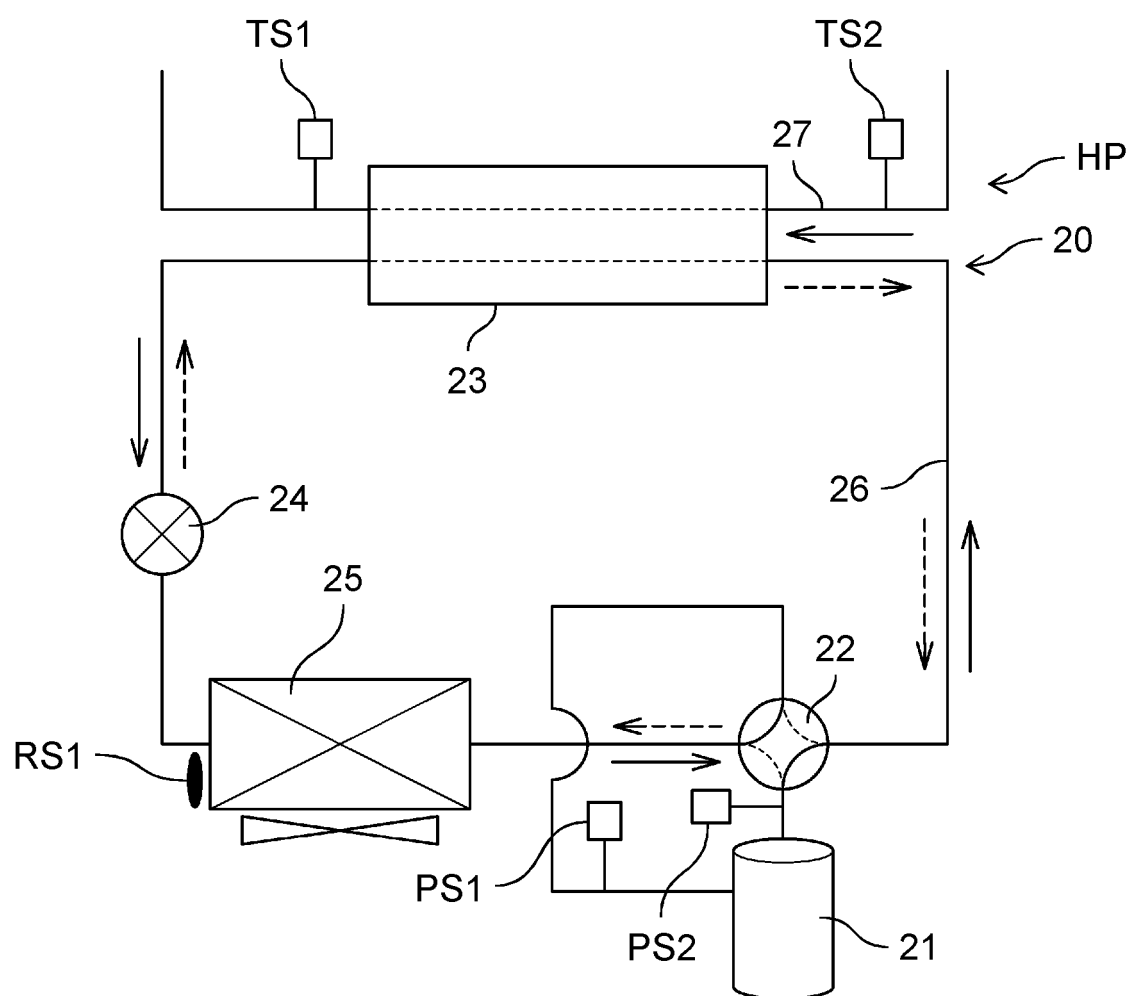


FIG. 4

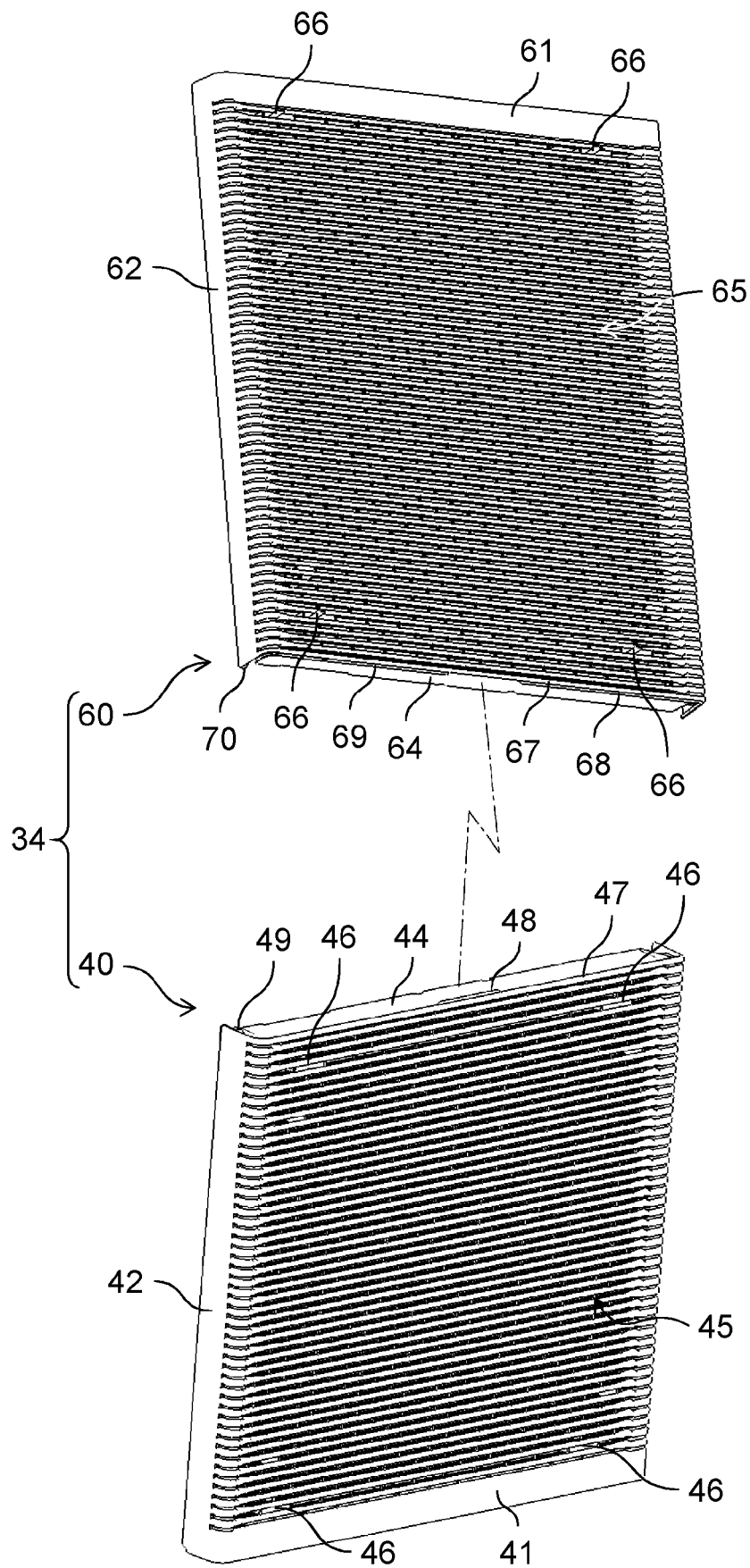


FIG. 5

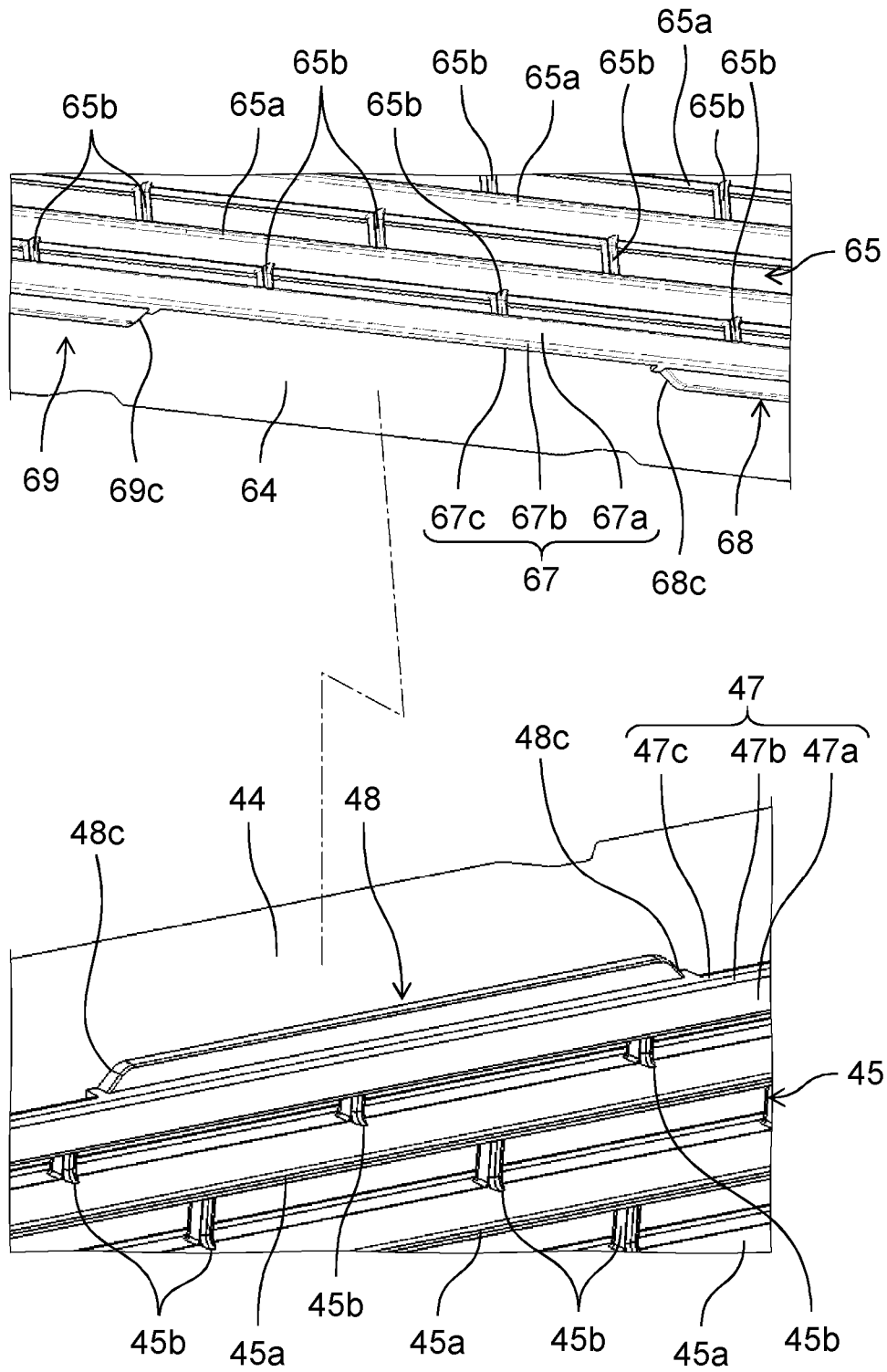


FIG. 6

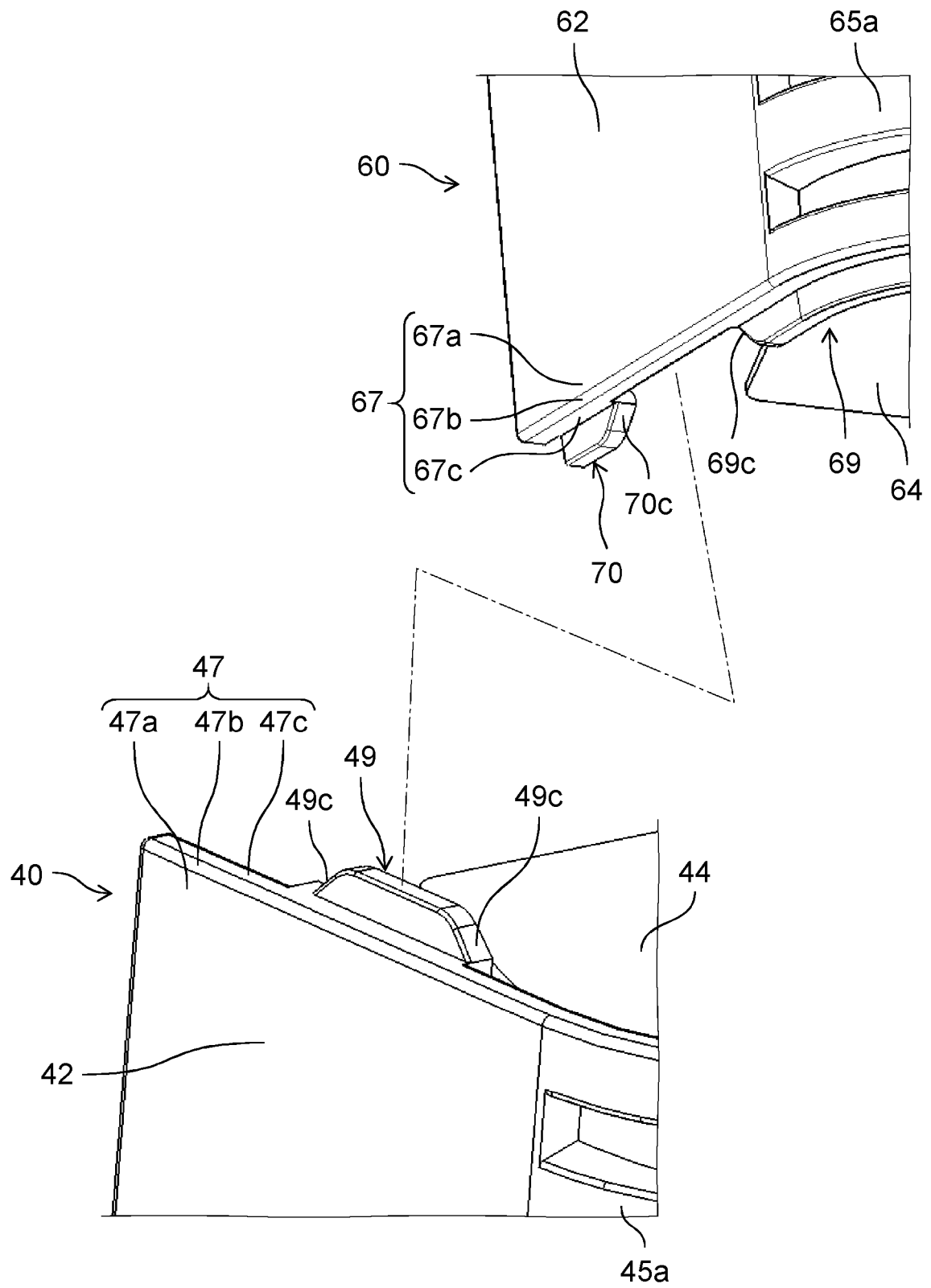


FIG. 7

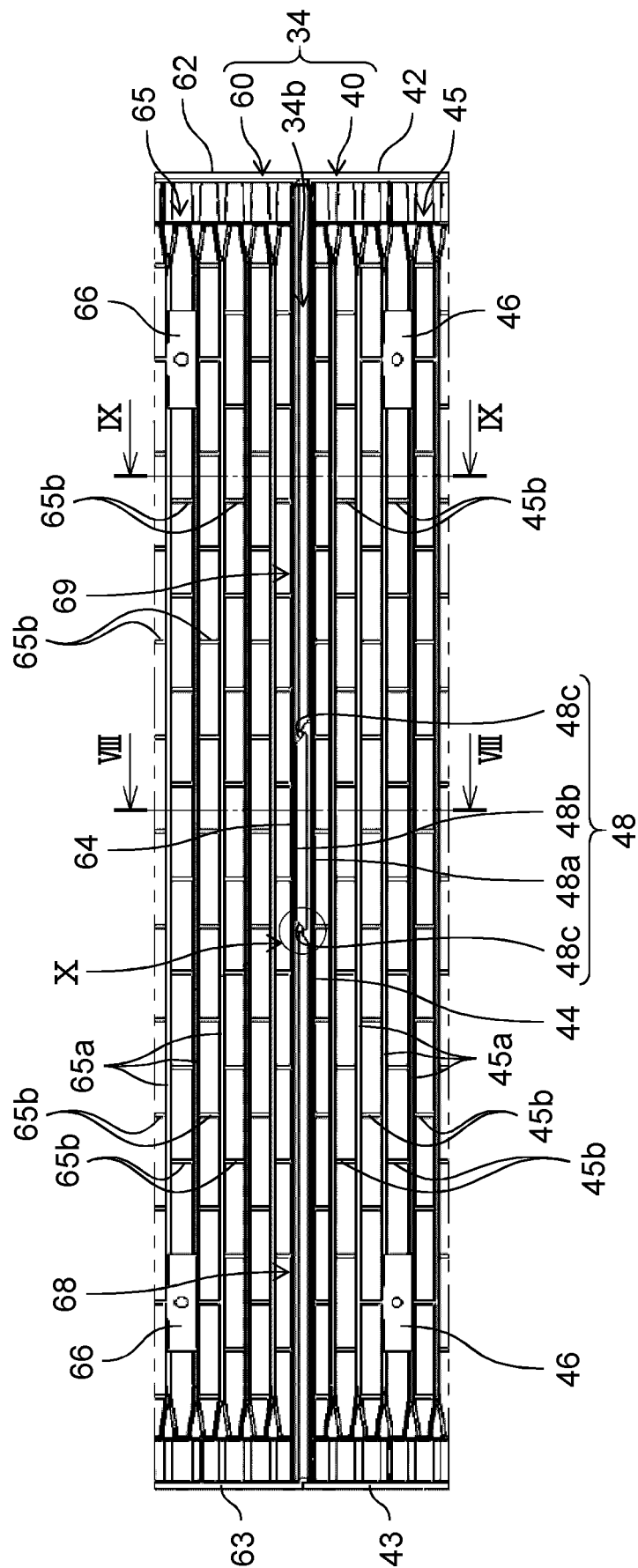


FIG. 8

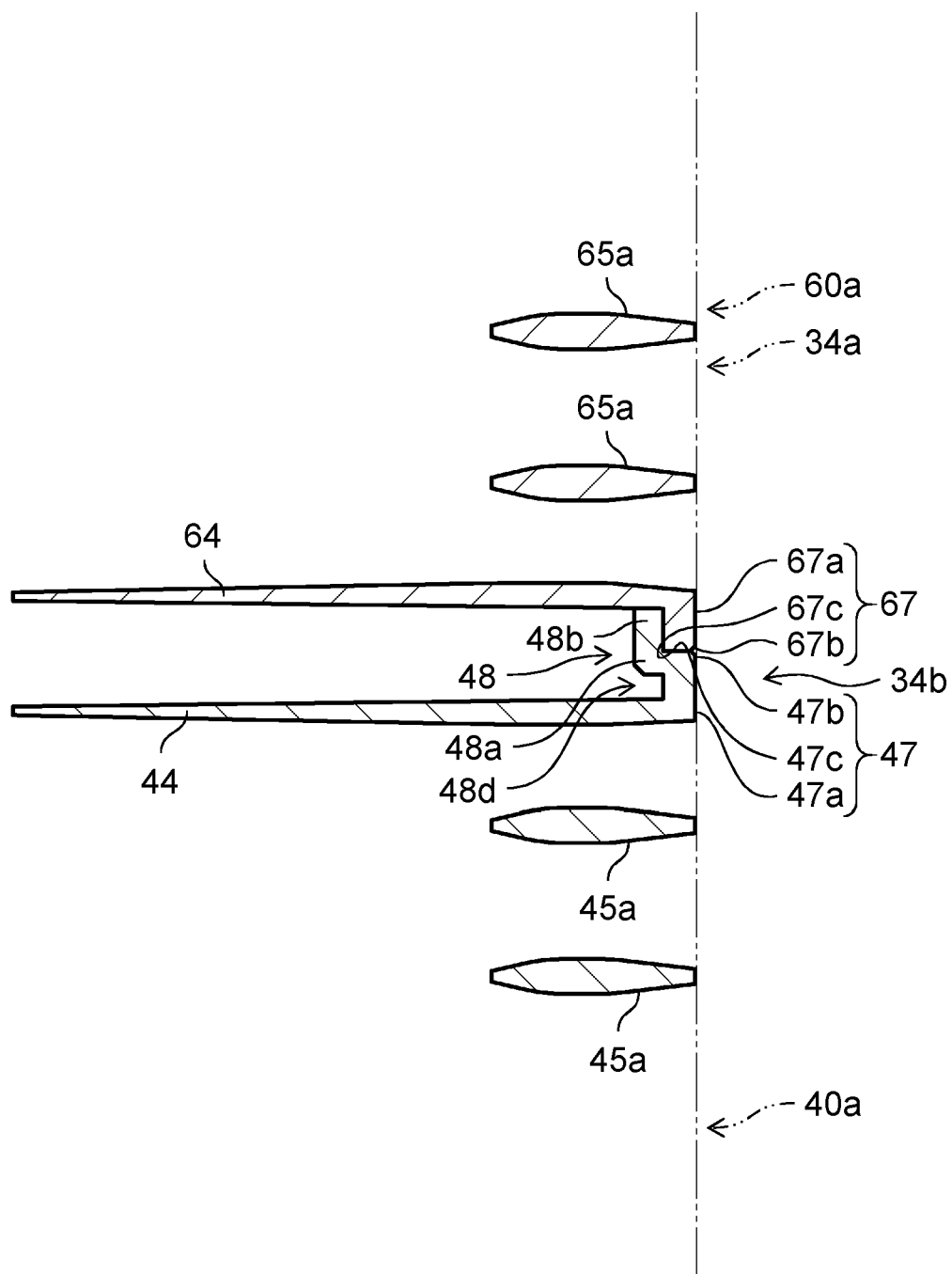


FIG. 9

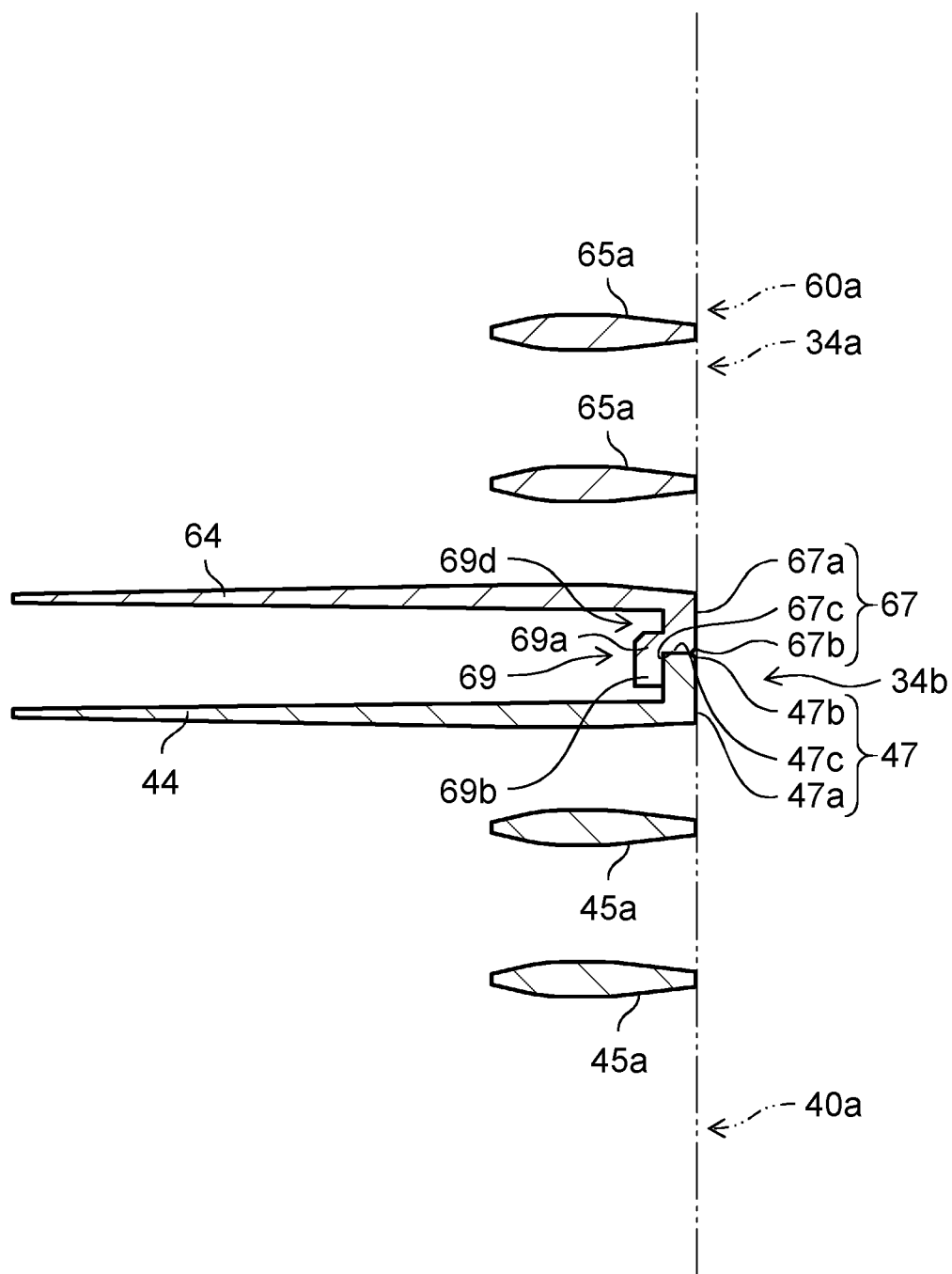


FIG. 10

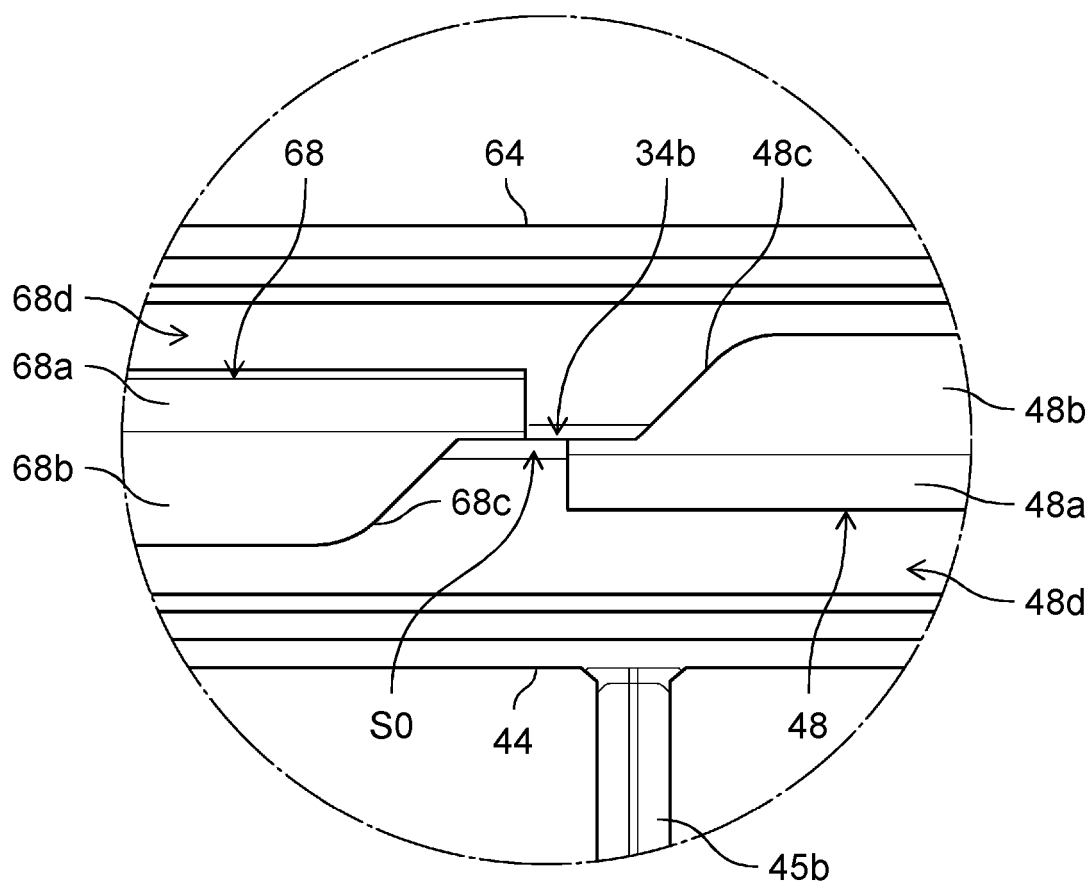


FIG. 11

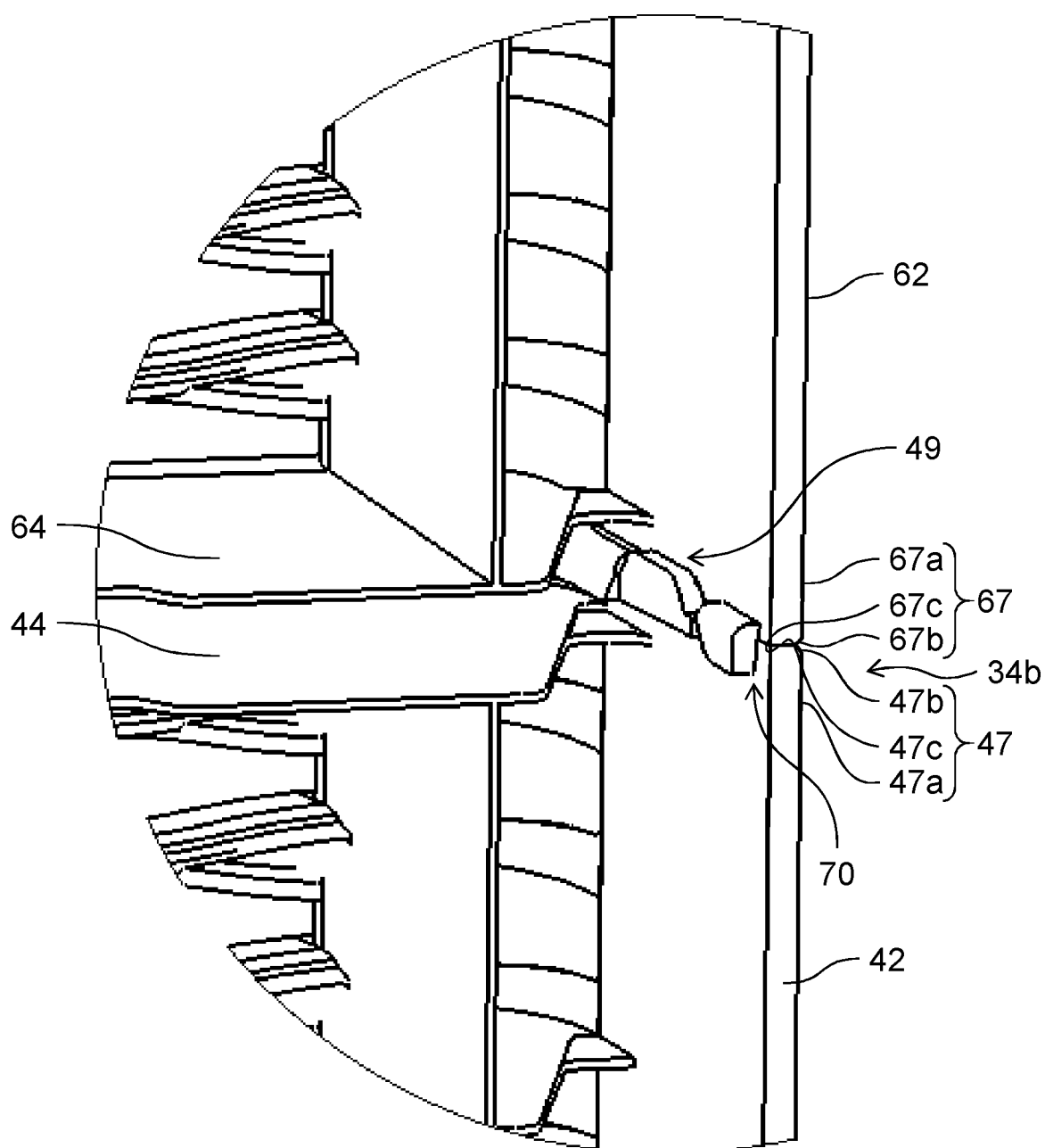


FIG. 12

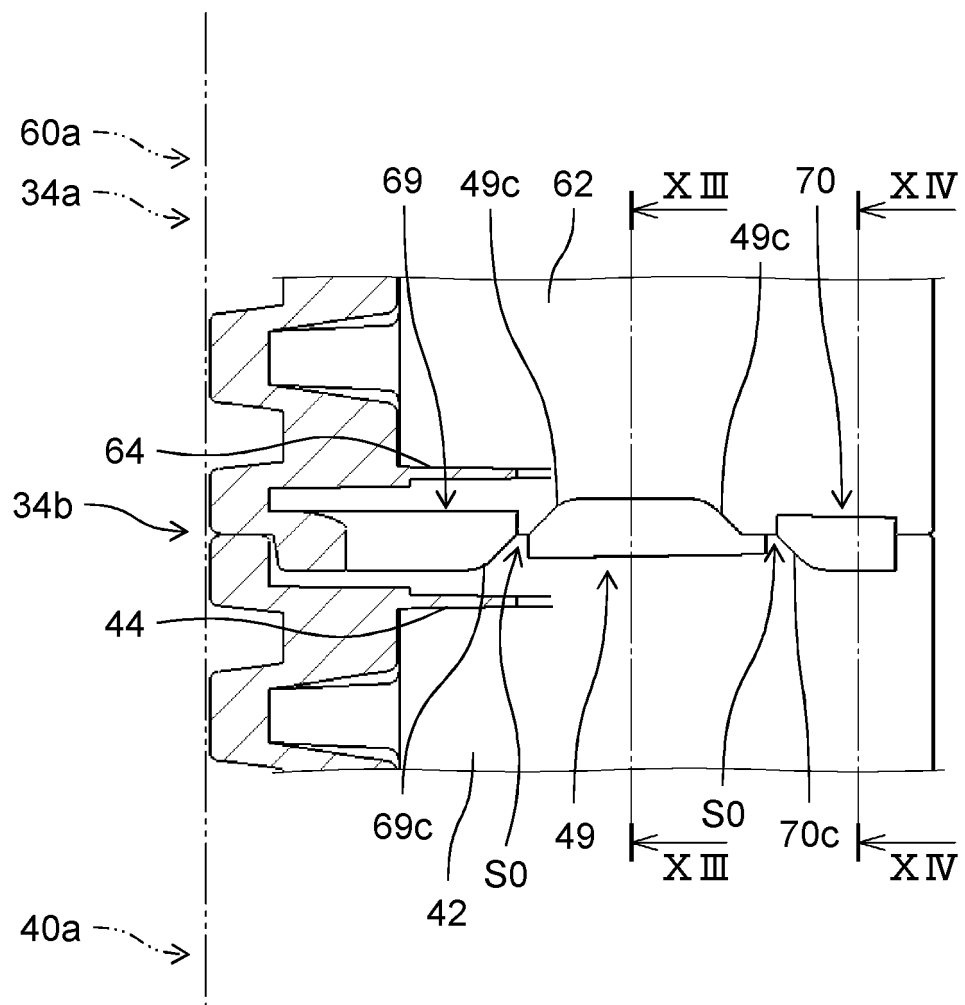


FIG. 13

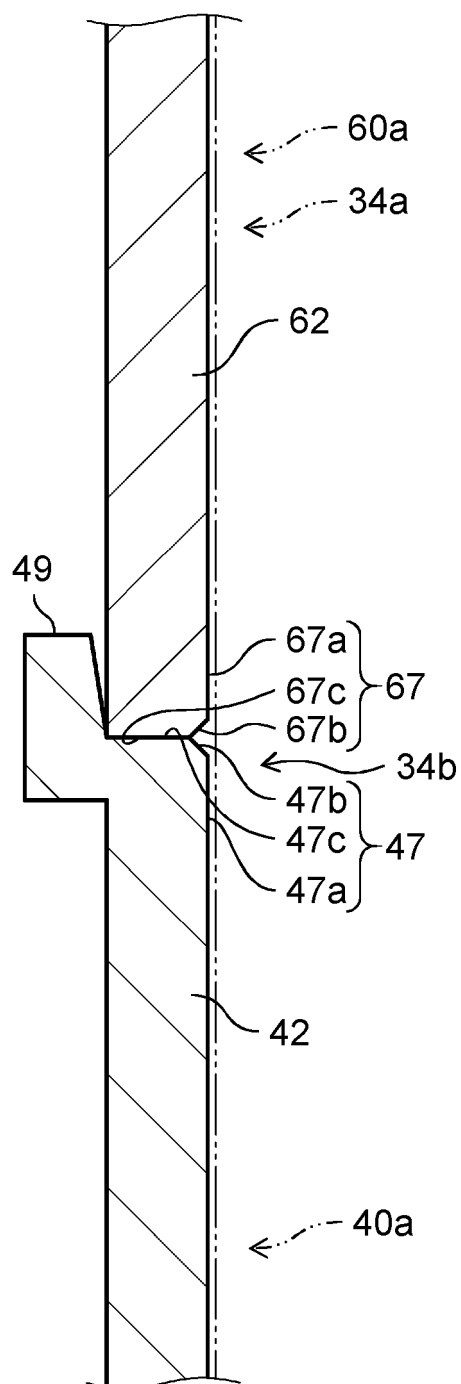
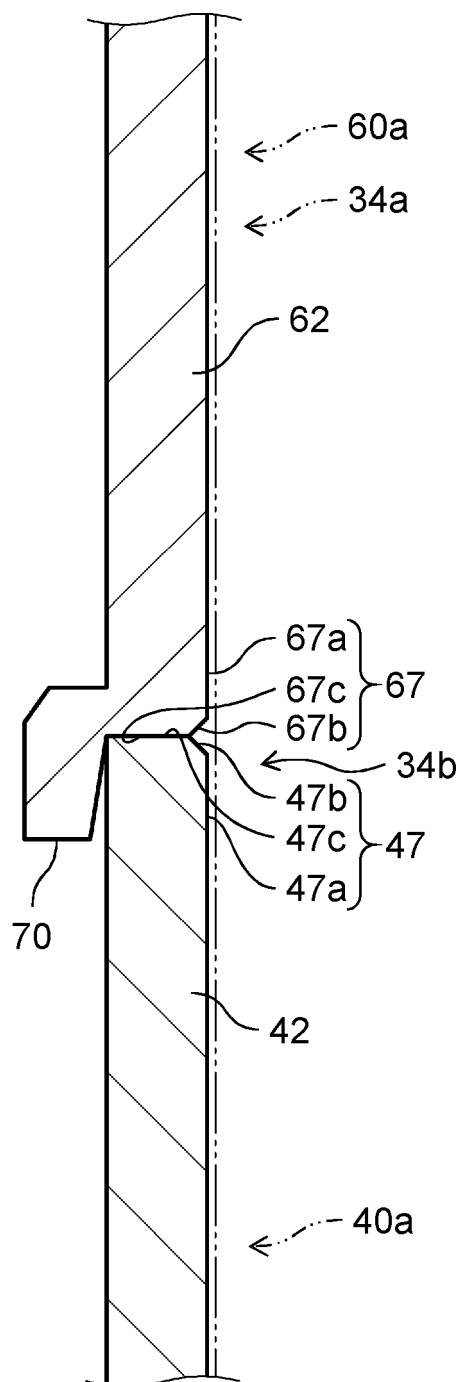


FIG. 14





EUROPEAN SEARCH REPORT

Application Number

EP 24 21 1050

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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Y	* the whole document *	3,6	F24F1/54
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			F24F13/08
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Y	* the whole document *	3,6	

			TECHNICAL FIELDS SEARCHED (IPC)
			F24F
			F04D
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
Munich		11 March 2025	Decking, Oliver
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11 - 03 - 2025

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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