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(54) **DISHWASHING MACHINE**

(57) A dishwashing machine (100), comprising a cavity (101), an evaporator air channel (108), a condenser air channel (109), and a heat pump drying system (107). A spraying arm assembly (60) is disposed within the cavity (101). The evaporator air channel (108) and the condenser air channel (109) are spaced apart. The heat pump drying system (107) comprises a compressor (1072), a first condenser (1071), a second condenser (1075), a throttle device (1074), and an evaporator (1073) that are connected together. The first condenser (1071) performs heat exchange with a washing liquid of the spraying arm assembly (60). The second condenser (1075) is disposed at the condenser air channel (109). The evaporator (1073) is disposed at the evaporator air channel (108). The heat pump drying system (107) is configured to heat, by using the second condenser (1075), air discharged from the cavity (101) via the condenser air channel (109), then return the same to the cavity (101), and to use the evaporator (1073) to cool and remove the moisture from air outside of the cavity (101) via the evaporator air channel (108).

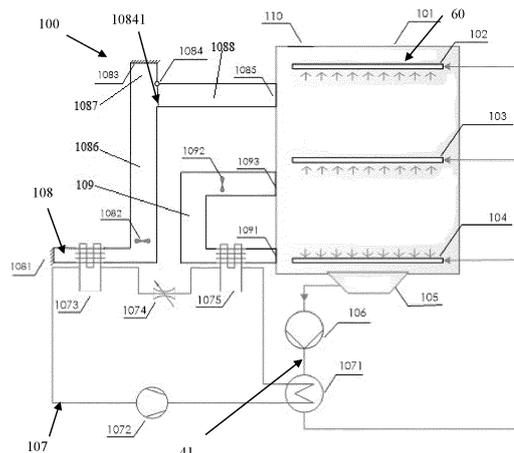


FIG. 1

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Description

PRIORITY INFORMATION

[0001] This application claims priority to and benefits of Chinese Patent Application Serial Numbers. 201811074701.4 and 201821510972.5, filed with National Intellectual Property Administration of PRC on September 14, 2018, the entire content of which are incorporated herein by reference.

FIELD

[0002] The present disclosure relates to the field of household appliances, and more particularly to a washing appliance.

BACKGROUND

[0003] In related art, dishwashers employ the same air passage to achieve the purpose of drying and storage, and need to be provided with a first heat exchange device and a second heat exchange device in the air passage in series. In this way, when the dishwasher enters a drying stage, the wet air in the tub of the dishwasher is drawn into the air passage, cooled by the first heat exchange device, and then heated by the second heat exchange device to flow back to the tub. Furthermore, when in the storage stage, the air in the tub of the dishwasher needs to be cooled by the first heat exchange device, causing a decrease in energy consumption of the system in the storage process and an increase in the energy consumption of the dishwasher. In addition, the first and second heat exchange devices are provided in series in the same air passage, causing problems of lengthy and complicated air passage, great pressure drop of the air passage, and reduced circulating air volume in the drying process.

SUMMARY

[0004] The present disclosure provides a washing appliance.

[0005] The washing appliance according to embodiments of the present disclosure includes a cavity, an evaporator air passage, a condenser air passage, and a heat pump drying system. The cavity is provided with a spray arm assembly therein. The evaporator air passage and the condenser air passage are spaced apart from each other. The heat pump drying system includes a compressor, a first condenser, a second condenser, a throttling device and an evaporator connected together. The first condenser is configured to perform heat exchange with washing liquid of the spray arm assembly. The second condenser is provided at the condenser air passage, and the evaporator is provided at the evaporator air passage. The heat pump drying system is configured to heat air discharged from the cavity by the second condenser and return it to the cavity via the condenser

air passage, and to cool and dehumidify air outside the cavity by the evaporator via the evaporator air passage.

[0006] In above-described washing appliance, the evaporator air passage where the evaporator is located and the condenser air passage where the second condenser is located are divided into two separate air passages, the design of the air passages can be simplified, the length of air flow path can be shortened, and efficiency and volume of air flow can be improved; meanwhile, the above-described washing appliance can realize drying with hot air from heat pump to improve the drying effect, and can also achieve hot air storage function, such that when tableware is removed, the tableware is in a dry and hot state.

[0007] In some embodiments, the evaporator air passage includes a main air passage, a first sub air passage and a second sub air passage, the main air passage connects the first sub air passage and the second sub air passage, the evaporator is at least partially provided in the main air passage, the heat pump drying system includes a switching device provided at the evaporator air passage, and the switching device is configured to adjust air flow entering the first sub air passage and the second sub air passage from the main air passage.

[0008] In some embodiments, the main air passage includes an air inlet located outside the cavity, the first sub air passage includes an air discharge port located outside the cavity, and the second sub air passage includes a first cavity outlet provided at the cavity.

[0009] In some embodiments, the washing appliance includes a housing, the cavity is provided in the housing, the air inlet and the air discharge port are located in a side board or a skirting board of the housing, or in a position of the housing not covered by a foreign object.

[0010] In some embodiments, the condenser air passage includes a second cavity outlet and cavity inlet provided at the cavity.

[0011] In some embodiments, the main air passage is provided with a first fan therein, and the first fan is configured to accelerate a flow rate of a gas in the evaporator air passage.

[0012] In some embodiments, the condenser air passage is provided with a second fan therein, and the second fan is configured to accelerate a flow rate of a gas in the condenser air passage.

[0013] In some embodiments, when the switching device completely cuts off air flow from the main air passage into the second sub air passage, the outside air is guided out of the cavity via the first sub air passage after being cooled and dehumidified by the evaporator; when the switching device completely cuts off air flow from the main air passage into the first sub air passage, the outside air is guided into the cavity via the second sub air passage after being cooled and dehumidified by the evaporator.

[0014] In some embodiments, the compressor, the first condenser, the second condenser, the throttling device and the evaporator are sequentially connected to form a closed refrigerant circuit.

[0015] In some embodiments, the washing appliance includes a first valve and a second valve, one end of the first valve is connected to an outlet end of the first condenser, the other end of the first valve is connected to an outlet end of the second condenser and an inlet end of the throttling device; one end of the second valve is connected to an inlet end of the first condenser and the compressor, the other end of the second valve is connected to an inlet end of the second condenser.

[0016] In some embodiments, the throttling device includes a first throttling device and a second throttling device, one end of the first throttling device is connected to an outlet end of the second condenser, the other end of the first throttling device is connected to an inlet end of the evaporator, one end of the second throttling device is connected to an outlet end of the first condenser, the other end of the second throttling device is connected to the inlet end of the evaporator, an inlet end of the first condenser and an inlet end of the second condenser are connected to the compressor.

[0017] In some embodiments, the washing appliance includes a washing pump and a sump, the washing pump is connected to the sump and the spray arm assembly through a pipeline, the washing pump is configured to pump washing liquid in the sump to the spray arm assembly, and the first condenser is configured to perform heat exchange with washing liquid of the pipeline.

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

BRIEF DESCRIPTION OF THE DRAWINGS

[0019] These above and/or additional aspects and advantages of embodiments of the present disclosure will become apparent and more readily appreciated from the following descriptions made with reference to the accompanying drawings, in which:

- FIG. 1 is a schematic structural view of a washing appliance according to an embodiment of the present disclosure;
- FIG. 2 is another schematic structural view of a washing appliance according to an embodiment of the present disclosure;
- FIG. 3 is yet another schematic structural view of a washing appliance according to an embodiment of the present disclosure; and
- FIG. 4 is still another schematic structural view of a washing appliance according to an embodiment of the present disclosure.

Symbol description of main elements:

[0020] washing appliance 100; cavity 101; sump 105; heat pump drying system 107; first condenser 1071; com-

pressor 1072; evaporator 1073; throttling device 1074; first throttling device 10741; second throttling device 10742; second condenser 1075; evaporator air passage 108; condenser air passage 109; cavity inlet 1091; second fan 1092; second cavity outlet 1093; cavity discharge port 110; air inlet 1081; first fan 1082; air discharge port 1083; switching device 1084; baffle 10841; first cavity outlet 1085; main air passage 1086; first sub air passage 1087; second sub air passage 1088; first valve 30; second valve 31; washing pump 106; pipeline 41; spray arm assembly 60; first spray arm 102; second spray arm 103; third spray arm 104.

DETAILED DESCRIPTION

[0021] Embodiments of the present application will be described in detail below, and the examples of the embodiments will be illustrated in the drawings. The same or similar elements and the elements having same or similar functions are denoted by like reference numerals throughout the description. The embodiments described herein with reference to the drawings are illustrative and used to generally understand the present disclosure. The embodiments shall not be construed to limit the present disclosure.

[0022] In the description of the present disclosure, relative terms such as "central," "longitudinal," "lateral," "length," "width," "thickness," "upper," "lower," "front," "rear," "left," "right," "vertical," "horizontal," "top," "bottom," "inner," "outer," "clockwise," "counterclockwise," and the like should be constructed to refer to the orientation or position as then described or as shown in the drawings under discussion. These relative terms are for convenience and simplification of description and do not indicate or imply that the device or element referred to must have a particular orientation, or be constructed and operated in a particular orientation, so these terms shall not be construed to limit the present disclosure. Furthermore, terms "first," "second," are used for descriptive purpose only, and cannot be construed to indicate or imply relative importance or implicitly indicate the number of technical features indicated. Therefore, the features defined with "first," "second," can explicitly or implicitly include at least one of the features. In the description of the present disclosure, the term "a plurality of" means at least two, for example, two, three, and the like, unless specified or limited otherwise.

[0023] In the descriptions, unless specified or limited otherwise, the terms "mounted," "connected," "coupled," and variations thereof should be understood broadly. For example, these may be permanent connections, detachable connections or integrated; mechanical connections, electrical connections, direct connections or indirect connections via intervening structures; inner communication or interaction of two elements. Those skilled in the related art may understand specific meanings of the above terms in the present disclosure according to specific situations.

[0024] Referring to FIGS. 1 to 4, a washing appliance

100 according to embodiments of the present disclosure includes a cavity 101, an evaporator air passage 108, a condenser air passage 109 and a heat pump drying system 107. The cavity 101 is provided with a spray arm assembly 60 therein. The evaporator air passage 108 and the condenser air passage 109 are spaced apart from each other. The heat pump drying system 107 includes a first condenser 1071, a compressor 1072, a second condenser 1075, a throttling device 1074 and an evaporator 1073 that are connected together.

[0025] The first condenser 1071 is used to perform heat exchange with washing liquid of the spray arm assembly 60. The second condenser 1075 is provided at the condenser air passage 109. The evaporator 1073 is provided at the evaporator air passage 108. The heat pump drying system 107 is configured to heat air discharged from the cavity 101 by the second condenser 1075 and return it to the cavity 101 via the condenser air passage 109, and to cool and dehumidify air outside the cavity 101 by the evaporator 1073 via the evaporator air passage 108.

[0026] Thus, the evaporator air passage 108 where the evaporator 1073 is located and the condenser air passage 109 where the second condenser 1075 is located are divided into two separate air passages, the design of the air passages can be simplified, the length of air flow path can be shortened, and efficiency and volume of air flow can be improved; meanwhile, the above-described washing appliance 100 can realize drying with hot air from heat pump to improve the drying effect, and can also achieve hot air storage function, such that when tableware is removed, the tableware is in a dry and hot state.

[0027] In some embodiments, the washing appliance 100 includes a washing pump 106 and a sump 105. The washing pump 106 is connected to the sump 105 and the spray arm assembly 60 through a pipeline 41. The washing pump 106 is used to pump the washing liquid in the sump 105 to the spray arm assembly 60. The first condenser 1071 is used to perform heat exchange with the washing liquid of the pipeline 41. In this way, the first condenser 1071 can transfer heat to the washing liquid of the pipeline 41 to heat the washing liquid. The washing liquid may be water or a mixed liquid of water and detergent, depending on washing stage or needs of the washing appliance 100.

[0028] In the present embodiment, the spray arm assembly 60 includes a first spray arm 102, a second spray arm 103 and a third spray arm 104. The first spray arm 102, the second spray arm 103 and the third spray arm 104 are provided in the cavity 101, spaced apart from one another, and connected to 1071 through the pipeline. The first spray arm 102 located above the second spray arm 103, and the second spray arm 103 is located above the third spray arm 104. The washing pump 106 pumps the washing liquid from the sump 105 to the first condenser 1071 of the heat pump drying system 107 for heating, and then pumps it to the first spray arm 102, the second

spray arm 103 and the third spray arm 104.

[0029] The second condenser 1075 may be at least partially provided in the condenser air passage 109, and the evaporator 1073 may be at least partially provided in the evaporator air passage 108, such that the second condenser 1075 and the evaporator 1073 can perform heat exchange with air flows in the air passages better.

[0030] In combination with FIGS. 1 and 2, in some embodiments, the compressor 1072, the first condenser 1071, the second condenser 1075, the throttling device 1074 and the evaporator 1073 are sequentially connected to form a closed refrigerant circuit. Thus, the refrigerant as a cooling agent can be circulated in the closed refrigerant circuit constituted by the compressor 1072, the first condenser 1071, the second condenser 1075, the throttling device 1074 and the evaporator 1073.

[0031] When the washing appliance 100 is in a stage of heating the washing liquid by the heat pump drying system 107, the compressor 1072 operates, to pump a high-temperature and high-pressure refrigerant to the first condenser 1071 (the first condenser 1071 may be a water-cooled condenser) for heating the washing liquid. The refrigerant exchanges heat with the washing liquid, flows out of the first condenser 1071 into the second condenser 1075, then is throttled by the throttling device 1074 into a low-temperature and low-pressure refrigerant, flows into the evaporator 1073 for evaporation and heat exchange with the air, and finally back to the compressor 1072 to achieve a complete heat pump heating circle.

[0032] In some embodiments, the evaporator air passage 108 includes a main air passage 1086 (as illustrated in FIG. 1), a first sub air passage 1087 and a second sub air passage 1088. The main air passage 1086 connects the first sub air passage 1087 and the second sub air passage 1088. The evaporator 1073 is at least partially provided in the main air passage 1086. The heat pump drying system 107 includes a switching device 1084 provided at the evaporator air passage 108. The switching device 1084 is used to adjust air flow from the main air passage 1086 into the first sub air passage 1087 and the second sub air passage 1088. Thus, the air flow from the main air passage 1086 into the first sub air passage 1087 and the second sub air passage 1088 can be adjusted through the switching device 1084, to meet the needs of different washing stages of the washing appliance.

[0033] Specifically, the main air passage 1086 includes an air inlet 1081 located outside the cavity 101. The first sub air passage 1087 includes an air discharge port 1083 located outside the cavity 101. The second sub air passage 1088 includes a first cavity outlet 1085 located at the cavity 101. Thus, the first sub air passage 1087 is in communication with outside atmosphere, while the second sub air passage 1088 is in communication with an inside of the cavity 101.

[0034] When the switching device 1084 completely cuts off the air flow from the main air passage 1086 into the second sub air passage 1088, the outside air is guid-

ed out from the cavity 101 via the first sub air passage 1087 after being cooled and dehumidified by the evaporator 1073. When the switching device 1084 completely cuts off the air flow from the main air passage 1086 into the first sub air passage 1087, the outside air is guided into the cavity 101 via second sub air passage 1088 after being cooled and dehumidified by the evaporator 1073.

[0035] Thus, when high-temperature wet air of the cavity 101 needs to be dried and dehumidified, the outside air can be guided into the cavity 101 via the second sub air passage 1088 after being cooled and dehumidified by the evaporator 1073, to be mixed with the high-temperature wet air of the cavity 101, thereby achieving drying. When the tableware of the cavity 101 needs to be stored, the outside air can be guided out from the cavity 101 via the first sub air passage 1087 after being cooled and dehumidified by the evaporator 1073, thereby preventing cold air from entering the cavity 101.

[0036] It should be noted that, the switching device 1084 may include a baffle 10841 and a driving device (not illustrated) for driving rotation of the baffle 10841. The baffle switching device 1084 can be switched between a first state and a second state under the driving of the driving device. When the switching device 1084 is in the first state, the switching device 1084 opens the air discharge port 1083 and close the first cavity outlet 1085. When the switching device 1084 is in the second state, the switching device 1084 closes the air discharge port 1083 and opens the first cavity outlet 1085. In addition, in order to adapt for more needs of the washing appliance, a position of the baffle 10841 may allow a part of the air flow of the main air passage 1086 to flow into the first sub air passage 1087 and the other part of the air flow to flow into the second sub air passage 1088.

[0037] When the washing appliance 100 is in the stage of heating the washing liquid by the heat pump drying system 107, the switching device 1084 is in the first state, such that the air flow in the main air passage 1086 enters the first sub air passage 1087 after heat exchange with the evaporator 1073 and then is discharged. In this way, the gas discharged from the first sub air passage 1087 is discharged into a room, and the gas discharged from the first sub air passage 1087 can also have an effect of cooling the room, to achieve a purpose of air condition and cooling.

[0038] When the washing appliance 100 is in a stage of drying a dishwasher, the baffle of the switching device 1084 is in the second state, such that the air flow in the main air passage 1086 enters the second sub air passage 1088 after heat exchange with the evaporator 1073 and thus enters the inside of the cavity 101. In this way, the cooled and dehumidified air flow can be mixed with the high-temperature and high-pressure air of the cavity 101 to achieve dehumidification effect of the air in the cavity 101, thereby promoting the drying effect.

[0039] In some embodiments, the washing appliance 100 includes a housing (not illustrated). The cavity 101 is provided in the housing. The air inlet 1081 and the air

discharge port 1083 are located in a side board or a skirting board of the housing, or at a position of the housing not covered by a foreign. Thus, smooth flowing of the air flow is facilitated.

[0040] In some embodiments, the condensor air passage 109 includes a second cavity outlet 1093 and a cavity inlet 1091 that are provided at the cavity 101. In this way, the condensor air passage 109 can be in communication with the inside of the cavity 101 through the second cavity outlet 1093 and the cavity inlet 1091, to achieve circulation of the air flow in the cavity 101.

[0041] It could be understood that, in order to facilitate flowing of the air flow and ensure the smoothness of the circulation of the air flow, the second cavity outlet 1093 and the cavity inlet 1091 may be defined at an identical side of the cavity 101. For example, the second cavity outlet 1093 and the cavity inlet 1091 may be defined in a side wall or a top wall of the cavity 101, or the second cavity outlet 1093 and the cavity inlet 1091 may be defined in a door (not illustrated, it may be an inner door) used to open or close an opening of the cavity 101. Certainly, it could be understood that, the second cavity outlet 1093 and the cavity inlet 1091 may also be provided at other positions of the cavity 101.

[0042] Referring to FIG. 1, when the washing appliance 100 is in a storage stage, in order to keep the temperature of the tableware itself and prevent the tableware from getting dump, the compressor 1072 is started, to heat the air of the cavity 101 through the second condensor 1075 (e.g., the second condensor 1075 is an air-cooled condensor). The baffle of the evaporator air passage 108 may be in the first state, to prevent the cold air from entering the cavity 101, thereby achieving the drying or storage function with low energy consumption.

[0043] In some embodiments, the main air passage 1086 is provided with a first fan 1082 therein. The first fan 1082 is used to accelerate the flow rate of the gas in the evaporator air passage 108. Thus, the provision of the first fan 1082 can increase the flow rate of the gas in the evaporator air passage 108, and then ensure the drying or storage effect of the washing appliance 100.

[0044] In some embodiments, the condensor air passage 109 is provided with a second fan 1092 therein. The second fan 1092 is used to accelerate a flow rate of a gas in the condensor air passage 109. Thus, the provision of the second fan 1092 can increase the flow rate of the air in the condensor air passage 109 from the cavity 101, and then enhance the storage and drying effect.

[0045] In an example illustrated in FIG. 1, when the washing appliance 100 is in the stage of heating the washing liquid, the first fan 1082 is started. The baffle of the switching device 1084 is in the first state, the switching device 1084 opens the air discharge port 1083 and closes the first cavity outlet 1085. Under the action of the first fan 1082, the room temperature air enters the evaporator air passage 108 via the air inlet 1081, and is accelerated to be discharged via the air discharge port 1083. In this case, the second fan 1092 is in an off state.

[0046] In an example as illustrated in FIG. 2, when the washing appliance 100 is in the drying stage, the washing liquid in both the sump 105 and the first condenser 1071 has been drained. The first fan 1082 and the second fan 1092 are in an operation state, the compressor 1072 is in a started state. The compressor 1072 pumps the high-temperature and high-pressure refrigerant to the first condenser 1071, to dry components in the first condenser 1071 and other water flow systems, and then the refrigerant flows into the second condenser 1075 for circulating heating of the air in the cavity 101, thereby achieving acceleration for evaporation and drying of the water drops on the tableware in cavity 101 and increase in the temperature of the tableware itself.

[0047] Moreover, the refrigerant is condensed by the second condenser 1075, throttled by the throttling device 1074, and then flows into the evaporator 1073. The room temperature air enters via the air inlet 1081 under the action of the first fan 1082, is cooled and dehumidified by the evaporator 1073, and then enters the cavity via the low-temperature and low-humidity first cavity outlet 1085, to be mixed with the high-temperature and high-humidity air in the cavity 101 or squeeze high-temperature and high-humidity air out from the cavity discharge port 110 (in this case, the baffle of the switching device 1084 is in the second state). Thus, dehumidification effect of the air in the cavity 101 is achieved, the drying efficiency is improved, and the drying time is shortened. In the embodiments illustrated in the drawings, the cavity discharge port 110 may be defined in a top of the cavity 101, and is sealed by a movable sealing member. When an internal pressure of the cavity 101 is greater than a preset pressure, the sealing member will be opened, to achieve the opening of the cavity discharge port 110. When the internal pressure of the cavity 101 is not greater than the preset pressure, the sealing member will reseal the cavity discharge port 110, to achieve the sealing of the cavity 101.

[0048] It could be understood that, in order to facilitate flowing of the air flow, the first cavity outlet 1085 may be defined in a side wall of the cavity 101 or in a top wall of the cavity 101, or the first cavity outlet 1085 may be defined in a door (not illustrated, it may be an inner door) used to open or close the cavity 101. Certainly, it could be understood that, the first cavity outlet 1085 may also be provided at other positions of the cavity 101.

[0049] Referring to FIG. 3, in some embodiments, the washing appliance 100 includes a first valve 30 and a second valve 31. One end of the first valve 30 is connected to an outlet end of the first condenser 1071, and the other end of the first valve 30 is connected to an outlet end of the second condenser 1075 and an inlet end of the throttling device 1074. One end of the second valve 31 is connected to an inlet end of the first condenser 1071 and the compressor 1072, and the other end of the second valve 31 is connected to an inlet end of the second condenser 1075.

[0050] Thus, when in the stage of heating the washing

liquid of the washing appliance 100, the first valve 30 is opened, the second valve 31 is closed, and then the second condenser 1075 is bypassed. In this way, the refrigerant does not need to pass through the second condenser 1075, the heat loss is reduced, the flow resistance of the pipeline of the heat pump drying system 107 is reduced, and the energy consumption of the heat pump system when heating the washing liquid is overall reduced. When the washing appliance 100 is in the drying stage or in the storage stage, the second valve 31 is opened, the first valve 30 is closed, and the first condenser 1071 is bypassed. In this way, the refrigerant does not need to pass through the first condenser 1071, the heat loss is reduced, the flow resistance of the pipeline of the heat pump drying system 107 is reduced, and the energy consumption of the heat pump drying system 107 when in the drying and storage stage is overall reduced.

[0051] Referring to FIG. 4, in some embodiments, the throttling device 1074 includes a first throttling device 10741 and a second throttling device 10742. One end of the first throttling device 10741 is connected to the outlet end of the second condenser 1075, and the other end of the first throttling device 10741 is connected to an inlet end of the evaporator 1073. One end of the second throttling device 10742 is connected to the outlet end of the first condenser 1071, and the other end of the second throttling device 10742 is connected to the inlet end of the evaporator 1073. The inlet end of the first condenser 1071 and the inlet end of the second condenser 1075 are connected to the compressor 1072.

[0052] Thus, the first throttling device 10741 and the second throttling device 10742 constitute a dual-throttling device system. When in the stage of heating the washing liquid of the washing appliance 100, the second throttling device 10742 enters a normal operation state, the first throttling device 10741 is closed up or is in the minimum opening state, and thus the second condenser 1075 is bypassed, thereby reducing the flow resistance of the pipeline of the heat pump drying system 107, and reducing the energy consumption of the heat pump drying system 107 when heating the washing water. When the washing appliance 100 is in the drying or storage stage, the first throttling device 10741 enters a normal operation state, the second throttling device 10742 is closed up or is in the minimum opening state, and the first condenser 1071 is bypassed, thereby reducing the flow resistance of the pipeline of the heat pump system and reducing the energy consumption of the heat pump system when in the drying and storage stage.

[0053] It should be noted that, the throttling device 1074 includes an expansion valve. The low-temperature and high-pressure liquid refrigerant formed after being condensed by the second condenser 1075 becomes a low-temperature and low-pressure mist hydraulic refrigerant after being throttled by the orifice of the expansion valve, creating conditions for the evaporation of the refrigerant. Of course, the throttling device 1074 can also be of other types, such as a capillary tube, etc., which is

not specifically limited. In addition, the first throttling device 10741 and the second throttling device 10742 can also employ an electronic expansion valve.

[0054] 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 embodiment in which the first feature is in direct contact with the second feature, and may also include an embodiment in which the first feature is in indirect contact with the second feature through intermediaries. Furthermore, a first feature "on," "above," or "on top of" a second feature may include an embodiment in which the first feature is right "on," "above," or "on top of" the second feature, and may also include an embodiment in which the first feature is diagonally "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. A first feature "beneath," "below," or "on bottom of" a second feature may include an embodiment in which the first feature is right "beneath," "below," or "on bottom of" the second feature, and may also include an embodiment in which the first feature is diagonally "beneath," "below," 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.

[0055] The present disclosure provides many different embodiments or examples for realizing different structures of the present disclosure. In order to simplify the disclosure of the present disclosure, the components and arrangements of specific examples are described herein. Of course, they are only examples, and are not intended to limit the present disclosure. In addition, the present disclosure may repeat reference numerals and/or reference letters in different examples, and this repetition is for the purpose of simplification and clarity, and does not indicate the relationship between the various embodiments and/or arrangements discussed. In addition, the present disclosure provides examples of various specific processes and materials, but those of ordinary skill in the art may be aware of the application of other processes and/or the use of other materials.

[0056] In the description of the present specification, reference throughout this specification to "an embodiment," "some embodiments," "an exemplary embodiment," "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. In the specification, the appearances of the above-mentioned terms 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.

[0057] Although embodiments of the present disclosure have been shown and described, it shall be appreciated by those skilled in the art that various changes,

modifications, alternatives, and variations can be made in the embodiments without departing from principles and purposes of the present disclosure. The scope of the present disclosure is defined by claims or their equivalents.

Claims

1. A washing appliance, comprising:
 - a cavity provided with a spray arm assembly therein;
 - an evaporator air passage and a condenser air passage spaced apart from each other; and
 - a heat pump drying system comprising:
 - a compressor, a first condenser, a second condenser, a throttling device and an evaporator connected together, wherein the first condenser is configured to perform heat exchange with washing liquid of the spray arm assembly; the second condenser is provided at the condenser air passage, the evaporator is provided at the evaporator air passage; the heat pump drying system is configured to heat air discharged from the cavity by the second condenser and return the heated air to the cavity via the condenser air passage, and to cool and dehumidify air outside the cavity by the evaporator via the evaporator air passage.
2. The washing appliance according to claim 1, wherein the evaporator air passage comprises a main air passage, a first sub air passage and a second sub air passage, the main air passage connects the first sub air passage and the second sub air passage, the evaporator is at least partially provided in the main air passage, the heat pump drying system comprises a switching device provided at the evaporator air passage, and the switching device is configured to adjust air flow entering the first sub air passage and the second sub air passage from the main air passage.
3. The washing appliance according to claim 2, wherein the main air passage comprises an air inlet located outside the cavity, the first sub air passage comprises an air discharge port located outside the cavity, and the second sub air passage comprises a first cavity outlet provided at the cavity.
4. The washing appliance according to claim 3, wherein the washing appliance comprises a housing, the cavity is provided in the housing, the air inlet and the air discharge port are located in a side board or a skirting board of the housing, or in a position of the housing not covered by a foreign object.

- 5. The washing appliance according to claim 1, wherein the condensor air passage comprises a second cavity outlet and cavity inlet provided at the cavity.
- 6. The washing appliance according to claim 2, wherein the main air passage is provided with a first fan therein, and the first fan is configured to accelerate a flow rate of a gas in the evaporator air passage.
- 7. The washing appliance according to claim 1, wherein the condensor air passage is provided with a second fan therein, and the second fan is configured to accelerate a flow rate of a gas in the condensor air passage.
- 8. The washing appliance according to claim 2, wherein when the switching device completely cuts off air flow from the main air passage into the second sub air passage, the outside air is guided out of the cavity via the first sub air passage after being cooled and dehumidified by the evaporator, when the switching device completely cuts off air flow from the main air passage into the first sub air passage, the outside air is guided into the cavity via the second sub air passage after being cooled and dehumidified by the evaporator.
- 9. The washing appliance according to claim 1, wherein the compressor, the first condensor, the second condensor, the throttling device and the evaporator are sequentially connected to form a closed refrigerant circuit.
- 10. The washing appliance according to claim 1, wherein the washing appliance comprises a first valve and a second valve, one end of the first valve is connected to an outlet end of the first condensor, the other end of the first valve is connected to an outlet end of the second condensor and an inlet end of the throttling device; one end of the second valve is connected to an inlet end of the first condensor and the compressor, the other end of the second valve is connected to an inlet end of the second condensor.
- 11. The washing appliance according to claim 1, wherein the throttling device comprises a first throttling device and a second throttling device, one end of the first throttling device is connected to an outlet end of the second condensor, the other end of the first throttling device is connected to an inlet end of the evaporator, one end of the second throttling device is connected to an outlet end of the first condensor, the other end of the second throttling device is connected to the inlet end of the evaporator, an inlet end of the first condensor and an inlet end of the second condensor are connected to the compressor.
- 12. The washing appliance according to claim 1, the

washing appliance comprises a washing pump and a sump, the washing pump is connected to the sump and the spray arm assembly through a pipeline, the washing pump is configured to pump washing liquid in the sump to the spray arm assembly, and the first condensor is configured to perform heat exchange with washing liquid of the pipeline.

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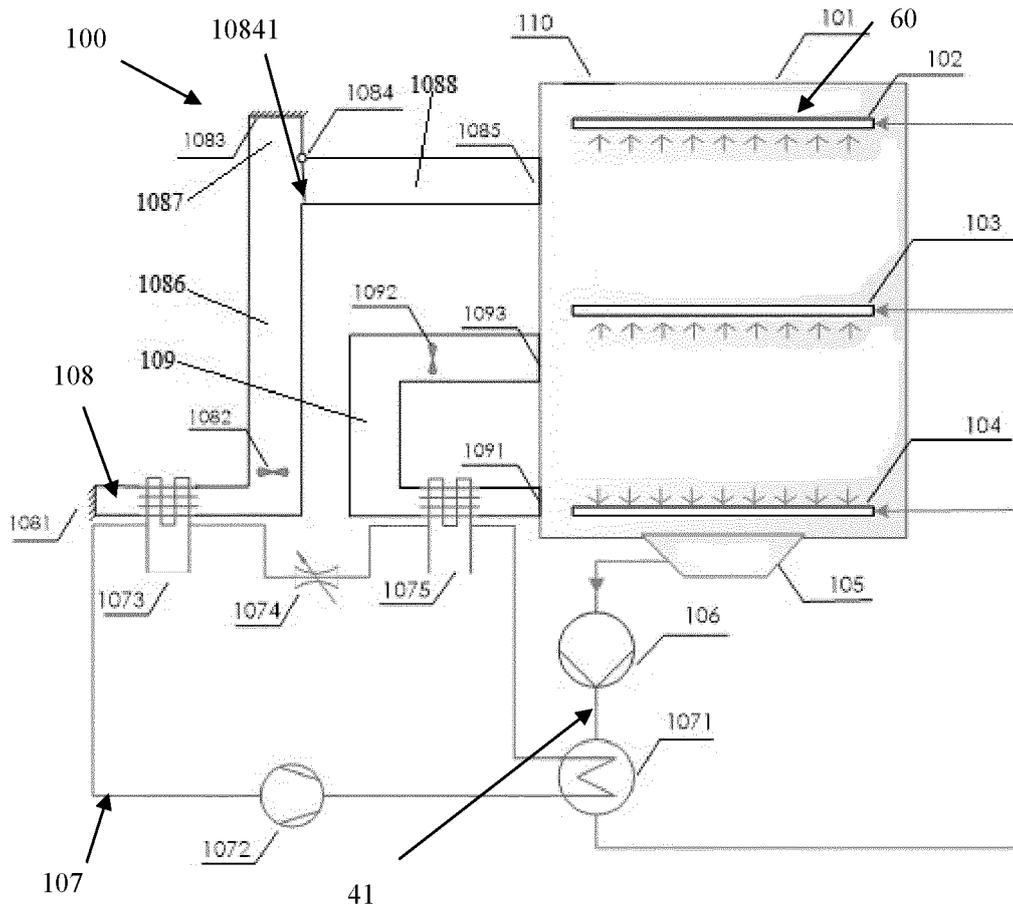


FIG. 1

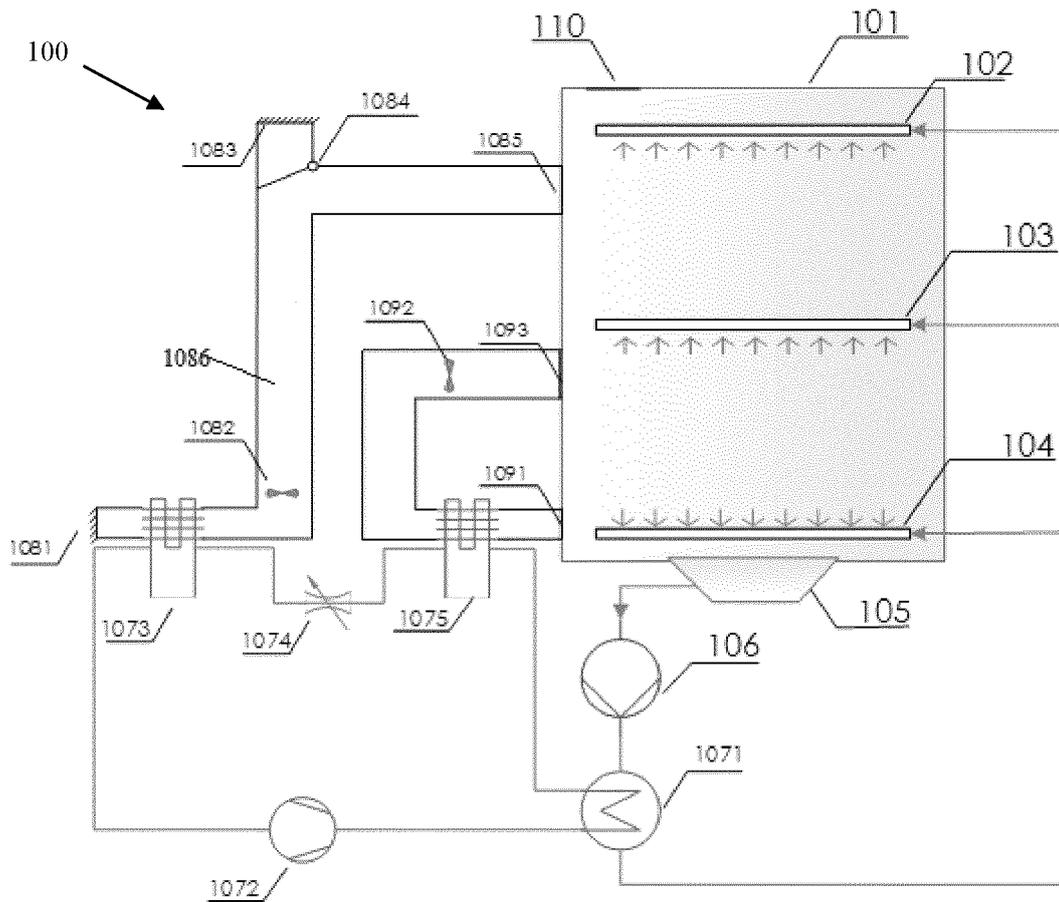


FIG. 2

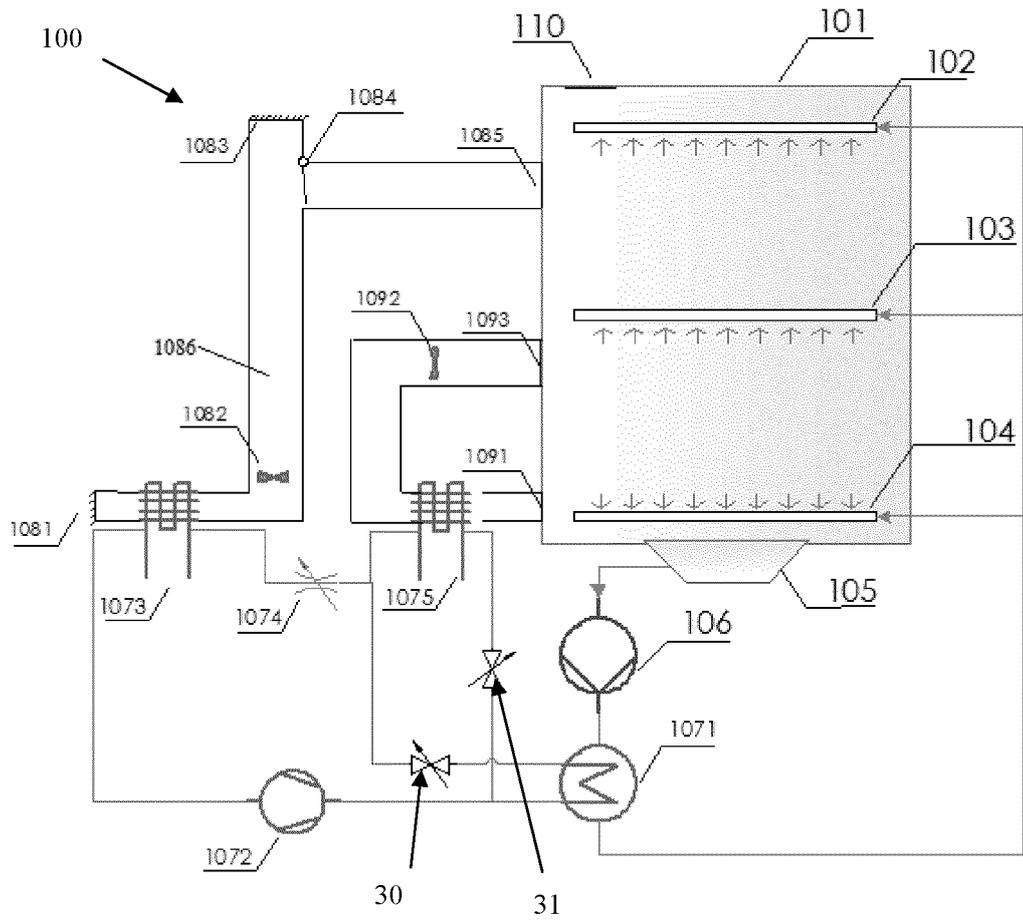


FIG. 3

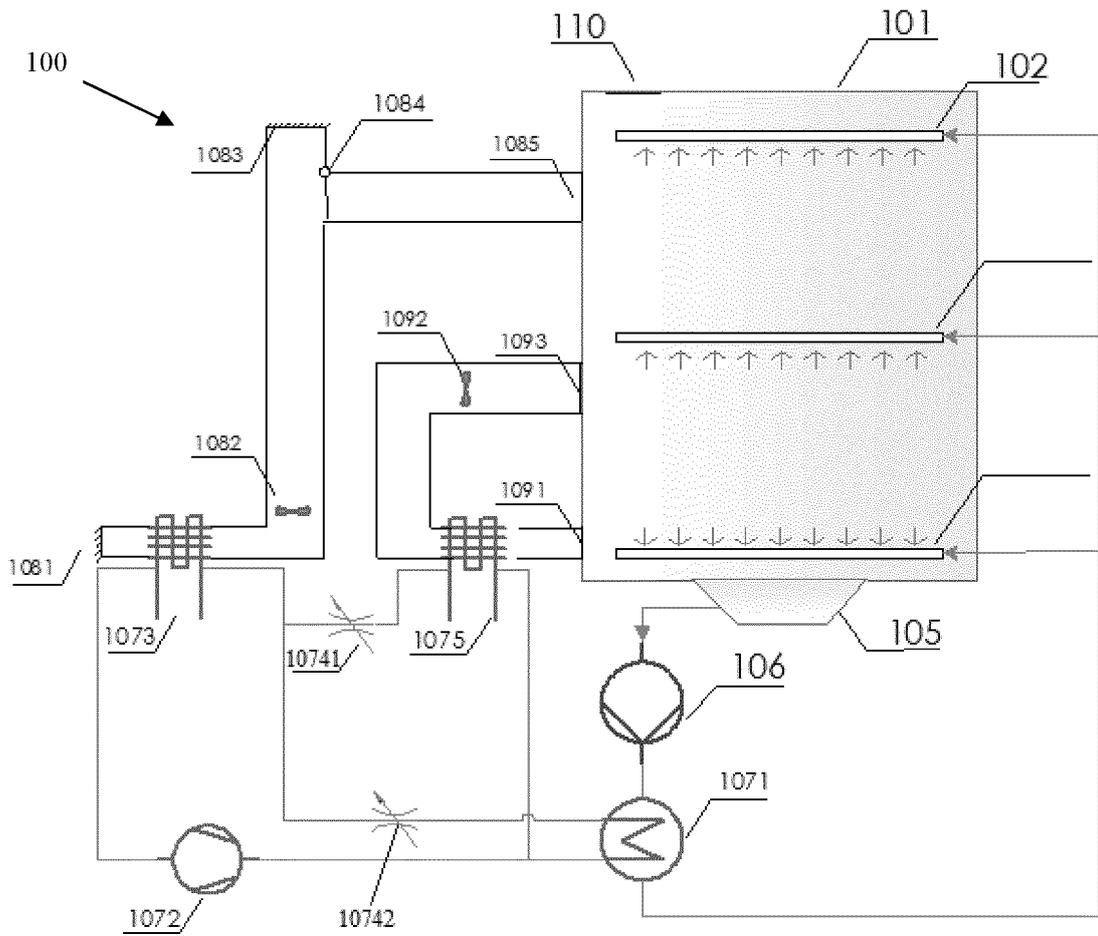


FIG. 4

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2019/094710

5	A. CLASSIFICATION OF SUBJECT MATTER	
	A47L 15/16(2006.01)i; A47L 15/42(2006.01)i; A47L 15/48(2006.01)i	
	According to International Patent Classification (IPC) or to both national classification and IPC	
	B. FIELDS SEARCHED	
10	Minimum documentation searched (classification system followed by classification symbols) A47L	
	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) CNPAT, CNKI, WPI, EPODOC: 美的, 刘闪闪, 蔡思琦, 刘超鹏, 洗涤, 洗碗, 喷, 蒸发, 冷凝, 风, 加热, 除湿, 流, wash, dish, bowl, spurt, vaporize, condensat+, heat+, wind	
	C. DOCUMENTS CONSIDERED TO BE RELEVANT	
20	Category*	Citation of document, with indication, where appropriate, of the relevant passages
	PX	CN 109077688 A (FOSHAN SHUNDE MIDEA WASHING APPLIANCES MFG. CO., LTD. ET AL.) 25 December 2018 (2018-12-25) claims 1-12, description, paragraphs [0028]-[0057], and figures 1-4
25	Y	CN 106852673 A (HANGZHOU SANHUA HOME APPLIANCE THERMAL MANAGEMENT SYSTEM CO., LTD.) 16 June 2017 (2017-06-16) description, paragraphs [0042]-[0088], and figure 1
	Y	CN 106606342 A (HANGZHOU SANHUA HOME APPLIANCE THERMAL MANAGEMENT SYSTEM CO., LTD.) 03 May 2017 (2017-05-03) description, paragraphs [0051]-[0103], and figures 1-3
30	A	CN 108420378 A (FOSHAN SHUNDE MIDEA WASHING APPLIANCES MFG CO., LTD. ET AL.) 21 August 2018 (2018-08-21) entire document
	A	EP 3095372 A1 (ILLINOIS TOOL WORKS INC.) 23 November 2016 (2016-11-23) entire document
35	A	JP 2017029390 A (HOSHIZAKI K.K.) 09 February 2017 (2017-02-09) entire document
	<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> See patent family annex.	
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45	"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	
	Date of the actual completion of the international search	Date of mailing of the international search report
	04 September 2019	10 October 2019
50	Name and mailing address of the ISA/CN	Authorized officer
	China National Intellectual Property Administration (ISA/ CN) No. 6, Xitucheng Road, Jimenqiao Haidian District, Beijing 100088 China	
55	Facsimile No. (86-10)62019451	Telephone No.

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