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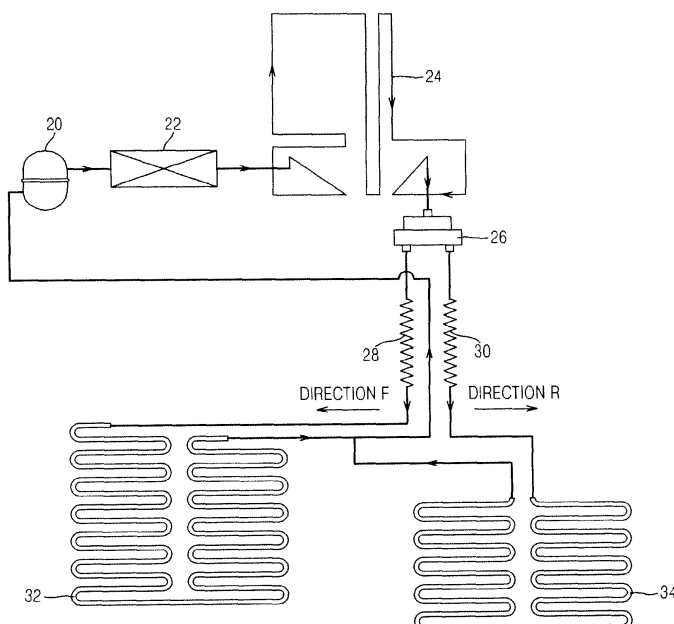
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(54) **Refrigerator and method of controlling operation thereof**

(57) A refrigerator in which an evaporator (32,34) is separately installed in each of a freezing chamber (12) and a refrigerating chamber (14) such that operations of the freezing chamber and the refrigerating chamber are independently controlled, and a method of controlling an operation thereof. An operation of the freezing chamber is performed first when the refrigerator starts to be oper-

ated in a parallel cycle to convert a flow of a refrigerant such that operations of the freezing chamber and the refrigerating chamber are independently performed using a 3-way valve (26), thereby achieving energy savings. Further, a check valve to prevent the refrigerant from flowing to a freezing chamber evaporator is omitted, thereby achieving production cost reduction.

FIG. 3



Description

BACKGROUND

1. Field

[0001] Embodiments relate to a refrigerator in which an evaporator is separately installed in each of a freezing chamber and a refrigerating chamber such that operations of the freezing chamber and the refrigerating chamber are independently controlled, and a method of controlling an operation thereof.

2. Description of the Related Art

[0002] In general, refrigerators are apparatuses to which a general refrigerating cycle to circulate a refrigerant thereinto is applied so as to supply cold air, generated by absorbing surrounding heat when the refrigerant in a liquid state is evaporated, to storage chambers, such as freezing and refrigerating chambers, to store food in a fresh state for a long time. The freezing chamber is kept at a low temperature of about -20°C, and the refrigerating chamber is kept at a low temperature of about 3°C.

[0003] Among these refrigerators, a parallel cycle-type refrigerator in which an evaporator is separately installed in each of a freezing chamber and a refrigerating chamber and operations of the freezing chamber and the refrigerating chamber are independently controlled using a 3-way valve has been disclosed.

[0004] The parallel cycle-type refrigerator achieves the operation of the refrigerating chamber independently of the operation of the freezing chamber and thus maintains high evaporation temperature of the refrigerating chamber, thereby improving energy efficiency during the operation of the refrigerating chamber. However, in the parallel cycle-type refrigerator, since the temperature of the freezing chamber evaporator is much lower than that of the refrigerating chamber evaporator, a regular amount of the refrigerant moves to the freezing chamber evaporator and is trapped in the freezing chamber evaporator during stoppage of the operation of a compressor, and thereby the refrigerant becomes insufficient during the next operation of the refrigerating chamber.

[0005] Therefore, in the conventional parallel cycle-type refrigerator, after the operations of the refrigerating chamber and the freezing chamber, a refrigerant recovery operation, in which the refrigerant distributed at a low-pressure part (the freezing chamber evaporator and the refrigerating chamber evaporator) is transferred to a high-pressure part (a condenser) by operating the compressor under the condition that passages of the 3-way valve in both directions, i.e., passages of the 3-way valves at the sides of the refrigerating chamber and the freezing chamber are closed, is performed, and then the operation of the compressor is completed.

[0006] However, the refrigerant recovered by the re-

frigerant recovery operation is re-introduced into the freezing chamber evaporator before the next operation of the refrigerating chamber is performed, and thus shortage of the refrigerant is still encountered during the operation of the refrigerating chamber. Therefore, in order to solve this problem, a check valve to prevent the refrigerant from flowing to the freezing chamber evaporator of the parallel cycle-type refrigerator is installed at an outlet of the freezing chamber evaporator so as to prevent the recovered refrigerant from being re-introduced into the freezing chamber evaporator.

[0007] However, the installation of the check valve causes increase of production costs and lowering of the pressure of the refrigerant during the operation of the freezing chamber to increase a compression ratio of discharge to suction, thereby influencing overall efficiency of the refrigerating cycle.

SUMMARY

[0008] Therefore, it is an aspect to provide a refrigerator which alleviates refrigerant shortage during the operation of a refrigerating chamber even if a check valve to prevent a refrigerant from flowing to a freezing chamber evaporator is omitted in a parallel cycle, and a method of controlling an operation thereof.

[0009] Additional aspects will be set forth in part in the description which follows and, in part, will be apparent from the description, or may be learned by practice of the invention.

[0010] In accordance with one aspect, a refrigerator includes a compressor, a condenser to condense a refrigerant compressed by the compressor, a freezing chamber and a refrigerating chamber, a freezing chamber evaporator and a refrigerating chamber evaporator respectively installed in the freezing chamber and the refrigerating chamber to cool the freezing chamber and the refrigerating chamber, a flow conversion valve to convert a flow of the refrigerant into the freezing chamber evaporator and the refrigerating chamber evaporator according to operation modes, and a control unit to control the flow conversion valve such that an operation of the freezing chamber is performed first, when the refrigerator starts to be operated.

[0011] The flow conversion valve may be a 3-way valve connected to a pipe at the side of an outlet of the condenser and to pipes at the sides of inlets of the freezing and refrigerating chamber evaporators.

[0012] The control unit may control the flow conversion valve such that a refrigerant recovery operation is performed after the operation of the freezing chamber and then an operation of the refrigerating chamber is performed, if it is judged that the operation of the refrigerating chamber is required.

[0013] The refrigerant recovery operation may be performed by operating the compressor under the condition that passages of the flow conversion valve in all directions are closed, so as to move the refrigerant distributed at

the freezing chamber evaporator to the condenser.

[0014] In accordance with a further aspect, a refrigerator includes a freezing chamber and a refrigerating chamber, a freezing chamber evaporator and a refrigerating chamber evaporator respectively installed in the freezing chamber and the refrigerating chamber to cool the freezing chamber and the refrigerating chamber, a flow conversion valve to convert a flow of a refrigerant into the freezing chamber evaporator and the refrigerating chamber evaporator so as to form a parallel cycle independently controlling operations of the freezing chamber and the refrigerating chamber, and a control unit to control the flow conversion valve such that the operation of the freezing chamber is performed first in the parallel cycle.

[0015] The control unit may perform a refrigerant recovery operation to recover the refrigerant distributed at the freezing chamber evaporator, after the operation of the freezing chamber.

[0016] In accordance with another aspect, a refrigerator includes a freezing chamber and a refrigerating chamber, a freezing chamber evaporator and a refrigerating chamber evaporator respectively installed in the freezing chamber and the refrigerating chamber to cool the freezing chamber and the refrigerating chamber, a flow conversion valve to convert a flow of a refrigerant into the freezing chamber evaporator and the refrigerating chamber evaporator according to operation modes, and a control unit to control the flow conversion valve such that a refrigerant recovery operation is performed before an operation of the refrigerating chamber.

[0017] The refrigerator may further include a compressor and a condenser to condense the refrigerant compressed by the compressor, and the flow conversion valve may be a 3-way valve connected to a pipe at the side of an outlet of the condenser and to pipes at the sides of inlets of the freezing and refrigerating chamber evaporators.

[0018] The refrigerant recovery operation may be performed by operating the compressor under the condition that passages of the flow conversion valve in all directions are closed, so as to move the refrigerant distributed at a low-pressure part to a high-pressure part.

[0019] The low-pressure part may be the freezing chamber evaporator, and the high-pressure part may be the condenser.

[0020] In accordance with another aspect, a refrigerator includes a freezing chamber and a refrigerating chamber, a freezing chamber evaporator and a refrigerating chamber evaporator respectively installed in the freezing chamber and the refrigerating chamber to cool the freezing chamber and the refrigerating chamber, a flow conversion valve to convert a flow of a refrigerant into the freezing chamber evaporator and the refrigerating chamber evaporator so as to form a parallel cycle independently controlling operations of the freezing chamber and the refrigerating chamber, and a control unit to control the flow conversion valve such that a re-

frigerant recovery operation is performed before the operation of the refrigerating chamber in the parallel cycle.

[0021] In accordance with another aspect, a method of controlling an operation of a refrigerator, which is provided with a freezing chamber and a refrigerating chamber, and a freezing chamber evaporator and a refrigerating chamber evaporator to cool the freezing chamber and the refrigerating chamber, includes judging whether or not it is time to start an operation of the refrigerator, and performing an operation of the freezing chamber first, if it is judged that it is time to start the operation of the refrigerator.

[0022] The performance of the operation of the freezing chamber may be achieved by opening a passage, in a direction of the freezing chamber, of a flow conversion valve to convert a flow of a refrigerant into the freezing chamber evaporator and the refrigerating chamber evaporator.

[0023] The method may further include judging whether or not an operation of the refrigerating chamber is required, and performing a refrigerant recovery operation to recover the refrigerant distributed at the freezing chamber evaporator and then performing the operation of the refrigerating chamber, if it is judged that the operation of the refrigerating chamber is required.

[0024] In accordance with yet another aspect, a method of controlling an operation of a refrigerator, which is provided with a freezing chamber and a refrigerating chamber, and a freezing chamber evaporator and a refrigerating chamber evaporator to cool the freezing chamber and the refrigerating chamber, includes judging whether or not it is time to operate the refrigerating chamber, performing a refrigerant recovery operation first to recover a refrigerant distributed at a low-pressure part, if it is judged that it is time to operate the refrigerating chamber, and performing an operation of the refrigerating chamber after the refrigerant recovery operation.

BRIEF DESCRIPTION OF THE DRAWINGS

[0025] These and/or other aspects 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 illustrating an external appearance of a refrigerator in accordance with one embodiment;

FIG. 2 is a front view illustrating an internal structure of the refrigerator in accordance with the embodiment;

FIG. 3 is a schematic view illustrating a parallel cycle of the refrigerator in accordance with the embodiment;

FIG. 4 is an operation control block diagram of the refrigerator in accordance with the embodiment;

FIG. 5 is a flow chart illustrating a method of controlling an operation of the refrigerator in accordance

with the embodiment; and

FIG. 6 is a schematic view illustrating parallel cycle control timing of the refrigerator in accordance with the embodiment.

DETAILED DESCRIPTION

[0026] Reference will now be made in detail to the embodiments, examples of which are illustrated in the accompanying drawings, wherein like reference numerals refer to like elements throughout. FIG. 1 is a front view illustrating an external appearance of a refrigerator in accordance with one embodiment, and FIG. 2 is a front view illustrating an internal structure of the refrigerator in accordance with the embodiment.

[0027] As shown in FIGS. 1 and 2, the refrigerator in accordance with the embodiment of the present invention includes a main body 10 provided with a freezing chamber 12 and a refrigerating chamber 14 formed therein, and doors 13 and 15 hinged to the main body 10 to respectively open and close the freezing chamber 12 and the refrigerating chamber 14.

[0028] The freezing chamber 12 and the refrigerating chamber 14 are horizontally divided from each other by a diaphragm 11 disposed on the main body 10 so as to prevent cold air of the respective chambers 12 and 14 from mixing, and a freezing chamber evaporator 32 and a refrigerating chamber evaporator 34 to cool the respective chambers 12 and 14 are separately installed at rear portions of the insides of the freezing chamber 12 and the refrigerating chamber 14.

[0029] FIG. 3 is a schematic view illustrating a parallel cycle of the refrigerator in accordance with the embodiment.

[0030] As shown in FIG. 3, the parallel cycle of the refrigerator in accordance with the embodiment includes a compressor 20, a condenser 22, a hot pipe 24, a flow conversion valve 26, a freezing chamber expansion device 28, a refrigerating chamber expansion device 30, the freezing chamber evaporator 32, and the refrigerating chamber evaporator 34.

[0031] The compressor 20 compresses an inhaled refrigerant in a low-temperature and low-pressure gaseous state into a high-temperature and high-pressure gaseous state, and then discharges the refrigerant in the high-temperature and high-pressure gaseous state.

[0032] The condenser 22 is connected to a discharge pipe at a high-pressure part of the compressor 20, and condenses the refrigerant in the high-temperature and high-pressure gaseous state, compressed by the compressor 20, into a liquid state by heat-exchange with surrounding air.

[0033] The hot pipe 24 is extended from the condenser 22 and is connected to an inlet of the flow conversion valve 26. The hot pipe 24 prevents dew from accumulating on the front surface of the main body 10 due to a temperature difference between the inside and the outside of the main body 10 caused by heat emission of the

refrigerant flowing within the hot pipe 24.

[0034] The flow conversion valve 26 selects one passage of the refrigerant having passed through condenser 22 according to an operation mode (a freezing chamber operation mode or a refrigerating chamber operation mode), and includes a 3-way valve consisting of one inlet and two outlets. The one inlet is connected to the hot pipe 24, and the two outlets are connected to the freezing and refrigerating chamber expansion devices 28 and 30. The passage at the side of the freezing chamber 12, i.e., the passage connected to the freezing chamber expansion device 28 is referred to as a passage in a direction F, the passage at the side of the refrigerating chamber 14, i.e., the passage connected to the refrigerating chamber expansion device 30 is referred to as a passage in a direction R, opening and closing of the passage at the side of the freezing chamber 12 is referred to as ON/OFF in the direction F, and opening and closing of the passage at the side of the refrigerating chamber 14 is referred to as ON/OFF in the direction R.

[0035] The freezing and refrigerating chamber expansion devices 28 and 30 decompress the refrigerant in the room-temperature and high-pressure liquid state, condensed by the condenser 22 through the flow conversion valve 26, into a two-phase refrigerant in a low-temperature and low-pressure state including a liquid component and a gaseous component by expansion. Each of the freezing and refrigerating chamber expansion devices 28 and 30 includes a capillary tube or an expansion valve.

[0036] The freezing and refrigerating chamber evaporators 32 and 34 evaporate the refrigerant in the low-temperature and low-pressure liquid state, expanded by the freezing and refrigerating chamber expansion devices 28 and 30, into a gaseous state to supply cold air, and are operated in a parallel cycle type such that operations of the freezing chamber 12 and the refrigerating chamber 14 are independently performed using the flow conversion valve 26.

[0037] FIG. 4 is an operation control block diagram of the refrigerator in accordance with the embodiment of the present invention. The refrigerator includes an input unit 50, a sensing unit 52, a control unit 54, a driving unit 56, and a memory unit 58.

[0038] The input unit 50 allows a user to input a control command to the control unit 54, and includes a plurality of buttons, such as a mode selection button to control operations of the freezing chamber 12 and the refrigerating chamber 14 and a temperature setting button to set desired temperatures of the freezing chamber 12 and the refrigerating chamber 14.

[0039] The sensing unit 52 senses internal temperatures of the freezing chamber 12 and the refrigerating chamber 14, and transmits the sensed temperatures to the control unit 54. These temperatures are used as data to judge an operation condition (a simultaneous operation mode or an individual operation mode) of the freezing chamber 12 and the refrigerating chamber 14.

[0040] The control unit 54 is a microcomputer to control

the overall operation of the refrigerator. The control unit 54 judges the operation condition of the freezing chamber 12 and the refrigerating chamber 14 according to the internal temperatures of the freezing chamber 12 and the refrigerating chamber 14 sensed by the sensing unit 52, thus controlling the operation of the refrigerator in the parallel cycle type such that the freezing chamber 12 and the refrigerating chamber 14 are independently operated.

[0041] Further, the control unit 54 controls the flow conversion valve 26 such that an operation of the freezing chamber 12 is performed first when the refrigerator starts to be operated, and thus the refrigerant recovery operation which was conventionally performed when the operation of the compressor 20 has been completed may be omitted. Further, the refrigerant recovery operation in which the refrigerant distributed at the freezing chamber evaporator 32 is transferred to a high-pressure part (the condenser) is performed, just after the operation of the freezing chamber 12 is performed. Thereby, it is not necessary to recover the refrigerant distributed at the condenser 22 during the operation of the freezing chamber 12, and thus a refrigerant recovery operation time may be shortened. The refrigerant recovery operation is an operation to simply redistribute the refrigerant. Since in the refrigerant recovery operation, the compressor 20 is operated but cooling effects are not generated, it is desired that the refrigerant recovery operation time be minimized. Therefore, the refrigerator in accordance with the embodiment omits the refrigerant recovery operation performed when the operation of the compressor 20 has been completed, and shortens the operation time of the compressor 20 (the refrigerant recovery operation time) not generating cooling effects, compared with the conventional operation method, thereby achieving energy savings (about 2%). Further, the refrigerator in accordance with the embodiment always performs the operation of the freezing chamber 12 first, and thus omits the check valve to prevent the refrigerant from flowing to the freezing chamber evaporator 32, thereby achieving production cost reduction.

[0042] Further, the control unit 54 judges whether or not it is necessary to operate the refrigerating chamber 14, controls the flow conversion valve 26 such that the refrigerant recovery operation to recover the refrigerant distributed at the freezing chamber evaporator 32 is performed when it is necessary to operate the refrigerating chamber 14, and then performs the operation of the refrigerating chamber 14, thereby not generating shortage of the refrigerant during the operation of the refrigerating chamber 14.

[0043] The driving unit 56 drives the compressor 20 and the flow conversion valve 26 according to a driving control signal of the control unit 54.

[0044] The memory unit 58 stores control values of temperatures according to the operation condition of the freezing chamber 12 and the refrigerating chamber 14 judged by the control unit 54, and stores control factors

regarding a parallel cycle operation in which the freezing chamber 12 is operated first and then the refrigerant recovery operation is performed just after the operation of the freezing chamber 12 when the refrigerator starts to be operated.

[0045] Hereinafter, an operating process of the above refrigerator and effects of a method of controlling an operation of the refrigerator will be described.

[0046] FIG. 5 is a flow chart illustrating a method of controlling an operation of the refrigerator in accordance with the embodiment, and FIG. 6 is a schematic view illustrating parallel cycle control timing of the refrigerator in accordance with the embodiment.

[0047] With reference to FIGS. 5 and 6, power is input to the refrigerator, the sensing unit 52 senses internal temperatures of the freezing chamber 12 and the refrigerating chamber 14, and transmits the sensed internal temperatures to the control unit 54.

[0048] Then, the control unit 54 judges whether or not it is time to start an operation of the refrigerator by comparing the internal temperatures of the freezing chamber 12 and the refrigerating chamber 14 sensed by the sensing unit 52 with a set temperature (operation 100).

[0049] The refrigerator starts to be operated when, if the internal temperature of the freezing chamber 12 or the refrigerating chamber 14 is higher than the set temperature by a designated temperature or more, a load of the corresponding chamber 12 or 14 is calculated according to a temperature difference, and then the compressor 20 is operated.

[0050] As a result of the judgment of operation 100, if it is judged that it is time to start the operation of the refrigerator, the control unit 54 turns on the flow conversion valve 26 in the direction F (in the direction of the freezing chamber), as shown in FIG. 3 such that the freezing chamber 12 is operated first. In this case, even if freezing of the freezing chamber 12 is not actually required, the freezing chamber 12 is operated first.

[0051] When the flow conversion valve 26 is turned on in the direction F (in the direction of the freezing chamber), the refrigerant is circulated in the freezing chamber operation mode, i.e., in the order of the compressor 20, the condenser 22, the hot pipe 24, the flow conversion valve 26, the freezing chamber expansion device 28, the freezing chamber evaporator 32, and the compressor 20.

[0052] Therefore, the refrigerant in the high-temperature and high-pressure gaseous state discharged from the compressor 20 is condensed into the high-pressure liquid state by the condenser 22, and then is introduced into the flow conversion valve 26 via the hot pipe 24.

[0053] Here, in the flow conversion valve 26, since the passage at the side of the freezing chamber 12 in the direction F is opened, the operation of the freezing chamber 12, in which the refrigerant introduced into the flow conversion valve 26 is introduced into the freezing chamber evaporator 32 through the freezing chamber expansion device 28 to cool the freezing chamber 12 and then is returned to the compressor 20, is performed (operation

102).

[0054] If the freezing chamber 12 is operated first in the freezing chamber operation mode when the refrigerator starts to be operated, a considerable amount of the refrigerant distributed at the freezing chamber evaporator 32 is immediately recovered, thereby achieving energy savings compared with the conventional case that a refrigerant distributed at a condenser is recovered.

[0055] Further, if it is judged that the operation of the refrigerating chamber 14 is required after the operation of the freezing chamber 12, the control unit 54 performs the refrigerant recovery operation to move the refrigerant distributed at the freezing chamber evaporator 32 to the condenser 22 just after the operation of the freezing chamber 12 (operation 104).

[0056] The refrigerant recovery operation is performed under the condition that both directions (the direction F and the direction R) of the flow conversion valve 26 are closed and the compressor 20 is turned on so as to move the refrigerant distributed at the freezing chamber evaporator 32 to the condenser 22. The refrigerant recovery operation allows the refrigerant used to cool the freezing chamber 12 to be completely used to cool the refrigerating chamber 14 without leaving on the cycle to cool the freezing chamber 12, thereby not causing shortage of the refrigerant necessary to cool the refrigerating chamber 14.

[0057] In general, the refrigerant recovery operation time Δt is about 1-2 minutes. The refrigerant recovery operation time is not limited thereto, but may be variously modified according to capacity or design structure of the refrigerator.

[0058] After the refrigerant distributed at the freezing chamber evaporator 32 is moved to the condenser 22 through the refrigerant recovery operation, the control unit 54 turns on the flow conversion valve 26 in the direction R (in the direction of the refrigerating chamber), as shown in FIG. 3 such that the refrigerating chamber 14 is operated.

[0059] When the flow conversion valve 26 is turned on in the direction R (in the direction of the refrigerating chamber), the refrigerant is circulated in the refrigerating chamber operation mode, i.e., in the order of the compressor 20, the condenser 22, the hot pipe 24, the flow conversion valve 26, the refrigerating chamber expansion device 30, the refrigerating chamber evaporator 34, and the compressor 20.

[0060] Therefore, the refrigerant in the high-temperature and high-pressure gaseous state discharged from the compressor 20 is condensed into the high-pressure liquid state by the condenser 22, and then is introduced into the flow conversion valve 26 via the hot pipe 24.

[0061] Here, in the flow conversion valve 26, since the passage at the side of the refrigerating chamber 14 in the direction R is opened, the operation of the refrigerating chamber 14, in which the refrigerant introduced into the flow conversion valve 26 is introduced into the refrigerating chamber evaporator 34 through the refrigerating

chamber expansion device 30 to cool the refrigerating chamber 14 and then is returned to the compressor 20, is performed (operation 106).

[0062] When the refrigerating chamber 14 is cooled in the refrigerating chamber operation mode along the above refrigerant flow, shortage of the refrigerant is not generated.

[0063] As described above, the parallel cycle is performed in the order of the operation of the freezing chamber 12 under the condition that the compressor 20 is turned off, the refrigerant recovery operation, and the operation of the refrigerating chamber 14, such that operations of the freezing chamber 12 and the refrigerating chamber 14 are performed independently. Thereafter, it is judged whether or not compressor turning-off conditions are satisfied (operation 108), and if it is judged that the compressor turning-off conditions are satisfied, the compressor 20 is turned off (operation 110), and the operation of the parallel cycle is completed.

[0064] As is apparent from the above description, in a refrigerator and a method of controlling an operation thereof in accordance with one embodiment, an evaporator is separately installed in each of a freezing chamber and a refrigerating chamber, and an operation of the freezing chamber is performed first when the refrigerator starts to be operated in a parallel cycle to convert the passage of a refrigerant such that operations of the freezing chamber and the refrigerating chamber are independently performed using a 3-way valve, thereby achieving energy savings. Further, a check valve to prevent the refrigerant from flowing to a freezing chamber evaporator is omitted, thereby achieving production cost reduction and shortening a refrigerant recovery operation time necessary to operate the refrigerating chamber.

[0065] Although a few embodiments 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 principles and spirit of the invention, the scope of which is defined in the claims and their equivalents.

Claims

1. A refrigerator comprising:

- a compressor;
- a condenser to condense a refrigerant compressed by the compressor;
- a freezing chamber and a refrigerating chamber;
- a freezing chamber evaporator and a refrigerating chamber evaporator respectively installed in the freezing chamber and the refrigerating chamber to cool the freezing chamber and the refrigerating chamber;
- a flow conversion valve to convert a flow of the refrigerant into the freezing chamber evaporator and the refrigerating chamber evaporator ac-

- cording to operation modes; and
a control unit to control the flow conversion valve such that an operation of the freezing chamber is performed first, when the refrigerator starts to be operated. 5
2. The refrigerator according to claim 1, wherein the flow conversion valve is a 3-way valve connected to a pipe at the side of an outlet of the condenser and to pipes at the sides of inlets of the freezing and refrigerating chamber evaporators. 10
3. The refrigerator according to claim 1, wherein the control unit controls the flow conversion valve such that a refrigerant recovery operation is performed after the operation of the freezing chamber and then an operation of the refrigerating chamber is performed, if it is judged that the operation of the refrigerating chamber is required. 15
4. The refrigerator according to claim 3, wherein the refrigerant recovery operation is performed by operating the compressor under the condition that passages of the flow conversion valve in all directions are closed, so as to move the refrigerant distributed at the freezing chamber evaporator to the condenser. 20
5. A refrigerator comprising:
a freezing chamber and a refrigerating chamber;
a freezing chamber evaporator and a refrigerating chamber evaporator respectively installed in the freezing chamber and the refrigerating chamber to cool the freezing chamber and the refrigerating chamber;
a flow conversion valve to convert a flow of a refrigerant into the freezing chamber evaporator and the refrigerating chamber evaporator so as to form a parallel cycle independently controlling operations of the freezing chamber and the refrigerating chamber; and
a control unit to control the flow conversion valve such that the operation of the freezing chamber is performed first in the parallel cycle. 25
6. The refrigerator according to claim 5, wherein the control unit performs a refrigerant recovery operation to recover the refrigerant distributed at the freezing chamber evaporator, after the operation of the freezing chamber. 30
7. A refrigerator comprising:
a freezing chamber and a refrigerating chamber;
a freezing chamber evaporator and a refrigerating chamber evaporator respectively installed in the freezing chamber and the refrigerating chamber. 35
8. The refrigerator according to claim 7, further comprising:
a compressor; and
a condenser to condense the refrigerant compressed by the compressor, wherein the flow conversion valve is a 3-way valve connected to a pipe at the side of an outlet of the condenser and to pipes at the sides of inlets of the freezing and refrigerating chamber evaporators. 40
9. The refrigerator according to claim 8, wherein the refrigerant recovery operation is performed by operating the compressor under the condition that passages of the flow conversion valve in all directions are closed, so as to move the refrigerant distributed at a low-pressure part to a high-pressure part. 45
10. The refrigerator according to claim 9, wherein the low-pressure part is the freezing chamber evaporator. 50
11. The refrigerator according to claim 9, wherein the high-pressure part is the condenser.
12. A method of controlling an operation of a refrigerator, which is provided with a freezing chamber and a refrigerating chamber, and a freezing chamber evaporator and a refrigerating chamber evaporator to cool the freezing chamber and the refrigerating chamber, comprising:
judging whether or not it is time to start an operation of the refrigerator; and
performing an operation of the freezing chamber first, if it is judged that it is time to start the operation of the refrigerator.
13. The method according to claim 12, wherein the performance of the operation of the freezing chamber is achieved by opening a passage, in a direction of the freezing chamber, of a flow conversion valve to convert a flow of a refrigerant into the freezing chamber evaporator and the refrigerating chamber evaporator.

14. The method according to claim 13, further comprising performing a refrigerant recovery operation by operating a compressor under the condition that passages of the flow conversion valve in all directions are closed, so as to move the refrigerant distributed at the freezing chamber evaporator to a high-pressure part. 5

15. A method of controlling an operation of a refrigerator, which is provided with a freezing chamber and a refrigerating chamber, and a freezing chamber evaporator and a refrigerating chamber evaporator to cool the freezing chamber and the refrigerating chamber, comprising: 10

judging whether or not it is time to operate the refrigerating chamber;
performing a refrigerant recovery operation first to recover a refrigerant distributed at a low-pressure part, if it is judged that it is time to operate the refrigerating chamber; and
performing an operation of the refrigerating chamber after the refrigerant recovery operation. 20

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FIG. 1

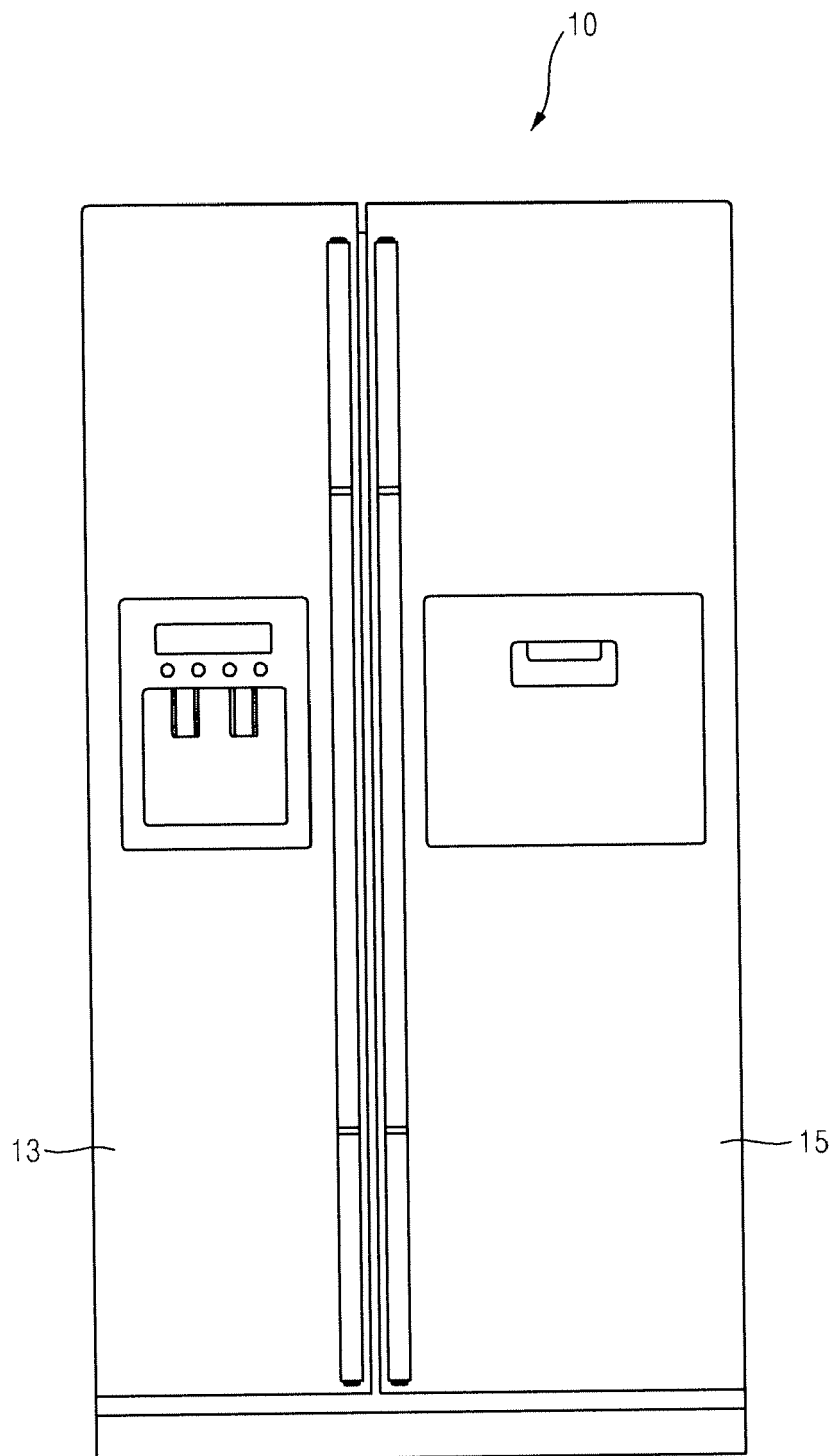


FIG. 2

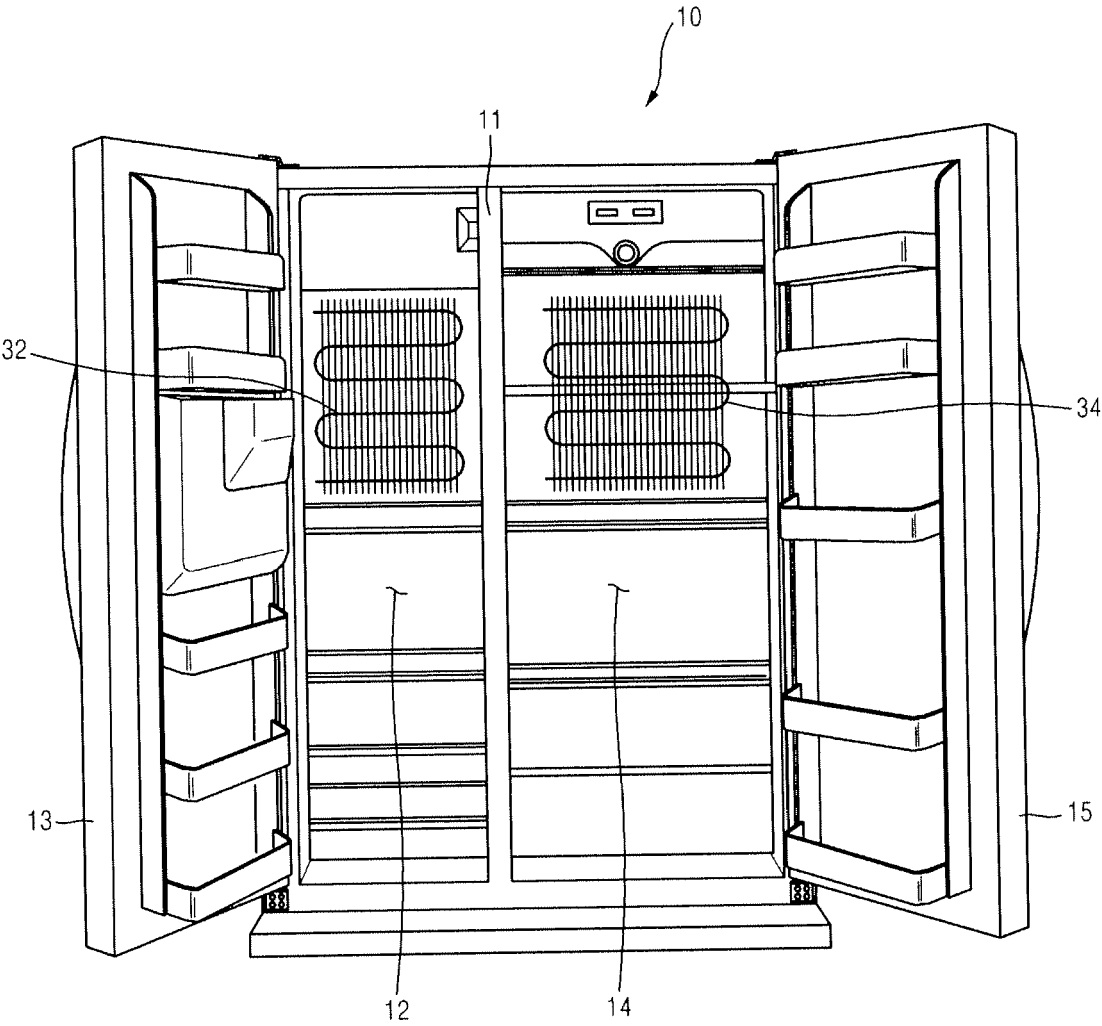


FIG. 3

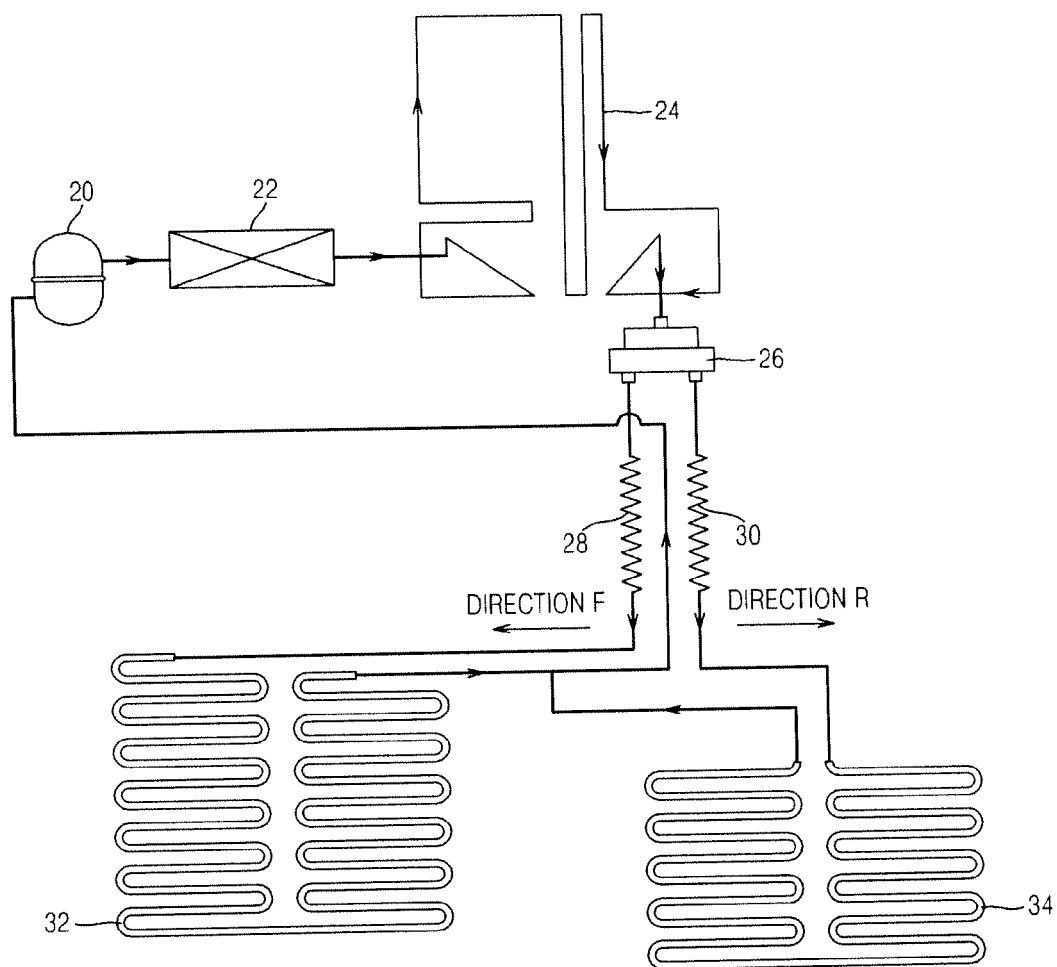


FIG. 4

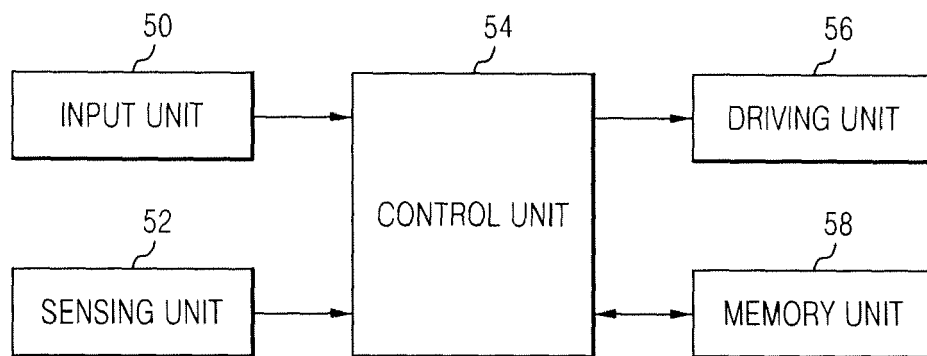


FIG. 5

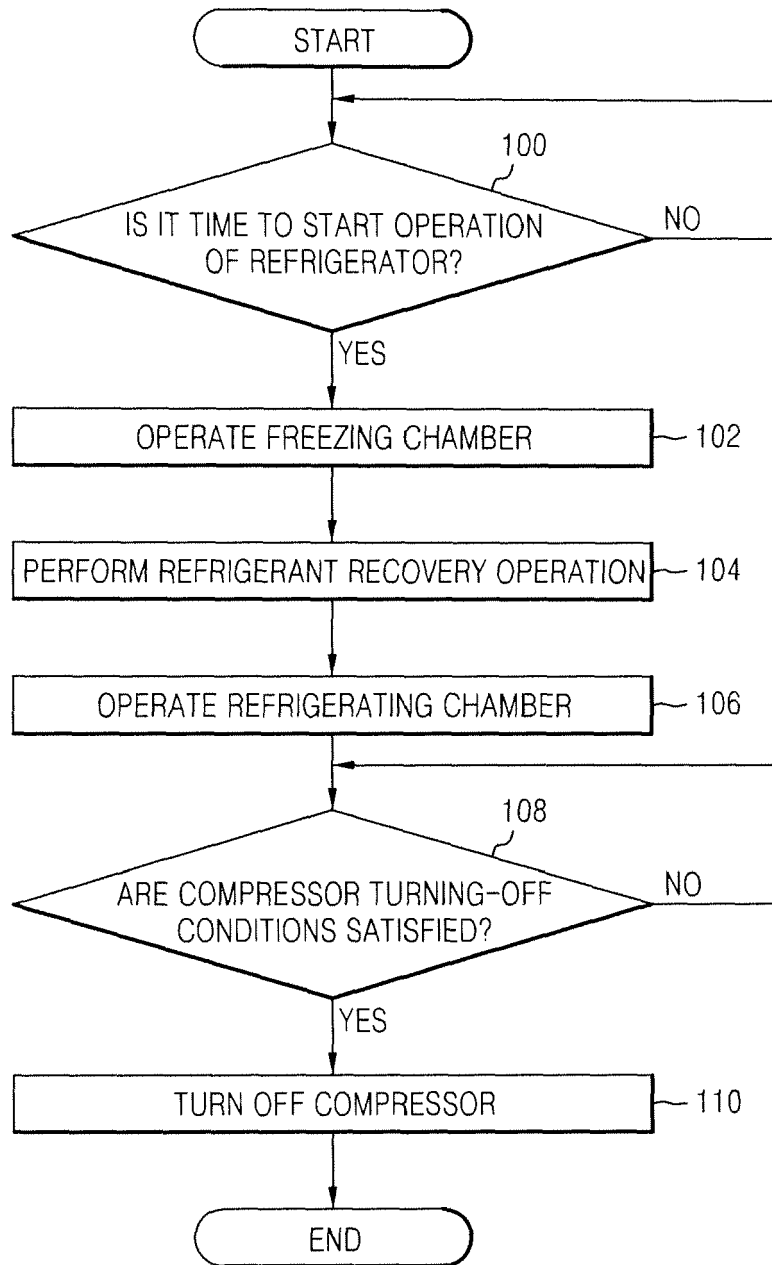


FIG. 6

