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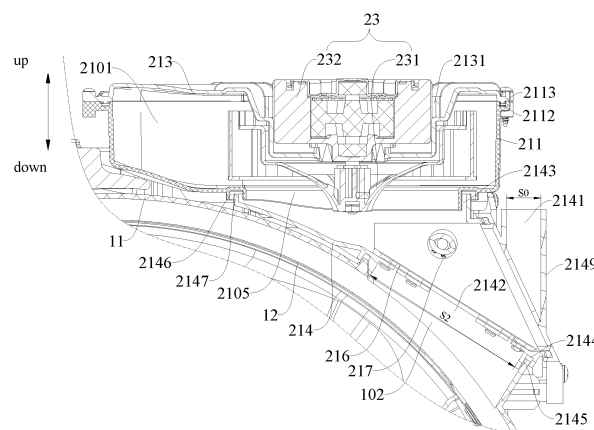
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(54) **CLOTHES TREATMENT APPARATUS**

(57) A clothes treatment apparatus (100), comprising: a drum assembly (10), which has an air inlet (101) and an air outlet (102), the air inlet (101) and the air outlet (102) being provided at an upper part of a side wall of the drum assembly (10); a clothes drying assembly (20), which comprises an air channel assembly that connects

the air inlet (101) and the air outlet (102), a heating member (22) provided inside of the air channel assembly, and a fan (23) which is used to guide air to flow, wherein the air channel assembly has a vent (2141) which communicates with the air outlet (102) and the outside, and the vent (2141) is located above the air outlet (102).



## Description

### CROSS-REFERENCE TO RELATED APPLICATION

[0001] The present disclosure is based on Chinese Patent Application Nos. 201920406145.X and 201910237996.0, filed on March 27, 2019, and claims priority to the Chinese Patent Applications, the entire contents of which are incorporated herein by reference.

### FIELD

[0002] The present disclosure relates to the technical field of clothes treatment, and in particular to a clothes treatment device such as a clothes dryer and a washer-dryer.

### BACKGROUND

[0003] For an existing washer-dryer, based on heat exchange between an outer tub and the outside air, hot and humid air in the tub condenses on a tub wall to form condensed water, thereby achieving the effect of clothes drying. However, since there is a small temperature difference between the outer tub and the air in the tub, even if a blower is added between the outer tub and a case, the temperature difference between the outer tub and the air in the tub cannot be effectively reduced.

[0004] A related art discloses a washer-dryer. By adding a blower between an outer tub and a case, heat exchange between the outer tub and the outside air is improved, so that the outer tub is cooled, and based on a temperature difference between the inside and outside of the outer tub, the hot and humid air in the tub condenses, thus resulting in a high cost and a poor heat exchange effect.

[0005] For this reason, another related art discloses a cycle + suction + discharge washing machine. During circulation of airflow, part of the outside air can be sucked in through a suction opening, and then part of hot and humid air can be discharged from a discharge opening. However, at an initial stage of drying, because the blower will suck in the outside air, and then discharge part of the air out of the tub, and due to arrangement of a discharge opening, a passage for suction and discharge is formed on the one hand, which causes the direct discharge of hot air, thus resulting in a slow heating-up in the initial stage; on the other hand, the direct discharge of the hot and humid air in a later state will also affect the environment. Moreover, the risk of overfoaming may occur at both the suction opening and the discharge opening, and the risk of overfoaming is relatively high.

### SUMMARY

[0006] The present disclosure is intended to solve at least one of the technical problems existing in the prior art. In view of this, an objective of the present disclosure

is to provide a clothes treatment device which has a simpler structure and high drying efficiency.

[0007] The clothes treatment device according to an embodiment of the present disclosure includes: a tub assembly defining a clothes treatment chamber therein, the tub assembly having an air inlet and an air outlet that are in communication with the clothes treatment chamber, the air inlet and the air outlet being provided at an upper part of a side wall of the tub assembly; and a clothes drying assembly including an air channel assembly communicating the air inlet with the air outlet, a heating member provided inside the air channel assembly, and a blower configured to guide air to flow, wherein the air channel assembly is provided with a vent in communication with the air outlet and the outside, and the vent is located above the air outlet.

[0008] In the clothes treatment device according to the embodiment of the present disclosure, a vent is provided and serves as an inlet/outlet of airflow to ensure a dynamic balance of air pressure between the clothes treatment chamber and the outside during the operation of the clothes treatment device. For example, when the air pressure in the clothes treatment chamber increases, part of the hot and humid air can overflow from the vent under the action of an air pressure difference, thus improving the drying efficiency; when the air pressure in the clothes treatment chamber decreases, the outside air can enter the clothes treatment chamber from the vent to participate in the circulation of the airflow, thereby realizing exchange of the hot and humid air with the outside air. In addition, compared with a technical solution with a discharge opening and a vent in the related art, by eliminating the discharge opening in the tub assembly, the clothes treatment device does not form a through airflow channel during the drying process, thereby ensuring quick heating-up in the tub assembly in the initial stage of the drying process and reducing the risk of overfoaming.

[0009] According to an embodiment of the present disclosure, a waterproof and air-permeable member is provided at the vent, thereby preventing water and foam in the clothes treatment chamber from overflowing from the vent, and ensuring that the air in the clothes treatment chamber can be discharged from the vent to the outside.

[0010] According to an embodiment of the present disclosure, a flow area of the vent is within a range of 500 mm<sup>2</sup> to 1500 mm<sup>2</sup>.

[0011] According to an embodiment of the present disclosure, in an axial direction of the tub assembly, the air inlet is located at a front part of the tub assembly, and the air outlet is located at a rear part of the tub assembly.

[0012] According to an embodiment of the present disclosure, the flow area of the air outlet is greater than 8000 mm<sup>2</sup>.

[0013] According to an embodiment of the present disclosure, an orthographic projection of the air outlet on an imaginary horizontal plane passing through a central axis of the tub assembly deviates from the central axis of the

tub assembly.

**[0014]** According to an embodiment of the present disclosure, the air channel assembly includes: an air channel shell mounted at the upper part of the side wall of the tub assembly, an inner cavity of the air channel shell being in communication with the air inlet; and a connecting base provided between the air channel shell and the tub assembly, the inner cavity of the air channel shell being in communication with the air outlet through an inner cavity of the connecting base, the vent being provided at the connecting base.

**[0015]** In some embodiments, a filter assembly and a spraying member are provided inside the connecting base, the filter assembly is configured to filter air discharged from the air outlet, and the spraying member is located above the filter assembly.

**[0016]** In some examples, the filter assembly includes a filter screen and an annular connecting frame, and the filter screen is mounted in the connecting base through the annular connecting frame.

**[0017]** In some embodiments, the air outlet is located below the connecting base, a bottom of the connecting base is defined with a first air-passing opening, and the first air-passing opening is in communication with the air outlet; a first latching rib is provided in a circumferential direction of one of the first air-passing opening and the air outlet, and a first latching groove fitted with the first latching rib is provided in a circumferential direction of the other one of the first air-passing opening and the air outlet.

**[0018]** In some embodiments, a filter screen and an annular connecting frame are connected in the connecting base, and the filter screen is mounted at the first air-passing opening through the annular connecting frame.

**[0019]** In some examples, a spraying member is further provided in the connecting base.

**[0020]** According to a further embodiment of the present disclosure, a bottom of the air channel shell is defined with a mounting opening, a top of the connecting base has a second air-passing opening, and the second air-passing opening is in communication with the mounting opening; a second latching rib is provided in a circumferential direction of one of the second air-passing opening and the mounting opening, and a second latching groove fitted with the second latching rib is provided in a circumferential direction of the other one of the second air-passing opening and the mounting opening.

**[0021]** According to a further embodiment of the present disclosure, an outer surface of the connecting base is provided with a connecting lug, an outer surface of the air channel shell is provided with a mounting lug, and the connecting base and the air channel shell are connected by a fastener passing through the connecting lug and the mounting lug.

**[0022]** According to a further embodiment of the present disclosure, the vent is provided to a side of the connecting base.

**[0023]** In some embodiments, the side of the connect-

ing base is provided with a tube head protruding outwards, and the tube head extends in an up-down direction and is defined with the vent.

**[0024]** According to a further embodiment of the present disclosure, the air channel shell includes: an air channel base arranged above the tub assembly and the connecting base; an air channel cover plate covering a part of the air channel base; and a blower cover plate covering the other part of the air channel base, a fan of the blower being arranged between the blower cover plate and the air channel base.

**[0025]** In some embodiments, a side of the blower cover plate away from the air channel base is provided with a mounting recess recessed downwards for mounting a driving motor of the fan.

**[0026]** In some examples, a side wall of the mounting recess is provided with a plurality of spacer ribs arranged at intervals along a circumferential direction of the mounting recess for spacing at least a part of the driving motor apart from the side wall of the mounting recess. Each of the spacer ribs includes an inner rib section and an outer rib section connected to each other, the inner rib section is located in the mounting recess and extends along a depth direction of the mounting recess, and the plurality of outer rib sections are arranged in a radial way and located outside the mounting recess.

**[0027]** In some embodiments, a top of a side wall of the air channel base is defined with a groove extending in a circumferential direction, and one side of the air channel cover plate and the blower cover plate facing the air channel base are each provided with a protruding rib fitted with the groove.

**[0028]** The additional aspects and advantages of the present disclosure will be set forth in part in the following description and become apparent in part from the following description or be understood through the practice of the present disclosure.

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0029]** The above-described and/or additional aspects and advantages of the present disclosure will become apparent and readily understood from the description of embodiments in conjunction with the following accompanying drawings, where

FIG 1 is a perspective view of a clothes treatment device according to an embodiment of the present disclosure;

FIG 2 is a rear view of the clothes treatment device shown in FIG. 1;

FIG. 3 is a cross-sectional view taken along line A-A in FIG. 2;

FIG. 4 is a side view of the clothes treatment device shown in FIG. 1;

FIG. 5 is a cross-sectional view taken along line B-B in FIG. 4;

FIG. 6 is an enlarged view of a part in FIG. 5;

FIG. 7 is an exploded view of an air channel assembly of a clothes treatment device according to an embodiment of the present disclosure;  
 FIG. 8 is an enlarged view of part C in FIG. 7; and  
 FIG. 9 is an enlarged view of part D in FIG. 7.

**[0030]** Reference numerals:

clothes treatment device 100,  
 tub assembly 10,  
 outer tub 11, air inlet 101, air outlet 102,  
 inner tub 12, clothes treatment chamber 121,  
 clothes drying assembly 20,  
 air channel shell 21, air channel 2101, air channel  
 outlet 2104, mounting opening 2105,  
 air channel base 211, groove 2112, a protruding rib  
 2113, mounting lug 2114,  
 air channel cover plate 212,  
 blower cover plate 213, mounting recess 2131, spacer  
 rib 2132, inner rib section 2133, outer rib section  
 2134,  
 connecting base 214, vent 2141, first air-passing  
 opening 2142, second air-passing opening 2143,  
 first latching groove 2144, first latching rib 2145, sec-  
 ond latching groove 2146, second latching rib 2147,  
 connecting lug 2148, tube head 2149  
 annular connecting frame 216, spaying member  
 217,  
 heating member 22,  
 blower 23, fan 231, driving motor 232.

**DETAILED DESCRIPTION**

**[0031]** Embodiments of the present disclosure will be described below in detail. Examples of the embodiments are illustrated in the accompanying drawings, where the same or similar reference numerals throughout the specification refer to the same or similar elements or elements having the same or similar functions. The embodiments described below with reference to the accompanying drawings are exemplary and are intended to be illustrative only and are not to be construed as limiting the scope of the present disclosure.

**[0032]** A clothes treatment device 100 according to an embodiment of the present disclosure will be described below with reference to FIGS. 1 to 9. The clothes treatment device 100 here may be configured as a clothes dryer or a washer-dryer.

**[0033]** As shown in FIGS. 1 to 5, the clothes treatment device 100 according to the embodiment of the present disclosure includes a tub assembly 10 and a clothes drying assembly 20.

**[0034]** The tub assembly 10 defines a clothes treatment chamber 121 therein. The tub assembly 10 has an air inlet 101 and an air outlet 102. The air inlet 101 and the air outlet 102 are both in communication with the clothes treatment chamber 121, and the air inlet 101 and the air outlet 102 are provided at an upper part of a side

wall of the tub assembly 10.

**[0035]** Further, the clothes drying assembly 20 includes an air channel assembly, a heating member 22 and a blower 23. The air channel assembly communicates the air inlet 101 with the air outlet 102. The air channel assembly has an air channel 2101, an air channel inlet of the air channel 2101 is in communication with the air outlet 102, and an air channel outlet 2104 of the air channel 2101 is in communication with the air inlet 101.

**[0036]** The heating member 22 is arranged in the air channel 2101 to heat air in the air channel 2101. In order to effectively utilize the space in the air channel 2101, improve drying efficiency, and increase a contact area between airflow and the heating member 22, the heating member 22 is configured as a serpentine heating elbow. The blower 23 functions as a power component which forms airflow to guide air to flow. The air channel assembly has a vent 2141 in communication with the air outlet 102 and the outside, and the vent 2141 is located above the air outlet 102.

**[0037]** In the clothes treatment device 100 according to the embodiment of the present disclosure, the vent 2141 is provided and serves as an inlet/outlet of airflow to ensure a dynamic balance of air pressure between the clothes treatment chamber 121 and the outside during the operation of the clothes treatment device 100. For example, when the air pressure in the clothes treatment chamber 121 increases, part of hot and humid air can overflow from the vent 2141 under the action of an air pressure difference, thus improving the drying efficiency; when the air pressure in the clothes treatment chamber 121 decreases, the outside air can enter the clothes treatment chamber 121 from the vent 2141 to participate in the circulation of the airflow, thereby realizing exchange of the hot and humid air with the outside air.

**[0038]** In addition, compared with a technical solution with a discharge opening and a vent in the related art, by eliminating the discharge opening in the tub assembly, the clothes treatment device 100 does not form a through airflow channel during the drying process, thereby ensuring quick heating-up in the tub assembly in an initial stage of the drying process and reducing the risk of over-foaming.

**[0039]** In order to prevent the water and foam in the clothes treatment chamber 121 from overflowing from the vent 2141, and to ensure that the air in the clothes treatment chamber 121 can be discharged from the vent 2141 to the outside, a waterproof and air-permeable member is provided at the vent 2141. In this embodiment, the waterproof and air-permeable member is configured as a waterproof and air-permeable membrane. In some embodiments, the waterproof and air-permeable membrane may be made of a nylon material or a PET material.

**[0040]** As shown in FIGS. 3 and 4, in an axial direction of the tub assembly 10, the air inlet 101 is located at a front part of the tub assembly 10, and the air outlet 102 is located at a rear part of the tub assembly 10. In other

words, the air inlet 101 and the air outlet 102 are spaced apart in the axial direction of the tub assembly 10.

**[0041]** Thus, a distance between the air inlet 101 and the air outlet 102 can be increased, i.e., a distance between the air channel inlet and the air channel outlet 2104, can be increased. In this way, the flowing time of moist air (discharged from the clothes treatment chamber 121) in the air channel 2101 can be increased, the heating time of the heating member 22 to the airflow is prolonged, and the moist air just discharged can be prevented from being sucked in immediately, which is beneficial to improving the drying efficiency.

**[0042]** In some embodiments, as shown in FIG. 5, an orthographic projection of the air outlet 102 on an imaginary horizontal plane X passing through a central axis of the tub assembly 10 deviates from the central axis of the tub assembly 10. Therefore, by effectively using the position of the tub assembly 10 in the circumferential direction, a distance between the air inlet 101 and the air outlet 102 can be increased, which is beneficial to improving the drying efficiency.

**[0043]** According to long-term experiments of the applicant, if the flow area of the vent 2141 is too large, the hot air will leak out too quickly during the drying process of the clothes treatment device 100, which will affect the drying efficiency and waste electrical energy; if the flow area of the vent 2141 is too small, the moisture removal effect of the clothes treatment device 100 during the drying process will be too poor, which will affect the final moisture content and drying time.

**[0044]** As shown in FIG. 5, in the present disclosure, by setting the flow area SO of the vent 2141 to be within a range of 500 mm<sup>2</sup> and 1500 mm<sup>2</sup>, the hot air can be prevented from leaking too quickly, the energy consumption is low, and poor moisture removal effect can be avoided during the drying process, which is beneficial to improving the drying efficiency.

**[0045]** In order to ensure a high flowing efficiency of the airflow and faster heating-up of the tub assembly 10 to improve the drying efficiency, the flow area S2 of the air outlet 102 is set to be greater than 8000 mm<sup>2</sup>.

**[0046]** According to an embodiment of the present disclosure, the tub assembly 10 includes an outer tub 11 and an inner tub 12. The inner tub 12 is rotatably provided in the outer tub 11 and extends along an axial direction of the outer tub 11. The inner tub 12 defines a clothes treatment chamber 121 in communication with a gap between the outer tub 11 and the inner tub 12.

**[0047]** An air outlet 102 is provided at an upper part of a side wall of the outer tub 11 and is in communication with the clothes treatment chamber 121 through the gap. An air inlet 101 is provided on a front edge of the outer tub 11 or a door seal on the outer tub 11. By arranging the air inlet 101 on the front edge of the outer tub 11, the length of the air channel 2101 can be increased, thereby improving the drying efficiency; by arranging the air inlet 101 on the door seal on the outer tub 11, the length of the air channel 2101 can be increased and the drying

efficiency is accordingly improved on the one hand, and on the other hand, there is no need to form holes in the outer tub 11, which simplifies the structure and processing procedures of the outer tub 11 and reduces the cost.

**[0048]** As shown in FIGS. 5 to 8, according to an embodiment of the present disclosure, the air channel assembly includes an air channel shell 21 mounted at the upper part of the side wall of the tub assembly 10, and an inner cavity of the air channel shell 21 is in communication with the air inlet 101. In this embodiment, the air channel shell 21 is mounted at the top of the outer tub 11, and at least a part of the air channel shell 21 extends along the axial direction of the tub assembly 10.

**[0049]** Further, the air channel assembly further includes a connecting base 214 provided between the air channel shell 21 and the tub assembly 10, so as to communicate the inner cavity of the air channel shell 21 with the air outlet 102, that is, the inner cavity of the connecting base 214 and the inner cavity of the air channel shell 21 constitute an air channel 2101, and the vent 2141 is provided on the connecting base 214. In this embodiment, the connecting base 214 is provided between an air channel base 211 of the air channel shell 21 and the outer tub 11, which can not only support the air channel base 211, but also effectively utilize the top space of the outer tub 11 to facilitate communication with the outside.

**[0050]** In some embodiments, the air channel shell 21 includes an air channel base 211, an air channel cover plate 212, and a blower cover plate 213. The air channel cover plate 212 covers a part of the air channel base 211, and the air channel cover plate 212 and the air channel base 211 define a part of the air channel 2101. The blower cover plate 213 covers the other part of the air channel base 211, and the blower cover plate 212 and the air channel base 211 define the other part of the air channel 2101. It can be understood that, in this embodiment, the connecting base 214 defines the rest part of the air channel 2101.

**[0051]** As shown in FIGS. 6 and 7, the blower 23 includes a fan 231 and a driving motor 232 for driving the fan 231 to rotate. The fan 231 of the blower 23 is provided between the blower cover plate 213 and the air channel base 211, and the driving motor 232 is provided outside the blower cover plate 213.

**[0052]** In this embodiment, a side of the blower cover plate 213 away from the air channel base 211 has a downwardly recessed mounting recess 2131 for mounting the driving motor 232, and a motor shaft of the driving motor 232 passes through a bottom wall of the mounting recess 2131 so as to be connected to the fan 231.

**[0053]** In some examples, a side wall of the mounting recess 2131 is provided with a plurality of spacer ribs 2132 arranged at intervals along the circumferential direction of the mounting recess 2131. The spacer ribs 2132 can space at least a part of the driving motor 232 from the side wall of the mounting recess 2131; in this way, a limiting effect can be achieved and a gap between the driving motor 232 and the mounting recess 2131 can

also be ensured, thus facilitating heat dissipation.

**[0054]** As shown in FIG. 8, each spacer rib 2132 includes an inner rib section 2133 and an outer rib section 2134 that are connected to each other. The inner rib section 2133 is located in the mounting recess 2131 and extends along a depth direction of the mounting recess 2131. One end of the outer rib section 2134 is connected to an upper end of the inner rib section 2133 and is located outside the mounting recess 2131. The plurality of outer rib sections 2134 are arranged in a radial way, which is beneficial to improving the structural strength of the blower cover plate 213.

**[0055]** In some embodiments, the top of the side wall of the air channel base 211 has a groove 2112 extending along its circumferential direction, and one sides of the air channel cover plate 212 and the blower cover plate 213 facing the air channel base 211 are each provided with a protruding rib 2113 fitted with the groove 2112, thus ensuring the reliability and tightness of the connection between the air channel base 211 and the air channel cover plate 212 and between the air channel base 211 and the blower cover plate 213.

**[0056]** Further, the groove 2112 is provided inside with a sealing ring extending along its circumferential direction. When the protruding rib 2113 is fitted with the groove 2112, the sealing ring is pressed tightly, thereby further ensuring the tight connection between the air channel base 211 and the air channel cover plate 212 and between the air channel base 211 and the blower cover plate 213.

**[0057]** In some embodiments, a filter assembly (not shown) and a spraying member 217 are connected in the connecting base 214. The filter assembly is configured to filter the hot and humid air discharged from the air outlet 102 to prevent lint of clothes from entering the air channel 2101. The spraying member 217 can wash the filter assembly, thereby flushing the lint on the filter assembly back to the clothes treatment chamber 121 to prevent the accumulation of lint.

**[0058]** In some examples, the filter assembly includes a filter screen and an annular connecting frame 216. The filter screen is mounted in the connecting base 214 through the annular connecting frame 216. The annular connecting frame 216 can not only fix the filter screen, but also improve the structural strength of the connecting base 214.

**[0059]** In this embodiment, the bottom of the connecting base 214 is provided with a first air-passing opening 2142, and the filter screen is fixed at the first air-passing opening 2142 by the annular connecting frame 216. The filter screen can filter the hot and humid air discharged from the air outlet 102 to prevent the lint of clothes from entering the air channel 2101. Moreover, the filter screen can also increase the resistance of foam entering the air channel 2101. In addition, compared with the technical solution of directly installing the filter screen on the air outlet in the related art, the solution of installing the filter screen and the annular connecting frame 216 in the con-

necting base 214 facilitates the modularization of components and also facilitates the assembly and disassembly of the filter screen.

**[0060]** According to a further embodiment of the present disclosure, the air outlet 102 is located below the connecting base 214, and the bottom of the connecting base 214 has a first air-passing opening 2142 in communication with the air outlet 102, that is, the first air-passing opening 2142 forms an air channel inlet of the air channel 2101. A first latching rib 2145 is provided in the circumferential direction of one of the first air-passing opening 2142 and the air outlet 102, and a first latching groove 2144 fitted with the first latching rib 2145 is provided in the circumferential direction of the other one, thus ensuring the reliability and tightness of the connection between the tub assembly 10 and the connecting base 214.

**[0061]** As shown in FIG. 6, in this embodiment, a first latching groove 2144 is provided in the circumferential direction of the first air-passing opening 2142 and forms a ring around the first air-passing opening 2142, and a first latching rib 2145 is provided in the circumferential direction of the air outlet 102 and surrounds the air outlet 102. By the fitting of the first latching rib 2145 and the first latching groove 2144 realizes a reliable connection between the connecting base 214 and the outer tub 11. In order to further ensure the airtightness between the connecting base 214 and the outer tub 11, a sealing ring may be provided in the first latching groove 2144, and the sealing ring is pressed tightly when the first latching rib 2145 and the first latching groove 2144 are fitted.

**[0062]** According to a further embodiment of the present disclosure, a bottom of the air channel shell 21 has a mounting opening 2104, a top of the connecting base 214 has a second air-passing opening 2143, and the second air-passing opening 2143 is in communication with the inner cavity of the air channel shell 21; a second latching rib 2147 is provided in a circumferential direction of one of the second air-passing opening 2143 and the mounting opening 2140, and a second latching groove 2146 fitted with the second latching rib 2147 is provided in the circumferential direction of the other one.

**[0063]** As shown in FIG. 6, in this embodiment, a second latching rib 2147 is provided in the circumferential direction of the second air-passing opening 2143 and surrounds the second air-passing opening 2143, and a second latching groove 2146 is provided in the circumferential direction of the mounting opening 2104 and surrounds the mounting opening 2104. By the fitting of the second latching rib 2147 and the second latching groove 2146 realizes a reliable connection between the connecting base 214 and the air channel base 211. In order to further ensure the airtightness between the connecting base 214 and the air channel base 211, a sealing ring may be provided in the second latching groove 2146, and the sealing ring is pressed tightly when the second latching rib 2147 and the second latching groove 2146 are fitted.

**[0064]** As shown in FIG. 7, an outer surface of the connecting base 214 is provided with a connecting lug 2148, and an outer surface of the air channel shell 21 is provided with a mounting lug 2114. The connecting base 214 and the air channel shell 21 are connected reliably and stably by a fastener passing through the connecting lug 2148 and the mounting lug 2114. In this embodiment, the air channel base 211 has a side coaming extending along its circumferential direction, the mounting lug 2114 is provided on the side coaming, the connecting base 214 and the air channel base 211 are further connected by a fastener passing through connecting holes in the connecting lug 2148 and the mounting lug 2114.

**[0065]** In some embodiments, the vent 2141 is provided on a side of the connecting base 214. Specifically, the side of the connecting base 214 is provided with a protruding tube head 2149 and the tube head 2149 extends in an up-down direction and thus defines the vent 2141. The advantages of simple structure and easy processing and manufacturing are achieved.

**[0066]** In this embodiment, the connecting base 214 includes a body part and a cover plate part. The body part is provided with a first air-passing opening 2142 at the bottom and a second air-passing opening 2143 at the top, and a side of the body part is provided with an opening. The cover plate part is provided at the opening, and a side of the cover plate part away from the body part is provided with a tube head 2149, thus defining a vent 2141.

**[0067]** In the description of the present disclosure, it is to be understood that the orientations or positional relationships, indicated by the terms "central", "longitudinal", "lateral", "length", "width", "thickness", "on", "under", "front", "rear", "left", "right", "vertical", "horizontal", "top", "bottom", "inside", "outside", "clockwise", "counterclockwise", "axial", "radial", "circumferential", and the like, are based on the orientations or positional relationships shown in the drawings and are only for the purpose of facilitating and simplifying the description of the present disclosure, rather than indicating or implying that the described device or element must have a particular orientation or must be constructed and operated in a particular orientation, and therefore they cannot to be construed as limiting the present disclosure.

**[0068]** Other configurations and operations of the clothes treatment device 100 according to the embodiment of the present disclosure are known to those of ordinary skill in the art, and will not be described in detail here.

**[0069]** In the description of the present specification, the description with reference to the terms "one embodiment", "some embodiments", "exemplary embodiment", "example", "specific example", "some examples" or the like means specific features, structures, materials or characteristics described in connection with the embodiment or example are included in at least one embodiment or example of the present disclosure. In the present specification, the schematic representations of the above

terms do not necessarily refer to the same embodiment. Moreover, the specific features, structures, materials, or characteristics described may be combined in a suitable manner in any one or more embodiments or examples.

**[0070]** While the embodiments of the present disclosure have been shown and described, it will be understood by those skilled in the art that the various modifications, changes, substitutions and variations of the embodiments may be made without departing from the spirit and scope of the invention. The scope of the invention is defined by the appended claims and their equivalents.

## Claims

1. A clothes treatment device, comprising:

a tub assembly defining a clothes treatment chamber therein, the tub assembly having an air inlet and an air outlet that are in communication with the clothes treatment chamber, the air inlet and the air outlet being provided at an upper part of a side wall of the tub assembly; and  
a clothes drying assembly comprising an air channel assembly communicating the air inlet with the air outlet, a heating member provided inside the air channel assembly, and a blower configured to guide air to flow, wherein the air channel assembly is provided with a vent in communication with the air outlet and outside, and the vent is located above the air outlet.

2. The clothes treatment device according to claim 1, wherein a waterproof and air-permeable member is provided at the vent.

3. The clothes treatment device according to claim 1 or 2, wherein a flow area of the vent is within a range of 500 mm<sup>2</sup> to 1500 mm<sup>2</sup>.

4. The clothes treatment device according to any of claims 1 to 3, wherein in an axial direction of the tub assembly, the air inlet is located at a front part of the tub assembly, and the air outlet is located at a rear part of the tub assembly.

5. The clothes treatment device according to any of claims 1 to 4, wherein a flow area of the vent is greater than 8000 mm<sup>2</sup>.

6. The clothes treatment device according to any of claims 1 to 5, wherein an orthographic projection of the air outlet on an imaginary horizontal plane passing through a central axis of the tub assembly deviates from the central axis of the tub assembly.

7. The clothes treatment device according to any of

claims 1 to 6, wherein the air channel assembly comprises:

an air channel shell mounted at the upper part of the side wall of the tub assembly, an inner cavity of the air channel shell being in communication with the air inlet; and  
a connecting base provided between the air channel shell and the tub assembly, the inner cavity of the air channel shell being in communication with the air outlet through an inner cavity of the connecting base, the vent being provided at the connecting base.

8. The clothes treatment device according to claim 7, wherein a filter assembly and a spraying member are provided inside the connecting base, the filter assembly is configured to filter air discharged from the air outlet, and the spraying member is located above the filter assembly.
9. The clothes treatment device according to claim 8, wherein the filter assembly comprises a filter screen and an annular connecting frame, and the filter screen is mounted in the connecting base through the annular connecting frame.
10. The clothes treatment device according to any of claims 7 to 9, wherein the air outlet is located below the connecting base, a bottom of the connecting base is defined with a first air-passing opening, and the first air-passing opening is in communication with the air outlet;  
wherein a first latching rib is provided in a circumferential direction of one of the first air-passing opening and the air outlet, and a first latching groove fitted with the first latching rib is provided in a circumferential direction of the other one of the first air-passing opening and the air outlet.
11. The clothes treatment device according to any of claims 7 to 10, wherein a bottom of the air channel shell is defined with a mounting opening, a top of the connecting base is defined with a second air-passing opening, and the second air-passing opening is in communication with the mounting opening;  
wherein a second latching rib is provided in a circumferential direction of one of the second air-passing opening and the mounting opening, and a second latching groove fitted with the second latching rib is provided in a circumferential direction of the other one of the second air-passing opening and the mounting opening.
12. The clothes treatment device according to any of claims 7 to 11, wherein an outer surface of the connecting base is provided with a connecting lug, an outer surface of the air channel shell is provided with

a mounting lug, and the connecting base and the air channel shell are connected by a fastener passing through the connecting lug and the mounting lug.

13. The clothes treatment device according to any of claims 7 to 12, wherein the vent is provided to a side of the connecting base.
14. The clothes treatment device according to claim 13, wherein the side of the connecting base is provided with a tube head protruding outwards, and the tube head extends in an up-down direction and is defined with the vent.
15. The clothes treatment device according to claim 7, wherein the air channel shell comprises:  
an air channel base arranged above the tub assembly and the connecting base;  
an air channel cover plate covering a part of the air channel base; and  
a blower cover plate covering the other part of the air channel base, a fan of the blower being arranged between the blower cover plate and the air channel base.
16. The clothes treatment device according to claim 15, wherein a side of the blower cover plate away from the air channel base is provided with a mounting recess recessed downwards, for mounting a driving motor of the fan.
17. The clothes treatment device according to claim 16, wherein a side wall of the mounting recess is provided with a plurality of spacer ribs arranged at intervals along a circumferential direction of the mounting recess, for spacing at least a part of the driving motor apart from the side wall of the mounting recess, wherein each of the spacer ribs comprising an inner rib section and an outer rib section connected to each other, the inner rib section is located in the mounting recess and extends along a depth direction of the mounting recess, the plurality of outer rib sections are arranged in a radial way and located outside the mounting recess.
18. The clothes treatment device according to any of claims 15 to 17, wherein a top of a side wall of the air channel base is defined with a groove extending in a circumferential direction, and one sides of the air channel cover plate and the blower cover plate facing the air channel base are each provided with a protruding rib fitted with the groove.



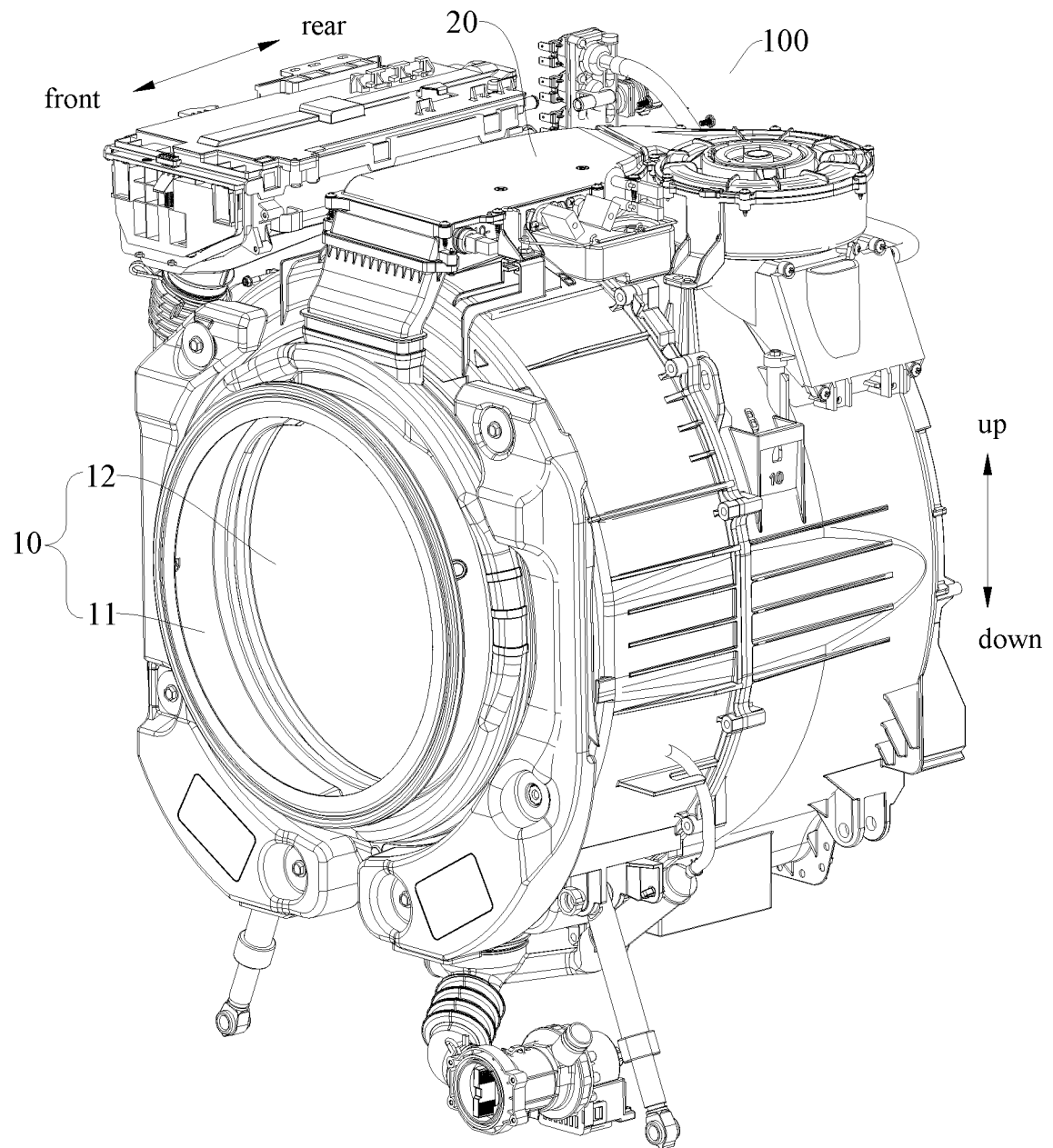


FIG. 1

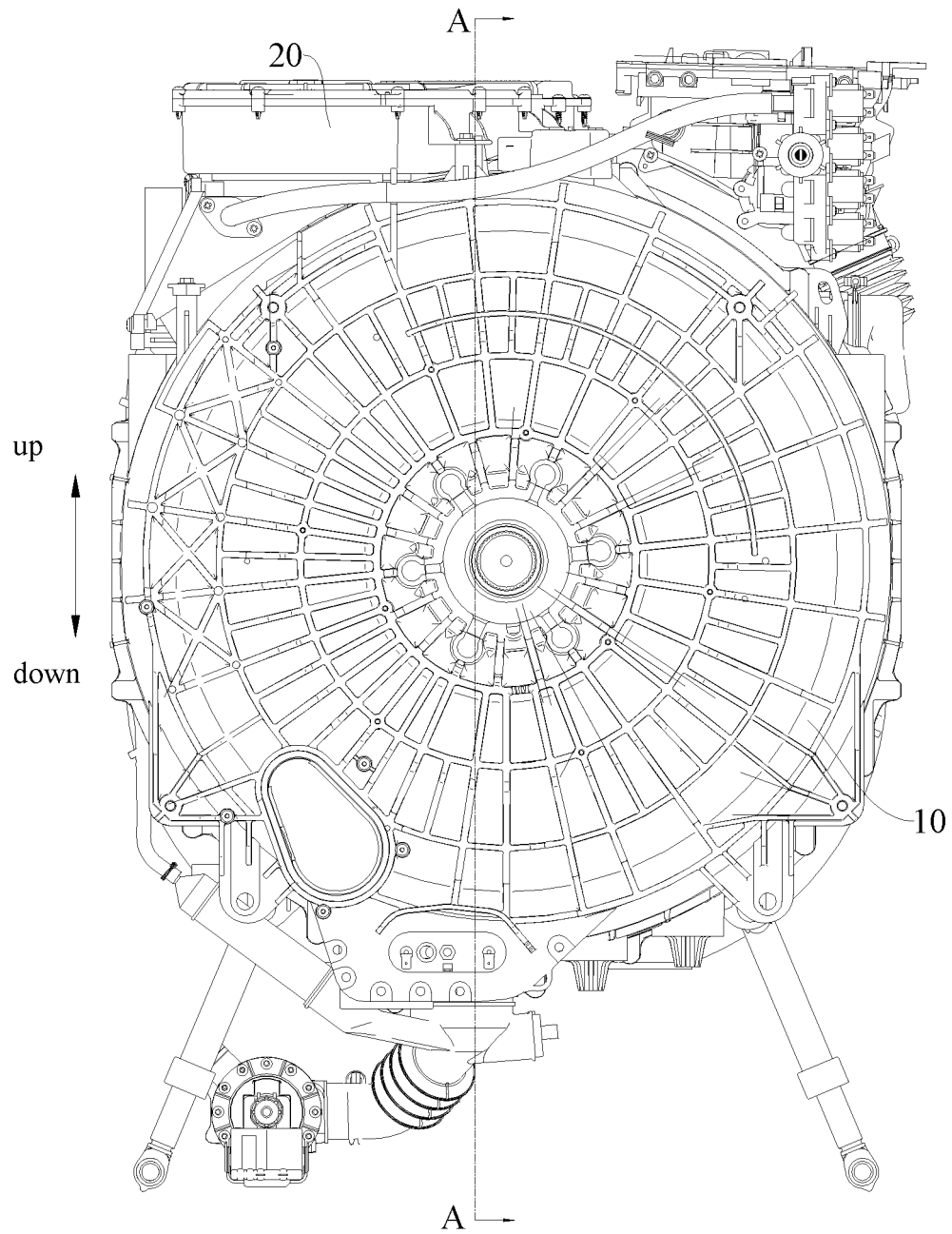


FIG. 2

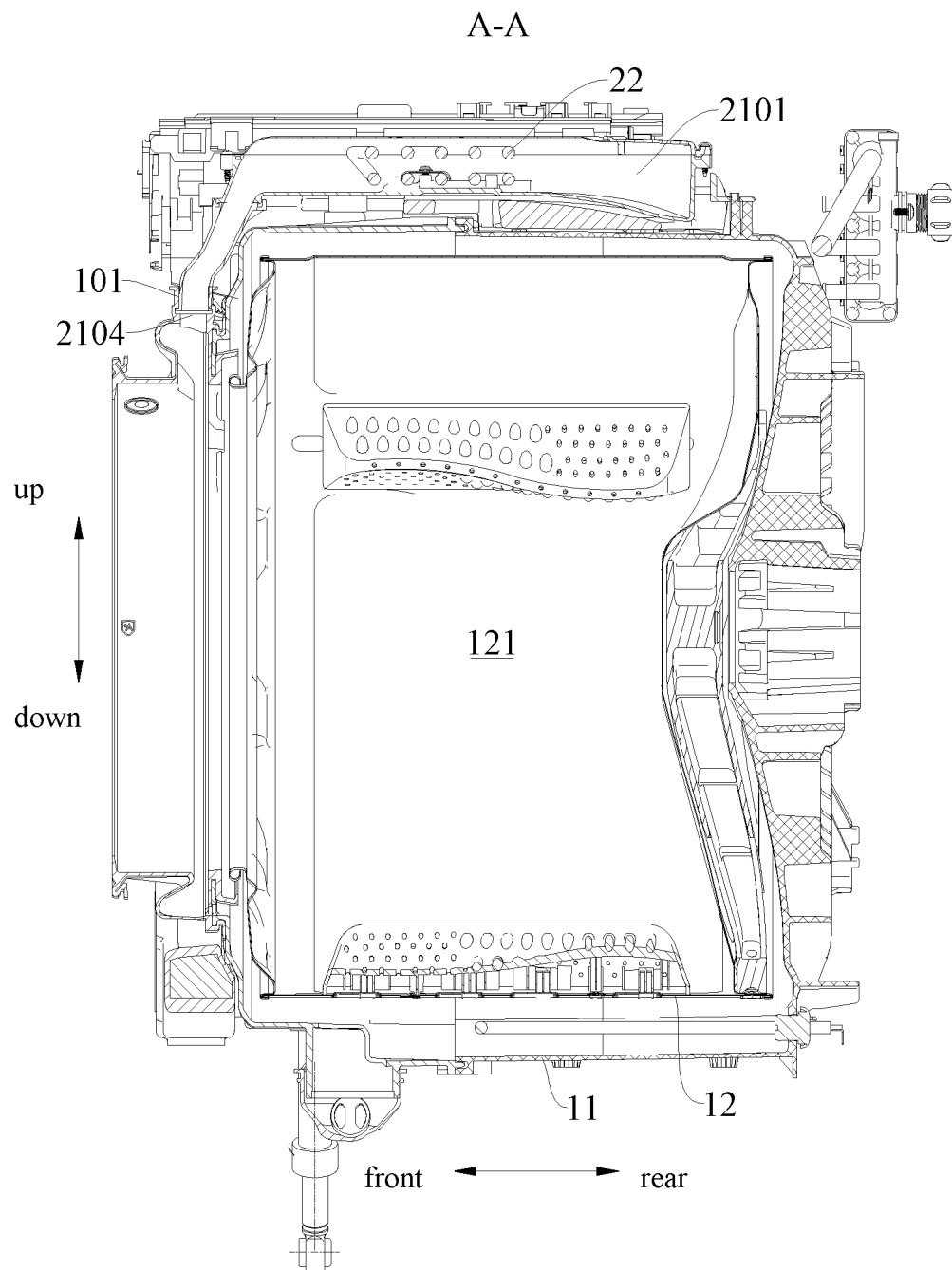


FIG. 3

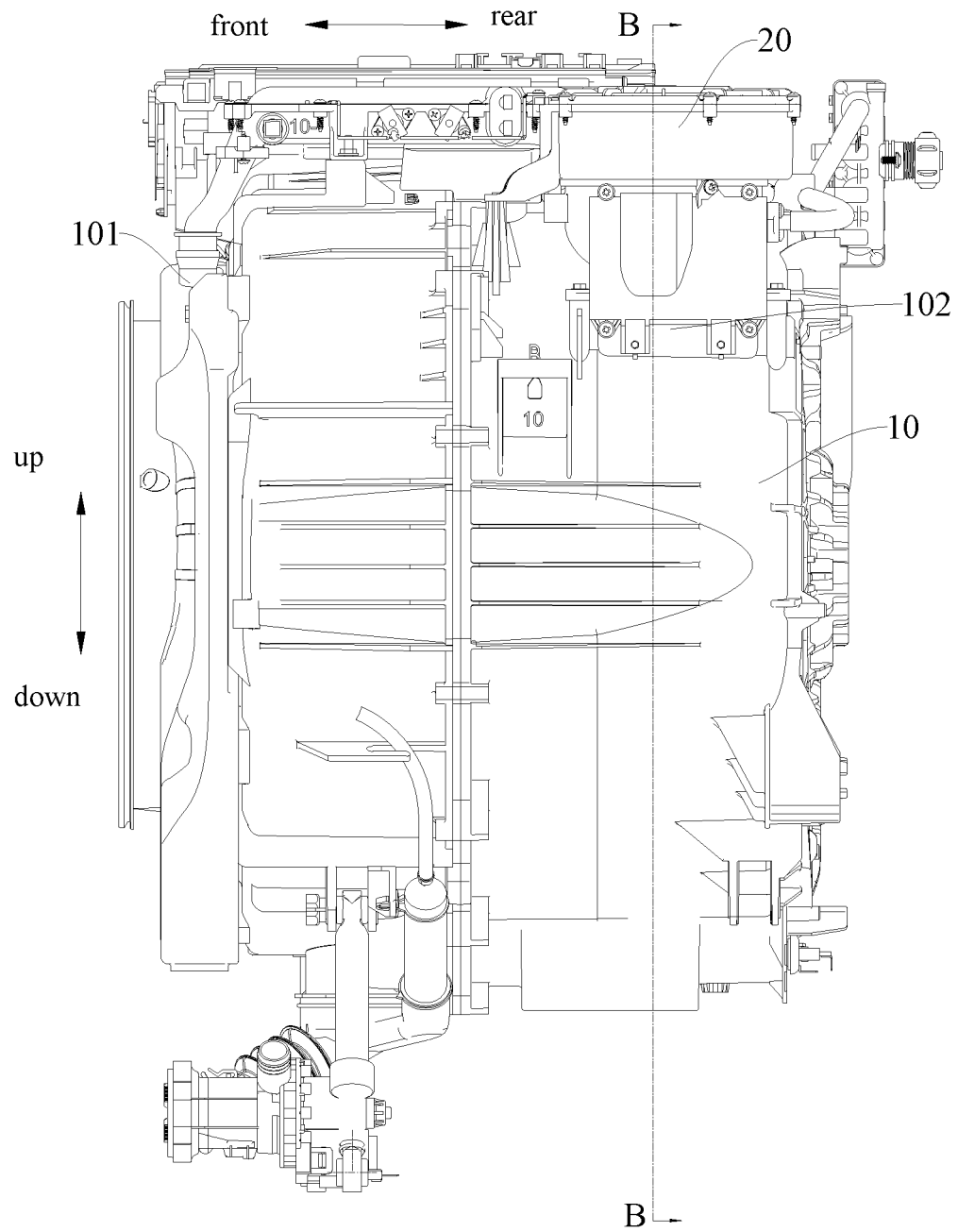


FIG. 4

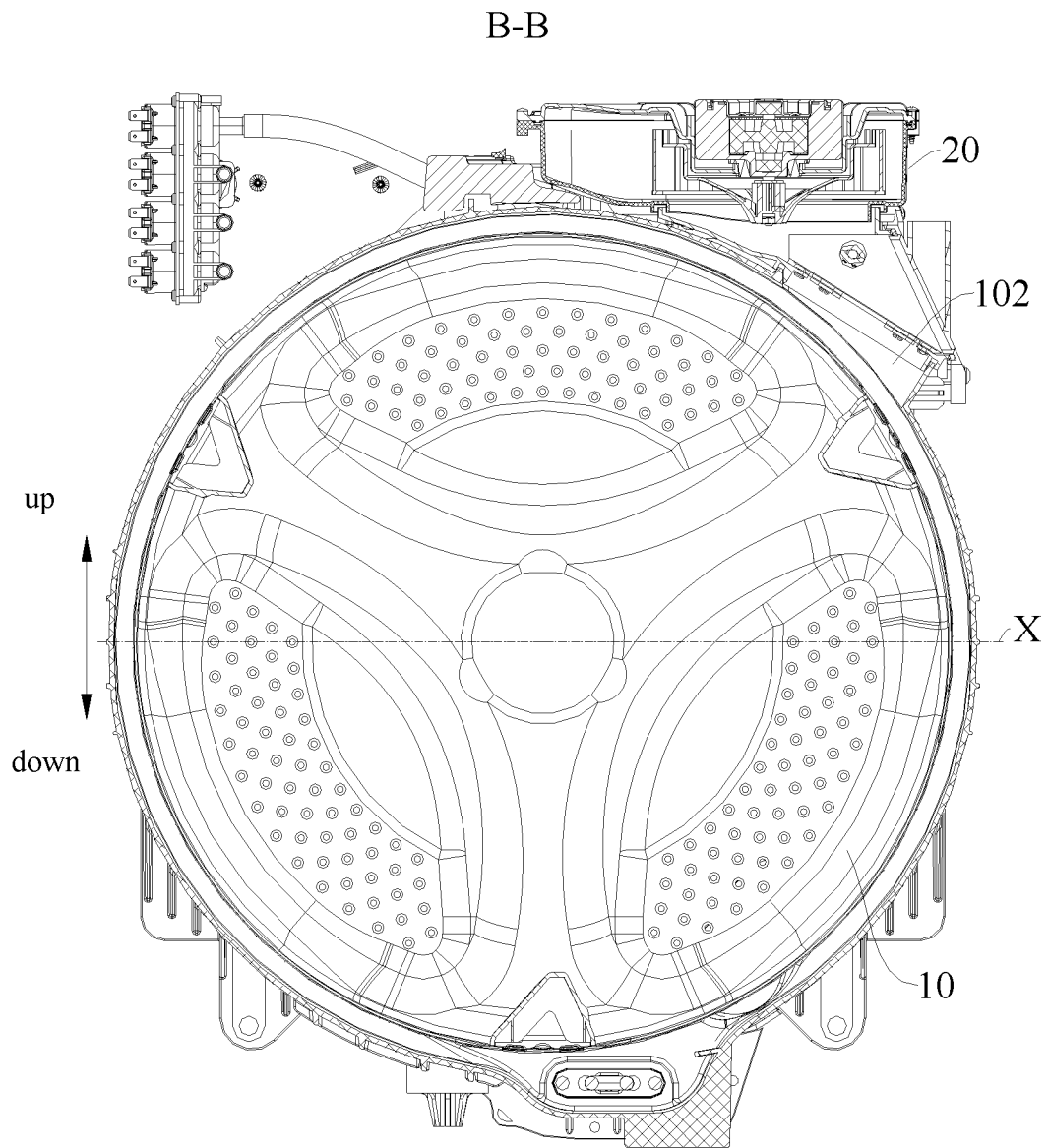


FIG. 5

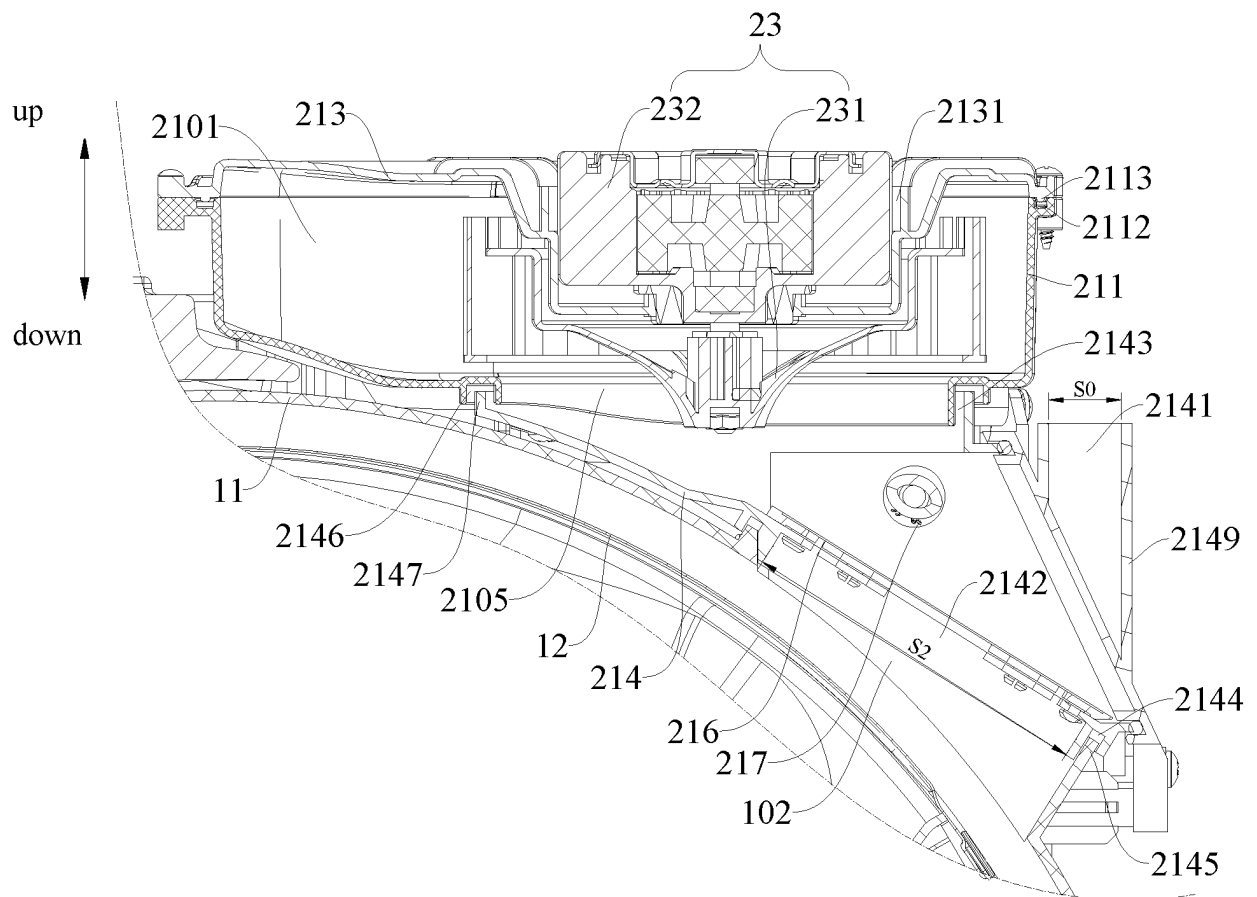


FIG. 6

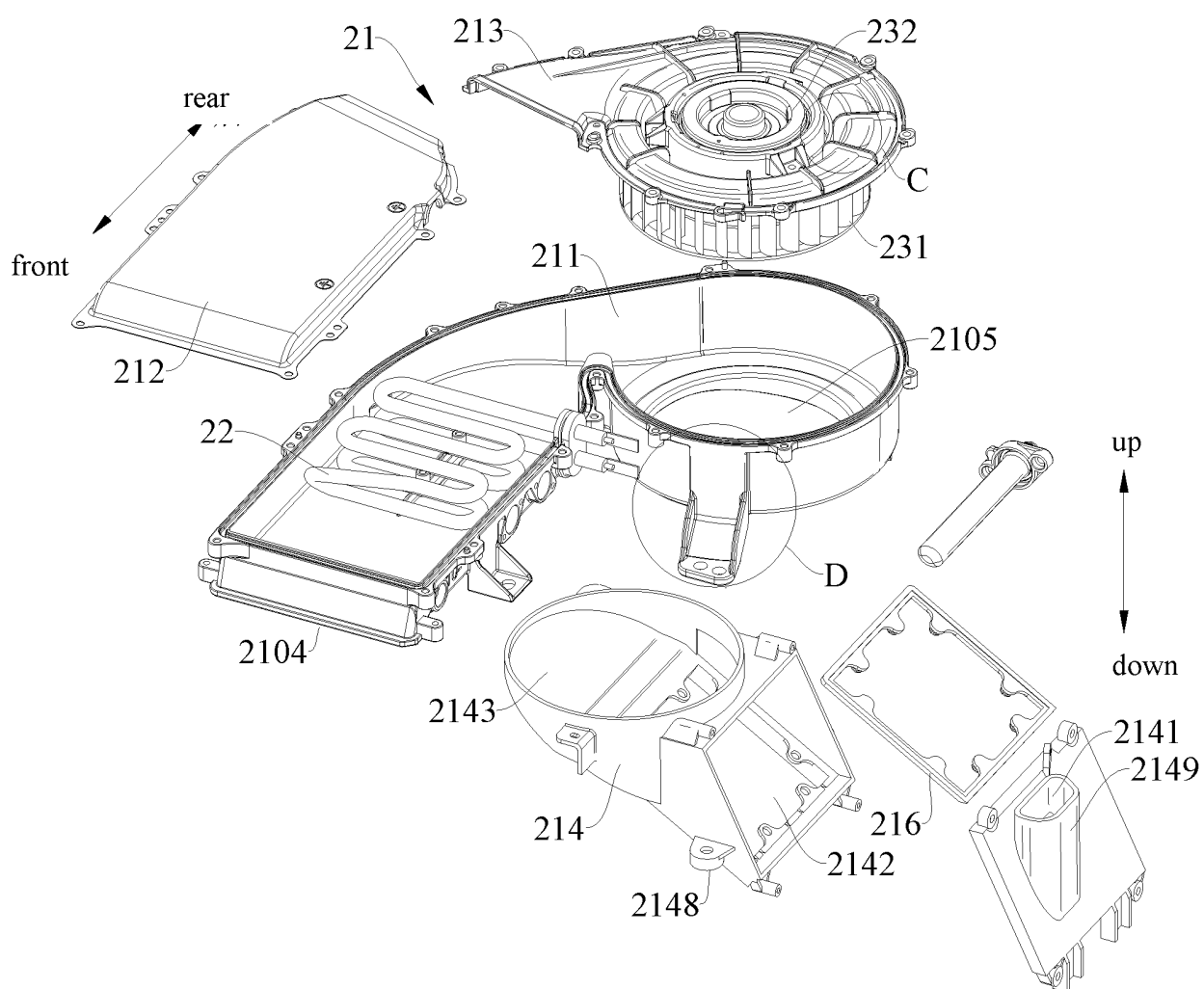


FIG. 7

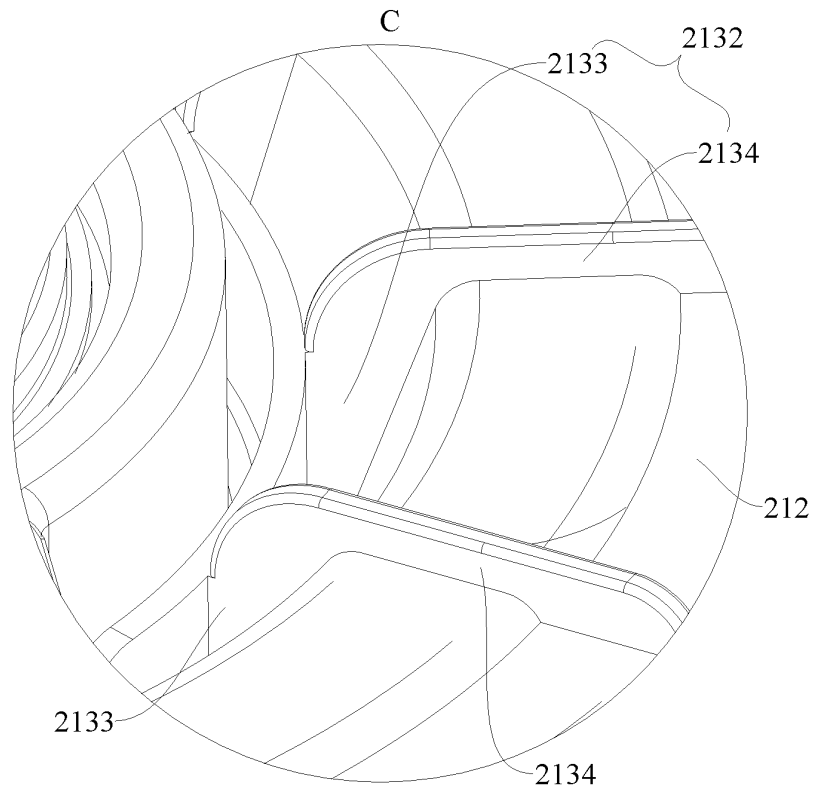


FIG. 8

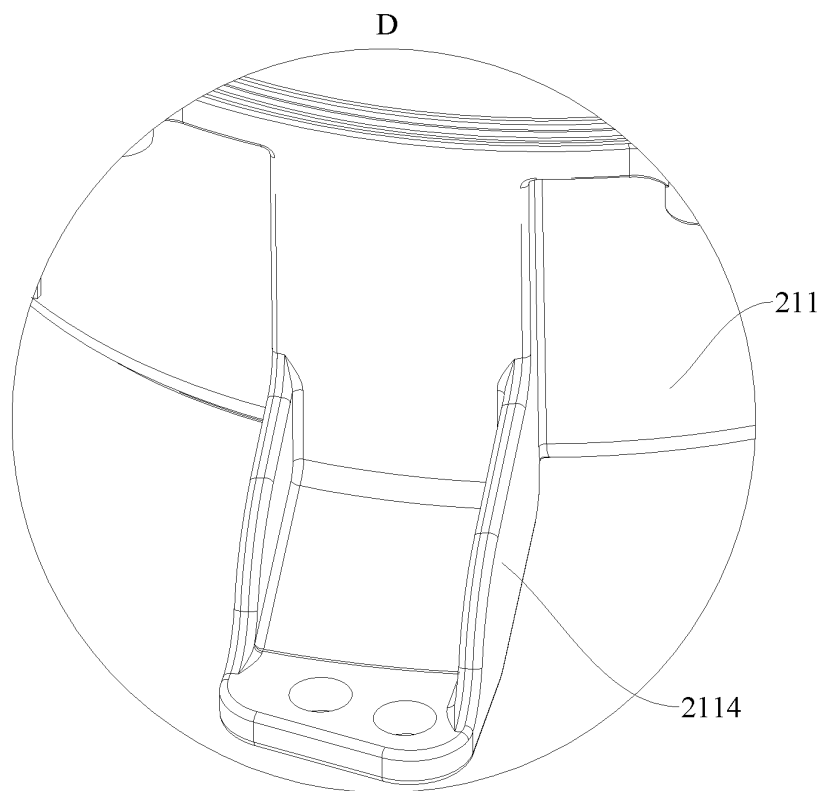


FIG. 9



## INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2019/096573

5	<b>A. CLASSIFICATION OF SUBJECT MATTER</b>		
	D06F 25/00(2006.01)i; D06F 58/18(2006.01)i		
	According to International Patent Classification (IPC) or to both national classification and IPC		
10	<b>B. FIELDS SEARCHED</b>		
	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		
15	Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
	EPODOC, WPI, CNPAT, CNKI: 洗衣, 干衣, 烘干, 风, 道, 通风, 气压, 平衡, 进风, 出风, 引, wash+, dry+, wind, passage, ventilat+, air, way?, pressure, gas, balance, inlet, intake, outlet, lead+		
20	<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>		
	Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
	X	CN 109267286 A (HISENSE (SHANDONG) REFRIGERATOR CO., LTD.) 25 January 2019 (2019-01-25) description, paragraphs 34-47, and figures 1-20	1-6
25	Y	CN 109267286 A (HISENSE (SHANDONG) REFRIGERATOR CO., LTD.) 25 January 2019 (2019-01-25) description, paragraphs 34-47, and figures 1-20	7-18
	Y	CN 107227598 A (HANGZHOU SANHUA HOME APPLIANCE THERMAL MANAGEMENT SYSTEM CO., LTD.) 03 October 2017 (2017-10-03) description, paragraphs 61-70 and 83-125, and figures 1-20	7-18
30	A	CN 207176307 U (PANASONIC HOME APPLIANCES R&D CENTER (HANGZHOU) CO., LTD. et al.) 03 April 2018 (2018-04-03) entire document	1-18
	A	CN 105624968 A (HISENSE SHANDONG REFRIGERATOR CO., LTD.) 01 June 2016 (2016-06-01) entire document	1-18
35	A	CN 201258401 Y (WUXI LITTLE SWAN CO., LTD.) 17 June 2009 (2009-06-17) entire document	1-18
	<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> See patent family annex.		
40	* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "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		
45			
	Date of the actual completion of the international search		Date of mailing of the international search report
	12 December 2019		27 December 2019
50	Name and mailing address of the ISA/CN		Authorized officer
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55	Facsimile No. (86-10)62019451		Telephone No.

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C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	JP 2007151670 A (TOSHIBA K. K. et al.) 21 June 2007 (2007-06-21) entire document	1-18

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**INTERNATIONAL SEARCH REPORT**  
Information on patent family members

International application No.

**PCT/CN2019/096573**

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CN 107227598 A	03 October 2017	None	
CN 207176307 U	03 April 2018	None	
CN 105624968 A	01 June 2016	None	
CN 201258401 Y	17 June 2009	None	
JP 2007330569 A	27 December 2007	None	
JP 2007151670 A	21 June 2007	None	

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**REFERENCES CITED IN THE DESCRIPTION**

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