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(54) **REFRIGERATOR**

(57) This application provide refrigerator (100) comprising a cabinet(120), a refrigeration door(112), an ice-making compartment(111); a temperature sensor(150), to detect a temperature information of the ice-making compartment(111); a door state detection module(140); a control module(160), configured to when receives a door opening information, control the refrigeration system(130) to stop supplying cold air to the ice-making compartment(111); when monitoring an opening duration of the refrigeration door(112) exceeds a preset duration, control the refrigeration system(130) to supply cold air to the ice-making compartment(111) and obtain a temperature information collected by the temperature sensor(150), if the temperature of the ice-making compartment(111) decreases, control the refrigeration system(130) to supply or stop supplying cold air to the ice-making compartment(111) based on the temperature of the ice-making compartment(111), otherwise, control the refrigeration system (130) to stop supplying cold air to the ice-making compartment(111).

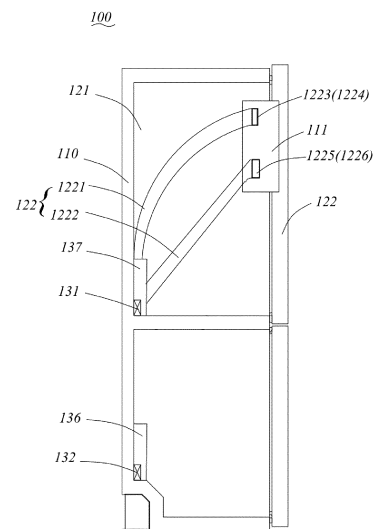


FIG.1

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Description

TECHNICAL FIELD

[0001] The present application refers to home appliance, in particular, a refrigerator control method and a refrigerator.

BACKGROUND

[0002] Currently, in domestic life, refrigerators have become an indispensable household appliance. Some refrigerators have an ice-making compartment provided on the refrigerator door, within which an ice-making device is provided. A refrigeration system is set up on the refrigerator, which can comprise an evaporator for supplying cold air to the ice-making compartment and an ice-making air duct for supplying cold air to the ice-making compartment. The air supply outlet and the return air inlet of the ice-making air duct are generally set on the side wall of the refrigeration compartment. The ice-making compartment is equipped with an air inlet corresponding to the air supply outlet, and an air outlet corresponding to the return air inlet. When the refrigerator door is closed, the air supply outlet matches the air inlet, and the return air inlet matches the air outlet, to supply cold air to the ice-making compartment.

[0003] A detection device is provided on the refrigerator door to detect the opening and closing of the refrigerator door. When the refrigerator door is opened, it controls the refrigeration system to stop supplying cold air to the ice-making compartment, to prevent cold air from entering the interior of the refrigeration compartment through the air supply outlet. However, when it is detected that the door remains open for an extended period, the detected state of the door may be erroneous, making it impossible to determine whether to supply cold air to the ice-making compartment.

SUMMARY

[0004] To address the aforementioned problems, this application provides a refrigerator that activates the refrigeration system to supply cold air to the ice-making compartment when a opening duration of the refrigerator door exceeds a preset duration, and based on a temperature information of the ice-making compartment to determine whether to continue controlling the operation of the refrigeration system.

[0005] The present application provides a refrigerator comprising:

a cabinet, a storage compartment formed within the cabinet comprises a refrigeration compartment and a freezing compartment;
a refrigeration door, mounted on the cabinet for opening and closing the refrigeration compartment;
an ice-making compartment, provided on the refrigeration door;

an evaporator door;

a refrigeration system, comprising an evaporator located a cabinet side;

an evaporator compartment, located on the cabinet side, the evaporator mounted within the evaporator compartment;

an ice-making air duct, communicating with the evaporator compartment, the ice-making air duct comprise an air supply outlet provided on a wall of the refrigeration compartment, an air inlet is provided on a wall of the ice-making compartment, the air inlet corresponding to the air supply outlet, wherein the air supply outlet and the air inlet cooperate when the refrigeration door is closed;

a temperature sensor, placed within the ice-making compartment to detect a temperature information of the ice-making compartment;

a door state detection module, configured to detect an open/close state of the refrigeration door;

a control module, configured to receive the open/close state information send by the door state detection module, and, when the control module receives a door opening information, control the refrigeration system to stop supplying cold air to the ice-making compartment;

characterized in that, the control module is further configured to: when monitoring an opening duration of the refrigeration door exceeds a preset duration, control the refrigeration system to supply cold air to the ice-making compartment and obtain a temperature information collected by the temperature sensor, if the temperature of the ice-making compartment decreases, control the refrigeration system to supply or stop supplying cold air to the ice-making compartment based on the temperature of the ice-making compartment, otherwise, control the refrigeration system to stop supplying cold air to the ice-making compartment.

[0006] As a further improvement of an embodiment of the present application, characterized in that an ice-making air supply fan corresponding to the ice-making air duct is provided in the ice-making air duct or the evaporator compartment; the control module is specifically configured to:

when receiving a door opening information, control the ice-making air supply fan to turn off;

when the opening duration of the refrigeration door exceeds the preset duration, control the ice-making air supply fan to turn on.

[0007] As a further improvement of an embodiment of the present application, characterized in that the control module is specifically configured to:

if the temperature of the ice-making compartment decreases, when monitoring the temperature of the ice-making compartment is higher than a preset startup temperature;

perature, control the refrigeration system to supply cold air to the ice-making compartment, and when the temperature of the ice-making compartment reaches a preset shutdown temperature, control the refrigeration system to stop supplying cold air to the ice-making compartment

[0008] As a further improvement of an embodiment of the present application, characterized in that it further comprises a notification module, and the control module is further configured to, if the temperature of the ice-making compartment decreases, control the notification module to send an alert information regarding a malfunction of the door state detection module.

[0009] As a further improvement of an embodiment of the present application, characterized in that the control module is further configured to:

if the temperature of the ice-making compartment decreases, when receiving a door-closed signal sent by the door state detection module, control the refrigeration system based on the open/close state of the refrigeration door and the temperature information of the ice-making compartment.

[0010] As a further improvement of an embodiment of the present application, characterized in that the control module is further configured to:

if the temperature of the ice-making compartment does not decrease, when receiving a door-closed signal sent by the door state detection module, decide whether to control the refrigeration system to supply cold air to the ice-making compartment based on the temperature of the ice-making compartment.

[0011] As a further improvement of an embodiment of the present application, characterized in that the control module is specifically configured to:

if the degree of temperature decrease in the ice-making compartment within the preset duration is greater than a preset value, control the refrigeration system to supply or stop supplying cold air to the ice-making compartment based on the temperature of the ice-making compartment.

[0012] As a further improvement of an embodiment of the present application, characterized in that the evaporator comprises a cabinet evaporator and an ice-making evaporator, and the evaporator compartment comprises a cabinet evaporator compartment for installing the cabinet evaporator and an ice-making evaporator compartment for installing the ice-making evaporator, the ice-making air duct communicates with the ice-making evaporator compartment and the air supply outlet, and the ice-making air supply fan is installed within the ice-making evaporator compartment.

[0013] As a further improvement of an embodiment of the present application, characterized in that the refrigeration system also comprises a compressor, the compressor is connected to an ice-making refrigerant branch and a cabinet refrigerant branch through a refrigerant valve, the ice-making evaporator is placed within the ice-making refrigerant branch, and the cabinet evaporator is

placed within the cabinet refrigerant branch; the control module is specifically configured to: if the temperature of the ice-making compartment decreases, when the temperature of the ice-making compartment is monitored to be higher than a preset startup temperature, control the refrigerant valve to open the ice-making refrigerant branch and control the ice-making air supply fan to turn on.

[0014] As a further improvement of an embodiment of the present application, characterized in that the cabinet side also provided with a cabinet air duct that communicates the evaporator compartment with the storage compartment, and the ice-making air supply fan is placed within the ice-making air duct.

[0015] The refrigerator provided by this application controls a refrigeration system to supply cold air to an ice-making compartment when it detects that the opening duration of a refrigerator door exceeds a preset duration. It judges the open/close state of the refrigerator door based on changes in the temperature information within the ice-making compartment, thereby controlling the operation of the corresponding refrigeration system for the ice-making compartment. This approach prevents the supply of cold air to the ice-making compartment from reducing the temperature of the refrigeration compartment when the refrigerator door is open. It also avoids errors in the door state detected by the door state detection module of the refrigerator, leading to a prolonged lack of cold air supply to the ice-making compartment when the refrigerator door is closed, causing the ice cubes within to melt and the ice-making device to malfunction.

BRIEF DESCRIPTION OF DRAWINGS

[0016]

Figure 1 shows a schematic diagram of a refrigerator of an embodiment of the present application;
Figure 2 shows a schematic diagram of the refrigerator refrigeration door shown in Figure 1;
Figure 3 shows a schematic diagram of the refrigeration system of the refrigerator shown in Figure 1;
Figure 4 shows a schematic diagram of a refrigerator module of an embodiment of the present invention.

DETAILED DESCRIPTION OF EMBODIMENTS

[0017] To better understand the technical solutions in this application, the following description will elaborate on the technical solutions in the embodiments of this application, in conjunction with the drawings in the embodiments. It is evident that the described embodiments are only a part of the embodiments of this application and not all embodiments. Based on these embodiments of this application, all other embodiments obtained by those skilled in the art without creative efforts should fall within the protection scope of this application.

[0018] Referring to Figures 1 to 4, an embodiment of the application provides a refrigerator 100. The refrigerator 100 comprises a cabinet 120, a storage compartment 121 is formed within the cabinet 120, the storage compartment 121 comprising a refrigeration compartment and a freezing compartment. A refrigeration door 112 is mounted on the cabinet 120 for opening and closing the refrigeration compartment and a freezing door is mounted on the cabinet 120 for the freezing compartment. Additionally, an ice-making compartment 111 is provided on the refrigeration door 112, the ice-making compartment 111 may have an opening on the door liner side. An ice-making door, for opening and closing the ice-making compartment 111, may also be connected to the door liner of the refrigeration door 112. Of course, the opening of the ice-making compartment 111 could also face the door shell side of the refrigeration door 112, where an ice-making door for opening and closing the ice-making compartment 111 could be provided, allowing the ice-making door to be opened without opening the refrigeration door 112.

[0019] An ice-making device may be installed inside the ice-making compartment 111, the ice-making device can comprise an ice maker and an ice storage box. A water supply device for supplying liquid water to the ice maker may also be provided on the refrigerator 100. After the ice maker freezes the liquid water into ice, the ice cubes can be discharged into the ice storage box for storage. A dispenser may also be provided on the refrigeration door 112, the dispenser can communicate with the ice storage box inside the ice-making compartment 111, allowing users to directly retrieve ice cubes from the ice storage box through the dispenser.

[0020] The refrigerator 100 may also comprise a refrigeration system 130, the refrigeration system 130 can supply cold air to the refrigeration compartment, freezing compartment, or ice-making compartment 111. The refrigeration system 130 can comprise a compressor 133, condenser, capillary tube, evaporator, and air supply fan connected in sequence. When the compressor 133 is turned on, the compressor 133 compresses a refrigerant, the refrigerant then flows through the condenser, capillary tube, and evaporator in sequence before returning to the compressor 133 to circulate.

[0021] The refrigeration system 130 can be located on the cabinet 120 side. In this embodiment, the cabinet 120 side is provided with a compressor chamber for installing the compressor 133 and an evaporator compartment for the evaporator. An air supply fan may also be installed in the evaporator compartment, the air supply fan can drive the cold air in the evaporator compartment into the corresponding air duct, and from there into the interior of the corresponding compartment.

[0022] The refrigerator 100 can comprise an ice-making air duct 122, the ice-making air duct 122 can communicate with the evaporator compartment. The ice-making air duct 122 can comprise an ice-making air supply duct 1221 and an ice-making return air duct 1222.

The ice-making air supply duct 1221 can have an air supply outlet 1223 provided on a wall of the refrigeration compartment. An air inlet 1224 corresponding to the air supply outlet 1223 can be provided on a wall of the ice-making compartment 111. The ice-making return air duct 1222 can have a return air outlet 1225 provided on a wall of the refrigeration compartment, an air outlet 1226 corresponding to the return air outlet 1225 can be provided on a wall of the ice-making compartment.

[0023] When the refrigeration door 112 is closed, the air supply outlet 1223 can cooperate with the air inlet 1224, and the return air outlet 1225 cooperate with the air outlet 1226, allowing the cold air from the evaporator compartment to enter the ice-making compartment 111 through the ice-making air supply duct 1221, air supply outlet 1223, and air inlet 1224. The cold air inside the ice-making compartment 111 can then return to the evaporator compartment through the air outlet 1226, return air outlet 1225, and the ice-making return air duct 1222. When the refrigeration door 112 is opened, the cold air can directly enter the refrigeration compartment through the ice-making air supply duct 1221 and air supply outlet 1223. Therefore, when the refrigeration door 112 is opened, it is necessary to turn off the air supply fan corresponding to the ice-making compartment 111 to prevent colder air from entering the interior of the refrigeration compartment.

[0024] In an embodiment of this application, the evaporator may comprise a cabinet evaporator 132 corresponding to the storage compartment 121, and an ice-making evaporator 131 corresponding to the ice-making compartment 111. The evaporator compartment may comprise a cabinet evaporator compartment 136 for installing the cabinet evaporator 132, and an ice-making evaporator compartment 137 for installing the ice-making evaporator 131. Both the cabinet evaporator compartment 136 and the ice-making evaporator compartment 137 are located the cabinet 120 side and are independent of each other. The cabinet evaporator compartment 136 can be connected to the refrigeration and freezing compartments through air ducts, and a cabinet air supply fan installed inside the cabinet evaporator compartment 136 can supply cold air from the cabinet evaporator compartment 136 to the refrigeration or freezing compartments.

[0025] An ice-making air supply fan may be installed inside the ice-making evaporator compartment 137, and the ice-making air duct 122 can connect the air supply outlet on a wall of the refrigeration compartment with the ice-making evaporator compartment 137. The ice-making evaporator 131 and the cabinet evaporator 132 can share the compressor 133, the compressor 133 can be connected to both the ice-making refrigerant branch 134 and the cabinet refrigerant branch 135 via a refrigerant valve 138, placing the ice-making evaporator 131 in the ice-making refrigerant branch 134, and the cabinet evaporator in the cabinet refrigerant branch.

[0026] In this embodiment, the refrigerant valve 138 can be a one-in-two-out valve, where the cabinet refrigerant

erant branch 135 and the ice-making refrigerant branch 134 are connected to the two outlets of the refrigerant valve 138, forming two parallel refrigerant branches. The refrigerant valve 138 can open any branch to allow the refrigerant to flow through the corresponding evaporator. The refrigerant valve 138 can control the direction of refrigerant flow, allowing refrigerant from the compressor to flow through the ice-making refrigerant branch 134 back to the compressor 133, or through the cabinet refrigerant branch 135 back to the compressor 133.

[0027] The refrigerator 100 also provided with a door state detection module 140 and a control module 160. The door state detection module 140 can be used to detect the open/close state of the refrigeration door 112. The door state detection module 140 can be a Hall sensor or a pressure sensor. The door state detection module 140 can send the detected open/close state information of the refrigeration door 112 to the control module 160. A temperature sensor 150 can also be installed inside the ice-making compartment 111 to detect the temperature inside the ice-making compartment 111.

[0028] The control module 160 can be configured to control the operation of the refrigeration system 130. When the control module 160 receives a door opening information from the door state detection module 140, it controls the refrigeration system 130 to stop supplying cold air to the ice-making compartment 111.

[0029] When the door state detection module 140 detects that the refrigeration door 112 is open, if the refrigeration system 130 is currently supplying cold air to the ice-making compartment 111, then the refrigeration system 130 is controlled to stop supplying cold air to the ice-making compartment 111. If the refrigeration system 130 is not supplying cold air to the ice-making compartment 111 at that time, then control continues to stop the refrigeration system 130 from supplying cold air to the ice-making compartment 111.

[0030] This can prevent the colder air from entering the refrigeration compartment while the refrigeration door 112 is open, affecting the temperature and preservation effect inside the refrigeration compartment.

[0031] In this embodiment, the control module 160 is also configured, when monitoring a opening duration of the refrigeration door 112 exceeds a preset duration, control the refrigeration system 130 to supply cold air to the ice-making compartment 111 and obtain a temperature information collected by the temperature sensor 150 inside the ice-making compartment 111. If the temperature inside the ice-making compartment 111 decreases, then it controls the refrigeration system 130 to supply or stop supplying cold air to the ice-making compartment 111 based on the temperature of the ice-making compartment 111; otherwise, it controls the refrigeration system 130 to stop supplying cold air to the ice-making compartment 111.

[0032] In this embodiment, the refrigerator 100 may also be provided with a notification module 170, the notification module 170 could be a voice notification module

170, a display screen, LED lights, a buzzer, etc. When monitoring that the duration for which the refrigeration door 112 of the refrigerator 100 is open exceeds the first preset duration, the notification module 170 can be controlled to issue a door closing reminder. The first preset duration can be less than the preset duration, such as the first preset duration could be 5 minutes, and the preset duration could be 10 minutes. If the refrigeration door 112 of the refrigerator 100 remains open after the notification module 170 issues a door closing reminder, the refrigeration system 130 can be controlled to supply cold air to the ice-making compartment 111. Based on the temperature change within the ice-making compartment 111, it can be determined whether there is an error in the open/close state information detected by the door state detection module 140, for instance, whether the door state detection module 140 is malfunctioning, or whether the door has been closed but not sealed completely, leading to a gap that causes the door state detection module 140 to detect the door as not closed.

[0033] If the temperature within the ice-making compartment 111 decreases, it can be determined that the refrigeration door 112 is in a closed state. In this embodiment, it can be judged whether the degree of temperature decrease in the ice-making compartment 111 within the preset duration exceeds a preset value. If so, it can be determined that the refrigeration door 112 is in a closed state, thus improving the accuracy of the determination.

[0034] If the temperature within the ice-making compartment 111 decreases, the open/close state of the refrigeration door 112 can be disregarded. The refrigeration system 130 can be controlled to supply or not supply cold air to the ice-making compartment 111 based solely on the temperature within the ice-making compartment 111. This prevents a situation where, due to a malfunction of the door state detection module 140, cold air is not supplied to the ice-making compartment 111 for an extended period, leading to an increase in temperature within the ice-making compartment 111, melting of the ice in the storage box, and the inability of the ice-making device to continue making ice.

[0035] Furthermore, in this embodiment of the application, the control module 160 is specifically configured as follows:

when receiving a door opening signal, the ice-making air supply fan is controlled to turn off.

when the opening duration of the refrigeration door 112 exceeds the preset duration, the ice-making air supply fan is controlled to turn on.

[0036] In this embodiment, when a door opening signal is received, if the compressor 133 is in operation and the ice-making refrigerant branch 134 is in a connected state, supplying refrigerant to the corresponding evaporator of the ice-making compartment 111, only the ice-making air supply fan may be turn off without turning off the com-

pressor 133 or cutting off the refrigerant circuit. When the refrigeration door 112 is closed, the ice-making air supply fan can be directly turned on to continue supplying cold air, avoiding frequent switching of the refrigerant circuit. Simultaneously, when it is detected that the opening duration of the refrigeration door 112 exceeds the preset duration, only the ice-making air supply fan may be turned on without opening the corresponding ice-making refrigerant branch 134 of the ice-making compartment 111. Thus, if the refrigeration door 112 is in an open state, it can prevent supplying colder air into the interior of the refrigeration compartment.

[0037] Moreover, if after the refrigeration door 112 opened for the preset duration, the refrigeration system 130 supplies cold air to the ice-making compartment 111 and the temperature of the ice-making compartment 111 does not decrease, if the compressor 133 is in operation and the corresponding ice-making refrigerant branch 134 of the ice-making compartment 111 is open, then the ice-making air supply fan may be turned off, and the corresponding ice-making refrigerant branch 134 of the ice-making compartment 111 may be cut off or the compressor 133 turned off.

[0038] Further, in this embodiment, the control module 160 is specifically configured as follows:

[0039] If the temperature of the ice-making compartment 111 decreases, then when monitoring the temperature of the ice-making compartment 111 is higher than a preset startup temperature, control the refrigeration system 130 to supply cold air to the ice-making compartment 111. When the temperature of the ice-making compartment 111 reaches the preset shutdown temperature, control the refrigeration system 130 to stop supplying cold air to the ice-making compartment 111.

[0040] In this embodiment, if the temperature of the ice-making compartment 111 decreases, the temperature of the ice-making compartment 111 can be monitored in real-time, controlling the refrigeration system 130 to supply or not supply cold air to the ice-making compartment 111 based solely on the temperature within the ice-making compartment 111. When the temperature of the ice-making compartment 111 is higher than the preset startup temperature, indicating a higher temperature in the ice-making compartment 111 and a greater need for cooling for the ice-making compartment 111, and since the cold air will enter the ice-making compartment 111 through the ice-making air duct 122 without affecting the temperature of the refrigeration compartment, the compressor 133, the corresponding refrigerant circuit of the ice-making compartment 111, and the ice-making air supply fan can be turned on to supply cold air to the ice-making compartment 111. When the temperature of the ice-making compartment 111 reaches the preset shutdown temperature, the ice-making air supply fan is turned off, the compressor 133 or the corresponding refrigerant circuit of the ice-making compartment 111 is turned off at the same time, stopping the cooling of the ice-making compartment 111 to ensure the normal operation of the

ice-making device within the ice-making compartment 111.

[0041] Further, in an embodiment of this application, the control module 160 is also configured to:

[0042] If the temperature in the ice-making compartment 111 decreases, control the notification module 170 to send an alert information for a malfunction of the door state detection module 140.

[0043] In this embodiment, an auxiliary door closing mechanism can be installed on the refrigeration door to prevent gaps between the refrigeration door and the cabinet. When the door is slightly open, the auxiliary door closing mechanism can drive the door to close. Therefore, if a decrease in the temperature of the ice-making compartment 111 is detected, it can be determined that the refrigeration door 112 is closed. If the door state detected by the door state detection module 140 does not match the actual door state, it might indicate a malfunction of the door state detection module 140. In this case, users can be prompted to replace it as soon as possible to reduce adverse effects.

[0044] Further, in this embodiment of the application, the control module 160 is also configured to:

[0045] If the temperature of the ice-making compartment 111 decreases, when receiving a door-closed signal sent by the door state detection module 140, control the refrigeration system 130 based on the open/close state of the refrigeration door 112 and the temperature information of the ice-making compartment 111.

[0046] In this embodiment, if the temperature of the ice-making compartment 111 decreases, it can be determined that there is a malfunction of the door state detection module 140, or that the user has not closed the refrigeration door 112 tightly. In such cases, the open/close state of the refrigeration door 112 can be disregarded, and the refrigeration system 130 can be controlled solely based on the temperature information within the ice-making compartment 111. When the door state detection module 140 sends a door-closed signal, indicating a change in the detected door state, it can be determined that the door state detection module 140 has resumed operation. Therefore, the refrigeration system 130 can execute the normal cooling program for the ice-making compartment 111, controlling the refrigeration system 130 based on both the open/close state of the refrigeration door 112 and the temperature information of the ice-making compartment 111. When the refrigeration door 112 is detected to be open, the refrigeration system 130 is controlled to stop supplying cold air to the ice-making compartment 111 to prevent cold air from entering the interior of the refrigeration compartment. When the refrigeration door 112 is detected to be closed, if the temperature inside the ice-making compartment 111 is higher than the preset startup temperature, the refrigeration system 130 is controlled to supply cold air to the ice-making compartment 111, such as turning on the compressor 133, the ice-making air supply fan, and the corresponding refrigerant circuit of the ice-making compart-

ment 111, until the temperature in the ice-making compartment 111 reaches the preset shutdown temperature, at which point the refrigeration system 130 is controlled to stop cooling the ice-making compartment 111, such as turning off the ice-making air supply fan and the corresponding ice-making refrigerant branch 134. If at this time, the storage compartment 121 also does not require cooling, the compressor 133 is also turned off; if the storage compartment 121 requires cooling, the compressor 133 remains on, and the corresponding cabinet refrigerant branch 135 and air supply fan for the storage compartment 121 are turned on to supply cold air inside the cabinet 120.

[0047] If after the refrigeration door 112 opened for the preset duration and the refrigeration system 130 has supplied cold air to the ice-making compartment 111 without a decrease in temperature, it can be determined that the door state detected by the door state detection module 140 corresponding to the refrigeration door 112 is accurate. Then, when the control module 160 receives a door-closed signal from the door state detection module 140, it decides whether to control the refrigeration system 130 to supply cold air to the ice-making compartment 111 based on the temperature of the ice-making compartment 111. Specifically, if the temperature inside the ice-making compartment 111 is higher than the corresponding startup temperature, the compressor 133, the ice-making refrigerant branch 134, and the ice-making air supply fan are turned on to supply cold air to the ice-making compartment 111 until the temperature inside reaches the corresponding shutdown temperature, at which point the ice-making air supply fan and the ice-making refrigerant branch 134 are turned off. If at this time, the storage compartment 121 also does not require cooling, the compressor 133 can be turned off.

[0048] This application also provides another embodiment, mainly distinguished from the previous embodiment in that the freezing compartment and the ice-making compartment 111 can share an evaporator, that is, the evaporator compartment has both an ice-making air duct 122 that communicates with the ice-making compartment 111 and a cabinet air duct that communicates with the storage compartment 121. The evaporator compartment can have an ice-making air supply fan corresponding to the ice-making air duct 122 and a cabinet air supply fan corresponding to the cabinet 120 air duct installed. The ice-making air supply fan can also be placed within the ice-making air duct 122, and whether to supply cold air to the ice-making compartment 111 can be controlled by operating the fan. When the refrigeration door 112 is detected to be open, if at this time both the compressor 133 and the ice-making air supply fan are in operation, the ice-making air supply fan can be turned off, stopping the refrigeration system 130 from supplying cold air to the ice-making compartment 111. When the temperature in the ice-making compartment 111 is detected to decrease and reaches the corresponding startup temperature, the compressor 133 can be turned on, and the

ice-making air supply fan activated. When the temperature in the ice-making compartment 111 reaches the corresponding shutdown temperature, the ice-making air supply fan is turned off. If the storage compartment 121 still requires cooling, keep the compressor 133 and the air supply fan for cabinet 120 turned on to continue supplying cold air inside the storage compartment 121.

[0049] It should be understood that although this specification is described according to embodiments, not every embodiment only comprises an independent technical solution. The narration of this specification is only for clarity, and those skilled in the art should consider the specification as a whole. The technical solutions in the embodiments of the specification can also be appropriately combined to form other embodiments that can be understood by those skilled in the art. The detailed explanation provided for the feasible embodiments of this application is only for specific illustration and not intended to limit the protection scope of this application. Any equivalent embodiment or change made without departing from the spirit of this application should be comprised within the protection scope of this application.

Claims

1. A refrigerator comprising:

a cabinet, a storage compartment formed within the cabinet comprises a refrigeration compartment and a freezing compartment;
a refrigeration door, mounted on the cabinet for opening and closing the refrigeration compartment;
an ice-making compartment, provided on the refrigeration door;
a refrigeration system, comprising an evaporator located a cabinet side;
an evaporator compartment, located on the cabinet side, the evaporator mounted within the evaporator compartment;
an ice-making air duct, communicating with the evaporator compartment, the ice-making air duct comprise an air supply outlet provided on a wall of the refrigeration compartment, an air inlet is provided on a wall of the ice-making compartment, the air inlet corresponding to the air supply outlet, wherein the air supply outlet and the air inlet cooperate when the refrigeration door is closed;
a temperature sensor, placed within the ice-making compartment to detect a temperature information of the ice-making compartment;
a door state detection module, configured to detect an open/close state of the refrigeration door;
a control module, configured to receive the open/close state information send by the door state detection module, and, when the control

- module receives a door opening information, control the refrigeration system to stop supplying cold air to the ice-making compartment; **characterized in that**, the control module is further configured to: when monitoring an opening duration of the refrigeration door exceeds a preset duration, control the refrigeration system to supply cold air to the ice-making compartment and obtain a temperature information collected by the temperature sensor, if the temperature of the ice-making compartment decreases, control the refrigeration system to supply or stop supplying cold air to the ice-making compartment, otherwise, control the refrigeration system to stop supplying cold air to the ice-making compartment.
2. The refrigerator according to claim 1, **characterized in that** an ice-making air supply fan corresponding to the ice-making air duct is provided in the ice-making air duct or the evaporator compartment; the control module is specifically configured to:
- when receiving a door opening information, control the ice-making air supply fan to turn off; when the opening duration of the refrigeration door exceeds the preset duration, control the ice-making air supply fan to turn on.
3. The refrigerator according to claim 1, **characterized in that** the control module is specifically configured to:
- if the temperature of the ice-making compartment decreases, when monitoring the temperature of the ice-making compartment is higher than a preset startup temperature, control the refrigeration system to supply cold air to the ice-making compartment, and when the temperature of the ice-making compartment reaches a preset shutdown temperature, control the refrigeration system to stop supplying cold air to the ice-making compartment.
4. The refrigerator according to claim 1, **characterized in that** it further comprises a notification module, and the control module is further configured to, if the temperature of the ice-making compartment decreases, control the notification module to send an alert information regarding a malfunction of the door state detection module.
5. The refrigerator according to claim 1, **characterized in that** the control module is further configured to: if the temperature of the ice-making compartment decreases, when receiving a door-closed signal sent by the door state detection module, control the refrigeration system based on the open/close state of the refrigeration door and the temperature information of the ice-making compartment.
6. The refrigerator according to claim 1, **characterized in that** the control module is further configured to: if the temperature of the ice-making compartment does not decrease, when receiving a door-closed signal sent by the door state detection module, decide whether to control the refrigeration system to supply cold air to the ice-making compartment based on the temperature of the ice-making compartment.
7. The refrigerator according to claim 1, **characterized in that** the control module is specifically configured to:
- if the degree of temperature decrease in the ice-making compartment within the preset duration is greater than a preset value, control the refrigeration system to supply or stop supplying cold air to the ice-making compartment based on the temperature of the ice-making compartment.
8. The refrigerator according to claim 2, **characterized in that** the evaporator comprises a cabinet evaporator and an ice-making evaporator, and the evaporator compartment comprises a cabinet evaporator compartment for installing the cabinet evaporator and an ice-making evaporator compartment for installing the ice-making evaporator, the ice-making air duct communicates with the ice-making evaporator compartment and the air supply outlet, and the ice-making air supply fan is installed within the ice-making evaporator compartment.
9. The refrigerator according to claim 8, **characterized in that** the refrigeration system also comprises a compressor, the compressor is connected to an ice-making refrigerant branch and a cabinet refrigerant branch through a refrigerant valve, the ice-making evaporator is placed within the ice-making refrigerant branch, and the cabinet evaporator is placed within the cabinet refrigerant branch; the control module is specifically configured to: if the temperature of the ice-making compartment decreases, when the temperature of the ice-making compartment is monitored to be higher than a preset startup temperature, control the refrigerant valve to open the ice-making refrigerant branch and control the ice-making air supply fan to turn on.
10. The refrigerator according to claim 2, **characterized in that** the cabinet side also provided with a cabinet air duct that communicates the evaporator compartment with the storage compartment, and the ice-making air supply fan is placed within the ice-making air duct.

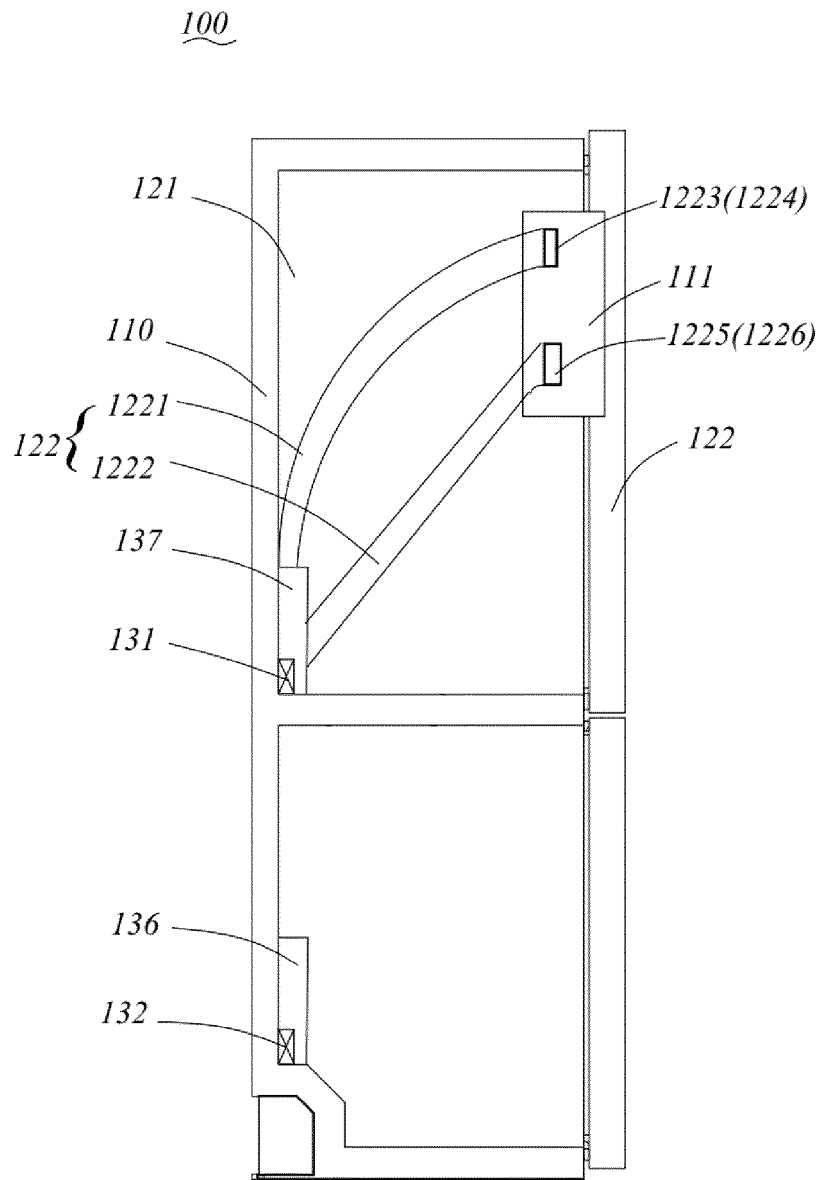


FIG.1

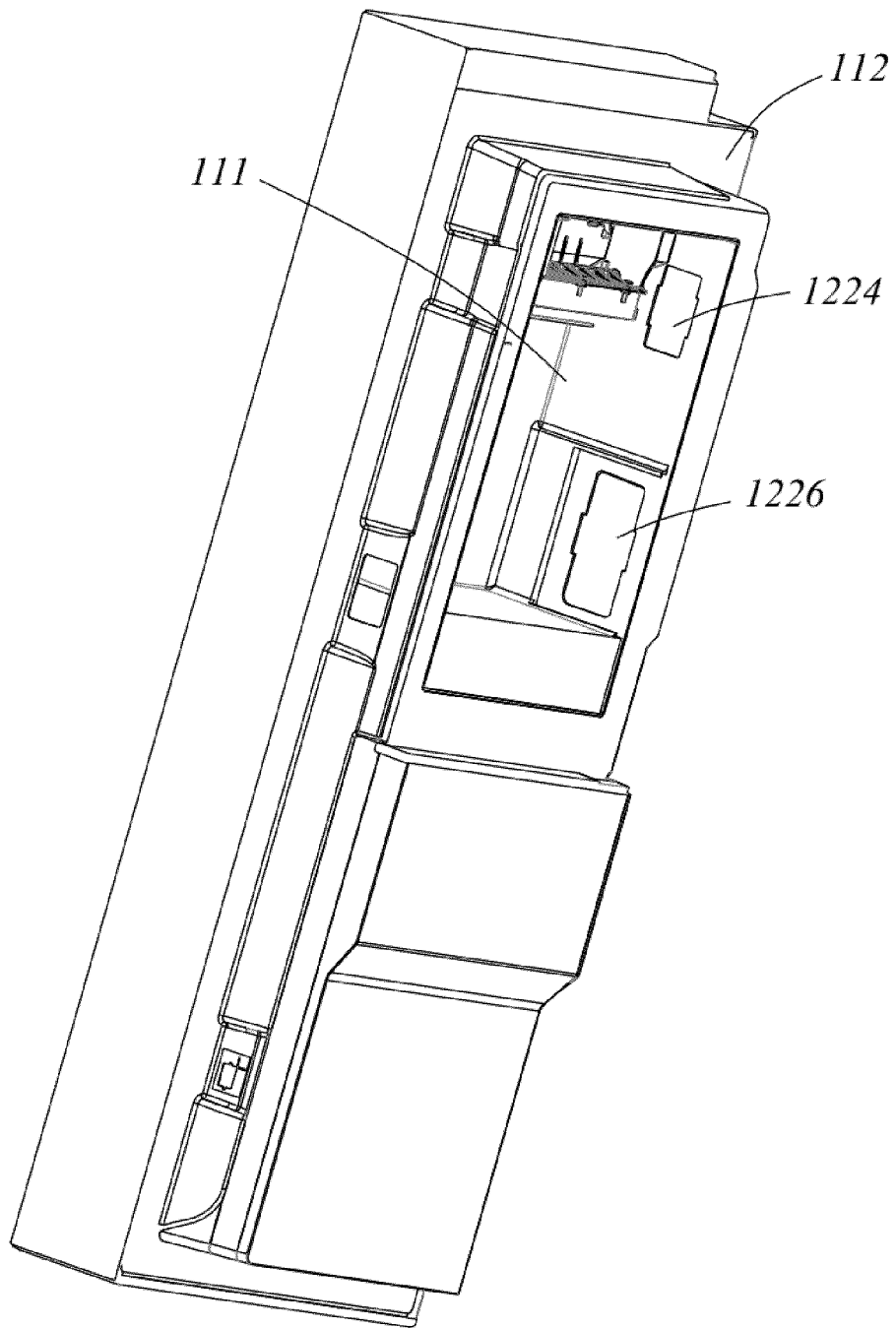


FIG.2

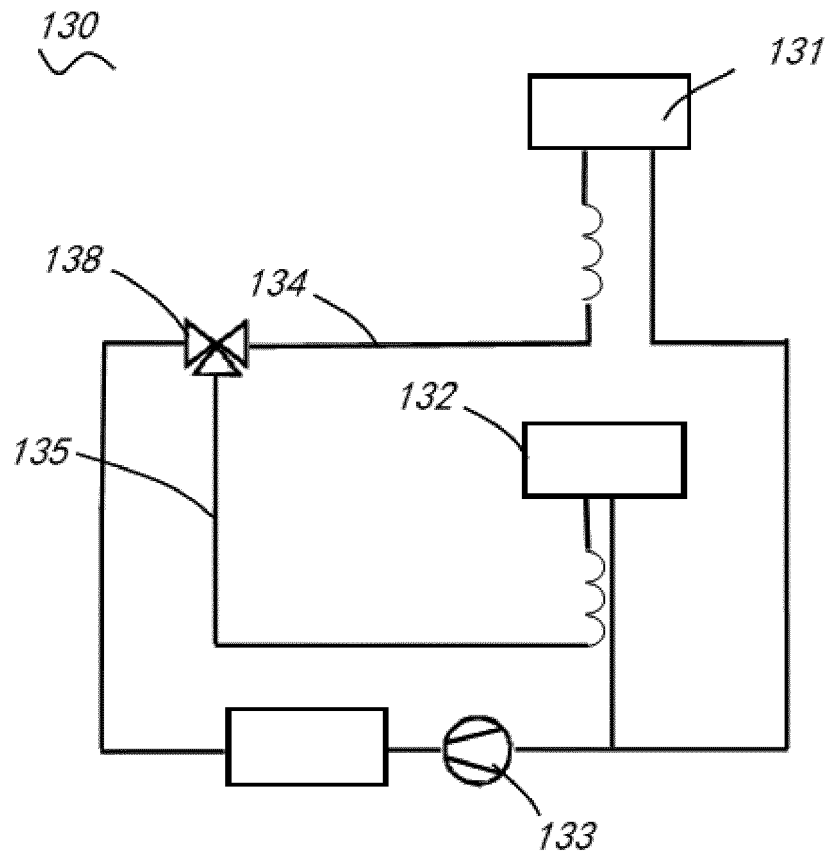


FIG.3

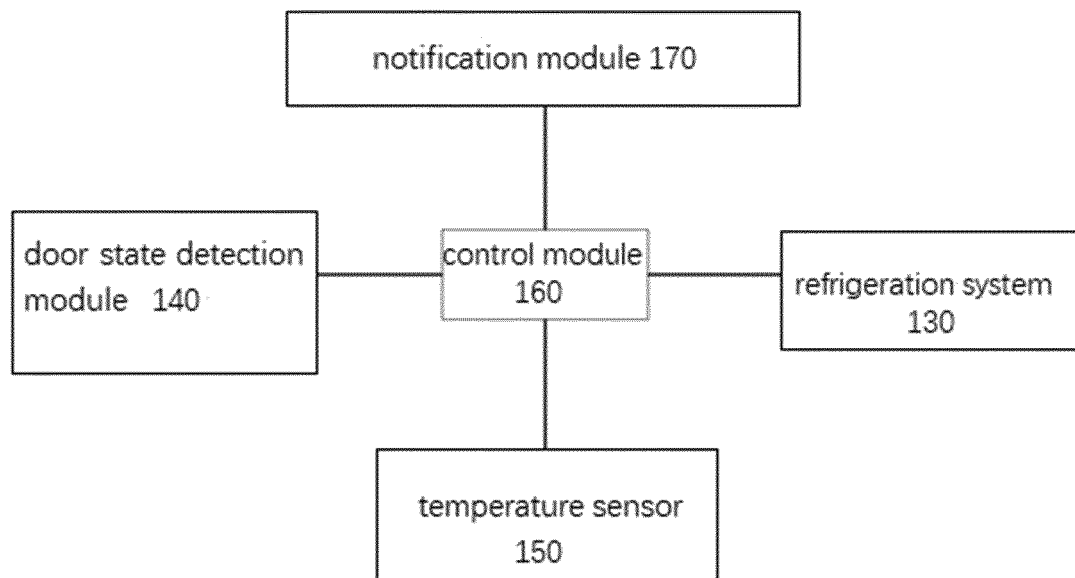


FIG.4

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2022/124250

A. CLASSIFICATION OF SUBJECT MATTER

F25D 17/08(2006.01)i; F25D 11/00(2006.01)i; F25D 23/12(2006.01)n

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)

F25D17; F25D11; F25D23

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)

CNTXT, CNABS, VEN, USTXT, EPTXT, WPABSC, EPTXTC, CNKI: 制冰, 漏冷, 间隙, 密封, 门, 状态, 打开, 关闭, 检测, 温度, 时长, 时段, 时间, ice maker?, cold mak+, seal+, door?, open?, close?, detect+, period+, time

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 0618148 A (HITACHI LTD.) 25 January 1994 (1994-01-25) entire document	1-10
A	CN 112066632 A (QINGDAO HAIER SPECIAL FREEZER CO., LTD. et al.) 11 December 2020 (2020-12-11) entire document	1-10
A	US 2008148761 A1 (VENKATAKRISHNAN Natarajan et al.) 26 June 2008 (2008-06-26) entire document	1-10
A	JP 2008070066 A (MITSUBISHI ELECTRIC CORP.) 27 March 2008 (2008-03-27) entire document	1-10
A	CN 1065134 A (SAMSUNG ELECTRONICS CO., LTD.) 07 October 1992 (1992-10-07) entire document	1-10
A	CN 102226618 A (HEFEI MIDEA RONGSHIDA REFRIGERATOR CO., LTD. et al.) 26 October 2011 (2011-10-26) description, paragraphs [0031]-[0051], and figures 1-3	1-10
A	KR 19990000890 A (LG ELECTRONICS INC.) 15 January 1999 (1999-01-15) entire document	1-10

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

* Special categories of cited documents:

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

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

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

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

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

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

“&” document member of the same patent family

Date of the actual completion of the international search

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Date of mailing of the international search report

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Authorized officer

Telephone No.

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2022/124250

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		MY 110879 A	30 June 1999
CN 102226618 A	26 October 2011	None	
KR 19990000890 A	15 January 1999	None	

Form PCT/ISA/210 (patent family annex) (January 2015)