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(54) **HEAT SOURCE UNIT OF A HEAT PUMP**

(57) The present disclosure relates to a heat source unit (1) of a heat pump having a refrigerant circuit, the heat source unit (1) comprising: a fan (2) and a heat source unit casing (10), the heat source unit casing (10) comprising an air chamber (11) accommodating the fan (2), and a machine chamber (12) accommodating components of the refrigerant circuit of the heat pump. A top plate (13) is disposed on a top side of the heat source unit (1), a bottom plate (14) is disposed on a bottom side of the heat source unit (1), and a front grille (15) is disposed on a front side of the heat source unit (1) and extends over both the air chamber (11) and the machine chamber (12). The front grille (15) comprises an air chamber portion (151) covering at least a part of the air chamber (11) and a machine chamber portion (152) covering at least a part of the machine chamber (12), wherein the air chamber portion (151) and the machine chamber portion (152) are provided as two separate parts, separated along a direction from the top plate (13) toward the bottom plate (14), wherein the machine chamber portion (152) is detachably attached to the heat source unit casing (10) so as to be removable therefrom.

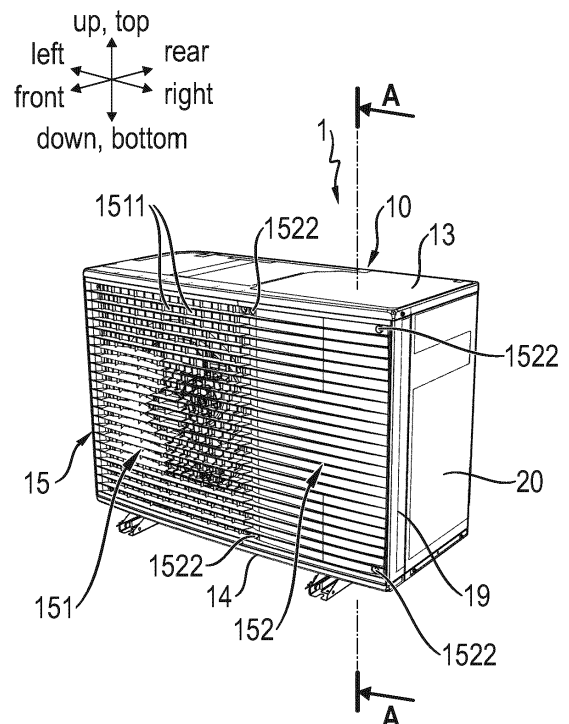


Fig. 1

Description

TECHNICAL FIELD

[0001] The present disclosure relates to a heat source unit of a heat pump and to a heat pump having such a heat source unit.

BACKGROUND

[0002] In general, a heat pump comprises in its most simple form a refrigerant circuit connecting a usage side heat exchanger, a compressor, a heat source heat exchanger, and an expansion valve, wherein a refrigerant is circulated in the refrigerant circuit for transporting heat or cold from the heat source heat exchanger to the usage side heat exchanger.

[0003] The heat source unit of such a heat pump is in most cases installed outdoors and includes the heat source heat exchanger for exchanging heat between outside air and the refrigerant. For this purpose, the heat source unit comprises a casing, a fan accommodated in the casing and being rotatable about a center axis as well as a bell mouth having an opening centered on the center axis of the fan for allowing an air flow induced by the fan to pass and flow through the heat source heat exchanger.

[0004] In order to comply with industrial standards and regulations, a grille or fan guard is provided, covering the opening of the bell mouth and, hence, the blades of the fan. In particular, the grille must be designed in such a way so as to comply with finger safety standards and regulations, for protecting the fingers of a user from the rotating fan blades.

[0005] The heat source units are often installed outdoors in front of residential buildings, sometimes even right beside the front door. From this perspective, there is also a desire to improve the outer appearance of the outdoor units. In most of these heat source units, the grille is oriented vertically covering a portion of the front of the casing. Thus, the grille has a significant influence on the outer appearance of the entire heat source unit. In order to improve the outer appearance of the heat source unit, there are front grilles that cover the entire front of the heat source unit, i.e., a portion of the heat source unit where the fan is located (e.g., an air chamber), and a portion of the heat source unit where usually components of the refrigerant circuit of the heat pump are located (e.g., a machine chamber). Such components can be, for example, a compressor, an expansion valve, a controller of the heat pump, and/or other sensitive electronic components of the heat pump.

[0006] For example, such a heat source unit is disclosed in EP 3 705 732 A1. The heat source unit comprises a grille 100, that is disposed on a front side of the heat source unit, i.e., a front grille 100. The front grille 100 has a fan portion 110 that covers an air chamber and a machine chamber portion 111 that covers a machine

chamber, the fan portion 110 and the machine chamber portion 111 forming an integral part, or one piece.

[0007] However, the configuration disclosed in EP 3 705 732 A1 has the following drawback. For maintenance of the components of the refrigerant circuit of the heat pump, access to the machine chamber needs to be provided. For that purpose, in the device of EP 3 705 732 A1, access to the machine chamber can be provided by disassembling the back plate 16. However, in case the heat source unit is installed in front of a residential building, the back plate 16 faces the wall of the building and is often not far removed therefrom. Thus, there is only little space between the wall of the building and the heat source unit, thereby making access to the components of the machine chamber and maintenance work difficult. On the other hand, the front grill 100 could be removed to allow access to the machine chamber from the front side of the heat source unit, thereby, however, also exposing the fan blades. In case it is accidentally forgotten to power off the heat source unit before maintenance, the rotating fan blades constitute an increased danger for a user when the front grille 100 is removed.

SUMMARY

[0008] Taking the aforesaid into account, it is an object of the present disclosure to provide a heat source unit of a heat pump which allows for improved maintenance work, in particular, regarding a heat source unit having a front grille covering the entire front side of the heat source unit.

[0009] This object is solved by a heat source unit as defined in claim 1. Optional features and preferred embodiments of the heat source unit are defined in the dependent claims.

[0010] According to a first aspect, a heat source unit of a heat pump having a refrigerant circuit comprises a fan and a heat source unit casing, the heat source unit casing comprising an air chamber accommodating the fan, and a machine chamber accommodating components of the refrigerant circuit of the heat pump. A top plate is disposed on a top side of the heat source unit, a bottom plate is disposed on a bottom side of the heat source unit, and a front grille is disposed on a front side of the heat source unit and extends over both the air chamber and the machine chamber. The front grille comprises an air chamber portion covering at least a part of the air chamber and a machine chamber portion covering at least a part of the machine chamber. The air chamber portion and the machine chamber portion are provided as two separate parts, separated along a direction from the top plate toward the bottom plate, wherein the machine chamber portion is detachably attached to the heat source unit casing so as to be removable therefrom.

[0011] Since the front grille of the heat source unit comprises an air chamber portion covering at least a part of the air chamber and a machine chamber portion covering at least a part of the machine chamber, and the air cham-

ber portion and the machine chamber portion are provided as two separate parts, separated along a direction from the top plate toward the bottom plate, and the machine chamber portion is detachably attached to the heat source unit casing so as to be removable therefrom, for maintenance work on the machine chamber, the machine chamber portion of the front grille can be disassembled from the heat source unit. Thus, access to the machine chamber can be provided from the front side of the heat source unit, thereby providing an improved accessibility to the machine chamber and, thus, enough space for maintenance work, as compared to a case where a back plate of the heat source unit is removed for maintenance work. Moreover, it is possible to only detach the machine chamber portion of the front grille for maintenance work. The air chamber portion of the front grille can remain attached to the heat source unit casing, so that the air chamber and, thus, the fan blades remain covered by the front grille. This also constitutes an improved access to the machine chamber because access is provided while safety during maintenance work is still ensured, thereby making maintenance work easier. This is opposite to a device in which the entire front grille needs to be removed from the heat source unit casing for maintenance work. For this reason, overall maintenance work can be improved.

[0012] The air chamber accommodates the fan. The fan may be rotatable about a fan rotation axis. The air chamber may also accommodate a bell mouth having an opening centered on the fan rotation axis of the fan for allowing an air flow induced by the fan to pass and flow through a heat source heat exchanger of the heat source unit.

[0013] The components of the refrigerant circuit of the heat pump accommodated in the machine chamber may comprise a compressor, an expansion valve, a controller of the heat pump, and/or sensitive electronic parts of the heat pump, such as a terminal block. Generally, the machine chamber may be designed for protecting these components from the outside environment, such as rain and wind. The machine chamber may also be designed to prohibit unauthorized people from accessing the machine chamber.

[0014] The "top side" of the heat source unit and the "bottom side" of the heat source unit may designate the sides of the heat source unit, when the heat source unit is in use or installed at a certain location or site, such as at a residential building or the like, as part of a heat pump. In this example, the bottom plate that is disposed on the bottom side of the heat source unit is disposed closer to the ground than the top plate that is disposed on the top side of the heat source unit. The bottom plate may be the plate on which a compressor of the heat source unit is disposed.

[0015] The top plate and the bottom plate may be made of metal, such as sheet metal. The top plate and the bottom plate may cover the top and, respectively, the bottom of the interior space of the heat source unit.

[0016] The "front side" of the heat source unit may designate the side of the heat source unit through which air is blown out from the heat source unit when an airflow is generated by the fan. The front side of the heat source unit may be a side that, when the heat source unit is installed at a building or the like, as part of a heat pump, faces away from the building.

[0017] In general, the heat source unit may have a rectangular, or substantially rectangular, structure. By use of the term "substantially", it is intended to include structures in which respective side walls do not form exact 90° angles and/or are slightly curved. The front grille may be disposed on the front side of the heat source unit, so as to be perpendicular, or substantially perpendicular, to the top plate and the bottom plate. The top plate and the bottom plate may be parallel to and oppose each other.

[0018] The front grille may extend over both the air chamber and the machine chamber, such that a substantial part of the air chamber and the machine chamber are covered by the front grille, or such that the entire air chamber and the entire machine chamber are covered by the front grille.

[0019] The front grille may be formed from metal, plastic, or resin. The front grille is provided with a plurality of air flow openings, wherein an airflow generated by the fan passes through the air flow openings. The air flow openings may be defined by a plurality of horizontal ribs and a plurality of vertical ribs extending perpendicularly to the horizontal ribs.

[0020] Since the front grille extends over both the air chamber and the machine chamber of the heat source unit casing, a front side of the heat source unit has a more uniform appearance, thereby achieving an improved appearance as compared to devices in which the front grille only covers the air chamber, while the machine chamber is covered from the outside by a metal plate, or the like.

[0021] The front grille comprises an air chamber portion and a machine chamber portion. The air chamber portion covers at least a part of the air chamber. The machine chamber portion covers at least a part of the machine chamber. The term "at least" is intended to include that the air chamber portion may cover the entire air chamber and the machine chamber portion may cover the entire machine chamber.

[0022] The air chamber portion may also cover the entire air chamber and part of the machine chamber, and the machine chamber portion may cover the remaining part of the machine chamber. In any case, it is to be ensured that after removing the machine chamber portion from the heat source unit casing sufficient access to the machine chamber is provided for maintenance work.

[0023] Likewise, the machine chamber portion may also cover the entire machine chamber and part of the fan chamber, and the fan chamber portion may cover the remaining part of the fan chamber. In any case, it is to be ensured that after removing the machine chamber portion from the heat source unit casing the fan blades

are still sufficiently covered from the outside by the air chamber portion of the grille, so as to reduce danger caused by rotating fan blades.

[0024] While the air chamber portion covering at least a part of the air chamber generally comprises the plurality of air flow openings, the machine chamber portion may have a closed surface without openings. However, the horizontal ribs and/or the vertical ribs may also extend over the machine chamber portion. This further increases uniformity of the appearance of the front side of the heat source unit, thereby improving an overall appearance of the heat source unit.

[0025] The direction from the top plate toward the bottom plate may also be designated as an up-down direction. The direction from the top plate toward the bottom plate may be perpendicular, or substantially perpendicular, to the top plate and the bottom plate. By use of the term "substantially", it is intended to include structures in which the angle does not form an exact 90° angle, but also includes angles of, for example, 85° to 95°.

[0026] The air chamber and the machine chamber may generally be arranged next to each other in a left-right direction of the heat source unit. The left-right direction is intended to designate a direction that is parallel to the top plate and the bottom plate and parallel to the front grille of the heat source unit. In this case, the air chamber portion and the machine chamber portion are separated in the left-right direction, i.e., they form two separate portions, one disposed on the left side and the other disposed on the right side of the heat source unit. In other words, in this case the air chamber portion and the machine chamber portion are separated along the direction from the top plate toward the bottom plate, i.e., along the up-down direction.

[0027] The air chamber portion and the machine chamber portion may be separated along the direction from the top plate toward the bottom plate so that the air chamber portion comprises an air chamber portion end face and the machine chamber portion comprises a machine chamber portion end face, the air chamber portion end face and the machine chamber portion end face opposing each other at the position where the air chamber portion and the machine chamber portion are separated. This position may be designated as separation line. The air chamber portion end face and the machine chamber portion end face may be parallel to a front-rear direction of the heat source unit and perpendicular to the left-right direction, the front-rear direction being perpendicular to the up-down direction and the left-right direction. Preferably, however, the air chamber portion end face and the machine chamber portion end face may be inclined with respect to the front-rear direction of the heat source unit and may be inclined with respect to the left-right direction. In this state, the machine chamber portion end face may overlap the air chamber portion end face at the separation line. Thus, the position where the air chamber portion and the machine chamber portion are separated is better concealed in the left-right direction, thereby further im-

proving the outer appearance of the front grille.

[0028] The machine chamber portion is detachably attached to the heat source unit casing so as to be removable therefrom, in particular, independently of the air chamber portion or without the need to remove, or even partly remove, the air chamber portion, and, in particular, independently of the top plate or without the need to remove, or even partly remove, the top plate. The machine chamber portion may be detachably attached to the heat source unit casing so as to be removable therefrom by screw connection. For example, one or more screws may be used to detachably attach the machine chamber portion to the heat source unit casing. For example, four screws may be used.

[0029] According to a second aspect, the heat source unit casing may further comprise a cover plate covering the machine chamber on the front side of the heat source unit, wherein the machine chamber portion of the front grille may be disposed in front of the cover plate when the heat source unit is viewed from the front side and connected with the cover plate, so that the cover plate is removable from the heat source unit casing together with the machine chamber portion.

[0030] The cover plate may be a plate that is designed to protect the components of the refrigerant circuit of the heat pump accommodated in the machine chamber. The cover plate may generally be made of metal or plastic. The cover plate may cover a substantial part of the machine chamber or the entire machine chamber on the front side of the heat source unit.

[0031] The cover plate may extend in the up-down direction from the top plate to the bottom plate and may be parallel to the machine chamber portion.

[0032] The machine chamber portion of the front grille may be disposed in front of the cover plate when the heat source unit is viewed from the front side, so that no further parts or layers are disposed between the machine chamber portion and the cover plate.

[0033] With this configuration, since the machine chamber portion is connected with the cover plate so that the cover plate is removable from the heat source unit casing together with the machine chamber portion, the machine chamber portion and the cover plate can be removed from the heat source unit casing at once in order to perform maintenance work. This further improves accessibility to the machine chamber and, thus, maintenance work.

[0034] According to a third aspect, the machine chamber portion and the cover plate may be connected with each other by means of a snap connection.

[0035] For example, the machine chamber portion may have at an upper end and at a lower end thereof, the upper end of the machine chamber portion opposing the top plate and the lower end of the machine chamber portion opposing the bottom plate, one or more convex parts, or protruding parts, protruding upward and, respectively, downward. The cover plate may have at an upper end and at a lower end thereof, the upper end of the cover

plate opposing the top plate and the lower end of the cover plate opposing the bottom plate, one or more receiving holes, respectively cooperating with the one or more convex parts of the machine chamber portion, so as to form the snap connection. More specifically, the one or more convex parts of the machine chamber portion are designed so as to enter the one or more receiving holes of the cover plate.

[0036] With this configuration, a simple mechanism is provided so as to connect the machine chamber portion with the cover plate.

[0037] In addition to that, the machine chamber portion and the cover plate may be connected with each other by means of one screw, or at least one screw. While the snap connection may be provided at the upper and lower ends of the machine chamber portion and the cover plate, the at least one screw may be provided between the upper end and the lower end of the machine chamber portion and the cover plate. The at least one screw may be a thermoplastic screw. Hence, with this at least one screw, the cover plate is prevented from rattling, while vibrating, when the heat pump is operated.

[0038] According to a fourth aspect, the machine chamber portion may be detachably attached to the heat source unit casing by means of screws, the screws passing through respective through holes provided in the cover plate.

[0039] The screws may be ordinary metal screws.

[0040] In an example, the cover plate may be made of metal, and the machine chamber portion may be made of plastic or resin. In case of a fire occurring at the heat source unit, the machine chamber portion will melt, but the cover plate will not melt as it is made of metal. Since the screws pass through respective through holes provided in the cover plate and are fixed to the heat source unit casing, even if the machine chamber portion has melted away in case of a fire, with this configuration, the cover plate remains in front of the machine chamber, thereby protecting components accommodated in the machine chamber.

[0041] Moreover, since the screws attaching the machine chamber portion to the heat source unit casing also pass through the through holes provided in the cover plate, the total number of screws for attaching the machine chamber portion of the front grille and the cover plate to the heat source unit casing can be reduced, thereby improving maintenance work.

[0042] According to a fifth aspect, the cover plate may be made of metal and the front grille may be made of resin.

[0043] In particular, the air chamber portion and the machine chamber portion may be made of resin. The air chamber portion and machine chamber portion may be made of the same resin.

[0044] For example, the front grille may be formed from polypropylene.

[0045] With this configuration, manufacturing costs can be reduced in comparison to the case where the front

grille is manufactured by sheet metal or the like. In addition, the outer appearance of the grille and, thus, of the heat source unit is improved by using a front grille made of resin.

[0046] Furthermore, in some countries, there are strict regulations and requirements in terms of fire resistance for plastic or polymeric parts forming enclosures that contain exposed uninsulated live parts. For example, such plastic or polymeric parts shall have a 5VA flammability rating when tested in accordance with certain standards. A front grille made of resin generally constitutes such a part that encloses exposed uninsulated live parts, at least at the machine chamber. Plastic or polymeric parts having a 5VA flammability rating are usually more expensive than plastic or polymeric parts having a lower flammability rating.

[0047] However, since the heat source unit comprises the cover plate, and the cover plate is made of metal and covers the machine chamber of the heat source unit casing, as explained above, in case of a fire occurring at the heat source unit, even if the machine chamber portion has melted away due to the fire, the cover plate remains in front of the machine chamber, thereby protecting components accommodated in the machine chamber. Thus, with this configuration, the fire resistance requirements for the machine chamber portion of the front grille do not necessarily have to comply with the above strict regulations due to provision of the metal cover plate, thereby further reducing costs.

[0048] According to a sixth aspect, the heat source unit casing may further comprise an insulation layer attached to an inner surface of the cover plate, the inner surface of the cover plate facing toward the inside of the machine chamber, so that the insulation layer may be removable from the heat source unit casing together with the cover plate and the machine chamber portion.

[0049] The insulation layer may be a layer for sound insulation, the sound being generated by components of the heat pump, such as the compressor. The insulation layer may be made of flame resistant polyester fiber.

[0050] For example, the insulation layer may be attached to the inner surface of the cover plate by means of adhesive, such as acrylic emulsion adhesive with polyester scrim.

[0051] With this configuration, since the insulation layer is removable from the heat source unit casing together with the cover plate and the machine chamber portion, these parts can be removed at once and maintenance work is further improved due to a quicker accessibility to the machine chamber.

[0052] According to a seventh aspect, the machine chamber portion may be removable from the heat source unit casing without removing the top plate.

[0053] For example, in the prior art heat source units, in order to provide access to the machine chamber from the front side, the top plate of the heat source unit needs to be removed first due to the internal configuration of the heat source unit, thereby making maintenance work

more burdensome.

[0054] By providing a machine chamber portion that is removable from the heat source unit casing without removing the top plate, accessibility to the machine chamber is further improved, thereby further improving maintenance work. In particular, since the top plate does not need to be removed, the inside of the heat source unit can be protected from rainwater, or the like.

[0055] According to an eighth aspect, at least a front side end of the bottom plate may be provided with a first flange extending upward from the bottom plate, wherein the machine chamber portion may be disposed at the heat source unit casing so that a lower end of the machine chamber portion may be located above an upper end of the first flange.

[0056] The front side end of the bottom plate and the front side end of the top plate are intended to be the ends of the bottom plate and the top plate at the front side of the heat source unit.

[0057] An upward direction may be understood as a direction from the bottom plate to the top plate. A downward direction may be understood as a direction from the top plate to the bottom plate.

[0058] The first flange extending upward from the bottom plate may be a separate part. Preferably, the first flange may be an integral part of the bottom plate. The first flange may also be understood as a rim of the bottom plate. For example, the first flange may be formed by bending a part of a flat bottom plate at the front side upward so that the bent part and the bottom plate may include an angle of approximately 90°.

[0059] With this configuration, since a lower end of the machine chamber portion may be located above an upper end of the first flange of the bottom plate when the machine chamber portion is disposed at the heat source unit casing, the machine chamber portion can be removed from the heat source unit casing without removing the top plate. For example, even if an upper end of the machine chamber portion may be located behind a lower end of a second flange that may be provided at a front side end of the top plate when the heat source unit is viewed from the front side, the top plate does not need to be removed because the machine chamber portion can be pivoted outward, at the lower end thereof, to the front side and then, the machine chamber portion can be moved downward so as to remove the upper end of the machine chamber portion from the second flange of the top plate. Thus, accessibility to the machine chamber can be further improved, thereby further improving maintenance work.

[0060] According to a ninth aspect, the lower end of the machine chamber portion may comprise a lip portion protruding further to the front side of the heat source unit than the first flange of the bottom plate.

[0061] The lip portion may be separate part, connected to the lower end of the machine chamber portion. Preferably, however, the lip portion is an integral part of the machine chamber portion.

[0062] The lip portion may face an upper end of the first flange of the bottom plate in the up-down direction of the heat source unit. The lip portion may be in contact with the upper end of the first flange, or there may be provided a gap, such as a tolerance gap, between the lip portion and the upper end of the first flange. For example, such tolerance gap may account for thermal expansions of the constituent parts of the heat source unit. For example, the tolerance gap may have an extension of 0.5 to 2.0 mm, preferably of 1.2 mm.

[0063] With this configuration, it is possible to prevent rainwater flowing downwards on the outside of the machine chamber portion from entering the machine chamber. Moreover, the machine chamber portion can temporarily rest with the lip portion on the upper end of the first flange, for example, when the screws fixing the machine chamber portion to the heat source unit casing are removed. This also facilitates maintenance work.

[0064] According to a tenth aspect, the heat source unit casing may further comprise a partition plate separating the air chamber and the machine chamber from each other, and a pillar that is arranged in a corner of the machine chamber located at the side of the machine chamber opposing the partition plate and that extends along the direction from the top plate toward the bottom plate, wherein the machine chamber portion may be detachably attached to the partition plate and the pillar.

[0065] The partition plate may be made of sheet metal. The air chamber and the machine chamber may be arranged next to each other, as seen in the left-right direction. The partition plate may be arranged within the heat source unit casing so as to extend perpendicularly, or substantially perpendicularly, from the top plate toward the bottom plate.

[0066] The pillar may be made of metal, such as a sheet metal. When the heat source unit is viewed from the front side, the pillar may form part of the side surface of the heat source unit at the machine chamber side. As such, the pillar may be arranged in a front side corner of the bottom plate and the top plate.

[0067] The machine chamber portion may be detachably attached to the partition plate and the pillar by means of screws. In particular, there may be provided two screws for attaching one side of the machine chamber portion to the partition plate and two further screws for attaching the other side of the machine chamber portion to the pillar.

[0068] With this configuration, the machine chamber portion can be removed from the heat source unit casing, without the need of removing a top plate, since the machine chamber portion is not connected to the top plate and attached to the heat source unit casing independently of the top plate. Thus, by providing the pillar, certain parts of the heat source unit casing can be separately removed from the heat source unit casing without the need to remove other parts thereof, while the structural strength of the heat source unit can still be ensured.

[0069] According to an eleventh aspect, at least a front

side end of the top plate may be provided with a second flange extending downward from the top plate, wherein an upper end of the machine chamber portion may be configured so that, when the machine chamber portion is disposed at the heat source unit casing, the second flange overlaps the upper end of the machine chamber portion when the heat source unit is viewed from the front side.

[0070] The second flange extending downward from the top plate may be a separate part. Preferably, the second flange may be an integral part of the top plate. The second flange may also be understood as a rim of the top plate. For example, the second flange may be formed by bending a part of a flat top plate at the front side downward so that the bent part and the top plate may include an angle of approximately 90°.

[0071] With this configuration, since an upper end of the machine chamber portion is located behind the second flange of the top plate when the heat source unit is viewed from the front side, the inside of the machine chamber portion has a better protection from rainwater.

[0072] Alternatively, the upper end of the machine chamber portion may be configured so that, when the machine chamber portion is disposed at the heat source unit casing, the upper end of the machine chamber portion is located below the second flange of the top plate when the heat source unit is viewed from the front side. With this configuration, the machine chamber portion can be more easily removed from the heat source unit casing, because the upper end of the machine chamber portion is not located behind the second flange of the top plate when the heat source unit is viewed from the front side. Thus, after removing the screws fixing the machine chamber portion to the heat source unit casing, the machine chamber portion can be simply pulled toward the front side, and does not need to be pivoted to the front side first and then, moved downward to remove the upper end of the machine chamber portion from the second flange of the top plate. Thus, improved accessibility and improved maintenance work can be achieved.

[0073] According to a twelfth aspect, the heat source unit casing may further comprise a side plate covering a side of the machine chamber, wherein the side plate may be removable from the heat source unit casing without removing the top plate and the machine chamber portion.

[0074] The side plate may be made of metal, such as sheet metal. In case the machine chamber is located on the right side of the heat source unit casing, the side plate may form the right side plate of the heat source unit casing. In case the machine chamber is located on the left side of the heat source unit casing, the side plate may form the left side plate of the heat source unit casing.

[0075] For example, in prior art heat source units, in order to provide access to the machine chamber from the side, for example, the right side of the heat source unit, the top plate and/or the front grille of the heat source unit needs to be removed first due to the internal configuration of the heat source unit, thereby making maintenance work more burdensome.

work more burdensome.

[0076] By providing a side plate that is removable from the heat source unit casing without removing the top plate and the machine chamber portion, accessibility to the machine chamber is further improved, thereby further improving maintenance work. Moreover, since the top plate does not need to be removed, the inside of the heat source unit can be protected from rainwater, or the like.

[0077] It is also conceivable that, for an even better accessibility to the machine chamber, both the side plate and the machine chamber portion, together with the cover plate and the insulation layer, are removed from the heat source unit casing, thereby providing access from the front side and the side of the heat source unit. The provision of the pillar ensures the structural strength of the heat source unit.

[0078] According to a thirteenth aspect, at least the front side end and a side end of the top plate may be provided with the second flange, wherein the side plate may comprise a first edge forming an upper end of the side plate, wherein the first edge may be configured so that when the side plate is disposed at the heat source unit casing, the second flange overlaps the first edge of the side plate when the heat source unit is viewed from the side, wherein the side plate may further comprise a first hook at a first side end thereof, the first hook extending upward to engage with a first hole provided in the pillar.

[0079] The first edge of the side plate that forms an upper end of the side plate may be an integral part of the side plate. For example, the first edge of the side plate may be offset from the rest of the side plate toward the inside of the heat source unit casing, so as to form a step on the outer surface of the side plate. In this way, the first edge can be configured so that the second flange overlaps the first edge when the side plate is disposed at the heat source unit casing and when the heat source unit is viewed from the side. The second flange of the top plate provided at the side end of the top plate can then rest on this step on the outer surface of the side plate.

[0080] The side plate may be screwed at a lower end of the side plate to the bottom plate, in particular, to the first flange of the bottom plate that may also be provided at a side end of the bottom plate.

[0081] The side plate may comprise at least a first hook at a first side end thereof. For example, the side plate may comprise at least two first hooks at the first side end thereof, wherein the two first hooks are separated from each other in an up-down direction of the heat source unit. In this case, the pillar may be provided with at least two first holes, also separated from each other in the up-down direction. The first hole may be a longitudinal slit, extending in the up-down direction. Since the first hook extends upward to engage with the first hole provided in the pillar, for removing the side plate from the machine chamber, after removing the screws from the side plate, the side plate merely needs to be slid downward so as to remove the upper end of the side plate from the second

flange provided at the side end of the top plate and then, the first hook can be removed from the first hole of the pillar, thereby removing the side plate from the heat source unit casing. In particular, the top plate does not need to be removed for removing the side plate.

[0082] With this configuration, accessibility of the machine chamber from the side of the heat source unit can be improved, thereby further improving maintenance work.

[0083] According to a fourteenth aspect, the heat source unit casing may further comprise a rear plate covering at least part of the rear side of the machine chamber, wherein the side plate may further comprise a second hook at a second side end thereof the second hook extending upward to engage a second hole provided in the rear plate.

[0084] The rear plate may be made of metal, such as sheet metal. As regards the second hook at the second side end of the side plate, the same features may apply as in case of the first hook. Furthermore, as regards the second hole provided in the rear plate, the same features may apply as in case of the first hole.

[0085] With this configuration, the side plate can be attached to the rear plate and still be easily removed from the heat source unit casing, in particular, without the need to remove the top plate, thereby improving accessibility of the machine chamber and, thus, maintenance work.

[0086] According to a fifteenth aspect, the side plate may have an L-shape when the heat source unit is viewed from the top side, the side plate covering the side of the machine chamber and part of the rear side of the machine chamber, wherein the first hook and the second hook may be oriented in parallel with the machine chamber portion and the rear plate.

[0087] Since the first hook and the second hook may be oriented in parallel with the machine chamber portion and the rear plate, for removing the side plate from the machine chamber, after removing the screws from the side plate, the side plate merely needs to be slid downward so as to remove the upper end of the side plate from the second flange provided at the side end of the top plate and then, the first hook can be removed from the first hole of the pillar and the second hook can be removed from the second hole of the rear plate, thereby removing the side plate from the heat source unit casing.

[0088] With this configuration, the side plate can be attached to both the pillar and the rear plate, by providing the hook-hole connection at the first side end and at the second side end of the side plate, and the side plate can still be easily removed from the heat source unit casing, in particular, without the need to remove the top plate, thereby improving accessibility of the machine chamber and, thus, maintenance work.

[0089] According to a sixteenth aspect, the rear plate may be provided with a third flange that extends forward from the rear plate toward the front side of the heat source unit and that has the second hole for engagement with the second hook formed therein, wherein the rear plate

may further be provided with a fourth flange that extends forward from the first flange toward the front side of the heat source unit and to that a reinforcing member connecting the rear plate to the pillar may be fixed, wherein the fourth flange may be provided with a notch at a lower end thereof extending along the direction from the top plate toward the bottom plate.

[0090] The third flange extending forward from the rear plate may be a separate part. Preferably, the third flange may be an integral part of the rear plate. For example, the third flange may be formed by bending a part of a flat rear plate at the side of the rear plate forward so that the bent part and the rear plate include an angle of approximately 90°.

[0091] The fourth flange and the third flange may be formed as integral parts of the rear plate. For example, the fourth flange may be offset from the third flange in the left-right direction, for example, toward an outer side of the heat source unit casing.

[0092] The reinforcing member may be made of metal, such as sheet metal, and may be connected to the fourth flange of the rear plate and to the pillar by means of screws. For example, the reinforcing member may extend along the front-rear direction of the heat source unit. The reinforcing member improves the structural strength of the heat source unit casing.

[0093] The notch may be formed by providing the fourth flange with a lower end that, in an installed state of the rear plate, is located at a higher position than the lower end of the third flange of the rear plate.

[0094] With this configuration, by providing the fourth flange with a notch at a lower end thereof, accessibility to the inside of the machine chamber is further improved, thereby further improving maintenance work.

[0095] According to seventeenth aspect, there is provided a heat pump that comprises the heat source unit according to any one of the preceding aspects.

[0096] Further aspects of the present disclosure may be found in the following description of particular embodiments referring to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0097]

Fig. 1 is a perspective front view of a heat source unit according to the present disclosure.

Fig. 2(a) is a perspective view of a cover plate of the heat source unit of Fig. 1.

Fig. 2(b) is a perspective view of a machine chamber portion of the heat source unit of Fig. 1.

Fig. 2(c) is a perspective view of the cover plate of

Fig. 2(a) connected to the machine chamber portion of

Fig. 2(b), together with an insulation layer.

Fig. 3 is a perspective cross-sectional view of a lower part of the heat source unit of Fig. 1 along the line A-A in Fig. 1.

Fig. 4 is a perspective cross-sectional view of an upper part of the heat source unit of Fig. 1 along the line A-A in Fig. 1.

Fig. 5 is a perspective top view of parts of the heat source unit of Fig. 1.

Fig. 6 is a top view of parts of the heat source unit of Fig. 1.

Fig. 7 is a perspective rear view of the heat source unit of Fig. 1.

Fig. 8 is a perspective top view of parts of the heat source unit of Fig. 1.

Fig. 9 is a perspective top view of parts of the heat source unit of Fig. 1.

DETAILED DESCRIPTION OF PARTICULAR EMBODIMENTS

[0098] Hereinafter, embodiments according to the disclosure will be described in detail with reference to the accompanying drawings in order to describe the disclosure using illustrative examples. Further modifications of certain individual features described in this context can be combined with other features of the described embodiments to form further embodiments of the disclosure.

[0099] Throughout the drawings, the same reference numerals are used for the same or similar elements.

[0100] Fig. 1 is a perspective front view of a heat source unit according to the present disclosure. The heat source unit 1 comprises a heat source unit casing 10. The heat source unit casing 10 comprises an air chamber 11 accommodating a fan 2. In Fig. 1, the air chamber 11 is located on the left side of the heat source unit casing 10, as better shown in Fig. 5. The heat source unit casing 10 also comprises a machine chamber 12 accommodating components of the refrigerant circuit of the heat pump. In Fig. 1, the machine chamber 12 is located on the right side of the heat source unit casing 10, as better shown in Fig. 5.

[0101] A top plate 13 is disposed on a top side of the heat source unit 1, a bottom plate 14 is disposed on a bottom side of the heat source unit 1, and a front grille 15 is disposed on a front side of the heat source unit 1. The front grille 15 extends over both the air chamber 11 and the machine chamber 12. The front grille comprises an air chamber portion 151 covering the air chamber 11 and a machine chamber portion 152 covering the machine chamber 12. As better seen in Fig. 5, the air cham-

ber portion 151 and the machine chamber portion 152 are provided as two separate parts, separated along a direction from the top plate 13 toward the bottom plate 14. In Figs. 5 and 8, the separation line 153 between the air chamber portion 151 and the machine chamber portion 152 is visible.

[0102] The front grille 15 is formed of resin. The air chamber portion 151 of the front grille 15 is provided with a plurality of air flow openings 1511. The air flow openings 1511 are defined by a plurality of horizontal ribs and a plurality of vertical ribs extending perpendicularly to the horizontal ribs. The machine chamber portion 152 has a closed surface without openings. However, the horizontal ribs also extend over the machine chamber portion 152. This further increases uniformity of the appearance of the front side of the heat source unit 1, thereby improving an overall appearance of the heat source unit 1.

[0103] The machine chamber portion 152 is detachably attached to the heat source unit casing 10 so as to be removable therefrom. In the embodiment shown in Fig. 1, there are provided four screws 1522 for detachably attaching the machine chamber portion 152 to the heat source unit casing 10. The removed machine chamber portion 152 is shown in Figs. 2(b) and 2(c).

[0104] With this configuration, it is possible to only disassemble the machine chamber portion 152 of the front grille 15 from the heat source unit 1. Thus, access to the machine chamber 12 can be provided from the front side of the heat source unit 1, thereby providing an improved accessibility to the machine chamber 12 and, thus, improved maintenance work. The air chamber portion 151 of the front grille 15 can remain attached to the heat source unit casing 10, so that the air chamber 11 and, thus, the fan 2 remain covered by the front grille 15. This also constitutes an improved access to the machine chamber 12 because access is provided while safety during maintenance work is still ensured, thereby making maintenance work easier.

[0105] The heat source unit casing 10 further comprises a cover plate 16. The cover plate 16 is shown in Fig. 2(a) in isolation, which is a perspective view of the cover plate 16 of the heat source unit 1 of Fig. 1. The cover plate 16 covers the machine chamber 12 on the front side of the heat source unit 1. In the assembled state, the machine chamber portion 152 is disposed in front of the cover plate 16 and connected with the cover plate 16, so that the cover plate 16 is removable from the heat source unit casing 10 together with the machine chamber portion 152. In this embodiment, the machine chamber portion 152, which is also shown in isolation in Fig. 2(b), and the cover plate 16 are connected with each other by means of a snap connection. The snap connection is realized by the machine chamber portion 152 having, at its upper and lower end, convex parts 1521 protruding upward and, respectively, downward. The cover plate 16 has at an upper end and at a lower end thereof receiving holes 161, respectively cooperating with the convex parts 1521 of the machine chamber portion 152, so as to form

the snap connection. More specifically, the convex parts 1521 of the machine chamber portion 152 are designed so as to enter the receiving holes 161 of the cover plate 16.

[0106] Fig. 2(c) is a perspective view of the cover plate 16 of Fig. 2(a) connected to the machine chamber portion 152 of Fig. 2(b). Also shown in Fig. 2(c) is an insulation layer 17, which is attached to an inner surface of the cover plate 16, so that the insulation layer 17 is removable from the heat source unit casing 10 together with the cover plate 16 and the machine chamber portion 152. The insulation layer 17 may be attached to the inner surface of the cover plate 16 by means of adhesive.

[0107] In this embodiment, the machine chamber portion 152 is detachably attached to the heat source unit casing 10 by means of screws 1522. The screws 1522 pass through respective through holes 162 provided in the cover plate 16. As shown in Fig. 1, there are four screws 1522 fixing the machine chamber portion 152 together with the cover plate 16 and the insulation layer 17 to the heat source unit casing 10.

[0108] With this configuration, the whole assembly shown in Fig. 2(c), i.e., the machine chamber portion 152, the cover plate 16, and the insulation layer 17, can be removed from the heat source unit casing 10 at once, thereby facilitating accessibility to the machine chamber and improving maintenance work.

[0109] Fig. 3 is a perspective cross-sectional view of a lower part of the heat source unit 1 of Fig. 1 along the line A-A in Fig. 1. Fig. 4 is a perspective cross-sectional view of an upper part of the heat source unit 1 of Fig. 1 along the line A-A in Fig. 1.

[0110] As shown in Fig. 3, a front side end of the bottom plate 14 is provided with a first flange 141 extending upward from the bottom plate 14. The machine chamber portion 152 is disposed at the heat source unit casing 10 so that a lower end of the machine chamber portion 152 is located above an upper end of the first flange 141.

[0111] As shown in Fig. 4, a front side end of the top plate 13 is provided with a second flange 131 extending downward from the top plate 13. An upper end of the machine chamber portion 152 is configured so that, when the machine chamber portion 152 is disposed at the heat source unit casing 10, the second flange 131 overlaps the upper end of the machine chamber portion 152.

[0112] With this configuration, the machine chamber portion 152 is removable from the heat source unit casing 10 without removing the top plate 13. That is, for removing the machine chamber portion 152, the lower end thereof is pivoted to the front side of the heat source unit 1 and then, moved downward so as to remove the upper and of the machine chamber portion 152 from the second flange 131. Thus, the top plate 13 does not need to be removed in order to remove the machine chamber portion 152, the cover plate 16, and the insulation layer 17. Hence, access to the machine chamber 12 is improved, thereby improving maintenance work.

[0113] As also shown in Fig. 3, the lower end of the

machine chamber portion 152 comprises a lip portion 1523 protruding further to the front side of the heat source unit 1 than the first flange 141 of the bottom plate 14. With this configuration, it is possible to prevent rainwater flowing downwards on the outside of the machine chamber portion 152 from entering the machine chamber 12. Moreover, the machine chamber portion 152 can temporarily rest with the lip portion 1523 on the upper end of the first flange 141, for example, when the screws 1522 fixing the machine chamber portion 152 to the heat source unit casing 10 are removed. This also facilitates maintenance work.

[0114] Fig. 5 is a perspective top view of parts of the heat source unit 1 of Fig. 1. The top plate 13 is omitted. As mentioned above, in the embodiment shown in Fig. 5, the air chamber 11 is located on the left side and the machine chamber 12 is located on the right side of the heat source unit casing 10. As an example of components of the refrigerant circuit of the heat pump, the compressor 30 is shown in the machine chamber 12. The fan 2 is accommodated in the air chamber 11.

[0115] The heat source unit casing 10 further comprises a partition plate 18 separating the air chamber 11 and the machine chamber 12 from each other. Furthermore, a pillar 19 is arranged in a corner of the machine chamber 12 located at the front right side of the machine chamber 12. The pillar 19 extends along the direction from the top plate 13 toward the bottom plate 14. As shown in Fig. 6, which is a top view of parts of the heat source unit 1 of Fig. 1, the machine chamber portion 152 is attached, i.e., detachably attached, to the partition plate 18 and the pillar 19 by means of screws 1522. With this configuration, the machine chamber portion 152 and the cover plate 16 are fixed to the heat source unit casing 10 independently of the top plate 13 and the air chamber portion 151. Thereby, an improved access to the machine chamber 12 is provided, thereby also facilitating maintenance work.

[0116] As shown in Fig. 7, which is a perspective rear view of the heat source unit 1 of Fig. 1, the heat source unit casing 10 further comprises a side plate 20 covering the right side of the machine chamber 12. The side plate 20 is removable from the heat source unit casing 10 without removing the top plate 13 and the machine chamber portion 152.

[0117] More specifically, as shown in Fig. 7, in Fig. 8, which is a perspective top view of parts of the heat source unit 1 of Fig. 1, and in Fig. 9, which is a perspective top view of parts of the heat source unit 1 of Fig. 1, the side plate 20 comprises a first edge 201 forming an upper end of the side plate 20, wherein the first edge 201 is configured so that, when the side plate 20 is disposed at the heat source unit casing 10 the second flange 131 overlaps the first edge 201 of the side plate 20 when the heat source unit 1 is viewed from the side. The side plate 20 further comprises a first hook 202 at a first side end thereof, wherein the first hook 202 extends upward to engage with a first hole 192 provided in the pillar 19. The side plate 20 is fixed to the bottom plate 14 by means of screws

205, as shown in Fig. 7. A lower end of the side plate 20 is configured so that, when the side plate 20 is disposed at the heat source unit casing 10, the lower end of the side plate 20 overlaps the first flange 141 of the bottom plate 14 when the heat source unit 1 is viewed from the side.

[0118] For removing the side plate 20 from the heat source unit casing 10, the screws 205 are unscrewed, then, the side plate 20 can be slid downward, thereby disengaging the first hook 202 from the first hole 192, thereby allowing the side plate 20 to be removed from the heat source unit casing 10 without the need to remove the top plate 13 of the heat source unit casing 10.

[0119] The heat source unit casing 10 further comprises a rear plate 21 covering part of a rear side of the machine chamber 12. The side plate 20 further comprises a second hook 203 at a second side end thereof, wherein the second hook 203 extends upward to engage a second hole 211 provided in the rear plate 21.

[0120] The side plate 20 has an L-shape, as shown, for example, in Figs. 8 and 9, when the heat source unit 1 is viewed from the top side. As such, the side plate 20 covers the side of the machine chamber 12 and part of the rear side of the machine chamber 12. The side plate 20 also comprises a second edge 204 which forms an upper end of the side plate 20 at the rear side of the heat source unit 1. The second flange 131 of the top plate 13 is, in the present embodiment, also provided at a rear side end of the top plate 13 so as to overlap the second edge 204 of the side plate 20 when the heat source unit 1 is viewed from the rear side, for example, as shown in Fig. 7.

[0121] The first hook 202 and the second hook 203 are oriented in parallel with the machine chamber portion 152 and the rear plate 21. Thus, the side plate 20 can be fixed to both the pillar 19 and the rear plate 21, while still allowing to remove the side plate 20 from the heat source unit casing 10, without the need to remove the top plate 13 from the heat source unit casing 10. Thereby, an improved access to the machine chamber 12 is provided and, thus, improved maintenance work is ensured.

[0122] The rear plate 21 is provided with a third flange 212 that extends forward from the rear plate 21 toward the front side of the heat source unit 1 and that has the second hole 211 for engagement with the second hook 203 formed therein. The rear plate 21 is further provided with a fourth flange 213 that extends forward from the third flange 212 toward the front side of the heat source unit 1 and to that a reinforcing member 22 connecting the rear plate 21 to the pillar 19 is fixed. With this configuration, structural strength of the heat source unit is improved.

[0123] Furthermore, the fourth flange 213 is provided with a notch 2131 at a lower end thereof, the notch 2131 extending along the direction from the top plate 13 toward the bottom plate 14. The size of the notch 2131 in the up-down direction is preferably such that it is possible to work by putting an arm in the back of the machine cham-

ber 12 from the side of the heat source unit 1, after removing the side plate 20. For example, the size of the notch 2131 may be 8 cm to 30 cm, preferably 10 cm to 25 cm, more preferably 12 cm to 20 cm. The size of the notch 2131 in the up-down direction may be 12.5 cm. By providing this notch 2131, accessibility to the machine chamber 12 is further improved.

LIST OF REFERENCE SIGNS

[0124]

1	Heat source unit
2	Fan
10	Heat source unit casing
11	Air chamber
12	Machine chamber
13	Top plate
131	Second flange
14	Bottom plate
141	First flange
15	Front grille
151	Air chamber portion
1511	Air flow openings
152	Machine chamber portion
1521	Convex part
1522	Screw
1523	Lip portion
153	Separation line
16	Cover plate
161	Receiving hole
162	Through hole
17	Insulation layer
18	Partition plate
19	Pillar
20	Side plate
201	First edge
202	First hook
203	Second hook
204	Second edge
205	Screw
21	Rear plate
211	Second hole
212	Third flange
213	Fourth flange
2131	Notch
22	Reinforcing member
30	Compressor

Claims

1. A heat source unit (1) of a heat pump having a refrigerant circuit, the heat source unit (1) comprising:
 - a fan (2) and
 - a heat source unit casing (10), the heat source unit casing (10) comprising

- an air chamber (11) accommodating the fan (2), and a machine chamber (12) accommodating components of the refrigerant circuit of the heat pump,
 wherein a top plate (13) is disposed on a top side of the heat source unit (1),
 a bottom plate (14) is disposed on a bottom side of the heat source unit (1), and
 a front grille (15) is disposed on a front side of the heat source unit (1) and extends over both the air chamber (11) and the machine chamber (12),
 wherein the front grille (15) comprises an air chamber portion (151) covering at least a part of the air chamber (11) and a machine chamber portion (152) covering at least a part of the machine chamber (12),
 wherein the air chamber portion (151) and the machine chamber portion (152) are provided as two separate parts, separated along a direction from the top plate (13) toward the bottom plate (14),
 wherein the machine chamber portion (152) is detachably attached to the heat source unit casing (10) so as to be removable therefrom.
2. The heat source unit (1) according to claim 1, wherein the heat source unit casing (10) further comprises a cover plate (16) covering the machine chamber (12) on the front side of the heat source unit (1), wherein the machine chamber portion (152) of the front grille (15) is disposed in front of the cover plate (16) when the heat source unit (1) is viewed from the front side and connected with the cover plate (16), so that the cover plate (16) is removable from the heat source unit casing (10) together with the machine chamber portion (152).
 3. The heat source unit (1) according to claim 2, wherein the machine chamber portion (152) and the cover plate (16) are connected with each other by means of a snap connection.
 4. The heat source unit (1) according to claim 2 or 3, wherein the machine chamber portion (152) is detachably attached to the heat source unit casing (10) by means of screws (1522), the screws (1522) passing through respective through holes (162) provided in the cover plate (16).
 5. The heat source unit (1) according to any one of claims 2 to 4, wherein the cover plate (16) is made of metal and the front grille (15) is made of resin.
 6. The heat source unit (1) according to any one of claims 2 to 5, wherein the heat source unit casing (10) further comprises an insulation layer (17) attached to an inner surface of the cover plate (16), the inner surface of the cover plate (16) facing toward the inside of the machine chamber (12), so that the insulation layer (17) is removable from the heat source unit casing (10) together with the cover plate (16) and the machine chamber portion (152).
 7. The heat source unit (1) according to any one of the preceding claims, wherein the machine chamber portion (152) is removable from the heat source unit casing (10) without removing the top plate (13).
 8. The heat source unit (1) according to claim 7, wherein at least a front side end of the bottom plate (14) is provided with a first flange (141) extending upward from the bottom plate (14), wherein the machine chamber portion (152) is disposed at the heat source unit casing (10) so that a lower end of the machine chamber portion (152) is located above an upper end of the first flange (141).
 9. The heat source unit (1) according to claim 8, wherein the lower end of the machine chamber portion (152) comprises a lip portion (1523) protruding further to the front side of the heat source unit (1) than the first flange (141) of the bottom plate (14).
 10. The heat source unit (1) according to any one of claims 7 to 9, wherein the heat source unit casing (10) further comprises a partition plate (18) separating the air chamber (11) and the machine chamber (12) from each other, and a pillar (19) that is arranged in a corner of the machine chamber (12) located at a side of the machine chamber (12) opposing the partition plate (18) and that extends along the direction from the top plate (13) toward the bottom plate (14), wherein the machine chamber portion (152) is detachably attached to the partition plate (18) and the pillar (19).
 11. The heat source unit (1) according to claim 10, wherein at least a front side end of the top plate (13) is provided with a second flange (131) extending downward from the top plate (13), wherein an upper end of the machine chamber portion (152) is configured so that, when the machine chamber portion (152) is disposed at the heat source unit casing (10), the second flange (131) overlaps the upper end of the machine chamber portion (152) when the heat source unit

(1) is viewed from the front side.

12. The heat source unit (1) according to any one of the preceding claims,
 wherein the heat source unit casing (10) further comprises a side plate (20) covering a side of the machine chamber (12), wherein the side plate (20) is removable from the heat source unit casing (10) without removing the top plate (13) and the machine chamber portion (152). 5 10
13. The heat source unit (1) according to claim 12 when being dependent on claim 11,
 wherein at least the front side end and a side end of the top plate (13) are provided with the second flange (131),
 wherein the side plate (20) comprises a first edge (201) forming an upper end of the side plate (20),
 wherein the first edge (201) is configured so that, when the side plate (20) is disposed at the heat source unit casing (10), the second flange (131) overlaps the first edge (201) of the side plate (20) when the heat source unit (1) is viewed from the side, 20 25
 wherein the side plate (20) further comprises a first hook (202) at a first side end thereof, the first hook (202) extending upward to engage with a first hole (192) provided in the pillar (19). 30
14. The heat source unit (1) according to claim 13,
 wherein the heat source unit casing (10) further comprises a rear plate (21) covering at least part of a rear side of the machine chamber (12), 35
 wherein the side plate (20) further comprises a second hook (203) at a second side end thereof, the second hook (203) extending upward to engage a second hole (211) provided in the rear plate (21). 40
15. The heat source unit (1) according to claim 14,
 wherein the side plate (20) has an L-shape when the heat source unit (1) is viewed from the top side, the side plate (20) covering the side of the machine chamber (12) and part of the rear side of the machine chamber (12), wherein the first hook (202) and the second hook (203) are oriented in parallel with the machine chamber portion (152) and the rear plate (21). 45 50
16. The heat source unit (1) according to claim 14 or 15,
 wherein the rear plate (21) is provided with a third flange (212) that extends forward from the rear plate (21) toward the front side of the heat source unit (1) and that has the second hole 55

(211) for engagement with the second hook (203) formed therein,
 wherein the rear plate (21) is further provided with a fourth flange (213) that extends forward from the third flange (212) toward the front side of the heat source unit (1) and to that a reinforcing member (22) connecting the rear plate (21) to the pillar (19) is fixed,
 wherein the fourth flange (213) is provided with a notch (2131) at a lower end thereof extending along the direction from the top plate (13) toward the bottom plate (14).

17. A heat pump comprising the heat source unit (1) according to any one of the preceding claims.

Amended claims in accordance with Rule 137(2) EPC.

1. A heat source unit (1) of a heat pump having a refrigerant circuit, the heat source unit (1) comprising:
 a fan (2) and
 a heat source unit casing (10), the heat source unit casing (10) comprising
 an air chamber (11) accommodating the fan (2),
 and a machine chamber (12) accommodating components of the refrigerant circuit of the heat pump,
 wherein a top plate (13) is disposed on a top side of the heat source unit (1),
 a bottom plate (14) is disposed on a bottom side of the heat source unit (1), and
 a front grille (15) is disposed on a front side of the heat source unit (1) and extends over both the air chamber (11) and the machine chamber (12),
 wherein the front grille (15) comprises an air chamber portion (151) covering at least a part of the air chamber (11) and a machine chamber portion (152) covering at least a part of the machine chamber (12),
 wherein the air chamber portion (151) and the machine chamber portion (152) are provided as two separate parts, separated along a direction from the top plate (13) toward the bottom plate (14),
 wherein the machine chamber portion (152) is detachably attached to the heat source unit casing (10) so as to be removable therefrom,
 wherein the heat source unit casing (10) further comprises a cover plate (16) covering the machine chamber (12) on the front side of the heat source unit (1), wherein the machine chamber portion (152) of the front grille (15) is disposed in front of the cover plate (16) when the heat source unit (1) is viewed from the front side and

- characterized in that** the machine chamber portion (152) is connected with the cover plate (16), so that the cover plate (16) is removable from the heat source unit casing (10) together with the machine chamber portion (152). 5
2. The heat source unit (1) according to claim 1, wherein the machine chamber portion (152) and the cover plate (16) are connected with each other by means of a snap connection. 10
 3. The heat source unit (1) according to claim 1 or 2, wherein the machine chamber portion (152) is detachably attached to the heat source unit casing (10) by means of screws (1522), the screws (1522) passing through respective through holes (162) provided in the cover plate (16). 15
 4. The heat source unit (1) according to any one of the preceding claims, wherein the cover plate (16) is made of metal and the front grille (15) is made of resin. 20
 5. The heat source unit (1) according to any one of the preceding claims, wherein the heat source unit casing (10) further comprises an insulation layer (17) attached to an inner surface of the cover plate (16), the inner surface of the cover plate (16) facing toward the inside of the machine chamber (12), so that the insulation layer (17) is removable from the heat source unit casing (10) together with the cover plate (16) and the machine chamber portion (152). 25 30
 6. The heat source unit (1) according to any one of the preceding claims, wherein the machine chamber portion (152) is removable from the heat source unit casing (10) without removing the top plate (13). 35 40
 7. The heat source unit (1) according to claim 6, wherein at least a front side end of the bottom plate (14) is provided with a first flange (141) extending upward from the bottom plate (14), wherein the machine chamber portion (152) is disposed at the heat source unit casing (10) so that a lower end of the machine chamber portion (152) is located above an upper end of the first flange (141). 45 50
 8. The heat source unit (1) according to claim 7, wherein the lower end of the machine chamber portion (152) comprises a lip portion (1523) protruding further to the front side of the heat source unit (1) than the first flange (141) of the bottom plate (14). 55
 9. The heat source unit (1) according to any one of

claims 6 to 8,

wherein the heat source unit casing (10) further comprises a partition plate (18) separating the air chamber (11) and the machine chamber (12) from each other, and a pillar (19) that is arranged in a corner of the machine chamber (12) located at a side of the machine chamber (12) opposing the partition plate (18) and that extends along the direction from the top plate (13) toward the bottom plate (14), wherein the machine chamber portion (152) is detachably attached to the partition plate (18) and the pillar (19).

10. The heat source unit (1) according to claim 9,

wherein at least a front side end of the top plate (13) is provided with a second flange (131) extending downward from the top plate (13), wherein an upper end of the machine chamber portion (152) is configured so that, when the machine chamber portion (152) is disposed at the heat source unit casing (10), the second flange (131) overlaps the upper end of the machine chamber portion (152) when the heat source unit (1) is viewed from the front side.

11. The heat source unit (1) according to claim 10,

wherein the heat source unit casing (10) further comprises a side plate (20) covering a side of the machine chamber (12), wherein at least the front side end and a side end of the top plate (13) are provided with the second flange (131), wherein the side plate (20) comprises a first edge (201) forming an upper end of the side plate (20), wherein the first edge (201) is configured so that, when the side plate (20) is disposed at the heat source unit casing (10), the second flange (131) overlaps the first edge (201) of the side plate (20) when the heat source unit (1) is viewed from the side, wherein the side plate (20) further comprises a first hook (202) at a first side end thereof, the first hook (202) extending upward to engage with a first hole (192) provided in the pillar (19).

12. The heat source unit (1) according to claim 11,

wherein the heat source unit casing (10) further comprises a rear plate (21) covering at least part of a rear side of the machine chamber (12), wherein the side plate (20) further comprises a second hook (203) at a second side end thereof, the second hook (203) extending upward to en-

gage a second hole (211) provided in the rear plate (21).

13. The heat source unit (1) according to claim 12, wherein the side plate (20) has an L-shape when the heat source unit (1) is viewed from the top side, the side plate (20) covering the side of the machine chamber (12) and part of the rear side of the machine chamber (12), wherein the first hook (202) and the second hook (203) are oriented in parallel with the machine chamber portion (152) and the rear plate (21). 5 10
14. The heat source unit (1) according to claim 12 or 13, wherein the rear plate (21) is provided with a third flange (212) that extends forward from the rear plate (21) toward the front side of the heat source unit (1) and that has the second hole (211) for engagement with the second hook (203) formed therein, 15 20 wherein the rear plate (21) is further provided with a fourth flange (213) that extends forward from the third flange (212) toward the front side of the heat source unit (1) and to that a reinforcing member (22) connecting the rear plate (21) to the pillar (19) is fixed, 25 wherein the fourth flange (213) is provided with a notch (2131) at a lower end thereof extending along the direction from the top plate (13) toward the bottom plate (14). 30
15. A heat pump comprising the heat source unit (1) according to any one of the preceding claims. 35

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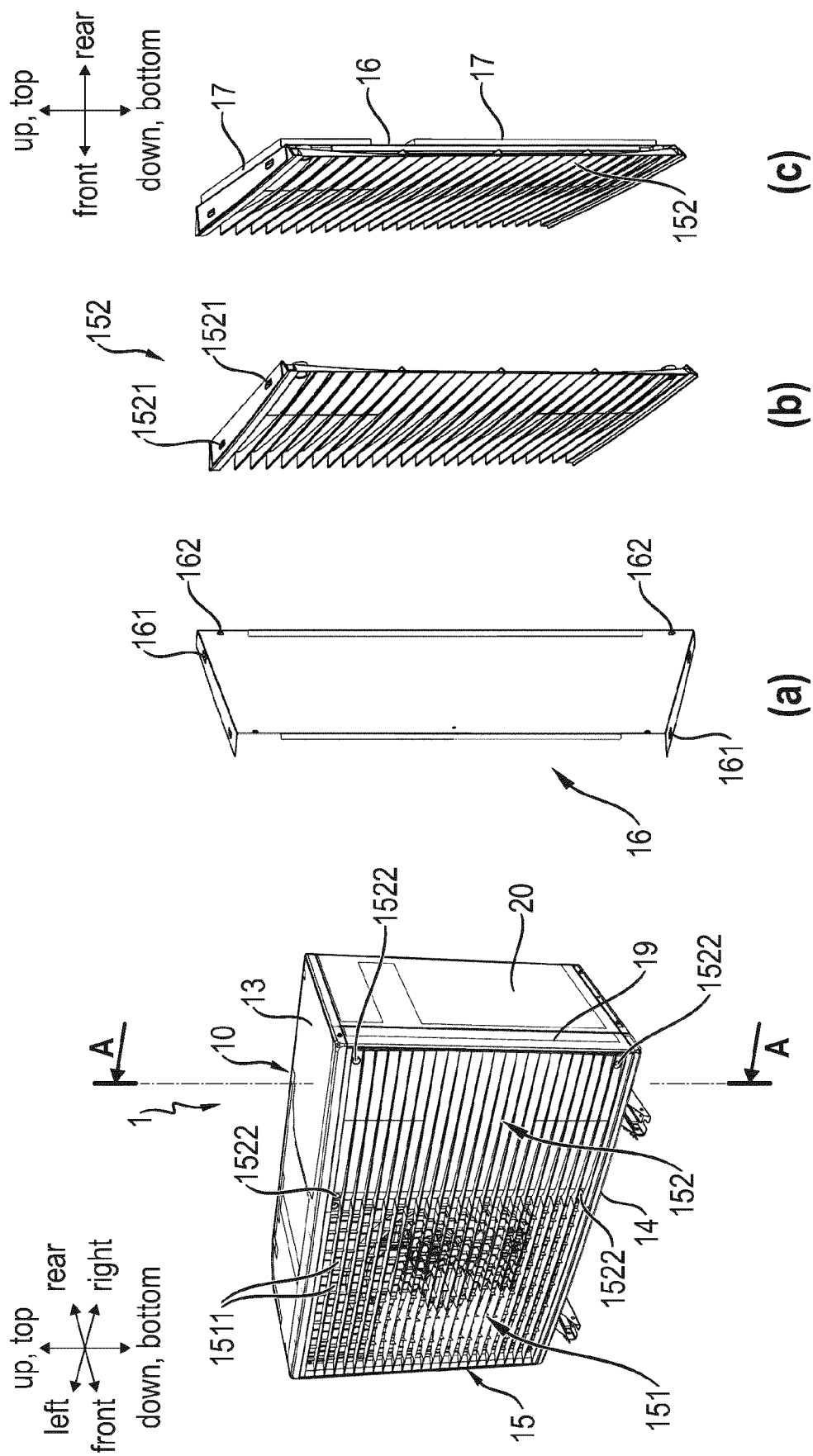


Fig. 1

Fig. 2

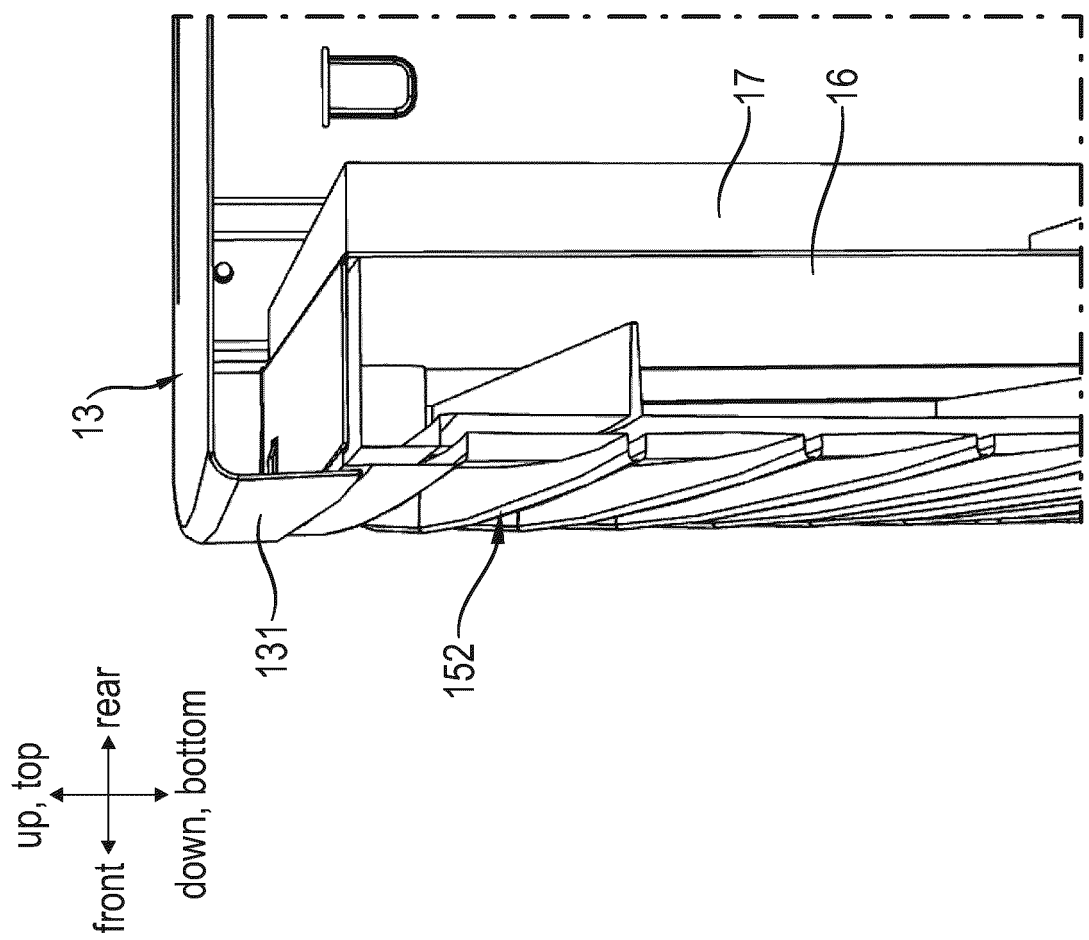


Fig. 3

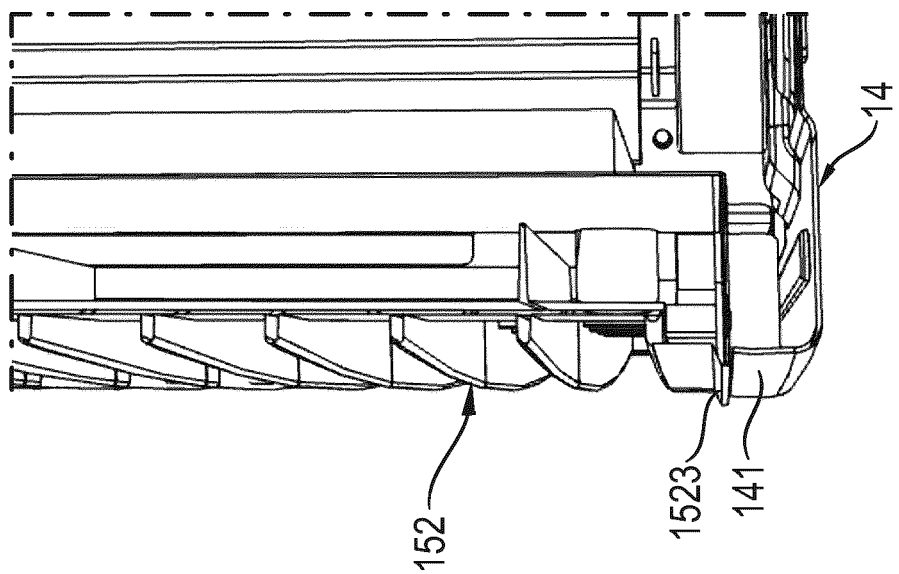


Fig. 4

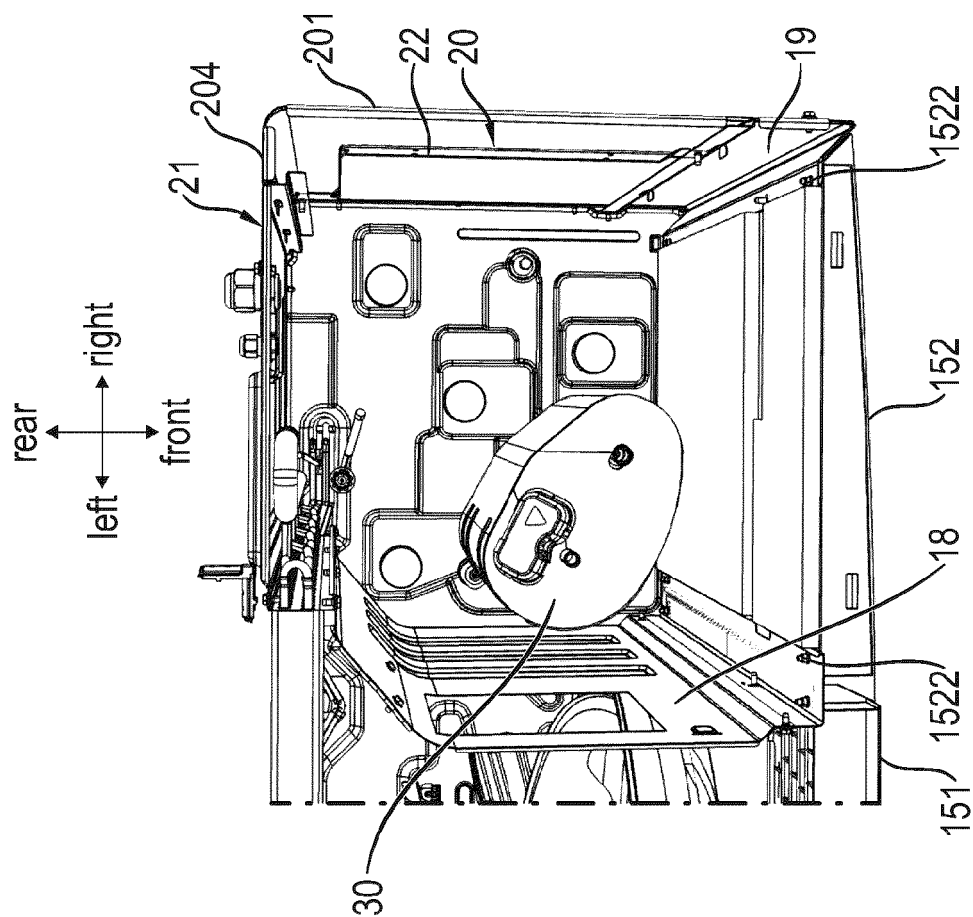


Fig. 6

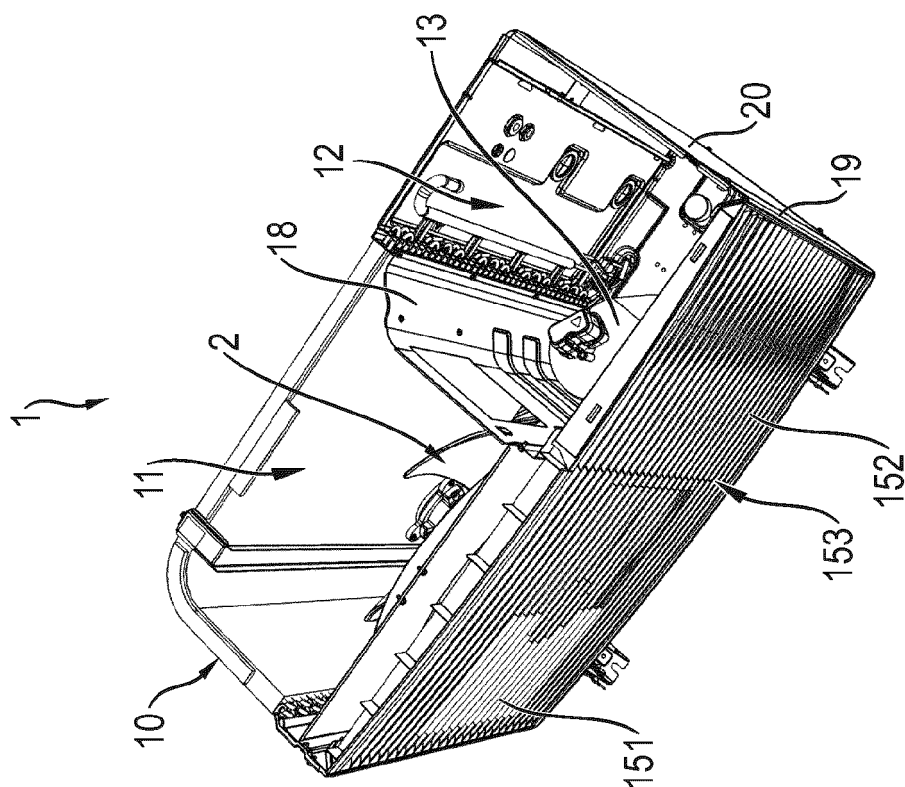


Fig. 5

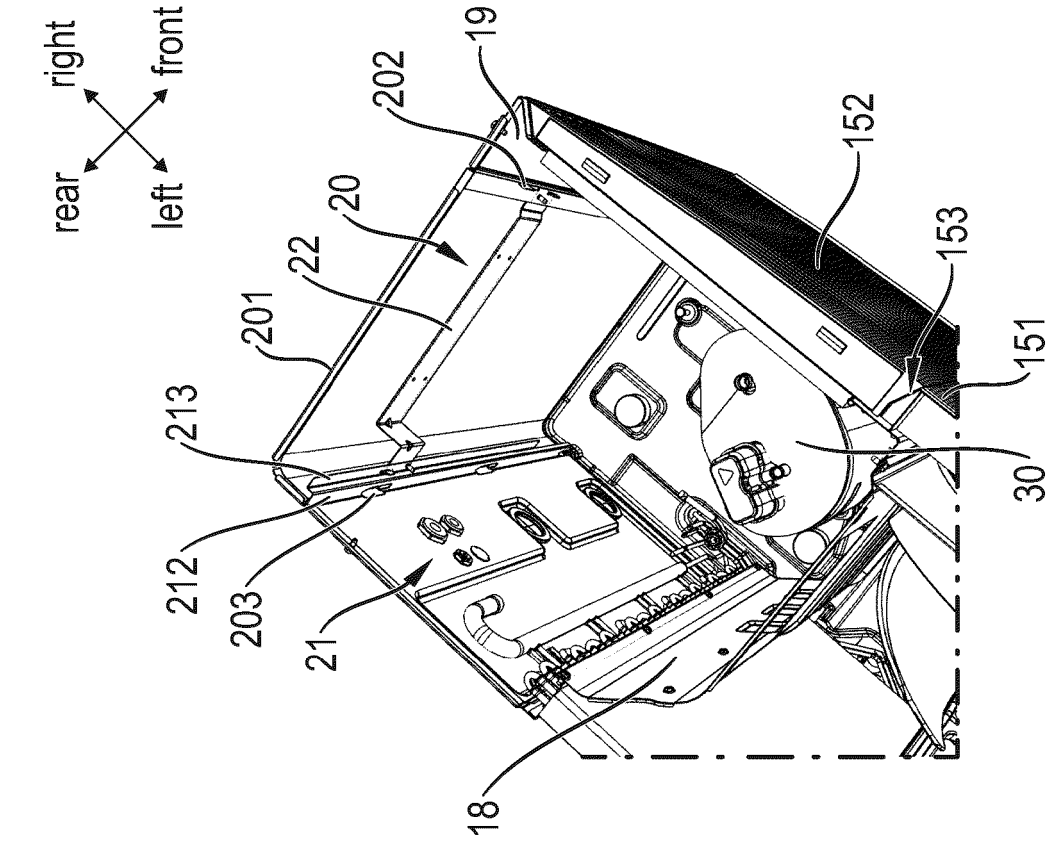


Fig. 7

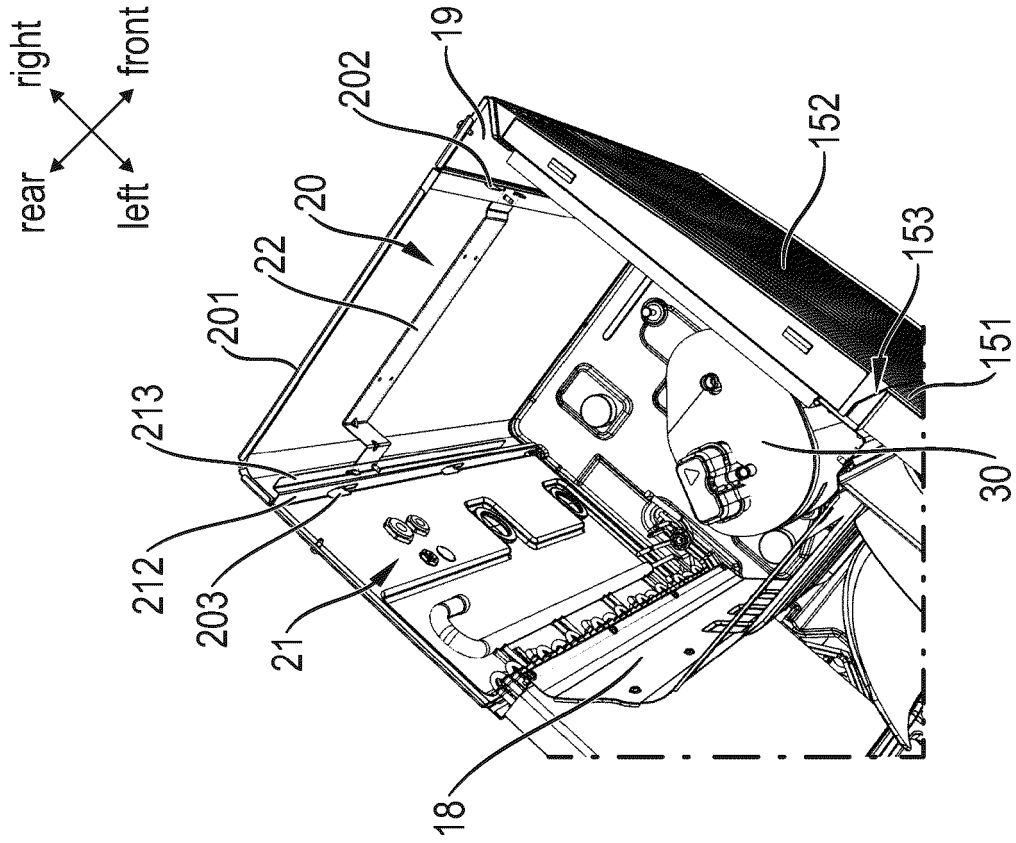
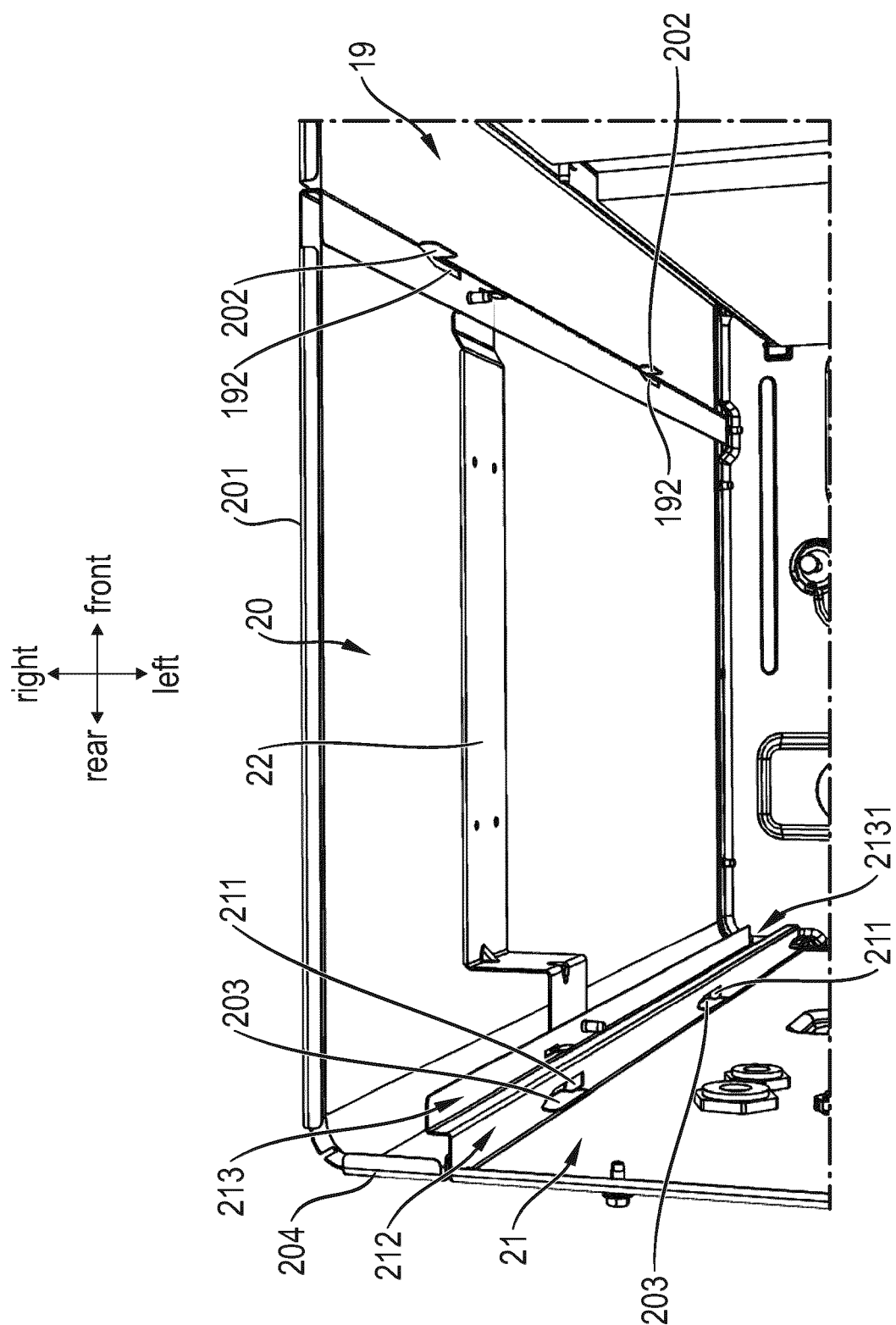


Fig. 8



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Application Number

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A		9, 16	F24F13/08
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