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### (54) HEAT PUMP MOUNTING BOX AND HEAT PUMP DRIER OR HEAT PUMP WASHER-DRIER MACHINE

(57) A heat pump mounting box (1) for a heat pump drier or washer-drier machine and a heat pump drier or washer-drier machine having the same are provided. The heat pump mounting box (1) includes: a base (100) provided with an air suction port (101), a two-device mounting chamber (110), a compressor mounting chamber (120), a cooling air supplement port (121) for communicating the compressor mounting chamber with the outside, and a bypass orifice (131) for communicating the two-device mounting chamber with the compressor mounting chamber; an air passage guide plate mounted

to the base and defining, together with the base, an air guide passage (210) that has a drying air inlet (211) in communication with the air suction port and a drying air outlet (212) in communication with the two-device mounting chamber; and a cover plate (300) mounted over the base and at least covering the two-device mounting chamber. The heat pump mounting box (1) according to the present invention has a function of supplying cooling air, so as to improve the clothes drying performance of the heat pump drier or washer-drier machine.

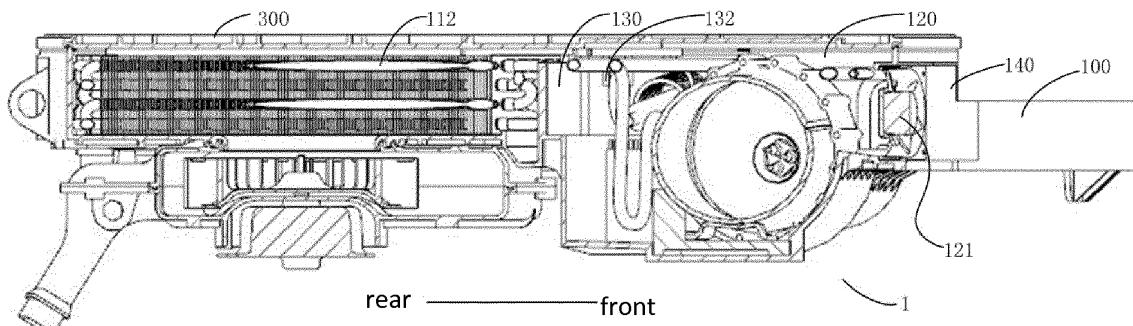


Fig. 1

## Description

### FIELD

**[0001]** The present invention relates to a field of washing equipment, and more particularly to a heat pump mounting box for a heat pump drier or washer-drier machine, and a heat pump drier or washer-drier machine having the same.

### BACKGROUND

**[0002]** For a heat pump drier or washer-drier machine in the related art, due to the high temperature of drying air, a heat pump drying system is easily subject to overheating, thereby degrading the clothes drying performance.

### SUMMARY

**[0003]** The present invention aims to solve at least one of the problems existing in the related art. Thus, embodiments of the present invention provide a heat pump mounting box for a heat pump drier or washer-drier machine, which has a function of supplementing cooling air, so as to improve the clothes drying performance of the heat pump drier or washer-drier machine.

**[0004]** Embodiments of the present invention further provide a heat pump drier or washer-drier machine having the heat pump mounting box.

**[0005]** According to embodiments of a first aspect of the present invention, the heat pump mounting box includes a base provided with an air suction port, a two-device mounting chamber, a compressor mounting chamber, a cooling air supplement port for communicating the compressor mounting chamber with the outside, and a bypass orifice for communicating the two-device mounting chamber with the compressor mounting chamber; an air passage guide plate mounted to the base and defining, together with the base, an air guide passage that has a drying air inlet in communication with the air suction port and a drying air outlet in communication with the two-device mounting chamber; and a cover plate mounted over the base and at least covering the two-device mounting chamber.

**[0006]** According to the embodiments of the present invention, the heat pump mounting box may realize the function of supplementing cooling air by means of the cooling air supplement port and the bypass orifice, such that dry ambient air of low temperature may enter the two-device mounting chamber from the compressor mounting chamber and be mixed with drying air of high humidity and high temperature, so as to lower the temperature of the condenser, avoid the overheating of the heat pump drying system, and hence improve the clothes drying performance of the heat pump drier or washer-drier machine.

**[0007]** Moreover, the heat pump mounting box accord-

ing to the present invention has the following additional technical features.

**[0008]** According to some embodiments of the present invention, the two-device mounting chamber includes an evaporator mounting section and a condenser mounting section communicated with each other, as well as a passage section located between the evaporator mounting section and the condenser mounting section; the air guide passage is in communication with the evaporator mounting section; and the bypass orifice in communication with the condenser mounting section and/or the passage section.

**[0009]** In some embodiments of the present invention, the two-device mounting chamber is separated from the compressor mounting chamber by a partition plate on the base, and the bypass orifice is disposed in the partition plate.

**[0010]** Alternatively, the bypass orifice extends along a length direction of the partition plate and has an open upper surface, and the upper surface of the bypass orifice is covered by the cover plate.

**[0011]** Alternatively, the partition plate is provided with a plurality of pipe-through holes running through the partition plate along a thickness direction thereof.

**[0012]** Preferably, a first part of the plurality of pipe-through holes lead to the evaporator mounting section while a second part of the plurality of pipe-through holes lead to the condenser mounting section, and the second part of the plurality of pipe-through holes are in communication with the bypass orifice.

**[0013]** In some specific embodiments of the present invention, the cooling air supplement port and the bypass orifice are disposed in two opposite side walls of the compressor mounting chamber respectively.

**[0014]** Further, the cooling air supplement port is right opposite the condenser mounting section.

**[0015]** According to some embodiments of the present invention, the base is provided with an air guide flange located at an exterior of the compressor mounting chamber and surrounding the cooling air supplement port.

**[0016]** According to embodiments of a second aspect of the present invention, the heat pump drier or washer-drier machine includes the heat pump mounting box according to the embodiments of the first aspect of the present invention.

**[0017]** The heat pump drier or washer-drier machine according to the present invention employs the heat pump mounting box described above, so as to avoid the overheating of the heat pump drying system to achieve good clothes drying performance, and facilitate componentization and modularization of production and installation.

**[0018]** Additional aspects and advantages of embodiments of present invention will be given in part in the following descriptions, become apparent in part from the following descriptions, or be learned from the practice of the embodiments of the present invention.

**BRIEF DESCRIPTION OF THE DRAWINGS****[0019]**

Fig. 1 is a schematic view of a heat pump mounting box for a heat pump drier or washer-drier machine according to an embodiment of the present invention;

Fig. 2 is a perspective view of the heat pump mounting box according to the embodiment of the present invention;

Fig. 3 is a schematic view of the heat pump mounting box according to the embodiment of the present invention.

Reference numerals:

**[0020]**

heat pump mounting box for a heat pump drier or washer-drier machine 1,  
 base 100, air suction port 101, two-device mounting chamber 110, evaporator mounting section 111, condenser mounting section 112, passage section 113, compressor mounting chamber 120, cooling air supplement port 121, partition plate 130, bypass orifice 131, pipe-through hole 132, air guide flange 140, air guide passage 210, drying air inlet 211, drying air outlet 212,  
 cover plate 300.

**DETAILED DESCRIPTION**

**[0021]** Embodiments of the present invention will be described in detail and examples of the embodiments will be illustrated in the drawings, where same or similar reference numerals are used to indicate same or similar members or members with same or similar functions. The embodiments described herein with reference to drawings are explanatory, which are used to illustrate the present invention, but shall not be construed to limit the present invention.

**[0022]** In the following, a heat pump mounting box 1 for a heat pump drier or washer-drier machine according to embodiments of a first aspect of the present invention will be described with reference to Figs. 1 to 3. The heat pump mounting box 1 is suitable for an integrated pre-installed heat pump drying system, may be disposed at the top of the heat pump drier or washer-drier machine, which is conductive to componentizing and modularizing production and installation, and moreover has a function of supplementing cooling air to improve clothes drying performance of the heat pump drier or washer-drier machine.

**[0023]** As shown in Figs. 1 to 3, the heat pump mounting box 1 according to the embodiments of the present invention includes a base 100, an air passage guide plate (not shown), and a cover plate 300.

**[0024]** Specifically, the base 100 is provided with an air suction port 101, a two-device mounting chamber 110, a compressor mounting chamber 120, a cooling air supplement port 121 and a bypass orifice 131. The compressor mounting chamber 120 is in communication with the outside through the cooling air supplement port 121, and the two-device mounting chamber 110 is in communication with the compressor mounting chamber 120 through the bypass orifice 131. The air passage guide plate is mounted to the base 100 and defines, together with the base 100, an air guide passage 210 that has a drying air inlet 211 in communication with the air suction port 101 and a drying air outlet 212 in communication with the two-device mounting chamber 110. The cover plate 300 is mounted over the base 100 and at least covers the two-device mounting chamber 110.

**[0025]** The term "two-device" in "the two-device mounting chamber 110" refers to an evaporator and a condenser that constitute the heat pump drying system, and the evaporator and the condenser are mounted within the two-device mounting chamber 110 separately. The compressor mounting chamber 120 is configured to mount a compressor of the heat pump drying system to implement heat exchange between the drying air and both of the evaporator and the condenser. It can be understood that the heat pump drying system may further include a throttling device, a fan, a sealing member, a damping member and a filtering device.

**[0026]** It can also be understood that the description that "the cover plate 300 at least covers the two-device mounting chamber 110" includes the following four situations: the cover plate 300 only covers the two-device mounting chamber 110; the cover plate 300 covers the two-device mounting chamber 110 and the compressor mounting chamber 120; the cover plate 300 covers the two-device mounting chamber 110 and the air passage guide plate; the cover plate 300 covers the two-device mounting chamber 110, the compressor mounting chamber 120 and the air passage guide plate.

**[0027]** Consequently, the drying air enters the air guide passage 210 via the drying air inlet 211 and enters the two-device mounting chamber 110 via the drying air outlet 212; ambient air enters the compressor mounting chamber 120 via the cooling air supplement port 121 and enters the two-device mounting chamber 110 via the bypass orifice 131. In such a way, the ambient air of relatively low temperature is mixed with the drying air of relatively high temperature, and takes away part of heat of the condenser when passing across the condenser, so as to lower the temperature of the condenser and avoid the overheating of the heat pump drying system; moreover, since the humidity of the drying air is greater than that of the ambient air, the mixed air has a smaller humidity than the original drying air before mixing, so as to improve the clothes drying performance of the heat pump drier or washer-drier machine.

**[0028]** In conclusion, the heat pump mounting box 1 according to the embodiments of the present invention

employs the cooling air supplement port 121 and the bypass orifice 131 to implement the function of supplementing cooling air, such that the dry ambient air of low temperature may enter the two-device mounting chamber 110 from the compressor mounting chamber 120 and be mixed with the drying air of high humidity and high temperature, so as to lower the temperature of the condenser and avoid the overheating of the heat pump drying system, thereby improving the clothes drying performance of the heat pump drier or washer-drier machine.

**[0029]** According to some embodiments of the present invention, as shown in Fig. 3, the two-device mounting chamber 110 includes an evaporator mounting section 111 and a condenser mounting section 112 communicated with each other, as well as a passage section 113 located between the evaporator mounting section 111 and the condenser mounting section 112; the air guide passage 210 is in communication with the evaporator mounting section 111; and the bypass orifice 131 in communication with the condenser mounting section 112 and/or the passage section 113. Herein, the evaporator is mounted in the evaporator mounting section 111 and the condenser is mounted in the condenser mounting section 112; the bypass orifice 131 may be in direct communication with the condenser mounting section 112, or may be in direct communication with the passage section 113, i.e. in indirect communication with the condenser mounting section 112, or may be in communication with both of the condenser mounting section 112 and the passage section 113.

**[0030]** Therefore, the drying air in the air guide passage 210 enters the evaporator mounting section 111 through the drying air outlet 212, enters the condenser mounting section 112 after heat exchange with the evaporator in the evaporator mounting section 111, and then exchanges heat with the condenser; meanwhile, the ambient air directly enters the condenser mounting section 112 through the bypass orifice 131, or first enters the passage section 113 and then enters the condenser mounting section 112, or enters the condenser mounting section 112 and the passage section 113 separately, so as to lower the temperature of the condenser.

**[0031]** In the embodiment shown in Figs. 1 to 3, the two-device mounting chamber 110 is separated from the compressor mounting chamber 120 by a partition plate 130 in the base 100, and the bypass orifice 131 is disposed in the partition plate 130, such that it is convenient for the air in the compressor mounting chamber 120 to enter the two-device mounting chamber 110 directly, so as to enhance the effect of supplying cooling air.

**[0032]** Alternatively, as shown in Fig. 2, the bypass orifice 131 may extend along a length direction of the partition plate 130 and have an open upper surface, and the upper surface of the bypass orifice 131 is covered by the cover plate 300, such that the air in the compressor mounting chamber 120 may enter the two-device mounting chamber 110 from a gap between a top of the partition plate 130 and the cover plate 300. For example, the par-

tition plate 130 and the bypass orifice 131 extend in a left-and-right direction, and the bypass orifice 131 is defined by the gap between the top of the partition plate 130 and the cover plate 300.

**[0033]** Alternatively, as shown in Figs. 2 and 3, the partition plate 130 may be provided with a plurality of pipe-through holes 132 running through the partition plate 130 along a thickness direction of the partition plate 130. Preferably, a first part of the plurality of pipe-through holes 132 lead to the evaporator mounting section 111 while a second part of the plurality of pipe-through holes 132 lead to the condenser mounting section 112, so that the connection between the evaporator and the compressor and between the condenser and the compressor can be achieved and the second part of the plurality of pipe-through holes 132 are in communication with the bypass orifice 131, so as to facilitate the installation of pipelines and make it convenient for more air to enter the condenser mounting section 112.

**[0034]** In some specific embodiments of the present invention, as shown in Figs. 1 to 3, the cooling air supplement port 121 and the bypass orifice 131 are disposed in two opposite side walls of the compressor mounting chamber 120 respectively, such that the air may flow smoothly and the ambient air may enter the two-device mounting chamber 110 successfully. For example, the cooling air supplement port 121 is disposed in a front wall of the compressor mounting chamber 120, and the bypass orifice 131 is disposed in a rear wall thereof, such that the ambient air is blown to the two-device mounting chamber 110 from front to rear.

**[0035]** Further, as shown in Fig. 3, the cooling air supplement port 121 is right opposite the condenser mounting section 112, i.e. in perpendicular to a plane where a central axis of the cooling air supplement port 121 is, and a projection of the cooling air supplement port 121 is located in a projection of the condenser mounting section 112, such that the ambient air may enter the condenser mounting section 112 quickly to enhance the cooling effect on the condenser, so as to further avoid the overheating of the heat pump drying system. Preferably, the base 100 may be provided with an air guide flange 140 located at an exterior of the compressor mounting chamber 120 and surrounding the cooling air supplement port 121, so as to guide the ambient air into the compressor mounting chamber 120.

**[0036]** In the following will be described the heat pump mounting box 1 according to a specific embodiment, and it shall be appreciated that the following description is only used to illustrate the present invention, but shall not be construed to limit the present invention.

**[0037]** As shown in Figs. 1 to 3, the heat pump mounting box 1 according to the embodiments of the present invention includes the base 100, the air passage guide plate and the cover plate 300.

**[0038]** Specifically, the base 100 is provided with the air suction port 101, the two-device mounting chamber 110, the compressor mounting chamber 120, the cooling

air supplement port 121 and the bypass orifice 131. The two-device mounting chamber 100 includes the evaporator mounting section 111 and the condenser mounting section 112 communicated with each other, as well as the passage section 113 located between the evaporator mounting section 111 and the condenser mounting section 112. The compressor mounting chamber 120 is in communication with the outside through the cooling air supplement port 121; the condenser mounting section 112 and the compressor mounting chamber 120 are communicated with each other through the bypass orifice 131, and the passage section 113 and the compressor mounting chamber 120 are communicated with each other through the bypass orifice 131. The air passage guide plate is mounted to the base 100 and defines, together with the base 100, the air guide passage 210 that has the drying air inlet 211 in communication with the air suction port 101 and the drying air outlet 212 in communication with the evaporator mounting section 111. The cover plate 300 is mounted over the base 100 and at least covers the two-device mounting chamber 110, the compressor mounting chamber 120 and the air passage guide plate.

**[0039]** The two-device mounting chamber 110 and the compressor mounting chamber 120 are separated from each other by the partition plate 130 that extends on the base 100 in the left-and-right direction, and the partition plate 130 constitutes a rear wall of the compressor mounting chamber 120 and a front wall of the two-device mounting chamber 110. The bypass orifice 131 is disposed in the partition plate 130 and extends along the left-and-right direction, and is defined by the gap between the top of the partition plate 130 and the cover plate 300. The partition plate 130 is further provided with four pipe-through holes 132 running through the partition plate 130 along the thickness direction thereof; two pipe-through holes 132 at the left side lead to the evaporator mounting section 111 while two pipe-through holes 132 at the right side lead to the condenser mounting section 112; the two pipe-through holes 132 at the left side are in communication with the bypass orifice 131. The cooling air supplement port 121 is disposed in the front wall of the compressor mounting chamber 120 and right opposite the condenser mounting section 112; the base 100 is provided with the air guide flange 140 located at the exterior of the compressor mounting chamber 120 and surrounding the cooling air supplement port 121.

**[0040]** Consequently, the drying air enters the air guide passage 210 via the drying air inlet 211, enters the evaporator mounting section 111 via the drying air outlet 212, enters the condenser mounting section 112 after heat exchange with the evaporator in the evaporator mounting section 111, and exchanges heat with the condenser; meanwhile, the dry ambient air of low temperature enters the compressor mounting chamber 120 from front to rear via the cooling air supplement port 121, enters the condenser mounting section 112 and the passage section 113 separately through the bypass orifice 131 after pass-

ing across the compressor, to be mixed with the drying air of high humidity and high temperature, and then takes away part of the heat on the condenser when passing across the condenser, so as to cool down the condenser and avoid the overheating of the heat pump drying system.

**[0041]** In conclusion, the heat pump mounting box 1 according to the embodiments of the present invention employs the cooling air supplement port 121 and the bypass orifice 131 to implement the function of supplementing cooling air, so as to lower the temperature of the condenser and avoid the overheating of the heat pump drying system, thereby improving the clothes drying performance of the heat pump drier or washer-drier machine.

**[0042]** The heat pump drier or washer-drier machine according to embodiments of a second aspect of the present invention includes the heat pump mounting box 1 according to the embodiments of the first aspect of the present invention.

**[0043]** The heat pump drier or washer-drier machine according to the present invention employs the heat pump mounting box 1 described above, such that the heat pump drying system is not easily subject to overheating, so as to enjoy the excellent clothes drying performance and facilitate componentization and modularization of production and installation.

**[0044]** The other configurations and operations of the heat pump drier or washer-drier machine according to the embodiments of the present invention are known to those skilled in the art, which will not be elaborated herein.

**[0045]** In the specification, it is to be understood that terms such as "central," "longitudinal," "lateral," "length," "width," "thickness," "upper," "lower," "front," "rear," "left," "right," "vertical," "horizontal," "top," "bottom," "inner," "outer," "clockwise," "counterclockwise," "axial," "radial," and "circumferential" should be construed to refer to the orientation as then described or as shown in the drawings under discussion. These relative terms are for convenience of description and do not require that the present invention be constructed or operated in a particular orientation. In addition, terms such as "first" and "second" are used herein for purposes of description and are not intended to indicate or imply relative importance or significance or to imply the number of indicated technical features. Thus, the feature defined with "first" and "second" may comprise one or more of this feature. In the description of the present invention, "a plurality of" means two or more than two, unless specified otherwise.

**[0046]** In the present invention, unless specified or limited otherwise, the terms "mounted," "connected," "coupled," "fixed" and the like are used broadly, and may be, for example, fixed connections, detachable connections, or integral connections; may also be mechanical or electrical connections; may also be direct connections or indirect connections via intervening structures; may also be inner communications of two elements, which can be understood by those skilled in the art according to specific

situations.

**[0047]** Reference throughout this specification to "an embodiment," "some embodiments," "specific embodiments," "alternative embodiments," "an example," or "some examples" means that a particular feature, structure, material, or characteristic described in connection with the embodiment or example is included in at least one embodiment or example of the present invention. Thus, the appearances of the above phrases throughout this specification are not necessarily referring to the same embodiment or example of the present invention. Furthermore, the particular features, structures, materials, or characteristics may be combined in any suitable manner in one or more embodiments or examples. Those skilled in the art can integrate and combine different embodiments or examples and the features in different embodiments or examples in the specification.

**[0048]** Although embodiments of the present invention have been shown and illustrated, it shall be understood by those skilled in the art that various changes, modifications, alternatives and variants without departing from the principle and spirit of the present invention are acceptable. The scope of the present invention is defined by the claims or the like.

## Claims

1. A heat pump mounting box (1) for a heat pump drier or washer-drier machine, comprising:

a base (100) provided with an air suction port (101), a two-device mounting chamber (110), a compressor mounting chamber (120), a cooling air supplement port (121) for communicating the compressor mounting chamber with the outside, and a bypass orifice (131) for communicating the two-device mounting chamber with the compressor mounting chamber; an air passage guide plate mounted to the base and defining, together with the base, an air guide passage (210) that has a drying air inlet (211) in communication with the air suction port and a drying air outlet (212) in communication with the two-device mounting chamber; and a cover plate (300) mounted over the base and at least covering the two-device mounting chamber (110).

2. The heat pump mounting box according to claim 1, wherein the two-device mounting chamber comprises an evaporator mounting section (111) and a condenser mounting section (112) communicated with each other, as well as a passage section (113) located between the evaporator mounting section (111) and the condenser mounting section (112); the air guide passage (210) is in communication with the evaporator mounting section (111); and the bypass

orifice (131) is in communication with the condenser mounting section (112) and/or the passage section (113).

5 3. The heat pump mounting box according to claim 2, wherein the two-device mounting chamber (110) is separated from the compressor mounting chamber (120) by a partition plate (130) in the base (100), and the bypass orifice (131) is disposed in the partition plate (130).

10 4. The heat pump mounting box according to claim 3, wherein the bypass orifice (131) extends along a length direction of the partition plate (130) and has an open upper surface, and the upper surface of the bypass orifice (131) is covered by the cover plate (300).

15 5. The heat pump mounting box according to claim 3, wherein the partition plate (130) is provided with a plurality of pipe-through holes (132) running through the partition plate along a thickness direction thereof.

20 6. The heat pump mounting box according to claim 5, wherein a first part of the plurality of pipe-through holes (132) lead to the evaporator mounting section (111) while a second part thereof lead to the condenser mounting section (112), and the second part of the plurality of pipe-through holes are in communication with the bypass orifice (131).

25 7. The heat pump mounting box according to any one of claims 2 to 6, wherein the cooling air supplement port (121) and the bypass orifice (131) are disposed in two opposite side walls of the compressor mounting chamber (120) respectively.

30 8. The heat pump mounting box according to claim 7, wherein the cooling air supplement port (121) is right opposite the condenser mounting section (112).

35 9. The heat pump mounting box according to claim 1, wherein the base (100) is provided with an air guide flange (140) located at an exterior of the compressor mounting chamber (120) and surrounding the cooling air supplement port (121).

40 10. A heat pump drier or washer-drier machine, comprising a heat pump mounting box (1) according to any one of claims 1 to 9.

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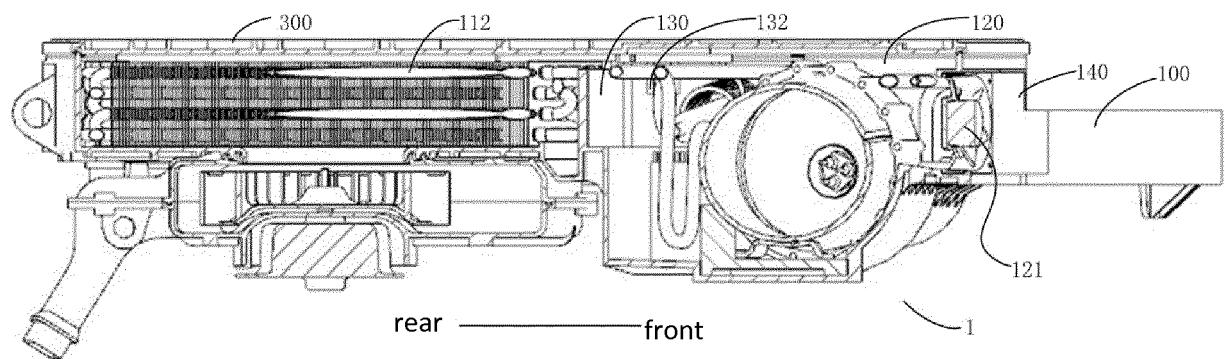


Fig. 1

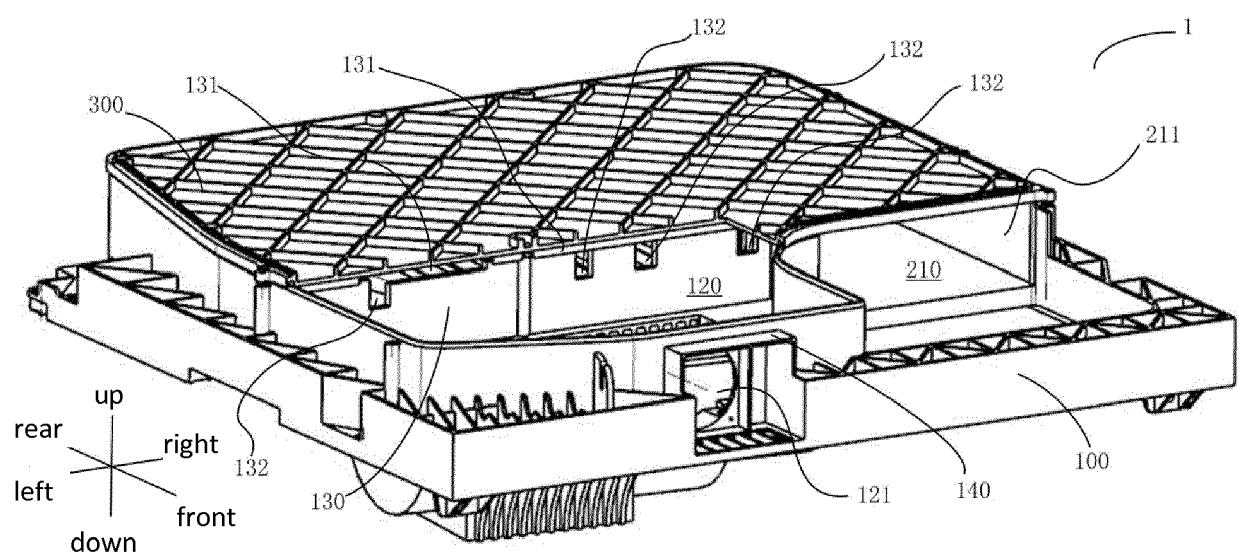


Fig. 2

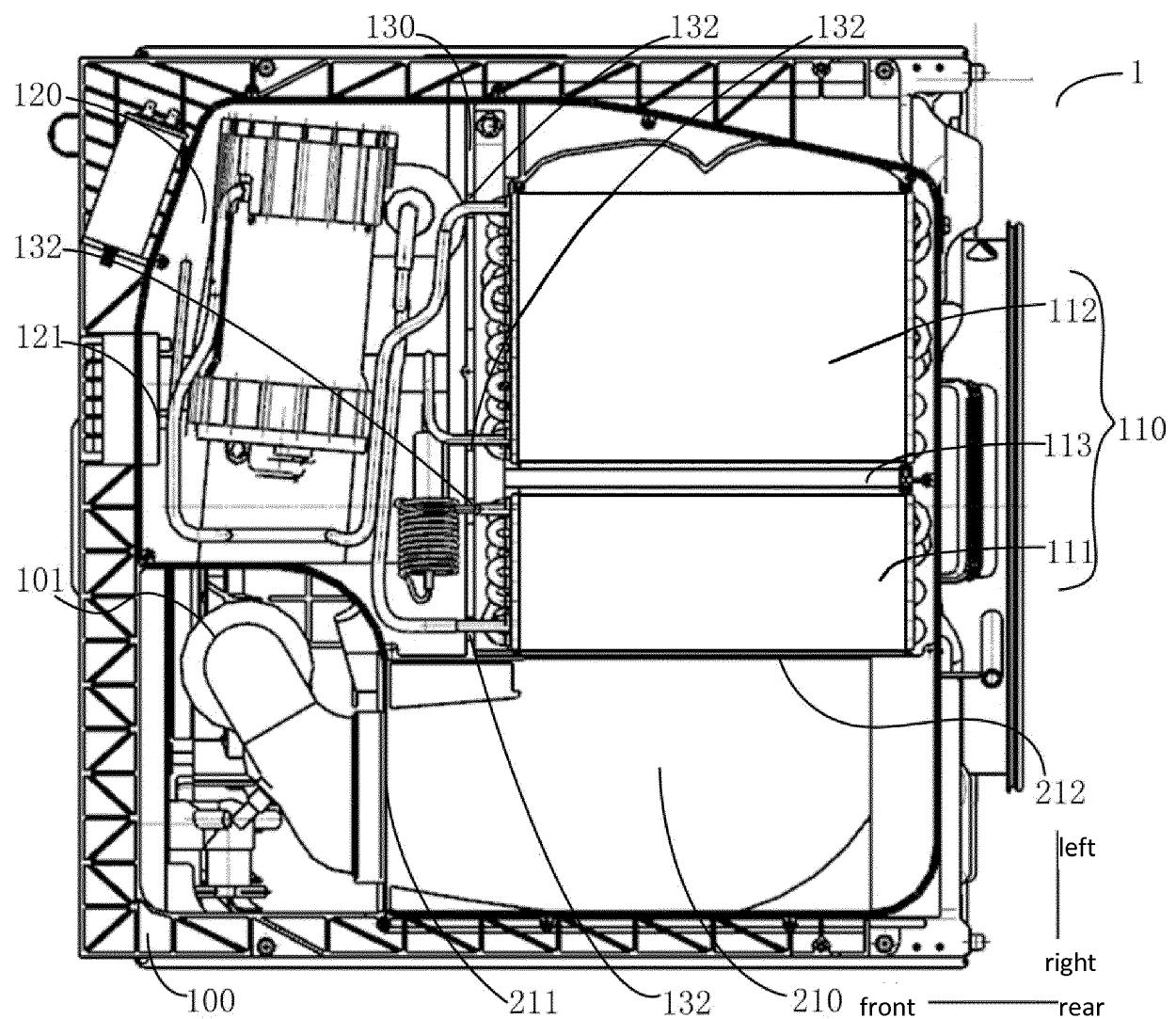


Fig. 3



## EUROPEAN SEARCH REPORT

Application Number

EP 16 20 5864

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1	The present search report has been drawn up for all claims		
50	Place of search Munich	Date of completion of the search 26 May 2017	Examiner Weinberg, Ekkehard
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	X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		
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EPO FORM 1503 03/82 (P04C01)

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## EUROPEAN SEARCH REPORT

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CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document			
T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ..... & : member of the same patent family, corresponding document			

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