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(54) **REFRIGERATOR AND CONTROL METHOD THEREOF**

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## Description

### Technical Field

[0001] The present invention relates to a refrigerator and a control method thereof.

### Background Art

[0002] Generally, a refrigerator is consumer electronics that can store food at low temperature. The refrigerator uses cool air generated by heat exchange with a refrigerant circulating a freezing cycle to cool the storage space, such that it is configured to store the stored food at an optimum state.

[0003] The refrigerator tends to increase more and more in its size and to have multi-functions as dietary life changes and users' taste is diversified, and the structure thereof is also diversified according to the configuration of the storage space.

[0004] Generally, the storage space inside the refrigerator is divided by a barrier to form a refrigerating compartment and a freezing compartment, and the structure thereof may be variously configured according to the arrangement of the refrigerating compartment and the freezing compartment.

[0005] In particular, a side by side-type refrigerator among such refrigerators has a refrigerating compartment and a freezing compartment which are in parallel disposed in the left and the right sides thereof, and is configured such that a refrigerating compartment door and a freezing compartment door are separately opened/closed.

[0006] The side by side-type refrigerator among such refrigerators is configured to have an evaporator mounted on the rear side of the refrigerating compartment and/or the freezing compartment to supply cold air to the refrigerating compartment and the freezing compartment, but there is a problem in that the interior volume of the refrigerator is decreased by the space occupied by the mounting of the evaporator.

[0007] In order to resolve the problem, KR registration patent 10-039849 discloses a refrigerator having an evaporator and a cold air circulation fan within a barrier to divide the space of the refrigerator into the refrigerating compartment and the freezing compartment.

[0008] However, in such a refrigerator, the heat insulation of the barrier on which the evaporator and the cold air circulation fan are disposed is not made, so that there is a problem in that a refrigerating compartment is excessively cooled. Furthermore, there is a problem in that the circulation of the cold air flowing in a narrow space within the barrier is not smooth.

[0009] JP H04 73573 A relates to a small-sized refrigerator having a design which is modified in that an inner upper side of a partition wall is provided with a cold air passage for feeding a part of the cold air fed into a freezing chamber extending up to a refrigeration chamber

placed at an opposite side of the freezing chamber with a partition wall being held near a cooling fan. When a baffle part of a damper thermostat is placed at an opening position, a cold air of a cooling device is fed to a freezing chamber under a rotation of a cooling fan so as to cool the freezing chamber, resulting in that a part of the cold air sucked into a freezing chamber duct under a rotation of the cooling fan passes from an opening of a cold air passage disposed at a rear plate of the freezing chamber duct through the cold air passage and is fed to a refrigeration chamber so as to cool the refrigeration chamber. As a temperature in the refrigeration chamber is lowered below a predetermined temperature, a probe part of the damper thermostat operated under a temperature variation moves the baffle part to a closed position through a cam part, thereby the amount of cold air flowing from the cold air passage to the refrigeration chamber is set to zero or reduced and the temperature of the refrigeration chamber is kept at the specified temperature.

[0010] US 3 248 894 A relates to a refrigerator having an evaporator compartment communicating through valve controlled openings with a freezer compartment and through valve controlled openings with an above-freezing compartment. The refrigerator comprises means to control the refrigeration circuit and to allow circulation of air either between the evaporator and the freezer compartment or between the evaporator and the above-freezing compartment according to the temperature in the evaporator compartment.

### Technical Problem

[0011] An object of the present invention is to provide a refrigerator for improving the interior volume of the refrigerator while maintaining the heat insulation performance of a barrier and allowing the flow of cold air to be smooth.

[0012] Another object of the present invention is to provide a refrigerator in which the mount location of an evaporator is modified and a ice making device for making ice using cold air supplied from the evaporator is provided.

[0013] Further, another object of the present invention is to provide a refrigerator having a cold air passage to prevent the cold air of a refrigerating compartment from being introduced into a freezing compartment upon cold air circulation, thereby blocking the smell of foods within the refrigerating compartment not to be introduced into the freezing compartment.

[0014] Further, another object of the present invention is to provide a method for controlling the cold air of a refrigerator which allows the efficient adjustment of the temperature of the refrigerator in the refrigerator in which an evaporator is mounted within a barrier.

### Solution to Problem

[0015] An exemplary embodiment of the present invention provides a refrigerator according to claim 1.

[0016] The refrigerator may further include a dispenser formed to be depressed on the front surface of the freezing compartment door and configured to discharge water or ice and a discharge duct formed on the rear surface of the freezing compartment door, and the discharge duct has an ice discharge passage configured to discharge the ice stored in the ice making unit to the dispenser therein.

[0017] The ice making unit may include an ice maker and an ice bin configured to store ice generated by the ice maker.

[0018] The refrigerator may include a cold air outlet formed on the freezing compartment-sided surface of barrier having a height corresponding to the height of the ice maker when the freezing compartment door is closed.

[0019] The refrigerator may further include a member configured to surround and accommodate the ice maker, and a cold air inlet is formed on the surface of the member opposite to the cold air outlet so that the cold air passage and the ice maker is fluidly in communication with each other.

[0020] The member to surround and accommodate the ice maker may include an ice maker cover configured to cover the ice maker and a case configured to accommodate the ice maker.

[0021] A cold air guide duct which is in communication with the cold air passage may be provided in the ceiling of the freezing compartment, and a cold air outlet may be formed on the front surface of the cold air guide duct.

[0022] Furthermore, the refrigerator may further include a member configured to surround and accommodate the ice maker, and the upper surface of the member and the front surface of the cold air guide duct are formed to be tilted to be opposite to each other when the freezing compartment door is closed.

### Advantageous Effects of Invention

[0023] According to the refrigerator according to this embodiment, the thickness of the heat insulation layer for a freezing compartment is formed to be thin whereas the thickness of the heat insulation layer for a refrigerating compartment is formed to be relatively thick in a barrier in which an evaporator is accommodated, thereby minimizing a phenomenon in which the refrigerating compartment is excessively cooled.

[0024] Furthermore, the evaporator is located on the freezing compartment, thereby minimizing the whole thickness of the barrier and, at the same time, maintaining the heat insulation performance of the refrigerating compartment.

[0025] In addition, a fan motor assembly accommodating part is additionally depressed, thereby securing a space which allows the cold air of the evaporator to be introduced into a blowing fan and, therefore, improving the flow performance of the cold air.

[0026] In addition, the fan motor assembly accommodating part and a cold air flowing part are formed to be

depressed in the barrier, thereby making the flow of the cold air within the barrier smooth, and, at the same time, making the entire structure of the barrier simple.

[0027] Furthermore, the evaporator is accommodated in the barrier, thereby increasing the interior volume of the refrigerator.

[0028] Furthermore, when an ice making unit is mounted in the freezing compartment door, the length of the cold air passage connected to an ice making duct is shortened, thereby decreasing the loss of cold air.

[0029] Furthermore, the temperature controls for the freezing compartment and the refrigerating compartment are independently made, thereby improving a problem in that, when one of the freezing compartment and the refrigerating compartment is cooled, the load of the other is increased.

[0030] Furthermore, a phenomenon in which the cold air of the refrigerating compartment is introduced into the freezing compartment is blocked, thereby preventing the in which the smell of foods within the refrigerating compartment is introduced into the freezing compartment.

[0031] Furthermore, according to the control method according to the embodiment of the present invention, a damper is mounted within the barrier and the time points at which the damper is opened and closed and a freezing cycle is operated are appropriately controlled, thereby efficiently controlling the temperature of the refrigerator and decreasing power consumption due to the operation of the freezing cycle.

### Brief Description of Drawings

[0032] The above and other objects, features and advantages of the present invention will become apparent from the following description of preferred embodiments given in conjunction with the accompanying drawings, in which:

FIG. 1 is an exterior perspective view of a refrigerator;

FIG. 2 is a front perspective view showing the internal structure of the refrigerator;

FIG. 3 is an exploded perspective view of a barrier.

FIG. 4 is a cross-sectional view taken along line I-I of FIG. 1;

FIG. 5 is a cross-sectional view taken along line II-II' of FIG. 1;

FIG. 6 is a cross-sectional view taken along line III-III of FIG. 1;

FIG. 7 is a diagram showing a flow state of cold air within the barrier viewed from the freezing compartment;

FIG. 8 is a diagram showing a flow state of cold air within the barrier viewed from the refrigerating compartment;

FIG. 9 is a partially enlarged cross-sectional view of part A of FIG. 4;

FIG. 10 is a perspective view showing an inner con-

figuration of a refrigerator according to an embodiment of the present invention;

FIG. 11 is an exploded perspective view of a barrier according to an embodiment of the present invention.

FIG. 12 is a plan cross-sectional view of a refrigerator according to an embodiment, which is a cross-sectional view taken along line II-II of FIG. 1;

FIG. 13 is a perspective view showing an inner configuration of a refrigerator according to an embodiment of the present invention;

FIG. 14 is a partial front cross-sectional view of the refrigerator according to Fig. 13.

FIG. 15 is a partial side view of the refrigerator according to Fig. 13;

FIG. 16 is an exploded perspective view of a barrier included in a refrigerator according to an embodiment which shows the configuration of a freezing compartment;

FIG. 17 is a cross-sectional view taken along line IV-IV of FIG. 16;

FIG. 18 is an exploded perspective view of a barrier included in a refrigerator according to an embodiment which shows the configuration of a refrigerating compartment;

FIG. 19 is a cross-sectional view taken along line I-I of FIG. 18;

FIG. 20 is an exploded perspective view of a barrier included in a refrigerator according to an embodiment which shows the configuration of a refrigerating compartment;

FIG. 21 is a cross-sectional view taken along line VI-VI of FIG. 18; and

FIG. 22 is a flowchart showing a method for controlling the temperature of a refrigerator according to an embodiment of the present invention.

## Mode for the Invention

[0033] Hereinafter, a reversible permeability measuring device according to the present invention will be described with reference to the accompanying drawings.

[0034] Refrigerators and control methods thereof according to embodiments of the present invention are described in detail below with reference to the drawings and flowcharts

[0035] FIG. 1 is an exterior perspective view of a refrigerator and FIG. 2 is a front perspective view showing the internal structure of the refrigerator.

[0036] Referring to FIGS. 1 and 2, the exterior shape of the refrigerator 1 is formed by a cabinet 10 defining a storage space and a door 20 to open and close the storage space.

[0037] The cabinet 10 is divided into left and right sides by a barrier 100 to define a refrigerating compartment 40 and a freezing compartment 30 respectively. The refrigerating compartment 40 and the freezing compartment 30 are configured to have a plurality of drawers and

shelves therewithin and to preserve various foods therein. The door 20 is composed of a refrigerating compartment door 24 and a freezing compartment door 22 for respectively opening and closing the refrigerating compartment 40 and the freezing compartment 30. Furthermore, the refrigerating compartment door 24 and the freezing compartment door 22 are respectively mounted to the cabinet 10 to be capable of pivoting thereon.

[0038] Furthermore, a plurality of baskets for storing foods may be mounted on the rear surfaces of the refrigerating compartment door 24 and the freezing compartment door 22 and, if required, an ice maker, a dispenser, a home bar or the like may be mounted on the refrigerating compartment door 24 and the freezing compartment door 22. It is suggested that an ice compartment 60 be provided inside the freezing compartment 30, a dispenser 50 be provided in the freezing compartment door 22, and a home bar be provided in refrigerating compartment door 24. Furthermore, a discharge duct 23 is formed on the rear surface of the freezing compartment door 22 and an ice discharge passage (25, see FIG. 6) to discharge ice generated in the ice compartment 60 to the dispenser 50 is formed in the discharge duct 23.

[0039] Meanwhile, the barrier 100 is vertically formed within the storage space defined inside the cabinet 10 to define the freezing compartment 30 and the refrigerating compartment 40 respectively on left and right sides. Furthermore, a heat insulator (described below) is filled within the inside of the barrier 100 so as to prevent heat exchange between the freezing compartment 30 and the refrigerating compartment 40 from occurring.

[0040] The barrier will be described in detail below with reference to drawings.

[0041] The barrier will be described in detail below with reference to drawings.

[0042] FIG. 3 is an exploded perspective view of a barrier according to Fig. 1, FIG. 4 is a cross-sectional view taken along line I-I of FIG. 1, FIG. 5 is a cross-sectional view taken along line II-II of FIG. 1, and FIG. 6 is a cross-sectional view taken along line III-III of FIG. 1.

[0043] Referring to FIGS. 3 to 6, the barrier 100 is formed to be elongated up and down inside the cabinet 10, and an evaporator 110 and a blowing unit 130 are mounted therewithin.

[0044] The external shape of the barrier 100 is defined by a casing 150 which defines the internal spaces of the refrigerating compartment 40 and the freezing compartment 30 and a heat insulator 300 is foamed and filled within the casing 150. The heat insulator 300 is filled evenly throughout the internal space of the barrier 100.

[0045] Meanwhile, a depression part 200 is formed on the left side surface of the barrier 100, that is, the surface exposed to cold air from the freezing compartment 30. Furthermore, the evaporator 110 and the blowing unit 130 which will be described below are accommodated in the depression part 200.

[0046] Specifically, the depression part 200 includes an evaporator accommodating part 210 in which the

evaporator 110 for generation of cold air is accommodated, a blowing unit accommodating part 220 which accommodates the blowing unit 130, and a cold air passage 230 which supplies the cold air generated by the evaporator 110 to the refrigerating compartment 40 and the freezing compartment 30.

**[0047]** The evaporator accommodating part 210 which is formed in the lower side of the barrier 100 is formed to be larger than the evaporator 110 to fully accommodate the evaporator 110 and may be formed to be depressed greater than the thickness of the evaporator 110. That is, the evaporator accommodating part 210 is formed to be depressed to a sufficient depth such that the evaporator 110 is not extruded outside the barrier 100 when the evaporator 110 is mounted therein. Furthermore, the evaporator 110 may be mounted to be fixed to the evaporator accommodating part 210 using a separate fixing member or a fixing structure.

**[0048]** Furthermore, a cold air inlet 212 is formed in the lower end of the evaporator accommodating part 210. The cold air inlet 212 is a passage through which the cold air within the refrigerating compartment 40 returns to the evaporator 110 and may be formed on rear side of the evaporator accommodating part 210.

**[0049]** A suction grill 214 is formed in the cold air inlet 212 to prevent foreign substances from being introduced from the inside of the refrigerating compartment and the outside of the refrigerator to the evaporator accommodating part 210.

**[0050]** Furthermore, a drain fan 120 for discharging defrost water produced upon defrosting frost may be further formed on the bottom of the evaporator accommodating part 210. The drain fan 120 is formed to be tilted to one side and may be formed to be in communication with the machine room of the cabinet 10.

**[0051]** The drain fan 120 may be provided as a separate member to be mounted on the bottom of the evaporator accommodating part 210 corresponding to the lower side of the evaporator 110. If required, the bottom the depression part 200 is formed to be tilted to enable the depression part 200 to play the role of the drain fan 120.

**[0052]** Meanwhile, the blowing unit accommodating part 220 is formed on the upper side of the evaporator accommodating part 210. In addition, the blowing unit 130 disposed on the blowing unit accommodating part 220 includes a motor 132, a blowing fan 134 and a shroud 136.

**[0053]** Specifically, the motor 132 is for providing a rotating force to operate the blowing fan 134, and an electric motor generally used may be applicable thereto. Furthermore, the blowing fan 134 is mounted on the rotating shaft of the motor 132. As the blowing fan 134, a centrifugal fan for introducing air in the direction of the rotating shaft and discharging it in a radial direction may be used, a turbo fan having excellent blowing capability may be used. The thickness of the barrier 100 may be slim by applying the turbo fan. Furthermore, the shroud 136 functions to guide the cold air passed through the evaporator

110 to be introduced to the blowing fan 134. The mount structure of the blowing unit 130 is described in detail below with reference the drawings.

**[0054]** Meanwhile, cold air guide part 222 is formed on both sides of the blowing unit accommodating part 220. The cold air guide part 222 guides the cold air from the evaporator accommodating part 210 to be directed to the center of the shroud 136. For this, the cold air guide part 222 is formed such that its width becomes narrow from the lower side to the upper side.

**[0055]** Specifically, the lower end of the blowing unit accommodating part 220 has a width identical to that of the upper end of the evaporator accommodating part 210, and the upper end of the blowing unit accommodating part 220 is formed to have a width identical to that of the lower end of the cold air passage 230.

**[0056]** Furthermore, the cold air guide part 222 may be formed to be tilted or rounded, and guides the cold air moving along with the cold air guide part 222 to be directed to the center of the shroud 136.

**[0057]** Furthermore, the blowing unit accommodating part 220 is formed to be depressed greater than the evaporator accommodating part 210 and the cold air passage 230 which will be described below. Herein, the surface of the inlet of the shroud 136 is spaced from the surface of the blowing unit accommodating part 220. Accordingly, the cold air rising from the evaporator accommodating part 210 can be smoothly moved into an orifice 137 formed around the center of the shroud 136 through a space spaced between the blowing unit accommodating part 220 and the shroud 136.

**[0058]** The evaporator accommodating part 210 and the blowing unit accommodating part 220 have different depression depths to be stepped with respect to each other. Therefore, the thicknesses of the heat insulators 300 within the barrier 100 corresponding to the evaporator accommodating part 210 and the blowing unit accommodating part 220 are become different. In order words, since the evaporator accommodating part 210 is relatively depressed less than the blowing unit accommodating part 220, the thickness of the heat insulator 300 corresponding to the evaporator accommodating part 210 relatively becomes thicker. As a result, it is possible to efficiently prevent the cold air from the evaporator 110 from being delivered to the refrigerating compartment 40 due to heat conduction.

**[0059]** Furthermore, since the blowing unit accommodating part 220 is relatively depressed greater than the evaporator accommodating part 210, a passage for smooth flowing of cold air to the blowing unit 130 is ensured. Furthermore, the thickness of the heat insulator 300 corresponding to the blowing unit accommodating part 220 is relatively thin, but the heat insulation of the blowing unit 130 having a temperature relatively higher than that of the evaporator 110 is sufficiently possible.

**[0060]** Meanwhile, the stepped parts of the evaporator accommodating part 210 and the blowing unit accommodating part 220 are coupled to each other by a coupling

part 240. The coupling part 240 forms an interface between the evaporator accommodating part 210 and the blowing unit 130 and is formed to be tilted. Accordingly, the cold air within the evaporator accommodating part 210 may be caused to be smoothly introduced into the inside of the blowing unit accommodating part 220.

**[0061]** The cold air passage 230 is formed on the upper side of the blowing unit accommodating part 220. The cold air passage 230 is for guiding the cold air discharged from the outlet 139 of the shroud 136 into the refrigerating compartment and the freezing compartment 30, and is formed to be extended to the upper side of the barrier 100. The width of the outlet 139 of the shroud 136 may be formed to be identical to the width of the cold air passage 230. Furthermore, the cold air passage 230 may be formed to have a width identical to the width of the opened upper end of the blowing unit accommodating part 220.

**[0062]** Furthermore, the cold air passage 230 is formed to be depressed less than the blowing unit accommodating part 220. Therefore, the thickness of the heat insulator 300 on a location corresponding to the cold air passage 230 may be formed to be thicker than the thickness of the heat insulator on a location corresponding to the blowing unit accommodating part 220. Accordingly, the cold air flowing along the cold air passage 230 can be blocked not to be delivered to the refrigerating compartment 40 due to heat conduction.

**[0063]** The cold air passage 230 is shielded by a barrier cover 400 which will be described below, thereby forming the cold air passage completely. Furthermore, a cold air outlet 232 is formed in the upper end of the cold air passage 230. The cold air outlet 232 is located in the upper center of the barrier 100 and may be exposed to the refrigerating compartment 40. In addition, an outlet grill 234 to guide the direction of the discharged cold air may be further formed in the cold air outlet 232.

**[0064]** Meanwhile, a cold air distribution device 140 is provided in the cold air outlet 232. The cold air distribution device 140 is for selectively supplying the cold air supplied from the cold air passage 230 to the cold air outlet 232, and is formed in a size corresponding to the cold air outlet 232. Furthermore, the cold air distribution device 140 may be formed to have the structure of a damper and the cold air outlet 232 is formed to be selectively opened and closed. Accordingly, when the cold air distribution device 140 is opened, a part of the cold air guided through the cold air passage 230 is discharged to the cold air outlet 232, thereby being introduced into the refrigerating compartment. On the other hand, when the cold air distribution device 140 is closed, the whole of the cold air guided through the cold air passage 230 is discharged to the freezing compartment 30.

**[0065]** Meanwhile, the depression part 200 is shielded by the barrier cover 400. The barrier cover 400 is formed to have a plate shape, and shields the depression part 200 to form a part of the left side surface of the barrier 100, that is, a part of the wall of the inside of the freezing

compartment 30. Furthermore, the barrier cover 400 is formed to have the same plane as the side surface of the barrier 100 when being mounted on the barrier 100.

**[0066]** The barrier cover 400 may be formed of one plate material, whereas may be formed to be divided into a plurality of parts if required. For example, the barrier cover 400 may be formed to be divided into a part covering the evaporator accommodating part 210 and a part covering the blowing unit 130 and the cold air passage 230.

**[0067]** In addition, the right side surface of the barrier 100 opposite to the surface on which the barrier cover 400 is mounted is also formed to have a smooth plane without protruding the outside, thereby forming a part of the wall of the inside of the refrigerating compartment 40. Accordingly, the both side surfaces of the barrier 100 all may be formed to be flat.

**[0068]** Furthermore, a mounting guide 420 having a shape corresponding to the external shape of the evaporator 110 is formed on the rear surface of the barrier cover 400 corresponding to the evaporator 110, thereby helping the evaporator 110 to be fixed.

**[0069]** Meanwhile, a cold air inlet 430 is formed in the lower end of the barrier cover 400 corresponding to the evaporator accommodating part 210. The cold air inlet 430 is a part into which the cold air of the freezing compartment is introduced, and guides the cold air of the freezing compartment 30 to be introduced into the evaporator accommodating part 210.

**[0070]** Meanwhile, a cold air inlet 410 is formed in the upper part of the barrier cover 400 corresponding to the cold air passage 230. A number of cold air outlet 410 may be formed at uniform intervals, and enable the cold air rising along the cold air passage 230 to be discharged to the freezing compartment 30.

**[0071]** Meanwhile, a coupling end 440 to mount the barrier cover 400 is further formed on the both side ends of the barrier cover 400. Furthermore, a fastening member, such as a screw, is inserted into the coupling end 440, thereby enabling the barrier cover 400 to be fixed to the left side surface of the barrier 100. Furthermore, the side surface of the barrier 100 corresponding to the coupling end 440 may be depressed, thereby enabling the coupling end 440 not to protrude from the left side surface of the barrier 100.

**[0072]** Meanwhile, the ice compartment 60 is mounted inside the freezing compartment 30. Specifically, the ice compartment 60 is mounted on the side surface of the barrier 100, in particular, on the left side surface exposed to the freezing compartment 30 and makes ice by receiving the cold air discharged through the cold air outlet 410 of the barrier 100.

**[0073]** The ice compartment 60 includes an ice maker 61, an ice bin 62 provided on the lower side of the ice maker 61 and configured to store ice made in the ice maker 61, and an ice making case 63 to surround the ice maker 61 and the ice bin 62. An ice outlet is formed on the bottom surface of the ice making case 63 and the

bottom surface of the ice bin 62. When the freezing compartment door 22 is closed, the upper inlet of an ice discharge passage 25 formed on the discharge duct 23 is in communication with the ice outlet of the ice making case 63. Furthermore, the damper 601 is coupled to be pivoted on the ice outlet or the inlet of the discharge duct 23, thereby selectively interrupting the ice discharge passage 25.

**[0074]** As shown in the drawings, an ice transfer mechanism 64 including an auger 642 that transfers ice to the front thereof, a motor 641 that operates the auger 642 and a crusher 643 that crushes the ice may be provided in the inside of the ice bin 62.

**[0075]** Furthermore, a faucet 51 that releases water may be provided in the dispenser 50. Specifically, a feed water hose 52 is disposed along the inside of a body 10, and may be extended to the inside of the freezing compartment door 22 through the hinge shaft of the freezing compartment door 22. Furthermore, an ice making hose 53 may be branched from the feed water hose 52 at any point to be extended toward the ice maker 61.

**[0076]** FIG. 7 is a diagram showing the flow state of cold air within the barrier viewed from the freezing compartment, and

**[0077]** FIG. 8 is a diagram showing the flow state of cold air within the barrier viewed from the refrigerating compartment.

**[0078]** Referring to FIGS. 7 and 8, when power is supplied to the refrigerator 1, a freezing cycle inside the refrigerator 1 is operated. Due to the operation of the freezing cycle, air in contact with the evaporator 110 is cooled, thereby generating cold air.

**[0079]** First, describing a state in which cold air is supplied to the freezing compartment 30 with reference to FIG. 7, the blowing fan 134 is operated by the operation of the motor 132 in order to supply cold air to the freezing compartment 30. Due to the operation of the blowing fan 134, the cold air of the freezing compartment 30 introduced through the cold air inlet 430 is heat-exchanged by the evaporator 110 to be a colder state, and is then moved upward according to the operation of the blowing fan 134.

**[0080]** The cold air moved upward from the evaporator accommodating part 210 is moved into inside the blowing unit accommodating part 220 along the coupling part 240, is then introduced into the orifice 137 of the shroud 136 by the guiding of the cold air guide part 222.

**[0081]** The cold air introduced into the shroud 136 is discharged into the outlet 139 of the shroud 136 to be guided to the cold air passage 230. The cold air guided to the cold air passage 230 is supplied to the freezing compartment 30 through the cold air outlet 410 formed on the barrier cover 400.

**[0082]** In this case, a plurality of cold air outlets 410 is formed in a vertical direction, and the cold air is discharged evenly throughout the inside of the freezing compartment 30 through the cold air outlets 410. The discharged cold air cools the inside of the freezing compart-

ment 30, and the cold air within the freezing compartment 30 is again introduced through the cold air inlet 430 and is circulated while the blowing fan 134 is operated.

**[0083]** Furthermore, since the cold air distribution device 140 provided in the cold air outlet 232 is in a closed state, the cold air is supplied only into the freezing compartment 30 without being introduced into the refrigerating compartment 40.

**[0084]** Meanwhile, the evaporator accommodating part 210, the blowing unit accommodating part 220 and the cold air passage 230 have been shielded by the barrier cover 400 made of a relatively thin plastic material. Accordingly, cold air of the evaporator 110 or the cold air moving in the inside of the depression part 200 may be heat-exchanged with the cold air of the freezing compartment 30 due to heat conduction through the barrier cover 400.

**[0085]** Describing a state in which cold air is supplied to the refrigerating compartment 40 with reference to FIG. 8, the blowing fan 134 is operated by the operation of the motor 132 in order to supply cold air to the refrigerating compartment 40. Due to the operation of the blowing fan 134, the cold air of the freezing compartment 30 and the refrigerating compartment 40 introduced through the cold air inlets 430 and 212 is heat-exchanged by the evaporator 110 to be a colder state, and is then moved upward according to the operation of the blowing fan 134.

**[0086]** The cold air moved upward from the evaporator accommodating part 210 is moved into inside the blowing unit accommodating part 220 along the coupling part 240, is then introduced into the orifice 137 of the shroud 136 by the guiding of the cold air guide part 222.

**[0087]** The cold air introduced into the shroud 136 is discharged into the outlet 139 of the shroud 136 to be guided to the cold air passage 230. The cold air guided to the cold air passage 230 is supplied to the freezing compartment 30 through the cold air outlet 410 formed on the barrier cover 400. Furthermore, the cold air guided through the cold air passage 230 is supplied up to the cold air distribution device 140 formed on the upper end of the cold air passage 230. The cold air distribution device 140 is opened when it is intended that the cold air is supplied to the refrigerating compartment 40. Accordingly, the cold air is discharged into the cold air outlet 232 through the cold air distribution device 140.

**[0088]** The cold air supplied into inside the refrigerating compartment 40 through the cold air outlet 232 cools the inside of the refrigerating compartment 40, and the cold air of the refrigerating compartment 40 is again introduced through the cold air inlet 212 and is circulated while the blowing fan 134 is operated.

**[0089]** FIG. 9 is an enlarged cross-sectional view of part A of FIG. 4.

**[0090]** Referring to FIG. 9, the blowing unit 130 may be fixed to the barrier cover 400. Specifically, the motor 132 is fixed to the barrier cover 400 by a motor mount 135, and a rotating shaft 132a is extended from the motor 132. Furthermore, the blowing fan 134 is coupled to the

rotating shaft 132a of the motor 132. The blowing fan 134 includes a hub 134a having a cone shape, a number of blades 134b arranged on the outer circumferential surface of the hub 134a and a bellmouth 134c formed on the upper ends of the blades 134b.

[0091] Furthermore, the shroud 136 is fixed to the barrier cover 400 in a form to accommodate the blowing fan 134. In addition, the edge of the orifice 137 formed in the shroud 136 is rounded toward the blowing fan 134 to be fitted to the inside of the bellmouth 134c. Accordingly, the cold air moving to the cold air guide part 222 is softly guided into the blowing fan 134. Furthermore, as described above, the surface of the shroud 136 on which the orifice 137 is formed is spaced from the cold air guide part 222. As a result, the cold air moved from the evaporator accommodating part 210 is introduced into the blowing fan 134 in parallel to the rotating shaft 132a of the blowing fan 134 through the orifice 137.

[0092] By the structure as described above, the barrier cover 400 may be integrated with the blowing unit 130. That is, when the barrier cover 400 is separated, the blowing unit 130 can be separated along therewith. As a result, when the repair of the blowing unit 130 is required, product repair is easy by separating the barrier cover 400.

[0093] FIG. 10 is a perspective view showing an inner configuration of a refrigerator according to an embodiment of the present invention, FIG. 11 is an exploded perspective view of a barrier according to an embodiment of the present invention, and FIG. 12 is a plan cross-sectional view of a refrigerator according to an embodiment, which is a cross-sectional view taken along line II-II of FIG. 1.

[0094] In this embodiment, same structures as the structures of figures 1 - 9 are denoted by the same reference numerals and therefore, the detailed description of the corresponding structures will be omitted.

[0095] Referring to FIGS. 10 to 12, in the refrigerator 1 according to this embodiment, the ice compartment 60 is mounted on the freezing compartment door 22.

[0096] Specifically, the ice maker 61 constituting the ice compartment 60 is mounted on the upper portion of the rear surface of the freezing compartment door 22. Furthermore, the ice maker 61 is accommodated by a member, such as an ice maker cover or a housing, thereby not being exposed to the outside when the freezing compartment door 22 is opened. In addition, the ice bin 62 is disposed on the lower side of the ice maker 61. In order words, the ice bin 62 is removably mounted in a space between the ice maker 61 and the upper end of the discharge duct 23. Furthermore, the ice transfer mechanism including the auger, the crusher and the like may be provided inside the ice bin 62, which is the same as described in the first embodiment.

[0097] Furthermore, a cold air inlet 611 is formed in the side surface of the ice maker 61, more specifically, in the side surface of an ice maker cover or a housing surrounding the ice maker 61. The surface on which the cold air inlet 611 is formed is the side surface that can

be viewed when the freezing compartment door 22 is opened.

[0098] Meanwhile, a cold air outlet 411 that is in communication with the cold air inlet 611 may be formed in the barrier 100.

[0099] Specifically, a branch passage 235 is extended from any point of the cold air passage 230 constituting the depression part 200. In order words, the branch passage 235 is extended by a predetermined length toward the front of the barrier 100 from the edge of the side surface of the cold air passage 230. Furthermore, a part of the side surface of the barrier cover 400 is also extended so as to cover the branch passage 235. In addition, the cold air outlet 411 is formed on the extended part of the barrier cover 400. The cold air outlet 411 is formed at a location that is in communication with the cold air inlet 611 of the ice maker 61 when the freezing compartment door 22 is closed. This is easily known from the plan view illustrated in FIG. 9.

[0100] Furthermore, a damper (not shown) is mounted in the cold air inlet 611 and/or the cold air outlet 411, thereby blocking the flowing of cold air when the freezing compartment door 22 is opened. As shown in FIG. 9, the ice maker 61 may be surrounded by an ice maker cover 64 or the like and the cold air inlet 611 may be formed on the side surface of the ice maker cover 64.

[0101] FIG. 13 is a perspective view showing an inner configuration of a refrigerator according to another embodiment of the present invention, FIG. 14 is a partial front cross-sectional view of the refrigerator according to this embodiment, and FIG. 15 is a partial side view of the refrigerator according to this embodiment.

[0102] The structure of the refrigerator according to this embodiment is almost same as the first embodiment, and is different therefrom in a cold air coupling structure connecting the ice maker from the barrier. The same structures as the structures of the first embodiment are denoted by the same reference numerals and therefore, the detailed description of the corresponding structures will be omitted.

[0103] Referring to FIGS. 13 to 15, in the refrigerator 1 according to this embodiment, the ice compartment 60 is provided in the freezing compartment door 22 as in the second embodiment. It should be noted that the cold air rising along the cold air passage 230 of the barrier 100 be delivered to the ice maker 61 by a cold air guide duct 70 formed on the ceiling of the freezing compartment 30.

[0104] Specifically, the cold air guide duct 70 is formed on the ceiling of the freezing compartment 30, and has a cold air outlet 701 on the front surface thereof. Furthermore, the ice making unit 60 includes an ice maker 61, an ice maker cover 64 surrounding the ice maker 61 and an ice bin 63 disposed on the lower side of the ice maker 61. Furthermore, the lower end of the ice bin 63 is disposed on the upper surface of the discharge duct 23.

[0105] In addition, the front surface of the cold air guide duct 70 and the upper surface of the ice maker cover 64 may be formed to be tilted at a predetermined angle. That

is, the front surface of the cold air guide duct 70 on which the cold air outlet 701 is formed to be tilted backward from the upper side to the lower side and the upper surface of the ice maker cover 64 is formed to be tilted at an angle corresponding to the front surface of the cold air guide duct 70 on which the cold air outlet is formed. Accordingly, when the freezing compartment door 22 is closed, the front surface of the cold air guide duct 70 and the ice maker cover 64 are in parallel opposite to each other. Accordingly, the cold air discharged through the cold air outlet 701 is sprayed to the ice maker 61 through a cold air hole formed in the upper surface of the ice maker cover 64.

**[0106]** Furthermore, the right side of the cold air guide duct 70, that is, the part opposite to the barrier 100, may be formed to be tilted downward as shown in the drawing. This is for allowing the cold air outlet 410 formed on the barrier 100 to be in communication with and the cold air guide duct 70.

**[0107]** According to the above-described structure, the evaporator 110 is accommodated within the barrier 100, and the cold air generated within the barrier 100 rises along the cold air passage 230 and is supplied to the freezing compartment 30 and the refrigerating compartment 40. Furthermore, a part of cold air is supplied to the ice making unit 60 through the cold air outlet 410. Accordingly, there is an advantage in that, even in a refrigerator having a structure in which the ice making unit 60 is mounted inside the freezing compartment 30 or on the freezing compartment door 22, an ice making function is smoothly performed. In addition, the evaporator 110 is accommodated in the barrier 100, thereby increasing the interior volume of the refrigerator.

**[0108]** FIG. 16 is an exploded perspective view of a barrier included in a refrigerator according to another embodiment which shows the configuration of a freezing compartment, and

**[0109]** FIG. 17 is a cross-sectional view taken along line IV-IV of FIG. 16.

**[0110]** Referring to FIGS. 16 and 17, the barrier 100 is formed to be elongated up and down inside the cabinet 10, and an evaporator 110 and a blowing unit 130 for a freezing compartment are mounted therewithin.

**[0111]** The external shape of the barrier 100 is defined by a casing 150 that defines the internal spaces of the refrigerating compartment 40 and the freezing compartment 30 and a heat insulator 300 is foamed and filled within the casing 150. The heat insulator 300 is filled evenly throughout the internal space of the barrier 100.

**[0112]** Meanwhile, a depression part 200 for a freezing compartment is formed on the left side surface of the barrier 100, that is, the surface exposed to cold air from the freezing compartment 30. Furthermore, the evaporator 110 and the blowing unit 130 for a freezing compartment are accommodated in the depression part 200 for a freezing compartment.

**[0113]** Specifically, the depression part 200 for a freezing compartment includes an evaporator accommodat-

ing part 210 in which the evaporator 110 for generation of cold air is accommodated, a blowing unit accommodating part 220 for a freezing compartment which accommodates the blowing unit 130 for a freezing compartment for a freezing compartment, and a cold air passage 230 for a freezing compartment which supplies the cold air generated by the evaporator 110 to the freezing compartment 30 similarly as described with reference to FIG. 3. Furthermore, the depression part 200 for a freezing compartment is shielded by the barrier cover 400 for a freezing compartment. The barrier cover 400 for a freezing compartment is made of a single plate, thereby shielding the entire of the depression part 200 for a freezing compartment at one time. As another method, the barrier cover 400 for a freezing compartment may be made of several covers, which is the same structure as that described with reference to FIG. 3, thereby omitting the description thereof. Furthermore, the structures of the evaporator accommodating part 210 and the drain fan 120 has been already described with reference to FIG. 3, thereby omitting the description thereof.

**[0114]** Meanwhile, a blowing unit accommodating part 220 for a freezing compartment is formed on the upper side of the evaporator accommodating part 210. Furthermore, the blowing unit accommodating part 220 for a freezing compartment may be mounted to be inclined on in front or rear of the barrier. The reason for this is that a blowing unit 130a (see FIG. 18) for the refrigerating compartment is mounted on the refrigerating compartment-sided surface of barrier 100. In this embodiment, the blowing unit 130 for a freezing compartment is mounted on the rear side of the barrier 100 and the blowing unit 130a for a refrigerating compartment is mounted on the front side of the blowing unit 130 for a freezing compartment.

**[0115]** In addition, the blowing unit 130 for a freezing compartment disposed on the blowing unit accommodating part 220 for a freezing compartment includes a motor 132, a blowing fan 134 and a shroud 136 as described with reference to FIG. 3.

**[0116]** Meanwhile, a cold air guide part 222 is formed between the upper end of the evaporator accommodating part 210 and the lower end of the blowing unit accommodating part 220 for a freezing compartment. The cold air guide part 222s performs the same function as the cold air guide part 222 as described with reference to FIG. 3 and has a shape in which its width becomes narrow to the upper side toward the center of the shroud 136.

**[0117]** Specifically, the upper end of the blowing unit accommodating part 220 for a freezing compartment is formed to have a width identical to that of the lower end of the cold air passage 230 for a freezing compartment.

**[0118]** Furthermore, the blowing unit accommodating part 220 for a freezing compartment is formed to be depressed greater than the evaporator accommodating part 210 and the cold air passage 230 for a freezing compartment.

**[0119]** This is for allowing the cold air to be smoothly

moved toward the orifice 137 formed around the center of the shroud 136 as described above. The evaporator accommodating part 210 and the blowing unit accommodating part 220 for a freezing compartment have different depression depths to be stepped with respect to each other. Meanwhile, the stepped parts of the evaporator accommodating part 210 and the blowing unit accommodating part 220 for a freezing compartment are coupled to each other by a coupling part 240. As described above, the coupling part 240 forms an interface between the evaporator accommodating part 210 and the blowing unit 130 for a freezing compartment and is formed to be tilted.

**[0120]** The cold air passage 230 is formed on the upper side of the blowing unit accommodating part 220 for a freezing compartment. Furthermore, the cold air passage 230 for a freezing compartment may be formed on the center of the side surface of the barrier 100. Accordingly, the cold air passage 230 for a freezing compartment is extended upward to be tilted in a front direction from the outlet 139 of the shroud 136 and then extended to be perpendicular thereto at the center of the side surface of the barrier 100. As described above, the cold air passage 230 for a freezing compartment is formed at the center of the side surface of the barrier 100 so that on the opposite side surface of the barrier 100, a cold air passage (as will be described below) for a refrigerating compartment can be formed in the front or rear of the side surface of the barrier 100.

**[0121]** A depression part (as will be described below) to accommodate a heat radiating means 500 is formed on the side surface of the barrier 100 opposite to the evaporator accommodating part 210. That is, the inside of the barrier 100, in particular, the inside of an area in which the evaporator 110 is accommodated is divided by a partition wall into the evaporator accommodating part 210 and a heat radiating means accommodating part (as will be described below). The configuration and function of the heat radiating means 500 is described in detail below with reference the drawings.

**[0122]** FIG. 18 is an exploded perspective view of a barrier included in a refrigerator according to another embodiment which shows the configuration of a refrigerating compartment, and FIG. 19 is a cross-sectional view taken along line I-I of FIG. 18.

**[0123]** Referring to FIGS. 18 and 19, a depression part 700 for a refrigerating compartment is formed on the right side surface of the barrier 100, that is, the surface exposed to the cold air of the refrigerating compartment 40.

**[0124]** Specifically, the depression part 700 for a refrigerating compartment is a part to perform the same function as the depression part 200 for the freezing compartment and includes a heat radiating means accommodating part 710, a blowing unit accommodating part 720 and a cold air passage 730 of a refrigerating compartment.

**[0125]** The heat radiating means 500 is accommodated in the heat radiating means accommodating part 710, and the blowing unit 130 is accommodated in the blowing

unit accommodating part 720. The blowing unit 130a is implemented using the same type of blowing unit as the blowing unit 130 provided in the depression part 200 for a freezing compartment. That is, a blowing unit for cold air circulation of the freezing compartment and a blowing unit for cold air circulation of the refrigerating compartment are independently provided in the barrier 100 of the embodiment of the present invention, and these blowing units are arranged in front and rear directions. Furthermore, the blowing unit 130a includes a motor 132a, a blowing fan 134a and a shroud 136a.

**[0126]** Furthermore, the blowing unit accommodating part 720 is depressed greater than the heat radiating means accommodating part 710 and the cold air passage 730 for a refrigerating compartment, like the blowing unit accommodating part 720 for a freezing compartment. Furthermore, the heat radiating means accommodating part 710 and the blowing unit accommodating part 720 is smoothly coupled to each other by the coupling part 740 extended to be tilted. Furthermore, a cold air guide 722 is formed on the upper end of the heat radiating means accommodating part 710 to allow the cold air passing through the heat radiating means accommodating part 710 to be concentrated on the blowing unit accommodating part 720.

**[0127]** Furthermore, the outlet 139 of the shroud 136 constituting the blowing unit 130 may be formed to have a width identical to that of the start end of the cold air passage 730 for the refrigerating compartment. Furthermore, the cold air passage 730 for a refrigerating compartment is formed respectively on the front and rear of the barrier 100 so as not to be interference with the cold air passage 230 for the freezing compartment as described above. That is, the cold air passage formed on the front of the barrier 100 is extended from the outlet 139 of the shroud 136 to be perpendicular thereto. Furthermore, the cold air passage formed on the rear of the barrier 100 is branched from the cold air passage formed on the front of the cold air passage and extended upward and backward, and at any point, extended upward to be perpendicular thereto.

**[0128]** Meanwhile, the depression part 700 of a refrigerating compartment is shielded by a barrier cover 600 for a refrigerating compartment like the depression part 200 of a freezing compartment. Furthermore, the barrier cover 600 for a refrigerating compartment may be also made of a single plate or a number of plates. Furthermore, a number of cold air outlets 610 may be formed along the cold air passage 730 for a refrigerating compartment in a part, which covers the cold air passage 730 for a refrigerating compartment, of the barrier cover 600 for a refrigerating compartment. Furthermore, a cold air inlet 620 may be formed in a part, which covers the heat radiating means accommodating part 710, of the barrier cover 600 for a refrigerating compartment. Specifically, the cold air inlet 620 may be formed on the rear side of the lower end of the barrier cover 600 for a refrigerating compartment. Furthermore, a mount 640 is extended

even on the edge of the barrier cover 600 for a refrigerating compartment to allow fixation to the barrier 100. Furthermore, a drain fan 120 is provided on the bottom of the heat radiating means accommodating part 710 which is the same as described above. With respect the drain fan 120, a drain fan for a freezing compartment and a drain fan for a refrigerating compartment may be respectively provided and two depression parts may be formed side by side on one drain fan.

**[0129]** Meanwhile, the heat radiating means 500 accommodated in the heat radiating means accommodating part 710 may be implemented such that a number of heat radiating pins 520 are formed on the whole surface of a heat radiating plate 510 corresponding to the size of the heat radiating means accommodating part 710 as shown in the drawings. When the heat radiating means 500 is tightly contacted with the heat radiating means accommodating part 710, heat-exchange is generated due to the cold air of the evaporator accommodating part 210 and heat conduction. That is, the cold air of the evaporator accommodating part 210 is delivered sequentially to the partition wall for division into the evaporator accommodating part 210 and the heat radiating means accommodating part 710, the heat radiating plate 510 and the heat radiating pins 520. Furthermore, when the cold air of the refrigerating compartment is introduced into the heat radiating means accommodating part 710 through the cold air inlet 620 by the blowing unit 130, the cold air of the refrigerating compartment is heat-exchanged with the heat radiating means 500. Furthermore, after the cold air of the refrigerating compartment introduced into the heat radiating means accommodating part 710 has been heat-exchanged with the heat radiating means 500 and cooled, the cold air is again discharged into the refrigerating compartment 40 through the cold air outlet 610.

**[0130]** According to the above-described structure, the cold air within the freezing compartment 30 is circulated along the freezing compartment 30 and the depression part 200 for a freezing compartment inside the barrier 100 and the cold air within the refrigerating compartment 40 is circulated along the refrigerating compartment 40 and the depression part 700 for a refrigerating compartment inside the barrier 100. Accordingly, the cold air of the freezing compartment and the cold air of the refrigerating compartment are not mixed with each other. As a result, smell which is generated from foods stored in the freezing compartment 30 or foods stored in the refrigerating compartment, is not permeated in the ice of a ice compartment (not shown).

**[0131]** In addition, since the blowing unit for cold air circulation of the freezing compartment and the blowing unit for cold air circulation of the refrigerating compartment are separately provided, there is an advantage in that temperatures of the freezing compartment and the refrigerating compartment are independently controlled.

**[0132]** For example, when a freezing cycle is operated in order to cool the freezing compartment, the evaporator 110 is cooled, and the cold air passing through the evap-

orator 110 is supplied into the inside of the freezing compartment. Furthermore, the cooling of the refrigerating compartment is possible not only while the freezing cycle is operated but also while the freezing cycle is stopped.

That is, when the evaporator 110 has a temperature that is lower than a setting temperature for the refrigerating compartment even though the freezing cycle is stopped, the cold air would be delivered to the heat radiating means 500. Furthermore, the blowing unit 130 accommodated in the depression part 700 for a refrigerating compartment of the barrier 100 is operated, so that the cold air of the refrigerating compartment is heat-exchanged with the heat radiating means 500.

**[0133]** FIG. 20 is an exploded perspective view of a barrier included in a refrigerator according to another embodiment which shows the configuration of a refrigerating compartment, and FIG. 21 is a cross-sectional view taken along line VI-VI of FIG. 18.

**[0134]** Referring to FIGS. 20 and 21, the structure of the barrier according to this embodiment is almost same as the structure of the barrier of earlier embodiment and there is a difference in that an evaporator 500 for a refrigerating compartment made of a refrigerant pipe instead of a heat radiating member is provided. Accordingly, parts different from the configuration of the fourth embodiment will be only described.

**[0135]** Specifically, an evaporator 500a for a refrigerating compartment is separately accommodated in the evaporator accommodating part 710a for a refrigerating compartment corresponding to the heat radiating part 710 of the fourth embodiment, so that the temperatures of the freezing compartment 30 and the refrigerating compartment 40 can be independently controlled.

**[0136]** More specifically, an expansion valve for the refrigerating compartment and an expansion valve for the freezing compartment may be in parallel connected to each other at the outlet of a condenser constituting the freezing cycle, and the evaporator 110 for the freezing compartment and the evaporator 500a for the refrigerating compartment may be connected to the respective expansion valves. In an alternative method, the evaporator 110 for the freezing compartment and the evaporator 500a for the refrigerating compartment may be in series connected to each other.

**[0137]** Furthermore, in this embodiment, the evaporator 500a for the freezing compartment is composed only of a refrigerant pipe without having separate heat deliver pins, but the present invention is not limited thereto, an evaporator the same type of the evaporator 110 for the freezing compartment may be also mounted.

**[0138]** Meanwhile, a heat insulating member may be attached to the part of the rear surface of the barrier cover 600 which covers the evaporator 500 for the refrigerating compartment. For example, a vacuum heat insulating member (vacuum insulation plate) is attached to the rear surface of the barrier cover 600, thereby preventing a phenomenon in which the front surface of the barrier cover 600 for the refrigerating compartment that covers the

evaporator 500 for the refrigerating compartment is excessively cooled and covered with frost. Of course, the heat insulating member may be mounted even on the rear surface of the barrier cover 600 of the refrigerating compartment which covers the cold air passage 730 for the refrigerating compartment.

**[0139]** In the unsatisfied state in which the temperature within the refrigerating compartment 40 is higher than a setting temperature, the structure as described above allows coolant to flow only into the evaporator 500 for the refrigerating compartment. Thereafter, the cold air generated by the evaporator 500 for the refrigerating compartment is forced to flow by the blowing unit 130 and moves along the cold air passage 730 for the refrigerating compartment to be discharged to the refrigerating compartment through the cold air outlet 610.

**[0140]** FIG. 22 is a flowchart showing a method for controlling the temperature of a refrigerator according to an embodiment of the present invention. A case in which a damper is mounted as an example of the distribution device 140 will be described below. Accordingly, the description is given by defining the damper 140 as the distribution device 140.

**[0141]** Referring to FIG. 22, the description is made under an assumption that a compressor (not shown) stops, the blowing fan 134 stops and the damper 140 is closed (S10).

**[0142]** Specifically, the control unit (not shown) of a refrigerator allows temperature sensors (not shown) mounted on the freezing compartment 30 and the refrigerating compartment 40 to detect the temperatures of the refrigerating compartment and the freezing compartment are detected (S11). Furthermore, the control unit receives the temperatures of the refrigerating compartment and the freezing compartment detected by the temperature sensors. Thereafter, whether the temperature  $T_R$  of the refrigerating-compartment is unsatisfied ( $T_R > T_a + dT$ ,  $T_a$  is a setting temperature for the refrigerating compartment, and  $dT$  is a set differential) or the temperature  $T_F$  of the freezing compartment is unsatisfied ( $T_F > T_b + dT$ ,  $T_b$  is setting temperature for the freezing compartment, and  $dT$  is a set differential) is determined (S12, S13 and S20).

**[0143]** If it is determined that the temperatures of the refrigerating compartment 40 and the freezing compartment 30 are all unsatisfied, the compressor and the blowing fan 134 are operated and the damper 140 is opened (S14), thereby allowing the cold air simultaneously to the refrigerating compartment 40 and the freezing compartment 30. Furthermore, when the cold air is supplied to the refrigerating compartment 40 and the freezing compartment 30, the temperatures of the respective compartments are periodically detected, and whether the temperature  $T_R$  of the refrigerating compartment reaches a satisfied state ( $T_R \leq T_a - dT$ ) is determined (S15). If the temperature of the refrigerating compartment reaches the satisfied state, the damper 140 is closed (S16) and when the satisfied state is not reached, the damper 140

is kept opened. In addition, if it is determined that the temperature of the refrigerating compartment reaches the satisfied state, the damper is closed and, at the same time, whether the temperature of the freezing compartment  $T_F$  reaches the satisfied state ( $T_F \leq T_b - dT$ ) is determined (S17). Furthermore, it is determined that the temperature of the freezing temperature reaches the satisfied state, the operations of the compressor and the blowing fan 134 are stopped (S18). In this flowchart, it is described that the determinations whether the temperatures of the refrigerating compartment and the freezing compartment reach the satisfied states are subsequently performed, but it should be noted that the detections of the temperatures of the compartments can be simultaneously made. In addition, as the detections of the temperatures of the compartments are simultaneously made, it is possible to simultaneously control the opening/closing of the damper and the operation of the blowing unit. In addition, depending on whether the power supply of the refrigerator is turned on (S19), the above-described control procedure is performed repeatedly or terminated.

**[0144]** Meanwhile, when it is determined that the temperature of the refrigerating compartment is in the satisfied state, whereas the temperature of the freezing compartment is in the unsatisfied state, the compressor and the blowing fan are operated, and the damper 140 is kept closed (S21) thereby allowing the cold air to be supplied only to the freezing compartment 30. Furthermore, when the cold air is supplied only to the freezing compartment, whether the temperature of the freezing compartment reaches the satisfied state is determined (S22). When it is determined that the satisfied state is reached, the operations of the compressor and the blowing fan 134 are stopped (S23). In addition, the step (S11) of detecting the temperatures of the refrigerating compartment 40 and the freezing compartment 30 is repeatedly performed.

**[0145]** Furthermore, when it is determined that the temperature of the refrigerating compartment is in the unsatisfied state, whereas the temperature of the freezing compartment is in the satisfied state, the control unit allows the blowing fan 134 to be operated and the damper 140 to be opened (S24). That is, when the temperature of the refrigerating compartment is only in the unsatisfied state, the control unit allows the cold air remained in the evaporator 110 to be circulated without operating the freezing cycle and therefore the refrigerating compartment to be cooled. In this case, as the blowing fan 134 is rotated, a part of the cold air of the freezing compartment may be introduced into the refrigerating compartment. In other words, the cold air of the freezing compartment introduced into the evaporator is forced to flow due to the operation of the blowing fan 134 to flow to be divided into the freezing compartment 30 and the refrigerating compartment 40. Accordingly, a part of the cold air of the freezing compartment 30 is introduced into the refrigerating compartment 40, so that the temperature of the refrigerating compartment 40 is lowered.

[0146] Specifically, while the damper 140 is opened, and the blowing fan 134 is operated in the state in which the compressor has been stopped, whether the temperature of the refrigerating compartment reaches the satisfied state is determined (S25). When it is determined that the satisfied state is reached, the blowing fan 134 is stopped and the damper 140 is closed (S26).

[0147] According to another method, even when the temperature of the refrigerating compartment is only in the unsatisfied state, the compressor may be operated to operate the freezing cycle. That is, since the load of the freezing compartment may increase when the refrigerating compartment is cooled by the cold air of the freezing compartment and the rest cold air of the evaporator, the refrigerating compartment may be controlled to be cooled along with the freezing compartment even when the temperature of the refrigerating compartment is only in the unsatisfied state. When the refrigerating compartment is excessively cooled, foods stored in the compartment may be in the danger of being frozen, but since the possibility in which the foods are damaged is low even when the cold air is more supplied in the state in which the temperature of the freezing compartment is in the satisfied state, it may be safe to operate the freezing cycle in the state in which the temperature of the refrigerating compartment is in the unsatisfied state.

[0148] Accordingly, the blowing fan 134 is operated, the damper 140 is opened, and, at the same time, the compressor is operated thereby lowering the temperature of the evaporator 110 and allowing the cold air generated by the evaporator 110 to flow to be divided into the refrigerating compartment 40 and the freezing compartment 30. Furthermore, when the temperature of the refrigerating compartment 40 reaches the satisfied state, it is possible to allow the supply of the cold air to be stopped. Since the setting temperature of the refrigerating compartment is about plus 3-5 degrees, the amount of the cold air to be supplied is not much larger. In order words, the time taken to cool the refrigerating compartment so as to be in the satisfied state is relatively shorter than the time taken to cool the freezing compartment. Accordingly, it is safe to more supply the cold air when the temperature of the freezing compartment is in the satisfied state.

## Claims

### 1. A refrigerator including:

a cabinet (10) having a storage space;  
a barrier (100) vertically formed in the storage space and configured to divide the storage space into a freezing compartment (30) and a refrigerating compartment (40) side by side, the barrier being filled with a heat insulator and having a depression part (200) formed on one side surface thereof;

a freezing compartment door (22) to open or close the freezing compartment;  
an evaporator (110) accommodated in a part of the depression part formed on one side surface of the barrier;  
a blowing unit (130) accommodated in another part of the depression part corresponding to a upper side of the evaporator; and  
a barrier cover (400) configured to shield the depression part by covering one side surface of the barrier,  
wherein the depression part includes  
an evaporator accommodating part (210) configured to accommodate the evaporator,  
a blowing unit accommodating part (220) configured to accommodate the blowing unit, and defined above the evaporator accommodating part; and  
a cold air passage (230) extending vertically from an upper end of the blowing unit accommodating part to allow the cold air to be guided into the freezing compartment and into the refrigerating compartment,  
wherein the blowing unit accommodating part is depressed further than the evaporator accommodating part,

### characterized in that

the refrigerator further comprises an ice compartment (60) mounted on a rear surface of the freezing compartment door, the ice compartment including:

an ice maker (61);  
an ice bin (62) disposed below the ice maker; and  
an ice maker cover (64) surrounding the ice maker and having a cold air inlet (611) formed in a side surface thereof,

wherein the depression part further comprises a branch passage (235) extending from a side edge of the cold air passage towards a front end of the barrier,  
wherein the barrier cover (400) further comprises:

an extended part extending to cover the branch passage; and  
a cold air outlet (411) formed in the extended part,  
and wherein the cold air inlet (611) and the cold air outlet (411) are in communication with each other, to supply cold air to the ice maker.

### 2. The refrigerator of claim 1, wherein the blowing unit includes a motor (132),

a blowing fan (134) coupled to the motor, and a shroud (136) configured to accommodate the blowing fan and to guide suction and discharge of air.

3. The refrigerator of claim 2, wherein the shroud includes an orifice (134c) formed therein to guide the cold air rising from the evaporator to the blowing fan, and the surface of the shroud, on which the orifice is formed, is spaced from the depressed surface of the blowing fan accommodating part. 5 10
4. The refrigerator of claim 3, wherein the motor and the shroud are fixed to the barrier cover. 15
5. The refrigerator of claim 3, wherein the shroud includes an outlet (139) having a width formed to correspond to a width of the cold air passage 20
6. The refrigerator of claim 2, wherein the blowing fan includes a centrifugal fan. 25
7. The refrigerator of claim 2, wherein the blowing fan includes a turbo fan. 30
8. The refrigerator of claim 1, wherein the evaporator and the cold air passage are located to be closer to the freezing compartment, and the heat insulator is filled within a part opposite to the depression part. 35
9. The refrigerator of claim 8, wherein the heat insulator formed in a part opposite to the evaporator accommodating part and the cold air passage has a thickness thicker than that of the heat insulator formed in a part opposite to the blowing unit accommodating part. 40

#### Patentansprüche

##### 1. Kühlschrank, mit:

einem Gehäuse (10) mit einem Lagerraum; einer Barriere (100), die im Lagerraum vertikal ausgebildet und konfiguriert ist, den Lagerraum in eine Gefrierabteilung (30) und eine Kühlabteilung (40) zu unterteilen, die nebeneinander liegen, wobei die Barriere mit einem Wärmedämmstoff gefüllt ist und ein Vertiefungsteil (200) aufweist, das an einer Seitenfläche davon ausgebildet ist; einer Gefrierabteilungstür (22) zum Öffnen oder Schließen der Gefrierabteilung; einem Verdampfer (110), der in einem Teil des Vertiefungsteils untergebracht ist, das an einer Seitenfläche der Barriere ausgebildet ist; einer Gebläseeinheit (130), die in einem ande-

ren Teil des Vertiefungsteils untergebracht ist, das einer Oberseite des Verdampfers entspricht; und einer Barrierenabdeckung (400), die konfiguriert ist, das Vertiefungsteil durch Abdecken einer Seitenfläche der Barriere abzuschirmen, wobei das Vertiefungsteil aufweist ein Verdampferaufnahme teil (210), das konfiguriert ist, den Verdampfer aufzunehmen, ein Gebläseeinheitenaufnahme teil (220), das konfiguriert ist, die Gebläseeinheit aufzunehmen und über dem Verdampferaufnahme teil definiert ist; und einen Kaltluftkanal (230), der sich vertikal von einem oberen Ende des Gebläseeinheitenaufnahme teils erstreckt, um es zu ermöglichen, dass Kaltluft in die Gefrierabteilung und in die Kühlabteilung geleitet wird, wobei das Gebläseeinheitenaufnahme teil weiter versenkt ist als das Verdampferaufnahme teil, **dadurch gekennzeichnet, dass** der Kühlschrank ferner ein Eisfach (60) aufweist, das an einer Rückseite der Gefrierabteilungstür angebracht ist, wobei das Eisfach aufweist:

einen Eisbereiter (61); einen Eisbehälter (62), der unter dem Eisbereiter angeordnet ist; und eine Eisbereiterabdeckung (64), die den Eisbereiter umgibt und einen Kaltluftereinlass (611) aufweist, der in einer Seitenfläche davon ausgebildet ist,

wobei das Vertiefungsteil ferner einen Zweigkanal (235) aufweist, der sich von einer Seitenkante des Kaltluftkanals zu einem vorderen Ende der Barriere erstreckt, wobei die Barrierenabdeckung (400) ferner aufweist:

ein Erweiterungsteil, das sich so erstreckt, dass es den Zweigkanal bedeckt; und einen Kaltluftauslass (411), der im Erweiterungsteil ausgebildet ist, und wobei der Kaltluftereinlass (611) und der Kaltluftauslass (411) miteinander in Verbindung stehen, um dem Eisbereiter Kaltluft zuzuführen.

##### 2. Kühlschrank nach Anspruch 1, wobei die Gebläseeinheit aufweist:

einen Motor (132), einen Gebläseventilator (134), der mit dem Motor gekoppelt ist, und ein Luftleitblech (136), das konfiguriert ist, den Gebläseventilator aufzunehmen und das An-

saugen und Ausstoßen von Luft zu leiten.

3. Kühlschrank nach Anspruch 2, wobei das Luftleitblech eine Öffnung (134c) aufweist, die darin ausgebildet ist, um die vom Verdampfer aufsteigende Kaltluft zum Gebläseventilator zu leiten, und die Oberfläche des Luftleitblechs, an der die Öffnung ausgebildet ist, von der vertieften Oberfläche des Gebläseventilatoraufnahmeteils beabstandet ist. 5 10
4. Kühlschrank nach Anspruch 3, wobei der Motor und das Luftleitblech an der Barrierenabdeckung befestigt sind. 15
5. Kühlschrank nach Anspruch 3, wobei das Luftleitblech einen Auslass (139) aufweist, der eine Breite aufweist, die so ausgebildet ist, dass sie einer Breite des Kaltluftkanals entspricht. 20
6. Kühlschrank nach Anspruch 2, wobei der Gebläseventilator einen Radialventilator aufweist. 25
7. Kühlschrank nach Anspruch 2, wobei der Gebläseventilator ein Turbogebälse aufweist. 30
8. Kühlschrank nach Anspruch 1, wobei der Verdampfer und der Kaltluftkanal so angeordnet sind, dass sie näher zur Gefrierabteilung liegen, und der Wärmedämmstoff in einen Teil gegenüber dem Vertiefungsteil gefüllt ist. 35
9. Kühlschrank nach Anspruch 8, wobei der Wärmedämmstoff, der in einem Teil gegenüber dem Verdampferaufnahmeteil und dem Kaltluftkanal ausgebildet ist, eine Dicke aufweist, die dicker als die des Wärmedämmstoffs ist, der in einem Teil gegenüber dem Gebläseeinheitsaufnahmeteil ausgebildet ist. 40

## Revendications

### 1. Réfrigérateur, comprenant :

une carrosserie (10) ayant un espace de stockage ;  
 une cloison (100) verticale formée dans l'espace de stockage et prévue pour partager l'espace de stockage en un compartiment de congélation (30) et un compartiment de réfrigération (40) juxtaposés, ladite cloison étant remplie d'un isolant thermique et comportant une partie évidée (200) formée sur une de ses surfaces latérales ;  
 une porte (22) de compartiment de congélation permettant d'ouvrir ou de fermer le compartiment de congélation ;  
 un évaporateur (110) logé dans une zone de la partie évidée formée sur une surface latérale de

la cloison ;

une unité de ventilation (130) logée dans une autre zone de la partie évidée correspondant à un côté supérieur de l'évaporateur ; et  
 un capot (400) de cloison prévu pour protéger la partie évidée en recouvrant une surface latérale de la cloison,

la partie évidée présentant

une zone de logement d'évaporateur (210) prévue pour recevoir l'évaporateur,  
 une zone de logement d'unité de ventilation (220) prévue pour recevoir l'unité de ventilation, et définie au-dessus de la zone de logement d'évaporateur ; et

un passage d'air froid (230) s'étendant verticalement depuis une extrémité supérieure de la zone de logement d'unité de ventilation pour permettre le guidage de l'air froid vers le compartiment de congélation et le compartiment de réfrigération,

la zone de logement d'unité de ventilation étant plus profonde que la zone de logement d'évaporateur,

### caractérisé en ce que

ledit réfrigérateur comprend en outre un compartiment à glaçons (60) monté sur une surface arrière de la porte de compartiment de congélation, ledit compartiment à glaçons comportant :

une machine à glaçons (61) ;

un bac à glaçons (62) disposé sous la machine à glaçons ; et

un couvercle (64) de machine à glaçons entourant la machine à glaçons et présentant une admission d'air froid (611) formée dans une de ses surfaces latérales,

la partie évidée présentant en outre un passage latéral (235) s'étendant depuis un bord latéral du passage d'air froid vers une extrémité avant de la cloison,

le capot (400) de cloison comprenant en outre :

une partie latérale s'étendant pour couvrir le passage latéral ; et

une sortie d'air froid (411) formée dans la partie latérale,

l'admission d'air froid (611) et la sortie d'air froid (411) communiquant l'une avec l'autre pour refouler l'air froid vers la machine à glaçons.

2. Réfrigérateur selon la revendication 1, où l'unité de ventilation comprend un moteur (132), un ventilateur (134) relié au moteur, et une coque (136) prévue pour recevoir le ventilateur et pour guider l'air aspiré et refoulé.

3. Réfrigérateur selon la revendication 2, où un orifice (134c) est ménagé dans la coque pour guider l'air froid passant de l'évaporateur au ventilateur, et où la surface de la coque où l'orifice est ménagé est espacée de la surface évidée de la zone de logement de ventilateur. 5
4. Réfrigérateur selon la revendication 3, où le moteur et la coque sont fixés sur le capot de cloison. 10
5. Réfrigérateur selon la revendication 3, où la coque présente une sortie (139) dont la largeur correspond à la largeur du passage d'air froid.
6. Réfrigérateur selon la revendication 2, où le ventilateur comprend un ventilateur centrifuge. 15
7. Réfrigérateur selon la revendication 2, où le ventilateur comprend un turboventilateur. 20
8. Réfrigérateur selon la revendication 1, où l'évaporateur et le passage d'air froid sont disposés pour être proches du compartiment de congélation, et où l'isolant thermique est chargé dans une zone opposée à la partie évidée. 25
9. Réfrigérateur selon la revendication 8, où l'isolant thermique est formé dans une zone opposée à la zone de logement d'évaporateur et où le passage d'air froid a une épaisseur supérieure à celle de l'isolant thermique formé dans une zone opposée à la zone de logement d'unité de ventilation. 30

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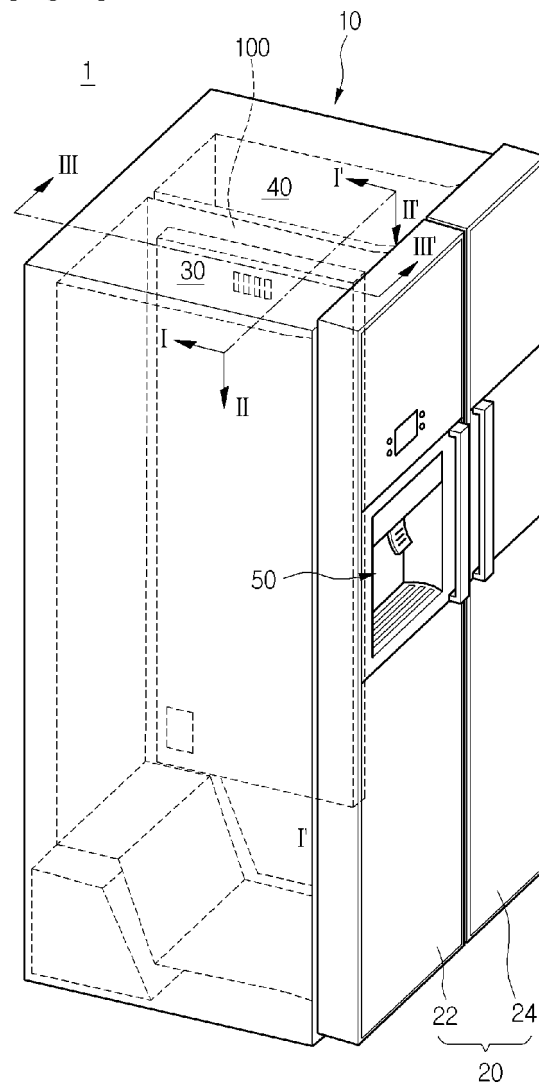
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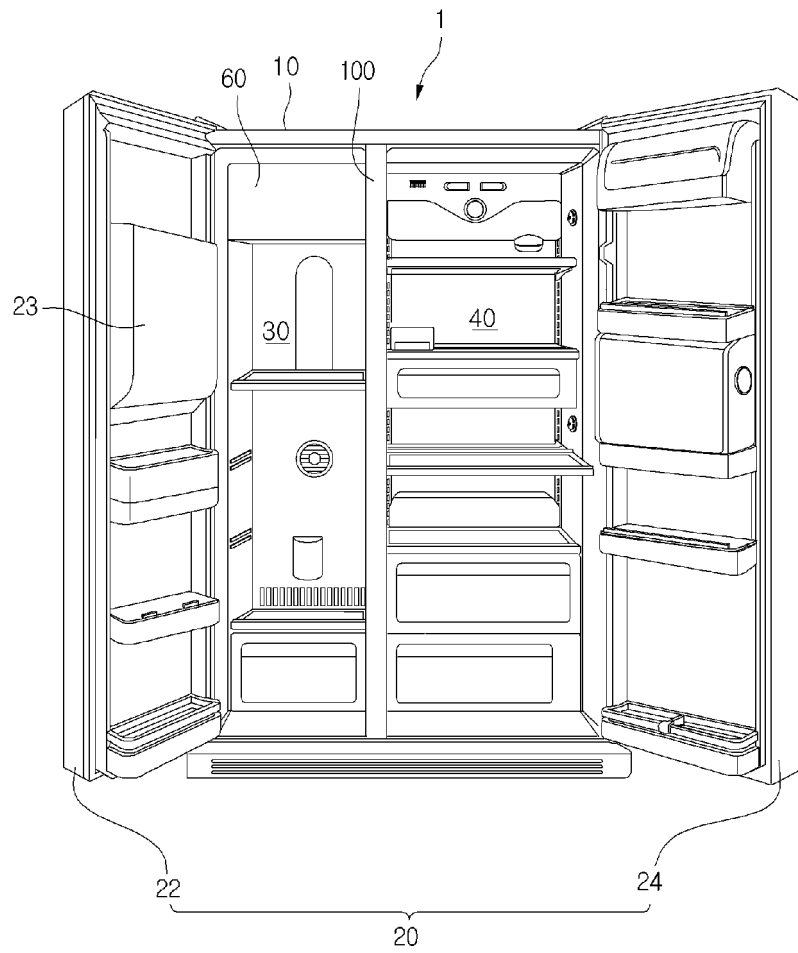
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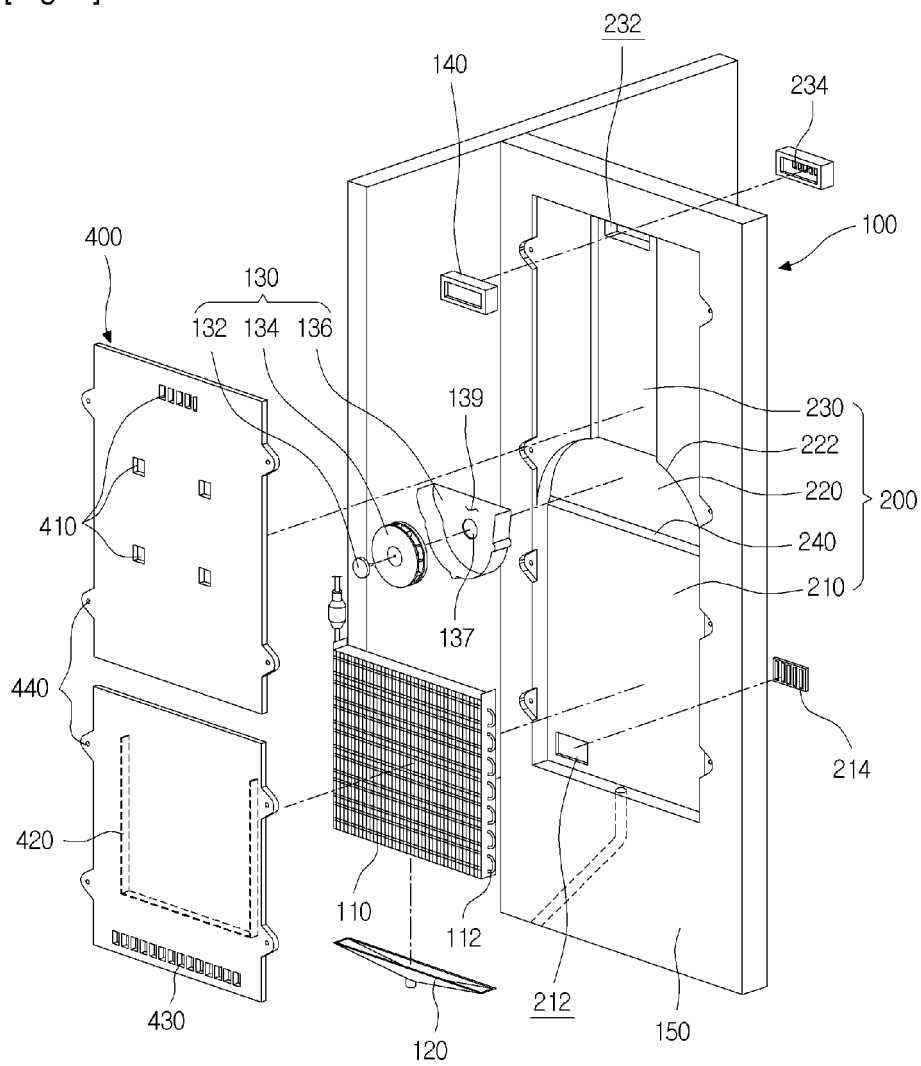
[Fig. 1]



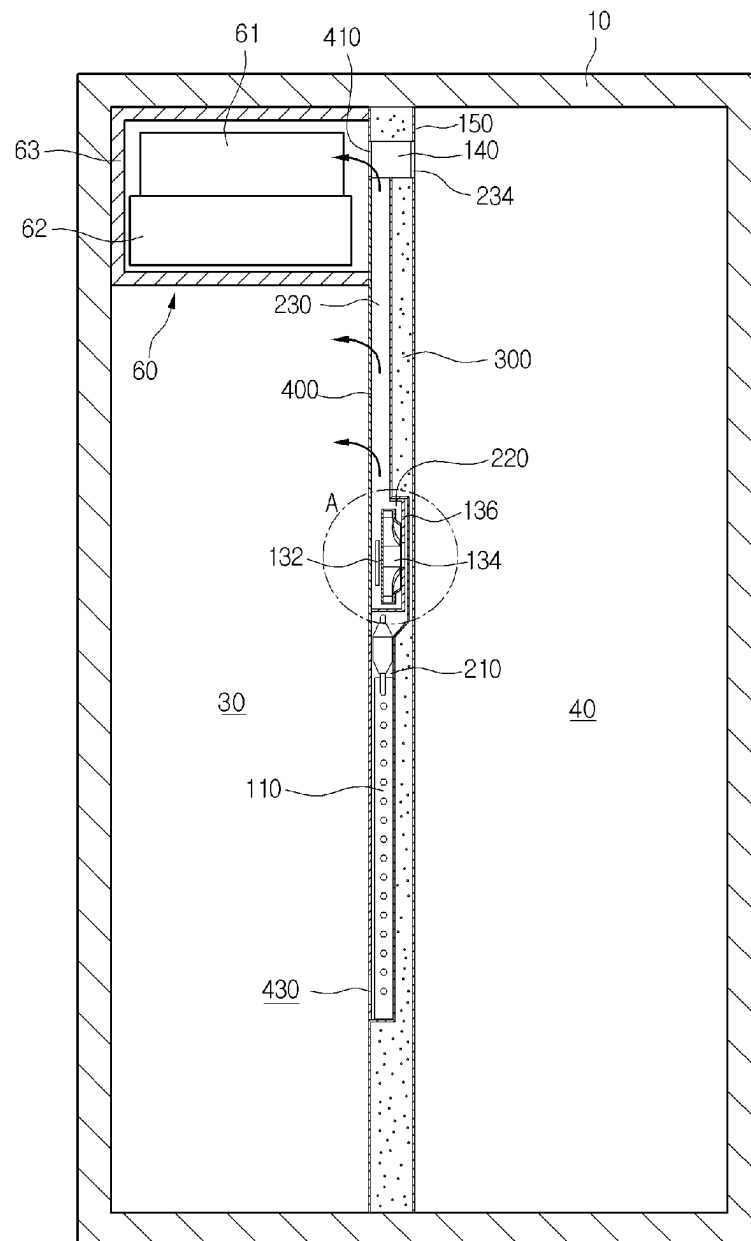
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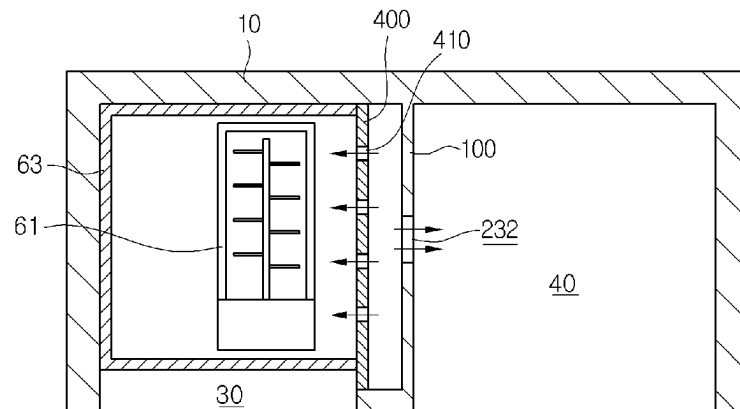
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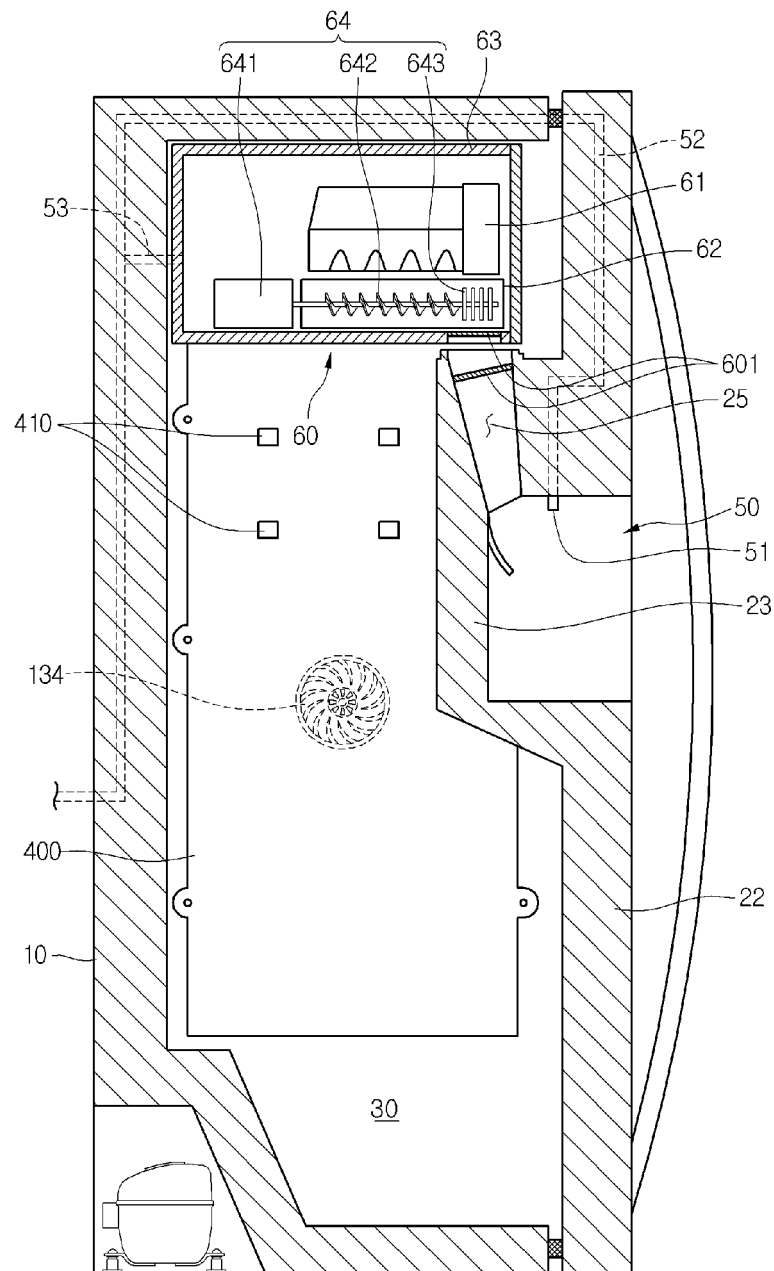
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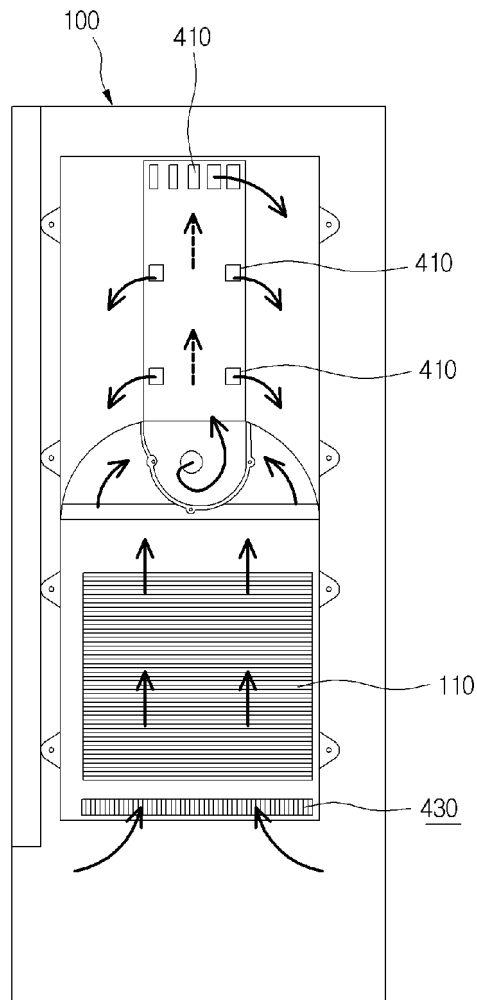
[Fig. 5]



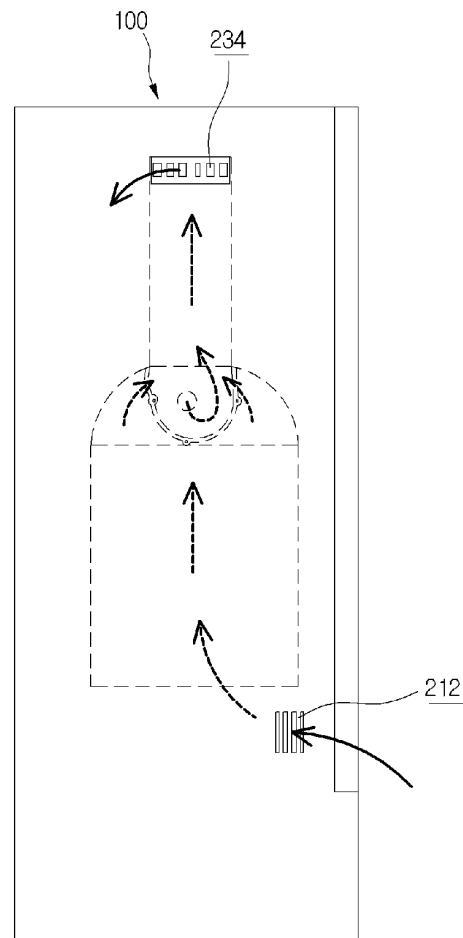
[Fig. 6]



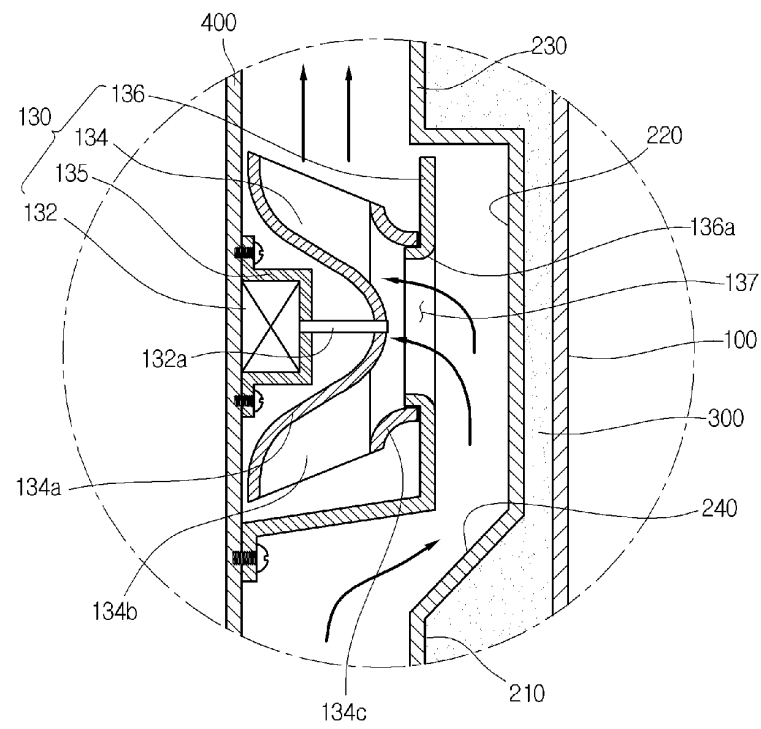
[Fig. 7]



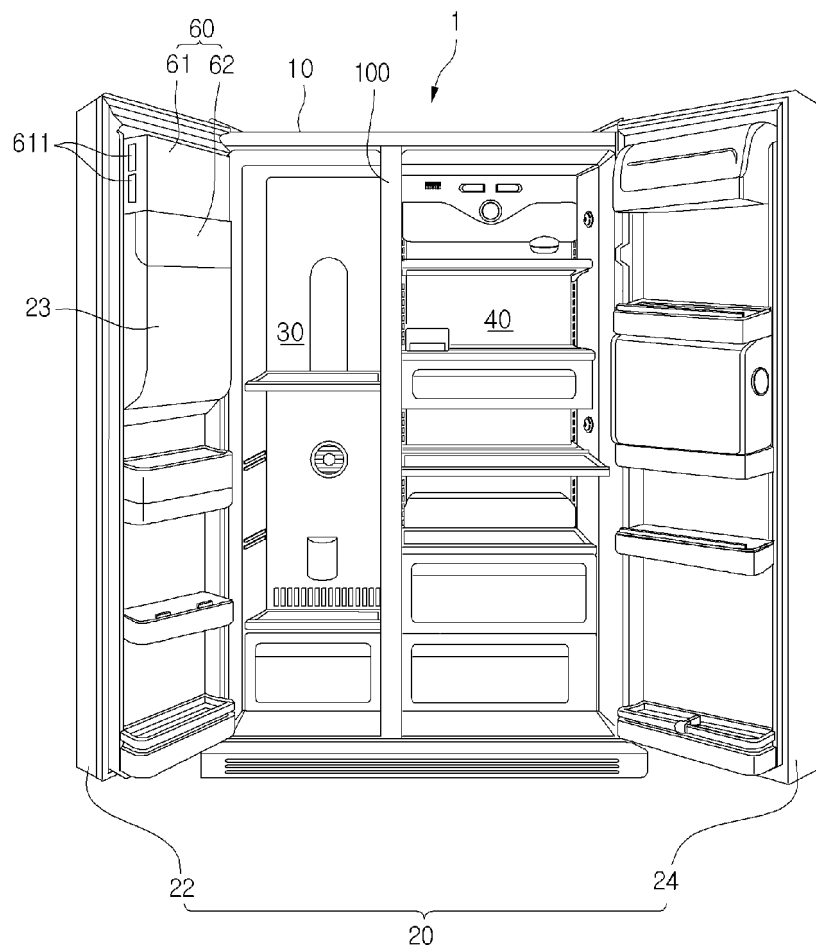
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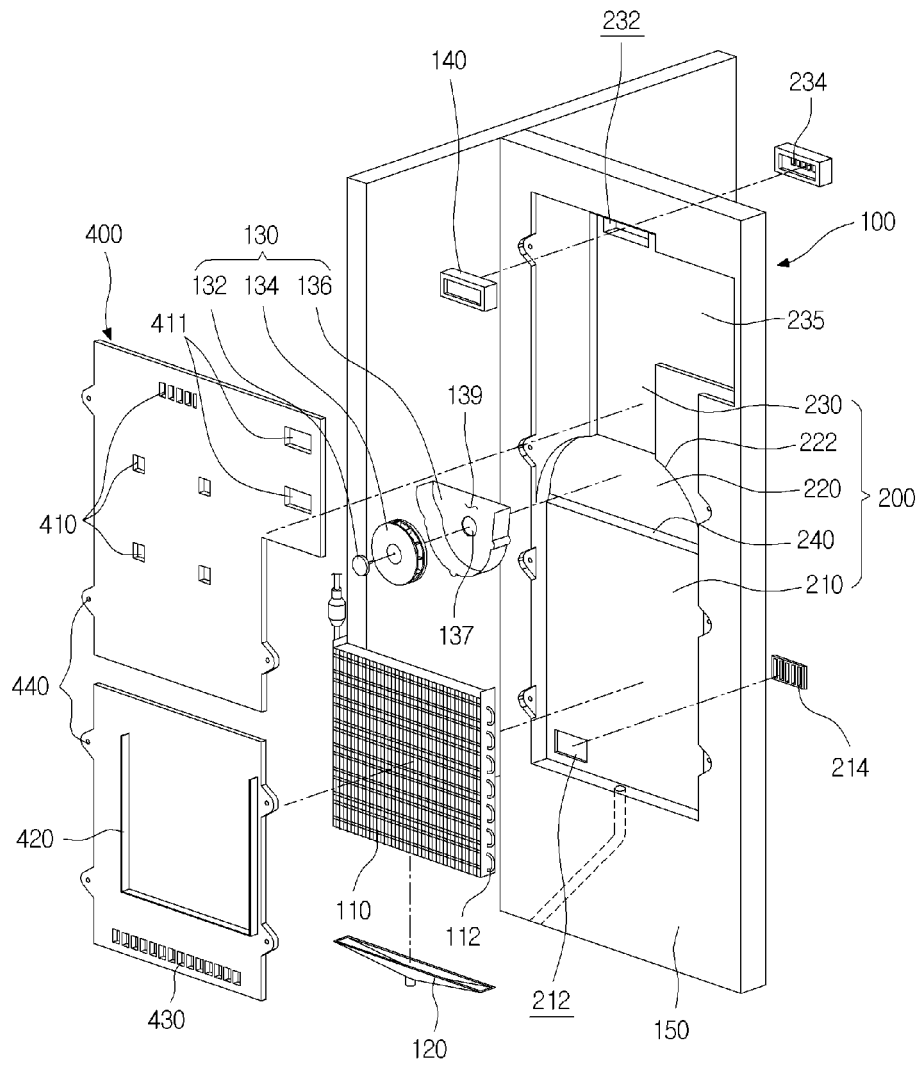
[Fig. 9]



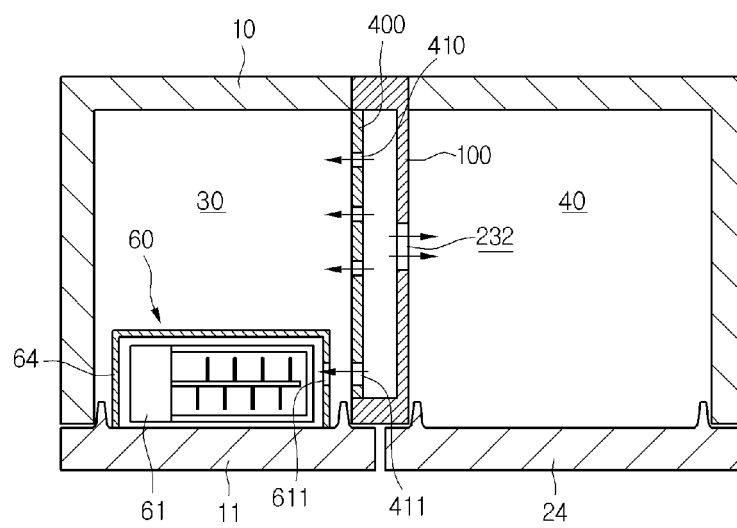
[Fig. 10]



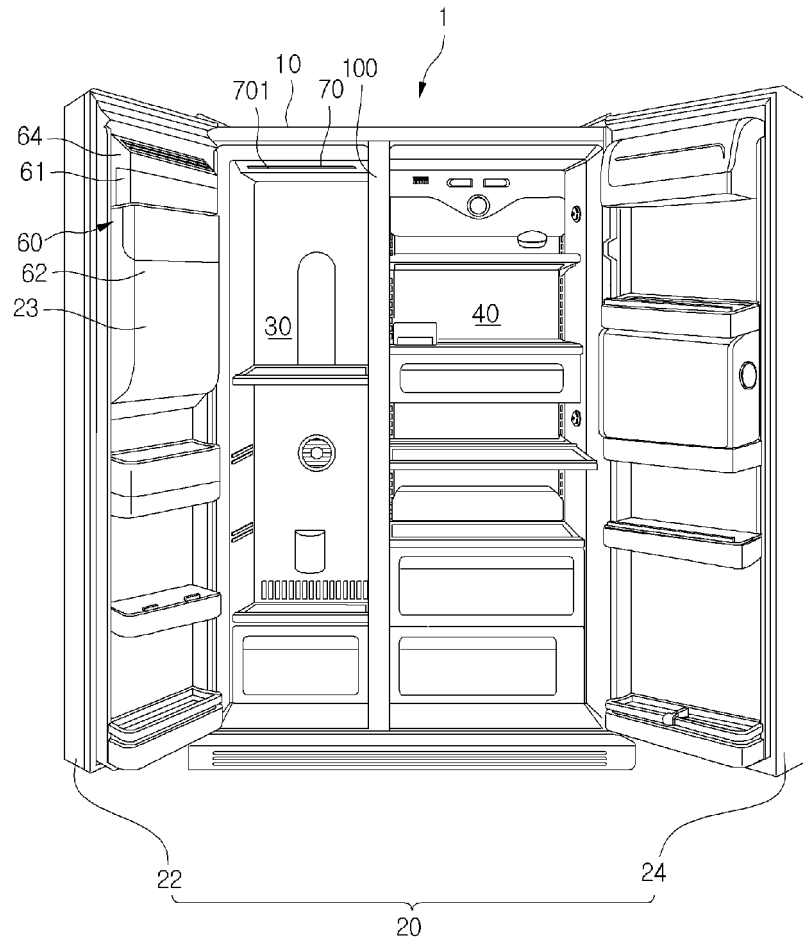
[Fig. 11]



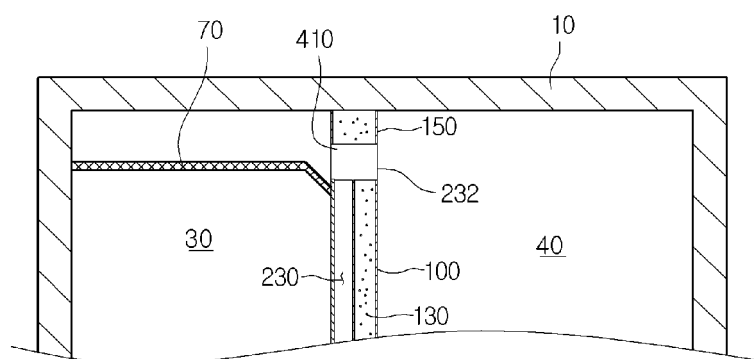
[Fig. 12]



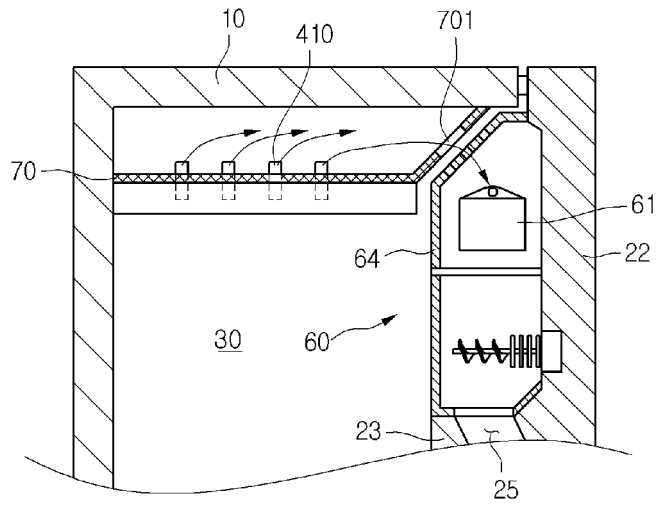
[Fig. 13]



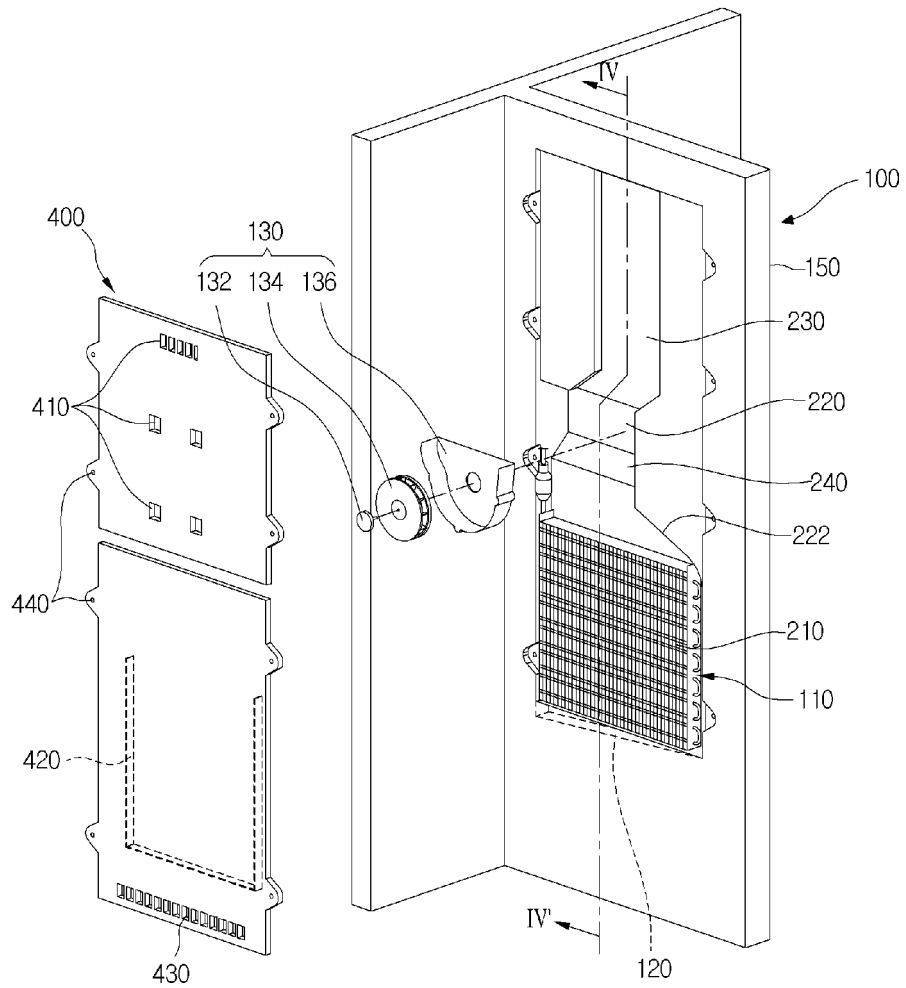
[Fig. 14]



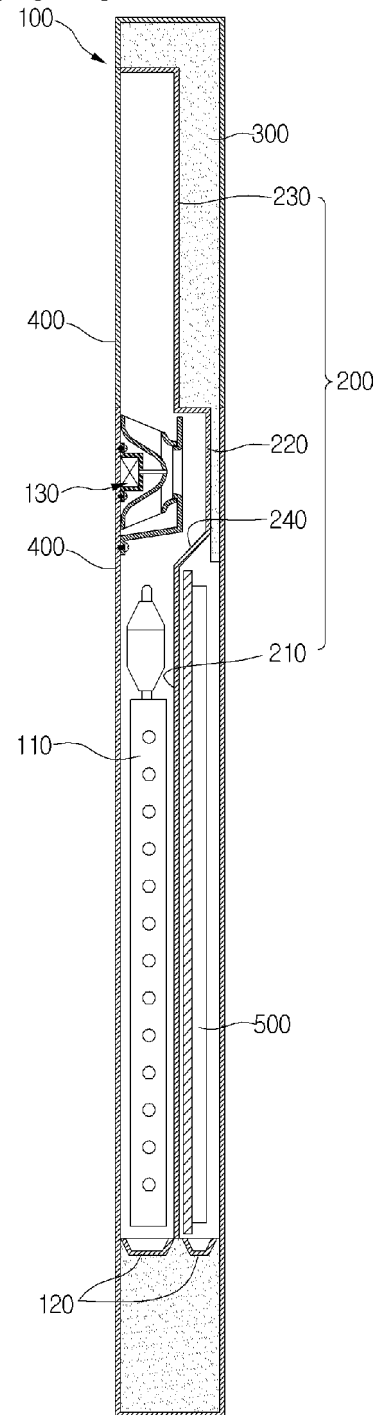
[Fig. 15]



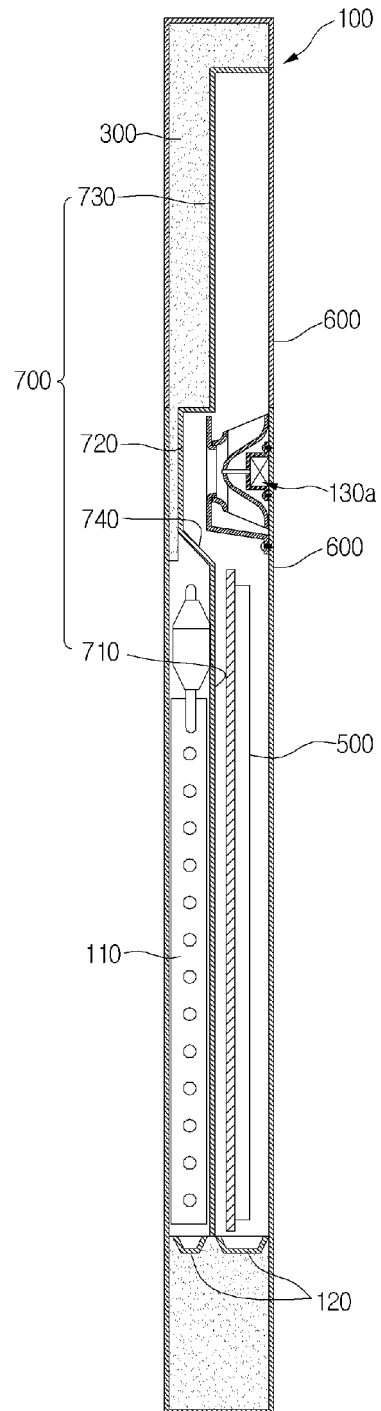
[Fig. 16]



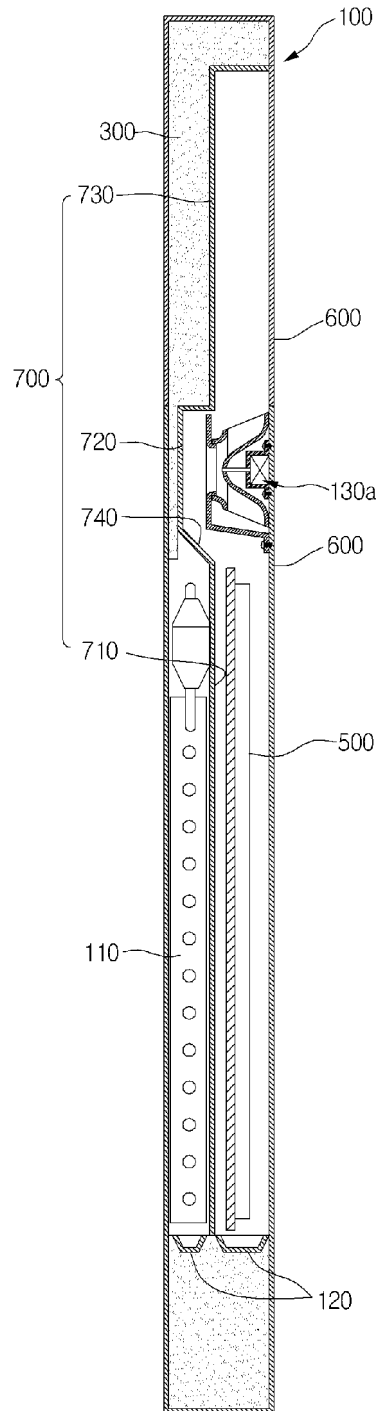
[Fig. 17]



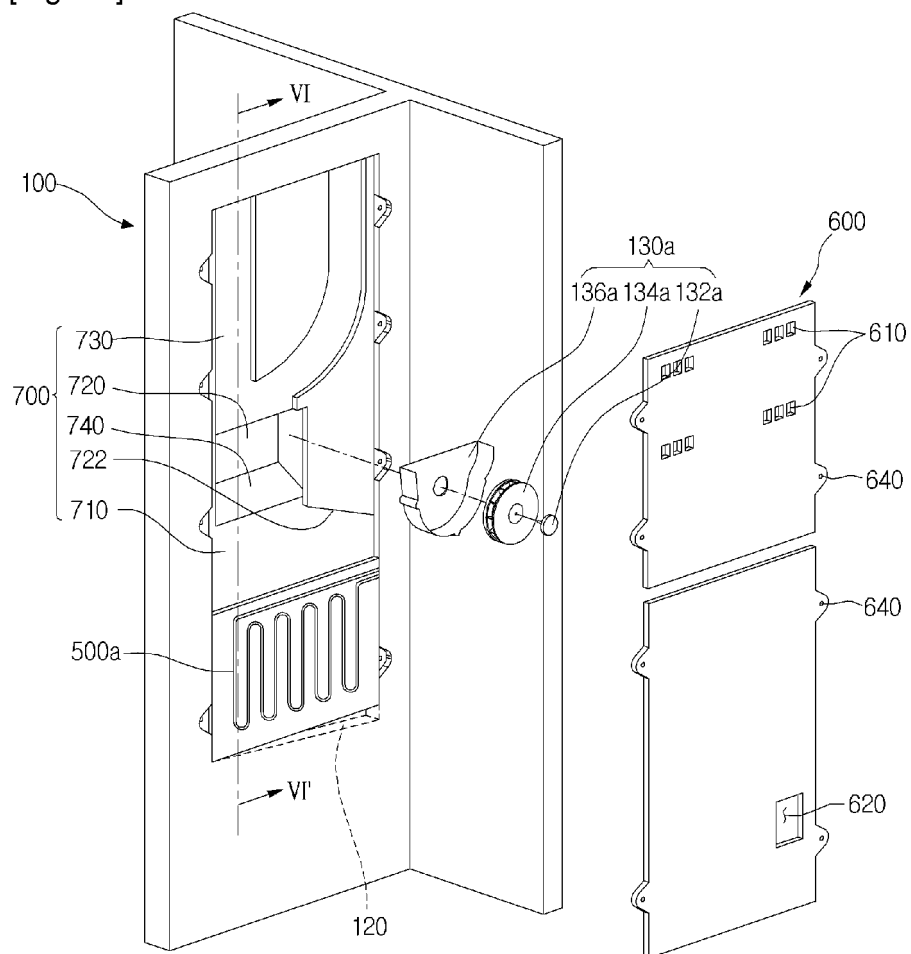
[Fig. 18]



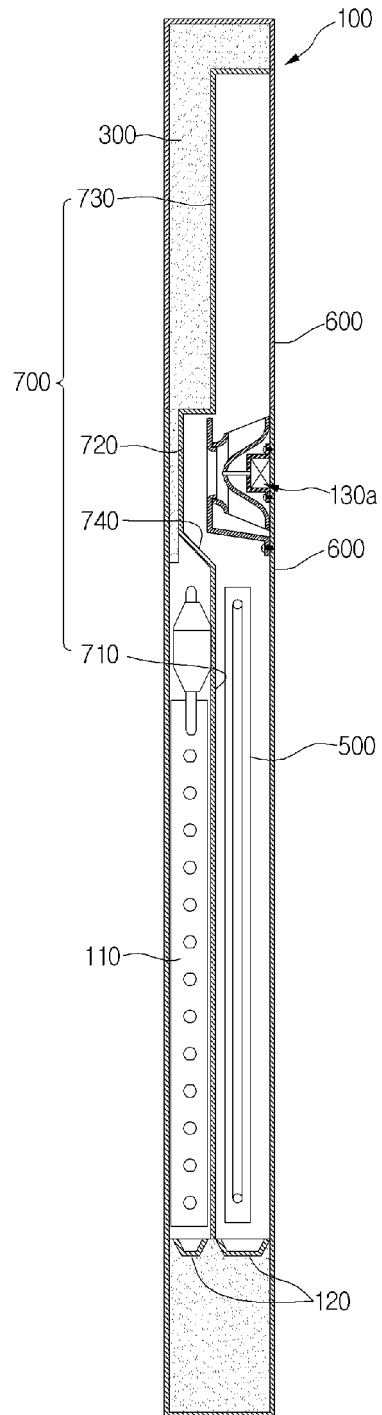
[Fig. 19]



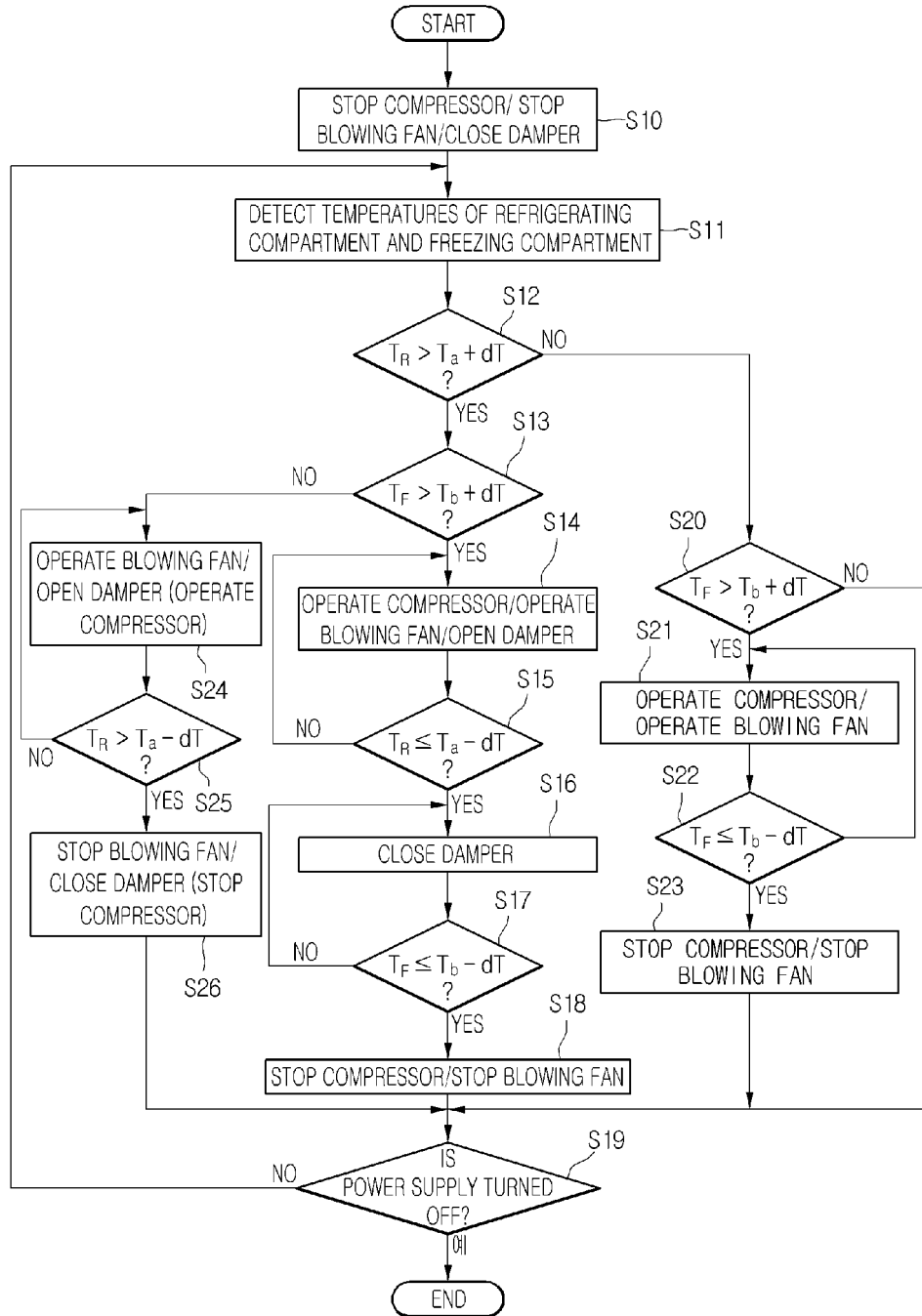
[Fig. 20]



[Fig. 21]



[Fig. 22]



**REFERENCES CITED IN THE DESCRIPTION**

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