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(54) **REFRIGERATOR**

(57) The present invention relates to a refrigerator, comprising: a dry article chamber (12), a cold chamber (14), a first cooling and circulating system and a second cooling and circulating system in which a coolant circulates respectively, wherein an evaporating temperature of the first cooling and circulating system is lower than that of the second cooling and circulating system, the first cooling and circulating system comprises an evaporator (13) arranged inside the cold chamber (14), and a refrigerating output passage (15) is arranged between the cold chamber (14) and the dry article chamber (12). By communicating the dry article chamber (12) with the cold chamber (14) of the first cooling and circulating system whose evaporating temperature is relatively low, the absolute humidity of the air entering the dry article chamber (12) is much lower, realizing a lower absolute humidity in the dry article chamber (12).

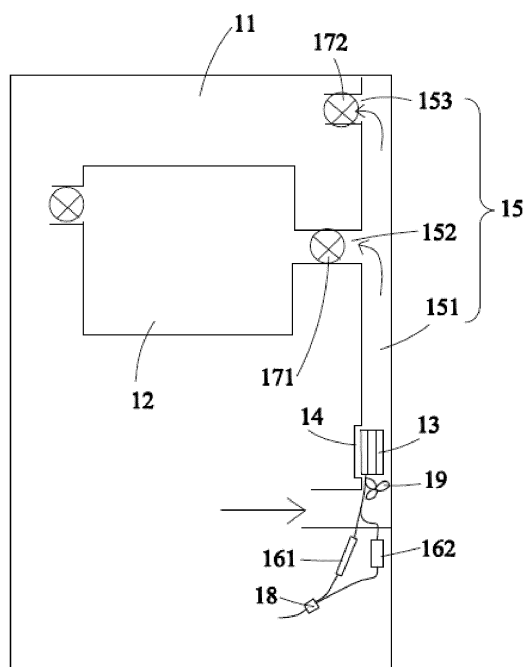


Fig. 1

Description

[0001] The present application claims the priority of the Chinese patent application No. 201410432007.0 filed on August 29, 2014 and with the title of "Refrigerator", which is incorporated herein in its entirety as reference.

TECHNICAL FIELD

[0002] The present invention is related to a refrigerator with a dry article chamber, which belongs to the field of electric home appliances.

BACKGROUND

[0003] Humidity generally refers to air humidity in meteorology, or water vapor content in the air excluding water in a liquid or solid state. Air not containing water vapor is called dry air. As water vapor in the atmosphere may account 0% to 4% of the air volume, when the constituents of various gases in the air are listed, it means the proportion of these constituents in dry air.

[0004] "Absolute humidity" refers to the mass of water vapor contained in the air of a certain volume, and generally the unit for this mass is grams/cubic meter. The maximum extent of an absolute humidity is the highest humidity in a saturation state.

[0005] "Relative humidity" (RH) refers to a ratio of an absolute humidity to the highest humidity, and an RH value indicates a saturation degree of water vapor. Air of an RH of 100% is saturate air. Air of an RH of 50% contains a half of the water vapor contained in saturate air with the same temperature. Generally, water vapor in air of an RH of over 100% condenses into water or ice. As the temperature rises, air can dissolve more water vapor, and the AH of air increases. When the RH value of air exceeds 100%, water vapor contained in the air condenses, which may facilitate cooling and dehumidification. If the temperature rises further, the RH value will decrease, which may facilitate drying.

[0006] Drying of food is mainly related with the RH. The lower the RH value is, the less possible the food will acquire water content.

[0007] Storage compartments of low RH of refrigerators are developed to store various dry articles or food requiring a dry environment (such as tea and nuts). Dry food is sensitive to the RH of the storage environment, and usually needs a relatively low RH, which may change in a small range. Otherwise, such food may deteriorate or its quality may be negatively affected.

[0008] A traditional method of reducing the RH of compartments utilizes the principle of cooling and dehumidification. In other words, the air in a compartment is sufficiently cooled by an evaporator, so that water vapor is precipitated and air of lower absolute humidity is obtained. Then, the air of higher absolute humidity in the compartment is exchanged with the dehumidified air (that is, the air of higher absolute humidity in the compartment

is driven out, and the air absolute humidity in the compartment is reduced). Then, the temperature is raised by the environment, so that lower RH is obtained and drying is realized.

SUMMARY

[0009] The object of the present invention is to provide a refrigerator that can provide a dry article chamber therein with air of lower absolute humidity to achieve better dehumidification effects.

[0010] To realize the above object, the present invention adopts the following technical solutions. There is provided a refrigerator, comprising: a dry article chamber, a cold chamber, a first cooling and circulating system and a second cooling and circulating system in which a coolant circulates respectively, wherein an evaporating temperature of the first cooling and circulating system is lower than that of the second cooling and circulating system, the first cooling and circulating system comprises an evaporator arranged inside the cold chamber, and a refrigerating output passage is arranged between the cold chamber and the dry article chamber.

[0011] As an improvement of the present invention, the refrigerator further comprises a first capillary tube and a second capillary tube that are connected in parallel and to the evaporator, and control valves respectively arranged on the first and second capillary tubes, wherein a flow rate of the first capillary tube is smaller than that of the second capillary tube, the first cooling system comprises the evaporator and the first capillary tube, the second cooling and circulating system comprises the evaporator and the second capillary tube, and starting of the first and second capillary tubes is alternated by the control valves according to a humidity condition in the dry article chamber.

[0012] As a further improvement of the present invention, the refrigerator further comprises a controller, which is electrically connected to the control valves and controls the alternative starting of the first and second capillary tubes according to the humidity condition in the dry article chamber.

[0013] As a yet further improvement of the present invention, the refrigerator further comprises a cooling compartment connected with the refrigerating output passage, wherein the refrigerating output passage comprises a main passage connected with the cold chamber and a first sub-passage and a second sub-passage that are bifurcated from the main passage and respectively connect the dry article chamber and the cooling compartment.

[0014] As a yet further improvement of the present invention, the cooling compartment comprises one or a combination of a refrigerating compartment, a freezing compartment, and a changing-temperature compartment.

[0015] As a yet further improvement of the present invention, the refrigerator further comprises a freezing

compartment cooled by the first cooling and circulating system, and a refrigerating compartment cooled by the second cooling and circulating system, wherein the second cooling and circulating system comprises a refrigerating evaporator, the refrigerating compartment and the freezing compartment are formed by foam layer clapboards respectively, the dry article chamber is arranged inside the refrigerating compartment, and the refrigerating output passage extends from the cold chamber, passes through the foam layer clapboards and communicates with the dry article chamber, or extends from the cold chamber to a foam layer at a side portion of the freezing compartment, and communicates with the dry article chamber from a side portion of the dry article chamber.

[0016] As a yet further improvement of the present invention, the refrigerator further comprises a return air passage communicating with the dry article chamber, wherein the return air passage passes downwards and through the foam layer clapboards and returns exchanging air in the dry article chamber to the freezing compartment or extends from a side or rear portion of the freezing compartment and directly communicates with the cold chamber; and one side of the return air passage is provided with a return air door.

[0017] As a yet further improvement of the present invention, the opening time of the refrigerating output passage is determined by the following steps:

S1: acquiring an absolute humidity ρ_1 in the dry article chamber and an absolute humidity ρ_2 in the cold chamber; and

S2: if the absolute humidity ρ_1 is higher than the absolute humidity ρ_2 , opening the refrigerating output passage;

or the opening time of the refrigerating output passage is determined by the following steps:

S1': acquiring a dew point temperature in the dry article chamber and a temperature in the cold chamber; and

S2': when the temperature in the cold chamber is lower than the dew point temperature in the dry article chamber, opening the refrigerating output passage;

or the opening time of the refrigerating output passage is determined by the following steps:

S1'': acquiring a temperature W_1 in the dry article chamber; and

S2'': comparing the acquired temperature W_1 in the dry article chamber with a preset temperature range D_0 in the dry article chamber of the refrigerator; if the acquired temperature W_1 in the dry article cham-

ber is higher than the preset temperature range D_0 , opening the refrigerating output passage.

[0018] As a yet further improvement of the present invention, one side of the refrigerating output passage is provided with an air door for opening the refrigerating output passage.

[0019] As a yet further improvement of the present invention, the dry article chamber is provided with a humidity sensor for detecting a relative humidity in the dry article chamber and/or a temperature sensor for detecting a temperature therein.

[0020] The present invention can produce the following advantageous effect. By using the first and second cooling and circulating systems, and by communicating the dry article chamber with the cold chamber of the first cooling and circulating system whose evaporating temperature is relatively low, the absolute humidity of the air entering the dry article chamber is much lower, realizing a lower absolute humidity in the dry article chamber.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021]

Fig. 1 is a partial schematic view of a refrigerator according to an embodiment of the present invention;

Fig. 2 shows a curve of the RH in the dry article chamber relative to time when using capillary tubes of different diameters; and

Fig. 3 is a partial schematic view of a refrigerator according to another embodiment of the present invention.

DETAILED DESCRIPTION

[0022] Referring to Fig. 1, a refrigerator provided by an embodiment of the present invention comprises a refrigerating compartment 11, a freezing compartment, a changing-temperature compartment, cooling and circulating systems in which a coolant circulates respectively, and a controller. Generally, the refrigerating compartment 11, the freezing compartment and the changing-temperature compartment are called cooling compartments collectively. A dry article chamber 12 is arranged in the refrigerating compartment 11 whose standard temperature therein is 0-10 degrees, for example, 6-8 degrees in general. A temperature in the dry article chamber 12 is lower than that in the refrigerating compartment 11, and is 3-5 degrees in general. The dry article chamber 12 is provided with a first temperature sensor (not shown) for detecting a temperature in the dry article chamber 12 and a first humidity sensor (not shown) for detecting a relative humidity in the dry article chamber, and the first temperature sensor and the first humidity sensor are

electrically connected with the controller. The cooling and circulating systems comprise a condenser, a compressor, an evaporator 13 and capillary tubes. The evaporator 13 is arranged inside a cold chamber 14 arranged at a rear side of the cooling compartment. A second temperature sensor (not shown) for detecting a temperature in the cold chamber 14 and a second humidity sensor (not shown) for detecting a relative humidity in the cold chamber are arranged in the cold chamber 14, and are electrically connected with the controller. The dry article chamber 12 is communicated with the cold chamber 14 and the refrigerating compartment 11 through a refrigerating output passage 15 comprising a main passage 151 connected with the cold chamber 14 and a first sub-passage 152 and a second sub-passage 153, which are bifurcated from the main passage 151 and respectively connect the dry article chamber 12 and the cooling compartment 11. The capillary tubes comprise a first capillary tube 161 and a second capillary tube 162 that are connected in parallel and to the evaporator 13, wherein a flow rate of the first capillary tube 161 is smaller than that of the second capillary tube 162, and the flow rate of the second capillary tube 162 is the same as that of a capillary tube used in an existing refrigerator. The condenser, the compressor, the evaporator 13 and the first capillary tube 161 form the first cooling and circulating system; and the condenser, the compressor, the evaporator 13 and the first capillary tube 161 form the second cooling and circulating system. When the refrigerator is in a normal cooling state, the second capillary tube 162 is switched on (i.e., the second cooling and circulating system is switched on), so that the coolant flows into the evaporator 13 through the second capillary tube 162.

[0023] In a cooling and circulating process, based on a throttling action of the capillary tube, a liquid coolant in a high-temperature and high-pressure state is depressurized to a saturated gaseous coolant in a low-temperature and low-pressure state. In case of a fixed volume, if the pressure becomes lower, the temperature becomes lower according to a gas pressure and temperature proportional relationship. Therefore, after the throttling through the capillary tube, the greater the reduction of the pressure of the coolant is, the lower the temperature of the coolant is. In other words, if the flow rate of the capillary tube becomes smaller, the pressure reduction of the coolant becomes greater and the temperature of the coolant becomes lower after throttling. As the two capillary tubes (namely, the first capillary tube 161 and the second capillary tube 162) form the double cooling and circulating systems (i.e., the first and second cooling and circulating systems), when the second capillary tube 162 is switched on, the flow rate of the coolant is relatively greater, the pressure reduction of the coolant depressurized by the second capillary tube 162 is not obvious, and an evaporating temperature is relatively higher; when the first capillary tube 161 is switched on, the flow rate of the coolant is relatively smaller, the pressure reduction of the coolant is obvious, and the evaporating temperature is relatively

lower.

[0024] When dehumidifying and drying are needed, the first capillary tube 161 is switched on, and the coolant flows into the evaporator 13 through the first capillary tube 161, so that the evaporating temperature becomes lower, and correspondingly, an absolute humidity of air in the cold chamber 14 becomes lower. After the dehumidifying is completed, the second capillary tube 162 is switched on, and the coolant flows into the evaporator 13 through the second capillary tube 162, so that the cooling temperature of the evaporator 13 is maintained at a normal temperature range of the refrigerating compartment. That is, the temperature is raised so as to reduce the absolute humidity.

[0025] Control valves 18 are arranged on the first capillary tube 161 and the second capillary tube 162 respectively. The controller is electrically connected to the solenoid valves 8, and is used for alternating the starting of the first capillary tube 161 and the second capillary tube 162 according to a humidity condition in the dry article chamber 12. In the present embodiment, the controller determines the humidity condition in the dry article chamber through data detected by the first humidity sensor in the dry article chamber 12, so as to determine whether to alternate the starting of the first capillary tube 161 and the second capillary tube 162.

[0026] A lower side of the evaporator 13 is provided with a fan 19 arranged in the cold chamber 14. One sides of the first sub-passage 152 and the second sub-passage 153 are respectively provided with a first air door 171 and a second air door 172. The first sub-passage 152 and the second sub-passage 153 can be respectively opened by opening the first air door 171 and the second air door 172. The opening of the first air door 171 and the second air door 172 is controlled by the controller. The second sub-passage 153 is always in an open state while the cooling systems are in operation or is in the open state only when the second capillary tube 61 is opened. The first sub-passage 152 is opened either when the first capillary tube 161 tube is opened or after the first capillary tube 161 is opened. The opening time of the first sub-passage 152 may be a time that is preset in the refrigerator and later than a time for opening the first capillary tube 161, and the preset time is obtained after a plurality of tests. Alternatively, the opening time of the first sub-passage 152 is determined by the following steps:

S1: acquiring an absolute humidity p_1 in the dry article chamber 12 and an absolute humidity p_2 in the cold chamber 14; and

S2: if the absolute humidity p_1 is higher than the absolute humidity p_2 , opening the first sub-passage 152.

[0027] The particular implementation mode of step S1 is as follows: the controller in the refrigerator receives and processes the temperature detected by the first tem-

perature sensor and the relative humidity detected by the first humidity sensor to obtain the absolute humidity p_1 , and receives and processes the temperature detected by the second temperature sensor and the relative humidity detected by the second humidity sensor to obtain the absolute humidity p_2 .

[0028] When the relative humidity in the cold chamber 14 is 100%, or condensation occurs to the evaporator 13, the particular implementation of step S1 may be as follows: the controller in the refrigerator receives and processes the temperature detected by the first temperature sensor and the relative humidity detected by the first humidity sensor to obtain the absolute humidity p_1 , and receives and processes the temperature detected by the second temperature sensor to obtain the absolute humidity p_2 . Here, it is not necessary to use the second humidity sensor to detect the relative humidity.

[0029] Since it is difficult to measure the absolute humidity in the refrigerator, the temperature can be used as a standard in specific control. Here, the opening time of the second sub-passage 52 is determined by the following steps:

S1': acquiring a dew point temperature in the dry article chamber 12 and a temperature in the cold chamber 14 through the following manner: the controller in the refrigerator receives and processes the temperature detected by the first temperature sensor in the dry article chamber 12 and the relative humidity detected by the first humidity sensor in the dry article chamber to obtain the dew point temperature, and the temperature in the cold chamber 14 is detected by the second temperature sensor therein, wherein the dew point temperature is acquired by inquiring a wet air enthalpy-humidity diagram preset in the controller, and is particularly acquired by the controller by calculating and inquiring the temperature detected by the first temperature sensor and the relative humidity detected by the first humidity sensor; and S2': when the temperature in the cold chamber 14 is lower than the dew point temperature in the dry article chamber 12, opening the first sub-passage 152.

[0030] In addition to the above two manners for determining the opening time of the second sub-passage 52, the opening time of the second sub-passage 52 may be determined by the following steps:

S1'': acquiring a temperature W1 in the dry article chamber 12; and

S2'': comparing the acquired temperature W1 in the dry article chamber 12 with a preset temperature range D0 in the dry article chamber of the refrigerator; if the acquired temperature W1 in the dry article chamber 12 is higher than the preset temperature range D0, opening the refrigerating output passage.

[0031] Referring to Fig. 2, the capillary tube for forming a curve 1 is the first capillary 161, and the capillary tube for forming a curve 2 is the second capillary tube 162. It can be seen from Fig. 2 that the dehumidifying effect reflected by the curve 2 is superior to that reflected by the curve 1.

[0032] In the above embodiment, the refrigerating output passage 15 is arranged among the refrigerating chamber 14, the dry article chamber 12 and the refrigerating compartment 11, and the fan 19 is arranged on one side of the evaporator 13. However, in other embodiments, the refrigerating output passage 15 is arranged among the cold chamber 14, the dry article chamber 12 and other cooling compartments, and the fan 19 is also arranged on the evaporator 13. Here, the first sub-passage 152 is connected with the main passage 151 and the dry article chamber 12, and the second sub-passage 153 is connected with the main passage 151 and other cooling compartments which may include a freezing compartment.

[0033] In the present embodiment, the dual systems are realized by the first capillary tube 161 and the second capillary tube 162, which have different flow rates and are connected to the evaporator 13 respectively. As the controller is electrically connected to the solenoid valves 8 and alternates the starting of the first capillary tube 161 and the second capillary tube 162 according to the humidity condition in the dry article chamber 12, when the first capillary tube 161 with a smaller flow rate is switched on, the absolute humidity of air in the cold chamber 14 is reduced to enable a lower evaporating temperature, and the absolute humidity of the air entering the dry article chambers 12 becomes much lower, realizing a better dehumidifying effect.

[0034] Referring to Fig. 3, a refrigerator provided by another embodiment of the present invention comprises a refrigerating compartment 21, a freezing compartment 22, a changing-temperature compartment, and first and second cooling and circulating systems in which a coolant circulates respectively. The refrigerating compartment 21 and the freezing compartment 22 are formed by foam layer clapboards 27 respectively. A dry article chamber 23 is arranged in the refrigerating compartment 21. In the present embodiment, the dry article chamber 23 nestles up against the foam layer clapboards 27. A standard temperature in the refrigerating compartment 21 is 0-10 degrees, for example, 6-8 degrees in general. A temperature in the dry article chamber 23 is lower than that in the refrigerating compartment 21, and is 3-5 degrees in general. An evaporating temperature of the first cooling and circulating system is lower than that of the second circulating system. The first cooling and circulating system comprises a freezing evaporator 241, a condenser, a capillary tube and a compressor, and the second cooling and circulating system comprises a refrigerating evaporator 242, a condenser, a capillary tube and a compressor. A rear side of the freezing compartment 22 is provided with a first cold chamber 251, a rear side

of the refrigerating compartment 21 is provided with a second cold chamber 252; and the freezing evaporator 241 is arranged in the first cold chamber 251, and the refrigerating evaporator 242 is arranged in the second cold chamber 252. A humidity sensor for detecting a relative humidity in the dry article chamber 23 and/or a temperature sensor for detecting a temperature in the dry article chamber 23 are/is arranged in the dry article chamber 23.

[0035] The first cold chamber 251 is communicated with the dry article chamber 23 through a first refrigerating output passage 26, which extends from the first cold chamber 251 to a position below the foam layer clapboards 27 and upwardly passes through the foam layer clapboards 27, so as to communicate with the dry article chamber 23 from the lower portion of the dry article chamber 23. One side of the first refrigerating output passage 26 is provided with an air door 28 for controlling the opening or closing of the first refrigerating output passage 26. Of course, in other embodiments, the first refrigerating output passage may extend from the first cold chamber 251 to a foam layer at a side portion of the freezing compartment 22 and upwardly extend to a side portion of the dry article chamber 23, so as to communicate with the dry article chamber 23 from a side portion of the dry article chamber 23, without passing through the foam layer clapboards 27.

[0036] Further, in the present embodiment, a return air passage 271, which is formed between the dry article chamber 23 and the freezing compartment 22, passes through the foam layer clapboards 27 and returns exchanging air in the dry article chamber 23 to the freezing compartment 22. One side of the return air passage 271 is provided with a return air door 272. Of course, the return air passage 271 may not pass through the foam layer clapboards 27, and may be an independent return air passage, which is independently arranged at a side portion or a rear portion of the refrigerator and directly communicated with the first cold chamber 251.

[0037] In addition, in the present embodiment, there is no direct passage for communicating the first cold chamber 251 with the freezing compartment 22 to supply refrigerating output to the freezing compartment 22. Of course, in actual design, the first refrigerating output passage may comprise a main passage connected with the first cold chamber 251, and a first sub-passage and a second sub-passage, which are bifurcated from the main passage and respectively connect the dry article chamber 23 and the freezing compartment 22. The structure of the first sub-passage can be the same as that of the above-mentioned first refrigerating output passage 26 which passes through the foam layer clapboards 27 or is arranged at a side portion of the freezing compartment 22. The second cold chamber 252 is communicated with the refrigerating compartment 21 through a second refrigerating output passage 29.

[0038] In the present embodiment, the dual cooling systems (the first cooling and circulating system and the

second cooling and circulating system) are implemented by two evaporators (a freezing evaporator 241 and a refrigerating evaporator 242), and the first refrigerating output passage communicates the first cold chamber 251 provided with freezing evaporator 241 with the dry article chamber 23. Therefore, the freezing evaporator 241 with a lower temperature is used to cool and dehumidify the exchanging air in the dry article chamber 23, enabling a lower absolute humidity of air entering the dry article chamber 23 and realizing a better dehumidifying effect.

[0039] In the present embodiment, to make the AH of the air entering the dry article chamber 23 even lower, the opening time of the refrigerating output passage may be determined by the following steps:

S1: acquiring an absolute humidity p_1 in the dry article chamber and an absolute humidity p_2 in the cold chamber; and

S2: if the absolute humidity p_1 is higher than the absolute humidity p_2 , opening the refrigerating output passage;

or the opening time of the refrigerating output passage may be determined by the following steps:

S1': acquiring a dew point temperature in the dry article chamber and a temperature in the cold chamber; and

S2': when the temperature in the cold chamber is lower than the dew point temperature in the dry article chamber, opening the refrigerating output passage;

or the opening time of the refrigerating output passage may be determined by the following steps:

S1'': acquiring a temperature W_1 in the dry article chamber; and

S2'': comparing the acquired temperature W_1 in the dry article chamber with a preset temperature range D_0 in the dry article chamber of the refrigerator; if the acquired temperature W_1 in the dry article chamber is higher than the preset temperature range D_0 , opening the refrigerating output passage.

[0040] To sum up, by using the first and second cooling and circulating systems, and by communicating the dry article chambers 12, 23 with the cold chambers 14, 251 of the first cooling and circulating system whose evaporating temperature is relatively low, the absolute humidity of the air entering the dry article chambers 12, 23 is much lower, realizing lower absolute humidity in the dry article chambers 12, 23.

[0041] Although the preferred embodiments of the present invention are disclosed for illustration purposes,

those skilled in the art may realize that various improvements, supplements and substitutions are possible without departing from the scope and spirit of the present invention as disclosed by the appended claims.

Claims

1. A refrigerator comprising a dry article chamber and a cold chamber, **characterised in that** the refrigerator further comprising a first cooling and circulating system and a second cooling and circulating system in which a coolant circulates respectively, **characterised in that** wherein an evaporating temperature of the first cooling and circulating system is lower than that of the second cooling and circulating system, the first cooling and circulating system comprises an evaporator arranged inside the cold chamber, and a refrigerating output passage is arranged between the cold chamber and the dry article chamber.
2. The refrigerator of claim 1, further comprising: a first capillary tube and a second capillary tube that are connected in parallel and to the evaporator, and control valves respectively arranged on the first and second capillary tubes, wherein a flow rate of the first capillary tube is smaller than that of the second capillary tube, the first cooling system comprises the evaporator and the first capillary tube, the second cooling and circulating system comprises the evaporator and the second capillary tube, and starting of the first and second capillary tubes is alternated by the control valves according to a humidity condition in the dry article chamber.
3. The refrigerator of claim 2, further comprising: a controller, which is electrically connected to the control valves and controls the alternative starting of the first and second capillary tubes according to the humidity condition in the dry article chamber.
4. The refrigerator of claim 2, further comprising: a cooling compartment connected with the refrigerating output passage, wherein the refrigerating output passage comprises a main passage connected with the cold chamber and a first sub-passage and a second sub-passage that are bifurcated from the main passage and respectively connect the dry article chamber and the cooling compartment.
5. The refrigerator of claim 4, wherein the cooling compartment comprises one or a combination of a refrigerating compartment, a freezing compartment, and a changing-temperature compartment.
6. The refrigerator of claim 1, further comprising: a freezing compartment cooled by the first cooling and circulating system, and a refrigerating compartment

cooled by the second cooling and circulating system, wherein the second cooling and circulating system comprises a refrigerating evaporator, the refrigerating compartment and the freezing compartment are formed by foam layer clapboards respectively, the dry article chamber is arranged inside the refrigerating compartment, and the refrigerating output passage extends from the cold chamber, passes through the foam layer clapboards and communicates with the dry article chamber, or extends from the cold chamber to a foam layer at a side portion of the freezing compartment, and communicates with the dry article chamber from a side portion of the dry article chamber.

7. The refrigerator of claim 6, further comprising: a return air passage communicating with the dry article chamber, wherein the return air passage passes downwards and through the foam layer clapboards and returns exchanging air in the dry article chamber to the freezing compartment or extends from a side or rear portion of the freezing compartment and directly communicates with the cold chamber; and one side of the return air passage is provided with a return air door.
8. The refrigerator of claim 1, wherein the opening time of the refrigerating output passage is determined by the following steps:

S1: acquiring an absolute humidity ρ_1 in the dry article chamber and an absolute humidity p_2 in the cold chamber; and
S2: if the absolute humidity ρ_1 is higher than the absolute humidity p_2 , opening the refrigerating output passage;

or the opening time of the refrigerating output passage is determined by the following steps:

S1': acquiring a dew point temperature in the dry article chamber and a temperature in the cold chamber; and
S2': when the temperature in the cold chamber is lower than the dew point temperature in the dry article chamber, opening the refrigerating output passage;

or the opening time of the refrigerating output passage is determined by the following steps:

S1'': acquiring a temperature W_1 in the dry article chamber; and
S2'': comparing the acquired temperature W_1 in the dry article chamber with a preset temperature range D_0 in the dry article chamber of the refrigerator; if the acquired temperature W_1 in the dry article chamber is higher than the preset

temperature range D0, opening the refrigerating output passage.

9. The refrigerator of claim 1, wherein one side of the refrigerating output passage is provided with an air door for opening the refrigerating output passage. 5
10. The refrigerator of claim 1, wherein the dry article chamber is provided with a humidity sensor for detecting a relative humidity in the dry article chamber and/or a temperature sensor for detecting a temperature therein. 10

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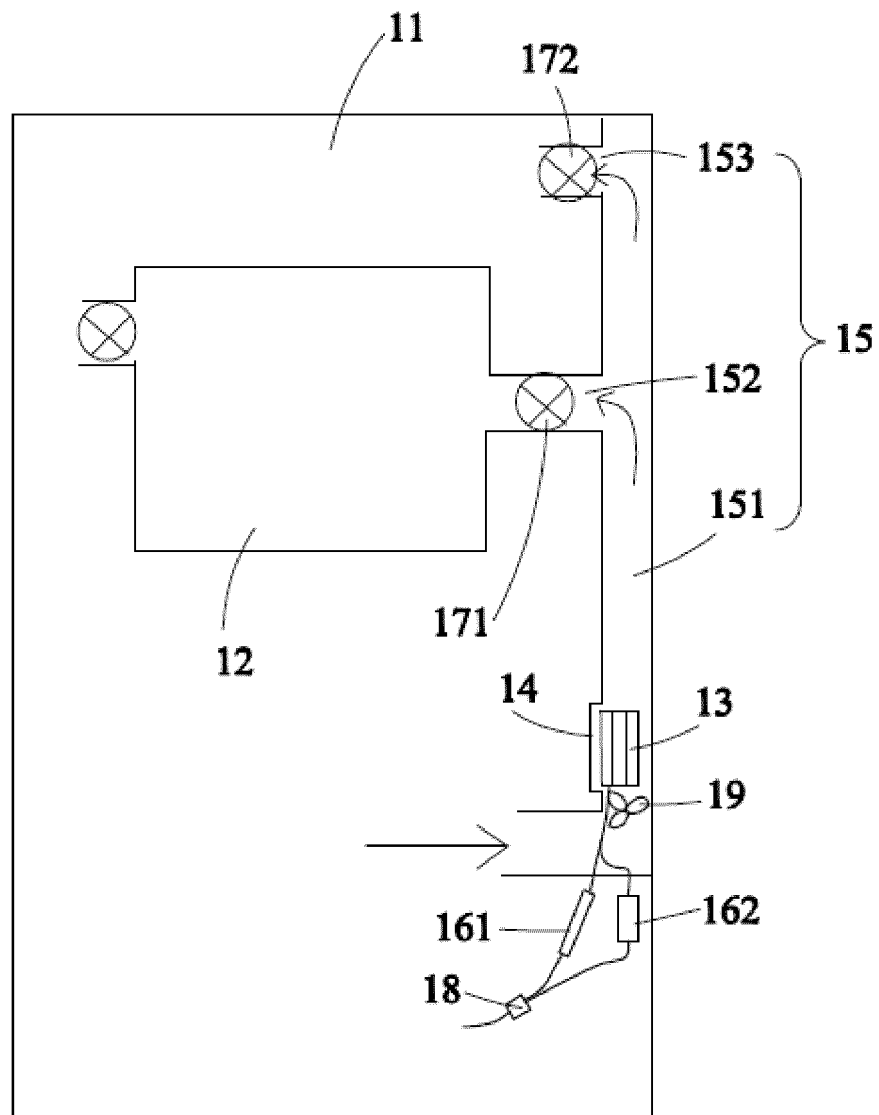


Fig. 1

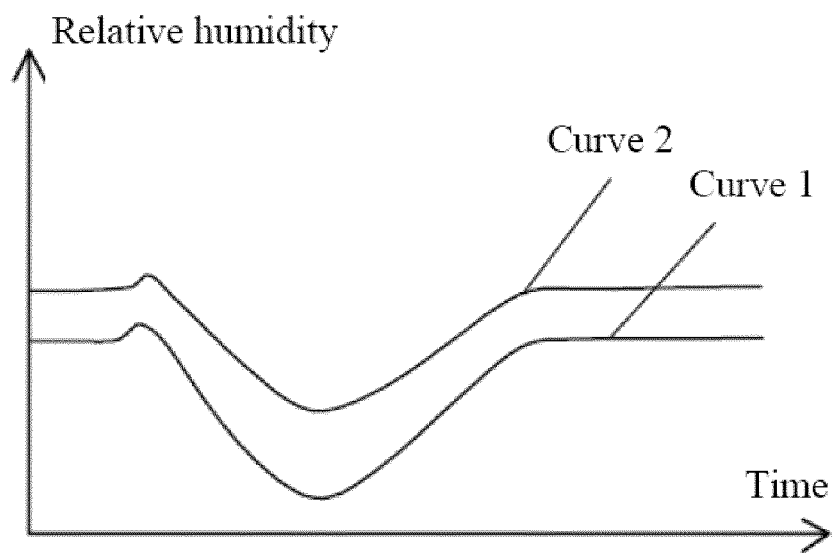


Fig. 2

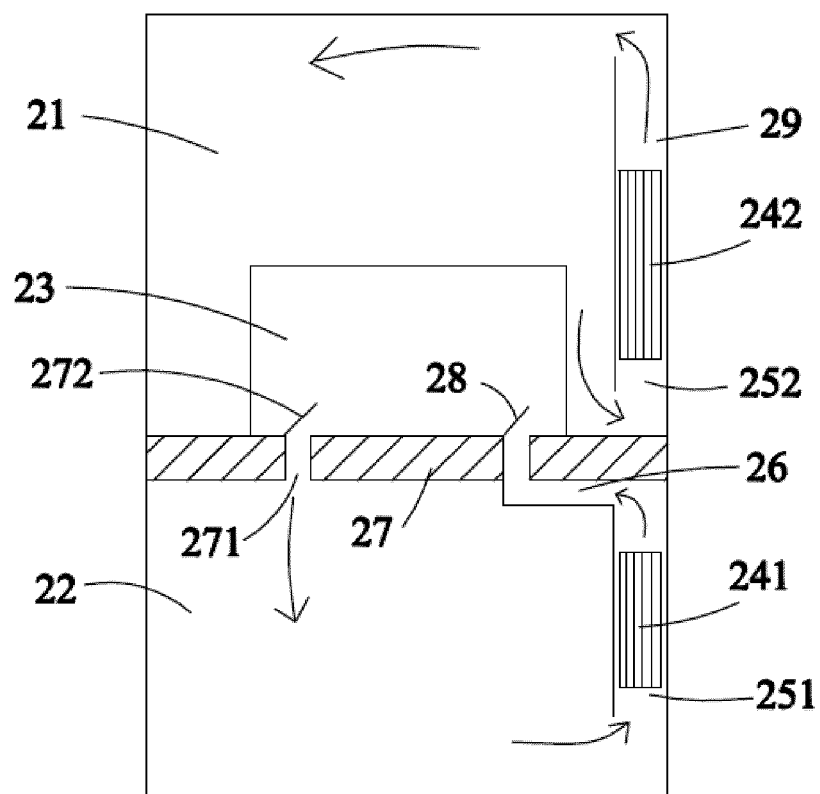


Fig. 3

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2014/092416

A. CLASSIFICATION OF SUBJECT MATTER

F25D 11/02 (2006.01) i; F25D 29/00 (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)

F25D

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)

WPI, EPODOC, CNTXT, CNKI: refrigerat+, dry, dehumidif+, room, chamber, compartment, humidity, switch, shift

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	CN 203190740 U (MATSUSHITA ELECTRIC IND CO., LTD.) 11 September 2013 (11.09.2013) description, paragraphs [0036]-[0095], [0103]-[0108], and figures 8 and 13	1, 9, 10
Y	CN 101266094 A (MATSUSHITA ELECTRIC IND CO., LTD.) 17 September 2008 (17.09.2008) description, first embodiment, and figures 1 and 2	1, 9, 10
A	CN 1553128 A (BOXIHUA HOUSEHOLD ELECTRICAL APPLIANCES) 08 December 2004 (08.12.2004) the whole document	1-10

☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

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"A" document defining the general state of the art which is not considered to be of particular relevance	"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
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Date of the actual completion of the international search 20 May 2015	Date of mailing of the international search report 02 June 2015
Name and mailing address of the ISA/CN State Intellectual Property Office of the P. R. China No. 6, Xitucheng Road, Jimenqiao Haidian District, Beijing 100088, China Facsimile No. (86-10) 62019451	Authorized officer ZHANG, Lihong Telephone No. (86-10) 62085509

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2014/092416

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