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

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(57) **ABSTRACT**

Disclosed herein is a refrigerator. In a refrigeration cycle including a channel switching valve to selectively supply a refrigerant to a first evaporator side and/or a second evaporator side and hot pipes, a hot pipe on a freezing chamber side and a hot pipe on a refrigerating chamber are disposed upstream and downstream of the channel switching valve, respectively to reduce unbalance in amounts of the refrigerant and in the amounts of generated heat.

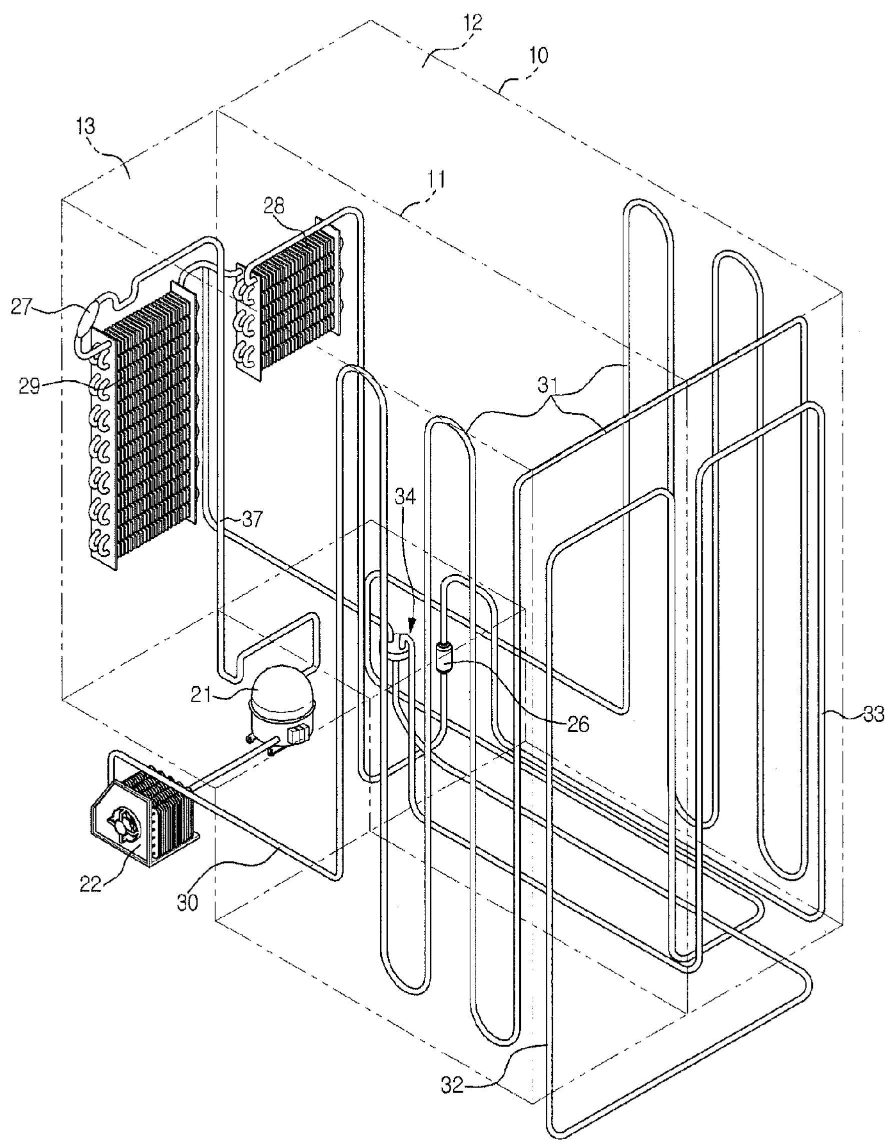


FIG. 1

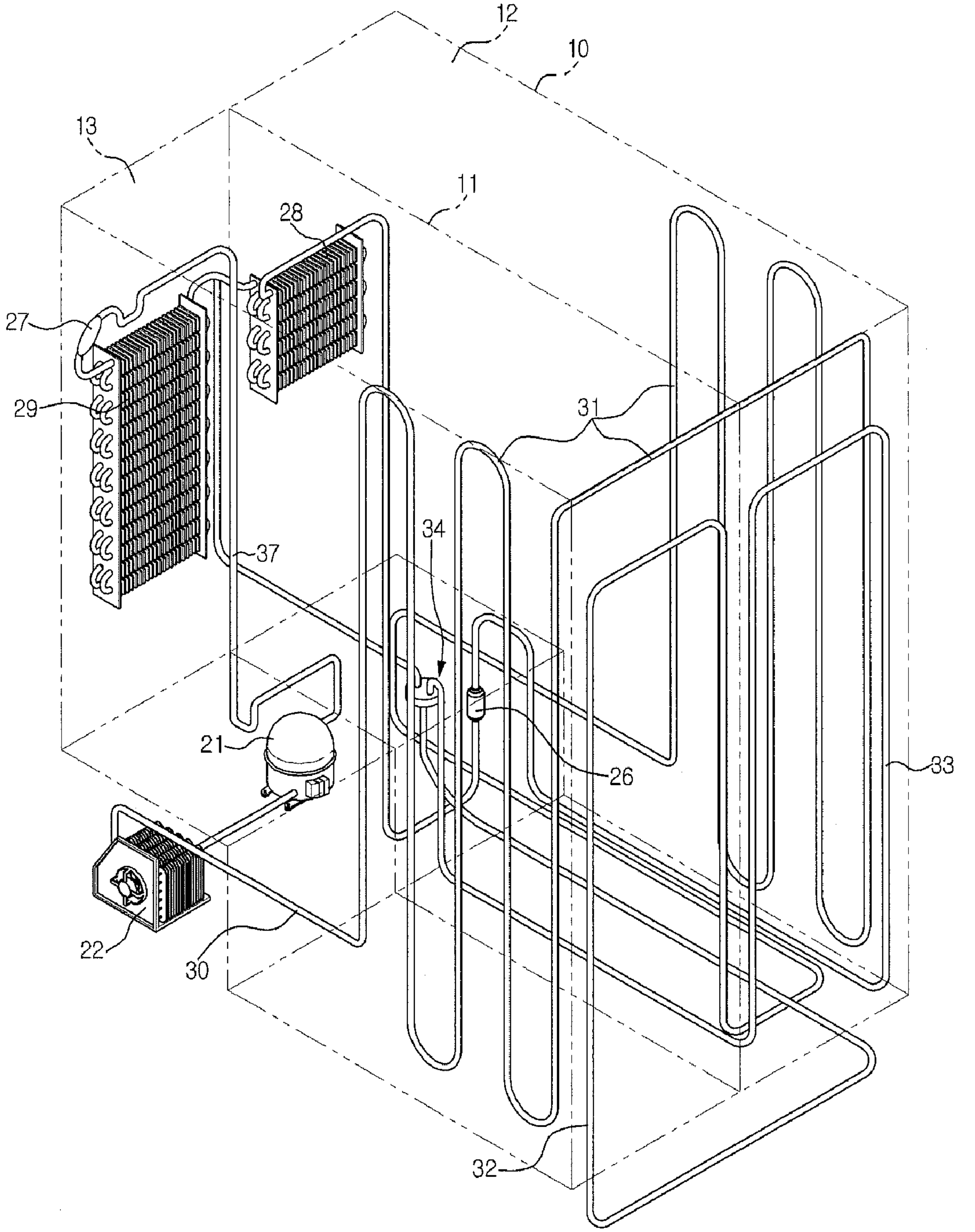


FIG. 2

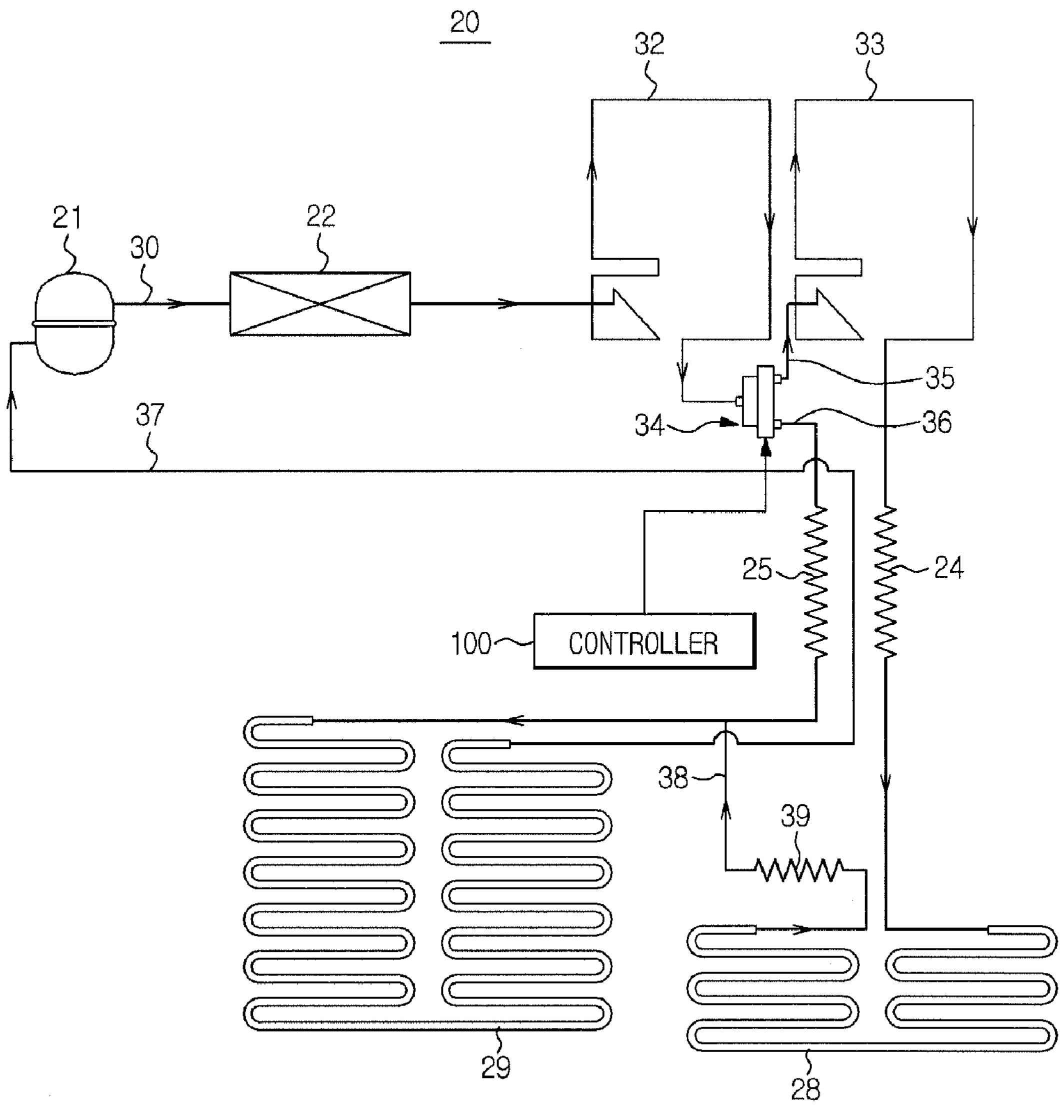


FIG. 3

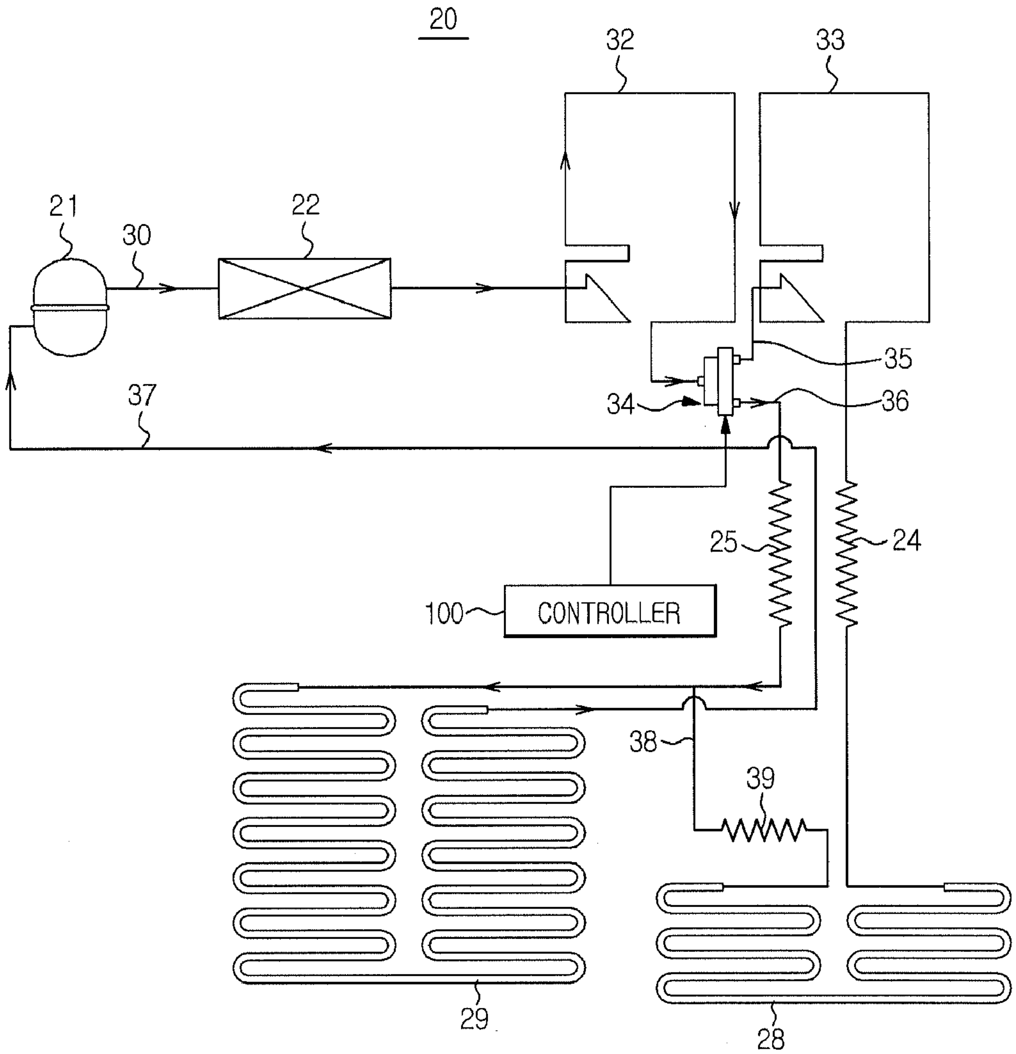


FIG. 4

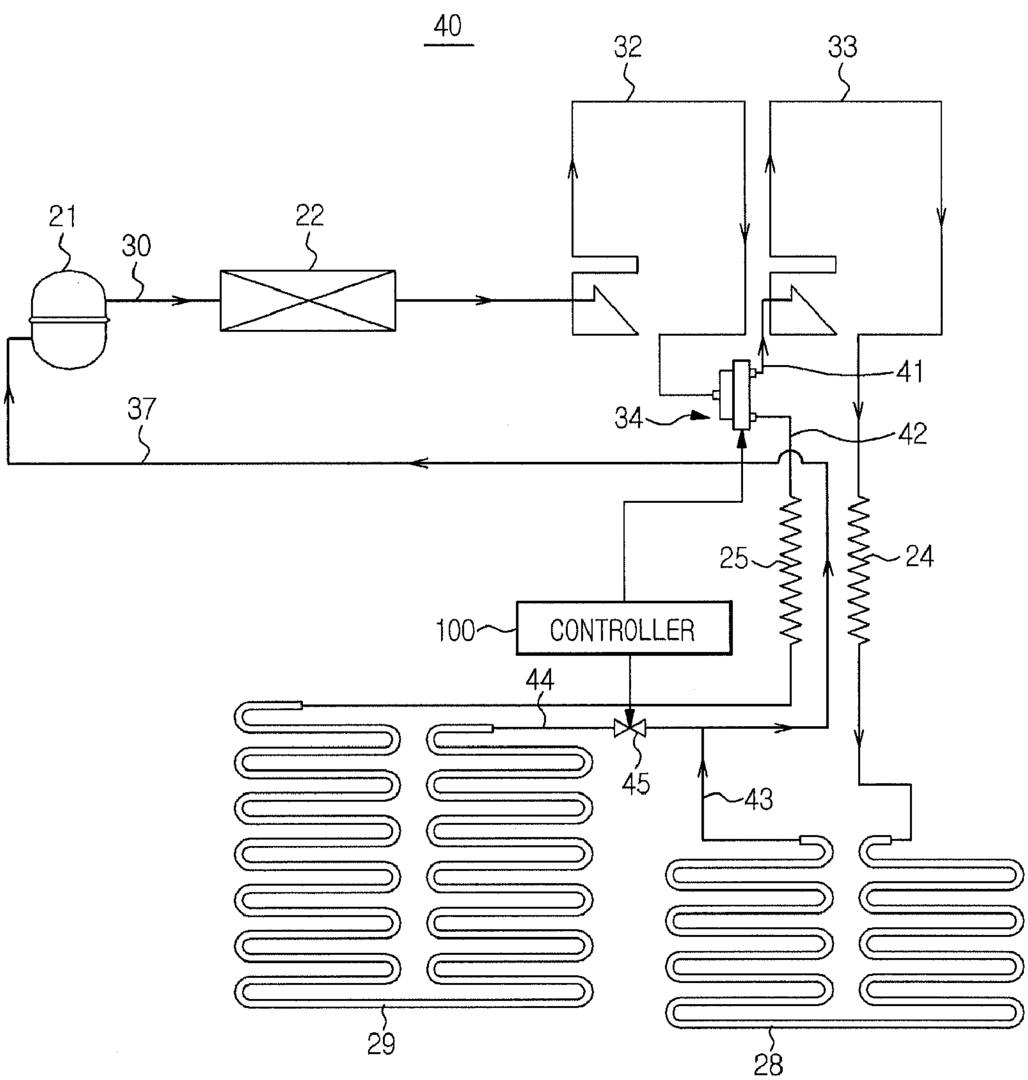
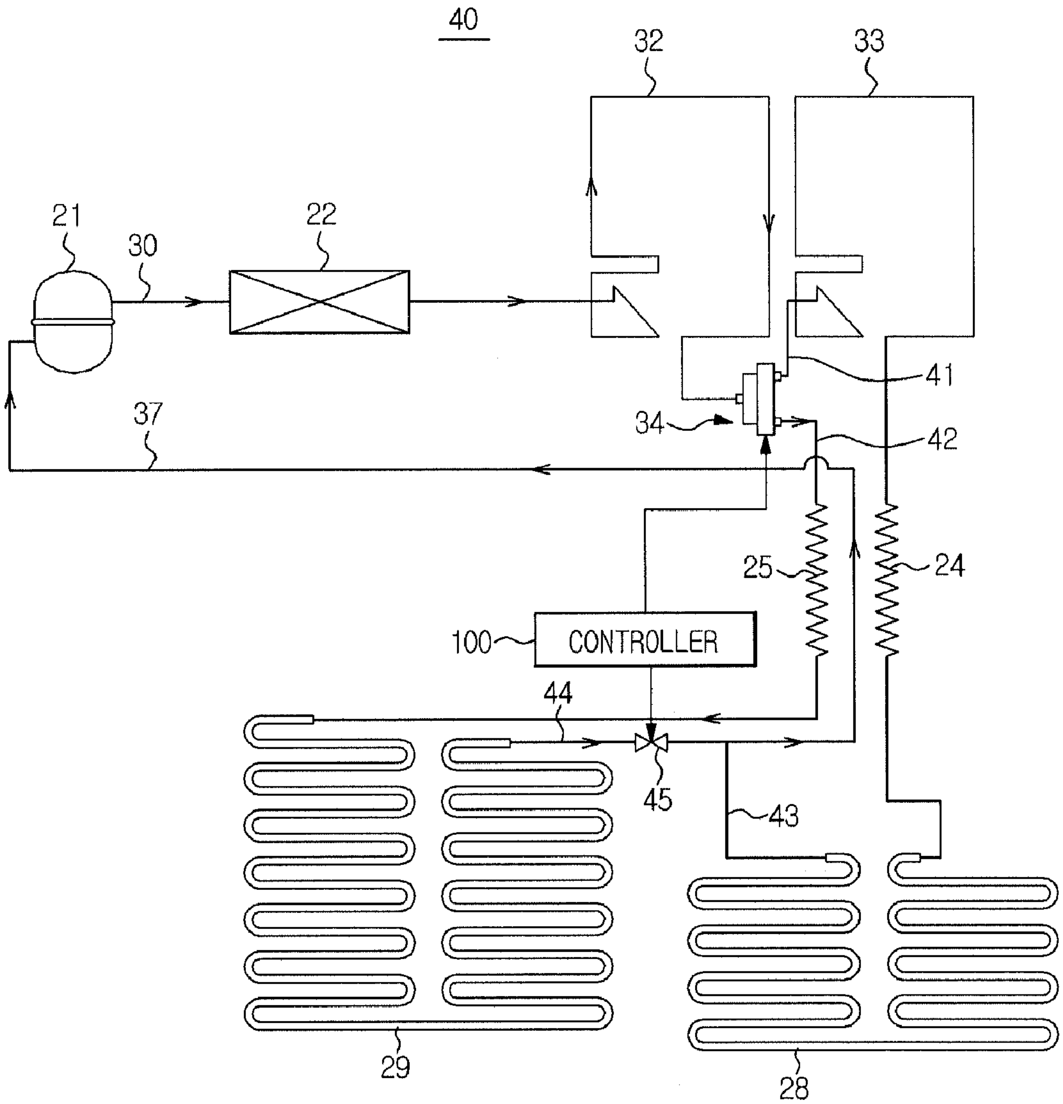


FIG. 5



REFRIGERATOR AND OPERATION CONTROL METHOD THEREOF

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of Korean Patent Application No. 10-2009-0129106, filed on Dec. 22, 2009 in the Korean Intellectual Property Office, the disclosure of which is incorporated herein by reference.

BACKGROUND

[0002] 1. Field

[0003] Embodiments discussed herein relate to a refrigerator having a refrigeration cycle including evaporators provided respectively in a refrigerating chamber and a freezing chamber and an operation control method thereof.

[0004] 2. Description of the Related Art

[0005] Generally, a refrigerator is an apparatus that supplies low-temperature cool air into a storage chamber to store food in the storage chamber at low temperature in a fresh state. The refrigerator may include a freezing chamber to store food at below freezing temperature and a refrigerating chamber to store food at a temperature slightly higher than freezing temperature.

[0006] Cool air to be supplied into the refrigerator is generated through heat exchange of a refrigerant. A refrigeration cycle of compression, condensation, expansion, and evaporation is repetitively performed to continuously supply cool air into the refrigerator. The supplied cool air is uniformly diffused in the refrigerator by convection to store or keep food in the refrigerator at a predetermined temperature.

[0007] A refrigerator is disclosed in which a refrigeration cycle includes evaporators provided respectively in a refrigerating chamber and a freezing chamber and a three-way valve to supply a refrigerant discharged from a condenser to the evaporator on the refrigerating chamber side or the evaporator on the freezing chamber side, thereby controlling flow of the refrigerant according to an operation mode of the refrigerator.

[0008] When cool air inside the refrigerator and hot air outside the refrigerator directly/indirectly contact each other, dew may be formed in the perimeters of openings of the refrigerating chamber and the freezing chamber due to a temperature difference. A refrigerator is also disclosed in which a hot pipe extending from the condenser of the refrigeration cycle is arranged in the perimeters of the openings of the refrigerating chamber and the freezing chamber to prevent dew formation.

[0009] The hot pipe is a refrigerant pipe mounted at a high-pressure side. Generally, the hot pipe is arranged upstream of the three-way valve throughout the perimeters of the openings of the refrigerating chamber and the freezing chamber to prevent dew formation at the openings of the refrigerating chamber and the freezing chamber through dissipation of heat from a high-temperature refrigerant gas during the operation of a compressor.

[0010] In the refrigeration cycle including the hot pipe, energy loss may occur due to unbalance in the amounts of heat generated from the hot pipe on the freezing chamber side and the hot pipe on the refrigerating chamber side and unbalance in the amount of the refrigerant.

SUMMARY

[0011] It is an aspect of the embodiments to provide a refrigerator that reduces unbalance in the amount of a refrigerant according to an operation mode of a refrigeration cycle, thereby improving cooling efficiency of a refrigerating chamber and a freezing chamber.

[0012] It is another aspect to provide a refrigerator that reduces unbalance in the amount of heat generated from a hot pipe, thereby reducing power consumption.

[0013] Additional aspects will be set forth in part in the description which follows and, in part, will be obvious from the description, or may be learned by practice of the embodiments.

[0014] In accordance with one aspect, a refrigerator includes a compressor, a condenser, a hot pipe, a first circulation channel to cool a refrigerating chamber, a second circulation channel to cool a freezing chamber, and a channel switching valve to perform switching between the circulation channels, wherein the hot pipe includes a first hot pipe on a freezing chamber side and a second hot pipe on a refrigerating chamber side, a first end of the first hot pipe is connected to the condenser and a second end of the first hot pipe an inlet of the channel switching valve, and the second hot pipe is connected to an outlet of the channel switching valve.

[0015] The second circulation channel may be connected to another outlet of the channel switching valve, and the second circulation channel may be connected to the compressor via a second expansion device and a second evaporator on the freezing chamber side.

[0016] The first circulation channel may be connected to a second evaporator on the freezing chamber side and the compressor via the second hot pipe, a first expansion device, a first evaporator on the refrigerating chamber side, and a third expansion device in a series.

[0017] The first circulation channel may be connected to a first evaporator on the refrigerating chamber side and the compressor via the second hot pipe and a first expansion device.

[0018] The channel switching valve may include a three-way valve having one inlet connected to an outlet of the first hot pipe and two outlets connected respectively to the first circulation channel and the second circulation channel.

[0019] In accordance with another aspect, a refrigerator includes a compressor, a condenser, a first hot pipe on a freezing chamber side and a second hot pipe on a refrigerating chamber site, and a controller to control a first operation mode to cool a refrigerating chamber and a second operation mode to cool a freezing chamber, wherein the controller controls a refrigerant channel such that a refrigerant discharged from the condenser cools the freezing chamber via the first hot pipe and the second hot pipe returns to the compressor during an operation in the first operation mode.

[0020] The controller may control a refrigerant channel such that the refrigerant flows to the first hot pipe during an operation in the second operation mode.

[0021] The controller may control a refrigerant channel such that the refrigerant discharged from the condenser cools the refrigerating chamber and the freezing chamber via the first hot pipe and the second hot pipe and returns to the compressor during an operation in the first operation mode.

[0022] The controller may control a refrigerant channel such that the refrigerant discharged from the condenser cools the refrigerating chamber via the first hot pipe and the second hot pipe and returns to the compressor during an operation in the first operation mode.

[0023] In accordance with a further aspect, an operation control method of a refrigerator including a compressor, a condenser, a first hot pipe on a freezing chamber side, a second hot pipe on a refrigerating chamber side, a refrigerating chamber, and a freezing chamber includes determining whether the refrigerating chamber or the freezing chamber is to be cooled and controlling a refrigerant discharged from the condenser to cool the freezing chamber via the first hot pipe upon determining that the freezing chamber is to be cooled.

[0024] The operation control method may further include controlling the refrigerant discharged from the condenser to cool the refrigerating chamber via the first hot pipe and the second hot pipe upon determining that the refrigerating chamber is to be cooled.

[0025] The operation control method may further include controlling the refrigerant to cool the freezing chamber, after cooling the refrigerating chamber, and return to the compressor.

[0026] The operation control method may further include controlling the refrigerant to return to the compressor after cooling the refrigerating chamber.

BRIEF DESCRIPTION OF THE DRAWINGS

[0027] 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:

[0028] FIG. **1** is a schematic perspective view illustrating a refrigeration cycle of a refrigerator according to an embodiment;

[0029] FIG. **2** is a view illustrating a first operation mode of a refrigeration cycle according to an embodiment;

[0030] FIG. **3** is a view illustrating a second operation mode of the refrigeration cycle of FIG. **2**;

[0031] FIG. **4** is a view illustrating a first operation mode of a refrigeration cycle according to another embodiment; and

[0032] FIG. **5** is a view illustrating a second operation mode of the refrigeration cycle of FIG. **4**.

DETAILED DESCRIPTION

[0033] 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.

[0034] Referring to FIG. **1**, a refrigerator according to an embodiment may include a refrigerator body **10** and a plurality of storage chambers **12** and **13** partitioned by a partition **11**.

[0035] The storage chambers **12** and **13** include a refrigerating chamber **12** to store food at a temperature slightly higher than freezing temperature and a freezing chamber **13** to store food at below freezing temperature. In the storage chambers **12** and **13** may be respectively provided evaporators **28** and **29** to perform heat exchange with air in the storage chambers **12** and **13**.

[0036] The evaporators **28** and **29** include a first evaporator **28** mounted in the refrigerating chamber **12** and a second evaporator **29** mounted in the freezing chamber **13**, respectively. The evaporators **28** and **29** are connected to a refrigeration cycle to cool the respective storage chambers **12** and **13**.

[0037] The refrigeration cycle includes a compressor **21** to compress a gas refrigerant into a high-temperature and high-pressure state, a condenser **22** to condense the gas refrigerant compressed by the compressor **21** into a liquid state, expansion devices **24** and **25** (see FIG. **2**) to convert the liquid refrigerant into a low-temperature and low-pressure state, and evaporators **28** and **29** to evaporate the low-temperature and low-pressure liquid refrigerant to generate cool air. These are connected to one another via a refrigerant pipe **30** such that the refrigerant is circulated while the phase of the refrigerant is changed.

[0038] The expansion devices **24** and **25** may include capillary tubes or expansion valves. The evaporators **28** and **29** may be provided in the respective storage chambers **12** and **13**.

[0039] Also, the refrigeration cycle may further include a dryer **26** provided between the compressor **22** and the expansion devices **24** and **25** to remove moisture from the refrigerant supplied from the condenser **22** and an accumulator **27** provided between the evaporators **28** and **29** and the compressor **21** to restrain the supply of the liquid refrigerant to the condenser **21**.

[0040] In the refrigerant pipe **30** connected between the condenser **22** and the expansion devices **24** and **25** may provided a cluster pipe **31** arranged at the top and opposite sidewalls of the refrigerator body **10** in a serpentine fashion and hot pipes **32** and **33** arranged along the perimeter of a front opening of the refrigerator body **10**.

[0041] The hot pipes **32** and **33** extend from the condenser **22** such that the hot pipes **32** and **33** are buried along the perimeter of the opening of the refrigerator body **10**. Formation of dew at the front of the refrigerator body **10** due to a temperature difference between the inside and outside of the refrigerator body **10** is prevented, and the amount of heat dissipated from the high-pressure side is increased, by the dissipation of heat from the high-temperature refrigerant flowing in the hot pipes **32** and **22**.

[0042] The hot pipes **32** and **33** may include, a first hot pipe **32** buried in the perimeter of the refrigerator body **10** constituting the freezing chamber **13** and a second hot pipe **33** buried in the perimeter of the refrigerator body **10** constituting the refrigerating chamber **12**.

[0043] Generally, a hot pipe is connected to a refrigerant pipe. The inlet and outlet of the hot pipe are connected respectively to the outlet of a high-pressure side refrigerant pipe and the inlet of a valve to control the flow of a refrigerant to a refrigerating chamber or freezing chamber evaporator.

[0044] In this case, a high-temperature refrigerant always flows in the hot pipe during the operation of a compressor, with the result that the amount of heat generated from a hot pipe on the refrigerating chamber side, the temperature of which is relatively low, is excessive, thereby lowering energy efficiency.

[0045] In this embodiment, therefore, a channel switching valve may be provided on a refrigerant circulation channel on the second hot pipe inlet side buried in the perimeter of the opening of the refrigerator body constituting the refrigerating chamber **12** to prevent lowering of energy efficiency of the refrigerator due to excessive heat generation from the hot pipe.

[0046] Hereinafter, the refrigerant circulation channel of the refrigeration cycle will be described. FIG. **2** is a schematic view illustrating the construction of a refrigeration cycle **20** according to an embodiment. In this embodiment, the refrigeration cycle is configured such that a first evaporator to generate cool air for the refrigerating chamber and a second evaporator to generate cool air for the freezing chamber are connected in series.

[0047] As shown in FIG. **2**, the refrigeration cycle **20** is configured such that a condenser **22** is connected to a high-pressure side discharge port of a compressor **21**, and a first hot pipe **32** buried in the perimeter of the opening of the freezing chamber **13** in FIG. **1** is connected to the outlet of the condenser **22**.

[0048] A channel switching valve **34** is connected to the outlet of the first hot pipe **32**. The channel switching valve **34** may include a three-way valve having one inlet and two outlets. The outlets of the channel switching valve **34** may be connected respectively to a first circulation channel **35** and a second circulation channel **36**.

[0049] The channel switching valve **34** is not particularly restricted as long as one of the outlets is selectively opened, or bidirectional opening and closing is performed.

[0050] A second hot pipe **33** buried in the perimeter of the opening of the refrigerating chamber **12** is connected to the outlet of the channel switching valve **34** connected to the first circulation channel **35**. A first expansion device **24** for the refrigerating chamber and a first evaporator **28** are sequentially connected to the outlet of the second hot pipe **33**.

[0051] A second expansion device **25** for the freezing chamber and a second evaporator **29** are sequentially connected to the outlet of the channel switching valve **34** connected to the second circulation channel **36**. The outlet of the second evaporator **29** is connected to the compressor **21** via a suction pipe **37**.

[0052] Also, the outlet of the first evaporator **28** and the inlet of the second evaporator **29** are connected in series via a connection refrigerant pipe **38**. A third expansion device **39** is mounted on the connection refrigerant pipe **38**.

[0053] Hereinafter, the operation of the refrigeration cycle of FIG. **2** will be described.

[0054] In this embodiment, the refrigeration cycle may include a first operation mode to simultaneously cool the refrigerating chamber **12** and the freezing chamber **13**, a second operation mode to cool the freezing chamber **13** alone, and a controller **100** to control the first operation mode and the second operation mode.

[0055] The controller **100** may be a microprocessor or microcontroller including a central processing unit (CPU) to perform at least one computer command to control operations of the respective components of the refrigerator according to manipulation set by a user or a predetermined program.

[0056] In the first operation mode as shown in FIG. **2**, a refrigerant, compressed by and discharged from the compressor **21**, is introduced into the condenser **22**. The refrigerant, condensed by the condenser **22**, flows to the channel switching valve **34** via the first hot pipe **32**.

[0057] At this time, the channel switching valve **34** opens only the first circulation channel **35** under the control of the controller **100**. Consequently, the refrigerant, introduced into the channel switching valve **34**, is introduced into the first evaporator **28** via the second hot pipe **33** and the first expansion device **24** to cool the refrigerating chamber **12**.

[0058] The refrigerant, discharged from the first evaporator **28**, is introduced into the second evaporator **29** via the third expansion device **39** to cool the freezing chamber **13**. The refrigerant, discharged from the second evaporator **29**, returns to the compressor **21** via the suction pipe **37**.

[0059] In the second operation mode as shown in FIG. **3**, a refrigerant, compressed by and discharged from the compressor **21**, is introduced into the condenser **22**. The refrigerant, condensed by the condenser **22**, flows to the channel switching valve **34** via the first hot pipe **32**.

[0060] At this time, the channel switching valve **34** opens only the second circulation channel **36** under the control of the controller **100**. Consequently, the refrigerant, introduced into the channel switching valve **34**, cools the freezing chamber **13** via the second expansion device **25** and the second evaporator **29**. The refrigerant, discharged from the second evaporator **29**, returns to the compressor **21** via the suction pipe **37**.

[0061] That is, the controller **100** determines whether the refrigerating chamber **12** or the freezing chamber **13** is to be cooled. Upon determining that the freezing chamber **13** is to be cooled, the controller **100** controls the second circulation channel **36** of the channel switching valve **34** such that the refrigerant discharged from the condenser **22** cools the freezing chamber **13** via the first hot pipe **32**. Upon determining that the refrigerating chamber **12** is to be cooled, the controller **100** controls the first circulation channel **35** of the channel switching valve **34** such that the refrigerant discharged from the condenser **22** cools the refrigerating chamber **12** via the first hot pipe **32** and the second hot pipe **33**.

[0062] Meanwhile, the amount of a refrigerant optimally filled in the refrigeration cycle may be changed depending upon a refrigerating operation or a freezing operation. Generally, an amount of a refrigerant between optimal amounts of a refrigerant for the refrigerating and freezing operations is filled in the refrigeration cycle.

[0063] As a result, the refrigerant is excessive in one of the refrigerating and freezing operations and is insufficient in the other of the refrigerating and freezing operations.

[0064] That is, the refrigerant is excessive in the refrigerating operation, and the refrigerant is insufficient in the freezing operation, with the result that energy loss may occur due to unbalance in the amount of the refrigerant. In this embodiment, such energy loss may be minimized.

[0065] Referring to FIG. **2**, in the first operation mode of the refrigeration cycle, a larger amount of the refrigerant than the optimal amount of the refrigerant to be introduced into the first evaporator **28** is filled. At this time, the refrigerant flows to the second hot pipe **33**, thereby preventing the refrigerant from being excessively introduced into the first evaporator **28**.

[0066] Referring to FIG. **3**, in the second operation mode of the refrigeration cycle, a smaller amount of the refrigerant than the optimal amount of the refrigerant to be introduced into the second evaporator **29** is filled. At this time, the refrigerant does not flow to the second hot pipe **33**, thereby preventing the refrigerant from being insufficiently introduced into the second evaporator **29**.

[0067] Consequently, in a conventional structure in which the refrigerant flows to both the first hot pipe **32** and the second hot pipe **33** during the operation of the compressor **21**, energy efficiency is lowered due to unbalance in the amount of the refrigerant. In this embodiment, the unbalance in the amount of the refrigerant is relatively reduced, thereby improving energy efficiency of the refrigerator.

[0068] Also, since the amount of heat to be provided to prevent dew formation is generally calculated based on the first hot pipe **32** on the freezing chamber side, heat is excessively generated from the second hot pipe **33** on the refrigerating chamber side, thereby excessively increasing thermal load of the refrigerator. In this embodiment, the amount of heat generated from the second hot pipe **33** of the refrigeration cycle is relatively reduced as compared with the amount of heat generated from the first hot pipe **32**, with the result that increase of thermal load due to excessive generation of heat is prevented, thereby improving energy efficiency of the refrigerator.

[0069] FIG. **4** is a schematic view illustrating the construction of a refrigeration cycle **40** according to another embodiment.

[0070] Hereinafter, components of this embodiment identical to those of the previous embodiment are denoted by the same reference numerals, and a detailed description thereof will not be given.

[0071] In this embodiment, the refrigeration cycle is configured such that a first evaporator to generate cool air for the refrigerating chamber and a second evaporator to generate cool air for the freezing chamber are connected in parallel, unlike the previous embodiment.

[0072] As shown in FIG. **4**, the refrigeration cycle **40** is configured such that a condenser **22** is connected to a high-pressure side discharge port of a compressor **21**, and a first hot pipe **32** buried in the perimeter of the opening of the freezing chamber **13** in FIG. **1** is connected to the outlet of the condenser **22**.

[0073] A channel switching valve **34** is connected to the outlet of the first hot pipe **32**. The channel switching valve **34** may include a three-way valve having one inlet and two outlets. The outlets of the channel switching valve **34** may be connected respectively to a first circulation channel **41** on the refrigerating chamber side and a second circulation channel **42** on the freezing chamber side.

[0074] A second hot pipe **33** buried in the perimeter of the opening of the refrigerating chamber **12** is connected to the outlet of the channel switching valve **34** connected to the first circulation channel **41**. A first expansion device **24** for the refrigerating chamber and a first evaporator **28** are sequentially connected to the outlet of the second hot pipe **33**.

[0075] Referring to FIG. **4**, the second hot pipe **33**, the first expansion device **24**, the first evaporator **28**, and a suction pipe **37** are sequentially connected to the outlet of the channel switching valve **34** connected to the first circulation channel **41**. A second expansion device **25**, a second evaporator **29**, and the suction pipe **37** are sequentially connected to the outlet of the channel switching valve **34** connected to the second circulation channel **42**.

[0076] The outlet of the first evaporator **28** is connected to a first discharge refrigerant pipe **43**, which is a discharge channel of the refrigerating chamber **12**. The outlet of the second evaporator **29** is connected to a second discharge refrigerant pipe **44**, which is a discharge channel of the freezing chamber **13**.

[0077] A refrigerant discharged from the first discharge refrigerant pipe **43** and a refrigerant discharged from the second discharge refrigerant pipe **44** are mixed before introduction thereof into the compressor **21**. The joint between the first discharge refrigerant pipe **43** and the second discharge refrigerant pipe **44** is connected to the inlet of the compressor **21** via the suction pipe **37**.

[0078] A check valve **45** is mounted on the second discharge refrigerant pipe **44** is mounted to prevent backward flow of the refrigerant from the first discharge refrigerant pipe **43**.

[0079] Hereinafter, the operation of the refrigeration cycle of FIG. **4** will be described.

[0080] In this embodiment, the refrigeration cycle may include a first operation mode to operate the refrigerating chamber **12**, a second operation mode to operate the freezing chamber **13**, and a controller to control the first operation mode and the second operation mode.

[0081] In the first operation mode as shown in FIG. **4**, a refrigerant, compressed by and discharged from the compressor **21**, is introduced into the condenser **22**. The refrigerant, condensed by the condenser **22**, flows to the channel switching valve **34** via the first hot pipe **32**.

[0082] At this time, the channel switching valve **34** opens only the first circulation channel **41** under the control of the controller. Consequently, the refrigerant, introduced into the channel switching valve **34**, sequentially flows through the second hot pipe **33**, the first expansion device **24**, and the first evaporator **28**, and returns to the compressor via the suction pipe **37**.

[0083] In the refrigeration cycle in which a larger amount of the refrigerant than the optimal amount of the refrigerant to be introduced into the first evaporator **28** is filled, therefore, the refrigerant flows to the second hot pipe **33**, thereby preventing the refrigerant from being excessively introduced into the first evaporator **28**.

[0084] Also, the amount of heat generated from the second hot pipe **33** is relatively reduced as compared with the amount of heat generated from the first hot pipe **32**, with the result that increase of thermal load due to excessive generation of heat from the second hot pipe **33** is prevented.

[0085] In the second operation mode as shown in FIG. **5**, a refrigerant, compressed by and discharged from the compressor **21**, is introduced into the condenser **22**. The refrigerant, condensed by the condenser **22**, flows to the channel switching valve **34** via the first hot pipe **32**.

[0086] At this time, the channel switching valve **34** opens only the second circulation channel **42** under the control of the controller. Consequently, the refrigerant, introduced into the channel switching valve **34** sequentially flows through the second expansion device **25** and the second evaporator **29**, and returns to the compressor **21** via the suction pipe **37**.

[0087] In the refrigeration cycle in which a smaller amount of the refrigerant than the optimal amount of the refrigerant to be introduced into the second evaporator **29** is filled, therefore, the refrigerant does not flow to the second hot pipe **33**, thereby preventing the refrigerant from being insufficiently introduced into the second evaporator **29**.

[0088] In the refrigeration cycle having the coolant circulation channel as described above, therefore, unbalance in the amount of the refrigerant and unbalance in the amounts of heat generated from the hot pipes **32** and **33** depending upon the operation modes are reduced, thereby improving energy efficiency of the refrigerator.

[0089] As is apparent from the above description, unbalance in the amount of the refrigerant and unbalance in the amounts of heat generated from the hot pipes depending upon the operation modes of the refrigeration cycle are reduced, thereby improving energy efficiency of the refrigerator.

[0090] 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 thereof, the scope of which is defined in the claims and their equivalents.

What is claimed is:

1. A refrigerator comprising a compressor, a condenser, a first circulation channel to cool a refrigerating chamber, a second circulation channel to cool a freezing chamber, and a channel switching valve to perform switching between the circulation channels, wherein

a first hot pipe on a freezing chamber side; a second hot pipe on a refrigerating chamber side,

wherein the first hot pipe is connected to the condenser and an inlet of the channel switching valve, and the second hot pipe is connected to an outlet of the channel switching valve.

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

the second circulation channel is connected to another outlet of the channel switching valve, and

the second circulation channel is connected to the compressor via a second expansion device and a second evaporator on the freezing chamber side.

3. The refrigerator according to claim **1**, wherein the first circulation channel is connected to a second evaporator on the freezing chamber side and the compressor via the second hot pipe, a first expansion device, a first evaporator on the refrigerating chamber side, and a third expansion device in a series.

4. The refrigerator according to claim **1**, wherein the first circulation channel is connected to a first evaporator on the refrigerating chamber side and the compressor via the second hot pipe and a first expansion device.

5. The refrigerator according to claim **1**, wherein the channel switching valve comprises a three-way valve having one inlet connected to an outlet of the first hot pipe and two outlets connected respectively to the first circulation channel and the second circulation channel.

6. A refrigerator comprising a compressor, a condenser, a hot pipe, and a controller to control a first operation mode to cool a refrigerating chamber and a second operation mode to cool a freezing chamber, wherein

the hot pipe comprises a first hot pipe on a freezing chamber side and a second hot pipe on a refrigerating chamber side, and

the controller controls a refrigerant channel such that a refrigerant discharged from the condenser cools the freezing chamber via the first hot pipe and returns to the compressor during an operation in the second operation mode.

7. The refrigerator according to claim **6**, wherein the controller controls a refrigerant channel such that the refrigerant flows to the first hot pipe and the second hot pipe during an operation in the first operation mode.

8. The refrigerator according to claim **6**, wherein the controller controls a refrigerant channel such that the refrigerant discharged from the condenser cools the refrigerating chamber and the freezing chamber via the first hot pipe and the second hot pipe and returns to the compressor during an operation in the first operation mode.

9. The refrigerator according to claim **6**, wherein the controller controls a refrigerant channel such that the refrigerant discharged from the condenser cools the refrigerating chamber via the first hot pipe and the second hot pipe and returns to the compressor during an operation in the first operation mode.

10. An operation control method of a refrigerator comprising a compressor, a condenser, a first hot pipe on a freezing chamber side, a second hot pipe on a refrigerating chamber side, a refrigerating chamber, and a freezing chamber, comprising:

determining whether the refrigerating chamber or the freezing chamber is to be cooled; and

controlling a refrigerant discharged from the condenser to cool the freezing chamber via the first hot pipe upon determining that the freezing chamber is to be cooled.

11. The operation control method according to claim **10**, further comprising controlling the refrigerant discharged from the condenser to cool the refrigerating chamber via the first hot pipe and the second hot pipe upon determining that the refrigerating chamber is to be cooled.

12. The operation control method according to claim **11**, further comprising controlling the refrigerant to cool the freezing chamber, after cooling the refrigerating chamber, and return to the compressor.

13. The operation control method according to claim **11**, further comprising controlling the refrigerant to return to the compressor after cooling the refrigerating chamber.

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