(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 2 559 960 B1

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
29.05.2019 Bulletin 2019/22

(51) Int Cl.:
F25D 17/06 *(2006.01)*

(21) Application number: **12180410.8**

(22) Date of filing: **14.08.2012**

(54) **Refrigerator and control method thereof**

Kühlschrank und Steuerungsverfahren dafür

Réfrigérateur et son procédé de commande

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR

(30) Priority: **16.08.2011 KR 20110081383**

(43) Date of publication of application:
20.02.2013 Bulletin 2013/08

(73) Proprietor: **Samsung Electronics Co., Ltd.**
Suwon-si, Gyeonggi-do, 443-742 (KR)

(72) Inventors:
- **Ryu, Dong Nyeol**
  Gyeonggi-do (KR)
- **Jung, Soon Dong**
  Gyeonggi-do (KR)
- **Han, Je Deok**
  Gyeonggi-do (KR)

(74) Representative: **Grünecker Patent- und Rechtsanwälte**
PartG mbB
Leopoldstraße 4
80802 München (DE)

(56) References cited:
EP-A1- 0 553 426
WO-A1-02/16843
KR-A- 20100 076 089

EP 2 559 960 B1

Description

BACKGROUND

1. Field

[0001] The following description relates to a refrigerator having a storage compartment configured for a converted use as a freezing compartment or a refrigerating compartment.

2. Description of the Related Art

[0002] In general, a refrigerator is an apparatus configured for keeping food fresh by using a cold air flow generated from a cooling cycle. A storage compartment of the refrigerator is divided into a refrigerating compartment configured to keep food refrigerated by maintaining the temperature at approximately 3° C, and a freezing compartment configured to keep food frozen by maintaining the temperature at approximately -20° C,

[0003] The amount of the food stored in the refrigerating compartment is generally more than the amount of the food stored in the freezing compartment, and therefore, the refrigerating compartment is configured to be provided with a larger size than the freezing compartment. Also, because the refrigerating compartment is more frequently accessed, the refrigerating compartment is provided at a lower portion of the refrigerator while the freezing compartment is provided at an upper portion of the refrigerator.

[0004] A cold air flow supply system of such refrigerator may be composed of in various methods. For example, a method to control the temperature of the freezing compartment at below 0° C and the temperature of the refrigerating compartment above 0° C by installing a damper apparatus at a cold air flow supply path for the refrigerating compartment and by adequately opening/closing the damper apparatus, while supplying the cold air flow generated from a single evaporating apparatus, is used.

[0005] Also, a refrigerator having the freezing compartment converted to the refrigerating compartment or the freezing compartment turned off for a use may be considered, and an example of such a refrigerator has been suggested in Korean patent publication No. 10-2010-0076089.

[0006] According to the publication above, a refrigerator is provided with the damper apparatus configured to control the supply of the cold air flow to the freezing compartment and a means for heating the freezing compartment. This refrigerator is configured to limit the cold air flow supply to the freezing compartment by the use of the damper apparatus in order to convert the freezing compartment to the refrigerating compartment, and at the same time, to heat up the freezing compartment. However, this method consumes additional energy, thereby increasing costs.

SUMMARY

[0007] Therefore, the invention provides a refrigerator according to one of the claims 1 to 14.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] These and/or other aspects of the invention will become apparent and more readily appreciated from the following description of the embodiments, taken in conjunction with the accompanying drawings of which:

FIG. 1 is a front view showing an inside structure of a refrigerator in accordance with an embodiment of the present disclosure.

FIG. 2 is a front view showing a structure of a converting compartment having a duct unit of a refrigerator of FIG. 1 separated in accordance with the embodiment of the present disclosure.

FIG. 3 is a schematic side sectional view of the refrigerator of FIG. 1.

FIG. 4 is an enlarged view illustrating a duct unit of the refrigerator of FIG. 3.

FIG. 5 is an exploded perspective view illustrating a duct unit of a refrigerator in accordance with the embodiment of the present disclosure.

FIG. 6 is an exploded perspective rear view of the duct unit of FIG. 5.

FIG. 7 is a front view illustrating a separating panel of the duct unit of FIG. 5.

FIG. 8 is a view illustrating a control method in a case that a converting compartment of a refrigerator is used for a freezing purpose in accordance with the embodiment of the present disclosure.

FIG. 9 is a view illustrating a control method in a case that a converting compartment of a refrigerator is used for a refrigerating purpose in accordance with the embodiment of the present disclosure.

FIG. 10 is a view illustrating a control method in a case that a converting compartment of a refrigerator is used for an off purpose in accordance with the embodiment of the present disclosure.

DETAILED DESCRIPTION

[0009] Reference will now be made in detail to the embodiments of the present invention, examples of which are illustrated in the accompanying drawings, wherein like reference numerals refer to like elements throughout.

[0010] FIG. 1 is a front view showing an inside structure of a refrigerator in accordance with an embodiment of the present disclosure, FIG. 2 is a front view showing a structure of a converting compartment having a duct unit of a refrigerator of FIG. 1 separated in accordance with the embodiment of the present disclosure, and FIG. 3 is a schematic side sectional view of the refrigerator of FIG. 1.

[0011] Referring to FIGS. 1 to 3, a refrigerator 1 includes a converting compartment 13 which is normally used for a freezing purpose. However, the converting compartment 13 is configured to also have a variable use for a refrigerating purpose or a turned off purpose, and the refrigerator 1 also includes a body 10 having a refrigerating compartment 14 formed at a lower side of the converting compartment 13. Each of the converting compartment 13 and the refrigerating compartment 14 is formed in a shape of having an open front surface, and the open front surface may be opened or closed by a converting compartment door 17 and a refrigerator door 18 that are hinge-coupled to the body 10.

[0012] The converting compartment 13 and the refrigerating compartment 14 are divided by a mid wall 16, and an insulator is foamed at an inside of the mid wall 16, thereby a heat exchange is prevented between the converting compartment 13 and the refrigerating compartment 14.

[0013] The converting compartment 13 is provided to have a smaller size than the refrigerating compartment 14, where a shelf 19 may be installed at an inside. A temperature sensor (not shown) is provided at an inside of each of the converting compartment 13 and the refrigerating compartment 14.

[0014] The body 10 is composed of an inner case 11 configured to form the converting compartment 13 and the refrigerating compartment 14, an outer case 12 coupled to an outer side of the inner case 11 and configured to form an exterior of the refrigerator 1, and an insulation wall 25 formed while the insulator is foamed between the inner case 11 and the outer case 12.

[0015] Here, the converting compartment 13 is normally used for the freezing purpose, and therefore, having a thicker insulation wall 25 is preferred when compared to that of the refrigerating compartment 14.

[0016] A cold air flow supplying apparatus 26 having a compressor 41, a condenser (not shown), an evaporator 40, and a refrigerating pipe (not shown) is provided in order to supply a cold air flow to such converting compartment 13 and refrigerating compartment 14.

[0017] The compressor 41 is installed in a machinery room 43 provided at a lower portion of the body 10, and configured to compress the refrigerant with high pressure and high temperature using the rotary power of an electric motor, etc. by receiving supplied electric energy. The refrigerant compressed with the high temperature and high pressure is condensed while passing through the condenser (not shown) provided at the rear of the body 10, and becomes a liquid state having a low pressure and a low temperature while passing though an expanding valve (not shown).

[0018] The evaporator 40 evaporates the liquid refrigerant having a low pressure and a low temperature passed through the expanding valve (not shown), and generates a cold air flow by cooling the surrounding air. The refrigerant that is completely evaporated is supplied to the compressor again for a cooling cycle to circulate. In addition, the evaporator 40 may be provided with a heating apparatus for a defrosting purpose (not shown).

[0019] Meanwhile, the evaporator 40 may be disposed at the rear of the converting compartment 13. Because FIG. 2 illustrates a state that a duct unit 30, which is to be described later, is separated from the converting compartment 13, as illustrated on FIG. 2, a settling unit 20 which is concaved toward a rear is formed at the rear inner case 11 of the converting compartment 13 in order for the evaporator 40 to be installed, thereby enabling the evaporator 40 being installed at the settling unit 20. At this time, the evaporator 40 is installed in a way of leaning toward one side direction from the settling unit 20 so that a rear flow path 72, which is to be described later, may be disposed at another side direction 15 of the settling unit 20.

[0020] Therefore, although to be described, by having a rear flow path 72, at which the converting compartment damper apparatus 80 is installed, disposed at one side direction of the evaporator 40, the storage space of the converting compartment 13 being reduced may be prevented.

[0021] Although not illustrated, the evaporator 40 may be disposed at approximately one fourth below the converting compartment 13 in order for the cold air flow generated from the evaporator 40 to be directly fluidized to the refrigerating compartment 14 without passing through the duct unit 30. In this case, without operating the draft fan 42, the cold air flow may be directly fluidized from the evaporator 40 to the refrigerating compartment 14, and thereby the temperature control is possible and the temperature of the refrigerating compartment 14 may be at the refrigerating temperature at a faster rate.

[0022] Meanwhile, the compressor 41, by compressing the refrigerant, pushes the refrigerant toward the condenser (not shown), and operates a cooling cycle which consists of a compression, a condensation, an expansion, and an evaporation. Therefore, when the compressor 41 is operated, the cold air flow generated at the evaporator 40 is supplied at the converting compartment 13 and the refrigerating compartment 14.

[0023] At this time, the reference value of the operating time of the compressor 41 may be determined depending on the use of the converting compartment 13.

[0024] That is, in a case that the converting compartment 13 is for freezing, the operating time of the compressor 41 is determined on the basis of the temperature of the converting compartment 13 as a reference value, and in a case that the converting compartment 13 is for refrigerating or turned off, the operating time of the com-

pressor 41 is determined on the basis of the temperature of the refrigerating compartment 14 as a reference value.

[0025] In detail, in a case that the converting compartment 13 is for freezing, the compressor 41 is operated depending on whether the temperature of the converting compartment 13 is at the freezing temperature. In addition, in a case that the converting compartment 13 is for refrigerating, the compressor 41 is operated depending on whether the temperature of the refrigerating compartment 14 is at the refrigerating temperature.

[0026] Here, the refrigerating temperature is approximately 3°C and the freezing temperature is approximately -20°C.

[0027] As described above, in a case that the converting compartment 13 is for refrigerating or turned off, by having the temperature of the refrigerating compartment 14 as the reference for the operating time of the compressor 41, the supply of the cold air flow to the converting compartment 13 through the converting compartment damper apparatus 80, which is to be described later, and therefore, the cold air flow is continued to be supplied until the temperature of the refrigerating compartment 14 reaches the refrigerating temperature.

[0028] Meanwhile, the cold air flow supplying apparatus 26 further includes a distributing flow path 60 configured to distribute the cold air flow generated at the evaporator 40 to the converting compartment 13 and the refrigerating compartment 14, a converting compartment discharging flow path 70 configured to guide the cold air flow to the converting compartment 13, a refrigerating compartment discharging flow path 71 configured to guide the cold air flow to the refrigerating compartment, and an inlet flow path 74 to which the discharged cold air flow returns.

[0029] Inlets 22 and 24, which are configured to guide the cold air flow discharged from each of the converting compartment 13 and the refrigerating compartment 14 to the inlet flow path 74, are formed at the bottom surface of the converting compartment 13 and at the upper surface of the refrigerating compartment 14, respectively, and a discharging hole 21 at which the cold air flow guided through the converting compartment discharging flow path 70 is formed at the rear of the converting compartment 13. At least one or more of a discharging hole 23 is vertically formed at the rear surface of the refrigerating compartment 14 at regular intervals for the cold air flow guided through the converting compartment discharging flow path 70.

[0030] In addition, the cold air flow supplying apparatus 26 further includes the duct unit 30 configured to divide the converting compartment 13 into a storage space 51 at the front and a cold air flow generating compartment 50 at the rear.

[0031] The duct unit 30 forms the distributing flow path 60 at the inside while dividing the converting compartment 13. The structure of the duct unit 30, the distributing flow path 60, and the converting compartment discharging flow path 70 will be explained hereafter.

[0032] FIG. 4 is an enlarged view illustrating a duct unit of the refrigerator of FIG. 3, FIG. 5 is an exploded perspective view illustrating a duct unit of a refrigerator in accordance with the embodiment of the present disclosure, FIG. 6 is an exploded perspective view of the duct unit of FIG. 5 from a rear, and FIG. 7 is a front view illustrating a separating panel of the duct unit of FIG. 5.

[0033] As illustrated in FIGS. 4 to 7, the duct unit is composed of a separating panel 31, a front surface cover 32 coupled to the front of the separating panel 31, and a rear surface cover 33 coupled to the rear surface of the separating panel 31.

[0034] The separating panel 31 and the front surface cover 32 form the distributing flow path 60 having the shape of a scroll in between the separating panel 31 and the front surface cover 32. An entry 61, a first exit 62, and a second exit 63 of the distributing flow path 60 are provided to penetrate through the separating panel 31.

[0035] A draft fan 42 is installed at the entry 61 of the distributing flow path 60 to enforce the fluidity of the cold air flow. A radial flow fan, which is capable of discharging the cold air flow toward the circumferential direction in order for the cold air flow taken in from the cold air flow generating compartment 50 to be supplied to a first scroll unit 64 and a second scroll unit 65, is preferred to be the draft fan 42. The first scroll unit 64 and the second scroll unit 65 are divaricated at a point 66 which is provided at a prescribed interval from the entry 61 of the cold air flow generating compartment 50.

[0036] Therefore, the cold air flow blown in through the entry 61 of the cold air flow generating compartment 50 is either discharged through the first exit 62 after moving along the first scroll unit 64 while having the point 66 as the reference, or is discharged through the second exit 63 after moving along the second scroll unit 65.

[0037] The cold air flow discharged through the second exit 63 is guided to the refrigerating compartment 14 by the refrigerating compartment discharging flow path 71, and is discharged to the inside of the refrigerating compartment 14 through the discharging hole 23.

[0038] In addition, the cold air flow discharged through the first exit 62 is guided to the storage space 51 of the converting compartment 13 by the converting compartment discharging flow path 70, and the converting compartment discharging flow path 70 is composed of the rear flow path 71 and the penetrating flow path 73.

[0039] An opening 67 other than the entry 61 of the distributing flow path 60, and the first exit 62 is formed at the separating panel 31, and the opening 67, together with the discharging hole 21 formed at the front cover 32, forms the penetrating flow path 73 which penetrates the duct unit 30.

[0040] As illustrated in FIG. 6, a flow path generating unit 34 is configured to protrude at the rear surface portion of the separating panel 31 in order for the rear flow path 71, which funnels the first exit 62 of the distributing flow path 60 with the opening 67, to be formed. The flow path generating unit 34 includes the rear flow path 72 of the

upper side from the center and a compartment unit 35 configured to divide the refrigerating compartment discharging flow path 71 of the lower side from the center.

[0041] In addition, the flow path generating unit 34 is provided having the rear surface open, and the rear surface cover 33 is coupled to the rear surface of the flow path generating unit 34 to close the rear surface of the flow path generating unit 34.

[0042] Therefore, by having the flow path generating unit 34 and the rear surface cover 33 coupled, the penetrating flow path 73 configured to funnel the first exit 62 of the distributing flow path 30 with the opening 67 may be formed. At this time, the second exit 63 of the distributing flow path 30 is funneled to the refrigerating compartment discharging flow path 71 of the lower side.

[0043] A converting compartment damper apparatus 80 may be installed at the rear flow path 72. The converting compartment damper apparatus 80 is configured to control the amount of the flow while being installed on the flow path, and is composed of a housing 82 having a cold air flow passing hole 85, an open/close panel 83 rotatably installed at the housing 82 to open/close the cold air flow passing hole 85, and an operating motor unit 84 configured to provide a rotating force to the open/close panel 83.

[0044] Therefore, by opening/closing the rear flow path 72 as the converting compartment damper apparatus 80 is installed on the rear flow path 72, the flow amount of the cold air flow passing through the rear flow path 72 may be controlled.

[0045] Having such structure, the converting compartment damper apparatus 80, as previously explained, may be positioned at one side surface of the rear evaporator 40 of the duct unit 30, and therefore, the storage space 51 of the converting compartment 13 may be maximized.

[0046] Meanwhile, before the rear surface cover 33 is coupled to the separating panel 31, the converting compartment damper apparatus 80 may be inserted at the inside of the front surface cover 32 and fixed to the separating panel 31 by using a fastening member such as a screw or adhesive, for example. By then coupling the rear surface cover 33 at the separating panel 31, the converting compartment damper apparatus 80 may be easily installed at the inside of the penetrating flow path 73.

[0047] A refrigerating compartment damper apparatus 81 configured to control the flow amount of the refrigerating compartment discharging flow path 71 as well is composed of a same structure, and may be installed at the refrigerating compartment discharging flow path 71 by using the same method. The explanation for such will be omitted.

[0048] FIG. 8 is a view illustrating a control method in a case that a converting compartment of a refrigerator is used for a freezing purpose in accordance with the embodiment of the present disclosure, FIG. 9 is a view illustrating a control method in a case that a converting compartment of a refrigerator is used for a refrigerating purpose in accordance with the embodiment of the present disclosure, and FIG. 10 is a view illustrating a control method in a case that a converting compartment of a refrigerator is used for an off purpose in accordance with the embodiment of the present disclosure.

[0049] By referring to FIGS. 1 to 10, a control method of the refrigerator in accordance with the embodiment of the present disclosure will be explained.

[0050] The refrigerator 1, depending on the use of the converting compartment 13, selectively determines the operating time of the compressor 41 according to the temperature of the converting compartment 13, or determines the operating time of the compressor 13 according to the temperature of the refrigerating compartment 14.

[0051] As illustrated in FIG. 8, in a case that the converting compartment 13 is set for freezing, the cooling of the converting compartment 13 and the refrigerating compartment 14 is started (100) by opening the converting compartment damper apparatus 80 and the refrigerating compartment damper apparatus 81, and by operating the compressor 41.

[0052] While the cooling is in process, the refrigerator 1 determines (110) whether the temperature of the refrigerating compartment 14 is at the refrigerating temperature, and when the temperature of the refrigerating compartment 14 is at the refrigerating temperature, the supply of the cold air flow to the refrigerating compartment 14 is shut off (120) by closing the refrigerating compartment damper apparatus 81.

[0053] At this time, the compressor 41 continues to operate, and the supply of the cold air flow to the converting compartment 13 is continued. The refrigerator 1 (130) determines whether the temperature of the converting compartment 13 is at the freezing temperature, and the cooling is stopped (140) by discontinuing the operation of the compressor 41 when the temperature of the converting compartment 13 is at the freezing temperature.

[0054] As such, the converting compartment 13 may be used for the freezing purpose, and the refrigerating compartment 14 may be used for the refrigerating purpose.

[0055] As illustrated in FIG. 9, in a case that the converting compartment 13 is set for refrigerating, the cooling of the converting compartment 13 and the refrigerating compartment 14 is started (200) by opening the converting compartment damper apparatus 80 and the refrigerating compartment damper apparatus 81, and by operating the compressor 41.

[0056] Here, since the converting compartment 13 is provided with a larger and thicker insulation wall 25 than the refrigerating compartment 14, the converting compartment 13 reaches the refrigerating temperature before the refrigerating compartment 14.

[0057] Therefore, while the cooling is in process, the refrigerator 1 first determines (210) whether the temperature of the converting compartment 13 is at the refrigerating temperature, and when the temperature of the converting compartment 13 is at the refrigerating tem-

perature, the supply of the cold air flow to the converting compartment 13 is shut off (220) by closing the converting compartment damper apparatus 81.

[0058] At this time, the compressor 41 is continued to operate, and continues to cool the refrigerating compartment 14. Therefore, the refrigerator 1 determines (230) during the cooling process whether the temperature of the refrigerating compartment 14 is at the refrigerating temperature, and when the temperature of the refrigerating compartment 14 is at the refrigerating temperature, the operation of the compressor 41 is stopped (240).

[0059] As such, the converting compartment 13 and the refrigerating compartment 14 may be used for the refrigerating purpose.

[0060] Meanwhile, when the converting compartment damper apparatus 80 is closed and the compressor 41 continues to operate to cool the refrigerating compartment 14, frost may form at the converting compartment discharging flow path 70 due to the temperature difference.

[0061] Therefore, in order to prevent the frost from forming at the converting compartment discharging flow path 70, the cold air flow is circulated to the converting compartment discharging flow path 70 by intermittently opening the converting compartment damper apparatus 80 even in a case that the temperature of the converting compartment 13 is already at the refrigerating temperature.

[0062] As illustrated on FIG. 10, in a case that the use of the converting compartment 13 is set to be turned off, the cooling of the refrigerating compartment 14 is started (300) by operating the compressor 41 in a state that the converting compartment damper apparatus 80 is closed and the refrigerating compartment damper apparatus 81 is open.

[0063] The refrigerator 1 determines (310) during the cooling process whether the temperature of the refrigerating compartment 14 is at the refrigerating temperature, and when the temperature of the refrigerating compartment 14 is at the refrigerating temperature, the operation of the compressor 41 is stopped (320).

[0064] As such, the converting compartment 13 is turned off, and the refrigerating compartment 14 may only be used.

[0065] Meanwhile, frost is prevented from forming at the converting compartment discharging flow path 70, while the converting compartment damper apparatus 80 is closed and the compressor 41 continues to operate to cool the refrigerating compartment 14, by circulating the cold air flow to the converting compartment discharging flow path 70 by intermittently opening the converting compartment damper apparatus 80, as previously explained.

[0066] Meanwhile, in a case that the converting compartment damper apparatus 80 and the refrigerating compartment damper apparatus 81 are both closed at the time of the defrost of the evaporator 14, the defrost heat is contained at the inside of the distributing flow path 60 in a state that the defrost heat is unable to spread outside. In such case, the refrigerant maintains at a state of a high pressure as the evaporator 14 is maintained at a high temperature, and thereby a defect due to an overload may occur when the compressor 41 is operated.

[0067] Thus, the evaporator 14 is cooled by opening the refrigerating compartment damper apparatus 81 and operating the draft fan 42 prior to operating the compressor 41 again after or at the time of the defrost process. In such case, in a case that the converting compartment damper apparatus 80 is open, frost may form at the converting compartment discharging flow path 70 due to the temperature difference, and therefore, the refrigerating compartment damper apparatus 81 is opened.

[0068] Although a few embodiments of the present invention have been shown and described, it would be appreciated by those skilled in the art that changes may be made in these embodiments without departing from the invention, the scope of which is defined in the claims and their equivalents.

Claims

1. A refrigerator, comprising:

a body (10) ;
a first storage room (13) and a second storage room (14) compartmentally provided to each other at an inside of the body;
a compressor (41), an condenser, and a evaporator (40) configured to compose a cooling cycle;
a first flow path (70) and a second flow path (71) configured to guide the cold air flow generated at the evaporator to the first storage room and the second storage room, respectively;
a draft fan (42) configured to circulate the cold air flow generated from the evaporator;
a first cold air flow control apparatus (80) and a second cold air flow control apparatus (81) installed at the first flow path and the second flow path, respectively, and configured to control the supply of the cold air flow; and
a first temperature sensor and a second temperature sensor configured to measure respectively the temperature of the first storage room and the temperature of the second storage room, wherein:

among a first mode configured to use the first storage room and the second storage room for freezing and refrigerating, respectively; a second mode for refrigerating and refrigerating, respectively; a third mode for off and refrigerating, respectively; one mode can be established, and **characterized in that**

in a case that the first mode is established, the operation of the compressor is decided based on the temperature of the first storage room, and in a case that the second mode or the third mode is established, the operation of the compressor is decided based on the temperature of the second storage room.

2. The refrigerator of claim 1, wherein
in a case that the first mode is established, the compressor (41) is operated until the temperature of the first storage room (13) reaches a freezing temperature and stops when the temperature of the first storage room reaches a freezing temperature.

3. The refrigerator of claim 1, wherein:
in a case that the second mode or the third mode is established, the compressor (41) is operated until the temperature of the second storage room (14) reaches a refrigerating temperature and stops when the temperature of the second storage room reaches a refrigerating temperature.

4. The refrigerator of claim 1, wherein:
in a case that the first mode is established, the second cold air flow control apparatus (81) shuts off the supply of the cold air flow to the second storage room (14) when the temperature of the second storage room reaches the refrigerating temperature.

5. The refrigerator of claim 1, wherein:
in a case that the second mode is established, the first cold air flow control apparatus (80) shuts off the supply of the cold air flow to the first storage room (13) when the temperature of the first storage room reaches the refrigerating temperature.

6. The refrigerator of claim 1, wherein:
in a case that the third mode is established, the first cold air flow control apparatus (80) shuts off the supply of the cold air flow to the first storage room (13).

7. The refrigerator of claim 1, wherein:
in a case that the second mode or the third mode is established, cold air flow is intermittently circulated at the first flow path (70) to prevent frost from forming at the first flow path.

8. The refrigerator of claim 1, wherein:
in a case that the second mode or the third mode is established, cold air flow is circulated to at least one of either the first flow path (70) or the second flow path (71) to reduce the heat of the evaporator (40) during or after the defrosting of the evaporator.

9. The refrigerator of claim 1, wherein:
the draft fan (42) is a radial flow fan.

10. The refrigerator of claim 1, further comprising:
a duct unit (30) configured to divide the converting compartment into a storage space (51) at the front and the cold air flow generating compartment (50) at the rear.

11. The refrigerator of claim 10, wherein:
a distributing flow path (60), which is configured to distribute the cold air flow generated at the cold air flow generating apparatus to the first flow path (70) and to the second flow path (71), is formed at the inside of the duct unit (30).

12. The refrigerator of claim 10, wherein:
the first flow path (70) comprises a rear flow path (72) formed at the rear of the duct unit and a penetrating flow path (73) connecting the rear flow path and the storage space after penetrating the duct unit (30).

13. The refrigerator of claim 12, wherein:
the cold air flow control apparatus is installed at the rear flow path.

14. The refrigerator of claim 12, wherein:
the rear flow path (72) is positioned at one side of the evaporator (40).

Patentansprüche

1. Kühlschrank, welcher aufweist:

einen Körper (10);
einen ersten Speicherraum (13) und einen zweiten Speicherraum (14), voneinander abgeteilt vorgesehen, in einem Inneren des Körpers;
einen Kompressor (41), einen Kondensor und einen Verdampfer (40), ausgebildet zur Bildung eines Kühlzyklus;
einen ersten Fließweg (70) und einen zweiten Fließweg (71), ausgebildet zur Führung eines Kaltluftstroms erzeugt durch den Verdampfer zum ersten Speicherraum und entsprechend zum zweiten Speicherraum;
einen Gebläselüfter (42), ausgebildet zur Zirkulation des Kaltluftstroms erzeugt durch den Verdampfer;
ein erstes Kaltluftstromsteuergerät (80) und ein zweites Kaltluftstromsteuergerät (81), installiert entsprechend am ersten Fließweg und am zweiten Fließweg und ausgebildet zur Steuerung der Zufuhr des Kaltluftstroms; und
einen ersten Temperatursensor und einen zweiten Temperatursensor, jeweils ausgebildet zur Messung der Temperatur des ersten Speicherraums und der Temperatur des zweiten Speicherraums, wobei ein Modus etabliert werden

kann von einem ersten Modus, ausgebildet zur Verwendung des ersten Speicherraums und des zweiten Speicherraums jeweils zum Gefrieren und Kühlen, einem zweiten Modus, jeweils zum Kühlen in beiden Fällen, und einem dritten Modus zum Ausschalten und Kühlen,
dadurch gekennzeichnet, dass
im Falle des Verwendens des ersten Modus die Tätigkeit des Kompressors festgelegt wird basierend auf der Temperatur des ersten Speicherraums und im Falle des zweiten Modus oder dritten Modus, die Tätigkeit des Kompressors festgelegt wird basierend auf der Temperatur des zweiten Speicherraums.

2. Kühlschrank nach Anspruch 1, wobei im Falle des ersten Modus, der Kompressor (41) betätigt wird, bis die Temperatur des ersten Speicherraums (13) eine Gefriertemperatur erreicht, und angehalten wird, wenn die Temperatur des ersten Speicherraums eine Gefriertemperatur erreicht.

3. Kühlschrank nach Anspruch 1, wobei im Falle des zweiten Modus oder des dritten Modus, der Kompressor (41) betätigt wird, bis die Temperatur des zweiten Speicherraums (14) eine Kühltemperatur erreicht, und angehalten wird, wenn die Temperatur des zweiten Speicherraums eine Kühltemperatur erreicht hat.

4. Kühlschrank nach Anspruch 1, wobei im Falle des ersten Modus das zweite Kaltluftstromsteuergerät (81) die Zufuhr des Kaltluftstroms zum zweiten Speicherraum (14) unterbricht, wenn die Temperatur des zweiten Speicherraums die Kühltemperatur erreicht hat.

5. Kühlschrank nach Anspruch 1, wobei im Falle des zweiten Modus das erste Kaltluftstromsteuergerät (80) die Zufuhr des Kaltluftstroms zum ersten Speicherraum (13) unterbricht, wenn die Temperatur des ersten Speicherraums die Kühltemperatur erreicht hat.

6. Kühlschrank nach Anspruch 1, wobei im Falle des dritten Modus das erste Kaltluftstromsteuergerät (80) die Zufuhr des Kaltluftstroms zum ersten Speicherraum (13) unterbricht.

7. Kühlschrank nach Anspruch 1, wobei im Falle des zweiten Modus oder des dritten Modus der Kaltluftstrom intermittierend im ersten Strömungsweg (70) zirkuliert, um Reifbildung im ersten Strömungsweg zu verhindern.

8. Kühlschrank nach Anspruch 1, wobei im Falle des zweiten Modus oder des dritten Modus ein Kaltluftstrom in wenigstens einem von entweder erstem Strömungsweg (70) oder zweitem Strömungsweg (41) zirkuliert, um die Wärme des Verdampfers (40) während oder nach einem Entfrosten des Verdampfers zu reduzieren.

9. Kühlschrank nach Anspruch 1, wobei der Gebläselüfter (42) ein Radiallüfter ist.

10. Kühlschrank nach Anspruch 1, welcher weiterhin aufweist:
eine Führungseinheit (30), ausgebildet zur Teilung des Abteils in einen Speicherraum (51) vorne und das Kaltluftstromerzeugungsabteil (50) hinten.

11. Kühlschrank nach Anspruch 10, wobei ein Verteilungsströmungsweg (60) im Inneren der Führungseinheit (30) gebildet ist, welcher ausgebildet ist zur Verteilung des durch das Kaltluftstromerzeugungsgerät erzeugten Kaltluftstroms zum ersten Strömungsweg (70) und zum zweiten Strömungsweg (71).

12. Kühlschrank nach Anspruch 10, wobei der erste Strömungsweg (70) einen hinteren Strömungsweg (72) gebildet hinten in der Führungseinheit und einen Durchdringungsströmungsweg (73) aufweist, welcher den hinteren Strömungsweg und den Speicherraum nach Durchdringen der Führungseinheit (30) verbindet.

13. Kühlschrank nach Anspruch 12, wobei das Kaltluftstromsteuergerät am hinteren Strömungsweg installiert ist.

14. Kühlschank nach Anspruch 12, wobei der hintere Strömungsweg (72) auf einer Seite des Verdampfers (40) angeordnet ist.

Revendications

1. Réfrigérateur comprenant:

un corps (10);
une première pièce de stockage (13) et une deuxième pièce de stockage (14) disposées de manière compartimentée l'une à l'autre à l'intérieur du corps;
un compresseur (41), un condenseur et un évaporateur (40) configurés pour composer un cycle de refroidissement;
un premier circuit d'écoulement (70) et un deuxième circuit d'écoulement (71) configurés pour guider le flux d'air froid généré au niveau de l'évaporateur vers la première pièce de stockage et la deuxième pièce de stockage, respectivement;
un ventilateur de tirage (42) configuré pour faire

circuler le flux d'air froid généré à partir de l'évaporateur;
un premier appareil de contrôle de flux d'air froid (80) et un deuxième appareil de contrôle de flux d'air froid (81) installés sur le premier circuit d'écoulement et le deuxième circuit d'écoulement, respectivement, et configurés pour contrôler l'alimentation du flux d'air froid; et
un premier capteur de température et un deuxième capteur de température configurés pour mesurer respectivement la température de la première pièce de stockage et la température de la deuxième pièce de stockage, dans lequel:

parmi un premier mode configuré pour utiliser la première pièce de stockage et la deuxième pièce de stockage pour la congélation et la réfrigération, respectivement; un deuxième mode de congélation et de réfrigération, respectivement; un troisième mode pour congeler et réfrigérer, respectivement; un mode peut être établi et **caractérisé en ce que**
au cas où le premier mode est établi, le fonctionnement du compresseur est décidé en fonction de la température de la première pièce de stockage et au cas où le deuxième mode ou le troisième mode est établi, le fonctionnement du compresseur est décidé sur la base de la température de la deuxième pièce de stockage.

2. Réfrigérateur selon la revendication 1, dans lequel: au cas où le premier mode est établi, le compresseur (41) est actionné jusqu'à ce que la température de la première pièce de stockage (13) atteigne une température de congélation et s'arrête lorsque la température de la première pièce de stockage atteint une température de congélation.

3. Réfrigérateur selon la revendication 1, dans lequel: au cas où le deuxième mode ou le troisième mode est établi, le compresseur (41) est actionné jusqu'à ce que la température de la deuxième pièce de stockage (14) atteigne une température de réfrigération et s'arrête lorsque la température de la deuxième pièce de stockage atteint une température de réfrigération.

4. Réfrigérateur selon la revendication 1, dans lequel: au cas où le premier mode est établi, le deuxième appareil de contrôle du flux d'air froid (81) ferme l'alimentation du flux d'air froid vers la deuxième pièce de stockage (14) lorsque la température de la deuxième pièce de stockage atteint la température de réfrigération.

5. Réfrigérateur selon la revendication 1, dans lequel: au cas où le deuxième mode est établi, le premier appareil de contrôle du flux d'air froid (80) ferme l'alimentation du flux d'air froid vers la première pièce de stockage (13) lorsque la température de la première pièce de stockage atteint la température de réfrigération.

6. Réfrigérateur selon la revendication 1, dans lequel: au cas où le troisième mode est établi, le premier appareil de contrôle du flux d'air froid (80) ferme l'alimentation du flux d'air froid vers la première pièce de stockage (13).

7. Réfrigérateur selon la revendication 1, dans lequel: au cas où le deuxième mode ou le troisième mode est établi, un flux d'air froid est mis en circulation de manière intermittente au niveau du premier circuit d'écoulement (70) pour empêcher la formation de givre au niveau du premier circuit d'écoulement.

8. Réfrigérateur selon la revendication 1, dans lequel: au cas où le deuxième mode ou le troisième mode est établi, un flux d'air froid circule dans au moins l'un du premier circuit d'écoulement (70) ou du deuxième circuit d'écoulement (71) afin de réduire la chaleur de l'évaporateur (40) pendant ou après le dégivrage de l'évaporateur.

9. Réfrigérateur selon la revendication 1, dans lequel: le ventilateur de tirage (42) est un ventilateur à écoulement radial.

10. Réfrigérateur selon la revendication 1, comprenant en outre:
une unité de conduit (30) configurée pour diviser le compartiment de conversion en un espace de stockage (51) à l'avant et le compartiment de génération de flux d'air froid (50) à l'arrière.

11. Réfrigérateur selon la revendication 10, dans lequel: un circuit d'écoulement de distribution (60), qui est configuré pour distribuer l'écoulement d'air froid généré au niveau du dispositif de génération d'écoulement d'air froid vers le premier circuit d'écoulement (70) et vers le deuxième circuit d'écoulement (71), est formé à l'intérieur de l'unité de conduit (30).

12. Réfrigérateur selon la revendication 10, dans lequel: le premier circuit d'écoulement (70) comprend un circuit d'écoulement arrière (72) formé à l'arrière de l'unité de conduit et un circuit d'écoulement de pénétration (73) reliant le circuit d'écoulement arrière et la pièce de stockage après avoir pénétré dans l'unité de conduit (30).

13. Réfrigérateur selon la revendication 12, dans lequel: l'appareil de contrôle d'écoulement d'air froid est installé sur le circuit d'écoulement arrière.

14. Réfrigérateur selon la revendication 12, dans lequel: le circuit d'écoulement arrière (72) est positionné sur un côté de l'évaporateur (40).

FIG. 1

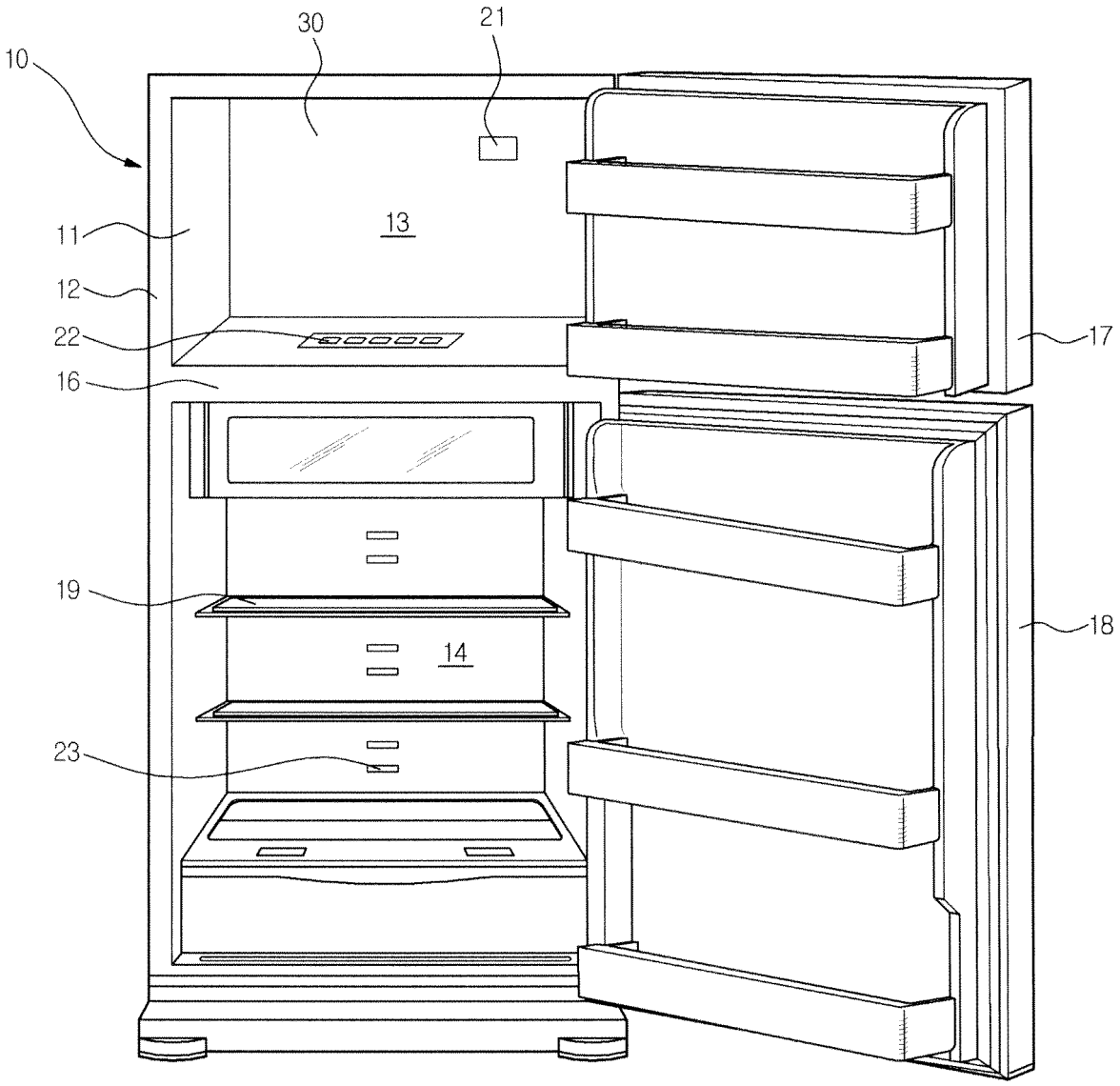


FIG. 2

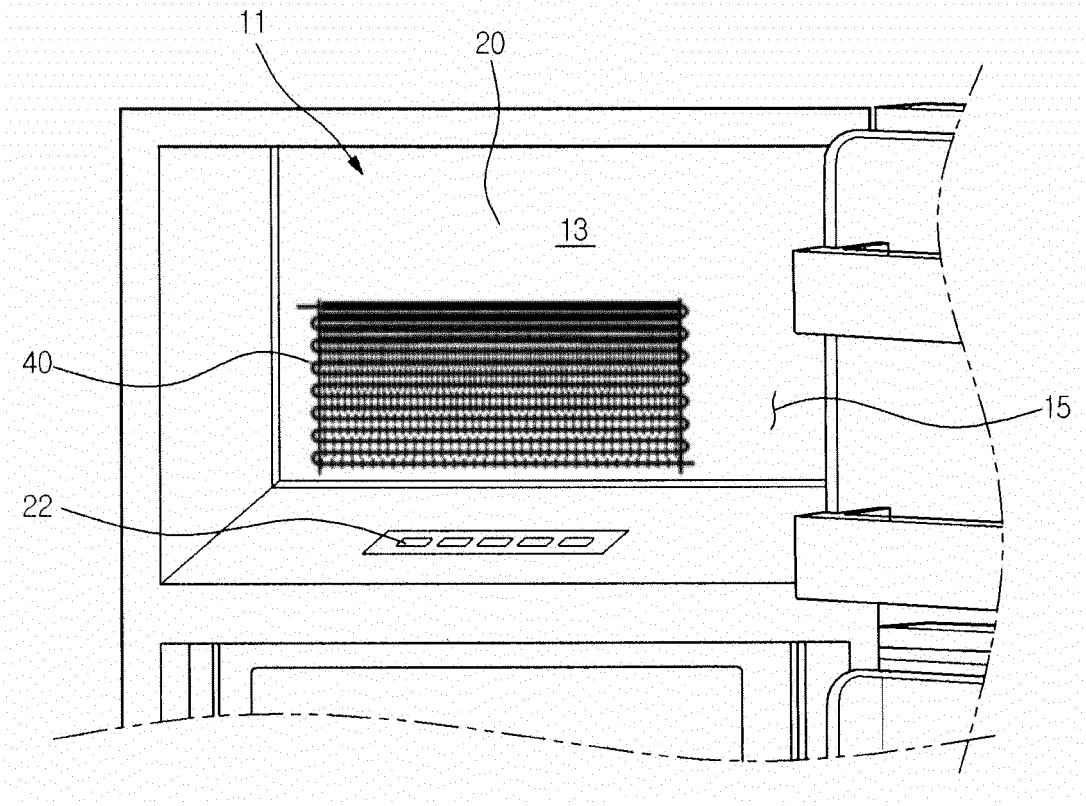


FIG. 3

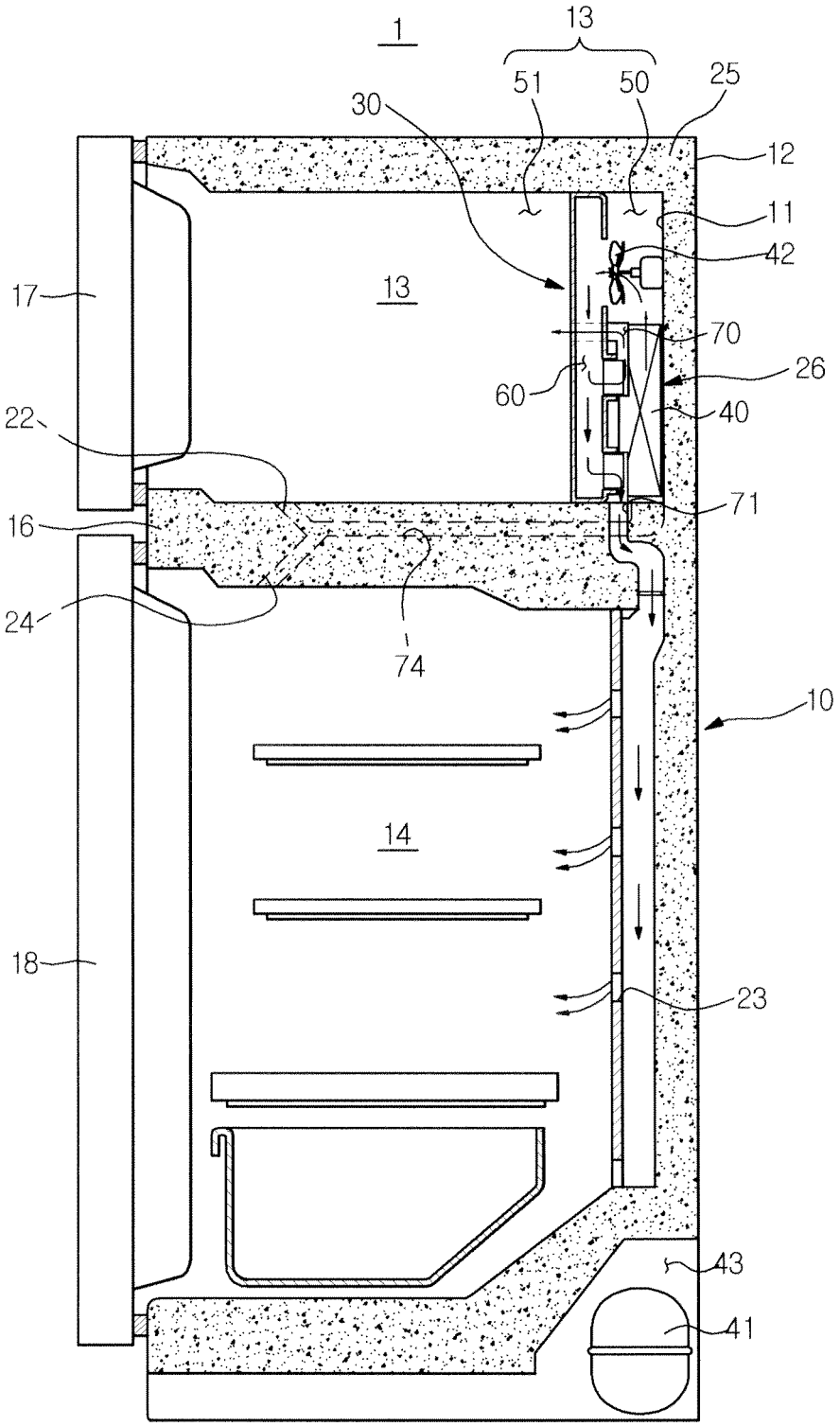

1
13
51
50
25
30
12
11
42
17
13
70
26
60
40
22
71
16
24
74
10
14
18
23
43
41

FIG. 4

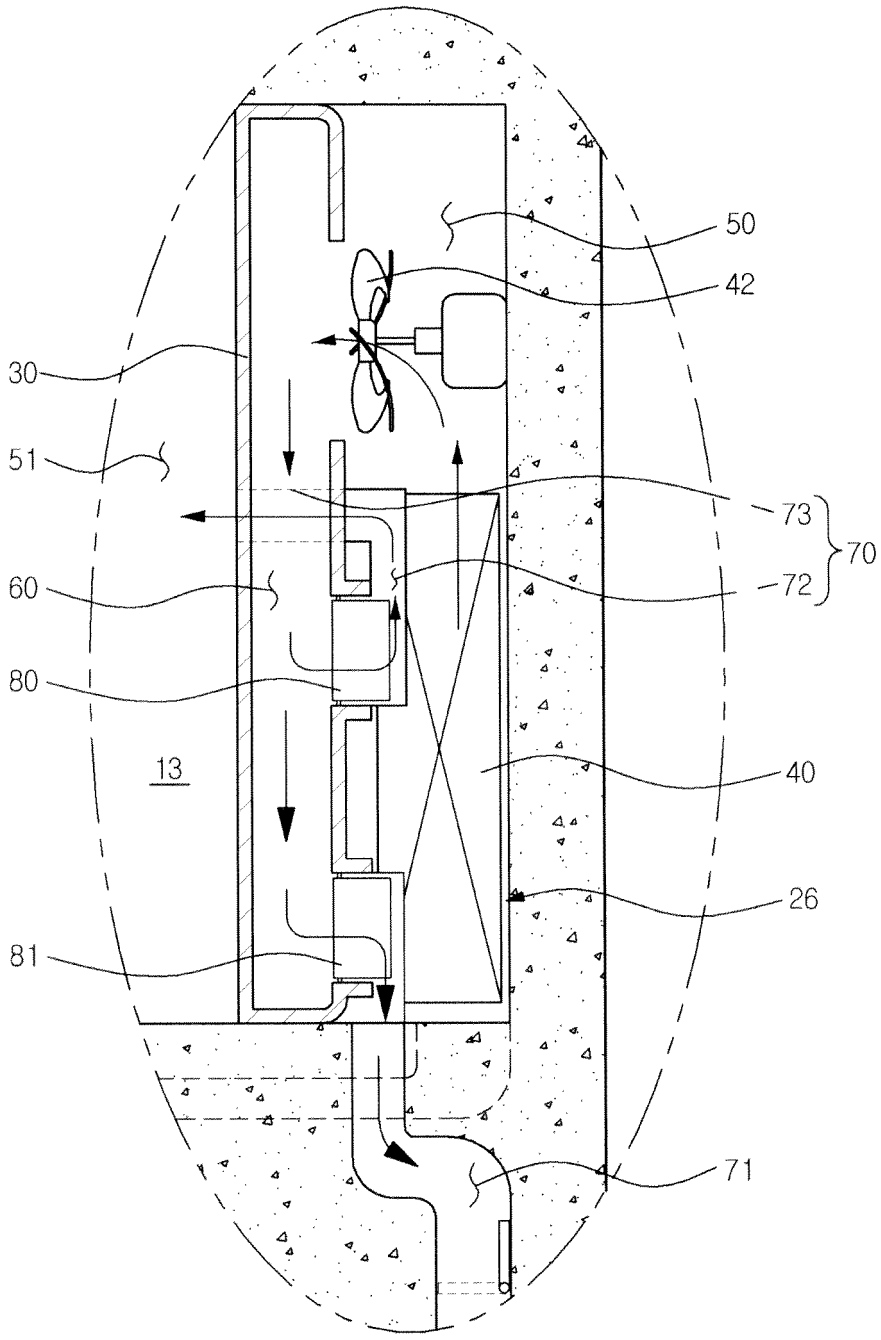


FIG. 5

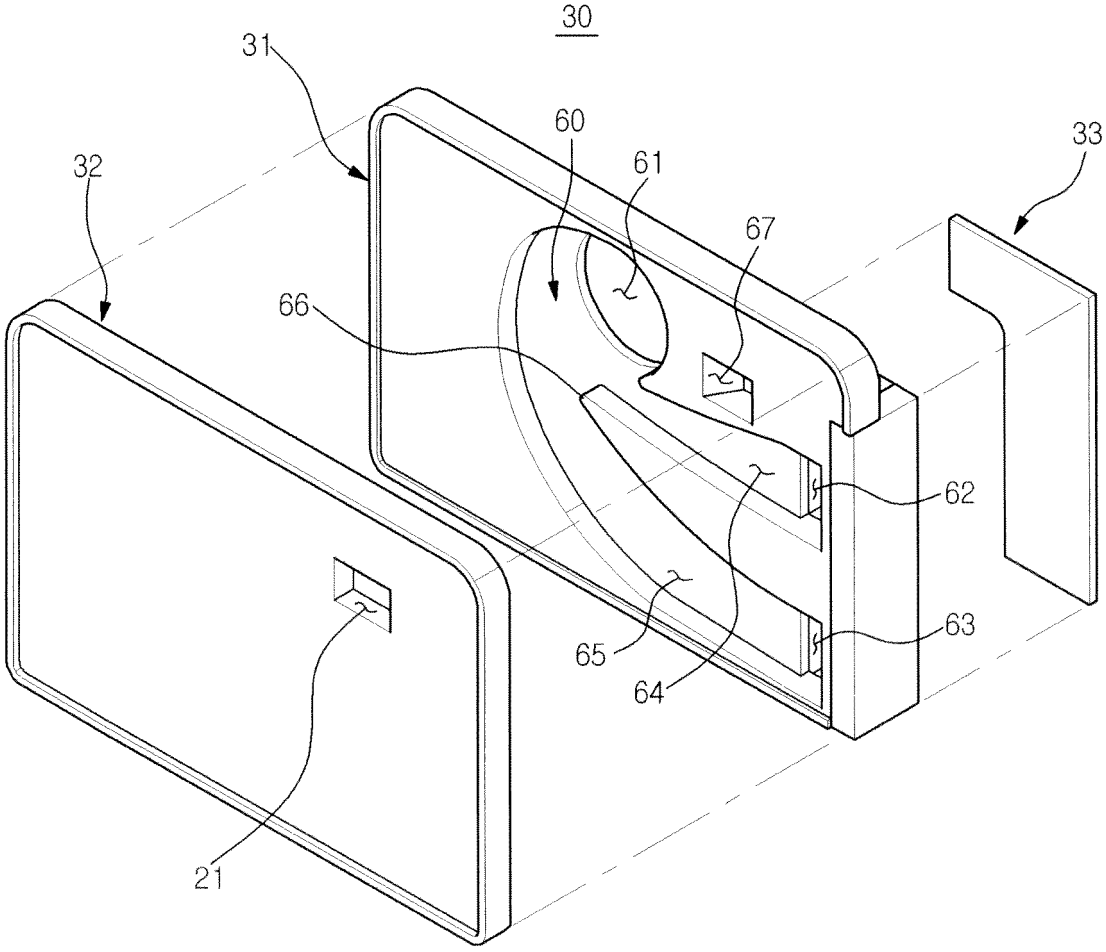


FIG. 6

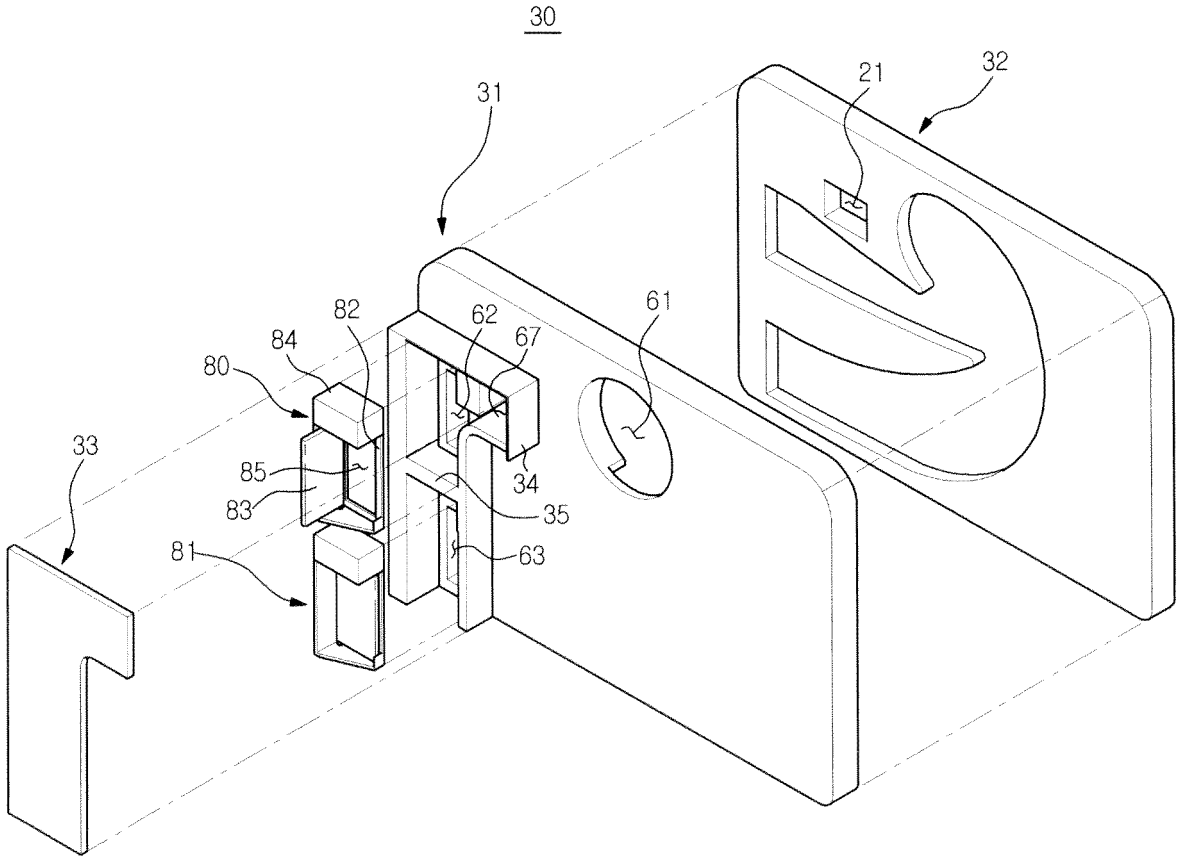


FIG. 7

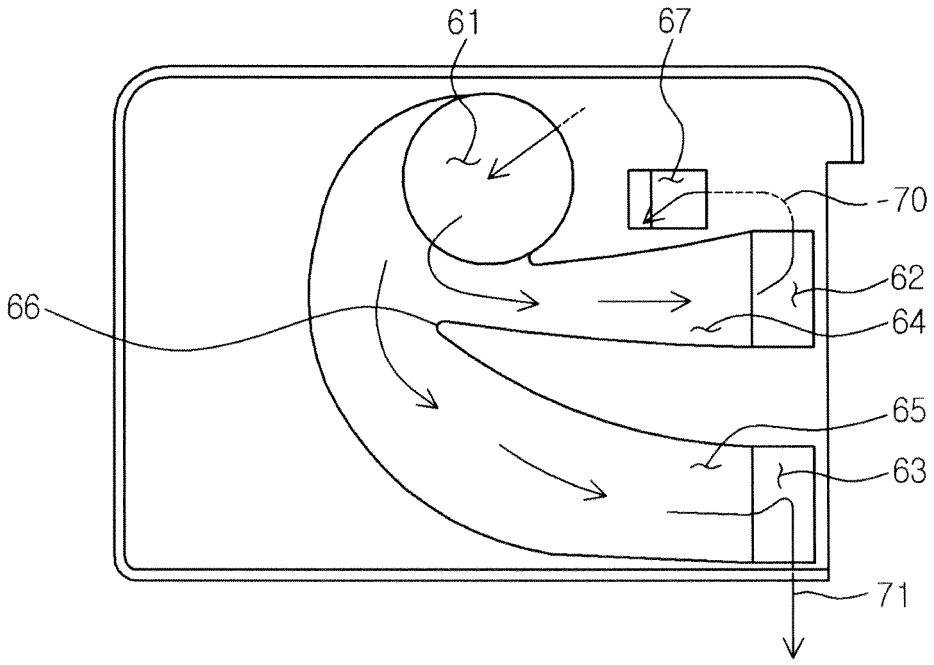


FIG. 8

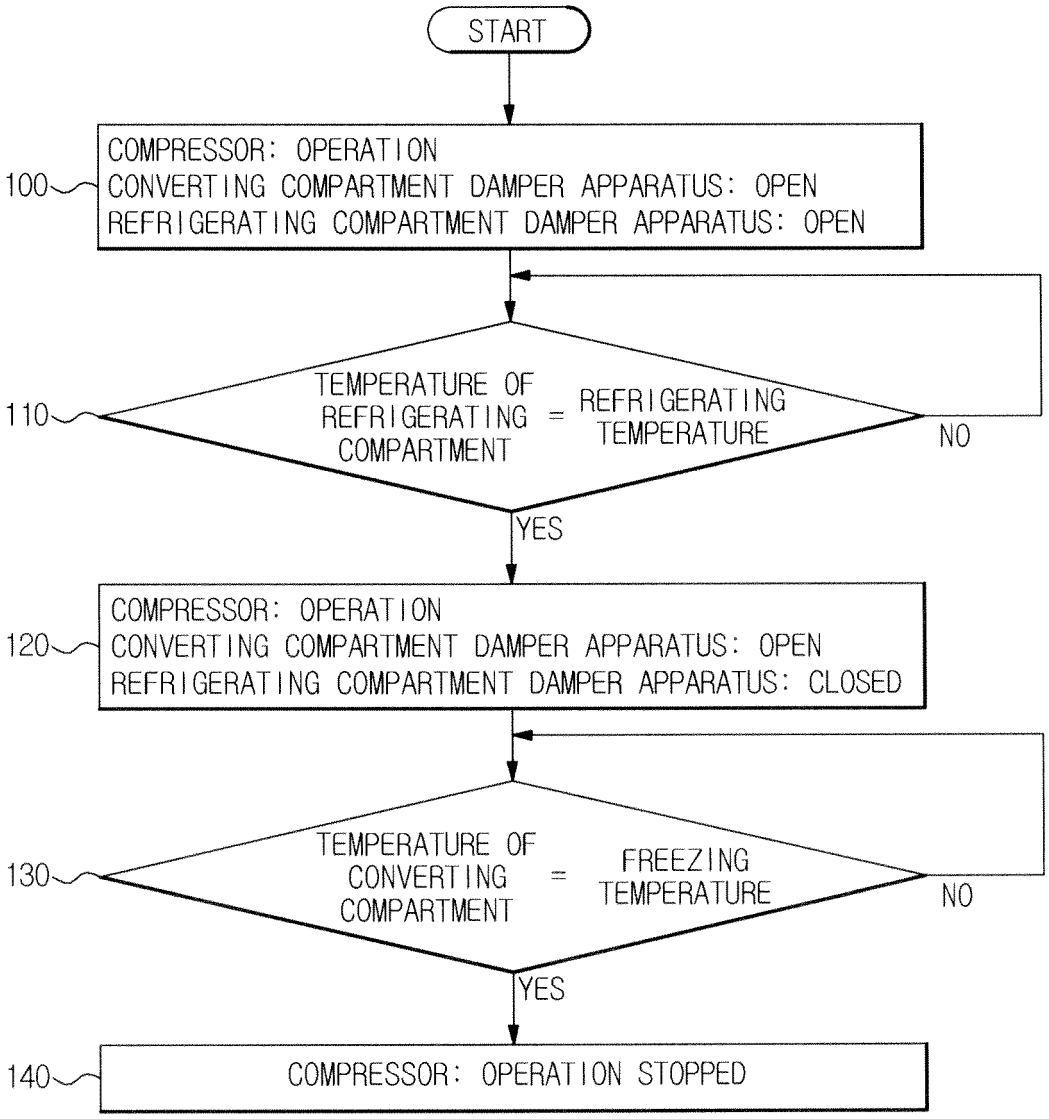

START
100
COMPRESSOR: OPERATION
CONVERTING COMPARTMENT DAMPER APPARATUS: OPEN
REFRIGERATING COMPARTMENT DAMPER APPARATUS: OPEN
110
TEMPERATURE OF REFRIGERATING COMPARTMENT = REFRIGERATING TEMPERATURE
NO
YES
120
COMPRESSOR: OPERATION
CONVERTING COMPARTMENT DAMPER APPARATUS: OPEN
REFRIGERATING COMPARTMENT DAMPER APPARATUS: CLOSED
130
TEMPERATURE OF CONVERTING COMPARTMENT = FREEZING TEMPERATURE
NO
YES
140
COMPRESSOR: OPERATION STOPPED

FIG. 9

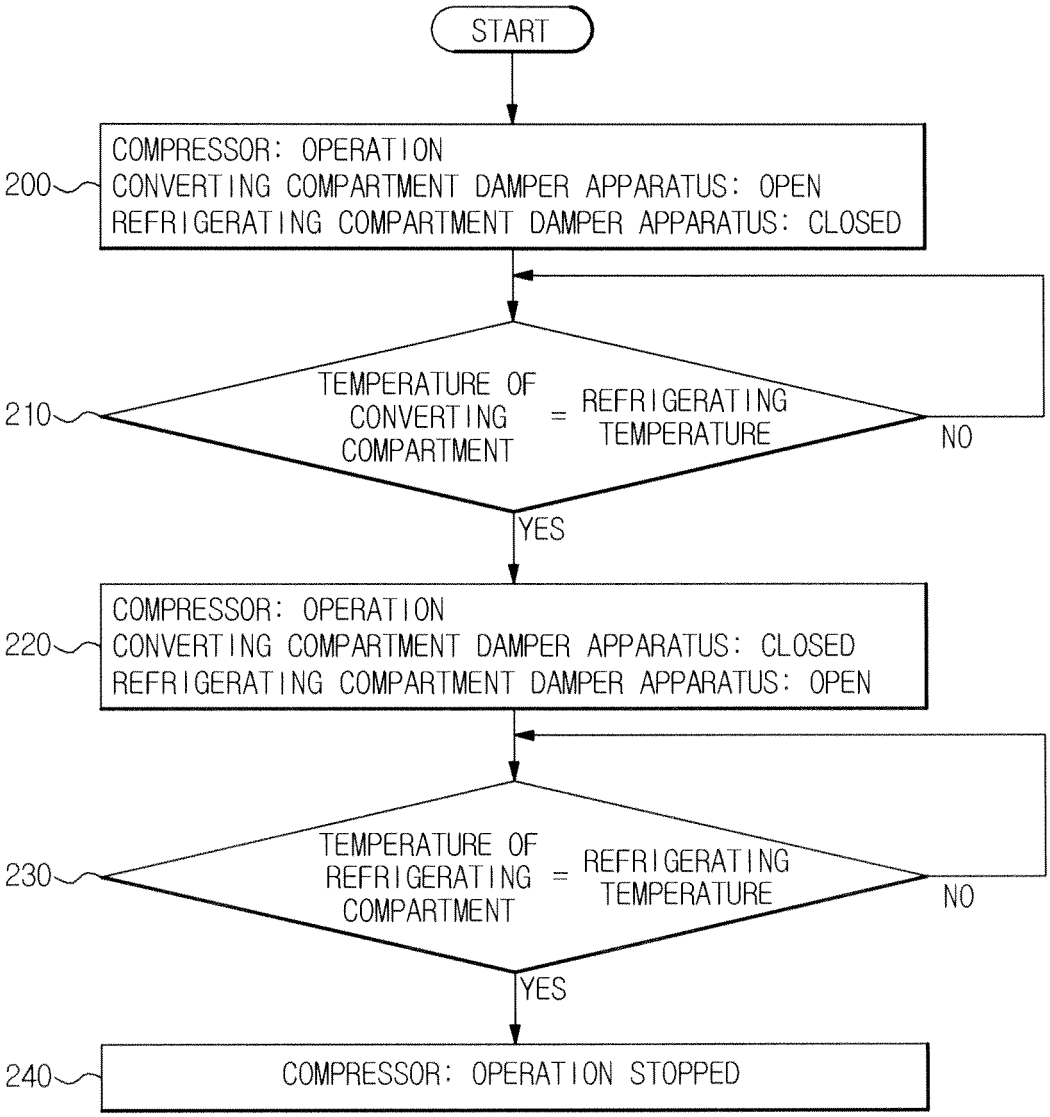
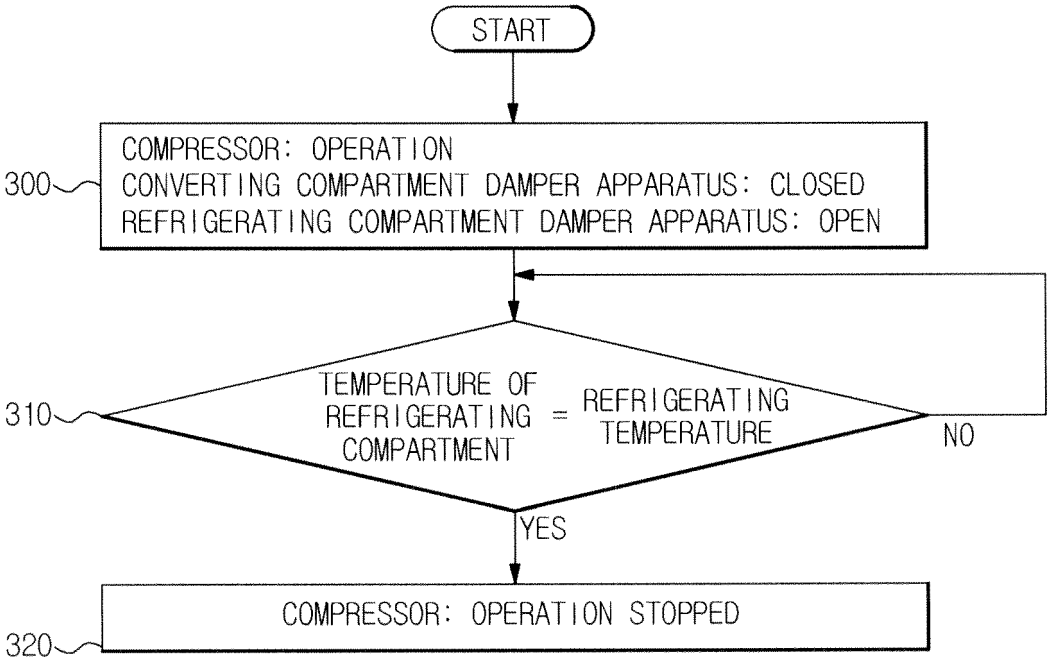

START
200
COMPRESSOR: OPERATION
CONVERTING COMPARTMENT DAMPER APPARATUS: OPEN
REFRIGERATING COMPARTMENT DAMPER APPARATUS: CLOSED
210
TEMPERATURE OF CONVERTING COMPARTMENT = REFRIGERATING TEMPERATURE
NO
YES
220
COMPRESSOR: OPERATION
CONVERTING COMPARTMENT DAMPER APPARATUS: CLOSED
REFRIGERATING COMPARTMENT DAMPER APPARATUS: OPEN
230
TEMPERATURE OF REFRIGERATING COMPARTMENT = REFRIGERATING TEMPERATURE
NO
YES
240
COMPRESSOR: OPERATION STOPPED

FIG. 10


START
300
COMPRESSOR: OPERATION
CONVERTING COMPARTMENT DAMPER APPARATUS: CLOSED
REFRIGERATING COMPARTMENT DAMPER APPARATUS: OPEN
310
TEMPERATURE OF REFRIGERATING COMPARTMENT = REFRIGERATING TEMPERATURE
NO
YES
320
COMPRESSOR: OPERATION STOPPED

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- KR 1020100076089 **[0005]**