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(71) Applicant: **Wuxi Little Swan Co., Ltd.**
New District
Wuxi
Jiangsu 214028 (CN)

(72) Inventors:
• **MIAO, Yulai**
Wuxi, Jiangsu 214028 (CN)
• **LU, Song**
Wuxi, Jiangsu 214028 (CN)
• **QIAN, Wei**
Wuxi, Jiangsu 214028 (CN)
• **QIN, Qiong**
Wuxi, Jiangsu 214028 (CN)

(74) Representative: **Romano, Giuseppe et al**
Società Italiana Brevetti S.p.A
Piazza di Pietra, 39
00186 Roma (IT)

(54) **HEAT PUMP MODULE FOR LAUNDRY TREATMENT DEVICE AND LAUNDRY TREATMENT DEVICE**

(57) A heat pump module (1) for a laundry treatment device and the laundry treatment device are provided, said heat pump module (1) includes: a base plate (1), a top cover and a compressor (2), wherein the base plate (1) has a first side wall (11) and a second side wall (12) adjacent to the first side wall (11); the top cover defines a mounting chamber together with the base plate (1); the compressor (2) is located in the mounting chamber; and an extension line of an axis of the compressor (2) intersects with the first side wall (11) and the second side wall (12) separately, which facilitates the layout of leads and pipes connected with the compressor (2) and the arrangement of other components on the base plate (1), thereby improving utilization rate of installation space on the base plate (1) and optimizing the layout scheme of the heat pump module (1).

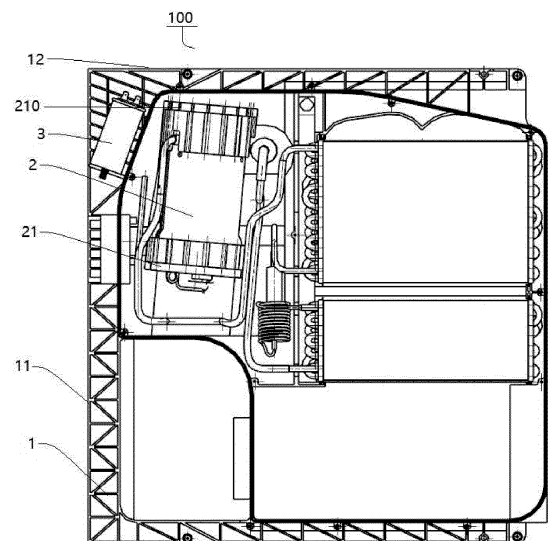


Fig. 1

Description

FIELD

[0001] The present invention relates to a technical field of household appliances, and more particularly to a heat pump module for a laundry treatment device and the laundry treatment device.

BACKGROUND

[0002] A washer-dryer is an intelligent novel washing machine, provided with an additional drying function based on an automatic washing machine, and thus combining many functions, such as washing, spinning and drying, into a single machine in one. The washer-dryer may have two types, namely, an air-vented washer-dryer and a condensation-based washer-dryer. The air-vented washer-dryer works in such a principle that air is heated by a heater to heat clothes and then becomes wet hot air to be exhausted, thereby carrying away moisture in the clothes in such a circulation and achieving a purpose of drying the clothes. The condensation-based washer-dryer works in such a principle that air enters a drum to heat clothes after heated by a heater, the drum is filled with wet hot air which is condensed into water by a condensation system and then collected in a water storage box, and hence moisture in the clothes is taken away in such a circulation, so as to achieve a purpose of drying the clothes.

[0003] A heat pump washer-dryer belongs to the condensation-based washer-dryer, but a heat pump module has layout difficulty due to space limit, a compressor generates vibration and noise in operation, and a service life of components of the heat pump washer-dryer is shortened.

SUMMARY

[0004] 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 module for a laundry treatment device that has advantages of simple structure and convenient assembling.

[0005] Embodiments of the present invention further provide a laundry treatment device having the heat pump module.

[0006] According to the embodiments of the present invention, the heat pump module includes: a base plate having a first side wall and a second side wall adjacent to the first side wall; a top cover defining a mounting chamber together with the base plate; and a compressor located in the mounting chamber, in which an extension line of an axis of the compressor intersects with the first side wall and the second side wall separately.

[0007] For the heat pump module according to the present invention, the extension line of the axis of the compressor intersects with the first side wall and the sec-

ond side wall, which facilitates the layout of leads and pipes connected with the compressor and the arrangement of other components on the base plate, thereby improving utilization rate of installation space on the base plate and optimizing the layout scheme of the heat pump module.

[0008] According to an embodiment of the present invention, an included angle α between the axis of the compressor and the first side wall is greater than 0 degree and equal to or smaller than 30 degrees.

[0009] According to an embodiment of the present invention, the included angle α is greater than 0 degree and equal to or smaller than 20 degrees.

[0010] According to an embodiment of the present invention, a starting capacitor of the compressor is located in an area defined by the first side wall, the second side wall and the axis together.

[0011] According to an embodiment of the present invention, an upper surface of the base plate is recessed downwards to form a first receiving groove, and the compressor is embedded in the first receiving groove.

[0012] According to an embodiment of the present invention, part of an outer peripheral wall of the first receiving groove protrudes beyond a lower surface of the base plate.

[0013] According to an embodiment of the present invention, the first receiving groove is configured as a semi-circular groove.

[0014] According to an embodiment of the present invention, a damping sheath is fitted over the compressor, and at least part of an outer peripheral wall of the damping sheath abuts against an inner peripheral wall of the first receiving groove.

[0015] According to an embodiment of the present invention, the outer peripheral wall of the damping sheath is provided with a plurality of ribs.

[0016] The laundry treatment device according to the embodiments of the present invention includes: a housing provided with an opening; a drum assembly disposed in the housing and having an open end opposite the opening; and the heat pump module mentioned above and disposed in the housing.

[0017] For the laundry treatment device according to the present invention, the extension line of the axis of the compressor intersects with the first side wall and the second side wall, which facilitates the layout of leads and pipes connected with the compressor and the arrangement of other components on the base plate, thereby improving utilization rate of installation space on the base plate and optimizing the layout scheme of the heat pump module.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018] These and/or additional aspects and advantages of embodiments of the present invention will become apparent and more readily appreciated from the following descriptions made with reference to the drawings, in

which:

Fig. 1 is a partially schematic view of a heat pump module for a laundry treatment device according to an embodiment of the present invention;

Fig. 2 is a sectional view of the heat pump module according to the embodiment of the present invention;

Fig. 3 is an exploded view of the heat pump module according to the embodiment of the present invention;

Fig. 4 is a schematic view of a base plate of the heat pump module according to the embodiment of the present invention;

Fig. 5 is a schematic view of the base plate of the heat pump module according to the embodiment of the present invention;

Fig. 6 is a partially schematic view of the heat pump module according to the embodiment of the present invention.

[0019] Reference numerals:

base plate 1, first side wall 11, second side wall 12, first receiving groove 13, compressor 2, damping sheath 21, rib 210, starting capacitor 3.

DETAILED DESCRIPTION

[0020] Embodiments of the present invention will be described in detail and examples of the embodiments will be illustrated in the drawings. The embodiments described herein with reference to drawings are explanatory, which are used to illustrate the present invention, but should not be construed to limit the present invention.

[0021] In the following, a heat pump module for a laundry treatment device and the laundry treatment device according to embodiments of the present invention will be described with reference to Figs. 1 to 6. It should be noted that the laundry treatment device may be a clothes dryer, a washer-dryer, or a washing machine with a drying function.

[0022] As shown in Figs. 1 to 6, the heat pump module according to the embodiments of the present invention includes a base plate 1, a top cover and a compressor 2.

[0023] Specifically, the top cover and the base plate 1 together define a mounting chamber, and the compressor 2 is located in the mounting chamber. The base plate 1 has a first side wall 11 and a second side wall 12 adjacent to the first side wall 11, and an extension line of an axis of the compressor 2 intersects with the first side wall 11 and the second side wall 12 separately. That is, the compressor 2 is obliquely mounted onto the base plate 1. For example, as shown in Figs. 1, 4, 5 and 6, the axis of the compressor 2, the first side wall 11 and the second side wall 12 form a triangle on a horizontal plane. Accordingly, it is possible to facilitate not only the layout

of leads and pipes connected with the compressor 2 but also the arrangement of other components, e.g. a starting capacitor 3, on the base plate 1, so as to improve utilization rate of installation space on the base plate 1 and optimize the layout scheme of the heat pump module.

[0024] For the heat pump module according to the present invention, the extension line of the axis of the compressor 2 intersects with the first side wall 11 and the second side wall 12, which facilitates the layout of the leads and the pipes connected with the compressor 2 and the arrangement of other components on the base plate 1, thereby improving utilization rate of the installation space on the base plate 1 and optimizing the layout scheme of the heat pump module.

[0025] According to an embodiment of the present invention, as shown in Figs. 1, 4, 5 and 6, an included angle α between the axis of the compressor 2 and the first side wall 11 is greater than 0 degree and equal to or smaller than 30 degrees. Through tests, it proves that it is more conducive to the layout of the heat pump module if the included angle α between the axis of the compressor 2 and the first side wall 11 is greater than 0 degree and equal to or smaller than 30 degrees. Further, when the included angle α is greater than 0 degree and equal to or smaller than 20 degrees, the layout scheme of the heat pump module is preferable.

[0026] According to an embodiment of the present invention, the starting capacitor 3 of the compressor 2 is located in an area defined by the first side wall 11, the second side wall 12 and the axis together. Thus, on one hand, a connection distance between the compressor 2 and the starting capacitor 3 is shortened, which saves materials; on the other hand, the installation space is saved.

[0027] According to an embodiment of the present invention, an upper surface of the base plate 1 is recessed downwards to form a first receiving groove 13, and the compressor 2 is embedded in the first receiving groove 13, so as to enhance stability of connecting the compressor 2 and the base plate 1 to reduce vibration and noise generated by the compressor 2 in operation. In some examples of the present invention, the first receiving groove 13 may be configured as a semi-circular groove, which can further improve stability of assembling the compressor.

[0028] According to some embodiments of the present invention, part of an outer peripheral wall of the first receiving groove 13 protrudes beyond a lower surface of the base plate 1, as shown in Figs. 2 and 3, so as to shorten a height by which the compressor 2 protrudes beyond the upper surface of the base plate 1. When the heat pump module is assembled to the laundry treatment device, the part of the outer peripheral wall of the first receiving groove 13 that protrudes beyond the lower surface of the base plate 1 may be received in inner space of the laundry treatment device, so as to reduce the overall height of the laundry treatment device to make the structure of the laundry treatment device more compact

and reasonable, thereby improving appearance aesthetics of the laundry treatment device.

[0029] According to an embodiment of the present invention, a damping sheath 21 is fitted over the compressor 2, and at least part of an outer peripheral wall of the damping sheath 21 abuts against an inner peripheral wall of the first receiving groove 13, so as to absorb the vibration generated by the compressor 2 in operation and hence lower the noise of the compressor 2. As shown in Fig. 3, the outer peripheral wall of the damping sheath 21 is provided with a plurality of ribs 210. Thus, on one hand, the compressor 2 may be fixed more stably, and on the other hand, the vibration of the compressor 2 in operation may be damped to prolong the service life of the compressor 2.

[0030] The heat pump module 1 according to a specific embodiment of the present invention will be described in detail with reference to Figs. 1 to 6. It should be appreciated that the following description is only explanatory and should not be construed to limit the present invention.

[0031] As shown in Figs. 1 to 6, the heat pump module includes the base plate 1, the top cover and the compressor 2.

[0032] As shown in Fig. 1, the top cover and the base plate 1 together define the mounting chamber, and the compressor 2 is located in the mounting chamber. The base plate 1 has the first side wall 11 and the second side wall 12 adjacent to the first side wall 11, and the extension line of the axis of the compressor 2 intersects with the first side wall 11 and the second side wall 12 separately. The starting capacitor 3 of the compressor 2 is located in the area defined by the first side wall 11, the second side wall 12 and the axis together, that is, the compressor 2 is obliquely mounted in the mounting chamber of the base plate 1. Therefore, the layout structure of the heat pump module may be optimized conveniently.

[0033] The included angle α between the axis of the compressor 2 and the first side wall 11 is greater than 0 degree and equal to or smaller than 30 degrees. Thus, the compressor 2 forms a triangular corner with the first side wall 11 and the second side wall 12, which provides an installation position for the starting capacitor 3 of the compressor 2.

[0034] As shown in Figs. 2 and 3, the upper surface of the base plate 1 is recessed downwards to form the first receiving groove 13, and the compressor 2 is embedded in the first receiving groove 13. Part of the outer peripheral wall of the first receiving groove 13 protrudes beyond the lower surface of the base plate 1, and the first receiving groove 13 is configured as a semi-circular groove, as shown in Figs. 2 and 3. Therefore, on one hand, the compressor 2 may be fixed stably, and on the other hand, the overall height of the laundry treatment device may be reduced.

[0035] The laundry treatment device according to the embodiments of the present invention includes: a housing,

tioned in the above embodiments.

[0036] Specifically, the housing is provided with an opening; the drum assembly is disposed in the housing and has an open end opposite the opening; and the heat pump module is used for the laundry treatment device and disposed in the housing.

[0037] For the laundry treatment device according to the present invention, the extension line of the axis of the compressor 2 intersects with the first side wall 11 and the second side wall 12, which facilitates the layout of the leads and the pipes connected with the compressor 2 and the arrangement of the other components on the base plate 1, thereby improving utilization rate of installation space on the base plate 1 and optimizing the layout scheme of the heat pump module.

[0038] In an embodiment of the present invention, the opening is provided in a front side of the housing; the drum assembly is disposed in the housing and has a front end configured as the open end; the open end of the drum assembly is opposite the opening; and the heat pump module is disposed in the housing and located at the top of the housing. Preferably, the heat pump module is configured as a top wall of the housing.

[0039] In the specification, it is to be understood that terms such as "upper," "lower," "front," "rear," "horizontal," "top," "inner," and "outer" 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.

[0040] 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.

[0041] 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.

[0042] Reference throughout this specification to "an embodiment," "some embodiments," "an example," "specific examples," 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 under circumstance without contradiction.

[0043] Although embodiments of the present invention have been shown and illustrated, it should 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 module for a laundry treatment device, comprising:
 - a base plate (1) having a first side wall (11) and a second side wall (12) adjacent to the first side wall (11);
 - a top cover defining a mounting chamber together with the base plate (1); and
 - a compressor (2) located in the mounting chamber, wherein an extension line of an axis of the compressor (2) intersects with the first side wall (11) and the second side wall (12) separately.
2. The heat pump module according to claim 1, wherein an included angle α between the axis of the compressor (2) and the first side wall (11) is greater than 0 degree and equal to or smaller than 30 degrees.
3. The heat pump module according to claim 2, wherein the included angle α is greater than 0 degree and equal to or smaller than 20 degrees.
4. The heat pump module according to claim 1, wherein a starting capacitor (3) of the compressor (2) is located in an area defined by the first side wall (11), the second side wall (12) and the axis together.
5. The heat pump module according to claim 1, wherein an upper surface of the base plate (1) is recessed downwards to form a first receiving groove (13), and the compressor (2) is embedded in the first receiving groove (13).
6. The heat pump module according to claim 5, wherein part of an outer peripheral wall of the first receiving groove (13) protrudes beyond a lower surface of the base plate (1).
7. The heat pump module according to claim 5, wherein the first receiving groove (13) is configured as a semi-

circular groove.

8. The heat pump module according to claim 5, wherein a damping sheath (21) is fitted over the compressor (2), and at least part of an outer peripheral wall of the damping sheath (21) abuts against an inner peripheral wall of the first receiving groove (13).
9. The heat pump module according to claim 8, wherein the outer peripheral wall of the damping sheath (21) is provided with a plurality of ribs (210).
10. A laundry treatment device, comprising a housing provided with an opening; a drum assembly disposed in the housing and having an open end opposite the opening; and a heat pump module according to any one of claims 1 to 9, disposed in the housing.

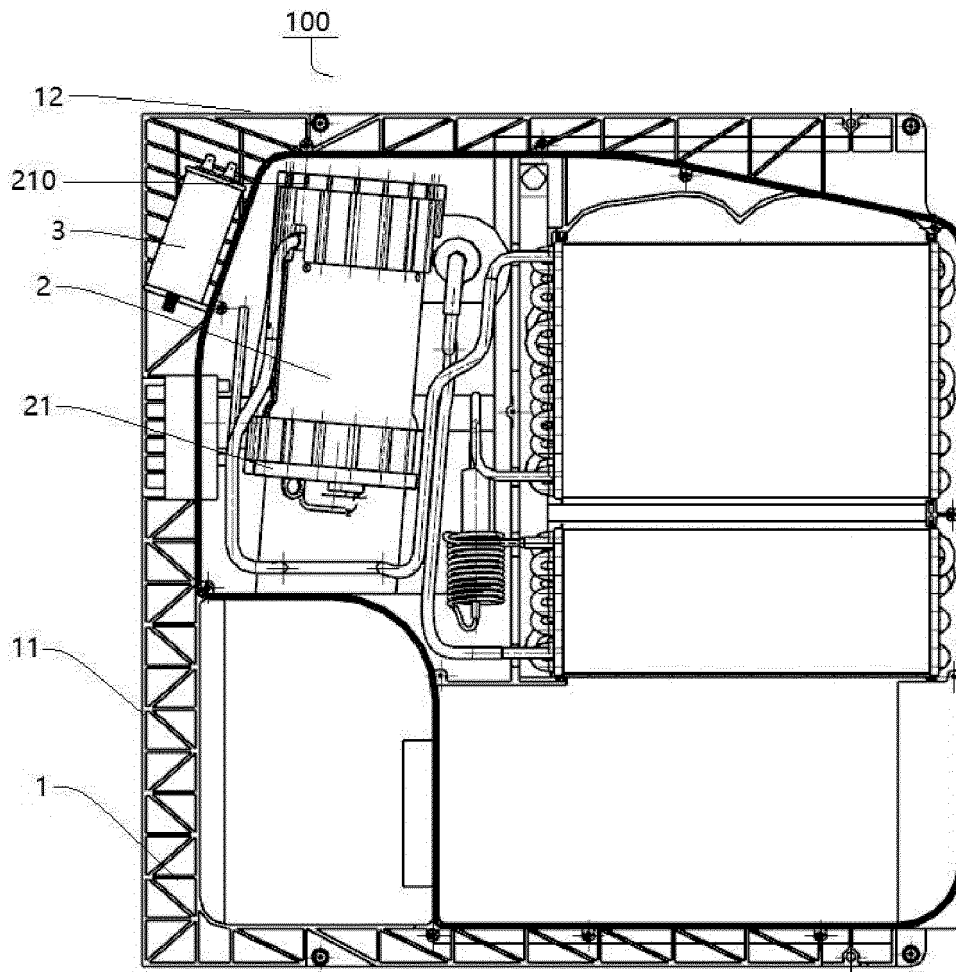


Fig. 1

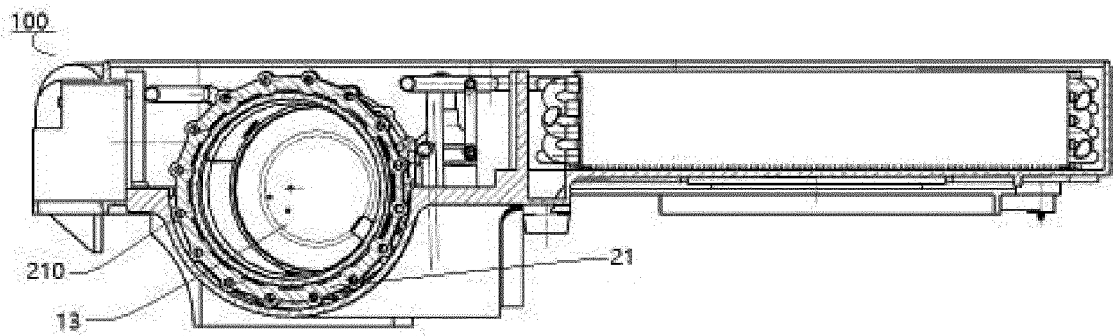


Fig. 2

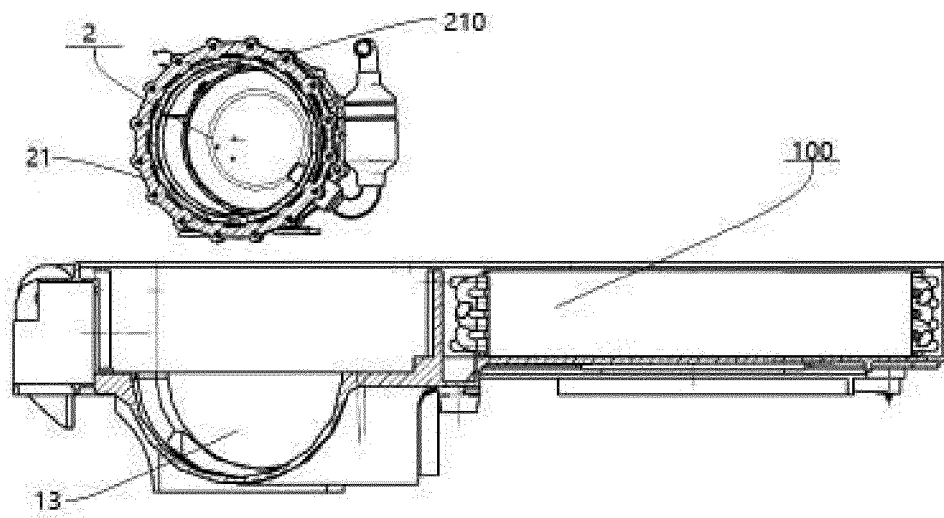


Fig. 3

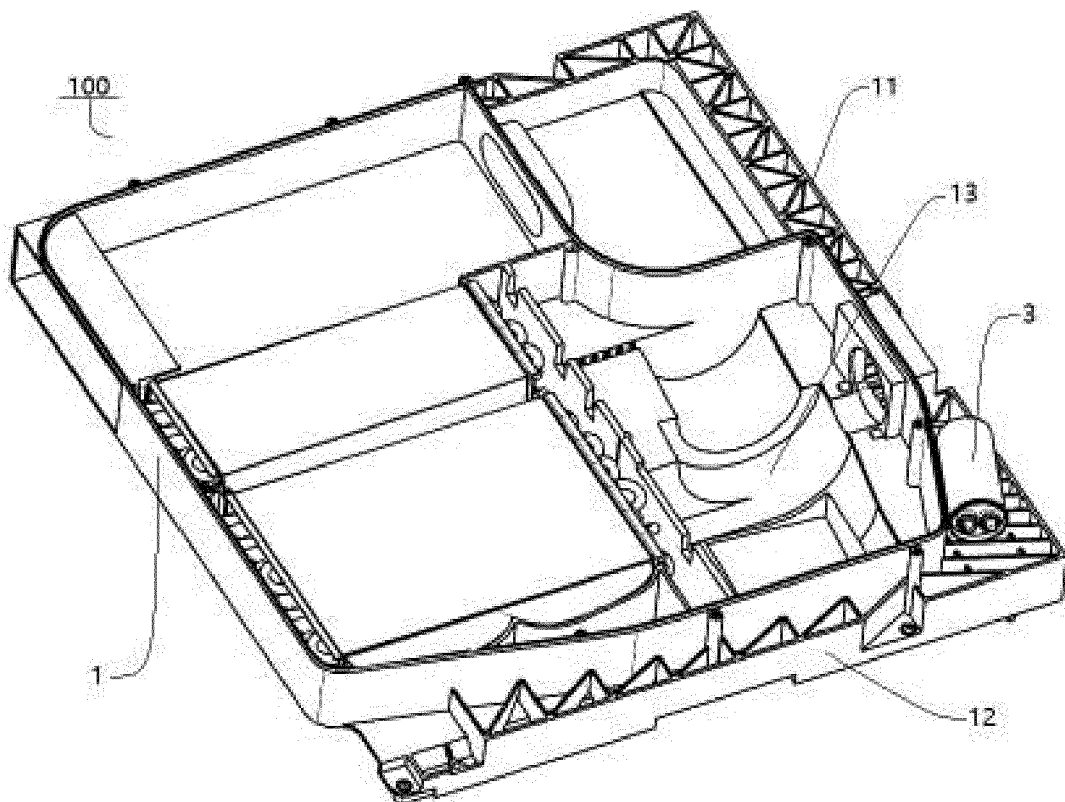


Fig. 4

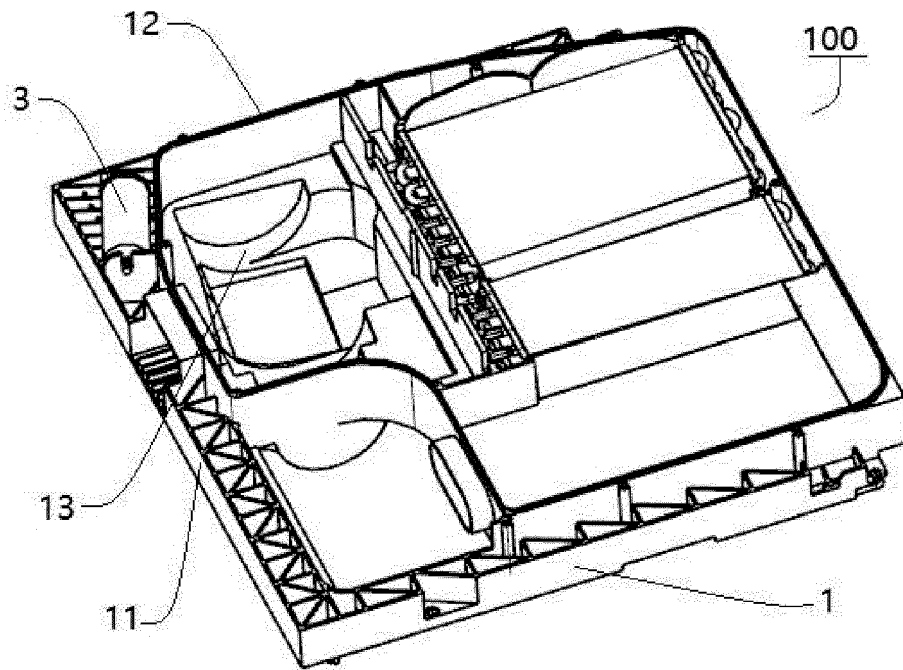


Fig. 5

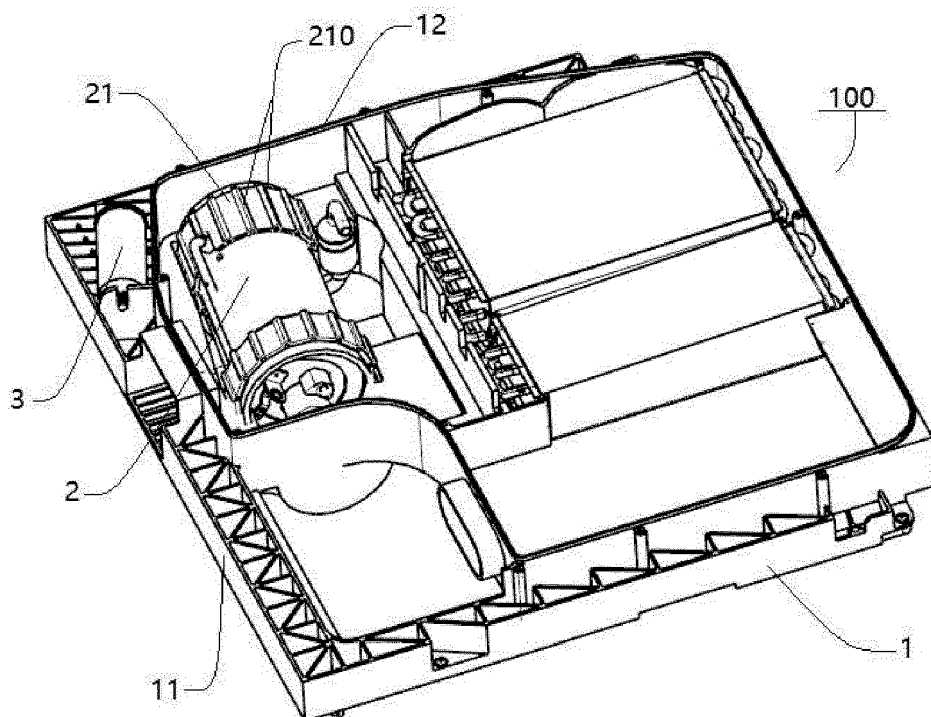


Fig. 6



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Application Number
EP 16 20 1055

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A	* paragraph [0020] - paragraph [0027] *	8,9	ADD. D06F25/00
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Place of search		Date of completion of the search	Examiner
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CATEGORY OF CITED DOCUMENTS			
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