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# (54) REFRIGERATOR

(57) A refrigerator, comprising a refrigerator body and a door body. The front side of the refrigerator body is open to define a first chamber; the door body comprises a main door and an auxiliary door; the main door is used for opening and closing the first chamber and defining a second chamber; the auxiliary door is used for opening and closing the second chamber; an air supply port and a return air vent are formed on the rear wall of the main door; the air supply port and the return air vent both are communicated with the first chamber and the second chamber; the rear wall is hollow, and a dew removal air channel communicated with the first chamber is defined in the rear wall; and a plurality of dew removal holes communicated with the second chamber and the dew removal air channel are backwards formed on the front surface of the rear wall. The refrigerator is configured to: be in a cooling cycle mode that air in the first chamber enters the second chamber by means of the air supply port and then returns to the first chamber by means of the return air vent; or be in a dew removal mode that air in the first chamber enters the dew removal air channel to enable part of an air flow to flow to the front surface of the rear wall by means of the dew removal holes so as to remove condensed dew on the surface of the rear wall. The refrigerator of the present invention can effectively remove the condensed dew on the inner walls of the chambers of the door body.

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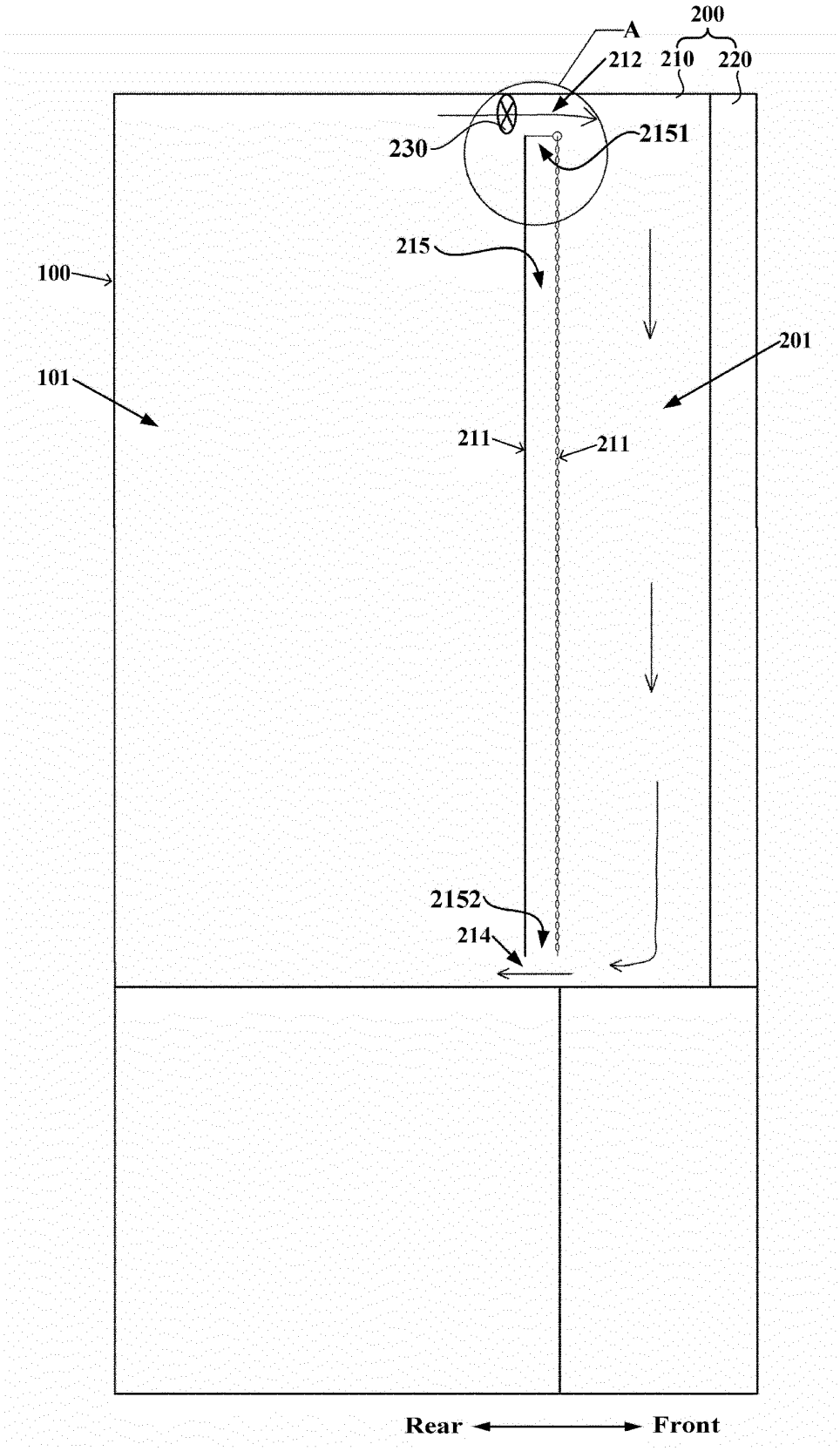
200
A
212
210
220
230
2151
215
100
201
101
211
211
2152
214
Rear
Front

Fig. 1

## Description

### FIELD OF THE INVENTION

**[0001]** The present invention relates to the technical field of refrigeration and freezing, and in particular to a refrigerator.

### BACKGROUND OF THE INVENTION

**[0002]** With the advancement of technology and the improvement of people's living standards, users have higher and higher requirements for refrigerators. The traditional refrigerators with only a refrigerating room, a freezing room and a temperature-variable room can no longer meet users' diverse needs for storage space.

**[0003]** In recent years, a composite door body technology has emerged in the field of refrigerators. As is well-known to all, a traditional refrigerator door body is used to open and close a refrigeration chamber of a refrigeration body. At most, a bottle holder is disposed at an inner lining of the refrigerator door body for placing bottled articles. As for the refrigerator with the composite door body, the structure and functions of the door body are improved, which makes the door body include a main door and a secondary door, and enables the main door to be used for opening and closing the refrigeration chamber. In addition, the main door defines a door body chamber with an open front side, and the secondary door is used to open and close the door body chamber. The secondary door remains closed during rotation of the main door. The door body chamber can be used for placement of stored articles, and only the secondary door needs to be opened when taking and placing the stored articles, without opening the main door. It not only makes the operation more convenient and faster, but also avoids excessive cold energy loss caused by frequent opening of the main door.

**[0004]** However, during the operation of the refrigerator with a composite door, the phenomenon of condensation often occurs on inner walls of the door body chamber, which affects the user experience and hinders the further development of the composite door technology. Therefore, how to reduce or avoid the condensation on the inner walls of the door body chamber has also become a technical problem to be solved urgently in this field.

### BRIEF DESCRIPTION OF THE INVENTION

**[0005]** An object of the present invention is to overcome at least one of the above-mentioned defects existing in the prior art, and provide a refrigerator capable of effectively removing condensed dew on inner walls of a door body chamber.

**[0006]** A further object of the present invention is to reduce the influence of removing the condensed dew on the normal refrigeration for the door body chamber.

**[0007]** In particular, the present invention provides a refrigerator, including a refrigerator body and a door body, where a front side of the refrigerator body is open to define a first chamber; the door body includes a main door and a secondary door; the main door is used for opening and closing the first chamber and defining a second chamber, the secondary door is used for opening and closing the second chamber, and

an air supply port and an air return port are formed in a rear wall of the main door and both communicated with the first chamber and the second chamber; the rear wall is hollow, a dew removal air duct communicated with the first chamber is defined in the rear wall, and a plurality of dew removal holes communicated with the second chamber and the dew removal air duct are backwards formed on a front surface of the rear wall; and the refrigerator is configured to be:

in a cooling cycle mode that air in the first chamber is allowed to enter the second chamber through the air supply port, and then return to the first chamber through the air return port; or

in a dew removal mode that the air in the first chamber is allowed to enter the dew removal air duct, so that part of an air flow flows to the front surface of the rear wall through the dew removal holes, to remove condensed dew on the surface of the rear wall.

**[0008]** Optionally, the dew removal air duct is provided with an inlet and an outlet which are communicated with the first chamber; and the refrigerator is configured to make the inlet and the outlet in a closed state and an open state respectively when in the cooling cycle mode; or make the inlet and the outlet both in the open state when in the dew removal mode.

**[0009]** Optionally, the inlet penetrates a side wall of the air supply port to communicate with the air supply port.

**[0010]** Optionally, the outlet penetrates a side wall of the air return port to communicate with the air return port.

**[0011]** Optionally, the air supply port and the air return port are located at a top and a bottom of the rear wall, respectively.

**[0012]** Optionally, the refrigerator further includes: a damper, installed at the air supply port and configured to controllably move to a cooling state in which the inlet is closed and the air supply port is turned on, or move to a dew removal state in which the inlet is opened and the air supply port is closed.

**[0013]** Optionally, one end of the damper is rotatably installed on a front edge of the inlet to be rotated to the cooling state or the dew removal state.

**[0014]** Optionally, the refrigerator further includes: a fan, installed at the air supply port to promote the air in the first chamber to flow toward the air supply port.

**[0015]** Optionally, in a direction from the air supply port to the air return port, the arrangement density of the dew removal holes gradually decreases.

**[0016]** Optionally, the dew removal holes are long strip

holes whose length direction is parallel to the airflow direction of the dew removal air duct.

**[0017]** The refrigerator provided by the present invention is a refrigerator with a composite door. The door body includes the main door and the secondary door, where the main door is used for opening and closing the first chamber defined by the refrigerator body, and the secondary door is used for opening and closing the second chamber defined by the main door. The present invention can effectively remove the condensed dew on an inner wall of the second chamber by means of a special design of the main door. Specifically, the present invention particularly makes the rear wall of the main door be hollow to define the dew removal air duct, and allows a plurality of dew removal holes to be backwards formed on the front surface of the rear wall. When the second chamber needs to be refrigerated normally, the refrigerator runs in the cooling cycle mode, so that the air in the first chamber normally enters the second chamber through the air supply port to refrigerate the second chamber. When condensation occurs on a rear wall face of the second chamber (that is, the front surface of the rear wall of the main door) and dew removal needs to be performed, the refrigerator runs in the dew removal mode, so that the air in the first chamber enters the dew removal air duct inside the rear wall of the main door, and part of the air flow is thus enabled to flow to the front surface of the rear wall through the dew removal holes. The relative humidity of the air in the dew removal air duct is inevitably lower than that of the original air flow at the front surface of the rear wall of the main door (the relative humidity of the air near the condensed dew is inevitably very high), so introduction of the low-humidity air of the dew removal air duct can promote the evaporation of the condensed dew.

**[0018]** In addition, when the refrigerator provided by the present invention runs in the dew removal mode, it does not employ the traditional methods such as electrically heating the rear wall or introducing hot air, but utilizes the cold air of the first chamber to remove dew, and the dew removal process basically does not affect the normal refrigeration for the second chamber, so that the structural design is very ingenious.

**[0019]** Further, according to the refrigerator provided by the present invention, the dew removal air duct is allowed to have the inlet and the outlet, so that an air path circulation is formed between the dew removal air duct and the first chamber, which avoids the influence on the dew removal effect caused by the failure in circulation of the dew removal air flow accumulating in the dew removal air duct and near the dew removal holes.

**[0020]** Further, according to the refrigerator provided by the present invention, the inlet of the dew removal air duct is communicated with the air supply port, and the outlet is communicated with the air return port, which simplifies the control of the air inlet and outlet on the one hand, and can use the damper to control the opening and closing of the air supply port and the inlet, so that the structure is very ingenious; and on the other hand, a perforated structure of the rear wall of the main door is also simplified, and a rear surface of the rear wall of the main door only needs to be directly provided with the air supply port and the air return port.

**[0021]** Further, it is recognized that the closer to the air supply port, the more condensation will occur on the rear wall of the main door, and the closer to the air return port, the less condensation will occur. Therefore, the present invention designs the arrangement density of the dew removal holes, and gradually reduces the arrangement density of the dew removal holes in the direction from the air supply port to the air return port, so as to match the variation trend of the condensation degrees at different positions of the rear wall of the main door, and avoid reserving too many meaningless holes.

**[0022]** The above and other objectives, advantages, and features of the present invention will be better understood by those skilled in the art according to the following detailed description of specific embodiments of the present invention in conjunction with the accompanying drawings.

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0023]** In the following part, some specific embodiments of the present invention will be described in detail in an exemplary rather than limited manner with reference to the accompanying drawings. The same reference numerals in the accompanying drawings indicate the same or similar components or parts. Those skilled in the art should understand that these accompanying drawings are not necessarily drawn to scale. In figures:

FIG. 1 is a schematic diagram of a refrigerator according to an embodiment of the present invention in a cooling cycle mode;

FIG. 2 is an enlarged view at A in FIG. 1;

FIG. 3 is a schematic diagram of a state of the refrigerator shown in FIG. 1 when in a dew removal mode; and

FIG. 4 is an enlarged view at B in FIG. 3.

## DETAILED DESCRIPTION

**[0024]** A refrigerator according to an embodiment of the present invention will be described below with reference to FIGS. 1 to 4. The orientations or positional relationships indicated by 'front', 'rear', 'upper', 'lower', 'top', 'bottom', 'inside', 'outside', 'transverse', etc. are based on the orientations or positional relationships shown in the accompanying drawings, only for the convenience of describing the present invention and simplifying the description, rather than indicating or implying that a device or an element referred to must has a particular orientation, and be constructed and operated in a particular orientation, and therefore cannot be construed as a limitation of the present invention.

**[0025]** FIG. 1 is a schematic diagram of a refrigerator

according to an embodiment of the present invention in a cooling cycle mode; FIG. 2 is an enlarged view at A in FIG. 1; FIG. 3 is a schematic diagram of a state of the refrigerator shown in FIG. 1 when in a dew removal mode; and FIG. 4 is an enlarged view at B in FIG. 3, and air directions are indicated by arrows in the figures.

**[0026]** As shown in FIGS. 1 to 4, the refrigerator according to the embodiment of the present invention may generally include a refrigerator body 100 and a door body 200. A front side (the side where the door body 200 is located is used as the front side of the refrigerator provided by the present invention, and the front and rear directions have been shown in the figures) of the refrigerator body 100 is open to define a first chamber 101. The door body 200 includes a main door 210 and a secondary door 220, where the main door 210 is used for opening and closing the first chamber 101, and defining a second chamber 201, and the secondary door 220 is used for opening and closing the second chamber 201.

**[0027]** The main door 210 can be rotatably installed on the refrigerator body 100 at the front side of the refrigerator body 100, a front side of the main door 210 is open to define the aforementioned second chamber 201, and the secondary door 220 can be rotatably installed on the main body 210 at the front side of the main door 210. When the main door 210 is opened, a user accesses articles from the first chamber 101. When the main door 210 is closed and the secondary door 220 is opened, the user can access articles from the second chamber 201.

**[0028]** The refrigerator can be refrigerated by a vapor compression refrigeration cycle system, a semiconductor refrigeration system or other means. According to different refrigeration temperatures, all chambers inside the refrigerator can be divided into a refrigerating room, a freezing room and a temperature-variable room. For example, the temperature in the refrigerating room is generally controlled within a range of 2°C to 10°C, preferably 4°C to 7°C. The temperature range in the freezing room is generally controlled at -22°C to -14°C. The temperature-variable room can be adjusted within a temperature range of -18°C to 8°C to achieve a variable temperature effect. Different types of articles are different in optimal storage temperatures and storage chambers suitable for storage. For example, fruit and vegetable foods are suitable for storage in the refrigerating room, and meat foods are suitable for storage in the freezing room. The first chamber 101 in the embodiment of the present invention is preferably a refrigerating room.

**[0029]** The refrigerator in the embodiment of the present invention is a refrigerator with a composite door, and the existing refrigerator with the composite door often has the problem of condensation on inner walls of a door body chamber (the second chamber 201 in the present invention). The inventor has realized that since a rear wall 211 of the main door 210 is adjacent to the first chamber 101, and it can transfer heat with the air in the first chamber 101 through thermal conduction, the temperature of a front surface of the rear wall 211 is lower than those of other wall surfaces of the second chamber 101, and condensation is more likely to occur.

**[0030]** Based on the above understanding, the embodiment of the present invention specifically designs the main door 210 to remove the dew on the front surface of the rear wall 211 of the second chamber 201 in a targeted manner. Specifically, an air supply port 212 and an air return port 214 are formed in the rear wall 211 of the main door 210 and both communicated with the first chamber 101 and the second chamber 201. Furthermore, the rear wall 211 of the main door 210 is hollow, and a dew removal air duct 215 communicated with the first chamber 101 is defined in the rear wall 211. That is, the hollow space of the rear wall 211 constitutes the dew removal air duct 215. A plurality of dew removal holes 2154 communicated with the second chamber 201 and the dew removal air duct 215 are backwards formed on the front surface of the rear wall 211. The refrigerator is configured to be: in a cooling cycle mode that the air in the first chamber 101 is allowed to enter the second chamber 201 through the air supply port 212, and then return to the first chamber 101 through the air return port 214 so as to utilize the cold air of the first chamber 101 to refrigerate the second chamber 201, as shown in FIGS. 1 and 2; or in a dew removal mode that the air in the first chamber 101 is allowed to enter the dew removal air duct 215, so that part of an air flow flows to the front surface of the rear wall 211 through the dew removal holes 2154, to remove condensed dew on the surface of the rear wall 211, as shown in FIGS. 3 and 4.

**[0031]** In the embodiment of the present invention, the refrigerator is in the aforementioned cooling cycle mode under normal conditions. However, when there is more condensed dew on the front surface of the rear wall 211 of the main door 210 after the introduction of wet air due to the door opening and closing operation or the placement of high-humidity stored articles, the refrigerator can be controlled to operate the aforementioned dew removal mode to make the air in the first chamber 101 enter the dew removal air duct 215 inside the rear wall 211 of the main door 210, so that part of the air flow flows to the front surface of the rear wall 211 through the dew removal holes 2154. Since the relative humidity of the air in the dew removal air duct 215 is inevitably lower than that of the original air flow at the front surface of the rear wall 211 of the main door 210 (the relative humidity of the air near the condensed dew is inevitably very high), the introduction of the low-humidity air of the dew removal air duct 215 can promote the evaporation of the condensed dew, and the dew removal process is accordingly completed. When the dew is removed, the refrigerator can be controlled to switch to the cooling cycle mode.

**[0032]** The switching timing of the cooling cycle mode and the dew removal mode can be automatically controlled by the refrigerator, and for example, timing switching or automatic switching of the refrigerator running mode according to a detection result of a humidity sensor. It can also be controlled manually, and for example, when

a user finds that dew removal is required or needs to be stopped, the refrigerator running mode can be manually switched.

**[0033]** When the refrigerator provided by the present invention runs in the dew removal mode, it does not employ the traditional methods such as electrically heating the rear wall 211 or introducing hot air, but utilizes the cold air of the first chamber 101 to remove dew, and the dew removal process basically does not affect the normal refrigeration for the second chamber 201, so that the structural design is very ingenious.

**[0034]** In some embodiments, as shown in FIGS. 1 and 3, the dew removal air duct 215 is allowed to have an inlet 2151 and an outlet 2152 which are communicated with the first chamber 101, so that an air path circulation is formed between the dew removal air duct 215 and the first chamber 101, which avoids the influence on the dew removal effect caused by the failure in circulation of the dew removal air flow accumulating in the dew removal air duct 215 and near the dew removal holes 2154. In addition, the refrigerator is configured to make the inlet 2151 and the outlet 2152 in a closed state and an open state respectively when in the cooling cycle mode; or make the inlet 2151 and the outlet 2152 both in the open state when in the dew removal mode. In other words, when in the cooling cycle mode, only the inlet 2151 of the dew removal air duct 215 needs to be closed. When in the dew removal mode, the inlet 2151 of the dew removal air duct 215 is opened. Since the circulation and closure of the dew removal air duct 215 have been controlled by controlling the opening and closing of the inlet 2151 and outlet 2152 of the dew removal air duct 215, it is unnecessary to control the outlet 2152 of the dew removal air duct 215. In both modes, the outlet 2152 of the dew removal air duct 215 is in a normally open state and does not need to be controlled, which simplifies the structure and control of the refrigerator.

**[0035]** In some embodiments, as shown in FIGS. 1 and 3, the inlet 2151 of the dew removal air duct 215 may be allowed to penetrate a side wall of the air supply port 212 to communicate with the air supply port 212. That is, the dew removal air duct 215 is communicated with the first chamber 101 via the air supply port 212, and there is no need for an additional opening on the rear wall 211. The outlet 2152 of the dew removal air duct 215 may also be allowed to penetrate a side wall of the air return port 214 to communicate with the air return port 214. That is, the dew removal air duct 215 is communicated with the first chamber 101 via the air return port 214, and there is no need for an additional opening on the rear wall 211. This design structure is very ingenious, which simplifies a perforated structure of the rear wall 211 of the main door 210, so that a rear surface of the rear wall 211 of the main door 210 only needs to be directly provided with the air supply port 212 and the air return port 214.

**[0036]** In some embodiments, as shown in FIGS. 1 and 3, the air supply port 212 and the air return port 214 are located at a top and a bottom of the rear wall 211, respectively. When the refrigerator is in the cooling cycle mode, after flowing into the second chamber 201 from the air supply port 212, the cold air has a sinking effect due to its relatively high density, and will flow downward to refrigerate all areas with different heights in the second chamber 201 in turn; and after the air temperature gradually rises, the cold air flows back to the first chamber 101 from the air return port 214 at the bottom of the second chamber 201. In this way, a smoother air path circulation is formed, and the refrigeration effect on the second chamber 201 is improved. When the refrigerator is in the dew removal mode, the cold air enters the dew removal air duct 215 from the top of the dew removal air duct 215, which is also more favorable for flowing downward, ensures that the dew removal air duct 215 has better circulation, and helps speed up the dew removal process.

**[0037]** As shown in FIGS. 2 and 4, the refrigerator may further include a damper 216; and the damper 216 is installed at the air supply port 212 and is configured to controllably move to a cooling state (as shown in FIG. 2) in which the inlet 2151 is closed and the air supply port 212 is turned on, or move to a dew removal state (as shown in FIG. 4) in which the inlet 2151 is opened and the air supply port 212 is closed. The embodiment effectively utilizes the advantage that the inlet 2151 is communicated with the air supply port 212, and uses the damper 216 to control the air supply port 212 and the inlet 2151 at the same time, which simplifies the control of the air in and out, so that the design is very ingenious.

**[0038]** Specifically, as shown in FIGS. 2 and 4, one end of the damper 216 is rotatably installed on a front edge of the inlet 2151 to be rotated to the cooling state (as shown in FIG. 2) or the dew removal state (as shown in FIG. 4). In the embodiment of the present invention, the switching of the refrigerator running mode can be completed only by controlling the rotation of the damper 216 without setting a complex motion mechanism and control logic, so that the structure and control are greatly simplified.

**[0039]** In some embodiments, as shown in FIGS. 1 and 4, the refrigerator further includes a fan 230, and the fan 230 is positioned at the air supply port 212 to promote the air in the first chamber 101 to flow toward the air supply port 212, thus accelerating a cooling cycle speed. Of course, for the solution in which the inlet 2151 is communicated with the air supply port 212, the fan 230 is also used to promote the air in the first chamber 101 to flow to the dew removal air duct 215.

**[0040]** The inventor realized that the closer to the air supply port 212, the more condensation will occur on the rear wall 211 of the main door 210, and the closer to the air return port 214, the less condensation will occur. Therefore, the embodiment of the present invention specifically designs the arrangement density of the dew removal holes 2154, and gradually reduces the arrangement density of the dew removal holes 2154 in the direction from the air supply port 212 to the air return port 214, so as to match the variation trend of the condensation

degrees at different positions of the rear wall 211 of the main door 210, and avoid reserving too many meaningless holes. The perforated area of the rear wall 211 of the main door 210 can be spread over the entire front surface of the rear wall 211 to achieve full dew removal, or it can be spread over part of the front surface of the rear wall 211. The perforating percentage of the dew removal holes 2154 can be 30%-80%. The dew removal holes 2154 may be arranged in a matrix manner or other manners. The dew removal holes 2154 may be circular, elliptical, square or other shaped. Preferably, the dew removal holes 2154 are long strip holes whose length direction is parallel to the airflow direction of the dew removal air duct 215. The structure is conducive to destroying the integrity of dewdrops, thus speeding up the dispersion and evaporation of the dewdrops.

**[0041]** Hereto, those skilled in the art should realize that although a plurality of exemplary embodiments of the present invention have been shown and described in detail herein, without departing from the spirit and scope of the present invention, many other variations or modifications that conform to the principles of the present invention can still be directly determined or deduced from the contents disclosed in the present invention. Therefore, the scope of the present invention should be understood and recognized as covering all these other variations or modifications.

## Claims

**1.** A refrigerator, comprising a refrigerator body and a door body, wherein a front side of the refrigerator body is open to define a first chamber; the door body comprises a main door and a secondary door; the main door is used for opening and closing the first chamber and defining a second chamber, and the secondary door is used for opening and closing the second chamber, wherein
an air supply port and an air return port are formed in a rear wall of the main door and both communicated with the first chamber and the second chamber; the rear wall is hollow, a dew removal air duct communicated with the first chamber is defined in the rear wall, and a plurality of dew removal holes communicated with the second chamber and the dew removal air duct are backwards formed on a front surface of the rear wall; and the refrigerator is configured to be:

in a cooling cycle mode that air in the first chamber is allowed to enter the second chamber through the air supply port, and then return to the first chamber through the air return port; or
in a dew removal mode that the air in the first chamber is allowed to enter the dew removal air duct, so that part of an air flow flows to the front surface of the rear wall through the dew removal holes, to remove condensed dew on the surface of the rear wall.

**2.** The refrigerator according to claim 1, wherein

the dew removal air duct is provided with an inlet and an outlet which are communicated with the first chamber; and
the refrigerator is configured to make the inlet and the outlet in a closed state and an open state respectively when in the cooling cycle mode; or make the inlet and the outlet both in the open state when in the dew removal mode.

**3.** The refrigerator according to claim 2, wherein
the inlet penetrates a side wall of the air supply port to communicate with the air supply port.

**4.** The refrigerator according to claim 3, wherein
the outlet penetrates a side wall of the air return port to communicate with the air return port.

**5.** The refrigerator according to claim 4, wherein
the air supply port and the air return port are located at a top and a bottom of the rear wall, respectively.

**6.** The refrigerator according to claim 5, further comprising:
a damper, installed at the air supply port and configured to controllably move to a cooling state in which the inlet is closed and the air supply port is turned on, or move to a dew removal state in which the inlet is opened and the air supply port is closed.

**7.** The refrigerator according to claim 6, wherein
one end of the damper is rotatably installed on a front edge of the inlet to be rotated to the cooling state or the dew removal state.

**8.** The refrigerator according to claim 1, further comprising:
a fan, installed at the air supply port to promote the air in the first chamber to flow toward the air supply port.

**9.** The refrigerator according to claim 1, wherein
in a direction from the air supply port to the air return port, the arrangement density of the dew removal holes gradually decreases.

**10.** The refrigerator according to claim 1, wherein
the dew removal holes are long strip holes whose length direction is parallel to the airflow direction of the dew removal air duct.

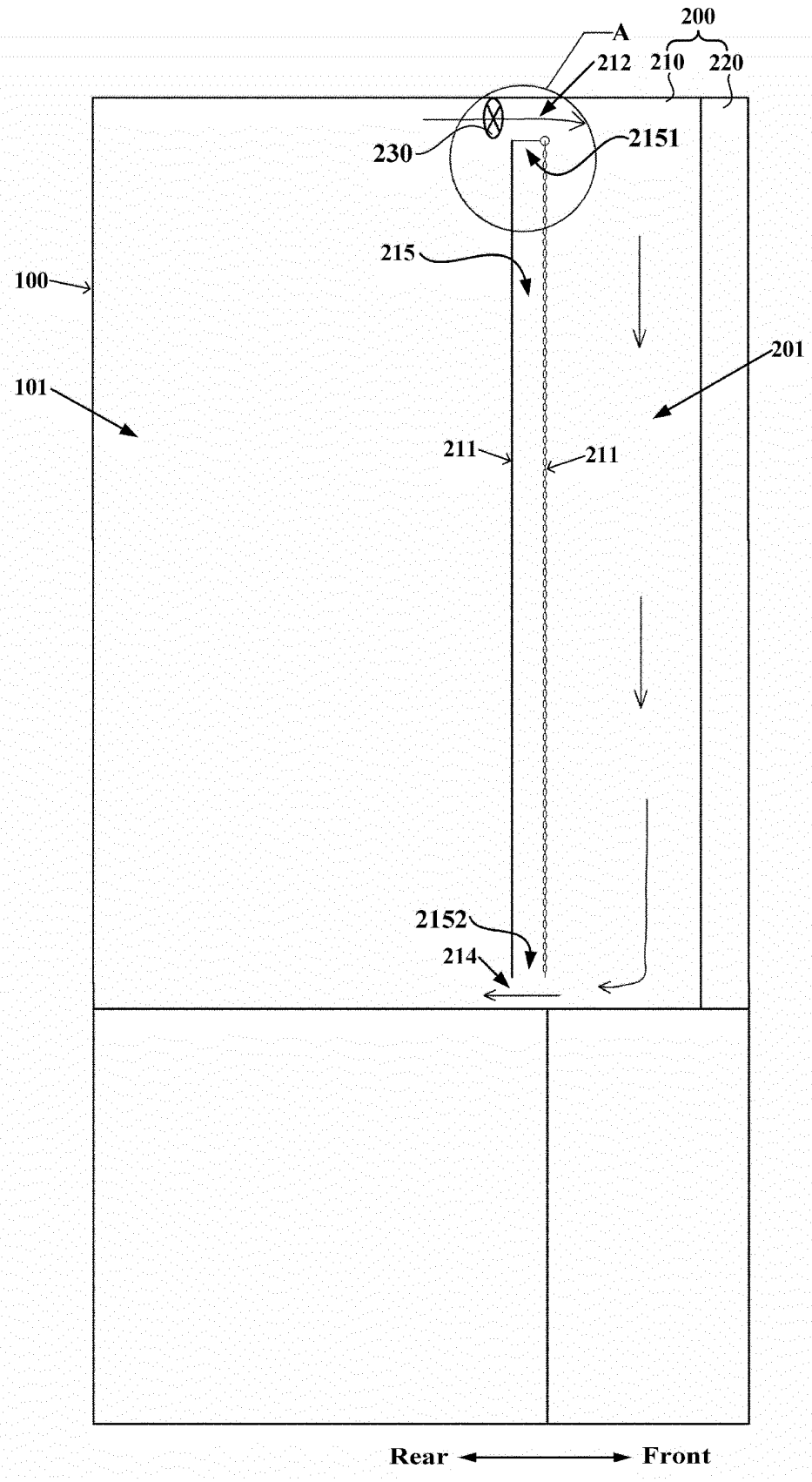
A
200
212
210
220
230
2151
215
100
201
101
211
211
2152
214
Rear
Front

Fig. 1

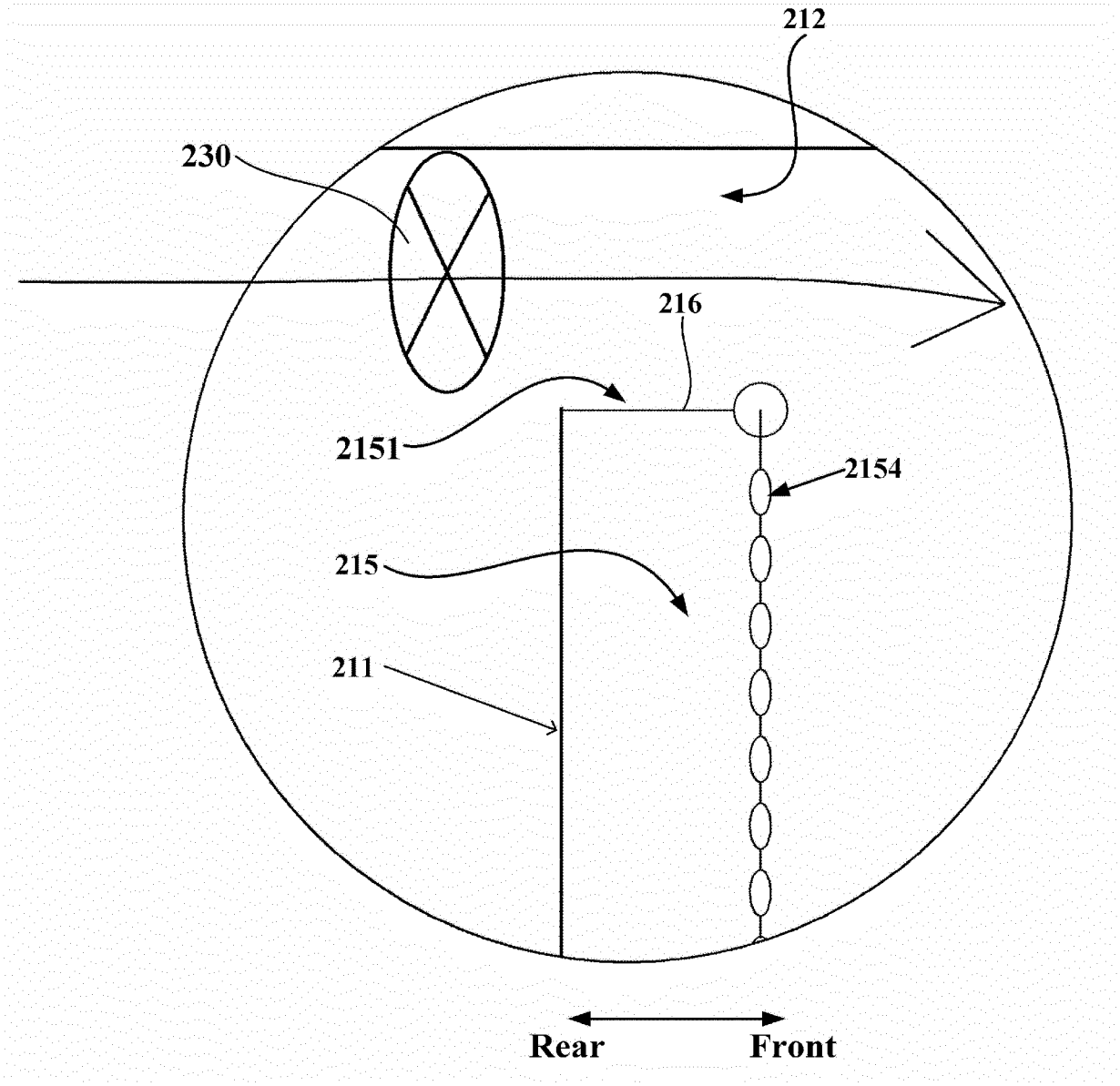


Fig. 2

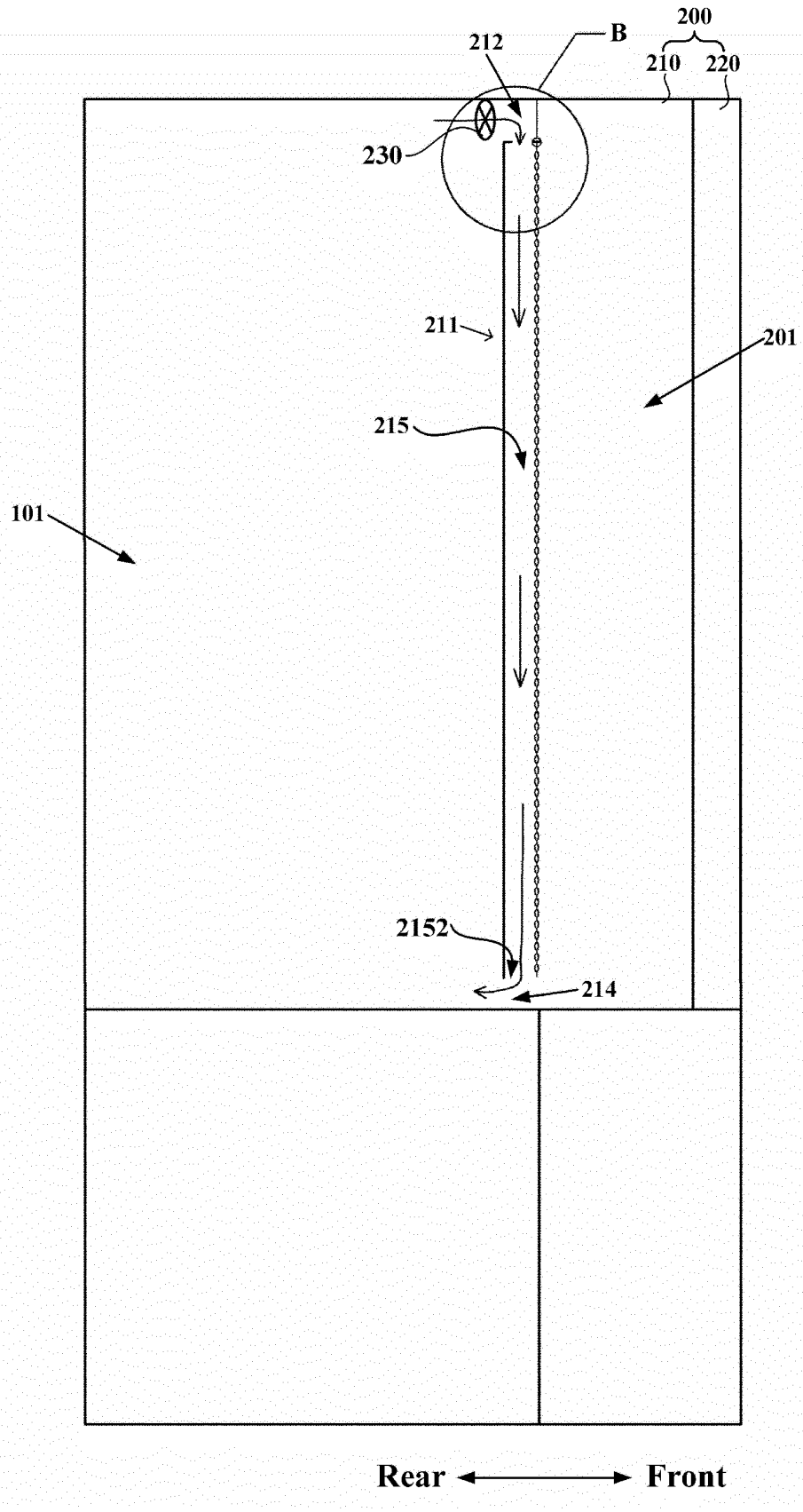


Fig. 3

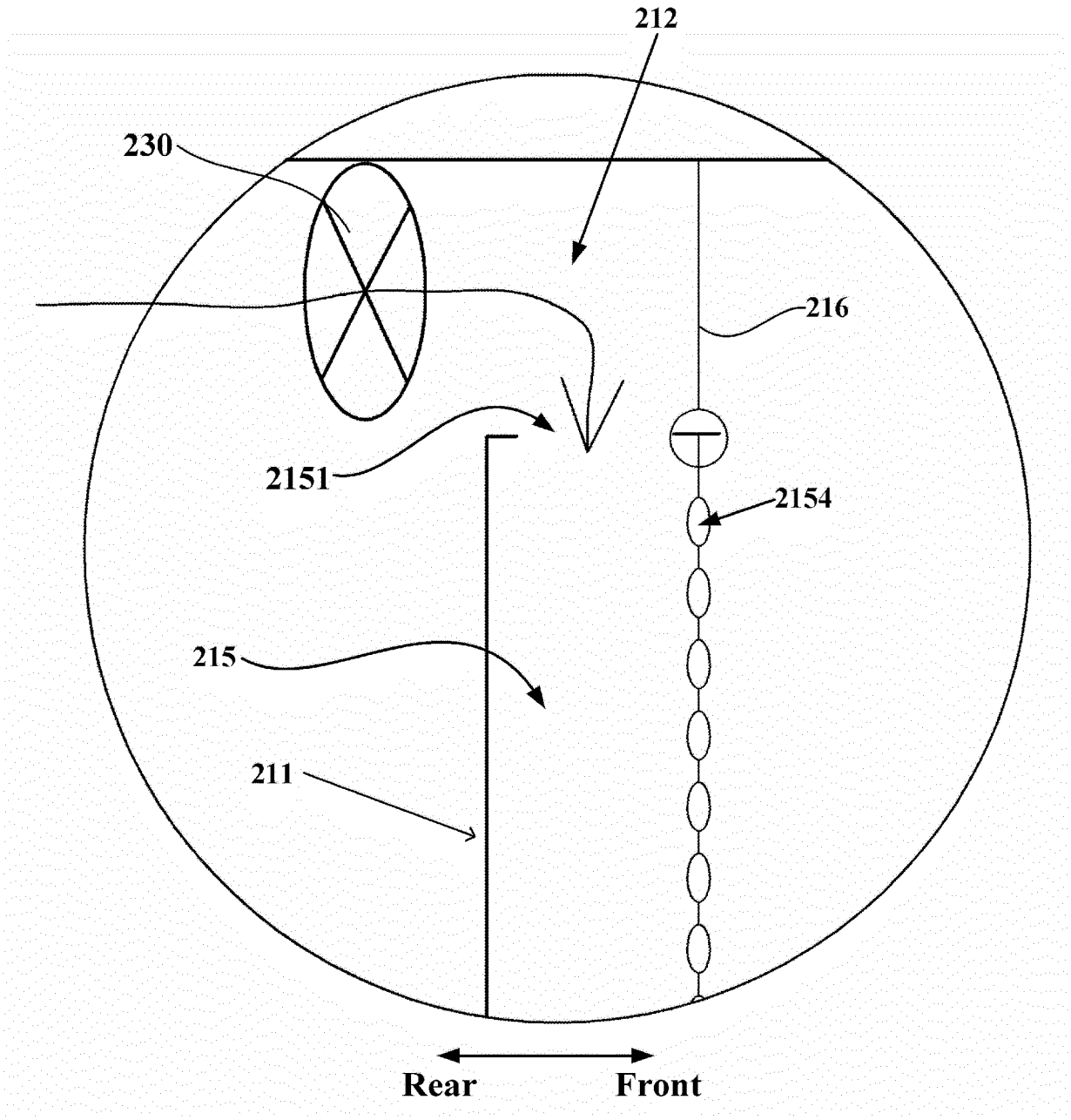


Fig. 4

## INTERNATIONAL SEARCH REPORT

International application No.
**PCT/CN2021/114764**

**A. CLASSIFICATION OF SUBJECT MATTER**

F25D 21/06(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)

F25D21/06，F25D21/00，F25D23/02，F25D29/00

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)

CNABS; VEN; CNTXT; USTXT; CNKI: 海尔, 姬立胜, 吕鹏, 李佳明, 崔展鹏, 冰箱, 外门, 内门, 主门, 副门, 除露, 除霜, 孔, 风道, refrigerator, outer door, inner door, main door, secondary door, dew, condensation, defrost+, hole, duct

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| PX | CN 212378327 U (CHONGQING HAIER REFRIGERATION ELECTRICAL APPLIANCE CO., LTD. et al.) 19 January 2021 (2021-01-19)<br>claims 1-10 | 1-10 |
| PX | CN 213514587 U (QINGDAO HAIER REFRIGERATOR CO., LTD. et al.) 22 June 2021 (2021-06-22)<br>description, paragraphs [0038]-[0061] and figures 1-8 | 1-10 |
| PX | CN 213514585 U (QINGDAO HAIER REFRIGERATOR CO., LTD. et al.) 22 June 2021 (2021-06-22)<br>description, paragraphs [0034]-[0060] and figures 1-7 | 1-10 |
| A | CN 102878746 A (LG ELECTRONICS INC. et al.) 16 January 2013 (2013-01-16)<br>description, paragraphs [0001]-[0083] and figures 1-7 | 1-10 |
| A | CN 202562167 U (HAIER GROUP CORP. et al.) 28 November 2012 (2012-11-28)<br>entire document | 1-10 |
| A | WO 2015172610 A1 (HAIER ASIA INT. CO., LTD. et al.) 19 November 2015 (2015-11-19)<br>entire document | 1-10 |

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

* Special categories of cited documents:
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"&" document member of the same patent family

| Date of the actual completion of the international search | Date of mailing of the international search report |
|---|---|
| **15 October 2021** | **03 November 2021** |
| Name and mailing address of the ISA/CN<br>**China National Intellectual Property Administration (ISA/CN)**<br>**No. 6, Xitucheng Road, Jimenqiao, Haidian District, Beijing 100088**<br>**China**<br>Facsimile No. **(86-10)62019451** | Authorized officer<br>Telephone No. |

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2021/114764

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| A | US 2017248348 A1 (HEFEI MIDEA REFRIGERATOR CO., LTD.) 31 August 2017 (2017-08-31)<br>entire document | 1-10 |

Form PCT/ISA/210 (second sheet) (January 2015)

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

International application No.
**PCT/CN2021/114764**

| Patent document cited in search report | | | Publication date (day/month/year) | Patent family member(s) | | | Publication date (day/month/year) |
|---|---|---|---|---|---|---|---|
| CN | 212378327 | U | 19 January 2021 | None | | | |
| CN | 213514587 | U | 22 June 2021 | None | | | |
| CN | 213514585 | U | 22 June 2021 | None | | | |
| CN | 102878746 | A | 16 January 2013 | KR | 20130009090 | A | 23 January 2013 |
| | | | | KR | 101857654 | B1 | 15 May 2018 |
| | | | | US | 2013014533 | A1 | 17 January 2013 |
| | | | | CN | 102878746 | B | 11 March 2015 |
| | | | | US | 9080808 | B2 | 14 July 2015 |
| CN | 202562167 | U | 28 November 2012 | None | | | |
| WO | 2015172610 | A1 | 19 November 2015 | JP | 6360717 | B2 | 18 July 2018 |
| | | | | JP | 2015218943 | A | 07 December 2015 |
| US | 2017248348 | A1 | 31 August 2017 | CN | 107131700 | A | 05 September 2017 |
| | | | | US | 10240851 | B2 | 26 March 2019 |
| | | | | EP | 3211354 | A3 | 20 September 2017 |
| | | | | EP | 3211354 | A2 | 30 August 2017 |
| | | | | EP | 3211354 | B1 | 24 June 2020 |
| | | | | CN | 107131700 | B | 29 November 2019 |

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