

(19)



(11)

EP 2 818 812 A2

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
31.12.2014 Bulletin 2015/01

(51) Int Cl.:
F25D 23/06 ^(2006.01) **F25D 21/04** ^(2006.01)

(21) Application number: **14172233.0**

(22) Date of filing: **12.06.2014**

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

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(30) Priority: **25.06.2013 JP 2013132671**

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(54) Refrigerator

(57) The invention is to provide a refrigerator in which dew condensation water can be prevented from dripping down a floor as water droplets even when sealing property for covering a clearance gap between vacuum heat insulating members is incomplete and thus the dew condensation water occurs.

The refrigerator is provided with a joining portion

formed by joining a plurality of plate members and is provided with a dew receiving portion below the location, in which the vacuum heat insulating member inside a main body is not arranged, as an accumulating portion for accumulating the dew condensation water occurring in the joining portion of the plate member.

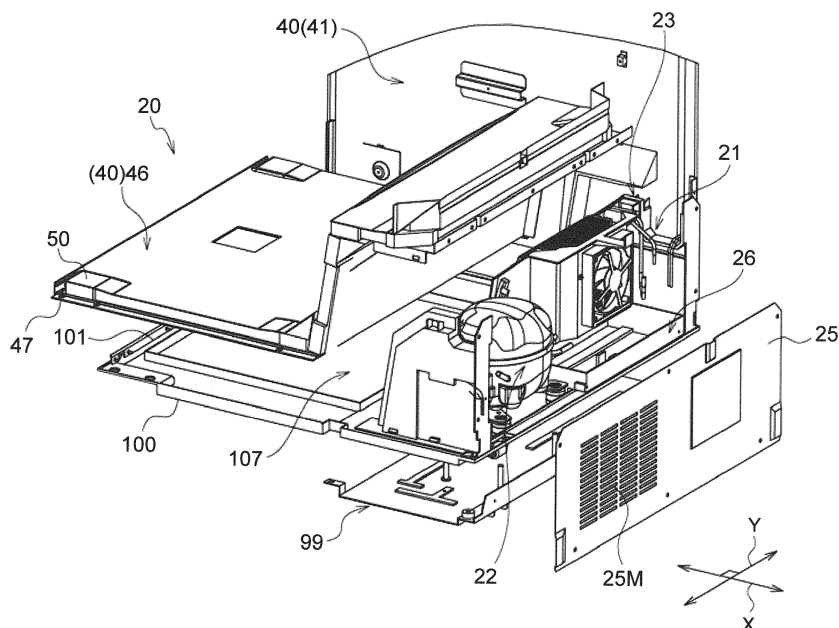


FIG. 7

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Description

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application is based upon and claims the benefit of priority from the prior Japanese Patent Application No. 2013-132671, filed on June 25, 2013, the entire contents of which are incorporated herein by reference.

FIELD

[0002] Embodiments described herein relate generally to a refrigerator.

BACKGROUND

[0003] In the prior art, a foamed polyurethane has been used for heat insulation of a refrigerator as a foamable heat insulating member. However, since a housing of the refrigerator requires higher heat insulating performance, both of the foamed polyurethane and a vacuum heat insulating member may be used in the housing of the refrigerator.

[0004] In consideration of basic heat insulating performance of the housing of the refrigerator, the heat insulating performance of the vacuum heat insulating member is approximately 10 times the heat insulating performance of the foamed polyurethane. Therefore, an insulation wall (heat insulating wall) of the housing, which is formed using the vacuum heat insulating member, has been proposed (JP 2013-2656 A). Further, in consideration of volumetric efficiency of the housing, since the insulation wall of the housing formed of only the vacuum heat insulating member can be made to be thinner than the insulation wall formed using the foamed polyurethane, it is possible to obtain the housing having higher volumetric efficiency.

[0005] However, the above technique has following problems.

[0006] In the insulation wall of the housing formed of the foamed polyurethane, since the foamed polyurethane can be filled between an outer box and an inner box, a clearance gap is not formed. However, in the insulation wall of the housing formed of only the vacuum heat insulating member, since the clearance gap (space) is formed at a portion where the vacuum heat insulating member are abutted against each other or a protrusion portion (fin portion) of an end portion of the vacuum heat insulating member, there is a possibility that a dew condensation occurs in the clearance gap and water droplets caused by the dew condensation drips down a floor of a house if the outer box of the housing does not have high sealing property.

[0007] Thus, in order for the outer box of the housing to have the high sealing property, it is required to fill a closed cell sealing agent, silicon or the like in the clearance gap formed at the portion where the vacuum heat

insulating member are abutted against each other or in the clearance gap formed at the protrusion portion (fin portion) of the end portion of the vacuum heat insulating member. For this reason, in addition to the assembling workability of the refrigerator is deteriorated, a further test for ensuring the sealing property needs to be additionally performed, thereby causing the deterioration in productivity of the refrigerator.

10 BRIEF DESCRIPTION OF THE DRAWINGS

[0008]

Fig. 1 is a perspective view illustrating an entire structure of a refrigerator according to a first embodiment. Fig. 2 is a front view of the refrigerator illustrated in Fig. 1.

Fig. 3 is a right-side view of the refrigerator illustrated in Fig. 1.

Fig. 4 is an exploded perspective view illustrating a configuration example of a bottom surface portion of the refrigerator illustrated in Fig. 1.

Fig. 5 is a cross-sectional view taken along the line R-R in a main body of the refrigerator illustrated in Fig. 2.

Fig. 6 is a perspective view illustrating a structural example of the vicinity of the bottom surface portion illustrated in Fig. 4.

Fig. 7 is an exploded perspective view illustrating a structural example of the vicinity of the bottom surface portion illustrated in Fig. 6.

Fig. 8A is a longitudinal cross-sectional view of a dew receiving pan or the like taken along the line D-D in Fig. 6, and Fig. 8B is a longitudinal cross-sectional view in which the illustration of a vacuum heat insulating member is excluded from Fig. 8A.

Fig. 9A is a perspective view illustrating an example of a preferred shape of the dew receiving pan illustrated in Figs. 7, 8A, and 8B, Fig. 9B is a perspective view illustrating an example of another shape of the dew receiving pan, and Fig. 9C is a perspective view illustrating an example of a further another shape of the dew receiving pan.

Fig. 10 is a cross-sectional view taken along the line A-A in the main body of the refrigerator illustrated in Fig. 2.

Fig. 11 is a cross-sectional view taken along the line B-B in the main body of the refrigerator illustrated in Fig. 3.

Fig. 12 is a cross-sectional view taken along the line C-C in the main body of the refrigerator illustrated in Fig. 3.

Fig. 13 is a perspective view illustrating the vicinity of a bottom surface portion of a refrigerator according to a second embodiment.

Fig. 14 is an exploded perspective view of the vicinity of the bottom surface portion of the refrigerator illustrated in Fig. 13.

Fig. 15A illustrates the second embodiment and illustrates a configuration example of a dew receiving pan or the like taken along the line E-E in Fig. 13, and Fig. 15B is a longitudinal cross-sectional view in which some portions of a vacuum heat insulating member and the like are excluded from the longitudinal cross-section of Fig. 15A.

SUMMARY

[0009] In view of the above circumstances, an object of embodiments is to provide a refrigerator in which the dew condensation water can be prevented from dripping down to the floor as water droplets even when the sealing property for caverling the clearance gap between the vacuum heat insulating members is incomplete and thus the dew condensation water occurs.

[0010] The refrigerator according to the embodiments is a refrigerator in which a plurality of vacuum heat insulating members are arranged between plate members, and a dew receiving portion is provided below a space between the adjacent vacuum heat insulating members to receive the dew condensation water occurred in the space.

DETAILED DESCRIPTION

[0011] Hereinafter, embodiments will be described with reference to the drawings.

(First Embodiment)

[0012] Fig. 1 is a perspective view illustrating an entire body of a refrigerator according to a first embodiment. Fig. 2 is a front view of a refrigerator 1 illustrated in Fig. 1, and Fig. 3 is a right-side view of the refrigerator 1 illustrated in Fig. 1.

[0013] The refrigerator 1 illustrated in Figs. 1 to 3 includes a main body 2. The uppermost position of the main body 2 is provided with a refrigerating compartment 5 which is opened and closed by double doors 3 and 4 opening from the center. These double doors 3 and 4 opening from the center are attached to be openable and closable around rotating shafts 3A and 4A of the main body 2, respectively.

[0014] As illustrated in Figs. 1 and 2, an ice-making compartment 7 and an upper freezing compartment 8 are laterally arranged in parallel with each other under the refrigerating compartment 5. The ice-making compartment 7 is opened and closed by a drawer-type door 7a, and the upper freezing compartment 8 is opened and closed by a drawer-type door 8a. A vegetable compartment 9 is arranged under the ice-making compartment 7 and the upper freezing compartment 8. The vegetable compartment 9 is opened and closed by a drawer-type door 9a. A freezing compartment 10 is provided under the vegetable compartment 9. The freezing compartment 10 is opened and closed by a drawer-type door 10a.

[0015] As illustrated in Fig. 1, at the lower portion of the double doors 3 and 4 opening from the center, recessed handles 3b and 4b are provided inside the doors to hook fingers, respectively. Recessed handles 7b, 8b, 9b, and 10b are provided at upper portions of the drawer-type doors 7a, 8a, 9a, and 10a to hook the fingers, respectively. Further, in Figs. 2 and 3, a longitudinal direction of the refrigerator 1 is indicated by an X-direction, and a horizontal direction thereof is indicated by a Y-direction.

[0016] Fig. 4 is an exploded perspective view illustrating a configuration example of a bottom surface portion 20 of the refrigerator 1 illustrated in Fig. 1.

[0017] As illustrated in Fig. 4, a compressor fan 21 and a compressor 22 are arranged on the bottom surface portion 20 of the refrigerator 1. A dew receiving portion 100, for example, dew receiving pan, is arranged under the compressor fan 21 and the compressor 22. The dew receiving portion 100 is fixed to the bottom surface portion 20 side by a compressor stage 99. In addition, two front foot portions 98 are attached to the bottom surface portion 20.

[0018] The refrigerator 1 illustrated in Fig. 4 is a bottom compressor-type refrigerator in which the compressor 22 is not arranged on the upper portion of the main body 2, but is arranged on the bottom surface portion 20 side. The structural example of the dew receiving portion 100 will be described below, but is, for example, a plastic member having substantially a flat shape, and the dew receiving portion 100 is a frame-shaped member. In Fig. 4, further, an example of a flow of dew condensation water W, which is guided in the main body 2, is indicated by a dashed line, and an example of the flow of the dew condensation water W in the dew receiving portion 100 is indicated by a dashed line.

[0019] Fig. 5 is a cross-sectional view taken along the line R-R in the main body 2 of the refrigerator 1 illustrated in Fig. 2.

[0020] The main body 2 of the refrigerator 1 illustrated in Figs. 1 to 3 is also called a housing, and the main body 2 includes right and left side surface portions 2A and 2B, a top surface portion 2C, the bottom surface portion 20, and a back surface portion 2D. As simplistically illustrated in Fig. 5, the main body 2 includes an assembly-type outer box 30, an assembly-type inner box 40, and a plurality of plate-shaped vacuum heat insulating members 50 which are arranged between the outer box 30 and the inner box 40 and act as an insulation wall (heat insulating wall). Here, the vacuum heat insulating member 50 is made up of, for example, a core material such as a glass wool and a packaging material having gas barrier properties. The panel-shaped (plate-shaped) vacuum heat insulating member is manufactured by evacuating the inside of the packaging material in a state where the core material is accommodated in the packaging material.

[0021] A plurality of metals, for example, iron plate members 31, 32, and 33 are assembled in a box shape to form the assembly-type outer box 30. A plurality of

plastic plate members 41, 42, and 43 are assembled in a box shape to form the assembly-type inner box 40. The heat insulating performance of the vacuum heat insulating member 50 is approximately 10 times the heat insulating performance of foamed polyurethane, in consideration of heat insulating performance of the housing of the refrigerator 1.

[0022] Fig. 6 is a perspective view illustrating a structural example of the vicinity of the bottom surface portion 20 illustrated in Fig. 4. Fig. 7 is an exploded perspective view illustrating a structural example of the vicinity of the bottom surface portion 20 illustrated in Fig. 6.

[0023] As illustrated in Figs. 6 and 7, a condenser unit 23 including the fan 21, the compressor 22, and an evaporation pan 26 are mounted on the compressor stage 99. The condenser unit 23, the compressor 22, the evaporation pan 26 are covered by a back grille 25.

[0024] As illustrated in Fig. 7, the structural example of the dew receiving pan 100 will be described below, but the dew receiving pan 100 is arranged at the lower portion of the bottom surface portion 20. In the bottom surface portion 20, the vacuum heat insulating member 50 is arranged between a bottom surface 46 of the inner box 40 and a bottom plate 47.

[0025] Fig. 8A is a longitudinal cross-sectional view of the dew receiving pan 100 or the like taken along the line D-D in Fig. 6, and Fig. 8B is a longitudinal cross-sectional view in which the illustration of the vacuum heat insulating member 50 is not presented from the cross-sectional view of Fig. 8A.

[0026] Fig. 9A is a perspective view illustrating an example of a preferred shape of the dew receiving pan 100 illustrated in Figs. 7, 8A, and 8B.

[0027] As illustrated in Fig. 9A, the dew receiving pan 100 is, for example, a plastic member having substantially a flat shape and is a frame-shaped member as described above. The dew receiving pan 100 is arranged at the lower portion of the bottom surface portion 20 and thus can receive the dew condensation water W illustrated in Fig. 4. For this reason, the dew condensation water W can be prevented from dripping down to a floor as water droplets. The dew receiving pan 100 is arranged at the lower portion of the bottom surface portion 20 to provide a clearance gap with respect to the bottom surface portion 20 such that air passes between the bottom surface portion 20 and the dew receiving pan 100.

[0028] As illustrated in Fig. 9A, the dew receiving pan 100 has water storage portions 101, 102, 103, 104, 105, and 106. These water storage portions 101, 102, 103, 104, 105, and 106 are formed to have a substantially U-shaped cross section (groove) to receive and store the dew condensation water W, for example, as illustrated in Fig. 4. Thus, the dew receiving pan 100 prevents the dew condensation water from being dripped down to the floor as the water droplets. In the dew receiving pan 100 illustrated in Fig. 9A, openings 107 and 108 are provided at an inner region which is surrounded by the water storage portions 101, 102, 103, 104, 105, and 106. The

weight of the dew receiving pan 100 can be reduced by such a structure of the dew receiving pan 100.

[0029] However, as illustrated in Figs. 9A and 8A, a part of the opening 108 is provided with an air suction port 109 which takes outside air in the fan 21 side to cool the compressor 22. In addition, four corners of the dew receiving portion 100 are provided with an attaching portion 110, respectively, and the dew receiving portion 100 can be fixed to the bottom surface portion 20 side, which is illustrated in Fig. 4, using screws (not illustrated).

[0030] In addition, as illustrated in Fig. 8A, the dew receiving portion 100 has the water storage portions 101, 102, 103, 104, 105, and 106, but the fan 21 of the refrigerator 1 is arranged at a rear-side position which is retreated from (apart from) these water storage portions 101, 102, 103, 104, 105, and 106. Thus, the fan 21 can be detached as much as possible from the dew condensation water accumulated in the water storage portions 101, 102, 103, 104, 105, and 106 to prevent the influence of the dew condensation water.

[0031] Further, the dew receiving pan 100 illustrated in Fig. 9A has the openings 107 and 108, but the dew receiving pan 100 illustrated in Fig. 9B has not the opening but closing portions 117 and 118. Thus, a mechanical strength of the dew receiving portion 100 increases. In addition, as an example, a dew receiving pan 100A illustrated in Fig. 9C is provided with water storage portions 120 at four corners of bottom surface portion 20.

[0032] Next, Fig. 10 is a cross-sectional view taken along the line A-A in the main body 2 of the refrigerator 1 illustrated in Fig. 2. Fig. 11 is a cross-sectional view taken along the line B-B in the main body 2 of the refrigerator 1 illustrated in Fig. 3. Further, Fig. 12 is a cross-sectional view taken along the line C-C in the main body 2 of the refrigerator 1 illustrated in Fig. 3.

[0033] Fig. 10 illustrates a front plate 30A of the outer box 30, a part of the dew receiving portion 100, and a part of the bottom surface portion 20. A vacuum heat insulating plate 20A of the bottom surface portion 20 is arranged between a bottom plate 20B of the outer box 30 of the bottom surface portion 20 and a bottom plate 20C of the inner box 40 of the bottom surface portion 20. The front plate 30A of the outer box 30 is joined by a joining portion 20D caused by folding of the outer box 30 of the bottom surface portion 20 with respect to the bottom plate 20B. The bottom plate 20B of the outer box and the bottom plate 20C of the inner box are reinforced by a reinforcing plate 20E which is provided therebetween.

[0034] In Fig. 10, the dew receiving portion 100 is provided with the water storage portion 101 for receiving and guiding the dew condensation water described above, but a clearance gap SP is provided between the dew receiving portion 100 and the front plate 30A of the outer box 30 and the bottom plate 20B of the outer box 30 of the bottom surface portion 20 to take the air therein from the outside of the main body 2. By the provision of the clearance gap SP, when the fan 21 is operated, air AR passes through an air path, which is provided under the

bottom surface portion 20, as illustrated by the arrow in Fig. 8A and thus can be supplied toward the fan 21 side.

[0035] As illustrated in Fig. 8A, the air AR taken-in by the fan 21 is discharged to the outside from a slit wall 25M illustrated in Fig. 8A. Accordingly, the fan 21 is a fan which can perform both functions of cooling the compressor 22 and of taking the air AR in the dew receiving pan 100 and generating convection of the air AR to cool the dew condensation water received by the dew receiving pan 100.

[0036] Fig. 11 illustrates the bottom surface portion 20, the right side surface portion 2B, and a part of the dew receiving pan 100.

[0037] The plate member 33 of the outer box 30 of the side surface portion 2B and the bottom plate 20B of the outer box 30 of the bottom surface portion 20 are joined through a joining portion 65 formed by folding in a corner portion CP as an angular portion. An angle 60 of an L-shaped cross section is fixed to the inside of the joining portion 65. A plurality of dew proofing pipes 61 (dew preventing pipes) are arranged inside the angle 60 of the corner portion CP. The dew proofing pipes 61 are heat radiating pipes for radiating heat. Since the dew proofing pipes 61 are arranged in this manner, it is possible to remove moisture invading from the outside of the refrigerator through a narrow clearance gap of the joining portion 65 and to suppress the formation of the dew condensation water.

[0038] Fig. 12 illustrates a corner portion CR made up of the right side surface portion 2B and the back surface portion 2D of the main body 2. The corner portion CR is a space region which is formed in such a manner that ends of the adjacent vacuum heat insulating members are abutted against each other.

[0039] The plate member 33 of the outer box 30 of the side surface portion 2B and the plate member 32 of the outer box 30 of the back surface portion 2D are joined through a joining portion 75 formed by folding in the corner portion CR. A dew proofing pipe 71 is provided inside the corner portion CR and is arranged at the vicinity of the joining portion 75. Since the dew proofing pipe 71 is arranged in this manner, it is possible to remove moisture invading as illustrated by the dashed-line arrow G through the narrow clearance gap of the joining portion 75.

[0040] In addition, heat insulating members (hereinafter, simply referred to as an EPS) 77 and 78 of a molded article such as a foamed polystyrene are arranged at the angular portion of the corner portion CR, in the inside of the side surface portion 2B and the back surface portion 2D. Suction pipes 79 are arranged in an inner space of the heat insulating member 77 and the inner portion of the corner portion CR, respectively, or a suction pipe 79 is arranged in at least one inner portion of the heat insulating member 77 and the corner portion CR. Since the suction pipes 79 are arranged in the space in this manner, it is possible to effectively utilize the space. Further, the suction pipes 79 connect the compressor with a cooler,

and thus when finished its role, a refrigerant returns to the compressor through the suction pipe 79 to be compressed again.

[0041] Operation of the refrigerator 1 having the above-described configuration will be described below.

[0042] When the refrigerator 1 is activated, dew condensation occurs in the corner portions CR and HS of the main body 2 illustrated in Fig. 5. As illustrated in Fig. 12, the vacuum heat insulating members 50 are abutted against to each other at the corner portion CR, but the space portion having no vacuum heat insulating member 50 is generated. In the space portion of the corner portion CR, for example, as illustrated in Fig. 4, the dew condensation occurs and falls in the corner portion CR along the main body 2 as the dew condensation water W, as illustrated by the dashed-line arrow, but the dew condensation water W can be received by the dew receiving portion 100. For this reason, even when sealing property for covering the clearance gap between the vacuum heat insulating members 50 is incomplete and thus the dew condensation water W occurs and falls along the main body 2, the dew condensation water W can be prevented from dripping down to the floor as water droplets.

[0043] For example, in Fig. 10, even when the dew condensation water W falls at the front side of the refrigerator 1, it can be received by the water storage portion 101 of the dew receiving portion 100. In Fig. 4, further, even when the dew condensation water W falls in the rear-side corner portion, the dew condensation water W can be received by the water storage portions 105 and 106 of the dew receiving portion 100. Then, the received dew condensation water W can be accumulated in the water storage portions 101, 102, 103, 104, 105, and 106 serving as an accumulating portion and the air AR can pass over the dew receiving portion 100 by the operation of the fan 21, as illustrated in Figs. 8A and 8B, thereby preventing the moisture from being retained in the vicinity of the bottom surface portion 20 of the refrigerator 1.

(Second Embodiment)

[0044] Figs. 13 to 15 illustrate a refrigerator according to a second embodiment of the invention.

[0045] Fig. 13 is a perspective view illustrating the vicinity of a bottom surface portion of a refrigerator 1S according to the second embodiment of the invention, Fig. 14 is an exploded perspective view of the vicinity of the bottom surface portion of the refrigerator 1S illustrated in Fig. 13. Fig. 15A illustrates the second embodiment and illustrates a configuration example of a dew receiving pan 100B or the like taken along the line E-E in Fig. 13. Fig. 15B is a longitudinal cross-sectional view in which some portions such as a vacuum heat insulating member are excluded from the longitudinal cross-sectional view of Fig. 15A.

[0046] As illustrated in Fig. 14, a fan 21H and an evaporation pan 26 are integrally structured with a back grille 25R. The refrigerator 1S is called a top compressor ar-

rangement-type refrigerator in which a compressor 22 is not arranged at a lower portion, but arranged at an upper portion of a main body 2. The dew receiving pan 100B is arranged at a lower portion of a bottom surface portion 20S.

[0047] As illustrated in Fig. 15A, a vacuum heat insulating member 50 and an EPS80 are arranged on the bottom surface portion 20S of the main body 2 in the refrigerator 1S. The vacuum heat insulating member 50 is also arranged in the lowermost drawer-type door 10a of a freezing compartment 10.

[0048] A clearance gap ST is provided between the dew receiving pan 100B and the bottom surface portion 20S as illustrated in Fig. 15A. Therefore, when the fan 21H is operated, outside air AR can pass between the dew receiving pan 100B and the bottom surface portion 20S through the clearance gap ST and then can be supplied to the fan 21H side. The air AR received by the fan 21H is discharged to the outside from a slit wall 25M. Accordingly, the fan 21H is a dedicated fan which is configured to pass the air AR over the dew receiving pan 100 by taking the air AR in the dew receiving pan 100 without playing the role for cooling the compressor 22.

[0049] Moreover, as illustrated in Figs. 15A and 14, a dew proofing pipe 85 is arranged between the dew receiving pan 100B and the bottom surface portion 20S. Since the dew proofing pipe 85 is arranged in this manner, it is possible to remove moisture invading through the clearance gap ST provided between the dew receiving pan 100B and the bottom surface portion 20S. In addition, as illustrated in Fig. 15A, a dew proofing pipe 86 is also arranged in a recessed portion 88 formed on the bottom of the dew receiving pan 100B. BY these configuration, the temperature of the dew receiving pan 100B rises, and thus it is possible to more efficiently remove the moisture invading through the clearance gap ST provided between the dew receiving pan 100B and the bottom surface portion 20S.

[0050] The refrigerator 1 according to the embodiments described above is a refrigerator in which the joining portion is formed by joining the plurality of plate members and the vacuum heat insulating member is arranged between the plurality of plate members. Moreover, in the refrigerator, the dew receiving portion is provided below the location, in which the vacuum heat insulating member inside the main body is not arranged, as an accumulating portion for accumulating the dew condensation water occurring in the joining portion of the plate member. For this reason, even when the sealing property for covering the clearance gap between the vacuum heat insulating members is incomplete and thus the dew condensation water occurs, the dew condensation water can be prevented from dripping down to the floor as water droplets.

[0051] The joining portion is in the space of the corner portion of the main body. For this reason, at the corner portion formed in such a manner that the vacuum heat insulating members are abutted against each other, even when the moisture invades through the narrow clearance

gap of the joining portion from the outside of the refrigerator 1 and thus the dew condensation water occurs, the dew condensation water can be reliably received by the dew receiving portion provided below to prevent the dew condensation water from being dripped down to the floor as the water droplets.

[0052] The outer box made up of the plurality of plate members and constituting the main body is an assembly-type structure. Thus, the joining portion is formed by assembling the plurality of plate members, and even when the moisture invades from the clearance gap provided between the plate members, the dew condensation water can be reliably received by the dew receiving portion provided below to prevent the dew condensation water from being dripped down to the floor as the water droplets.

[0053] The refrigerator has a structure in which the foamed polyurethane is not arranged in the inner wall surface of the main body including the space of the corner portion. For this reason, at the corner portion formed in such a manner that the vacuum heat insulating members are abutted against each other, even when the foamed polyurethane is not arranged, the dew condensation water can be reliably received by the dew receiving portion provided below to prevent the dew condensation water from being dripped down to the floor as the water droplets.

[0054] The suction pipe is arranged in the space of the corner portion. Thus, it is possible to perform the arrangement of the suction pipe by effectively using the space of the corner portion.

[0055] The inner box, which is provided inside the outer box constituting the main box, is made up of a plurality of inner plates as a divided body. Thus, the inner box can be easily made by the plurality of inner plates.

[0056] The dew proofing pipe is arranged in the space of the corner portion. Thus, the occurrence of the dew condensation water in the space of the corner portion can be suppressed by the heat of the dew proofing pipe, thereby reducing the amount of dew condensation water accumulated in the dew receiving portion.

[0057] The dew receiving portion has a frame shape. Thus, the dew condensation water can be guided to the portion which needs to receive the dew condensation water, thereby reducing the weight of the dew receiving portion.

[0058] The dew receiving portion has the water storage portions, and the fan of the refrigerator is arranged at the position which is retreated from the water storage portions. Thus, the fan can be detached from the dew condensation water accumulated in the water storage portions to prevent the influence of the dew condensation water.

[0059] The clearance gap is provided between the dew receiving portion and the bottom surface portion of the main body. Thus, when the fan is rotated, since the air can flow between the dew receiving portion and the bottom surface portion of the main body by a natural convection, it is possible to discharge the moisture to the

outside of the refrigerator, thereby preventing the occurrence of the moisture in the bottom surface portion of the refrigerator.

[0060] The dual-purpose fan is provided to flow the air to the upper portion of the dew receiving portion and to cool the compressor, which is arranged in the refrigerator. Thus, when the dual-purpose fan is rotated, since the forced convection of the air is caused in the dew receiving pan, it is possible to discharge the moisture to the outside of the refrigerator, thereby preventing the occurrence of the moisture in the bottom surface portion of the refrigerator and cooling the compressor.

[0061] The dew receiving portion has the air suction port for cooling the compressor. Thus, the cooling air can be supplied to the compressor through the air suction port of the dew receiving portion.

[0062] The heat source (for example, dew proofing pipes 85 and 86) is arranged in the dew receiving portion. Thus, the dew receiving portion can suppress the occurrence of the moisture in the bottom surface portion of the refrigerator by heat generation of the heat source.

[0063] The dedicated fan is arranged in the bottom surface portion of the refrigerator to flow the air to the upper portion of the dew receiving portion, and the compressor is arranged on the upper portion of the refrigerator. Thus, even in the type of the refrigerator in which the compressor is arranged on the upper portion of the refrigerator, the dew receiving portion is applicable.

[0064] Further, the structure of the refrigerator 1 illustrated in Fig. 1 is an example, and any structure may be employed. The dew receiving pan may be provided with the water storage portions which are individually independent at the corners of the refrigerator 1 to receive the dew condensation water, and the respective water storage portions may allow the dew condensation water to move using a communication tape having continuous foam (open cell foam).

[0065] In the drawings:

- 1: refrigerator,
- 2: main body,
- 21: fan,
- 22: compressor,
- 30: outer box,
- 40: inner box,
- 50: vacuum heat insulating member,
- 75: joining portion,
- 100: dew receiving pan (dew receiving portion),
- 101 to 106: water storage portion, and
- AR: air.

[0066] While certain embodiments have been described, these embodiments have been presented by way of example only, and are not intended to limit the scope of the inventions. Indeed, the novel embodiments described herein may be embodied in a variety of other forms; furthermore, various omissions substitutions and changes in the form of the embodiments described herein

may be made without departing from the spirit of the inventions. The accompanying claims and their equivalents are intended to cover such forms or modifications as would fall within the scope and spirit of the inventions.

Claims

1. A refrigerator in which a plurality of vacuum heat insulating members are arranged between plate members, wherein a dew receiving portion is provided below a space between the adjacent vacuum heat insulating members to receive dew condensation water occurred in the space.
2. The refrigerator according to claim 1, wherein a space position between the adjacent vacuum heat insulating members is in an angular portion of the refrigerator and the plurality of plate members are joined to form a joining portion.
3. The refrigerator according to claim 1, wherein an outer box constituting a main body of the refrigerator is an assembly-type structure which is made up of the plurality of plate members.
4. The refrigerator according to claim 2, wherein a foamable heat insulating member is not arranged in a wall surface of the main body including a space of the angular portion.
5. The refrigerator according to claim 2, wherein a suction pipe is arranged in the space of the angular portion.
6. The refrigerator according to claim 3, wherein an inner box, which is provided inside the outer box constituting the main box, is made up of a plurality of inner plates as a divided body.
7. The refrigerator according to claim 2, wherein a dew proofing pipe is arranged in the space of the angular portion.
8. The refrigerator according to any one of claims 1 to 7, wherein the dew receiving portion has a frame shape.
9. The refrigerator according to any one of claims 1 to 8, wherein the dew receiving portion has a water storage portion, and a fan of the refrigerator is arranged at a position which is retreated from the water storage portion.
10. The refrigerator according to any one of claims 1 to 9, wherein a gap is provided between the dew receiving portion and a bottom surface portion of the main body.

11. The refrigerator according to any one of claims 1 to 10, wherein a dual-purpose fan is provided to flow air to an upper portion of the dew receiving portion and to cool a compressor which is arranged in the refrigerator. 5
12. The refrigerator according to any one of claims 1 to 11, wherein the dew receiving portion has an air suction port for cooling the compressor. 10
13. The refrigerator according to any one of claims 1 to 12, wherein a heat source is arranged in the dew receiving portion.
14. The refrigerator according to any one of claims 1 to 10, 12 and 13, wherein a dedicated fan is arranged in a bottom portion of the refrigerator to flow air to an upper portion of the dew receiving portion, and a compressor is arranged on an upper portion of the refrigerator. 15 20

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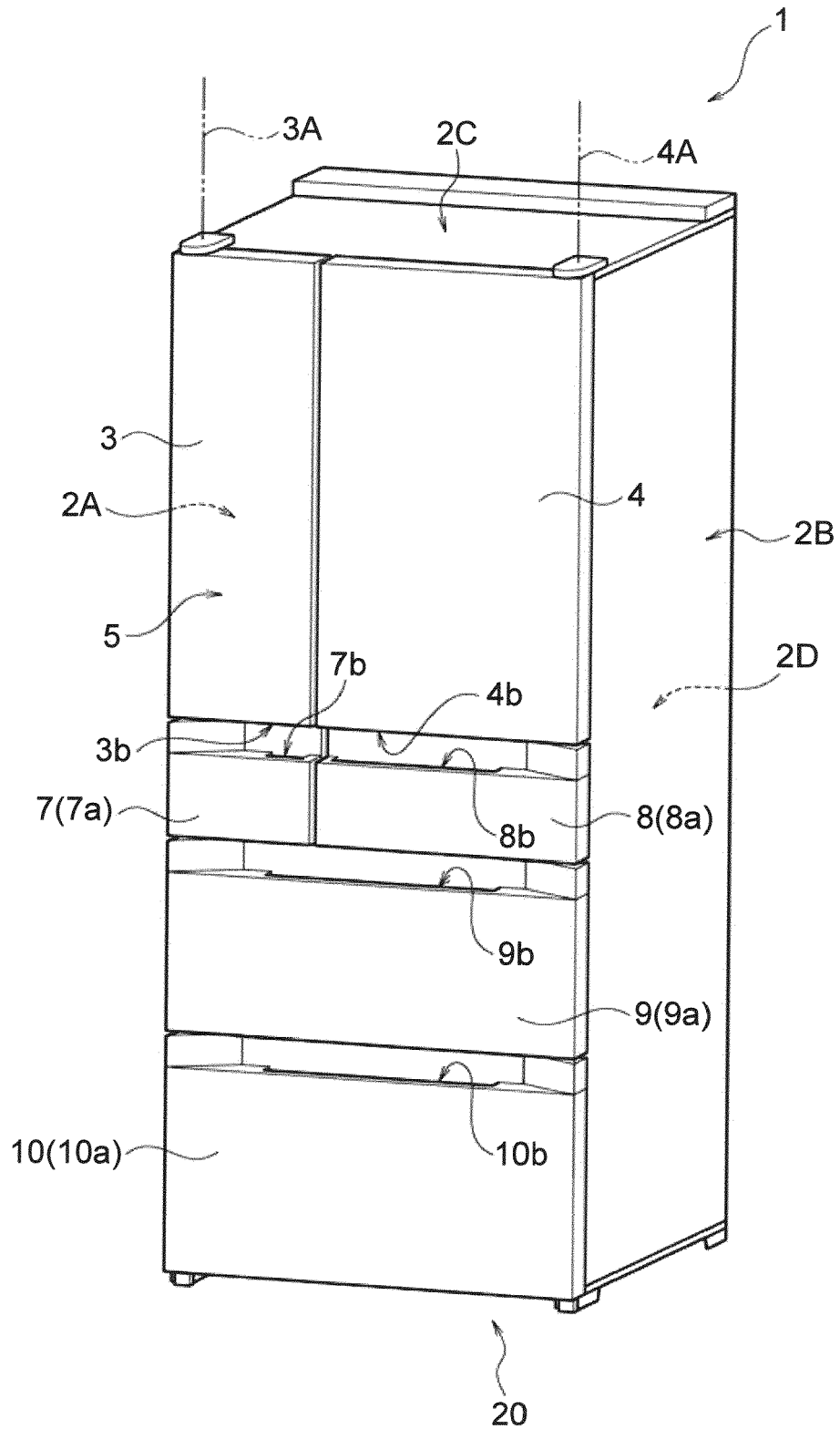


FIG. 1

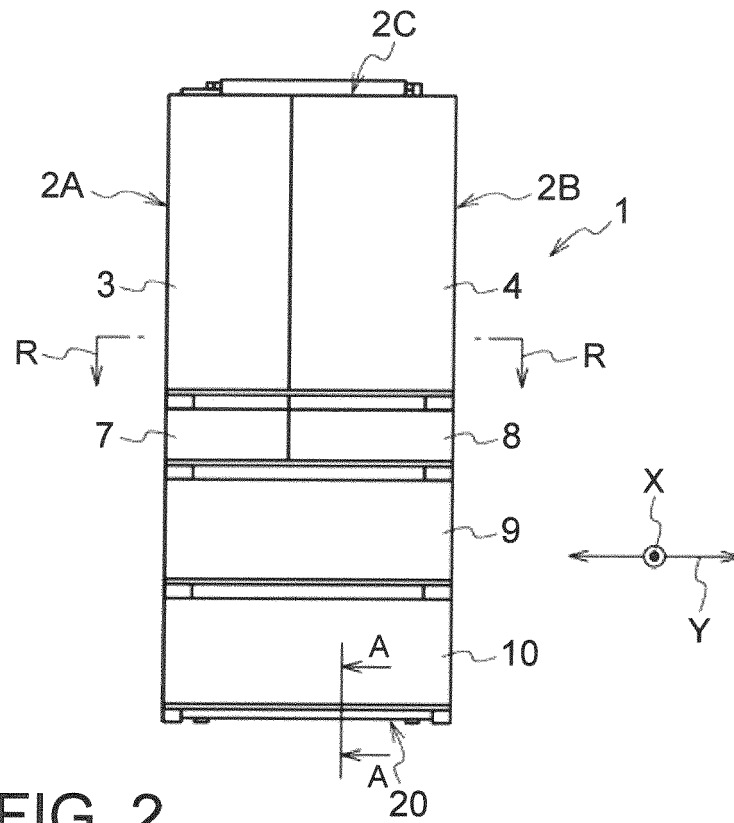


FIG. 2

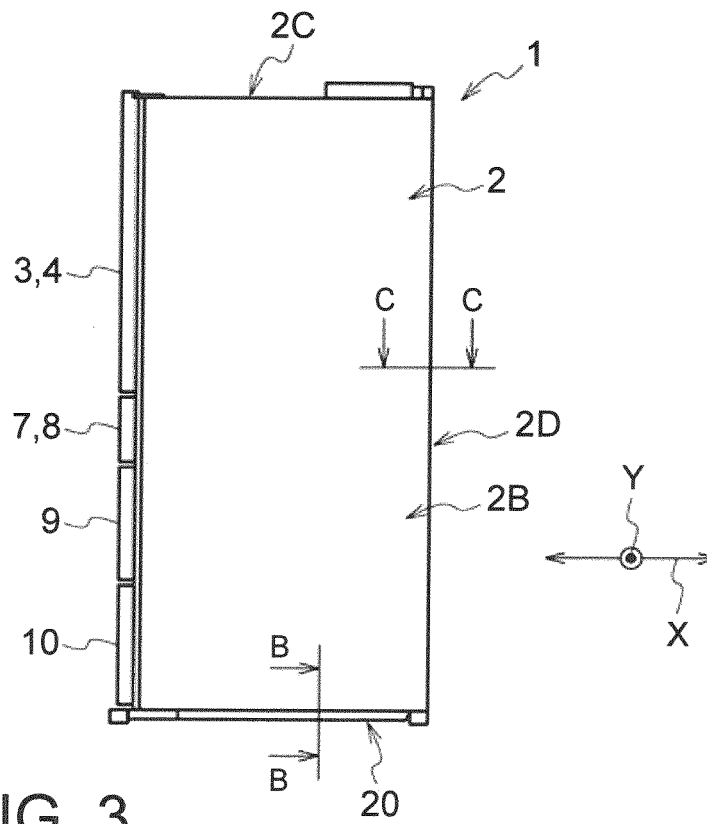


FIG. 3

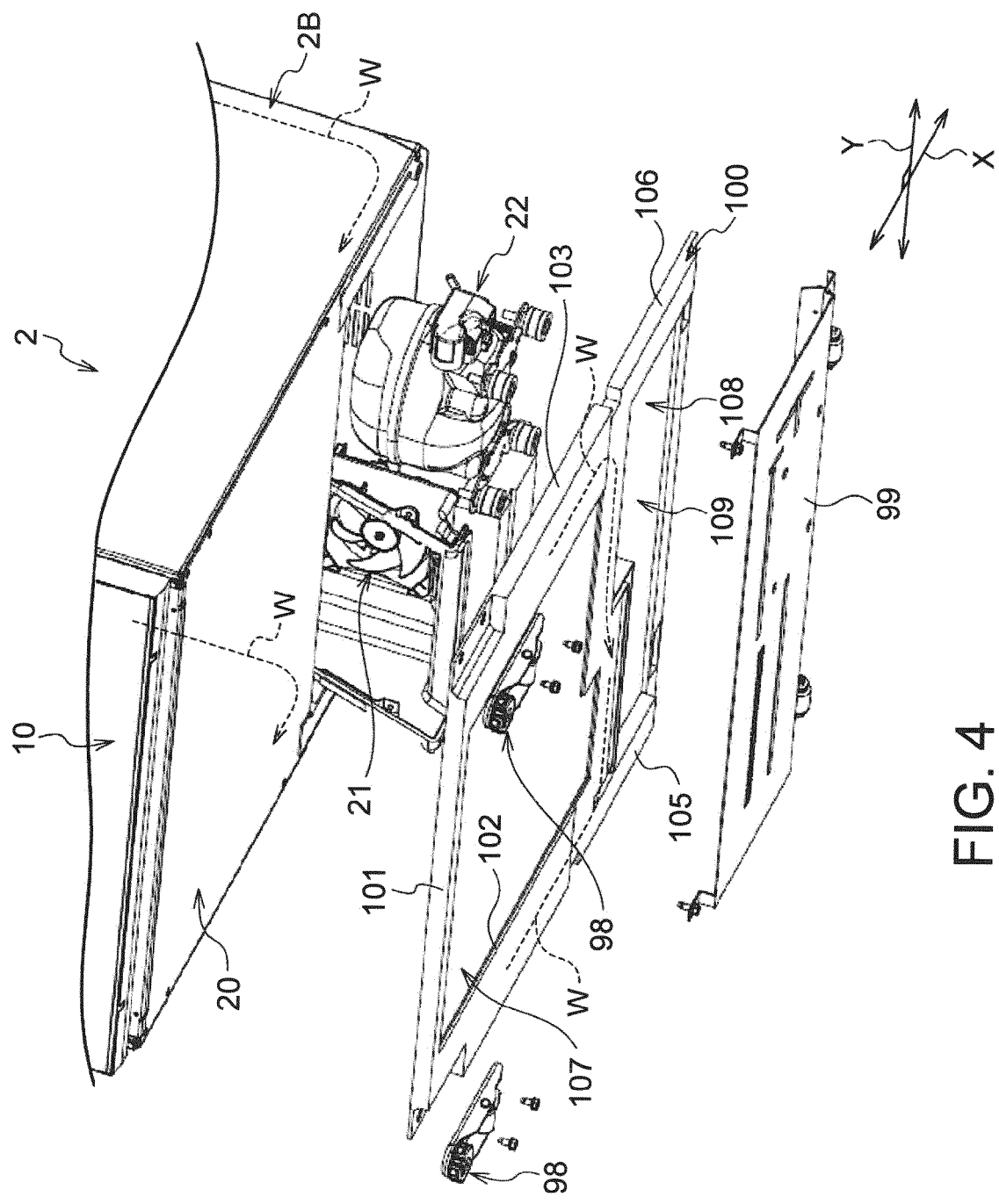


FIG. 4

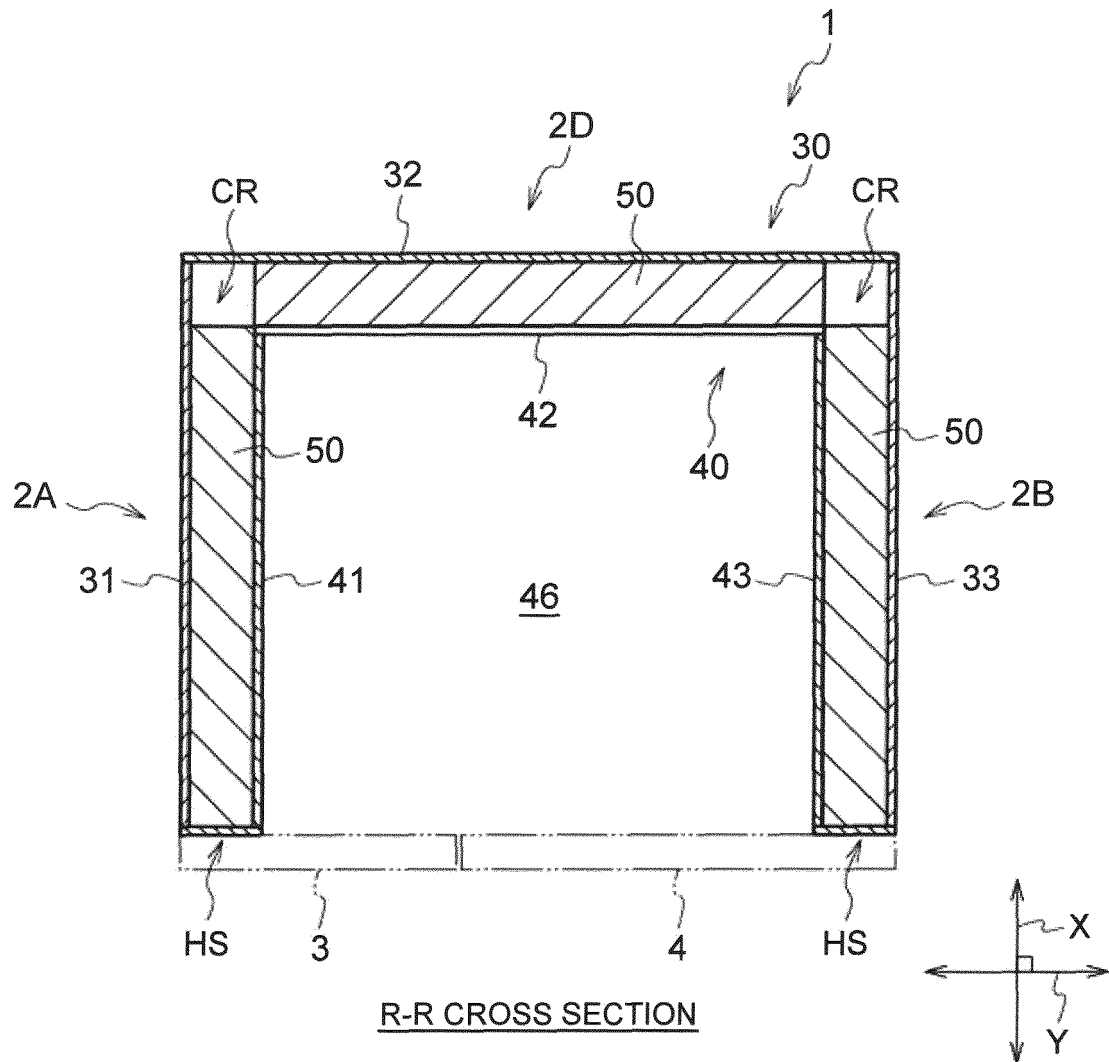


FIG. 5

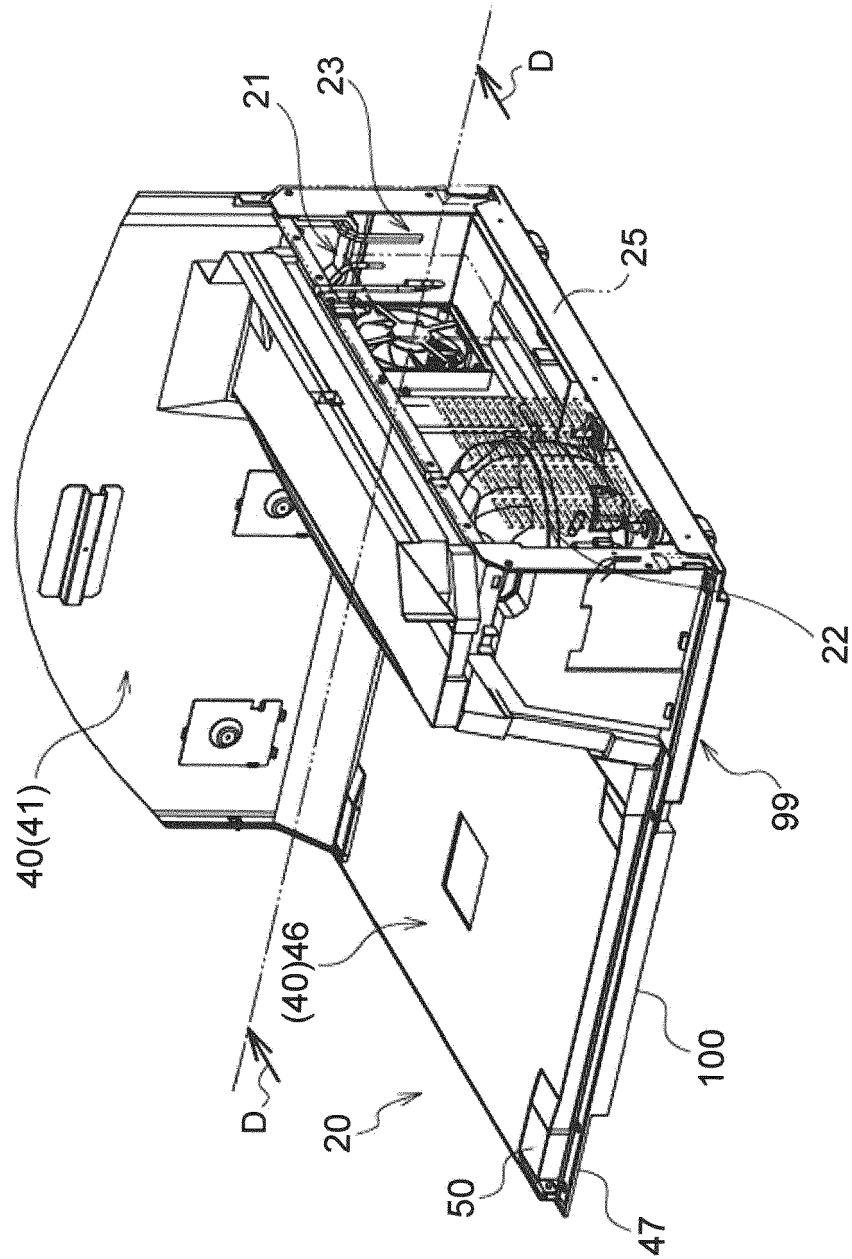


FIG. 6

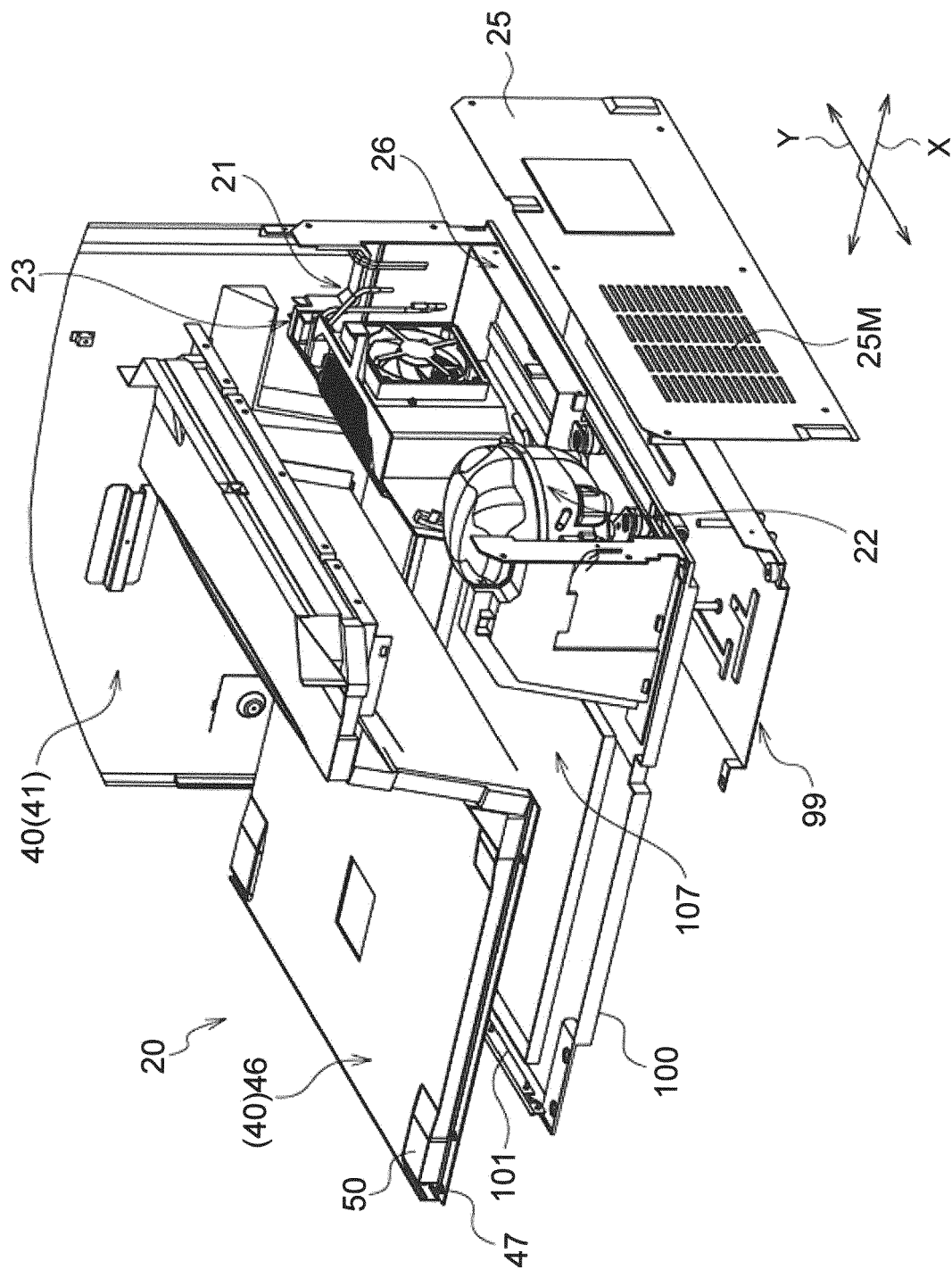


FIG. 7

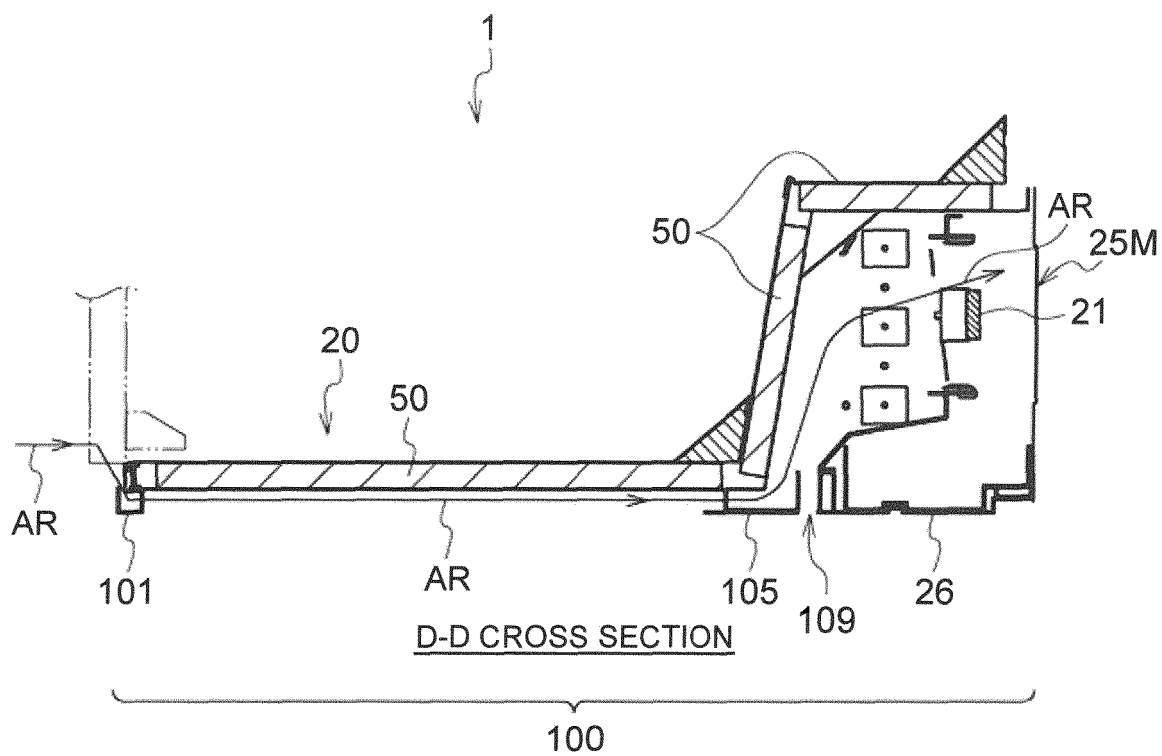


FIG. 8A

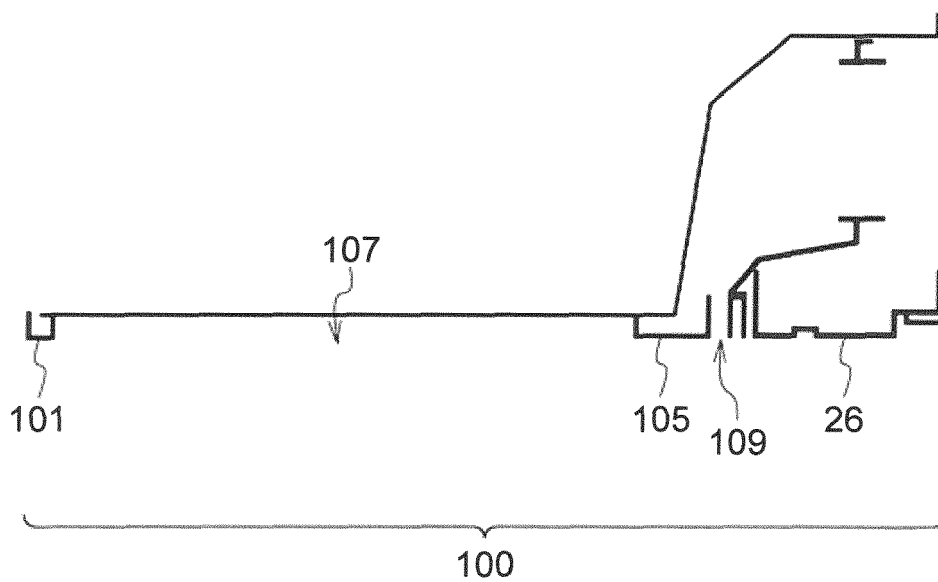


FIG. 8B

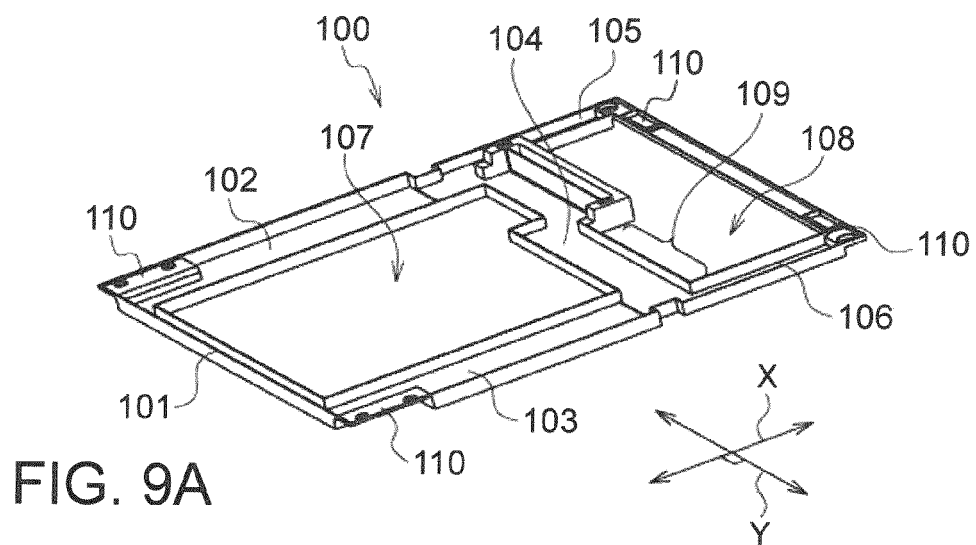


FIG. 9A

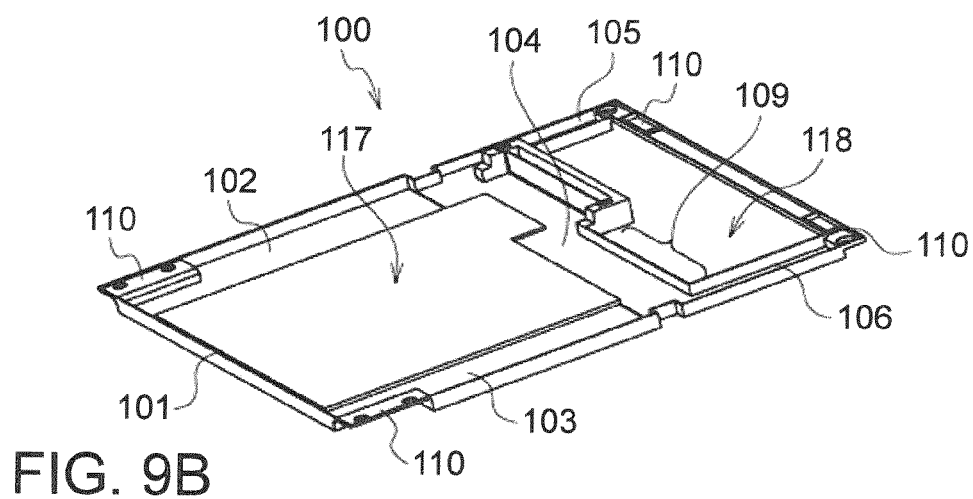


FIG. 9B

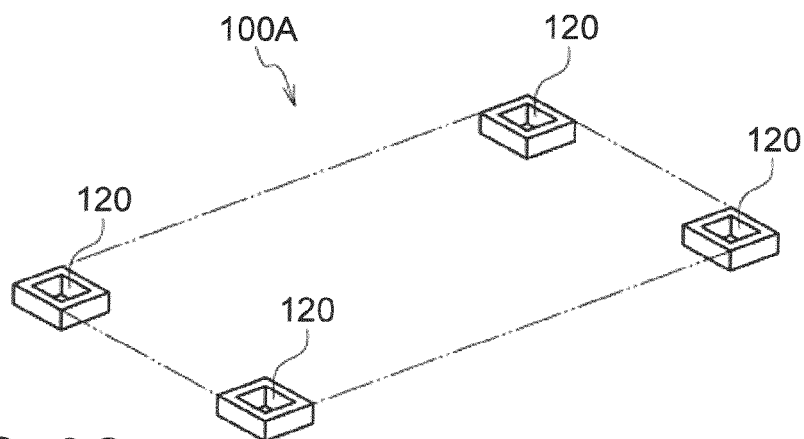


FIG. 9C

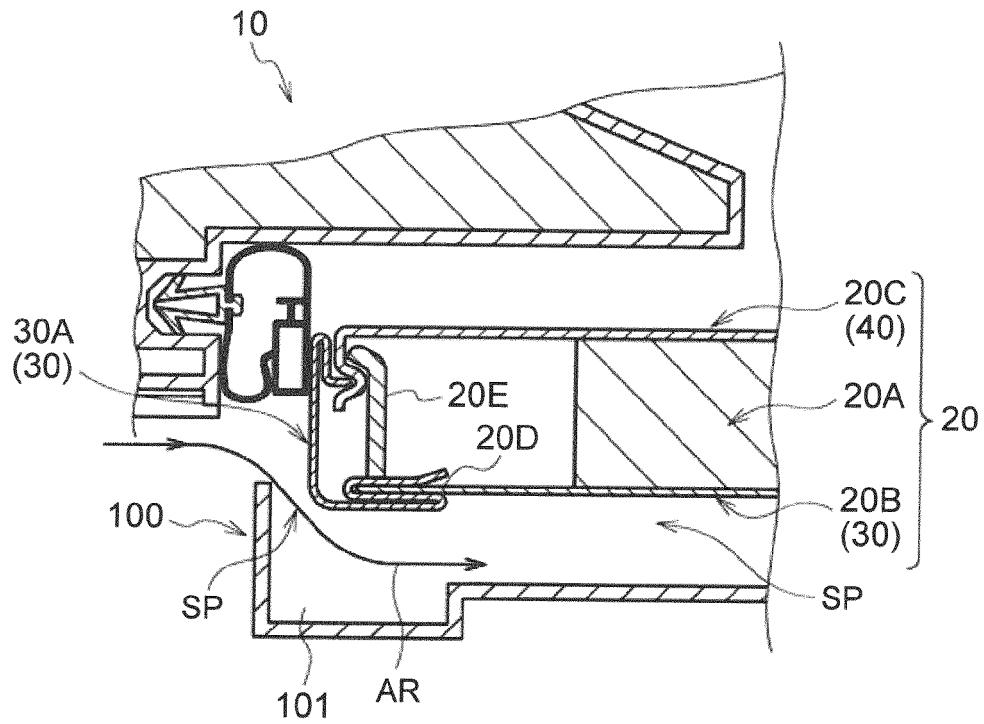


FIG. 10

A-A CROSS SECTION

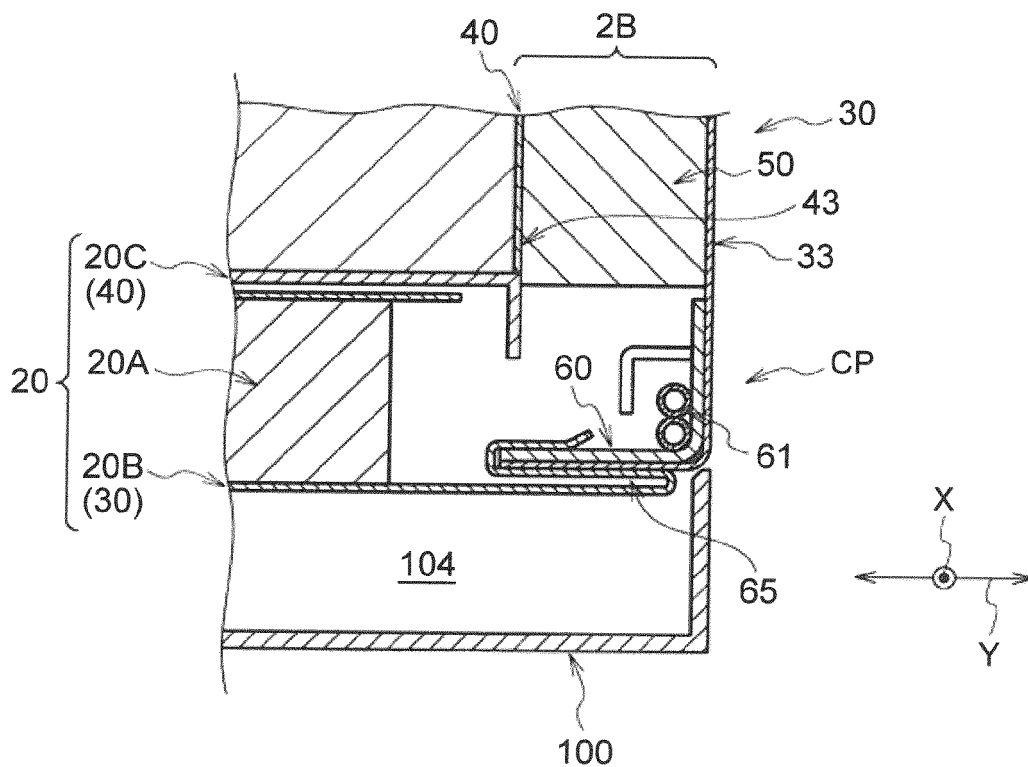


FIG. 11

B-B CROSS SECTION

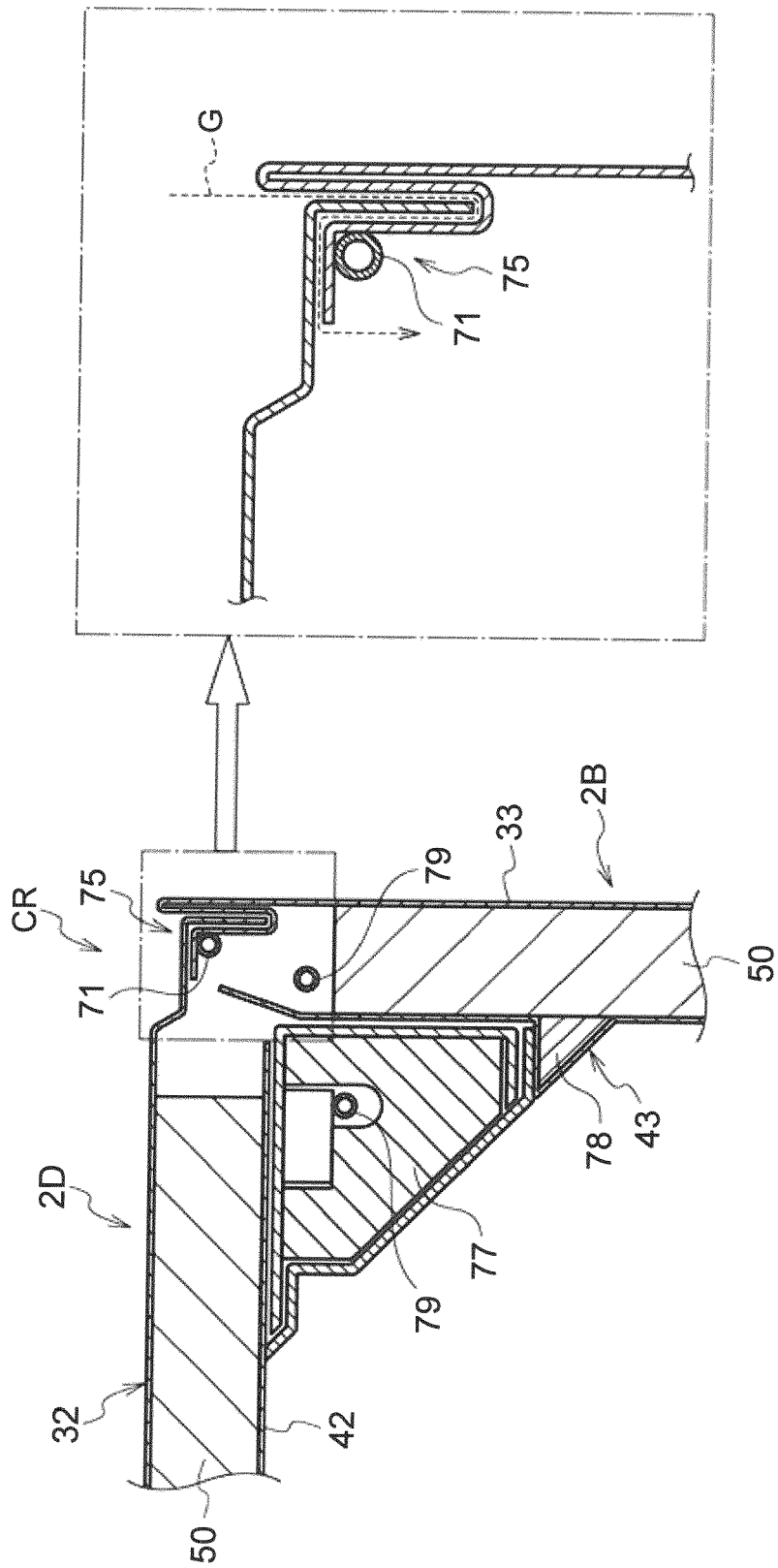


FIG. 12

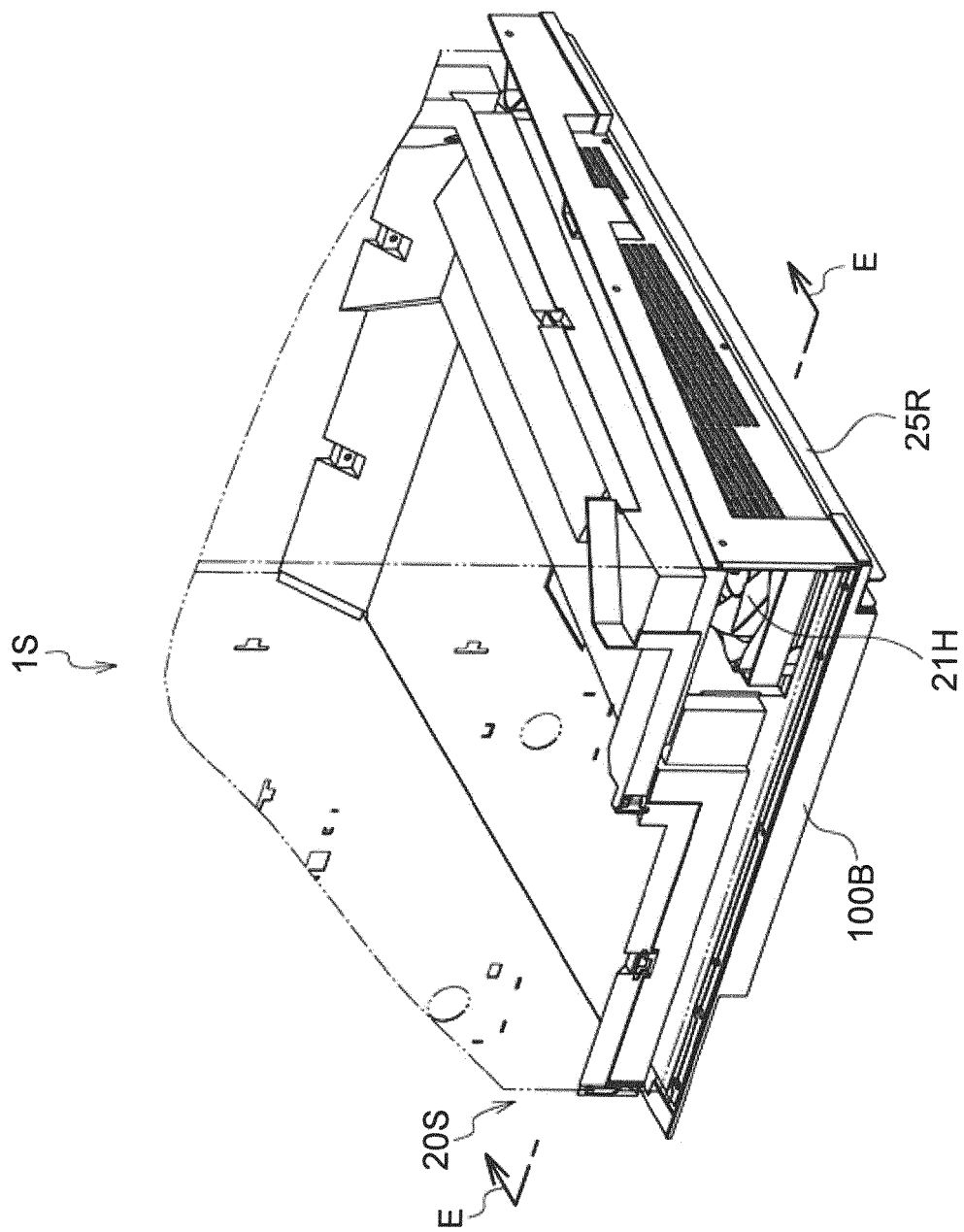


FIG. 13

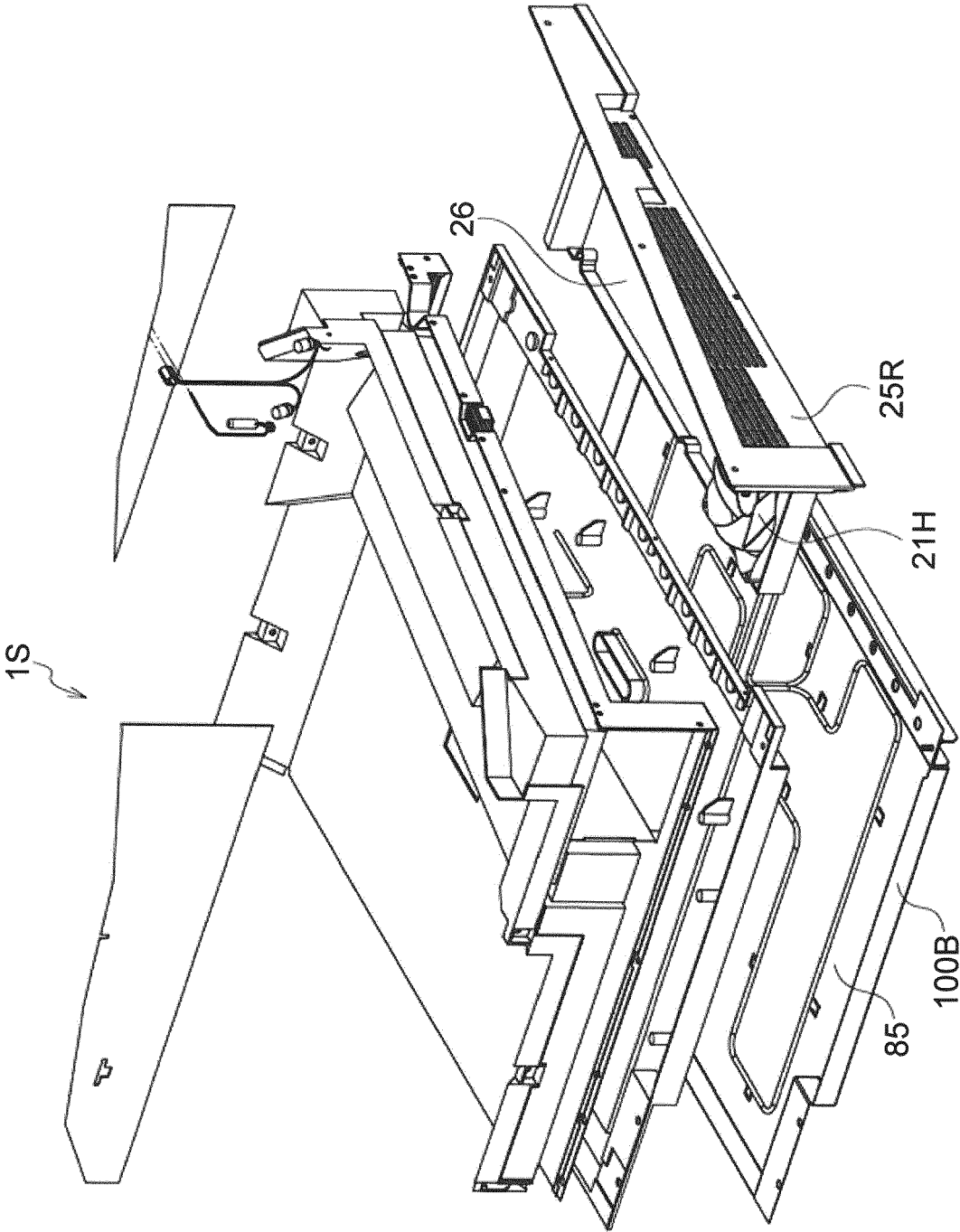


FIG. 14

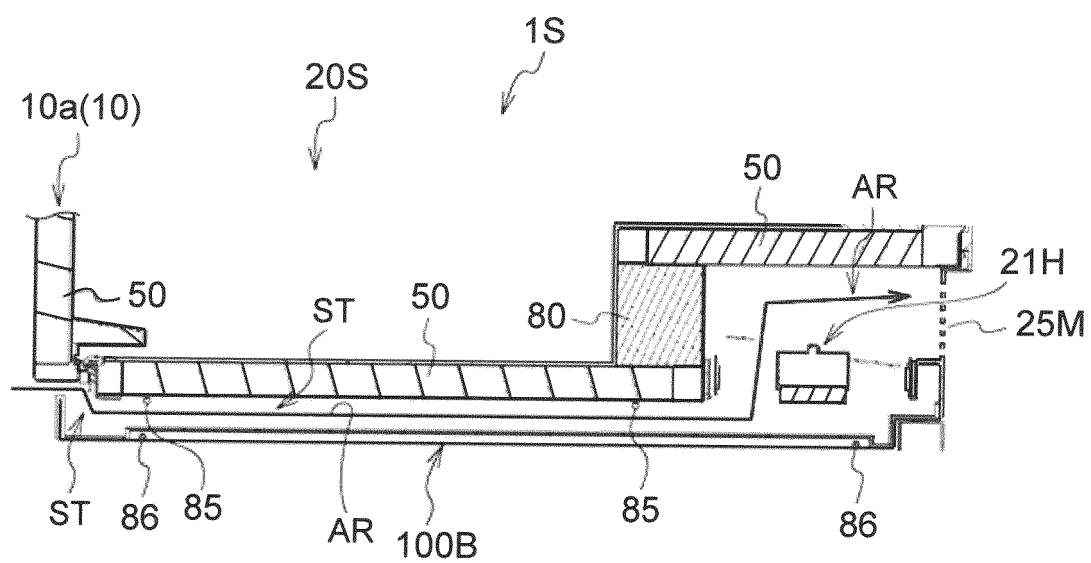


FIG. 15A

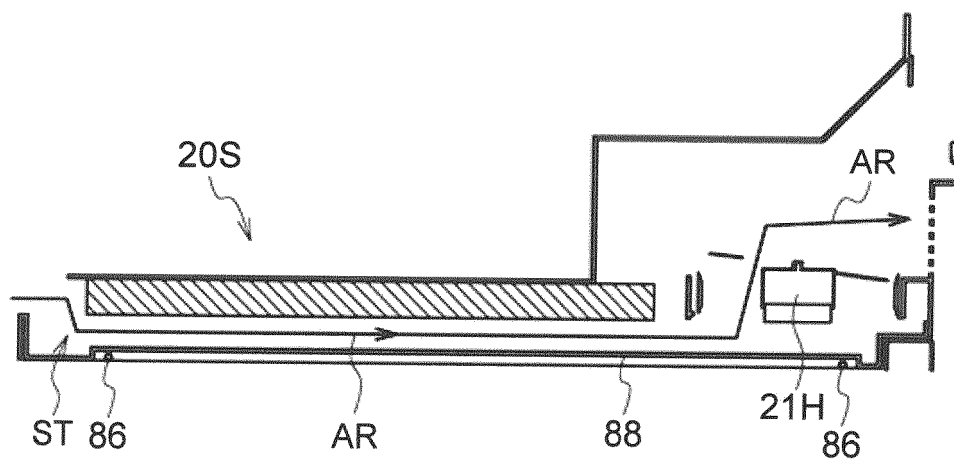


FIG. 15B

REFERENCES CITED IN THE DESCRIPTION

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