

(19)



(11)

EP 3 178 985 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
14.06.2017 Bulletin 2017/24

(51) Int Cl.:
D06F 58/20 ^(2006.01) **D06F 25/00** ^(2006.01)

(21) Application number: **16201042.5**

(22) Date of filing: **29.11.2016**

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

(30) Priority: **07.12.2015 CN 201510888770**
07.12.2015 CN 201521002194 U

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

(72) Inventors:
• **Miao, Yulai**
Wuxi, Jiangsu 214028 (CN)

- **Qian, Wei**
Wuxi, Jiangsu 214028 (CN)
- **Zhu, Chunyu**
Wuxi, Jiangsu 214028 (CN)
- **Lu, Song**
Wuxi, Jiangsu 214028 (CN)
- **You, Huiqin**
Wuxi, Jiangsu 214028 (CN)
- **Shi, Xubin**
Wuxi, Jiangsu 214028 (CN)
- **Lin, Guangfang**
Wuxi, Jiangsu 214028 (CN)

(74) Representative: **Maiwald Patentanwalts GmbH**
Engineering
Elisenhof
Elisenstrasse 3
80335 München (DE)

(54) **WASHING-DRYING MACHINE**

(57) A washing-drying which includes: a main body (110) and a clothes drying device; the main body (110) is provided with a washing drum (111) therein and a guiding assembly thereon, in which the guiding assembly is communicated with the washing drum (111) to form an airflow loop; the clothes drying device includes a hori-

zontal compressor (121), a condenser (122) and an evaporator (123), in which the horizontal compressor (121), the condenser (122) and the evaporator (123) are connected in series to form a clothes drying loop, and the evaporator (123) is connected with the guiding assembly.

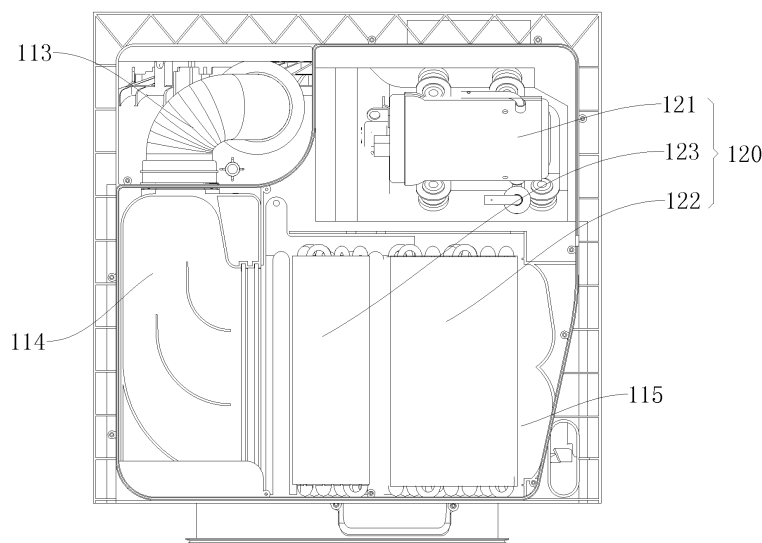


Fig. 3

EP 3 178 985 A1

Description

FIELD

[0001] The present disclosure relates to a technical field of household appliances, especially to a washing-drying machine.

BACKGROUND

[0002] In the related art, a compressor adopted in a washing-drying machine usually is a vertical compressor. The washing-drying machine in the related art has a large height due to the space occupation of the vertical compressor in the height direction. In some other washing-drying machines, the compressor unit, two components (namely the condenser and the evaporator) and other units may be designed separately, which seriously influences a production efficiency of the washing-drying machine and is inconvenient for the after-sales maintenances.

SUMMARY

[0003] The present disclosure aims to solve one of the technical problems in the related art to at least some extent. Accordingly, one objective of the present disclosure aims to provide a washing-drying machine which is convenient to be mounted and has a high space utilization.

[0004] The washing-drying machine according to embodiments of the present disclosure includes: a main body provided with a washing drum therein and a guiding assembly thereon, in which the guiding assembly is communicated with the washing drum to form an airflow loop; and a clothes drying device including a horizontal compressor, a condenser and an evaporator, in which the horizontal compressor, the condenser and the evaporator are connected in series to form a clothes drying loop and the evaporator is connected with the guiding assembly.

[0005] In the washing-drying machine according to embodiments of the present disclosure, the horizontal compressor is chosen for the clothes drying device, and also, a traditional mounting manner of the horizontal compressor is changed, such that the space occupied by the horizontal compressor is controlled effectively and an overall height of the clothes drying device is lowered, thus further decreasing a height of the washing-drying machine, and realizing an integrated top-set design of the clothes drying device with less influence on the height of the washing-drying machine.

[0006] In addition, the washing-drying machine according to embodiments of the present disclosure may further have the additional technical features as followed.

[0007] According to an embodiment of the present disclosure, the guiding assembly includes an air inlet duct, a filter, an accommodating cavity and an air return duct connected in series in turn, and the air inlet duct and the

air return duct are communicated with the washing drum respectively.

[0008] Further, the air inlet duct, the filter, the accommodating cavity and the horizontal compressor are disposed in a top of the main body and arranged along a circumferential direction of the main body.

[0009] Further, the condenser and the evaporator are disposed in the accommodating cavity, and the evaporator is located upstream of the condenser along an air-flow direction in the guiding assembly.

[0010] Optionally, at least one of the air inlet duct and the air return duct is a rubber hose.

[0011] Optionally, an axis of the washing drum extends along a front and rear direction, the air inlet duct is connected to a rear end of the washing drum, and the air return duct is connected to a front end of the washing drum.

[0012] According to some embodiments of the present disclosure, the horizontal compressor is disposed in a top of the washing-drying machine.

[0013] Further, a compressor base is disposed in the top of the washing-drying machine, and the horizontal compressor is mounted to the compressor base.

[0014] Optionally, the condenser and the evaporator are disposed in the top of the washing-drying machine, and arranged adjacent to the horizontal compressor.

[0015] According to some embodiments of the present disclosure, the horizontal compressor has a slope angle ranging from 0° to 90° relative to a horizontal plane.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016]

Fig. 1 is a schematic view of a washing-drying machine according to embodiments of the present disclosure;

Fig. 2 is an exploded view of the washing-drying machine in Fig. 1;

Fig. 3 is a partial schematic view of a washing-drying machine according to embodiments of the present disclosure;

Fig. 4 is another partial schematic view of a washing-drying machine according to embodiments of the present disclosure; and

Fig. 5 is a schematic view of a washing drum in a washing-drying machine according to embodiments of the present disclosure.

Reference numerals:

[0017]

washing-drying machine 100, main body 110, washing drum 111, air inlet duct 113, filter 114, accommodating cavity 115, air return duct 116, clothes drying device 120, horizontal compressor 121, condenser 122, evaporator 123, compressor base 130,

cover 101.

DETAILED DESCRIPTION

[0018] Embodiments of the present disclosure will be described in detail. Examples of the embodiments are shown in the drawings. The same or similar elements and the elements having same or similar functions are denoted by like reference numerals throughout the descriptions. The embodiments described herein with reference to drawings are explanatory, and used to generally understand the present disclosure, and shall not be construed to limit the present disclosure.

[0019] In the following, a washing-drying machine 100 according to embodiments of the present disclosure will be described with reference to Fig. 1 to Fig. 5.

[0020] As shown in Fig. 1 to Fig. 5, the washing-drying machine 100 according to embodiments of the present disclosure includes a main body 110 and a clothes drying device 120.

[0021] Specifically, referring to Fig. 1 to Fig. 5, the main body 110 is provided with a washing drum 111 therein and a guiding assembly thereon, in which the guiding assembly is communicated with the washing drum 111 to form an airflow loop. The clothes drying device 120 includes a horizontal compressor 121, a condenser 122 and an evaporator 123 (referring to Fig. 3), in which the horizontal compressor 121, the condenser 122 and the evaporator 123 are connected in series to form a clothes drying loop, and the evaporator 123 is connected with the guiding assembly. The horizontal compressor 121 is chosen for the clothes drying device 120, and thus a space occupation of the washing-drying machine 100 is reduced.

[0022] In the washing-drying machine 100 according to embodiments of the present disclosure, the horizontal compressor 121 is chosen for the clothes drying device 120, and also, a traditional mounting manner of the horizontal compressor 121 is changed, such that the space occupied by the horizontal compressor 121 is controlled effectively and an overall height of the clothes drying device 120 is lowered, thus further decreasing a height of the washing-drying machine 100, and realizing an integrated top-set design of the clothes drying device 120 with less influence on the height of the washing-drying machine.

[0023] Referring to Fig. 3 to Fig. 5, the guiding assembly includes an air inlet duct 113, a filter 114, an accommodating cavity 115 and an air return duct 116 connected in series in turn, and the air inlet duct 113 and the air return duct 116 are communicated with the washing drum 111 respectively (referring to Fig. 5). Thus, the guiding assembly is communicated with the washing drum 111 to form the airflow loop, so that the washing drum 111 is ensured to be clean.

[0024] Further, referring to Fig. 3 and Fig. 4 and combining Fig. 1, the air inlet duct 113, the filter 114, the accommodating cavity 115 and the horizontal compressor

121 are disposed in a top of the main body 110 and arranged in turn along a circumferential direction of the main body 110. Thus, the mounting manner of the horizontal compressor 121 is optimized and the space is sufficiently used, which provides a favorable condition for the top-set design of the clothes drying device 120 in the washing-drying machine 100.

[0025] As shown in Fig. 3 and Fig. 4, the condenser 122 and the evaporator 123 are disposed in the accommodating cavity 115, and the evaporator 123 is located upstream of the condenser 122 along an airflow direction in the guiding assembly. In other words, along the airflow direction in the guiding assembly, the air may be condensed by the evaporator 123 firstly, and then be heated by the condenser 122.

[0026] Optionally, at least one of the air inlet duct 113 and the air return duct 116 is a rubber hose.

[0027] For example, in an embodiment shown in Fig. 3, the air inlet duct 113 may be the rubber hose, and thus, an arrangement manner of the air inlet duct 113 may be adjusted according to a reserved space, so that the space occupied by the air inlet duct 113 can be saved and a service life of the air inlet duct 113 can be prolonged to some extent.

[0028] Of course, the air return duct 116 may also be the rubber hose, and the specific materials of the air inlet duct 113 and the air return duct 116 are not limited in the present disclosure and may be selected suitably according to demands in a practical application.

[0029] Referring to Fig. 5 and combining Fig. 1, an axis of the washing drum 111 may extend along a front and rear direction (such as a front and rear direction shown in Fig. 5), the air inlet duct 113 may be connected to a rear end of the washing drum 111, and the air return duct 116 may be connected to a front end of the washing drum 111. In the drying process, airflow in the rear end of the washing drum 111 is guided to the clothes drying device 120 by the guiding assembly firstly, water vapor in the airflow is condensed and the airflow is heated again through the clothes drying device 120, and then the airflow returns to the front end of the washing drum 111. The airflow returning to the front end of the washing drum 111 flows in the washing drum 111 and further to the rear end of the washing drum 111, thus completing an airflow circulation.

[0030] Thus, in the drying process, the airflow can circulate in the whole washing drum 111, so as to improve the efficiency and effect of drying the clothes, thereby making the clothes in the washing drum 111 dried rapidly.

[0031] Referring to Fig. 1 and Fig. 2, the horizontal compressor 121 may be disposed in a top of the washing-drying machine 100. Thus, the overall height of the washing-drying machine 100 can be lowered and the used space is compressed.

[0032] In addition, the top-set horizontal compressor 121 is disposed adjacent to the condenser 122 and the evaporator 123, which can simplify the duct connection and improve the clothes drying efficiency.

[0033] Further, as shown in Fig. 1, a compressor base 130 may be disposed in the top of the washing-drying machine 100, and the horizontal compressor 121 may be mounted to the compressor base 130. The compressor base 130 may be used to support and accommodate the horizontal compressor 121, thus improving the mounting stability of the horizontal compressor 121.

[0034] Referring to Fig. 3 and Fig. 4 and combining Fig. 1, the condenser 122 and the evaporator 123 both may be disposed in the top of the washing-drying machine 100 (as shown in Fig. 1), and the condenser 122 and the evaporator 123 may further be disposed adjacent to the horizontal compressor 121 (referring to Fig. 3 and Fig. 4). Thus, a distance between the horizontal compressor 121 and the condenser 122 can be shortened, and also, a distance between the horizontal compressor 121 and the evaporator 123 can be shortened, so that the duct design is simple, therefore improving the producing efficiency of the washing-drying machine 100 to some extent.

[0035] In addition, componentization of the horizontal compressor 121, the condenser 122 and the evaporator 123 can be achieved due to the short distance between the horizontal compressor 121 and the condenser 122 as well as the short distance between the horizontal compressor 121 and the evaporator 123.

[0036] It can be understood that, by disposing the horizontal compressor 121 in the washing-drying machine 100, the horizontal compressor 121 can be disposed at the top or a bottom of the washing-drying machine 100 due to a small height of the horizontal compressor 121, which is greatly advantageous for space usage. For example, the horizontal compressor 121 may be disposed in the top of the washing-drying machine 100, which can shorten the distance between the horizontal compressor 121 and the condenser 122 as well as the distance between the horizontal compressor 121 and the evaporator 123, so that the duct design is simple, and the producing efficiency is high.

[0037] Optionally, the horizontal compressor 121 has a slope angle ranging from 0° to 90° relative to a horizontal plane. Thus, in the mounting process of the horizontal compressor 121, the specific mounting position of the horizontal compressor 121 can be suitably adjusted according to the actual demands, so as to make full use of space and meet various demands of the user.

[0038] The slope angle of the horizontal compressor 121 relative to the horizontal plane is not limited in the present disclosure, and may be selected suitably according to demands in a practical application.

[0039] Referring to Fig. 1 and Fig. 2, a cover 101 may also be disposed at the top of the washing-drying machine 100, and configured to cover the top of the clothes drying device 120, so that the cover 101 is easy to be assembled and disassembled, thus improving the maintenance efficiency of the washing-drying machine 100 to some extent.

[0040] The horizontal compressor 121 is chosen for

the washing-drying machine 100 according to embodiments of the present disclosure, which has an evident advantage in the space usage, compared with a traditional washing-drying machine using a vertical compressor.

[0041] In addition, the use of the horizontal compressor 121 can decrease the height of the clothes drying device 120 effectively and realize the integrated top-set design of the clothes drying device 120 with less influence on the height of the washing-drying machine 100.

[0042] In addition, in the washing-drying machine 100 according to embodiments of the present disclosure, the horizontal compressor 121 is introduced and the mounting manner of the horizontal compressor 121 is optimized, so that the height of the clothes drying device 120 can be decreased, thus providing an advantageous foundation for the top-set design of the clothes drying device 120 of the washing-drying machine 100, and also improving the producing and manufacturing, as well as the after-sales maintenance efficiency of the washing-drying machine 100.

[0043] In addition, the horizontal compressor 121 in the present disclosure may be a compressor whose cylinder having a horizontal axis, and furthermore, the horizontal compressor 121 can be rotated to be placed in the optimal position.

[0044] 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," "an axial direction," "a radical direction," and "a circumferential direction," 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 disclosure be constructed or operated in a particular orientation.

[0045] 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 disclosure, "a plurality of" means two or more than two, unless specified otherwise.

[0046] In the present disclosure, 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 or interaction of two elements, which can be understood by those skilled in the art according to specific situations.

[0047] In the present disclosure, unless specified or limited otherwise, a structure in which a first feature is "on" or "below" a second feature may include an embod-

iment in which the first feature is in direct contact with the second feature, and may also include an embodiment in which the first feature and the second feature are not in direct contact with each other, but are contacted via an intervening structures. Furthermore, a first feature "on," "above," or "on top of" a second feature may include an embodiment in which the first feature is right or obliquely "on," "above," or "on top of" the second feature, or just means that the first feature is at a height higher than that of the second feature; while a first feature "below," "under," or "on bottom of" a second feature may include an embodiment in which the first feature is right or obliquely "below," "under," or "on bottom of" the second feature, or just means that the first feature is at a height lower than that of the second feature.

[0048] Reference throughout this specification to "an embodiment," "some embodiments," "an example," "a specific 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 disclosure. Thus, the appearances of the phrases in various places throughout this specification are not necessarily referring to the same embodiment or example of the present disclosure. Furthermore, the particular features, structures, materials, or characteristics may be combined in any suitable manner in one or more embodiments or examples. Furthermore, different embodiments or examples in this specification can be joined and combined by those skilled in the art without mutual contradiction.

[0049] Although embodiments have been shown and described, it would be appreciated that the embodiments above are explanatory and cannot be construed to limit the present disclosure, and changes, alternatives, transformation and modifications to the embodiments above can be made by those skilled in the art in the scope of the present disclosure.

Claims

1. A washing-drying machine (100), comprising:

a main body (110) provided with a washing drum (111) therein and a guiding assembly thereon, wherein the guiding assembly is communicated with the washing drum (111) to define an airflow loop; and

a clothes drying device (120) comprising a horizontal compressor (121), a condenser (122) and an evaporator (123), wherein the horizontal compressor (121), the condenser (122) and the evaporator (123) are connected in series to define a clothes drying loop, and the evaporator (123) is connected with the guiding assembly.

2. The washing-drying machine (100) according to

claim 1, wherein the guiding assembly comprises an air inlet duct (113), a filter (114), an accommodating cavity (115) and an air return duct (116) connected in series in turn, and the air inlet duct (113) and the air return duct (116) are communicated with the washing drum (111) respectively.

3. The washing-drying machine (100) according to claim 2, wherein the air inlet duct (113), the filter (114), the accommodating cavity (115) and the horizontal compressor (121) are disposed in a top of the main body (110) and arranged in turn along a circumferential direction of the main body (110).

4. The washing-drying machine (100) according to claim 3, wherein the condenser (122) and the evaporator (123) are disposed in the accommodating cavity (115), and the evaporator (123) is located upstream of the condenser (122) along an airflow direction in the guiding assembly.

5. The washing-drying machine (100) according to claim 2, wherein at least one of the air inlet duct (113) and the air return duct (116) is a rubber hose.

6. The washing-drying machine (100) according to claim 2, wherein an axis of the washing drum (111) extends along a front and rear direction, the air inlet duct (113) is connected to a rear end of the washing drum (111), and the air return duct (116) is connected to a front end of the washing drum (111).

7. The washing-drying machine (100) according to any one of claims 1-6, wherein the horizontal compressor (121) is disposed in a top of the washing-drying machine (100).

8. The washing-drying machine (100) according to claim 7, wherein a compressor base (130) is disposed in the top of the washing-drying machine (100), and the horizontal compressor (121) is mounted to the compressor base (130).

9. The washing-drying machine (100) according to claim 7, wherein the condenser (122) and the evaporator (123) are disposed in the top of the washing-drying machine (100), and arranged adjacent to the horizontal compressor (121).

10. The washing-drying machine (100) according to any one of claims 1-6, wherein the horizontal compressor (121) has a slope angle ranging from 0° to 90° relative to a horizontal plane.

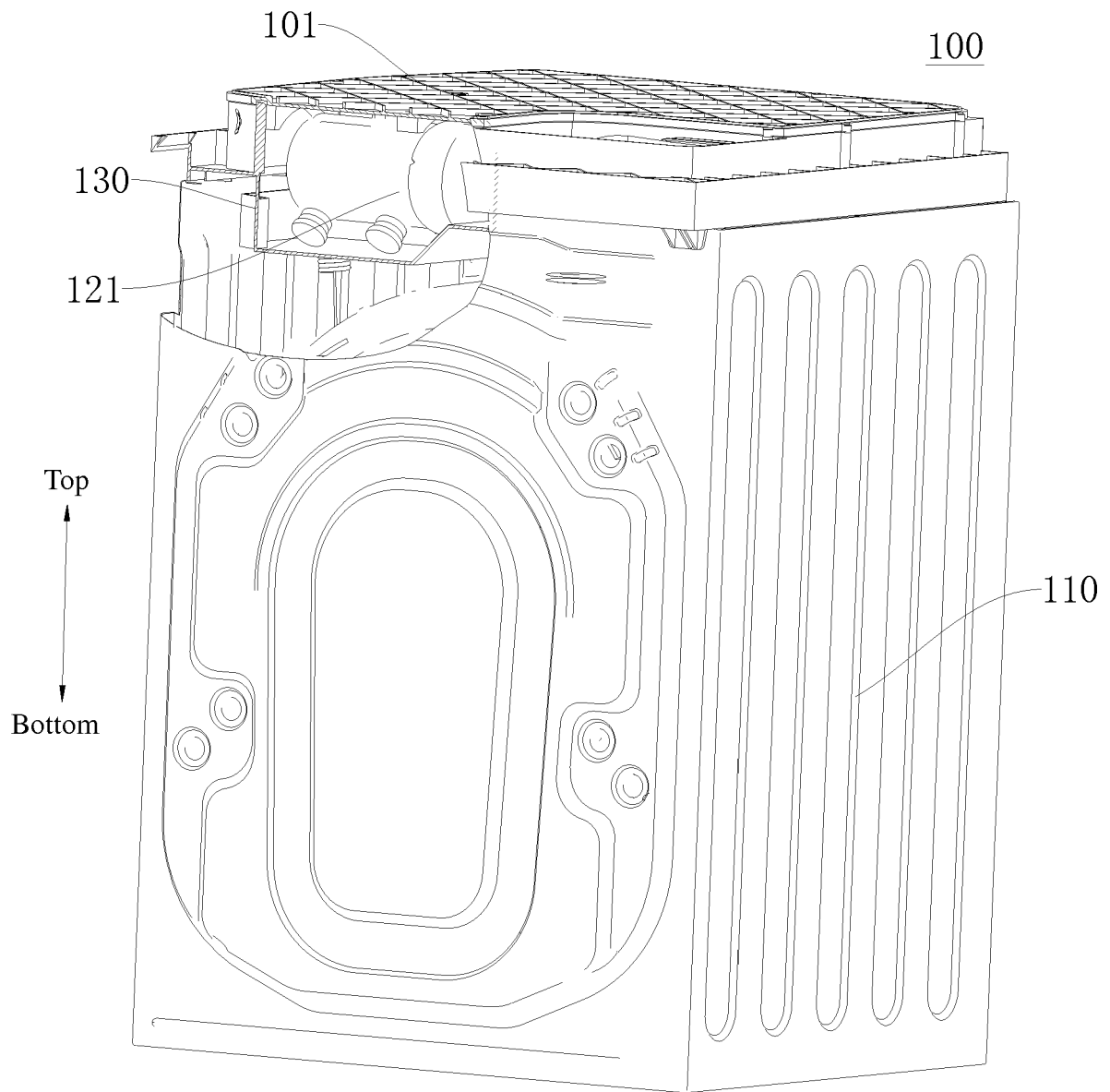


Fig. 1

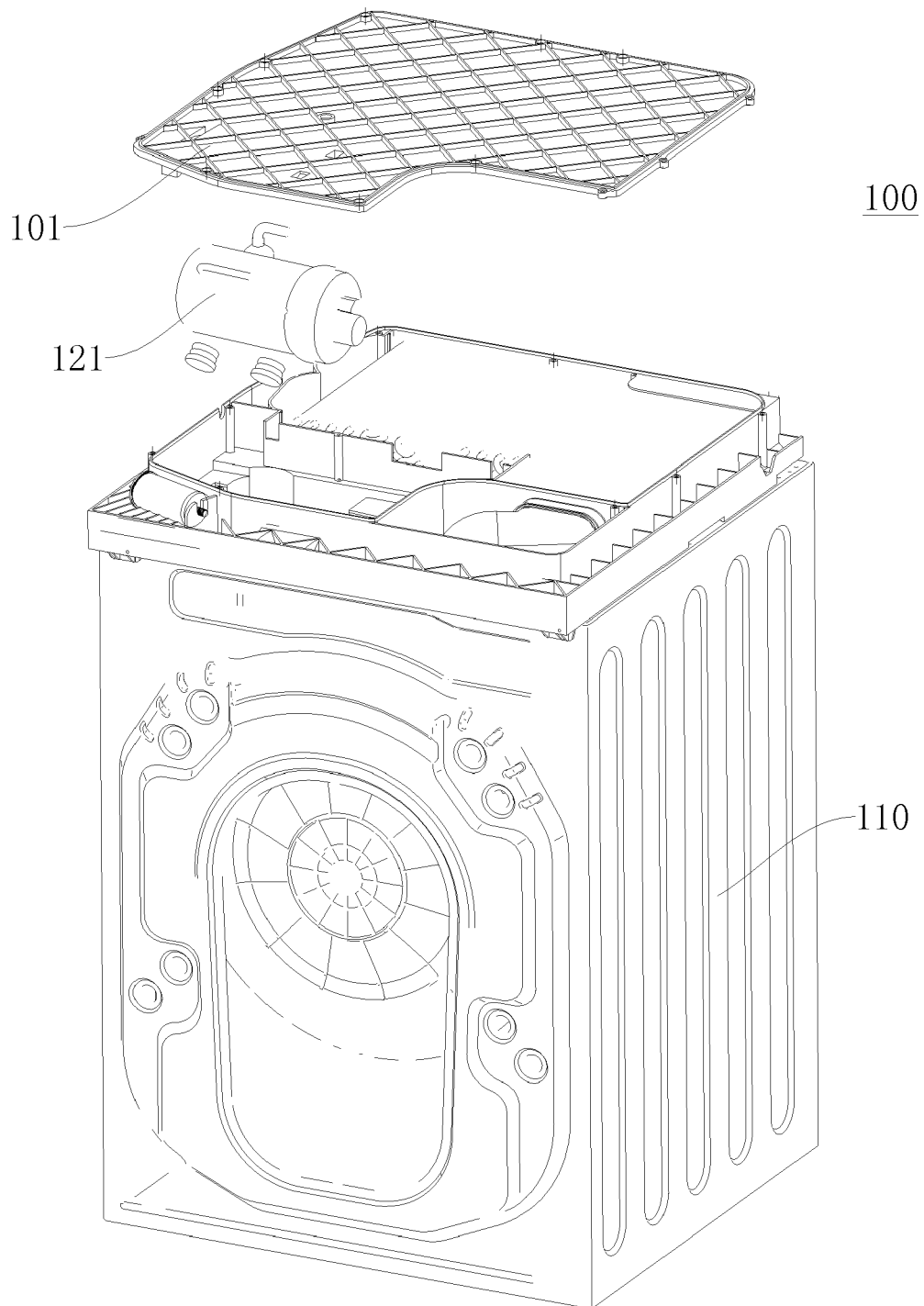


Fig. 2

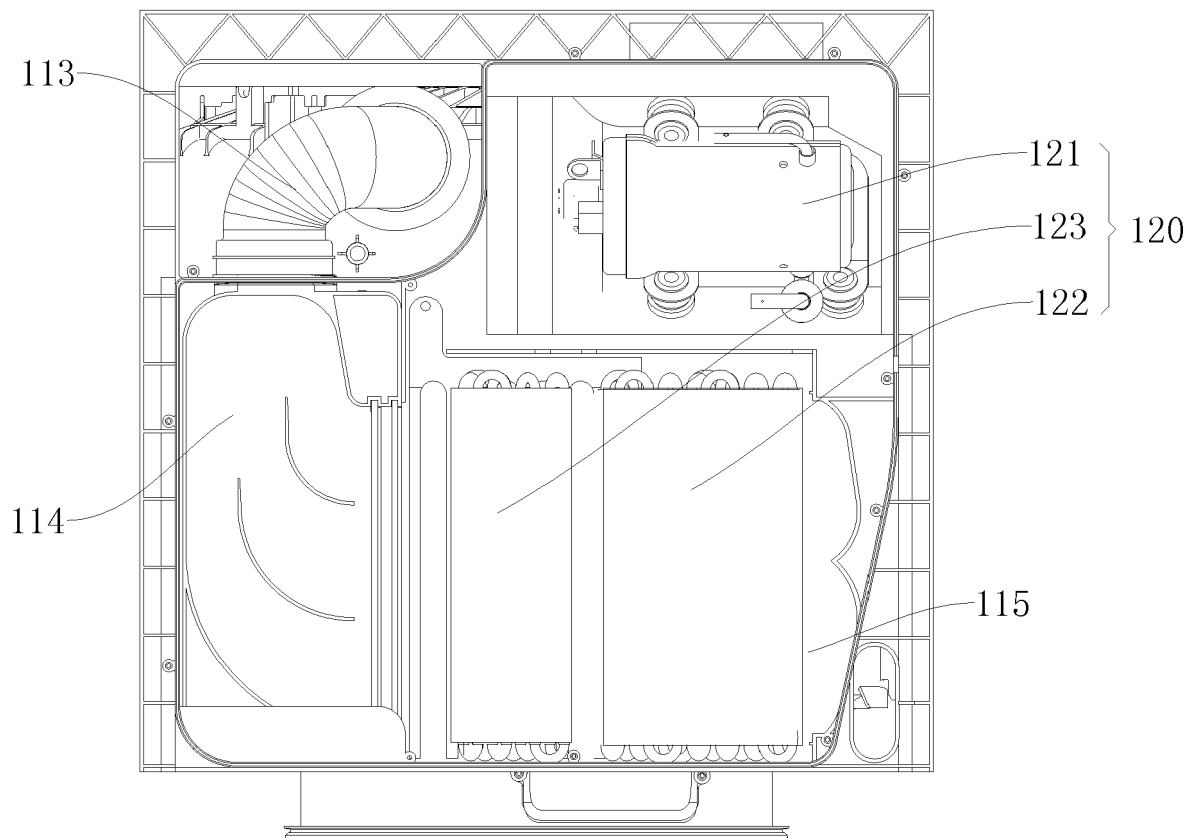


Fig. 3

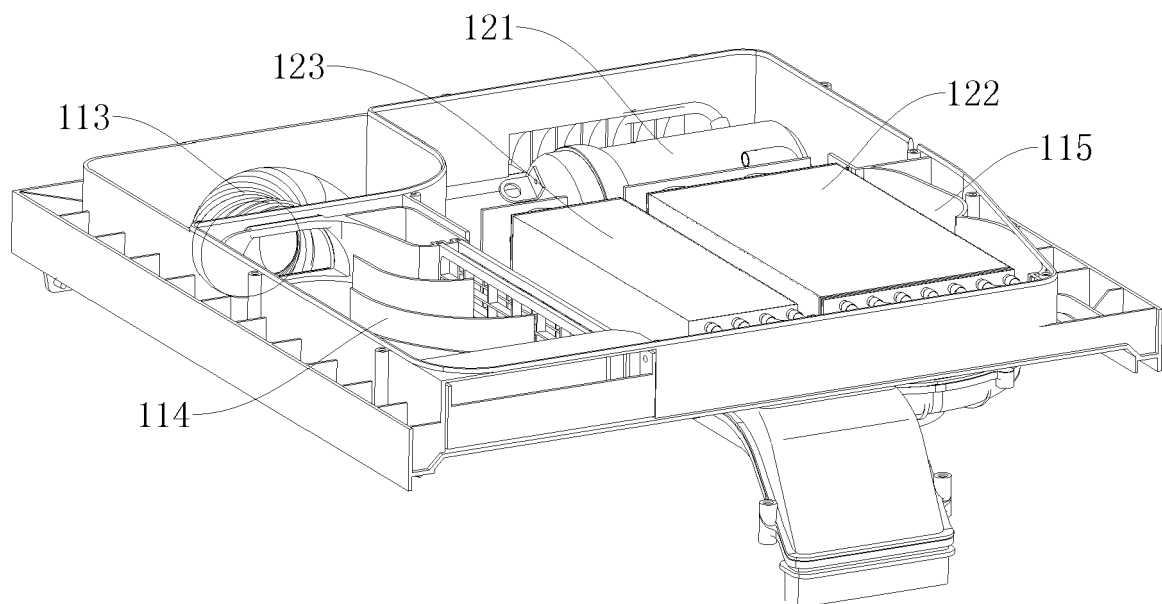


Fig. 4

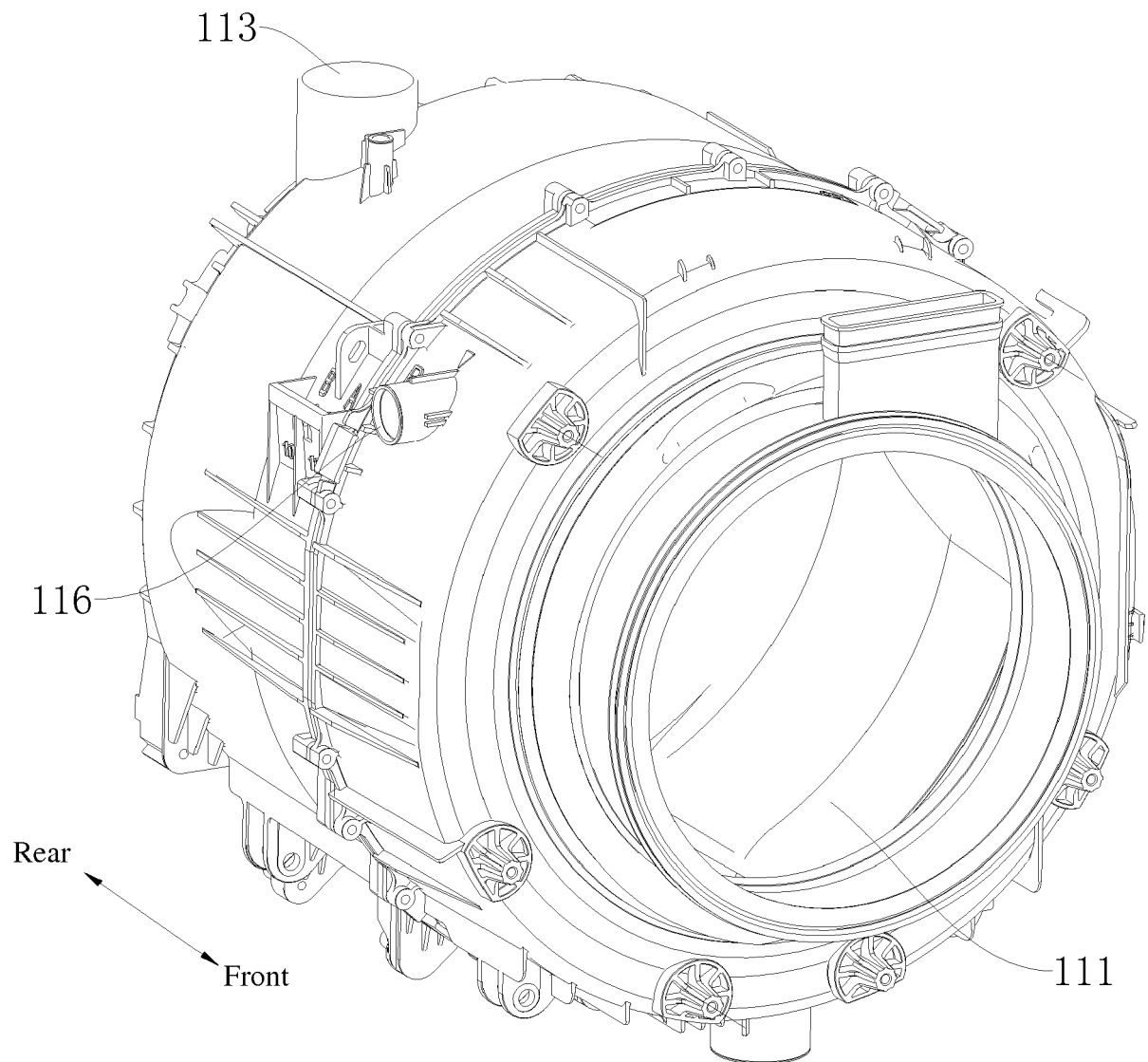


Fig. 5



EUROPEAN SEARCH REPORT

Application Number
EP 16 20 1042

5

10

15

20

25

30

35

40

45

50

55

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	WO 2014/083503 A2 (MECCANICA GENERALE SRL [IT]) 5 June 2014 (2014-06-05) * page 7, line 11 - page 8, line 22 * * figures 1-6 *	1-10	INV. D06F58/20 ADD. D06F25/00
X	EP 2 886 708 A1 (BSH ELECTRODOMÉSTICOS ESPAÑA S A [ES]) 24 June 2015 (2015-06-24) * paragraph [0023] - paragraph [0024] * * paragraph [0032] - paragraph [0036] * * paragraph [0049] - paragraph [0055] * * figures 5, 6 *	1-10	
X,P	EP 3 015 590 A1 (LG ELECTRONICS INC [KR]) 4 May 2016 (2016-05-04) * figure 2 *	1-4,6-10	
			TECHNICAL FIELDS SEARCHED (IPC)
			D06F
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 2 February 2017	Examiner Bermejo, Marco
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	

 1
EPO FORM 1503 03.02 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 16 20 1042

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

02-02-2017

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2014083503 A2	05-06-2014	EP 2925924 A2	07-10-2015
		US 2015322610 A1	12-11-2015
		WO 2014083503 A2	05-06-2014
EP 2886708 A1	24-06-2015	NONE	
EP 3015590 A1	04-05-2016	CN 105544143 A	04-05-2016
		EP 3015590 A1	04-05-2016
		KR 20160049734 A	10-05-2016
		US 2016115641 A1	28-04-2016