



(11) **EP 4 516 979 A1**

(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
05.03.2025 Bulletin 2025/10

(51) International Patent Classification (IPC):
D06F 25/00 ^(2006.01) **D06F 58/24** ^(2006.01)
D06F 58/04 ^(2006.01)

(21) Application number: **22939965.4**

(86) International application number:
PCT/CN2022/140856

(22) Date of filing: **22.12.2022**

(87) International publication number:
WO 2023/207156 (02.11.2023 Gazette 2023/44)

(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 ME MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA
Designated Validation States:
KH MA MD TN

(72) Inventors:
• **YI, Zhenxu**
Zhuhai, Guangdong 519031 (CN)
• **YANG, Hongyong**
Zhuhai, Guangdong 519031 (CN)
• **WANG, Shubin**
Zhuhai, Guangdong 519031 (CN)
• **LONG, Binhua**
Zhuhai, Guangdong 519031 (CN)
• **CHEN, Zongpeng**
Zhuhai, Guangdong 519031 (CN)

(30) Priority: **29.04.2022 CN 202210467728**

(74) Representative: **Zacco GmbH**
Bayerstrasse 83
80335 München (DE)

(71) Applicant: **Gree Electric Appliances, Inc. of Zhuhai**
Zhuhai, Guangdong 519031 (CN)

(54) **LAUNDRY TREATMENT APPARATUS**

(57) A laundry treatment apparatus is provided, including a rear drum (4), an inner drum, a main condenser, and a condenser extending portion. The rear drum (4) includes an inner wall of the rear drum, the inner drum includes an outer wall of the inner drum, and the condenser extending portion includes a space formed by the inner wall of the rear drum and the outer wall of the inner drum, a rear drum spray pipe (4-4), the inner wall of the rear drum, and the outer wall of the inner drum. The rear drum spray pipe (4-4) is capable of spraying water towards at least one of hot and humid airs at the inner wall of the rear drum, at the outer wall of the inner drum, and in the space formed by the inner wall of the rear drum and the outer wall of the inner drum for condensation and heat exchange. The main condenser includes an air condensing duct (1) disposed on an outer wall of the rear drum and a condenser spray pipe (1-4) disposed on the air condensing duct (1), and the condenser spray pipe (1-4) is capable of spraying water towards hot and humid air entering the air condensing duct (1) for condensation and heat exchange.

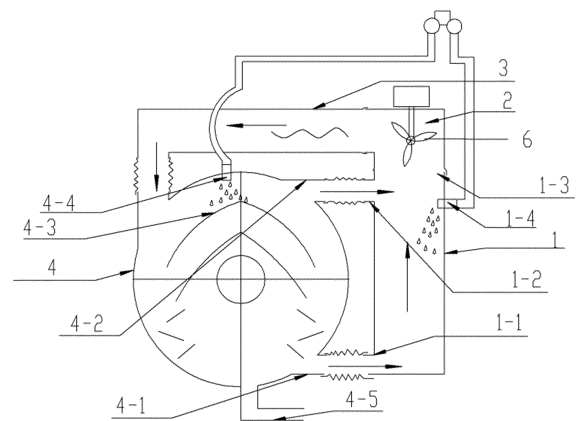


Fig. 1

Description

Cross-Reference to Related Application

[0001] This application claims the priority to Chinese Patent Application No. 202210467728.X, titled "LAUNDRY TREATMENT APPARATUS" and filed on April 29, 2022, which is incorporated herein by reference in its entirety.

Technical Field

[0002] The present invention relates to a field of laundry washing and drying technologies, and in particular to, a laundry treatment apparatus.

Background

[0003] Common water-cooled washing and drying machines rely on a condenser to condense steam from the laundry during the drying process. The principle is that a motor acts as an air power source to drive the air in the drum to circulate along a fixed trajectory, pass through the heater to be heated, enter the washing drum to exchange heat with the wet laundry, thereby bringing moisture out of the laundry in the form of steam. When the air passes through the condenser, an external water source is sprayed into the condenser to contact the steam, achieving moisture condensation. Due to the limited overall layout of the washing machine, the condenser is typically a passage with a small space, making it inconvenient for the steam to fully contact the external water source, thus resulting in low condensation efficiency. There is always incompletely condensed steam circulating in the path, causing troubles to the user such as high power and water consumption and long drying time.

[0004] Due to the limited overall layout of the washing and drying machine in the related art, the condenser is typically a passage with a small space, making it inconvenient for the steam to fully contact the external water source, thus resulting in low condensation efficiency. There is always incompletely condensed steam circulating in the path, causing technical problems such as high power and water consumption and long drying time.

SUMMARY

[0005] Therefore, some embodiments of the invention provide a laundry treatment apparatus, to resolve the technical problem that due to the limited overall layout of the washing and drying machine in the related art, the condenser is typically a passage with a small space, making it inconvenient for the steam to fully contact the external water source, thus resulting in the defect of low condensation efficiency.

[0006] To resolve the foregoing technical problem, some embodiments of the invention provide the laundry

treatment apparatus, including:

a rear drum, an inner drum, a main condenser, and a condenser extending portion. The rear drum includes an inner wall of the rear drum, the inner drum includes an outer wall of the inner drum, and the condenser extending portion includes a space formed by the inner wall of the rear drum and the outer wall of the inner drum, a rear drum spray pipe, the inner wall of the rear drum, and the outer wall of the inner drum. The rear drum spray pipe is configured to spray water towards at least one of hot and humid airs at the inner wall of the rear drum, at the outer wall of the inner drum, and in the space formed by the inner wall of the rear drum and the outer wall of the inner drum for condensation and heat exchange. The main condenser includes an air condensing duct disposed on an outer wall of the rear drum and a condenser spray pipe disposed on the air condensing duct, and the condenser spray pipe is capable of spraying water towards hot and humid air entering the air condensing duct for condensation and heat exchange.

[0007] In some embodiments, the rear drum is provided with a first air exhaust port and a second air exhaust port, the air condensing duct is of a passage structure that has at least three passages and is provided with a first air intake port, a second air intake port, and a third air exhaust port, the first air exhaust port is communicated with the first air intake port so as to guide hot and humid air in the rear drum into the air condensing duct, the second air exhaust port is communicated with the second air intake port so as to guide condensed air in the rear drum into the air condensing duct, and the third air exhaust port 1-3 is configured to deliver air in the air condensing duct into an air heating duct.

[0008] In some embodiments, the first air exhaust port is located below the second air exhaust port, and the first air intake port is located below the second air intake port.

[0009] In some embodiments, a rear wall of the rear drum is vertically divided into three equal parts in a height direction, the first air exhaust port is located within the lower third of the rear drum, and the second air exhaust port is located within the upper third of the rear drum.

[0010] In some embodiments, a center line of the second air exhaust port is perpendicular to a rear drum wall of the rear drum.

[0011] In some embodiments, a diameter ratio of the first air exhaust port to the second air exhaust port is 2/3-4.

[0012] In some embodiments, within a planar projection of the rear drum wall of the rear drum, a length from a center of the first air exhaust port to a center of the second air exhaust port along a horizontal direction is L, a diameter of the rear drum is D, and $L/D=0.15-0.35$.

[0013] In some embodiments, the inner wall of the rear drum is provided with a plurality of water guide structures, a bottom of the rear drum is provided with a drainage port, and a part of the rear drum spray pipe is penetrated from an outside of the rear drum to an inner side of inner wall of the rear drum, so as to spray water onto the inner wall of

the rear drum.

[0014] In some embodiments, the air condensing duct is further provided with a third air exhaust port, through which the air in the air condensing duct can be delivered to the air heating duct.

[0015] In some embodiments, when the air condensing duct is further provided with the third air exhaust port, the laundry treatment apparatus further includes an air heating duct and a heater, the air heating duct is provided with an air intake port, the air intake port is communicated with the third air exhaust port on the air condensing duct, an end of the air heating duct is configured to communicate with the inner drum and/or the rear drum, and the heater is disposed in the air heating duct.

[0016] In some embodiments, a fan is disposed in the air heating duct; and/or the laundry treatment apparatus is a washing and drying machine.

[0017] The laundry treatment apparatus provided by this application has the following beneficial effects:

This application provides a main condenser including an air condensing duct disposed on an outer wall of a rear drum and a condenser spray pipe disposed on the air condensing duct. The condenser spray pipe sprays water towards the hot and humid air entering the air condensing duct for condensation and heat exchange. In addition, a condenser extending portion includes a space formed by the inner wall of the rear drum and the outer wall of the inner drum, a rear drum spray pipe, the inner wall of the rear drum, and the outer wall of the inner drum. The rear drum spray pipe can spray water towards at least one of the hot and humid air at the inner wall of the rear drum, at the outer wall of the inner drum, and in the space formed by the inner wall of the rear drum and the outer wall of the inner drum for condensation and heat exchange, forming a dual condensing structure with both the main condenser and the condenser extending portion condensing and cooling the hot and humid air simultaneously, thus improving dehumidification efficiency and condensation efficiency. This effectively resolves the problem that due to the limited overall layout of the washing and drying machine, the condenser is typically a passage with a small space, making it inconvenient for the steam to fully contact the external water source, thus resulting in low condensation efficiency. The laundry treatment apparatus reasonably utilizes the existing space and extends the contact path of steam and external water sources during the air circulation process, thereby improving condensation efficiency and enhancing the drying efficiency of the washing and drying machine.

Brief Description of the Drawings

[0018] To describe the technical solutions in the embodiments of this application or in the prior art more clearly, the accompanying drawings required for use in the embodiments or the prior art are briefly described below. Apparently, the accompanying drawings described below are only some embodiments of this appli-

cation. A person of ordinary skill in the art may further obtain accompanying drawings based on the disclosed accompanying drawings without creative efforts.

5 FIG. 1 illustrates a schematic diagram of simplified interior of a laundry treatment apparatus according to this application.

10 FIG. 2 illustrates an internal structural diagram of the laundry treatment apparatus (a washing and drying machine) according to this application.

15 FIG. 3 illustrates a rear structural view of the laundry treatment apparatus (the washing and drying machine) according to this application.

20 FIG. 4 illustrates a schematic diagram of an internal structural of a rear drum of a washing and drying machine with a dual condensing structure according to this application.

25 FIG. 5 illustrates a front view of a main condenser of a washing and drying machine with a dual condensing structure according to this application.

FIG. 6 illustrates a top view of a main condenser of a washing and drying machine with a dual condensing structure according to this application.

30 Numeral references:

[0019] 1, air condensing duct; 2, air intake port; 3, air heating duct; 4, rear drum; 1-1, first air intake port; 1-2, second air intake port; 1-3, third air exhaust port; 1-4, condenser spray pipe; 4-1, first air exhaust port; 4-2, second air exhaust port; 4-3, water guide structure; 4-4, rear drum spray pipe; 4-5, drainage port; 5, heater; and 6, fan.

Detailed Description of the Embodiments

[0020] The technical solutions of the embodiments of this application are clearly and completely described below with reference to the accompanying drawings of the embodiments of this application. Apparently, the described embodiments are merely some rather than all of the embodiments of this application. All other embodiments obtained by persons of ordinary skill in the art based on the embodiments of this application without creative efforts shall fall within the protection scope of this application.

[0021] As shown in Figs. 1 to 6, some embodiments of this application provide a laundry treatment apparatus, including:

35 a rear drum 4, an inner drum, a main condenser, and a condenser extending portion. The rear drum 4 includes an inner wall of the rear drum, the inner drum includes an outer wall of the inner drum, the condenser extending

portion includes a space formed by the inner wall of the rear drum and the outer wall of the inner drum, a rear drum spray pipe 4-4, the inner wall of the rear drum, and the outer wall of the inner drum. The rear drum spray pipe 4-4 is configured to spray water towards at least one of hot and humid airs at the inner wall of the rear drum, at the outer wall of the inner drum, and in the space formed by the inner wall of the rear drum and the outer wall of the inner drum for condensation and heat exchange. The main condenser includes an air condensing duct 1 disposed on an outer wall of the rear drum and a condenser spray pipe 1-4 disposed on the air condensing duct 1, and the condenser spray pipe 1-4 is capable of spraying water towards hot and humid air entering the air condensing duct 1 for condensation and heat exchange.

[0022] This application provides the main condenser including the air condensing duct disposed on the outer wall of the rear drum and the condenser spray pipe disposed on the air condensing duct. The condenser spray pipe sprays water towards the hot and humid air entering the air condensing duct for condensation and heat exchange. In addition, the condenser extending portion includes the space formed by the inner wall of the rear drum and the outer wall of the inner drum, the rear drum spray pipe, the inner wall of the rear drum, and the outer wall of the inner drum. The rear drum spray pipe can spray water towards at least one of the hot and humid air at the inner wall of the rear drum, at the outer wall of the inner drum, and in the space formed by the inner wall of the rear drum and the outer wall of the inner drum for condensation and heat exchange, forming a dual condensing structure with both the main condenser and the condenser extending portion condensing and cooling the hot and humid air simultaneously, thus improving dehumidification efficiency and condensation efficiency. This effectively resolves the problem that due to the limited overall layout of the washing and drying machine, the condenser is typically a passage with a small space, making it inconvenient for the steam to fully contact the external water source, thus resulting in low condensation efficiency. The laundry treatment apparatus reasonably utilizes the existing space and extends the contact path of steam and external water sources during the air circulation process, thereby improving condensation efficiency and enhancing the drying efficiency of the washing and drying machine.

[0023] In some implementations, the rear drum 4 is provided with a first air exhaust port 4-1 and a second air exhaust port 4-2. The air condensing duct 1 is of a passage structure that has at least three passages and is provided with a first air intake port 1-1, a second air intake port 1-2, and a third air exhaust port 1-3. The first air exhaust port 4-1 is communicated with the first air intake port 1-1 so as to guide the hot and humid air in the rear drum 4 into the air condensing duct 1. The second air exhaust port 4-2 is communicated with the second air intake port 1-2 so as to guide condensed air in the rear drum 4 into the air condensing duct 1, and the third air

exhaust port 1-3 is configured to deliver air in the air condensing duct 1 into an air heating duct. In this application, as the first air exhaust port is provided on the rear drum and the first air intake port is provided on the air condensing duct, via the first air intake port and the first air exhaust port, the hot and humid air can be drawn from the inside of the rear drum into the air condensing duct. Air-liquid separation is performed under the cooling effect caused by condensing the water sprayed by the condenser spray pipe, effectively removing moisture, drying the air, and allowing it to circulate back into the inner drum for continued drying. Via the second air exhaust port and the second air intake port, the main air that has undergone condensation and heat exchange can be drawn from the upper part of the inner drum into the air condensing duct. Additionally, via the third air exhaust port, the air in the air condensing duct can be effectively discharged into the air heating duct, enabling the air condensing duct to form a three-passage structure, the three-passage structure is a three-passage characteristic condenser (one end connected to the fan and the other two ends connected to the outer drum of the washing machine); an interlayer between the inner wall of the outer drum of the washing machine and the outer wall of the inner drum of the washing machine serves as the condenser extending portion, such that the manifold and the air condensing duct effectively form an integrated structure.

[0024] Fig. 2 is another expression of the principle of a dual condensing system. As shown in the figure, the hot air blown by the electric heater enters the drum and can be simply divided into three parts: the first part passes through the air condensing duct 1 for condensation, the second part passes through the rear drum 4 for condensation, and the third part directly passes through the second air exhaust port 4-2 into the second air intake port 1-2. This is a drying cycle with low efficiency.

[0025] The air condensing duct 1 is provided with a first air intake port 1-1, a second air intake port 1-2, and a third air exhaust port 1-3. The third air exhaust port 1-3 is located higher and connected to a fan volute assembly. The first air intake port 1-1 is located lower and far from the third air exhaust port 1-3. The condenser spray pipe 1-4 is located higher than the first air intake port 1-1. Steam enters the air condensing duct 1 via the first air intake port 1-1, and flows from the lower position to the higher position to be discharged from the air condensing duct 1 via the third air exhaust port 1-3. During this process, an external water source is sprayed in by the condenser spray pipe 1-4 to mix with the steam for condensation. The condensed water and the external water converge, pass through the first air intake port 1-1 and the first air exhaust port 4-1, and flow into the rear drum 4 to be discharged via the drainage port 4-5.

[0026] The second air intake port 1-2 of the air condensing duct 1 is located higher than the first air intake port 1-1 and close to the third air exhaust port 1-3. Another part of the steam in the rear drum 4 exists

between the inner wall of the outer drum of the washing machine and the outer wall of the inner drum of the washing machine, as shown in fig. 1, between the bottom of the outer drum and the bottom of the inner drum. At this position, a rear drum spray pipe 4-4 and a water guide structure 4-3 are arranged according to a special rule. In some embodiments, the water guide structure 4-3 is water guise ribs. The external water source is sprayed in by the rear drum spray pipe 4-4, and extends through a large water contact region created by the water guide structure 4-3 arranged according to a special rule to contact the steam for condensation. The condensed water and external water are discharged via the drainage port 4-5. Then this part of the air enters the air condensing duct 1 via the second air exhaust port 4-2 and the second air intake port 1-2. A small amount of uncondensed steam in this part of the air is condensed in the air condensing duct 1 with the help of external water introduced by the condenser spray pipe 1-4.

[0027] In some embodiments, the first air exhaust port 4-1 is located below the second air exhaust port 4-2, and the first air intake port 1-1 is located below the second air intake port 1-2. The first air exhaust port of this application is located at the lower, which can mainly guide out the hot and humid steam in the rear drum. Most of the steam has not undergone condensation and heat exchange in the rear drum and is humid. The second air exhaust port is located at the upper, which can mainly guide out the air, at the top of the rear drum, that has undergone condensation and heat exchange. This part of the air is mainly dehumidified dry air, and therefore located at the top.

[0028] In some embodiments, a rear wall of the rear drum 4 is vertically divided into three equal parts in a height direction, the first air exhaust port 4-1 is located within the lower third of the rear drum 4, and the second air exhaust port 4-2 is located within the upper third of the rear drum 4. Fig. 4 is a schematic structural diagram of a rear drum of a washing and drying machine with a dual condensing structure, showing a rear drum structure. Generally, the rear drum is divided into three equal parts. The second air exhaust port 4-2 is located in the upper third, and the first air exhaust port 4-1 is located in the lower third. This distribution is because a larger and longer condensation water contact area is needed to increase efficiency.

[0029] In some embodiments, a center line of the second air exhaust port 4-2 is perpendicular to a rear drum wall of the rear drum. Generally, the center line of the second air exhaust port 4-2 is perpendicular to the rear drum wall. If it is parallel to the rear drum wall, condensed water from a pipeline between the second air exhaust port 4-2 and the second air intake port 1-2 is likely to drip onto the laundry, affecting drying. The condensed water from the second air exhaust port on the rear drum wall flows down along the inner wall of the rear drum, without wetting the laundry and affecting drying, thus improving the drying efficiency.

[0030] In some embodiments, a diameter ratio of the

first air exhaust port 4-1 to the second air exhaust port 4-2 is $2/3-4$. The optimal ratio of the aperture of the first air exhaust port 4-1 to the equivalent aperture of the second air exhaust port 4-2 is between $80/120$ and $80/20$. In some embodiments, the optimal ratio of the aperture of the first air exhaust port 4-1 to the equivalent aperture of the second air exhaust port 4-2 is $80/120$. In some embodiments, the optimal ratio of the aperture of the first air exhaust port 4-1 to the equivalent aperture of the second air exhaust port 4-2 is $80/20$. This is because, with the fan speed unchanged, if the diameter of the second air exhaust port 4-2 increases, that is, the ratio decreases, the amount of air passing through the third part increases, resulting in more ineffective or low-efficiency cycles, thus reducing drying efficiency. However, if the diameter of the second air exhaust port 4-2 decreases, that is, the diameter ratio of the first air exhaust port 4-1 to the second air exhaust port 4-2 increases, the amount of air passing through the second part decreases, reducing the condensation efficiency of the rear drum, thus increasing drying time. Moreover, the diameter ratio of the first air exhaust port 4-1 to the second air exhaust port 4-2 also affects the flow rate of the air passing through the second air exhaust port 4-2. If the diameter of the second air exhaust port 4-2 decreases, the flow rate is too large. As a result, the water flowing out of the rear drum spray pipe 4-4 or even the condenser spray pipe 1-4 is easily drawn back into the fan and rear-end pipeline and heated electrically to be sprayed back into the drum, reducing temperature, increasing humidity, and wetting the laundry again. Considering the limited internal space, the diameter of the second air exhaust port 4-2 cannot be too large; otherwise ineffective heat exchange increases. It should be neither too small; otherwise the condensation effect of the rear drum is poor. Therefore, choosing the range of $2/3-4$ can ensure condensation and heat exchange of the rear drum while preventing or reducing ineffective heat exchange.

[0031] In some embodiments, within a planar projection of the rear drum wall of the rear drum 4, a length from a center of the first air exhaust port 4-1 to a center of the second air exhaust port 4-2 along a horizontal direction is L , a diameter of the rear drum 4 is D , and $L/D=0.15-0.35$. As for embodiments, the second air intake port 1-2 is consistent with the second air exhaust port 4-2, and the first air intake port 1-1 is consistent with the first air exhaust port 4-1. Generally, the horizontal length distance between two lines, passing through the centers of the second air intake port 1-2 and the first air intake port 1-1, perpendicular to the ground, is L in the fig. 5, and a ratio of L to the diameter of the drum being $0.15-0.35$ is preferable. L being too large increases the heat dissipation area of this air duct, as this section of the pipeline itself is not heated, affecting the temperature in the drum, thus reducing efficiency. If it is too small, that is, the horizontal distance of the opening position of the second air exhaust port 4-2 is closer to the first air exhaust port 4-1, the condensation utilization rate of the rear drum

area away from a side of the first air exhaust port 4-1 is reduced, reducing drying efficiency.

[0032] In some embodiments, the inner wall of the rear drum is provided with a plurality of water guide structures 4-3, a bottom of the rear drum 4 is provided with a drainage port 4-5, and a part of the rear drum spray pipe 4-4 is penetrated from an outside of the rear drum 4 to an inner side of the inner wall of the rear drum, so as to spray water onto the inner wall of the rear drum. The rear drum spray pipe of this application sprays water onto the inner wall of the rear drum, allowing the hot and humid air to complete heat exchange on the inner wall of the rear drum, achieving dehumidifying and cooling, and effectively avoiding situations such as directly spraying water into the rear drum and wetting the clothes. This also increases the heat exchange area, improving heat exchange efficiency.

[0033] In some embodiments, in the rear drum 4, the rear drum spray pipe 4-4 introduces an external water source, and the water guide structure 4-3 arranged according to a special rule expands the water contact area. The second air exhaust port 4-2, the second air intake port 1-2, the air exhaust port 1-3, and the fan volute assembly serves as air path and the power source, facilitating the formation of the condenser extending portion. The entire machine space is used properly without increasing the overall cost, the condensation path is extended, the heat exchange phase change area is increased, the circulation airflow amount is increased, the drying efficiency is improved, the time is shortened, and electricity is saved.

[0034] In some embodiments, when the air condensing duct 1 is further provided with the third air exhaust port 1-3, the laundry treatment apparatus further includes an air heating duct 3 and a heater 5, one end of the air heating duct 3 is provided with an air intake port 2, the air intake port 2 is communicated with the third air exhaust port 1-3 on the air condensing duct 1, another end of the air heating duct 3 is configured to communicate with the inner drum and/or the rear drum, and the heater 5 is disposed in the air heating duct 3.

[0035] In some implementations, a fan 6 is disposed in the air heating duct 3; and/or the laundry treatment apparatus is a washing and drying machine.

[0036] The technical features of the foregoing embodiments can be combined in any way. For brevity of description, not all possible combinations of the technical features in the foregoing embodiments are described. However, as long as there is no contradiction in the combination of these technical features, they should be considered within the scope described in this specification.

[0037] The foregoing embodiments only represent several implementations of this application. Their descriptions are relatively specific and detailed, but should not be construed as limiting the patent scope of this application. It is to be noted that for those skilled in the art, several modifications and improvements can be

made without departing from the concept of this application, which all fall within the protection scope of this application. Therefore, the protection scope of this application should be subject to the protection scope defined by the claims.

Claims

1. A laundry treatment apparatus, comprising:

a rear drum (4), an inner drum, and a main condenser, and a condenser extending portion, wherein the rear drum (4) comprises an inner wall of the rear drum, the inner drum comprises an outer wall of the inner drum, the condenser extending portion comprises a space formed by the inner wall of the rear drum and the outer wall of the inner drum, a rear drum spray pipe (4-4), the inner wall of the rear drum, and the outer wall of the inner drum, and the rear drum spray pipe (4-4) is configured to spray water towards at least one of hot and humid airs at the inner wall of the rear drum, at the outer wall of the inner drum, and in the space formed by the inner wall of the rear drum and the outer wall of the inner drum for condensation and heat exchange; and the main condenser comprises an air condensing duct (1) disposed on an outer wall of the rear drum and a condenser spray pipe (1-4) disposed on the air condensing duct (1), and the condenser spray pipe (1-4) is configured to spray water towards hot and humid air entering the air condensing duct (1) for condensation and heat exchange.

2. The laundry treatment apparatus according to claim 1, wherein

the rear drum (4) is provided with a first air exhaust port (4-1) and a second air exhaust port (4-2), the air condensing duct (1) is of a passage structure that has at least three passages and is provided with a first air intake port (1-1), a second air intake port (1-2), and a third air exhaust port (1-3), the first air exhaust port (4-1) is communicated with the first air intake port (1-1) so as to guide hot and humid air in the rear drum (4) into the air condensing duct (1), the second air exhaust port (4-2) is communicated with the second air intake port (1-2) so as to guide condensed air in the rear drum (4) into the air condensing duct (1), and the third air exhaust port (1-3) is configured to deliver air in the air condensing duct (1) into an air heating duct.

3. The laundry treatment apparatus according to claim 2, wherein

the first air exhaust port (4-1) is located below the second air exhaust port (4-2), and the first air intake

port (1-1) is located below the second air intake port (1-2).

4. The laundry treatment apparatus according to claim 3, wherein
a rear wall of the rear drum (4) is vertically divided into three equal parts in a height direction, the first air exhaust port (4-1) is located within the lower third of the rear drum (4), and the second air exhaust port (4-2) is located within the upper third of the rear drum (4). 5 10

5. The laundry treatment apparatus according to claim 2, wherein
a center line of the second air exhaust port (4-2) is perpendicular to a rear drum wall of the rear drum (4). 15

6. The laundry treatment apparatus according to claim 2, wherein
a diameter ratio of the first air exhaust port (4-1) to the second air exhaust port (4-2) is $2/3-4$. 20

7. The laundry treatment apparatus according to any one of claims 2 to 6, wherein
within a planar projection of the rear drum wall of the rear drum (4), a length from a center of the first air exhaust port (4-1) to a center of the second air exhaust port (4-2) along a horizontal direction is L, a diameter of the rear drum (4) is D, and $L/D=0.15-0.35$. 25 30

8. The laundry treatment apparatus according to any one of claims 1 to 7, wherein
the inner wall of the rear drum is provided with a plurality of water guide structures (4-3), a bottom of the rear drum (4) is provided with a drainage port (4-5), and a part of the rear drum spray pipe (4-4) is penetrated from an outside of the rear drum (4) to an inner side of the inner wall of the rear drum, so as to spray water onto the inner wall of the rear drum. 35 40

9. The laundry treatment apparatus according to claim 2, wherein
the laundry treatment apparatus further comprises an air heating duct (3) and a heater (5), the air heating duct (3) is provided with an air intake port (2), the air intake port (2) is communicated with the third air exhaust port (1-3) on the air condensing duct (1), an end of the air heating duct (3) is configured to communicate with the inner drum and/or the rear drum, and the heater (5) is disposed in the air heating duct (3). 45 50

10. The laundry treatment apparatus according to claim 9, wherein
a fan (6) is disposed in the air heating duct (3); and/or the laundry treatment apparatus is a washing and drying machine. 55

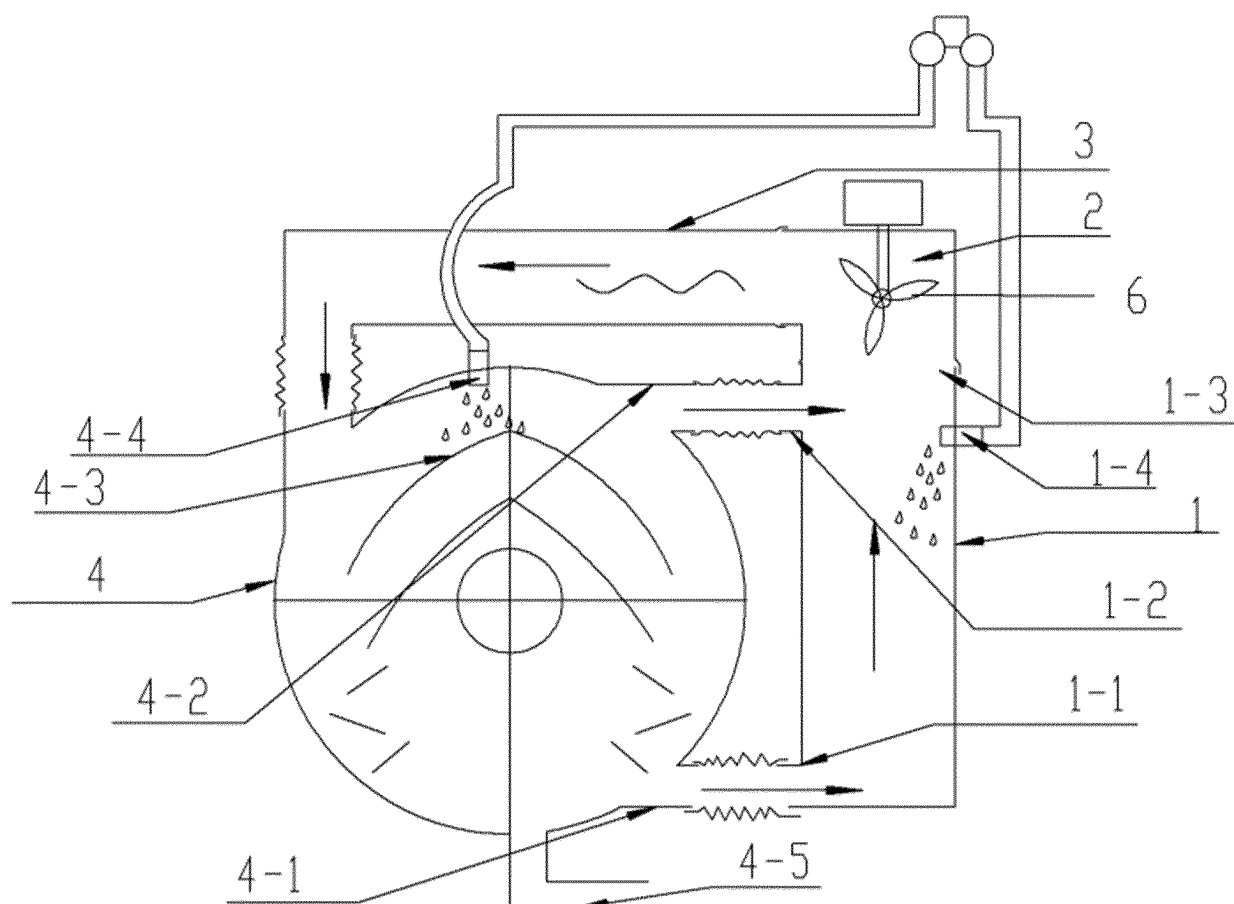


Fig. 1

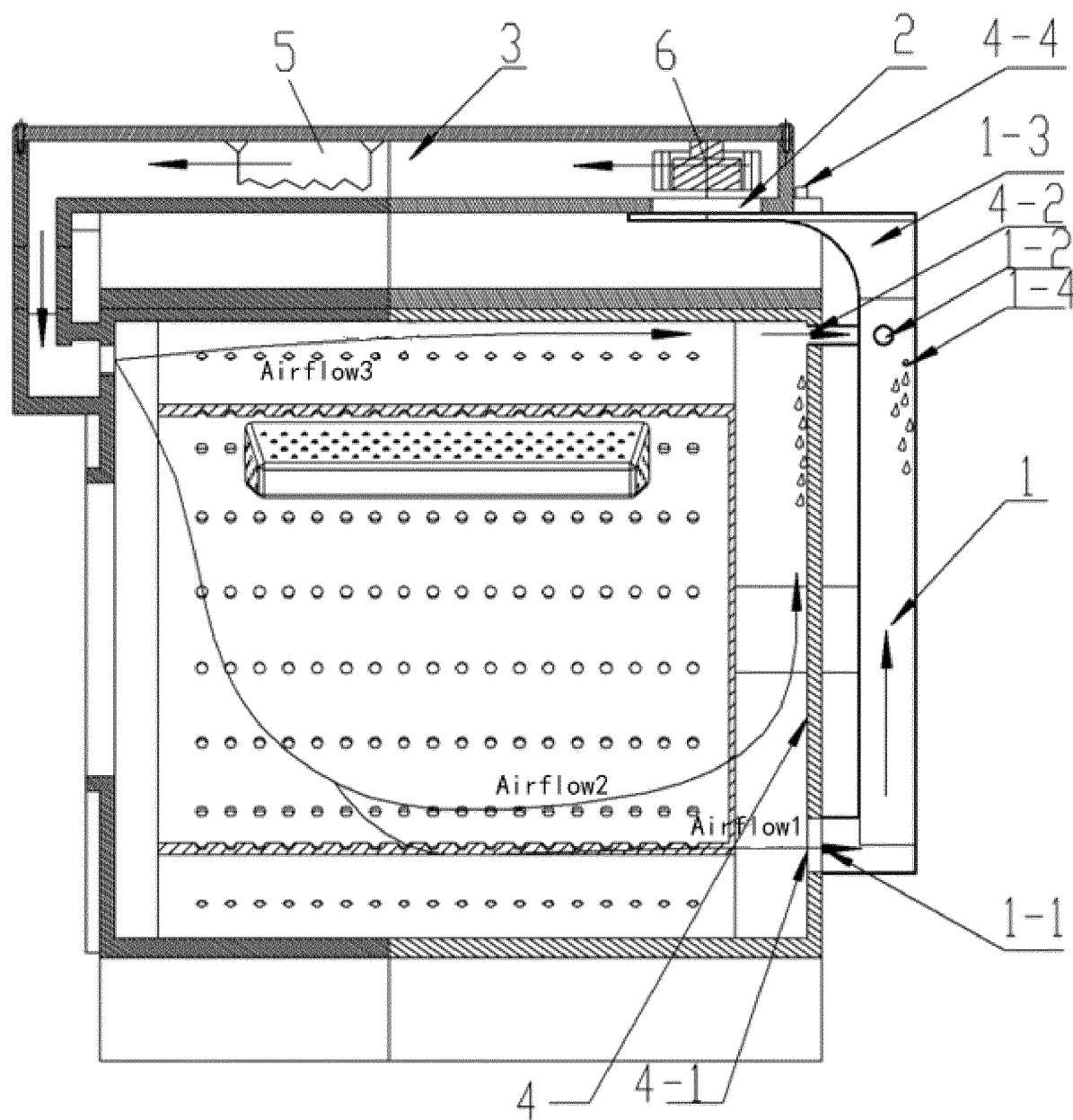


Fig. 2

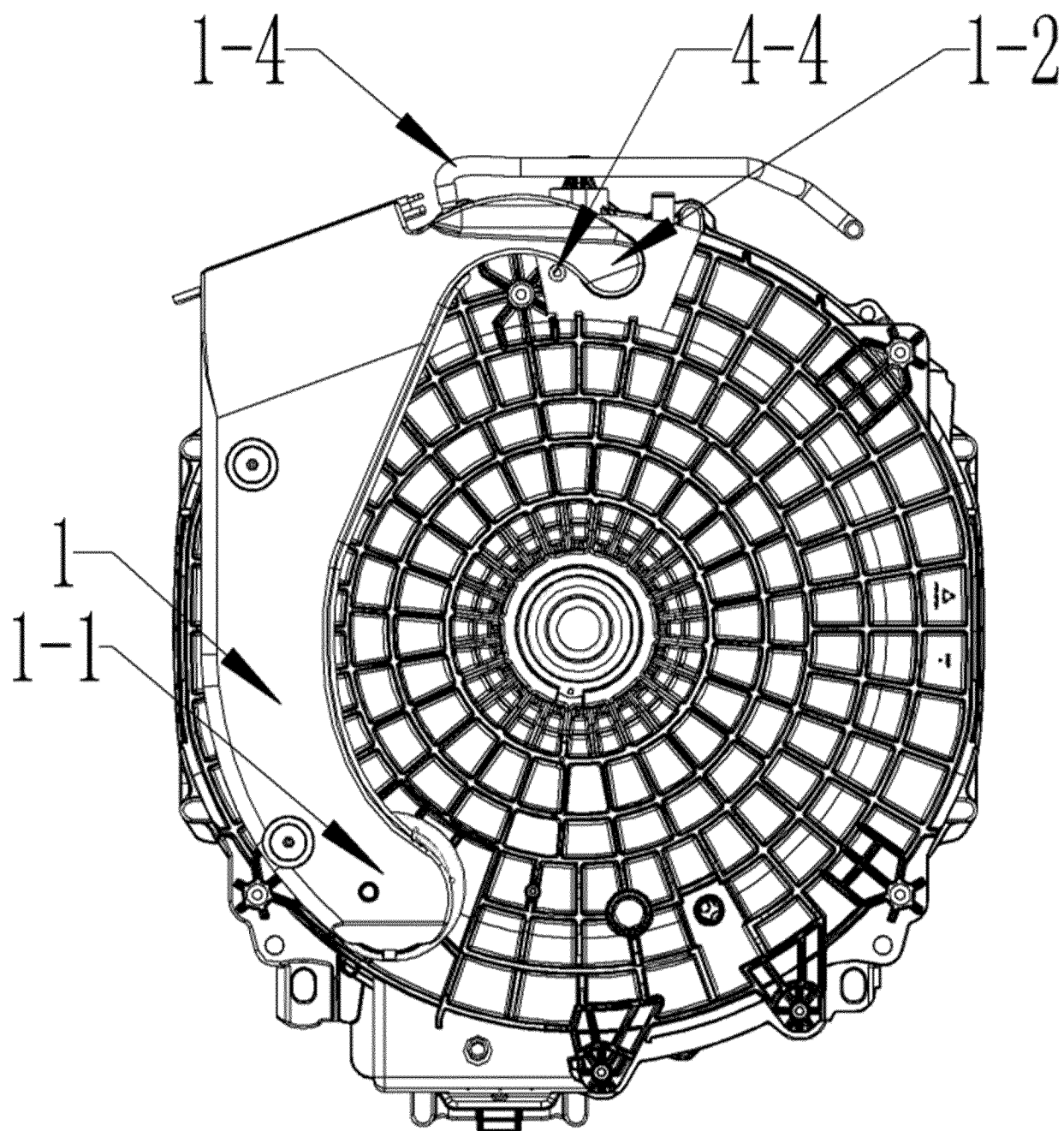


Fig. 3

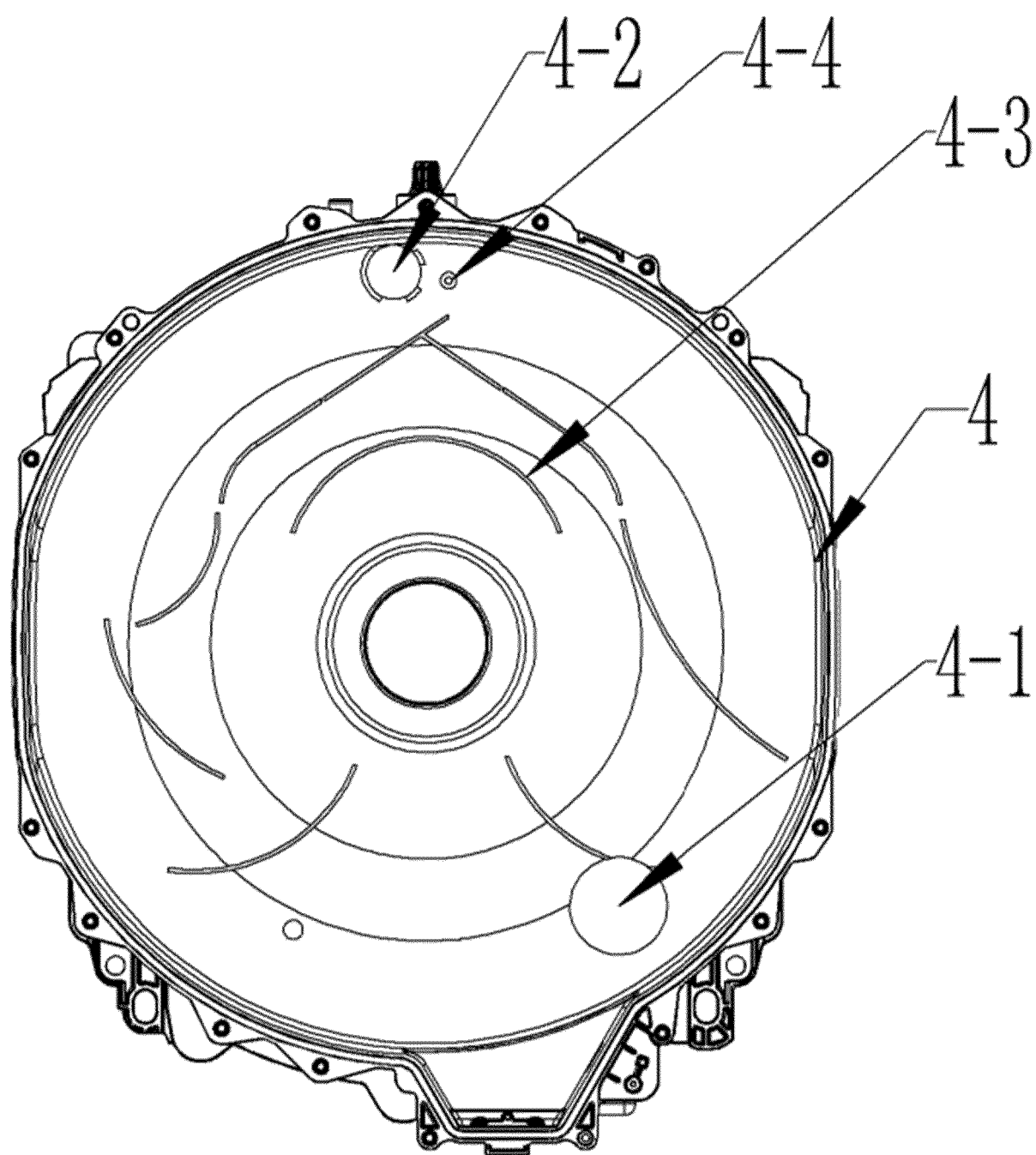


Fig. 4

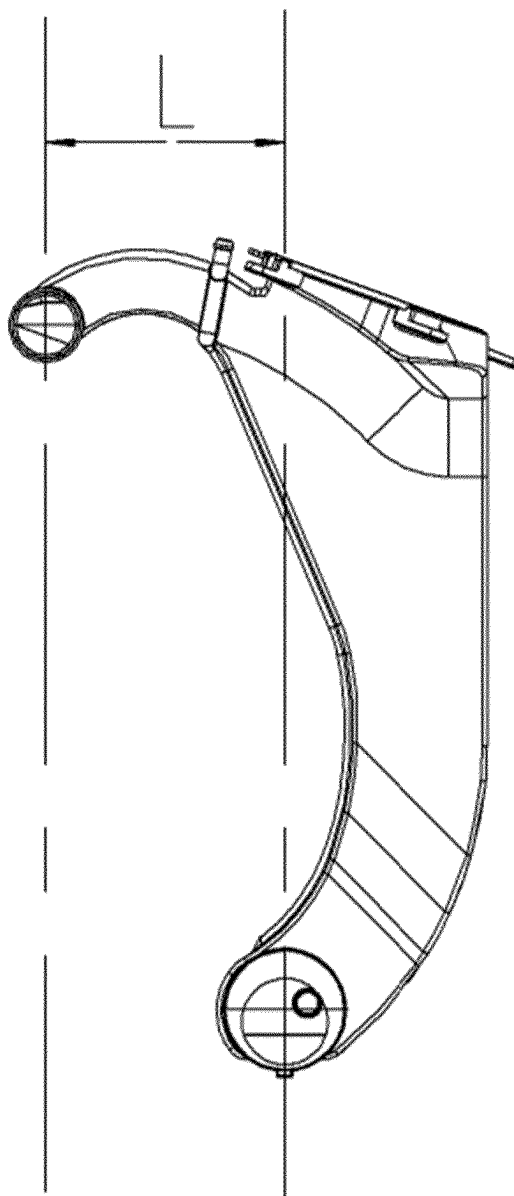


Fig. 5

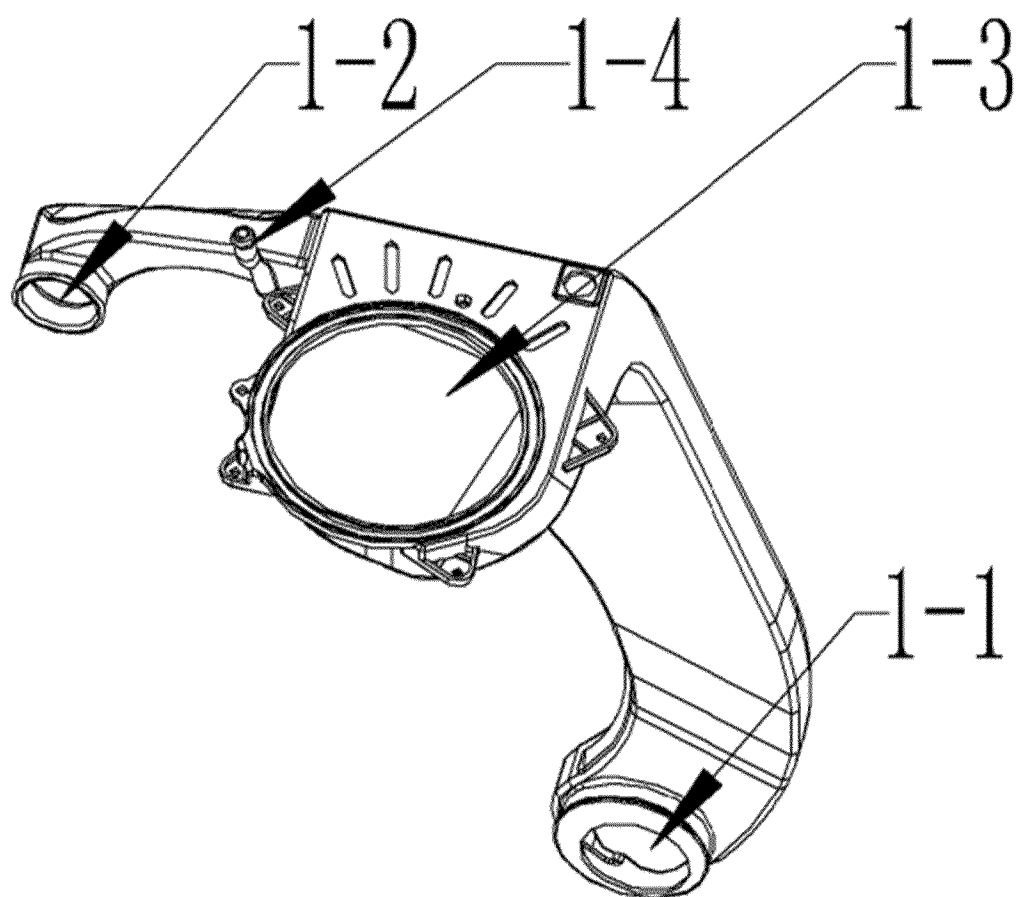


Fig. 6

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2022/140856

A. CLASSIFICATION OF SUBJECT MATTER

D06F25/00(2006.01)i;D06F58/24(2006.01)i; D06F58/04(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

D06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPABS; CNTXT; CNABS; SIPOABS; DWPI; CNKI: 冷凝, 外桶, 外筒, 后筒, 后桶, 盛水桶, 盛水槽, 盛水筒, 外槽, 后壁, 底壁, 后端, 第二, 附加, 两条, 两个, 辅助, 双冷凝, 双通道, 喷淋, 喷头, 喷嘴, double, two, second, condensat+, tub, tank, barrel, cask, container, wall, inject+, spray+, nozzle?

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	KR 20080071425 A (LG ELECTRONICS INC.) 04 August 2008 (2008-08-04) description, paragraphs 28-63, and figures 1-6	1-10
PX	CN 217351852 U (ZHUHAI GREE ELECTRIC APPLIANCES INC.) 02 September 2022 (2022-09-02) claims 1-10	1-10
PX	CN 114775215 A (ZHUHAI GREE ELECTRIC APPLIANCES INC.) 22 July 2022 (2022-07-22) claims 1-10	1-10
A	KR 100631574 B1 (LG ELECTRONICS INC.) 09 October 2006 (2006-10-09) entire document	1-10
A	CN 102691198 A (WHIRLPOOL(CHINA) INVESTMENT CO., LTD.) 26 September 2012 (2012-09-26) entire document	1-10

☒ Further documents are listed in the continuation of Box C.☒ See patent family annex.

* Special categories of cited documents:

“A” document defining the general state of the art which is not considered to be of particular relevance

“D” document cited by the applicant in the international application

“E” earlier application or patent but published on or after the international filing date

“L” document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

“O” document referring to an oral disclosure, use, exhibition or other means

“P” document published prior to the international filing date but later than the priority date claimed

“T” later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

“X” document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

“Y” document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

“&” document member of the same patent family

Date of the actual completion of the international search

09 March 2023

Date of mailing of the international search report

20 March 2023

Name and mailing address of the ISA/CN

China National Intellectual Property Administration (ISA/
CN)China No. 6, Xitucheng Road, Jimenqiao, Haidian District,
Beijing 100088

Facsimile No. (86-10)62019451

Authorized officer

Telephone No.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2022/140856

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CN 109267286 A (HISENSE (SHANDONG) REFRIGERATOR CO., LTD.) 25 January 2019 (2019-01-25) entire document	1-10
A	CN 112831985 A (HISENSE (SHANDONG) REFRIGERATOR CO., LTD.) 25 May 2021 (2021-05-25) entire document	1-10
A	CN 114045650 A (ZHUHAI GREE ELECTRIC APPLIANCES INC.) 15 February 2022 (2022-02-15) entire document	1-10
A	JP 2006000354 A (MATSUSHITA ELECTRIC INDUSTRIAL CO., LTD.) 05 January 2006 (2006-01-05) entire document	1-10

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/CN2022/140856

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
KR 20080071425 A	04 August 2008	KR 101336705 B1	04 December 2013
CN 217351852 U	02 September 2022	None	
CN 114775215 A	22 July 2022	None	
KR 100631574 B1	09 October 2006	EP 1752575 A1	14 February 2007
		EP 1752575 B1	23 February 2011
		EP 1752575 B2	07 October 2015
		US 2007033970 A1	15 February 2007
		DE 602006020211 D1	07 April 2011
CN 102691198 A	26 September 2012	None	
CN 109267286 A	25 January 2019	EP 3875655 A1	08 September 2021
		EP 3875655 A4	17 August 2022
		WO 2020088331 A1	07 May 2020
CN 112831985 A	25 May 2021	None	
CN 114045650 A	15 February 2022	None	
JP 2006000354 A	05 January 2006	JP 4444016 B2	31 March 2010

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- CN 202210467728X [0001]