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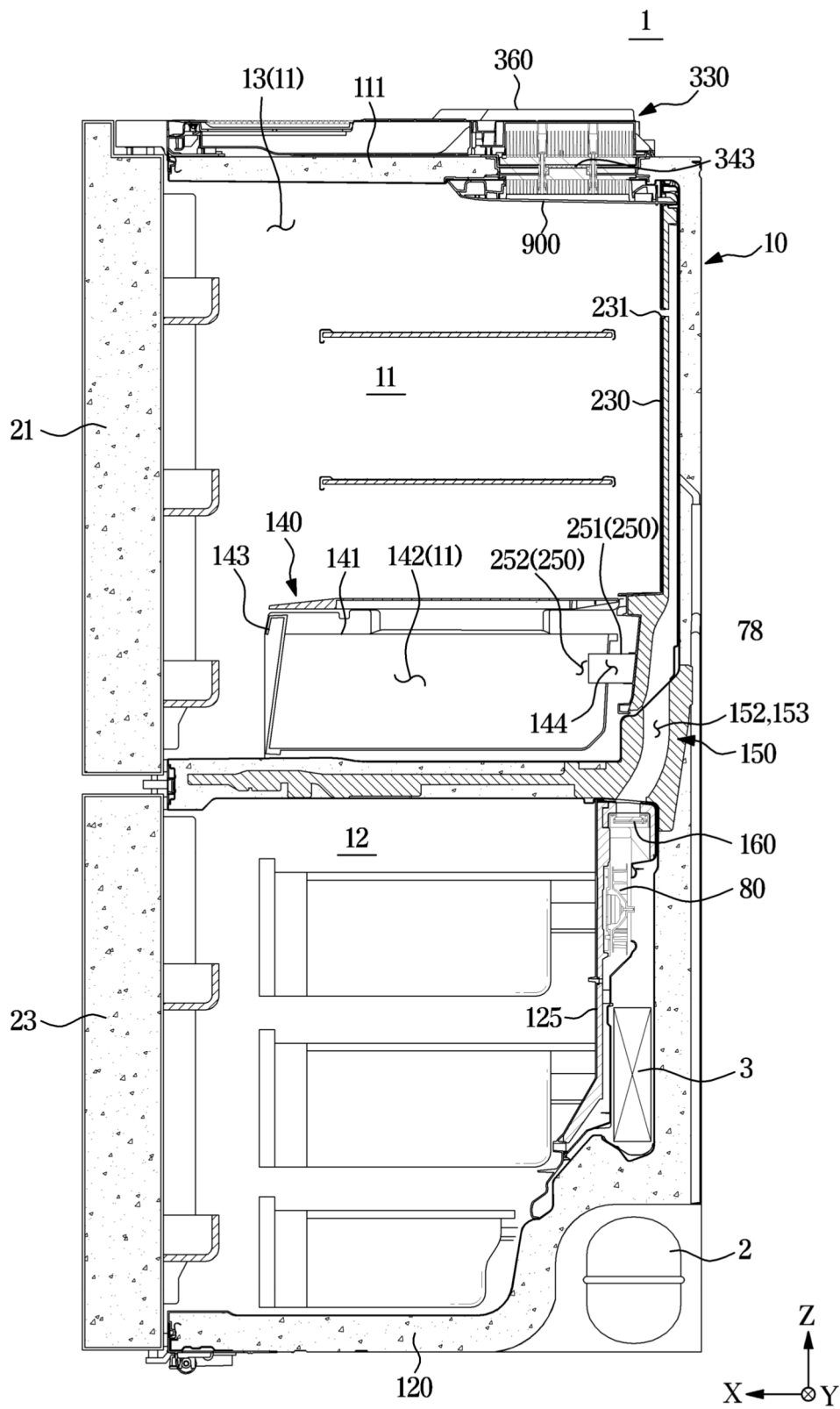
(54) **REFRIGERATOR**

(57) A refrigerator including a refrigerating compartment; a freezing compartment; an evaporator at a rear side of the freezing compartment; a communicating duct including a first flow path and a second flow path; a refrigerating compartment duct configured to receive cold air generated by the evaporator from the communicating duct and including a first internal flow path to guide cold air from the first flow path to a first refrigerating

space of the refrigerating compartment, and a second internal flow path to guide cold air from the second flow path to a second refrigerating space of the refrigerating compartment; and a damper including a first damping cover configured to control a supply of cold air to the first internal flow path, and a second damping cover configured to control a supply of cold air to the second internal flow path.

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FIG. 4



Description

[Technical Field]

[0001] The present disclosure relates to a refrigerator including an evaporator configured to cool a freezing compartment, a variable temperature compartment, and a refrigerating compartment.

[Background Art]

[0002] A refrigerator is a home appliance that keeps stored food fresh by including an inner case that forms a refrigerating compartment and a freezing compartment, and an evaporator that generates cold air to cool the refrigerating compartment and the freezing compartment.

[0003] A duct through which cold air flows may be arranged at the rear of the refrigerating compartment and the freezing compartment, and cold air generated in the evaporator may be supplied to the refrigerating compartment and the freezing compartment, respectively, through the duct.

[Disclosure]

[Technical Problem]

[0004] The present disclosure is directed to providing a refrigerator including a structure capable of moving cold air from a freezing compartment to a refrigerating compartment.

[0005] The present disclosure is directed to providing a refrigerator including a structure capable of controlling a flow of cold air flowing from a freezing compartment to a refrigerating compartment.

[0006] The present disclosure is directed to providing a refrigerator, in which a refrigerating compartment is divided into a plurality of spaces, including a structure capable of differently setting a temperature of each of the divided spaces.

[0007] The present disclosure is directed to providing a refrigerator, in which a refrigerating compartment is divided into a plurality of spaces, including a structure capable of controlling an amount of cold air flowing into each space.

[0008] The technical objectives of the disclosure are not limited to the above, and other objectives may become apparent to those of ordinary skill in the art based on the following descriptions.

[Technical Solution]

[0009] According to one aspect of the present disclosure, a refrigerator includes an inner case forming a refrigerating compartment and a freezing compartment. The refrigerator includes an evaporator at a rear side of the freezing compartment and configured to generate

cold air. The refrigerator includes a communicating duct including a first flow path through which cold air generated by the evaporator is flowable, and a second flow path partitioned from the first flow path through which cold air generated by the evaporator is flowable. The refrigerator includes a refrigerating compartment duct including a first internal flow path configured to be supplied with cold air generated by the evaporator that flowed through the first flow path and to guide the supplied cold air generated by the evaporator that flowed through the first flow path to a first refrigerating space which is a portion of the refrigerating compartment, and a second internal flow path configured to be supplied with cold air generated by the evaporator that flowed through the second flow path and to guide the supplied cold air generated by the evaporator that flowed through the second flow path to a second refrigerating space which is an other portion of the refrigerating compartment. The refrigerator includes a damper including a first damping cover configured to control the supply of cold air to the first internal flow path, and a second damping cover configured to control the supply of cold air to the second internal flow path.

[0010] According to one aspect of the present disclosure, a refrigerator including: an inner case forming a refrigerating compartment and a freezing compartment; an evaporator configured to generate cold air and installed at a rear side of the freezing compartment; and a fan configured to generate a flow of cold air. The refrigerator includes a communicating duct provided to allow the refrigerating compartment and the freezing compartment to communicate with each other so as to transfer cold air generated in the evaporator to the refrigerating compartment, and including a first flow path on which cold air flows, and a second flow path partitioned from the first flow path. The refrigerator includes a refrigerating compartment duct installed in the refrigerating compartment and provided to communicate with the communicating duct to receive cold air from the communicating duct, and including a first internal flow path provided to communicate with the first flow path and provided to guide a portion of cold air to a first storage space which is a portion of the refrigerating compartment, and a second internal flow path provided to communicate with the second flow path and provided to guide other portion of the cold air to a second storage space which is other portion of the refrigerating compartment. The refrigerator includes a damper configured to open and close the first flow path and the second flow path so as to control a flow of cold air flowing on the first internal flow path and the second internal flow path.

[0011] According to one aspect of the present disclosure, a refrigerator including: an inner case forming a refrigerating compartment, in which a storage case is disposed, and a freezing compartment partitioned from the refrigerating compartment; and an evaporator configured to generate cold air and installed at a rear side of the freezing compartment. The refrigerator includes a communicating duct including a first flow path, on which

cold air flows, and a second flow path partitioned from the first flow path, the communicating duct provided to allow the refrigerating compartment and the freezing compartment to communicate with each other. The refrigerator includes a refrigerating compartment duct installed in the refrigerating compartment and provided to communicate with the communicating duct, and including a first internal flow path provided to communicate with the first flow path and provided to receive a portion of cold air and guide the cold air to an inside of the storage case, and a second internal flow path provided to communicate with the second flow path and provided to receive other portion of the cold air and guide the cold air to a space except the storage case. The refrigerator includes a damper configured to open and close the first flow path and the second flow path.

[Description of Drawings]

[0012]

FIG. 1 is a view illustrating a refrigerator according to one embodiment.

FIG. 2 is a view illustrating a state in which doors of the refrigerator are open according to one embodiment.

FIG. 3 is a view of an upper portion of a storage compartment of the refrigerator according to one embodiment when viewed from below.

FIG. 4 is a schematic cross-sectional side view of the refrigerator according to one embodiment.

FIG. 5 is a cross-sectional view taken along line I-I of FIG. 2.

FIG. 6 is a view illustrating an inner case, an outer case, and a connecting frame in the refrigerator according to one embodiment.

FIG. 7 is a view illustrating the inner case, a communicating duct, and a cooling duct in the refrigerator according to one embodiment, and illustrating a cover portion separated.

FIG. 8 is a view illustrating a state in which components coupled to the inner case are separated from the inner case in the refrigerator according to one embodiment.

FIG. 9 is an enlarged view of a connection among a refrigerating compartment duct, a freezing compartment duct and the communicating duct, and illustrating a damper separated.

FIG. 10 is a cross-sectional view of the refrigerating compartment duct, the freezing compartment duct, and the communicating duct in the refrigerator according to one embodiment.

FIG. 11 is a control block diagram illustrating the refrigerator according to one embodiment.

FIG. 12 is a flowchart of a control method of the refrigerator according to FIG. 10.

FIG. 13 is a flowchart of a control method of the refrigerator according to FIG. 10.

FIG. 14 is a cross-sectional view of a refrigerating compartment duct, a freezing compartment duct and a communicating duct in a refrigerator according to one embodiment.

FIG. 15 is a flowchart of a method for controlling a refrigerator according to one embodiment.

FIG. 16 is a flowchart of a method for controlling a refrigerator according to one embodiment.

FIG. 17 is a flowchart of a method for controlling a refrigerator according to one embodiment.

FIG. 18 is a cross-sectional view of a refrigerating compartment duct, a freezing compartment duct, and a communicating duct in a refrigerator according to one embodiment.

FIG. 19 is a flowchart of a method for controlling a refrigerator according to one embodiment.

FIG. 20 is a flowchart of a method for controlling a refrigerator according to one embodiment.

FIG. 21 is a cross-sectional view of a refrigerating compartment duct, a freezing compartment duct, and a communicating duct in a refrigerator according to one embodiment.

FIG. 22 is a flowchart of a method for controlling a refrigerator according to one embodiment.

FIG. 23 is a flowchart of a method for controlling a refrigerator according to one embodiment.

[Modes of the Invention]

[0013] Various embodiments of the disclosure and terms used herein are not intended to limit the technical features described herein to specific embodiments, and should be understood to include various modifications, equivalents, or substitutions of the corresponding embodiments.

[0014] In describing of the drawings, similar reference numerals may be used for similar or related elements.

[0015] The singular form of a noun corresponding to an item may include one or more of the items unless clearly indicated otherwise in a related context.

[0016] In the disclosure, phrases, such as "A or B", "at least one of A and B", "at least one of A or B", "A, B or C", "at least one of A, B and C", and "at least one of A, B, or C" may include any one or all possible combinations of the items listed together in the corresponding phrase among the phrases.

[0017] As used herein, the term "and/or" includes any and all combinations of one or more of the associated listed items.

[0018] Terms such as "1st", "2nd", "primary", or "secondary" may be used simply to distinguish an element from other elements, without limiting the element in other aspects (e.g., importance or order).

[0019] Further, as used in the disclosure, the terms "front", "rear", "top", "bottom", "side", "left", "right", "upper", "lower", and the like are defined with reference to the drawings, and are not intended to limit the shape and position of any element.

[0020] It will be understood that when the terms "includes", "comprises", "including", and/or "comprising" are used in the disclosure, they specify the presence of the specified features, figures, steps, operations, components, members, or combinations thereof, but do not preclude the presence or addition of one or more other features, figures, steps, operations, components, members, or combinations thereof.

[0021] When a given element is referred to as being "connected to", "coupled to", "supported by" or "in contact with" another element, it is to be understood that it may be directly or indirectly connected to, coupled to, supported by, or in contact with the other element. When a given element is indirectly connected to, coupled to, supported by, or in contact with another element, it is to be understood that it may be connected to, coupled to, supported by, or in contact with the other element through a third element.

[0022] It will also be understood that when an element is referred to as being "on" another element, it may be directly on the other element or intervening elements may also be present.

[0023] A refrigerator according to an embodiment of the disclosure may include a main body.

[0024] The "main body" may include an inner case, an outer case positioned outside the inner case, and an insulation provided between the inner case and the outer case.

[0025] The "inner case" may include a case, a plate, a panel, or a liner forming a storage compartment (also referred to as a storage room). The inner case may be formed as one body, or may be formed by assembling a plurality of plates together. The "outer case" may form an appearance of the main body, and be coupled to an outer side of the inner case such that the insulation is positioned between the inner case and the outer case.

[0026] The "insulation" may insulate an inside of the storage compartment from an outside of the storage compartment to maintain inside temperature of the storage compartment at appropriate temperature without being influenced by an external environment of the storage compartment. According to an embodiment of the disclosure, the insulation may include a foaming insulation. The foaming insulation may be molded by fixing the inner case and the outer case with jigs, etc. and then injecting and foaming urethane foam as a mixture of polyurethane and a foaming agent between the inner case and the outer case.

[0027] According to an embodiment of the disclosure, the insulation may include a vacuum insulation in addition to a foaming insulation, or may be configured only with a vacuum insulation instead of a foaming insulation. The vacuum insulation may include a core material and a cladding material accommodating the core material and sealing the inside with vacuum or pressure close to vacuum. However, the insulation is not limited to the above-mentioned foaming insulation or vacuum insulation, and may include various materials capable of being

used for insulation.

[0028] The "storage compartment" may include a space defined by the inner case. The storage compartment may further include the inner case defining the space corresponding to the storage compartment. The storage compartment may store a variety of items, such as food, medicines, cosmetics, and the like, and the storage compartment may be configured to be open on at least one side for insertion and removal of the items.

[0029] The refrigerator may include one or more storage compartments. In a case in which two or more storage compartments are formed in the refrigerator, the respective storage compartments may have different purposes of use, and may be maintained at different temperatures. To this end, the respective storage compartments may be partitioned by a partition wall including an insulation.

[0030] The storage compartment may be maintained within an appropriate temperature range according to a purpose of use, and may include a "refrigerating compartment", a "freezing compartment", and a "temperature conversion compartment" according to purposes of use and/or temperature ranges. The refrigerating compartment may be maintained at an appropriate temperature to keep food refrigerating, and the freezing compartment may be maintained at an appropriate temperature to keep food frozen. The "refrigerating" may be keeping food cold without freezing the food, and for example, the refrigerating compartment may be maintained within a range of 0 degrees Celsius to 7 degrees Celsius. The "freezing" may be freezing food or keeping food frozen, and for example, the freezing compartment may be maintained within a range of -20 degrees Celsius to -1 degrees Celsius. The temperature conversion compartment may be used as either a refrigerating compartment or a freezing compartment according to or regardless of a user's selection.

[0031] The storage compartment may also be referred to by various terms, such as "vegetable compartment", "freshness compartment", "cooling compartment", and "ice-making compartment", in addition to "refrigerating compartment", "freezing compartment", and "temperature conversion compartment", and the terms, such as "refrigerating compartment", "freezing compartment", "temperature conversion compartment", etc., as used below are to be understood as representing storage compartments having the corresponding purposes of use and the corresponding temperature ranges.

[0032] The refrigerator according to an embodiment of the disclosure may include at least one door configured to open or close the open side of the storage compartment. The respective doors may be provided to open and close one or more storage compartments, or a single door may be provided to open and close a plurality of storage compartments. The door may be rotatably or slidably mounted to the front of the main body.

[0033] The "door" may seal the storage compartment in a closed state. The door, like the main body, may

include an insulation to insulate the storage compartment in a closed state.

[0034] According to an embodiment, the door may include an outer door plate forming the front surface of the door, an inner door plate forming the rear surface of the door and facing the storage compartment, an upper cap, a lower cap, and a door insulation provided therein.

[0035] A gasket may be provided on the edge of the inner door plate to seal the storage compartment by coming into close contact with the front surface of the main body when the door is closed. The inner door plate may include a dyke that protrudes rearward to allow a door basket for storing items to be fitted.

[0036] According to an embodiment, the door may include a door body and a front panel that is detachably coupled to the front of the door body and forming the front surface of the door. The door body may include an outer door plate forming the front surface of the door body, an inner door plate forming the rear surface of the door body and facing the storage compartment, an upper cap, a lower cap, and a door insulator provided therein.

[0037] The refrigerator may be classified as French Door Type, Side-by-side Type, Bottom Mounted Freezer (BMF), Top Mounted Freezer (TMF), or Single Door Refrigerator according to the arrangement of the doors and the storage compartments.

[0038] The refrigerator according to an embodiment of the disclosure may include a cold air supply device for supplying cold air to the storage compartment.

[0039] The "cold air supply device" may include a machine, an apparatus, an electronic device, and/or a combination system thereof, capable of generating cold air and guiding the cold air to cool the storage compartment.

[0040] According to an embodiment of the disclosure, the cold air supply device may generate cold air through a cooling cycle including compression, condensation, expansion, and evaporation processes of refrigerants. To this end, the cold air supply device may include a refrigeration cycle device having a compressor, a condenser, an expander, and an evaporator to drive the refrigeration cycle. According to an embodiment of the disclosure, the cold air supply device may include a semiconductor, such as a thermoelectric element. The thermoelectric element may cool the storage compartment by heating and cooling actions through the Peltier effect.

[0041] The refrigerator according to an embodiment of the disclosure may include a machine compartment in which at least some components belonging to the cold air supply device are installed.

[0042] The "machine compartment" may be partitioned and insulated from the storage compartment to prevent heat generated by the components installed in the machine compartment from being transferred to the storage compartment. To dissipate heat from the components installed in the machine compartment, the machine compartment may communicate with outside of the main body.

[0043] The refrigerator according to an embodiment of the disclosure may include a dispenser provided on the door to provide water and/or ice. The dispenser may be provided on the door to allow access by the user without opening the door.

[0044] The refrigerator according to an embodiment of the disclosure may include an ice-making device that produces ice. The ice-making device may include an ice-making tray that stores water, an ice-moving device that separates ice from the ice-making tray, and an ice-bucket that stores ice produced in the ice-making tray.

[0045] The refrigerator according to an embodiment of the disclosure may include a controller for controlling the refrigerator.

[0046] The "controller" may include a memory for storing and/or recording data and/or programs for controlling the refrigerator, and a processor for outputting control signals for controlling the cold air supply device, etc. in accordance with the programs and/or data stored in the memory.

[0047] The memory may store or record various information, data, instructions, programs, and the like necessary for operation of the refrigerator. The memory may store temporary data generated while generating control signals for controlling components included in the refrigerator. The memory may include at least one of a volatile memory or a non-volatile memory, or a combination thereof.

[0048] The processor may control the overall operation of the refrigerator. The processor may control the components of the refrigerator by executing programs stored in memory. The processor may include a separate neural processing unit (NPU) that performs an artificial intelligence (AI) model operation. In addition, the processor may include a central processing unit (CPU), a graphics processor (GPU), and the like. The processor may generate a control signal to control the operation of the cold air supply device. For example, the processor may receive temperature information of the storage compartment from a temperature sensor and generate a cooling control signal to control an operation of the cold air supply device based on the temperature information of the storage compartment.

[0049] Furthermore, the processor may process a user input of a user interface and control an operation of the user interface in accordance with the programs and/or data memorized/stored in the memory. The user interface may be provided with an input interface and an output interface. The processor may receive the user input from the user interface. In addition, the processor may transmit a display control signal and image data for displaying an image on the user interface to the user interface in response to the user input.

[0050] The processor and memory may be provided integrally or may be provided separately. The processor may include one or more processors. For example, the processor may include a main processor and at least one sub-processor. The memory may include one or more

memories.

[0051] The refrigerator according to an embodiment of the disclosure may include a processor and a memory for controlling all of the components included in the refrigerator, and may include a plurality of processors and a plurality of memories for individually controlling the components of the refrigerator. For example, the refrigerator may include a processor and a memory for controlling the operation of the cold air supply device in accordance with to an output of the temperature sensor. In addition, the refrigerator may be separately provided with a processor and a memory for controlling the operation of the user interface in accordance with the user input.

[0052] A communication module may communicate with external devices, such as servers, mobile devices, and other home appliances via a nearby access point (AP). The AP may connect a local area network (LAN) to which a refrigerator or a user device is connected to a wide area network (WAN) to which a server is connected. The refrigerator or the user device may be connected to the server via the WAN.

[0053] The input interface may include keys, a touch screen, a microphone, and the like. The input interface may receive the user input and pass the received user input to the processor.

[0054] The output interface may include a display, a speaker, and the like. The output interface may output various notifications, messages, information, and the like generated by the processor.

[0055] Hereinafter, various embodiments according to the disclosure will be described in detail with reference to the accompanying drawings.

[0056] FIG. 1 is a view illustrating a refrigerator according to one embodiment. FIG. 2 is a view illustrating a state in which doors of the refrigerator are open according to one embodiment. FIG. 3 is a view of an upper portion of storage compartments 11 and 12 of the refrigerator according to one embodiment when viewed from below. FIG. 4 is a schematic cross-sectional side view of the refrigerator according to one embodiment. FIG. 5 is a cross-sectional view taken along line I-I of FIG. 2.

[0057] Referring to FIGS. 1 to 5, a refrigerator 1 may include a main body 10, storage compartments 11, and 12 formed inside the main body 10, and doors (described later) configured to open and close the storage compartments 11 and 12. Particularly, the storage compartments 11 and 12 may be formed inside an inner case 100.

[0058] For example, the storage compartments 11 and 12 may include a refrigerating compartment 11 and a freezing compartment 12 provided to be partitioned from the refrigerating compartment 11. For example, the refrigerating compartment 11 may be disposed on an upper side of the inner case 100, and the freezing compartment 12 may be disposed on a lower side (-Z side) of the inner case 100.

[0059] It is illustrated that the refrigerating compartment 11 is disposed on the upper side (+Z side) and the freezing compartment 12 is disposed on the lower side,

but this is only an example. Therefore, the refrigerating compartment 11 and the freezing compartment 12 may be provided to be partitioned from each other and may be disposed in various locations.

[0060] The main body 10 may include an outer case 310 coupled to the outside of the inner case 100, and an insulating material 190 disposed between the inner case 100 and the outer case 310. The inner case 100 may form the storage compartments 11 and 12, and the outer case 310 may form an appearance of the main body 10.

[0061] For example, the main body 10 may include an upper wall 301 forming an upper surface of an outer appearance. An upper surface of the upper wall 301 may be formed by the outer case 310, a lower surface of the upper wall 301 may be formed by the inner case 100, and the insulating material 190 may be provided on the inside of the upper wall 301.

[0062] The storage compartments 11 and 12 may accommodate goods. The storage compartments 11 and 12 may be formed with an open front side to allow goods to be inserted thereto or withdrawn therefrom. The main body 10 may include a horizontal partition 130 provided to divide the storage compartments 11 and 12 into the refrigerating compartment 11 and the freezing compartment 12.

[0063] For example, the refrigerating compartment 11 may be disposed at the upper portion of the main body 10 and the freezing compartment 12 may be disposed at the lower portion of the main body 10.

[0064] For example, a storage case 140 may be disposed in the refrigerating compartment 11. As will be described later, an inside space of the storage case 140 may be defined as a first refrigerating space 142. For example, the first refrigerating space 142 may be formed by a variable temperature portion 140. Therefore, the first refrigerating space 142 may be referred to as a variable temperature compartment 142.

[0065] Other space except the first refrigerating space 142 may be defined as a second refrigerating space 13. Temperatures of the first refrigerating space 142 and the second refrigerating space 13 may be set differently.

[0066] More particularly, the variable temperature portion 140 may include a variable temperature case 141 forming an outer appearance, the first refrigerating space 142 formed inside the variable temperature case 141, and a holding portion 143 disposed on a front side to hold the variable temperature case 141.

[0067] The variable temperature portion 140 may include a variable temperature compartment cold air inlet 144 formed to penetrate the variable temperature compartment case 141 at a rear side of the variable temperature compartment case 141. As described later, a refrigerating compartment duct 200 may include a variable temperature compartment connecting portion 250 inserted into the variable temperature compartment cold air inlet 144 and connected to the variable temperature compartment 142.

[0068] The variable temperature compartment con-

necting portion 250 may communicate with a first cold air discharge port 252 (refer to FIG. 9) provided to discharge cold air flowing in the refrigerating compartment duct 200.

[0069] Cold air discharged through the first cold air discharge port 252 may cool the first refrigerating space 142. Accordingly, the first refrigerating space 142 may be cooled separately from the second refrigerating space 13, and thus the temperatures of the first refrigerating space 142 and the second refrigerating space 13 may be set to be different from each other. A detailed description of a process in which the cold air flows into the first refrigerating space 142 through the first cold air discharge port 252 will be described later.

[0070] It is illustrated that the variable temperature portion 140 is installed at a lower end of the left (+Y side) of the refrigerating compartment 11, but this is only an example. Therefore, the variable temperature portion 140 may be installed in various spaces inside the refrigerating compartment 11.

[0071] The doors may open and close the storage compartments 11 and 12. A first door 21 and a second door 22 may open and close the refrigerating compartment 11, and a third door 23 and a fourth door 24 may open and close the freezing compartment 12. The doors may be rotatably coupled to the main body 10.

[0072] The doors may be rotatably coupled to the main body 10 by a hinge. For example, the first door 21 and the second door 22 may be rotatably coupled to the main body 10 by a hinge 31 disposed in the upper portion of the main body 10 and a hinge disposed in a middle portion of the main body 10. The hinge 31 may be covered by a top cover 600 provided to cover a front portion of the upper surface of the main body 10.

[0073] One of the first door 21 and the second door 22 may be provided with a rotation bar 40 provided to cover a gap formed between the first door 21 and the second door 22 when the first door 21 and the second door 22 are closed. The rotation bar 40 may be rotatably provided on one of the first door 21 and the second door 22. The rotation bar 40 may have a bar shape that is elongated in the vertical direction. The rotation bar 40 may also be referred to as 'pillar', 'mullion', etc.

[0074] A guide protrusion 46 may be provided at an upper end of the rotation bar 40, and a rotation guide 119 provided to guide a rotation of the guide protrusion 46 may be provided in the upper portion of the main body 10.

[0075] The doors may include a gasket 51. The gasket 51 may be in close contact with the front surface of the main body 10 when the doors are closed. The doors may include a dyke 52 protruding rearward (-X direction). The dyke 52 may be equipped with a door shelf 53 provided to store goods. The rotation bar 40 may be rotatably installed on the dyke 52.

[0076] The number and arrangement of storage compartments and the number and arrangement of doors are described above, but the number and arrangement of storage compartments and the number and arrangement of doors of the refrigerator according to one embodiment

of the present disclosure are not limited thereto.

[0077] The refrigerator 1 may include a thermoelectric cooling device 330 configured to cool the storage compartments 11 and 12. The thermoelectric cooling device 330 may be referred to as a cooling device 330.

[0078] The thermoelectric cooling device 330 may be disposed on the upper side of the storage compartments 11 and 12 to cool the storage compartments 11 and 12. That is, the thermoelectric cooling device 330 may be provided on the upper wall 301 of the main body 10.

[0079] The thermoelectric cooling device 330 may include a thermoelectric element 343. The thermoelectric element 343 may be a semiconductor element configured to convert thermal energy into electrical energy using the thermoelectric effect, and may also be referred to as 'thermoelectric semiconductor element', 'Peltier element', etc.

[0080] The thermoelectric element 343 may include a heating portion 348 and a cooling portion 349. When a current is applied to the thermoelectric element 343, heat generation may occur in the heating portion 348 and heat absorption may occur in the cooling portion 349. The thermoelectric element 343 may have a thin hexahedral shape. The heating portion 348 may be disposed on one surface of the thermoelectric element 343 and the cooling portion 349 may be disposed on the opposite surface.

[0081] The thermoelectric element 343 may be provided in such a way that the heating portion 348 faces above the thermoelectric element 343 and the cooling portion 349 faces below the thermoelectric element 343. That is, the heating portion 348 may face the outside of the main body 10 and the cooling portion 349 may face the inside of the storage compartments 11 and 12. Accordingly, air heated by the heat exchange with the heating portion 348 may be discharged to the outside of the main body 10, and air cooled by the heat exchange with the cooling portion 349 may be supplied to the storage compartments 11 and 12.

[0082] The thermoelectric cooling device 330 may include a heat dissipation sink 342 in contact with the heating portion 348 to efficiently exchange heat between the heating portion 348 and air outside the main body 10.

[0083] The heat dissipation sink 342 may be disposed outside the main body 10. The heat dissipation sink 342 may be in contact with the heating portion 348 to absorb heat from the heating portion 348 and emit the heat to the outside of the main body 10. The heat dissipation sink 342 may also be referred to as 'hot sink', 'dissipation heat sink', 'hot heat sink', etc.

[0084] The heat dissipation sink 342 may be formed of a metal material with relatively high thermal conductivity. For example, the heat dissipation sink 342 may be formed of aluminum or copper.

[0085] The heat dissipation sink 342 may include a heat dissipation sink base 342a in contact with the heating portion 348 and a plurality of heat dissipation fins 342b protruding from the heat dissipation sink base 342a to increase a heat transfer area. The plurality of heat

dissipation fins 342b may protrude upward from the heat dissipation sink base 342a.

[0086] The thermoelectric cooling device 330 may include a cooling sink 347 in contact with the cooling portion 349 to efficiently exchange heat between the cooling portion 349 and air inside the storage compartments 11 and 12.

[0087] The cooling sink 347 may be disposed inside the storage compartments 11 and 12. The cooling sink 347 may cool the storage compartments 11 and 12 by absorbing heat from the storage compartments 11 and 12 and transferring the heat to the cooling portion 349. The cooling sink 347 may also be referred to as 'cold sink', 'cooling heat sink', 'cold heat sink', 'cooling heat sink', etc.

[0088] The cooling sink 347 may be formed of a metal material with relatively high thermal conductivity. For example, the cooling sink 347 may be formed of aluminum or copper.

[0089] The cooling sink 347 may include a cooling sink base 347b in contact with the cooling portion 349 and a plurality of cooling fins 347a protruding from the cooling sink base 347b to increase a heat transfer area. The plurality of cooling fins 347a may protrude downward from the cooling sink base 347b. The cooling sink base 347b and the plurality of cooling fins 347a may be formed integrally with each other.

[0090] The thermoelectric cooling device 330 may include a heat dissipation fan 382 configured to move air to efficiently exchange heat between the heat dissipation sink 342 and air outside the main body 10.

[0091] The heat dissipation fan 382 may be configured to blow air toward the heat dissipation sink 342. The heat dissipation fan 382 may be disposed in the horizontal direction of the heat dissipation sink 342. The heat dissipation fan 382 may be disposed outside the main body 10. The heat dissipation fan 382 may be provided on the upper side of the upper wall 301.

[0092] The heat dissipation fan 382 may be a centrifugal fan configured to draw in air in an axial direction and discharge the drawn air to radial directions. The centrifugal fan may include a blower fan. A rotating shaft 381 of the heat dissipation fan 382 may be disposed perpendicular to the upper surface of the upper wall 301.

[0093] The thermoelectric cooling device 330 may include a heat dissipation duct 360 configured to guide air flowing by the heat dissipation fan 382. The heat dissipation duct 360 may draw in air outside the main body 10 and guide the drawn air to exchange heat with the heat dissipation sink 342, and discharge the air, which exchanges heat with the heat dissipation sink 342, back to the outside of the main body 10.

[0094] The heat dissipation duct 360 may draw in air in an external space on the upper side of the main body 10. The heat dissipation duct 360 may discharge air, which exchanges heat with the heat dissipation sink 342, to the external space on the upper side of the main body 10. The heat dissipation fan 382 may be disposed inside the heat dissipation duct 360. The heat dissipation sink 342 may

be disposed inside the heat dissipation duct 360. The heat dissipation duct 360 may be provided on the upper surface of the upper wall 301.

[0095] The heat dissipation duct 360 may include an outside air intake port 361 provided to draw in air outside the main body 10 to the inside of the heat dissipation duct 360, and an outside air discharge port 369 provided to discharge air, which exchanges heat with the heat dissipation sink 342, to the outside of the main body 10.

[0096] The thermoelectric cooling device 330 may include a cooling fan 800 configured to move air to efficiently exchange heat between the cooling sink 347 and the air inside the storage compartments 11 and 12.

[0097] The cooling fan 800 may be configured to blow air toward the cooling sink 347. The cooling fan 800 may be disposed in the horizontal direction of the cooling sink 347. The cooling fan 800 may be disposed inside the storage compartments 11 and 12. The cooling fan 800 may be disposed on the lower side of the upper wall 301.

[0098] The cooling fan 800 may be a centrifugal fan configured to draw in air in the axial direction and discharge the drawn air to the radial directions. A rotating shaft 810 of the cooling fan 800 may be disposed perpendicular to the lower surface of the upper wall 301.

[0099] The thermoelectric cooling device 330 may include a cooling duct 900 provided to guide air flowing by the cooling fan 800. The cooling duct 900 may draw in air inside the storage compartments 11 and 12 and guide the drawn air to exchange heat with the cooling sink 347, and discharge the air, which exchanges heat with the cooling sink 347, back into the storage compartments 11 and 12.

[0100] The cooling fan 800 may be disposed inside the cooling duct 900. The cooling sink 347 may be disposed inside the cooling duct 900. The cooling duct 900 may be provided on the lower surface of the upper wall 301.

[0101] The cooling duct 900 may include an inside air intake port 991 provided to draw in air inside the storage compartments 11 and 12 to the inside of the cooling duct 900, and an inside air discharge port 992 provided to discharge air, which exchanges heat with the cooling sink 347, to the inside of the storage compartments 11 and 12.

[0102] Referring to FIG. 4, the refrigerator 1 may include a refrigeration cycle device to cool the storage compartments 11 and 12 through a refrigeration cycle. The refrigeration cycle device may include a compressor 2, a condenser (not shown), an expansion device (not shown), and an evaporator 3.

[0103] The evaporator 3 may be configured to generate cold air. For example, the evaporator 3 may be disposed at the rear (-X side) of the freezing compartment 12.

[0104] The refrigerator 1 may include evaporator ducts provided to guide cold air generated in the evaporator 3. The evaporator ducts may include the refrigerating compartment duct 200 installed in the refrigerating compartment 11 and a freezing compartment duct 125 installed in the freezing compartment 12.

[0105] The freezing compartment duct 125 may be

provided at the rear side of the freezing compartment 12. The refrigerating compartment duct 200 may be provided at the rear side of the refrigerating compartment 11.

[0106] Cold air generated by the evaporator 3 may be drawn into the inside of the freezing compartment duct 125 by an evaporator fan 80. The cold air drawn into the inside of the freezing compartment duct 125 may be discharged into the freezing compartment 12 through a freezing compartment cold air discharge port (not shown) formed on the front surface.

[0107] In addition, cold air drawn into the inside of the freezing compartment duct 125 may be guided to an internal flow path of the refrigerating compartment duct 200 (refer to FIG. 8). That is, the refrigerating compartment duct 200 may be arranged to receive cold air from a communicating duct 150.

[0108] A damper 160 configured to control the supply of cold air of the freezing compartment duct 125 to the refrigerating compartment duct 200 may be disposed in the freezing compartment duct 125. For example, the damper 160 may control a flow of cold air flowing from the freezing compartment duct 125 to the communicating duct 150. A detailed description of the damper 160 will be described later.

[0109] The communicating duct 150 may be disposed between the freezing compartment duct 125 and the refrigerating compartment duct 200 to connect the freezing compartment duct 125 and the refrigerating compartment duct 200. In other words, the communicating duct 150 may allow the refrigerating compartment 11 and the freezing compartment 12 to communicate with each other.

[0110] For example, cold air generated in the evaporator 3 may be transferred from the freezing compartment 12 to the refrigerating compartment 11 through the communicating duct 150. A detailed description of the communicating duct 150 will be described later.

[0111] Cold air introduced into the internal flow path of the refrigerating compartment duct 200 may be supplied to the refrigerating compartment 11 through the cold air discharge port formed on the front surface of the refrigerating compartment duct 200.

[0112] However, unlike the above embodiment, cold air generated in the evaporator 3 may be supplied directly to the refrigerating compartment duct 200 without passing through the freezing compartment duct 125. Alternatively, a separate evaporator 3 may be provided at the rear of the refrigerating compartment 11, thereby supplying cold air to the refrigerating compartment duct 200.

[0113] As mentioned above, the refrigerator 1 according to one embodiment of the present disclosure may include the thermoelectric cooling device 330 and the refrigeration cycle device for cooling the storage compartments 11 and 12. Accordingly, a method of supplying cold air to the storage compartments 11 and 12 may include a first method of supplying only cold air generated by the thermoelectric cooling device 330, a second method of supplying only cold generated by the refrigeration

cycle device, and a third method of supplying both cold generated by the thermoelectric cooling device 330 and cold air generated by the refrigeration cycle device.

[0114] The refrigerator 1 may supply cold air to the storage compartments 11 and 12 in an appropriate manner according to external and internal conditions. For example, the refrigerator 1 may cool the storage compartments 11 and 12 using one method according to a temperature of an indoor space in which the refrigerator 1 is installed. That is, when an indoor temperature is higher than a predetermined temperature, and cooling by the refrigeration cycle device is more efficient than cooling by the thermoelectric cooling device 330, the storage compartments 11 and 12 may be cooled only with cold generated by the refrigeration cycle device. Conversely, when the indoor temperature is lower than the predetermined temperature and cooling by the thermoelectric cooling device 330 is more efficient than cooling by the refrigeration cycle device, the storage compartments 11 and 12 may be cooled only with the cold generated by the thermoelectric cooling device 330.

[0115] The refrigerator 1 may only operate the thermoelectric cooling device 330 when it is required to reduce noise. When it is required to rapidly cool the storage compartments 11 and 12, the refrigerator 1 may simultaneously supply cold air generated by the thermoelectric cooling device 330 and cold air generated by the refrigeration cycle device to the storage compartments 11 and 12.

[0116] As mentioned above, according to one embodiment of the present disclosure, the refrigerator 1 may include the thermoelectric cooling device 330 and the refrigeration cycle device, but the present disclosure is not limited thereto. Alternatively, the refrigerator 1 may include only the thermoelectric cooling device 330.

[0117] FIG. 6 is a view illustrating an inner case, an outer case, and a connecting frame in the refrigerator according to one embodiment. FIG. 7 is a view illustrating the inner case, a communicating duct, and a cooling duct in the refrigerator according to one embodiment, and illustrating a cover portion separated. FIG. 8 is a view illustrating a state in which components coupled to the inner case are separated from the inner case in the refrigerator according to one embodiment. FIG. 9 is an enlarged view of a connection among a refrigerating compartment duct, a freezing compartment duct and the communicating duct, and illustrating a damper separated.

[0118] Referring to FIGS. 6 to 9, the inner case 100 may include a first inner case 110 forming the refrigerating compartment 11 and a second inner case 120 forming the freezing compartment 12.

[0119] The first inner case 110 may include a first inner case body 111 forming an outer appearance, and first openings 112 and 113 formed to penetrate the first inner case body 111. Through the first openings 112 and 113, the refrigerating compartment 11 may communicate with the outside of the first inner case 110. For example, the

first openings 112 and 113 may be formed at a lower end of the rear side (-X side) of the first inner case 110. For example, the first openings 112 and 113 may be formed to face the freezing compartment 12.

[0120] The first openings 112 and 113 may include a first left opening 112 formed to communicate with a first duct cover hole 221 (described later), and a first right opening 113 formed to communicate with a second duct cover hole 222 (described later).

[0121] The second inner case 120 may include a second inner case body 121 forming an outer appearance, and second openings 122 and 123 formed to penetrate the second inner case body 121. Through the second openings 122 and 123, the freezing compartment 12 may communicate with the outside of the second inner case 120.

[0122] For example, the second openings 122 and 123 may be formed at an upper end of a rear side of the second inner case 120. For example, the second openings 122 and 123 may be formed to face the refrigerating compartment 11.

[0123] The second openings 122 and 123 may include a second left opening 122 formed to communicate with a first damping hole 162a (described later), and a second right opening 123 formed to communicate with a second damping hole 163a (described later).

[0124] The freezing compartment duct 125 may be installed at the rear side of the freezing compartment 12. The freezing compartment duct 125 may include a freezing compartment duct body 126 forming the outer appearance of the freezing compartment duct 125 and a freezing compartment duct cover 127 provided to be coupled to the freezing compartment duct body 126. A space formed as the freezing compartment duct body 126 and the freezing compartment duct cover 127 are coupled may be defined as a freezing compartment duct flow path 128.

[0125] For example, the evaporator 3 may be disposed on a rear surface of the freezing compartment duct cover 127. For example, the evaporator fan 80 may be disposed on the freezing compartment duct flow path 128. When the evaporator fan 80 operates, air may be drawn from the rear surface of the freezing compartment duct cover 127 toward the freezing compartment duct flow path 128. In this process, the air may pass through the evaporator 3 and be cooled, and thus cold air may be generated.

[0126] The refrigerating compartment duct 200 may be installed at the rear side of the refrigerating compartment 11. The refrigerating compartment duct 200 may include a refrigerating compartment duct body 230 forming an outer appearance, and a refrigerating compartment duct cover 220 provided to be coupled to the refrigerating compartment duct body 230. The refrigerating compartment duct cover 220 may include a duct cover body 223 forming an outer appearance of the refrigerating compartment duct cover 220.

[0127] The refrigerating compartment duct body 230

and the refrigerating compartment duct cover 220 may be coupled to each other, thereby forming internal flow paths 241 and 242. In the internal flow path, cold air generated in the evaporator 3 may be transferred and moved. The internal flow paths 241 and 242 may include a first internal flow path 241 formed to allow cold air to flow, and a second internal flow path 242 except the first internal flow path 241.

[0128] For example, the first internal flow path 241 may be formed to guide a portion of the cold air flowing through the refrigerating compartment duct 200 to the first refrigerating space 142. For example, the second internal flow path 242 may be formed to guide other portion of the cold air flowing through the refrigerating compartment duct 200 to the second refrigerating space 13.

[0129] For example, the first internal flow path 241 may include a first cold air intake port 241a opened downward and provided to receive cold air from the freezing compartment duct 125. For example, the second internal flow path 242 may include a second cold air intake port 242a opened downward (-Z direction) and provided to receive cold air from the freezing compartment duct 125. A detailed description of the internal flow path will be described later.

[0130] For example, the cooling duct 900 may be coupled to the upper side of the refrigerating compartment duct body 230. For example, cold air generated in the thermoelectric cooling device 330 described above may flow to the refrigerating compartment duct 200 through the cooling duct 900.

[0131] As described above, the communicating duct 150 may be installed to allow the freezing compartment 12 and the refrigerating compartment 11 to communicate with each other. For example, the communicating duct 150 may be disposed between the first inner case 110 and the second inner case 120.

[0132] More particularly, the communicating duct 150 may be arranged to connect the freezing compartment duct 125 and the refrigerating compartment duct 200 to each other.

[0133] The communicating duct 150 may include a base portion 151 arranged to connect the first inner case 110 and the second inner case 120, and a cover portion 154 provided to be coupled to the base portion 151. The cover portion 154 may include a partition wall 155 formed to partition a space formed by the base portion 151 and the cover portion 154 when the cover portion 154 is coupled to the base portion 151.

[0134] When the cover portion 154 is coupled to the base portion 151, the internal space partitioned by the partition wall 155 may be defined as a first flow path 152 and a second flow path 153, respectively. For example, the first flow path 152 may be a space on the left (+Y side) of the internal space, and the second flow path 153 may be a space on the right (-Y side) of the internal space, but is not limited thereto.

[0135] The first flow path 152 may be formed to extend in the vertical direction (+-Z direction). Cold air may flow in

the first flow path 152. The first flow path 152 may include a first flow path inlet 152a formed at one end facing the freezing compartment 12 and opened downward (-Z direction).

[0136] For example, the first flow path inlet 152a may communicate with the freezing compartment duct 125. Accordingly, a portion of the cold air generated from the evaporator 3 installed in the freezing compartment duct 125 may flow on the freezing compartment duct flow path 128 and flow into the first flow path inlet 152a.

[0137] The first flow path 152 may include a first flow path outlet 152b formed at one end facing the refrigerating compartment 11 and opened upward. The first flow path outlet 152b may communicate with the first cold air intake port 241a of the first internal flow path 241 described above. Accordingly, a portion of the cold air introduced into the first flow path inlet 152a may be discharged to the first flow path outlet 152b and then drawn into the first cold air intake port 241a. Accordingly, a portion of the cold air may flow on the first internal flow path 241.

[0138] The second flow path 153 may be formed to extend in the vertical direction. For example, the second flow path 153 may be arranged adjacent to the first flow path 152. For example, the second flow path 153 may be arranged on the right side of the first flow path 152, but is not limited thereto.

[0139] Cold air may flow on the second flow path 153. The second flow path 153 may include a second flow path inlet 153a formed at one end facing the freezing compartment 12 and opened downward.

[0140] For example, the second flow path inlet 153a may communicate with the freezing compartment duct 125. Accordingly, other portion of the cold air generated in the evaporator 3 installed in the freezing compartment duct 125 may flow along the freezing compartment duct flow path 128 and flow into the second flow path inlet 153a.

[0141] The second flow path 153 may include a second flow path outlet 153b formed at one end facing the refrigerating compartment 11 and opened upward. The second flow path outlet 153b may communicate with the second cold air intake port 242a of the second internal flow path 242 described above. Accordingly, other portion of the cold air introduced into the second flow path inlet 153a may be discharged to the second flow path outlet 153b and then drawn into the second cold air intake port 242a. Accordingly, other portion of the cold air may flow on the second internal flow path 242.

[0142] The damper 160 may be installed in the freezing compartment duct 125. For example, the damper 160 may be installed between the communicating duct 150 and the evaporator 3.

[0143] The damper 160 may include a damper body 161 forming an outer appearance, a first damping hole 162a formed on one side of the damper body 161 and provided to allow cold air to pass therethrough, and a second damping hole 163a partitioned from the first

damping hole 162a. The damper 160 may include a first damping cover 162b configured to open and close the first damping hole 162a, and a second damping cover 163b configured to open and close the second damping hole 163a.

[0144] For example, the damper 160 may include a first damping portion 162 including the first damping hole 162a and the first damping cover 162b, and a second damping portion 163 including the second damping hole 163a and the second damping cover 163b.

[0145] The first damping cover 162b and the second damping cover 163b may be configured to operate independently of each other. In other words, the damper 160 may be controlled to allow the first damping cover 162b to close the first damping hole 162a and to allow the second damping cover 163b to open the second damping hole 163a. The damper 160 may be controlled to allow the first damping cover 162b to open the first damping hole 162a and to allow the second damping cover 163b to close the second damping hole 163a. The damper 160 may be controlled to allow the first damping cover 162b to close the first damping hole 162a and to allow the second damping cover 163b to close the second damping hole 163a. The damper 160 may be controlled to allow the first damping cover 162b to open the first damping hole 162a and to allow the second damping cover 163b to open the second damping hole 163a. The damper 160 may be electrically connected to a controller 91 (refer to FIG. 11) and controlled by the controller 91.

[0146] For example, the damper 160 may be disposed to allow the first damping hole 162a to communicate with the first flow path inlet 152a of the communicating duct 150. For example, the damper 160 may be disposed to allow the second damping hole 163a to communicate with the second flow path inlet 153a of the communicating duct 150. As described above, because the first damping hole 162a communicates with the first flow path inlet 152a and the second damping hole 163a communicates with the second flow path inlet 153a, the damper 160 may control the supply of cold air flowing to the first flow path 152 and the second flow path 153.

[0147] For example, when the first damping cover 162b closes the first damping hole 162a, cold air generated in the evaporator 3 may not pass through the first damping hole 162a. Accordingly, the cold air may not flow to the first flow path 152 connected to the first damping hole 162a and may not be supplied to the first internal flow path 241. Because the cold air is not supplied to the first internal flow path 241, the cold air may not be discharged to the first refrigerating space 142, and thus the first refrigerating space 142 may not be cooled.

[0148] For example, when the second damping cover 163b closes the second damping hole 163a, cold air generated in the evaporator 3 may not pass through the second damping hole 163a. Accordingly, the cold air may not flow to the second flow path 153 connected to the second damping hole 163a and may not be supplied to the second internal flow path 242. Because the

cold air is not supplied to the second internal flow path 242, the cold air may not be discharged to the second refrigerating space 13.

[0149] FIG. 10 is a cross-sectional view of the refrigerating compartment duct, the freezing compartment duct and the communicating duct in the refrigerator according to one embodiment. FIG. 11 is a control block diagram illustrating the refrigerator according to one embodiment. FIG. 12 is a flowchart of a control method of the refrigerator according to FIG. 10. FIG. 13 is a flowchart of a control method of the refrigerator according to FIG. 10.

[0150] Hereinafter a process of cold air flowing in the refrigerating compartment duct of the refrigerator according to one embodiment is described. Descriptions of the same contents as those described above will be omitted.

[0151] Referring to FIGS. 10 to 13, the refrigerating compartment duct 200 may include the cold air discharge port formed to penetrate the refrigerating compartment duct body 230 and provided to communicate with the internal flow path and the refrigerating compartment 11.

[0152] For example, the cold air discharge port may include the first cold air discharge port 252 formed to communicate with the first refrigerating space 142, and a second cold air discharge port 231 formed to communicate with the second refrigerating space 13.

[0153] It is illustrated that the first cold air discharge port 252 is formed at the lower end of left side (+Y side) of the refrigerating compartment duct body 230, and the second cold air discharge port 231 is formed at the upper side of the refrigerating compartment duct body 230, but is not limited thereto.

[0154] The first cold air discharge port 252 may be formed to discharge cold air (F1), which is drawn in through the first cold air intake port 241a and flows on the first internal flow path 241, into the first refrigerating space 142. In other words, the first internal flow path 241 may be formed to connect the first cold air intake port 241a and the first cold air discharge port 252.

[0155] The second cold air discharge port 231 may be formed to discharge cold air (F21 and F22), which is drawn in through the second cold air intake port 242a and flows on the second internal flow path 242, to the second refrigerating space 13. In other words, the second internal flow path 242 may be formed to connect the second cold air intake port 242a and the second cold air discharge port 231.

[0156] For example, the second cold air discharge port 231 may include a plurality of second cold air discharge ports 231. For example, some of the plurality of second cold air discharge ports 231 may be formed at the upper end of the left side of the refrigerating compartment duct body 230, and other of the plurality of second cold air discharge ports 231 may be formed at the upper end of the right side of the refrigerating compartment duct body 230.

[0157] The second internal flow path 242 may include a first branch flow path 2421 branched to communicate

with some of the plurality of second cold air discharge ports 231, and a second branch flow path 2422 formed to be partitioned from the first branch flow path 2421 and provided to communicate with other some of the plurality of second cold air discharge ports 231. Because the second internal flow path 242 branches into the first branch flow path 2421 and the second branch flow path 2422, cold air sprayed into the second refrigerating space 13 may flow more uniformly into the second refrigerating space 13, thereby cooling the second refrigerating space 13 more effectively.

[0158] For example, the first internal flow path 241 and the second internal flow path 242 may be formed to be partitioned from each other.

[0159] For example, the refrigerator 1 may include a first refrigerating space temperature sensor 92 configured to sense a temperature of the first refrigerating space 142, a second refrigerating space temperature sensor 93 configured to sense a temperature of the second refrigerating space 13, a refrigerating compartment opening/closing detection sensor 94 configured to detect the operation of the first door 21 and the second door 22 configured to open and close the refrigerating compartment 11, and a status setting panel 95 configured to allow a user to set a temperature of the storage compartments 11 and 12.

[0160] For example, the refrigerator 1 may include the controller 91. The controller 91 may be electrically connected to the first refrigerating space temperature sensor 92 and may receive the temperature of the first refrigerating space 142 sensed by the first refrigerating space temperature sensor 92. The controller 91 may be electrically connected to the second refrigerating space temperature sensor 93 and may receive the temperature of the second refrigerating space 13 sensed by the second refrigerating space temperature sensor 93. The controller 91 may be electrically connected to the refrigerating compartment opening/closing detection sensor 94 and may receive information, on whether the refrigerating compartment 11 is open/closed, sensed by the refrigerating compartment opening/closing detection sensor 94. The controller 91 may be electrically connected to the status setting panel 95 and may sense information on the temperature of the storage compartments 11 and 12 set by a user.

[0161] The controller 91 may be electrically connected to the damper 160, thereby controlling the movements of the first damping cover 162b and the second damping cover 163b. In other words, the controller 91 may control the damper 160 to allow the first damping cover 162b to open and close the first damping hole 162a. In addition, the controller 91 may control the damper 160 to allow the second damping cover 163b to open and close the second damping hole 163a.

[0162] Hereinafter a process, in which the controller 91 controls the temperature of the first refrigerating space 142 and the second refrigerating space 13 by controlling the damper 160, will be described in details.

[0163] For example, a user can set a temperature of the first refrigerating space 142 and a temperature of the second refrigerating space 13 through the status setting panel 95. A temperature of the first refrigerating space 142 selected by the user may be defined as a first selected temperature, and a temperature of the second refrigerating space 13 selected by the user may be defined as a second selected temperature. The controller 91 may receive information about the first selected temperature and the second selected temperature. The first selected temperature and the second selected temperature may be set in various ways to suit the storage of items stored in the storage compartments 11 and 12.

[0164] The first refrigerating space temperature sensor 92 may sense a temperature of the first refrigerating space 142 (1010). The controller 91 may receive the temperature of the first refrigerating space 142 sensed by the first refrigerating space temperature sensor 92.

[0165] In response to the sensed temperature of the first refrigerating space 142 being higher than the first selected temperature by 1 °C or more (1020), the controller 91 may control the damper 160 to allow the first damping cover 162b to open the first damping hole 162a (1030). In response to the first damping cover 162b opening the first damping hole 162a, cold air in the freezing compartment duct 125 may flow into the first internal flow path 241 of the refrigerating compartment duct 200 through the first flow path 152 of the communicating duct 150.

[0166] Cold air flowing into the first internal flow path 241 may be discharged to the first refrigerating space 142 through the first cold air discharge port 252 so as to cool the first refrigerating space 142.

[0167] Thereafter, the first refrigerating space temperature sensor 92 may sense the temperature of the first refrigerating space 142 again (1040). The first refrigerating space 142 is cooled and in response to the temperature of the first refrigerating space 142 sensed by the first refrigerating space temperature sensor 92 being lower than the first selected temperature by 1 °C or more (1050), the controller 91 may control the damper 160 to allow the first damping cover 162b to close the first damping hole 162a (1060).

[0168] The second refrigerating space temperature sensor 93 may sense a temperature of the second refrigerating space 13 (2010). The controller 91 may receive the temperature of the second refrigerating space 13 sensed by the second refrigerating space temperature sensor 93.

[0169] In response to the sensed temperature of the second refrigerating space 13 being higher than the second selected temperature by 2°C or more (2020), the controller 91 may control the damper 160 to allow the second damping cover 163b to open the second damping hole 163a (2030). In response to the second damping cover 163b opening the second damping hole 163a, cold air in the freezing compartment duct 125 may flow into the second internal flow path 242 of the refrigerating

compartment duct 200 through the second flow path 153 of the communicating duct 150. The cold air flowing into the second internal flow path 242 may be discharged into the second refrigerating space 13 through the second cold air discharge port 231 to cool the second refrigerating space 13.

[0170] Thereafter, the second refrigerating space temperature sensor 93 may sense the temperature of the second refrigerating space 13 again (2040). The second refrigerating space 13 is cooled and in response to the temperature of the second refrigerating space 13 sensed by the second refrigerating space temperature sensor 93 being equal to the second selected temperature (2050), the controller 91 may control the damper 160 to allow the second damping cover 163b to close the second damping hole 163a (2060).

[0171] FIG. 14 is a cross-sectional view of a refrigerating compartment duct, a freezing compartment duct and a communicating duct in a refrigerator according to one embodiment. FIG. 15 is a flowchart of a method for controlling a refrigerator according to one embodiment. FIG. 16 is a flowchart of a method for controlling a refrigerator according to one embodiment. FIG. 17 is a flowchart of a method for controlling a refrigerator according to one embodiment.

[0172] Hereinafter a process of cold air flowing in a refrigerating compartment duct of a refrigerator according to one embodiment is described. Descriptions of the same contents as those described above will be omitted.

[0173] Referring to FIGS. 14 to 17, a refrigerating compartment duct 400 may include a bypass flow path 460 provided to allow a first internal flow path 441 and a second internal flow path 442 to communicate with each other.

[0174] The bypass flow path 460 may include a bypass inlet 460a provided to communicate with the first internal flow path 441 to receive a portion of the cold air flowing in the first internal flow path 441, and a bypass outlet 460b provided to communicate with the second internal flow path 442 to transfer a portion of the cold air flowing into the bypass inlet 460a to the second internal flow path 442.

[0175] It is illustrated that the bypass outlet 460b communicates with a first branch flow path 4421 of the second internal flow path 442, but is not limited thereto. It should be understood that the bypass outlet 460b communicates with a second branch flow path 4422 of the second internal flow path 442.

[0176] A portion (F42) of cold air flowing into the first internal flow path 441 may flow into the second internal flow path 442 through the bypass flow path 460. Accordingly, even when the cold air in the freezing compartment duct 125 does not flow into the second flow path 153 because the first damping hole 162a is open and the second damping hole 163a is closed, the portion (F42) of the cold air flowing into the first internal flow path 441 may flow into the second internal flow path 442 and be discharged through a second cold air discharge port 431.

Accordingly, the second refrigerating space 13 may be cooled.

[0177] Hereinafter a process, in which the damper 160 is controlled when the outside air temperature of the refrigerator is 34 °C or higher, when the refrigerating compartment opening/closing detection sensor detects that the refrigerating compartment is open, or when the refrigerator is operated for the first time, will be described in details.

[0178] In response to the occurrence of the above-mentioned situation, the second refrigerating space temperature sensor 93 may sense a temperature of the second refrigerating space 13 (3010).

[0179] In response to the temperature of the second refrigerating space 13, which is received by the controller 91, being higher than the second selected temperature by 2 °C or more (3020), the controller 91 may control the damper 160 to allow the first damping cover 162b to open the first damping hole 162a and to allow the second damping cover 163b to open the second damping hole 163a (3030). Accordingly, the cold air of the freezing compartment duct 125 may flow to the first refrigerating space 142 and the second refrigerating space 13, thereby cooling the first refrigerating space 142 and the second refrigerating space 13.

[0180] Thereafter, the first refrigerating space temperature sensor 92 may sense a temperature of the first refrigerating space 142 (3140), and in response to the sensed temperature being lower than the first selected temperature by 1 °C or more (3150), the controller 91 may control the damper 160 to allow the first damping cover 162b to close the first damping hole 162a (3160). The first refrigerating space temperature sensor 92 may sense the temperature of the first refrigerating space 142, again (3170), and in response to the sensed temperature being higher than the first selected temperature by 1 °C or more (3180), the controller 91 may control the damper 160 to allow the first damping cover 162b to open the first damping hole 162a (3190).

[0181] Meanwhile, in response to the controller 91 controlling the damper 160 to allow the first damping cover 162b to open the first damping hole 162a and to allow the second damping cover 163b to open the second damping hole 163a (3030), the second refrigerating space temperature sensor 93 may sense a temperature of the second refrigerating space 13 (3240). In response to the sensed temperature of the second refrigerating space 13 satisfying the second selected temperature (3250), the controller 91 may control the damper 160 to allow the second damping cover 163b to close the second damping hole 163a (3260).

[0182] Hereinafter a process, in which the damper 160 is controlled when a purpose of the first refrigerating space 142 input into the status setting panel 95 is for storing meat, fish or kimchi, will be described in details.

[0183] For example, in response to the purpose of the first refrigerating space 142, which is input into the status setting panel 95 and received by the controller 91, corre-

sponding to storing meat, fish or kimchi (4010), the first refrigerating space temperature sensor 92 may sense a temperature of the first refrigerating space 142 (4020).

[0184] In response to the temperature of the first refrigerating space 142 sensed by the first refrigerating space temperature sensor 92 being higher than a temperature for storing meat, fish or kimchi (4030), the controller 91 may control the damper 160 to allow the first damping cover 162b to open the first damping hole 162a (4040).

[0185] Thereafter, the first refrigerating space temperature sensor 92 may sense the temperature of the first refrigerating space 142 again (4050), and in response to the sensed temperature of the first refrigerating space 142 being equal to the temperature for storing meat, fish or kimchi (4060), the controller 91 may control the damper 160 to allow the first damping cover 162b to close the first damping hole 162a (4070).

[0186] Thereafter, the second refrigerating space temperature sensor 93 may sense a temperature of the second refrigerating space 13 (4080), and in response to the sensed temperature of the second refrigerating space 13 being higher than the second selected temperature (4090), the controller 91 may control the damper 160 to allow the second damping cover 163b to open the second damping hole 163a (4100).

[0187] Hereinafter a process, in which the damper 160 is controlled when a purpose of the first refrigerating space 142 input into the status setting panel 95 is for storing fruits or vegetables, will be described in details.

[0188] For example, when the items stored in the first refrigerating space 142 are fruits or vegetables, cold air may not be supplied separately to the first refrigerating space 142. This may be because the temperature for storing the fruits or vegetables may be satisfied to an extent that the first refrigerating space 142 is indirectly cooled due to its proximity to the second refrigerating space 13.

[0189] In response to the purpose of the first refrigerating space 142, which is input into the status setting panel 95 and received by the controller 91, corresponding to storing fruits or vegetables (5010), the second refrigerating space temperature sensor 93 may sense the temperature of the second refrigerating space 13 (5020).

[0190] In response to the sensed second refrigerating space 13 being higher than the second selected temperature (5030), the controller 91 may control the damper 160 to allow the second damping cover 163b to open the second damping hole 163a (5040).

[0191] Thereafter, the second refrigerating space temperature sensor 93 may sense the temperature of the second refrigerating space 13 again (5050), and in response to the sensed temperature of the second refrigerating space 13 being equal to the second selected temperature (5060), the controller 91 may control the damper 160 to allow the second damping cover 163b to close the second damping hole 163a (5070).

[0192] FIG. 18 is a cross-sectional view of a refrigerating compartment duct, a freezing compartment duct and a communicating duct in a refrigerator according to one embodiment. FIG. 19 is a flowchart of a method for controlling a refrigerator according to one embodiment. FIG. 20 is a flowchart of a method for controlling a refrigerator according to one embodiment. Descriptions of the same contents as those described above will be omitted.

[0193] Hereinafter a process, in which the controller 91 controls temperatures of the first refrigerating space 142 and the second refrigerating space 13 by controlling the damper 160 and a sub-damper 570 (described later), will be described in details.

[0194] Referring to FIGS. 18 to 20, a refrigerating compartment duct 500 may further include a third internal flow path 560 configured to receive cold air generated from the cooling device 330. For example, the cooling device 330 may be installed above the refrigerating compartment duct 500.

[0195] The refrigerating compartment duct 500 may include a third cold air intake port 531 provided to communicate with the cooling device 330. For example, the third cold air intake port 531 may be formed to penetrate a refrigerating compartment duct body 530. For example, the third cold air intake port 531 may be formed in an upper portion of the left side (+X side) of the refrigerating compartment duct body 530.

[0196] For example, an internal space of the cooling device 330 in which cold air is generated may be provided to communicate with the third cold air intake port 531.

[0197] The refrigerating compartment duct 500 may include the third internal flow path 560 connecting the third cold air intake 531 and a first cold air discharge port 552. The third internal flow path 560 may guide cold air, which is drawn in through the third cold air intake port 531 from the cooling device 330, to the first cold air discharge port 552.

[0198] For example, the sub-damper 570 may be installed on the third internal flow path 560 to control the flow of cold air flowing in the third internal flow path 560. The sub-damper 570 may be electrically connected to the controller 91 and controlled to be openable. More particularly, the sub-damper 570 may include a sub-damping hole (not shown) provided to allow cold air to pass there-through and a sub-damping cover (not shown) configured to open and close the sub-damping hole.

[0199] For example, the third internal flow path 560 may communicate with a first internal flow path 541. Both cold air (F52) flowing on the first internal flow path 541 and cold air (F51) flowing on the third internal flow path 560 may be discharged to the first refrigerating space 142 through the first cold air discharge port 552.

[0200] For example, the first internal flow path 541 and the second internal flow path 542 may be formed to be partitioned from each other.

[0201] The first refrigerating space temperature sensor 92 may sense a temperature of the first refrigerating

space 142 (6010). In response to the sensed temperature of the first refrigerating space 142 being higher than the first selected temperature by 1 °C or more (6020), the controller 91 may control the damper 160 to allow the first damping cover 162b to open the first damping hole 162a, and control the sub-damper 570 to allow the sub-damping cover to open the sub-damping hole (6030).

[0202] Thereafter, the first refrigerating space temperature sensor 92 may sense the temperature of the first refrigerating space 142 again (6040), and in response to the sensed temperature of the first refrigerating space 142 being lower than the first selected temperature by 1 °C or more (6050), the controller 91 may control the damper 160 to allow the first damping cover 162b to close the first damping hole 162a, and control the sub-damper 570 to allow the sub-damping cover to close the sub-damping hole (6060).

[0203] For example, the second refrigerating space temperature sensor 93 may sense a temperature of the second refrigerating space 13 (7010). In response to the sensed temperature of the second refrigerating space 13 being higher than the second selected temperature by 2 °C or more (7020), the controller 91 may control the damper 160 to allow the second damping cover 163b to open the second damping hole 163a (7030).

[0204] Thereafter, the second refrigerating space temperature sensor 93 may sense the temperature of the second refrigerating space 13 again (7040), and in response to the sensed temperature of the second refrigerating space 13 being equal to the second selected temperature (7050), the controller 91 may control the damper 160 to allow the second damping cover 163b to close the second damping hole 163a (7060).

[0205] FIG. 21 is a cross-sectional view of a refrigerating compartment duct, a freezing compartment duct and a communicating duct in a refrigerator according to one embodiment. FIG. 22 is a flowchart of a method for controlling a refrigerator according to one embodiment. FIG. 23 is a flowchart of a method for controlling a refrigerator according to one embodiment.

[0206] Descriptions of the same contents as those described above will be omitted.

[0207] Referring to FIGS. 21 to 23, a refrigerating compartment duct 700 may include a first internal flow path 741 and a second internal flow path 742 provided to communicate with the first internal flow path 741. The first internal flow path 741 and the second internal flow path 742 may communicate with a second cold air discharge port 732 provided to communicate with the second refrigerating space 13.

[0208] The refrigerating compartment duct 700 may include a first cold air discharge port 752 formed to communicate with the first refrigerating space 142, and a third cold air intake port 731 formed to communicate with the cooling device 330.

[0209] The third cold air intake 731 and the first cold air discharge port 752 may be connected to each other. In

other words, the refrigerating compartment duct 700 may include a third internal flow path 760 connecting the third cold air intake port 731 and the first cold air discharge port 752.

[0210] A first flow path 152 and a second flow path 153 of a communicating duct 150 may communicate with the first internal flow path 741 and the second internal flow path 742. More particularly, cold air introduced from the freezing compartment duct 125 into the first flow path 152 and the second flow path 153 may be discharged to the second refrigerating space 13 through the first internal flow path 741 and the second internal flow path 742.

[0211] The cold air flowing into the third internal flow path 760 through the third cold air intake port 731 may be discharged through the first cold air discharge port 752 to cool the first refrigerating space 142.

[0212] For example, the first internal flow path 741 and the third internal flow path 760 may be partitioned from each other. For example, the second internal flow path 742 and the third internal flow path 760 may be partitioned from each other.

[0213] A sub-damper 770 configured to control a flow of cold air flowing in the third internal flow path 760 may be installed in the third internal flow path 760. The sub-damper 770 may be electrically connected to the controller 91 and may be provided to be openable to control the flow of cold air.

[0214] For example, the first refrigerating space temperature sensor 92 may sense a temperature of the first refrigerating space 142 (8010).

[0215] In response to the sensed temperature of the first refrigerating space 142 being higher than the first selected temperature by 1 °C or more (8020), the controller 91 may control the sub-damper 770 to allow a sub-damping cover to open a sub-damping hole (8030).

[0216] Thereafter, the first refrigerating space temperature sensor 92 may sense the temperature of the first refrigerating space 142 (8040). In response to the sensed temperature of the first refrigerating space 142 being lower than the first selected temperature by 1 °C or more (8050), the controller 91 may control the sub-damper 770 to allow the sub-damping cover to close the sub-damping hole (8060).

[0217] For example, the second refrigerating space temperature sensor 93 may sense a temperature of the second refrigerating space 13 (9010).

[0218] In response to the sensed temperature of the second refrigerating space 13 being higher than the second selected temperature by 2 °C or more (9020), the controller 91 may control the damper 160 to allow the first damping cover 162b to open the first damping hole 162a and to allow the second damping cover 163b to open the second damping hole 163a (9030).

[0219] Thereafter, the second refrigerating space temperature sensor 93 may sense the temperature of the second refrigerating space 13 again (9040), and in response to the sensed temperature of the second refrigerating space 13 being equal to the second selected

temperature (9050), the controller 91 may control the damper 160 to allow the first damping cover 162b to close the first damping hole 162a and to allow the second damping cover 163b to close the second damping hole 163a (9060).

[0220] The refrigerator 1 according to one embodiment may include the inner case 100 forming the refrigerating compartment 11 and the freezing compartment 12. The refrigerator 1 may include the evaporator 3 configured to generate cold air and installed at the rear side of the freezing compartment 12. The refrigerator 1 may include the communicating duct 150 provided to allow the refrigerating compartment 11 and the freezing compartment 12 to communicate with each other so as to transfer cold air generated in the evaporator 3 to the refrigerating compartment 11, and including the first flow path 152 and the second flow path 153 partitioned from the first flow path 152. The refrigerator 1 may include the refrigerating compartment duct 200 installed in the refrigerating compartment 11 and configured to receive cold air from the communicating duct 150, and including the first internal flow path 241 provided to guide cold air of the first flow path 152 to the first refrigerating space 142 which is a portion of the refrigerating compartment 11, and the second internal flow path 242 provided to guide cold air of the second flow path 153 to the second refrigerating space 13 which is other portion of the refrigerating compartment 11. The refrigerator 1 may include the damper 160 including the first damping cover 162b configured to control the supply of cold air to the first internal flow path 241, and the second damping cover 163b configured to control the supply of cold air to the second internal flow path 242.

[0221] The inner case 100 may include the first inner case 110 including the first inner case body 111 forming the refrigerating compartment 11 and the first openings 112 and 113 formed to penetrate the first inner case body 111, and the second inner case 120 including the second inner case body 121 forming the freezing compartment 12 and the second openings 122 and 123 formed to penetrate the second inner case body 121. The communicating duct 150 may be disposed to allow the first flow path 151 and the second flow path 152 to communicate with the first openings 112 and 113 and the second openings 122 and 123.

[0222] The communicating duct 150 may include the base portion 151 disposed to connect the first inner case 110 and the second inner case 120. The communicating duct 150 may include the cover portion 154 provided to be coupled to the base portion 151 and including the partition wall 155 provided to define the first flow path 152 and the second flow path 153.

[0223] The damper 160 may be disposed between the communicating duct 150 and the evaporator 3.

[0224] The first internal flow path 241 may communicate with the first flow path 152, and the second internal flow path 242 may communicate with the second flow path 153. The damper 160 may further include the first

damping hole 162a provided to communicate with the first flow path inlet 152a, which faces the freezing compartment 12, of the first flow path 152 and provided to be opened or closed by the first damping cover 162b, and the second damping hole 163a provided to communicate with the second flow path inlet 153a, which faces the freezing compartment 12, of the second flow path 153 and provided to be opened or closed by the second damping cover 163b.

[0225] The first internal flow path 241 may include the first cold air intake port 241a provided to communicate with the first flow path outlet 152b, which faces the refrigerating compartment 11, of the first flow path 152. The second internal flow path 242 may include the second cold air intake port 242a provided to communicate with the second flow path outlet 153b, which faces the refrigerating compartment 11, of the second flow path 153.

[0226] The refrigerating compartment duct 200 may include the first cold air discharge port 252 formed to discharge cold air of the first internal flow path 241 to the first refrigerating space 142. The refrigerating compartment duct 200 may include the second cold air discharge port 231 formed to discharge cold air of the second internal flow path 242 to the second refrigerating space 13.

[0227] The first internal flow path 241 may be formed to connect the first cold air intake port 241a and the first cold air discharge port 252. The second internal flow path 242 may be formed to connect the second cold air intake port 242a and the second cold air discharge port 231.

[0228] The first internal flow path 241 and the second internal flow path 242 may be formed to be partitioned from each other.

[0229] The refrigerating compartment duct 200 may include the bypass flow path 460 provided to allow the first internal flow path 241 and the second internal flow path 242 to communicate with each other.

[0230] The bypass flow path 460 may include the bypass inlet 460a provided to communicate with the first internal flow path 241 to receive a portion of the cold air flowing in the first internal flow path 241. The bypass flow path 460 may include the bypass outlet 460b provided to communicate with the second internal flow path 242 to transfer a portion of the cold air introduced into the bypass inlet 460a to the second internal flow path 242.

[0231] The refrigerator may further include the cooling device 330 configured to generate cold air and installed in the refrigerating compartment 11. The refrigerating compartment duct 200 may further include the third cold air intake port provided to communicate with the cooling device 330 to receive cold air generated by the cooling device 330, and the third internal flow path provided to connect the third cold air intake port and the first cold air discharge port 252 to guide cold air, which is introduced into the third cold air intake port, to the first cold air discharge port 252.

[0232] The refrigerator may further include the sub-

damper 570 installed on the third internal flow path and configured to be openable to control the flow of cold air in the third internal flow path.

[0233] The third internal flow path and the first internal flow path 241 may be formed to communicate with each other.

[0234] The cooling device 330 may include a Peltier element configured to generate cold air.

[0235] The refrigerator 1 according to one embodiment may include the inner case 100 forming the refrigerating compartment 11 and the freezing compartment 12, the evaporator 3 configured to generate cold air and installed at the rear side of the freezing compartment 12, and the fan configured to generate the flow of cold air. The refrigerator 1 may include the communicating duct 150 provided to allow the refrigerating compartment 11 and the freezing compartment 12 to communicate with each other so as to transfer cold air generated in the evaporator 3 to the refrigerating compartment 11, and including the first flow path 152 on which cold air flows, and the second flow path 153 partitioned from the first flow path 152. The refrigerator 1 may include the refrigerating compartment duct 200 installed in the refrigerating compartment 11 and provided to communicate with the communicating duct 150 to receive cold air from the communicating duct 150, and including the first internal flow path 241 provided to communicate with the first flow path 152 and provided to guide a portion of cold air to the first refrigerating space 142 which is a portion of the refrigerating compartment 11, and the second internal flow path 242 provided to communicate with the second flow path 153 and provided to guide other portion of the cold air to the second refrigerating space 13 which is other portion of the refrigerating compartment 11. The refrigerator 1 may include the damper 160 configured to open and close the first flow path 152 and the second flow path 153 so as to control the flow of cold air flowing on the first internal flow path 241 and the second internal flow path 242.

[0236] The damper 160 may include the first damping hole 162a provided to communicate with the first flow path 152, the first damping cover 162b configured to open and close the first damping hole 162a, the second damping hole 163a provided to communicate with the second flow path 153, and the second damping cover 163b configured to open and close the second damping hole 163a.

[0237] The refrigerating compartment duct 200 may include the bypass flow path 460 provided to allow the first internal flow path 241 and the second internal flow path 242 to communicate with each other.

[0238] The refrigerator may further include the cooling device 330 configured to generate cold air and installed in the refrigerating compartment 11. The refrigerating compartment duct 200 may further include the third cold air intake port provided to communicate with the cooling device 330 to receive cold air generated by the cooling device 330, and the third internal flow path provided to

communicate with the first internal flow path 241 to allow cold air, which is introduced into the third cold air intake port, to flow to the first refrigerating space 142.

[0239] The refrigerator 1 according to one embodiment may include the inner case 100 forming the refrigerating compartment 11, in which the storage case 140 is disposed, and the freezing compartment 12, and the evaporator 3 configured to generate cold air and installed at the rear side of the freezing compartment 12. The refrigerator 1 may include the communicating duct 150 including the first flow path 152 on which cold air flows, and the second flow path 153 partitioned from the first flow path 152, the communicating duct provided to allow the refrigerating compartment 11 and the freezing compartment 12 to communicate with each other. The refrigerator 1 may include the refrigerating compartment duct 200 installed in the refrigerating compartment 11 and provided to communicate with the communicating duct 150, and including the first internal flow path 241 provided to communicate with the first flow path 152 and provided to receive a portion of cold air and guide the cold air to the inside of the storage case 140, and the second internal flow path 242 provided to communicate with the second flow path 153 and provided to receive other portion of the cold air and guide the cold air to the space except the storage case 140. The refrigerator 1 may include the damper 160 configured to open and close the first flow path 152 and the second flow path 153.

[0240] As is apparent from the above description, it is possible to move cold air of a freezing compartment to a refrigerating compartment so as to cool the refrigerating compartment because a communicating duct is configured to allow the freezing compartment and the refrigerating compartment to communicate with each other.

[0241] Further, it is possible to set temperatures of a first refrigerating space and a second refrigerating space to be different from each other because a damper is configured to control a flow of cold air flowing on a first internal flow path and a second internal flow path.

[0242] Further, because a damper includes a first damping hole and a second damping hole, it is possible to increase utilization of an internal space of a refrigerator in comparison with a case in which a plurality of dampers is installed.

[0243] Additional aspects of the disclosure 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 disclosure.

[0244] While the present disclosure has been particularly described with reference to exemplary embodiments, it should be understood by those of skilled in the art that various changes in form and details may be made without departing from the spirit and scope of the present disclosure.

Claims

1. A refrigerator comprising:

an inner case forming a refrigerating compartment and a freezing compartment;
an evaporator at a rear side of the freezing compartment and configured to generate cold air;
a communicating duct including a first flow path through which cold air generated by the evaporator is flowable, and a second flow path partitioned from the first flow path through which cold air generated by the evaporator is flowable;
a refrigerating compartment duct including a first internal flow path configured to be supplied with cold air generated by the evaporator that flowed through the first flow path and to guide the supplied cold air generated by the evaporator that flowed through the first flow path to a first refrigerating space which is a portion of the refrigerating compartment, and a second internal flow path configured to be supplied with cold air generated by the evaporator that flowed through the second flow path and to guide the supplied cold air generated by the evaporator that flowed through the second flow path to a second refrigerating space which is an other portion of the refrigerating compartment; and
a damper including a first damping cover configured to control the supply of cold air to the first internal flow path, and a second damping cover configured to control the supply of cold air to the second internal flow path.

2. The refrigerator of claim 1, wherein

the inner case includes:

a first inner case including a first inner case body forming the refrigerating compartment, and a first opening penetrating the first inner case body, and
a second inner case including a second inner case body forming the freezing compartment, and a second opening penetrating the second inner case body, and

the communicating duct is configured to allow the first flow path and the second flow path to communicate with the first opening and the second opening.

3. The refrigerator of claim 2, wherein the communicating duct includes:

a base portion connecting the first inner case and the second inner case, and

- a cover portion coupled to the base portion and including a partition wall defining the first flow path and the second flow path.
4. The refrigerator of claim 1, wherein the damper is between the communicating duct and the evaporator.
 5. The refrigerator of claim 3, wherein the damper further includes:
 - 10 a first damping hole configured to communicate with a first flow path inlet, which faces the freezing compartment, of the first flow path, and to be opened or closed by the first damping cover, and
 - 15 a second damping hole configured to communicate with a second flow path inlet, which faces the freezing compartment, of the second flow path, and to be opened or closed by the second damping cover.
 6. The refrigerator of claim 1, wherein
 - 25 the first internal flow path includes a first cold air intake port configured to communicate with a first flow path outlet, which faces the refrigerating compartment, of the first flow path, and
 - 30 the second internal flow path includes a second cold air intake port configured to communicate with a second flow path outlet, which faces the refrigerating compartment, of the second flow path.
 7. The refrigerator of claim 6, wherein the refrigerating compartment duct includes:
 - 35 a first cold air discharge port configured to discharge cold air guided by the first internal flow path to the first refrigerating space, and
 - 40 a second cold air discharge port configured to discharge cold air guided by the second internal flow path to the second refrigerating space.
 8. The refrigerator of claim 7, wherein
 - 45 the first internal flow path is configured to connect the first cold air intake port and the first cold air discharge port, and
 - 50 the second internal flow path is configured to connect the second cold air intake port and the second cold air discharge port.
 9. The refrigerator of claim 8, wherein the first internal flow path and the second internal flow path are partitioned from each other.
 10. The refrigerator of claim 8, wherein the refrigerating compartment duct includes a bypass flow path con-
- figured to allow the first internal flow path and the second internal flow path to communicate with each other.
- 5 11. The refrigerator of claim 10, wherein the bypass flow path includes:
 - a bypass inlet configured to communicate with the first internal flow path to receive a portion of the cold air flowing in the first internal flow path, and
 - a bypass outlet configured to communicate with the second internal flow path to transfer a portion of the cold air introduced into the bypass inlet to the second internal flow path.
 12. The refrigerator of claim 8, further comprising:
 - 20 a cooling device in the refrigerating compartment and configured to generate cold air, wherein the refrigerating compartment duct further includes:
 - a third cold air intake port configured to communicate with the cooling device to receive cold air generated by the cooling device, and
 - a third internal flow path configured to connect the third cold air intake port and the first cold air discharge port to guide cold air, which is introduced into the third cold air intake port, to the first cold air discharge port.
 - 35 13. The refrigerator of claim 12, further comprising:
 - a sub-damper on the third internal flow path and configured to be openable to control a flow of cold air in the third internal flow path.
 - 40 14. The refrigerator of claim 12, wherein the third internal flow path and the first internal flow path are configured to communicate with each other.
 - 45 15. The refrigerator of claim 12, wherein the cooling device includes a Peltier element configured to generate cold air.

FIG. 1

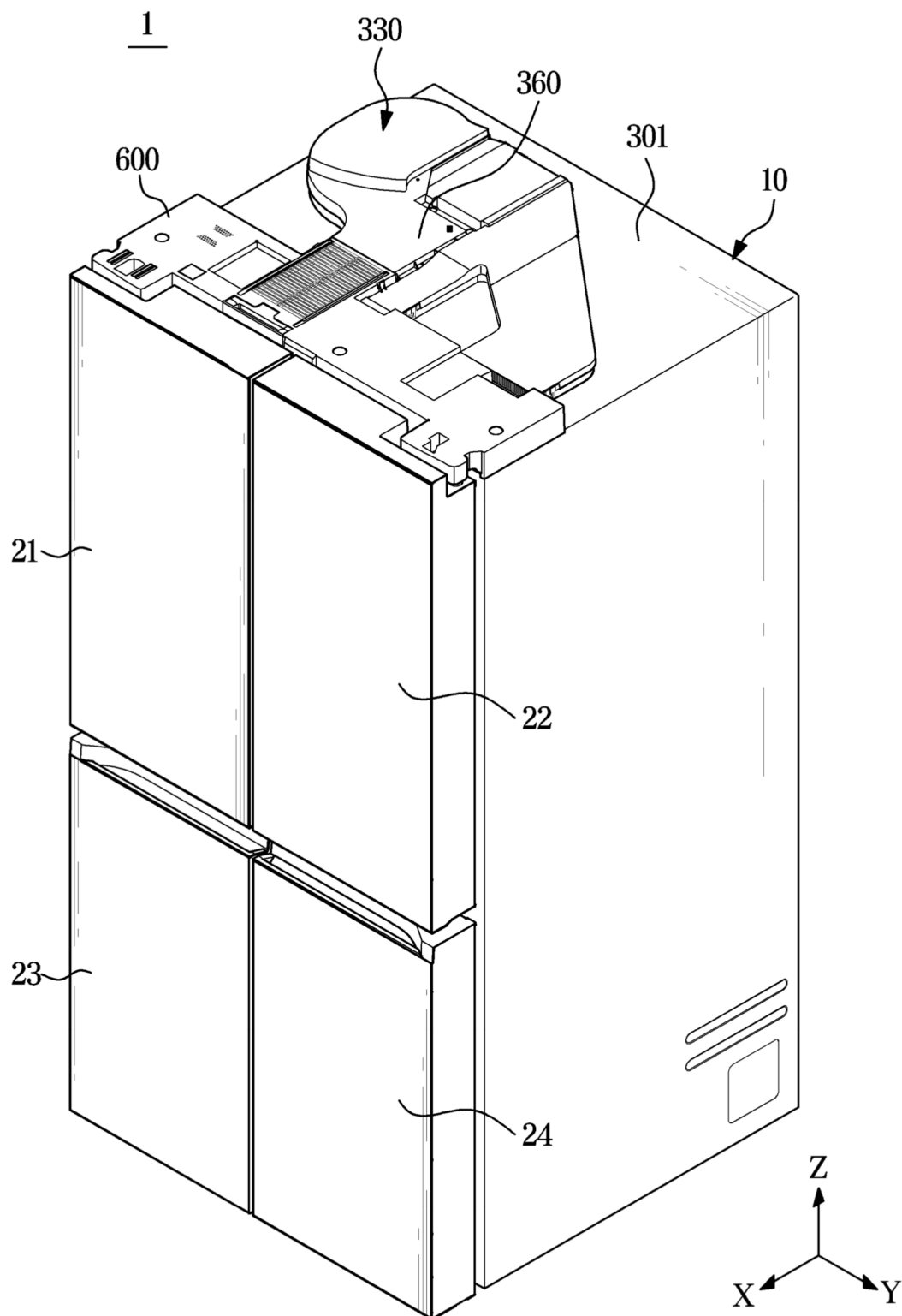


FIG. 2

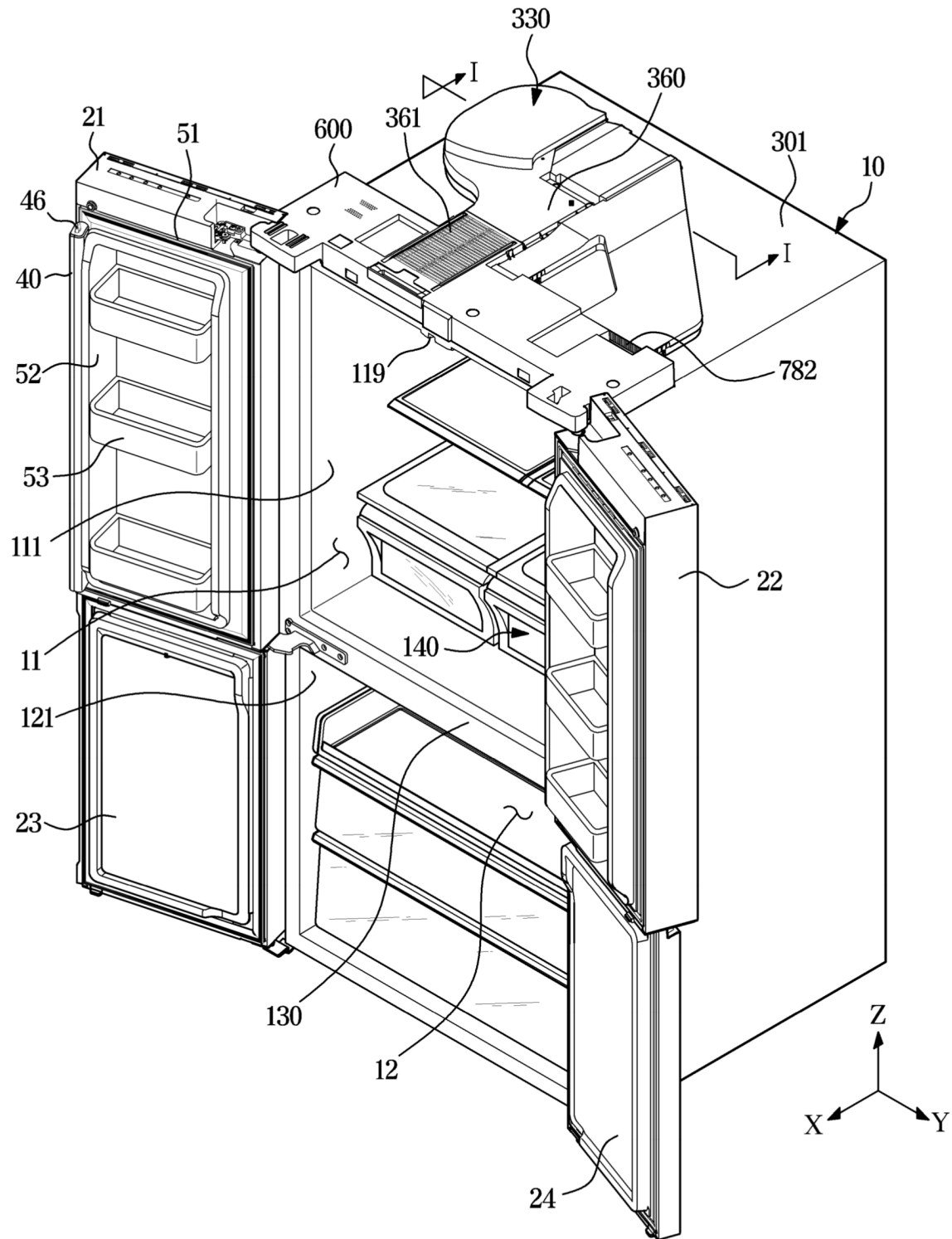


FIG. 3

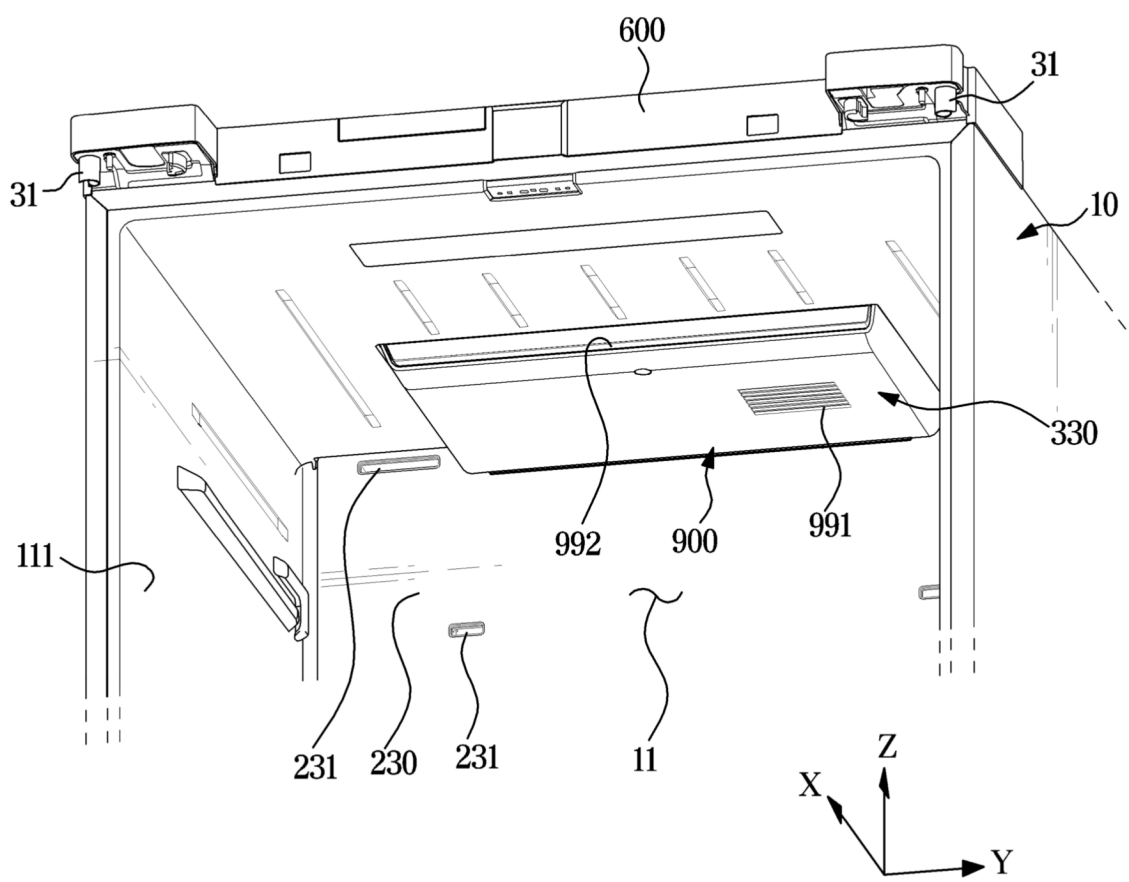


FIG. 4

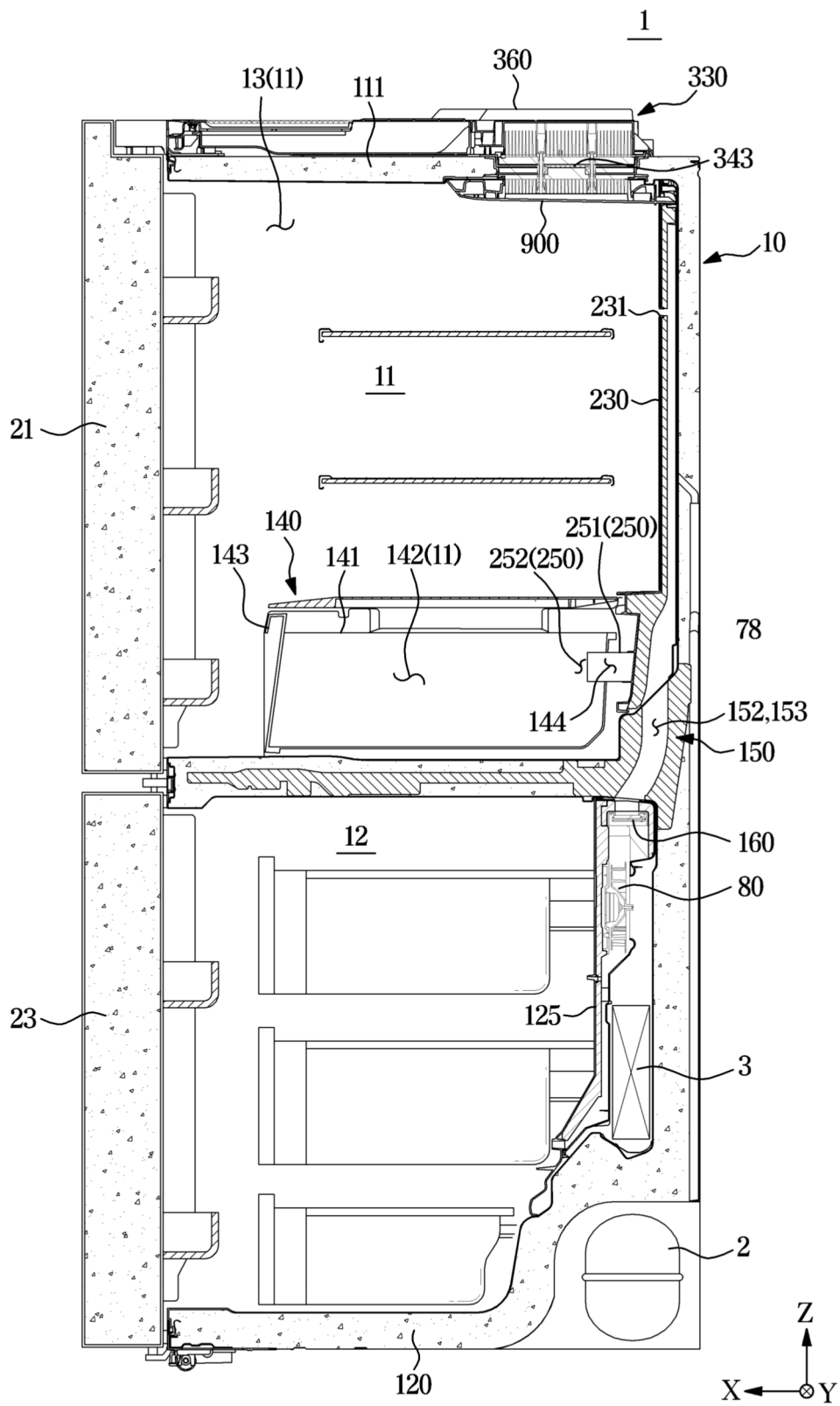


FIG. 5

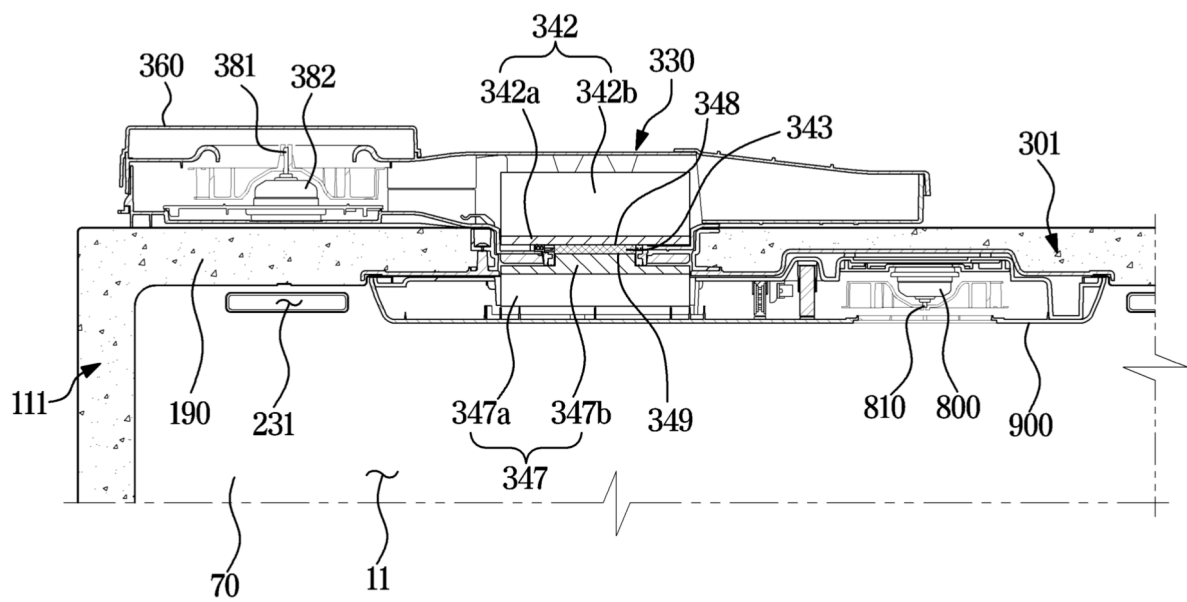


FIG. 6

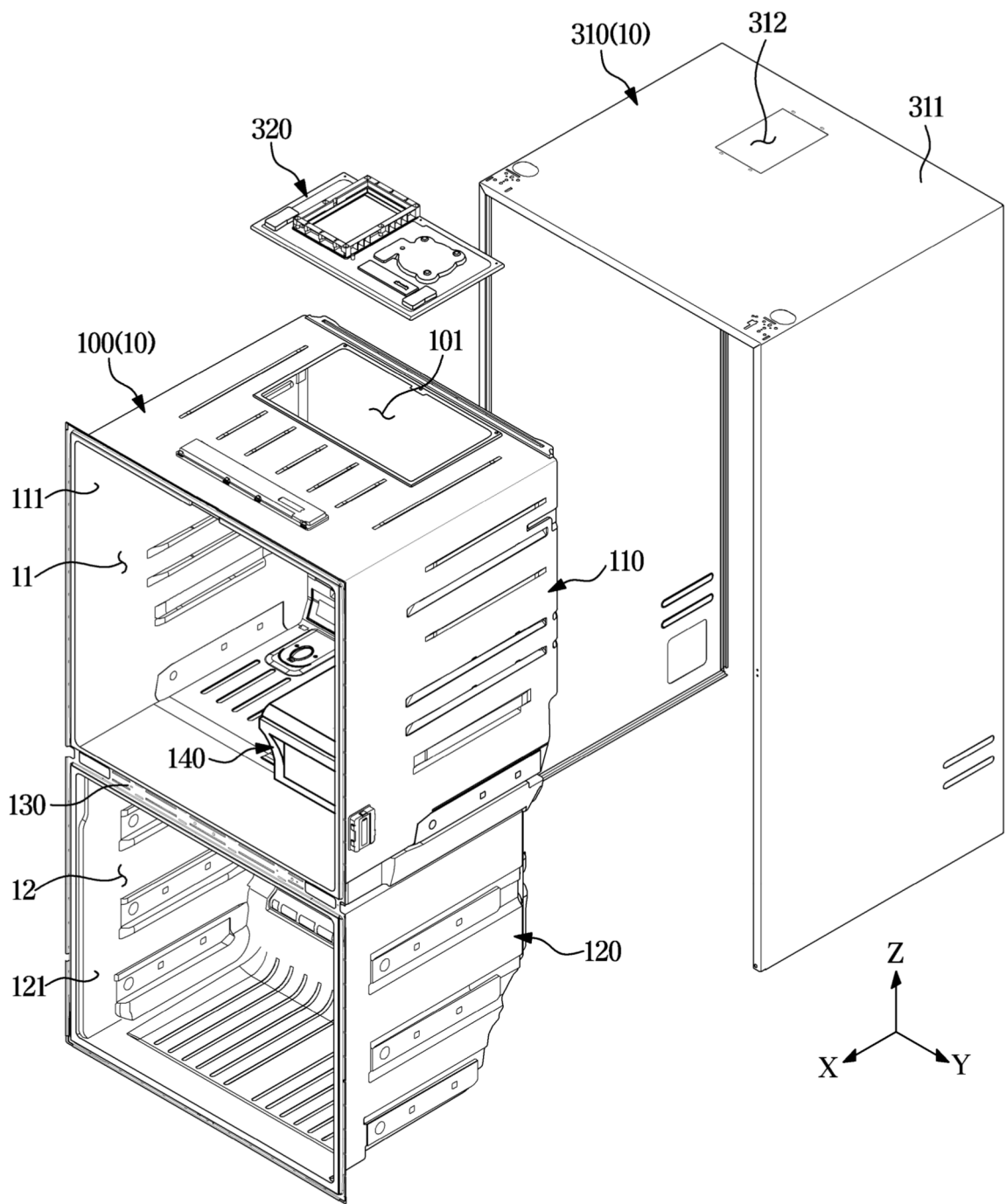


FIG. 7

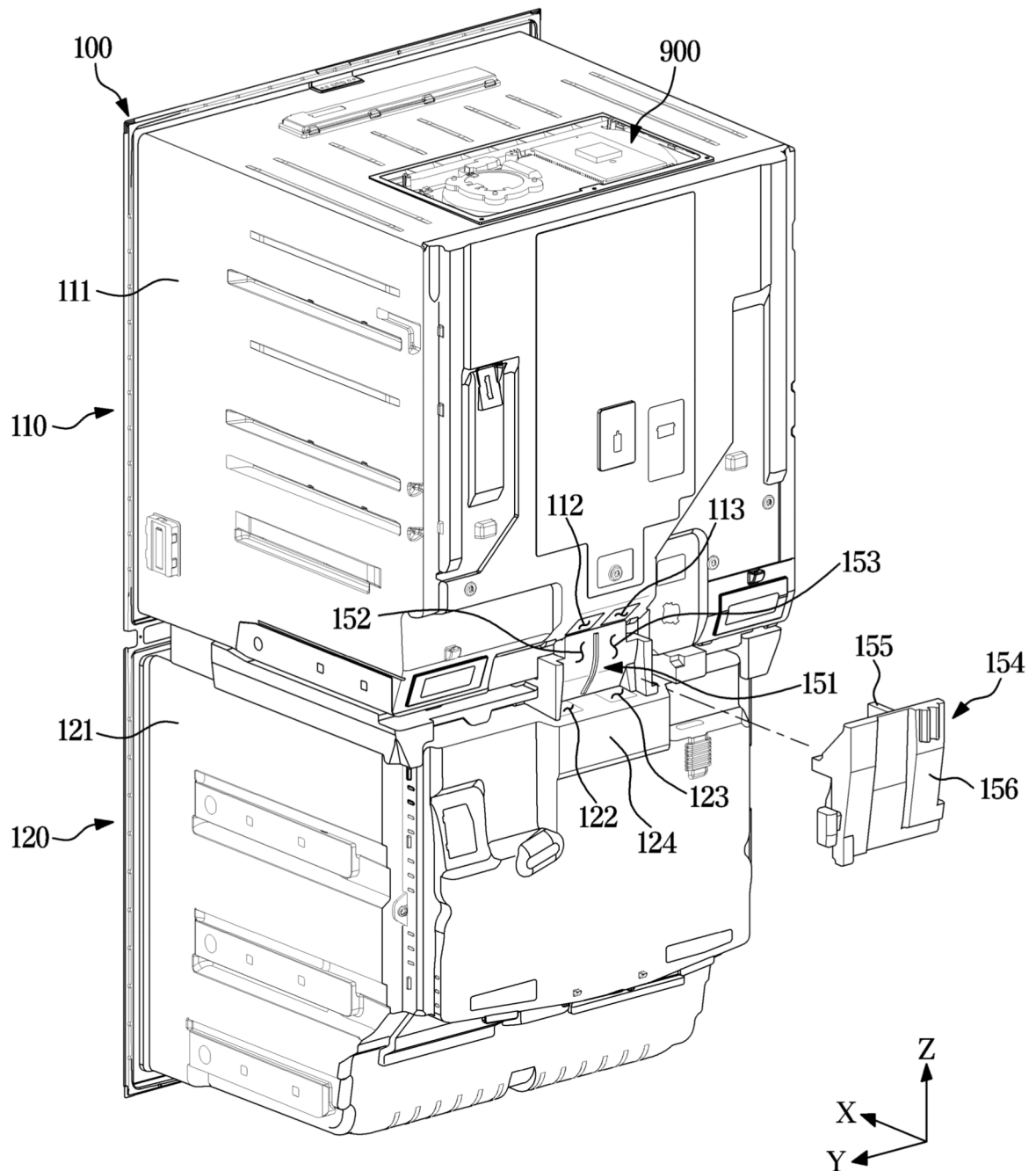


FIG. 8

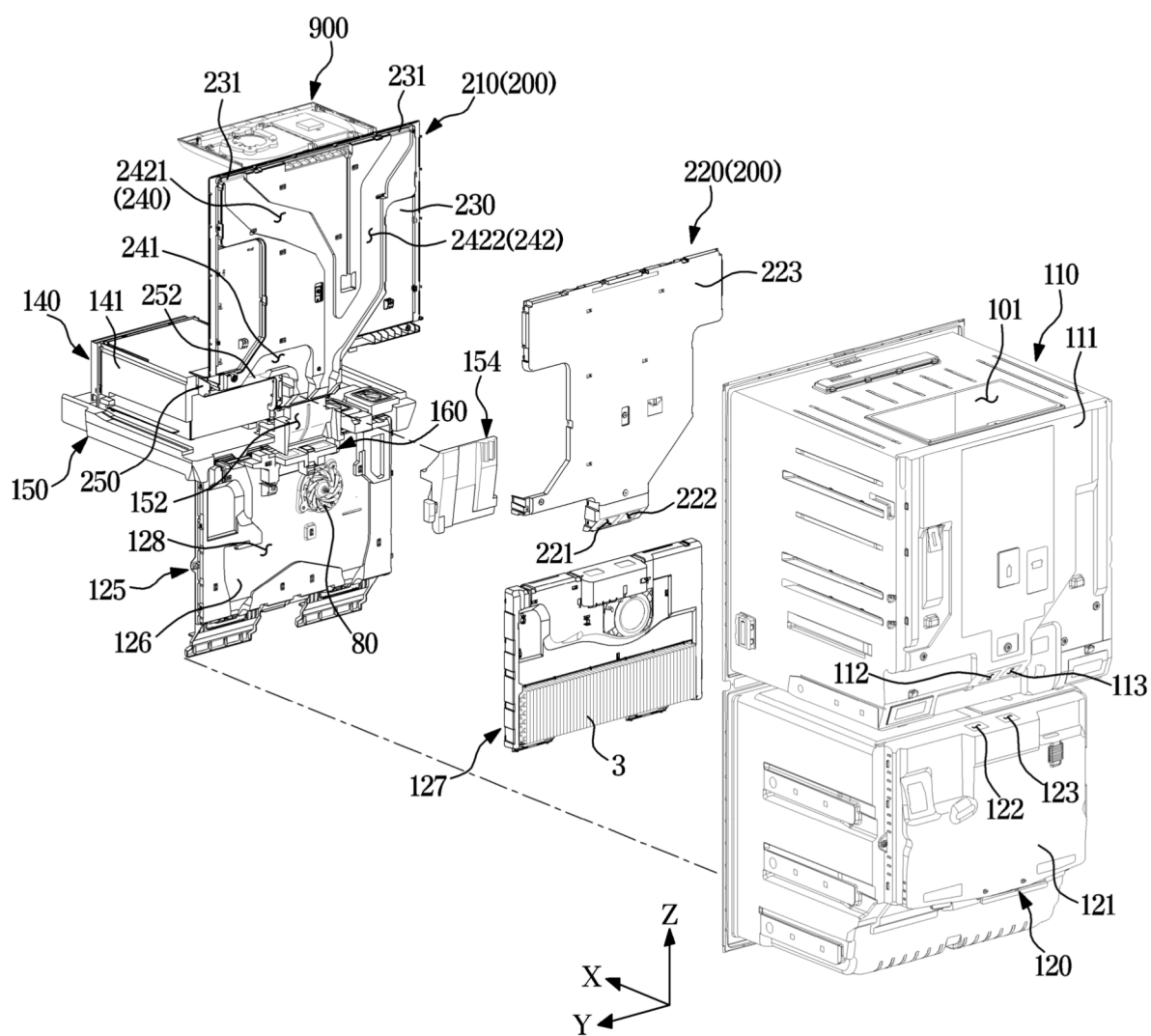


FIG. 9

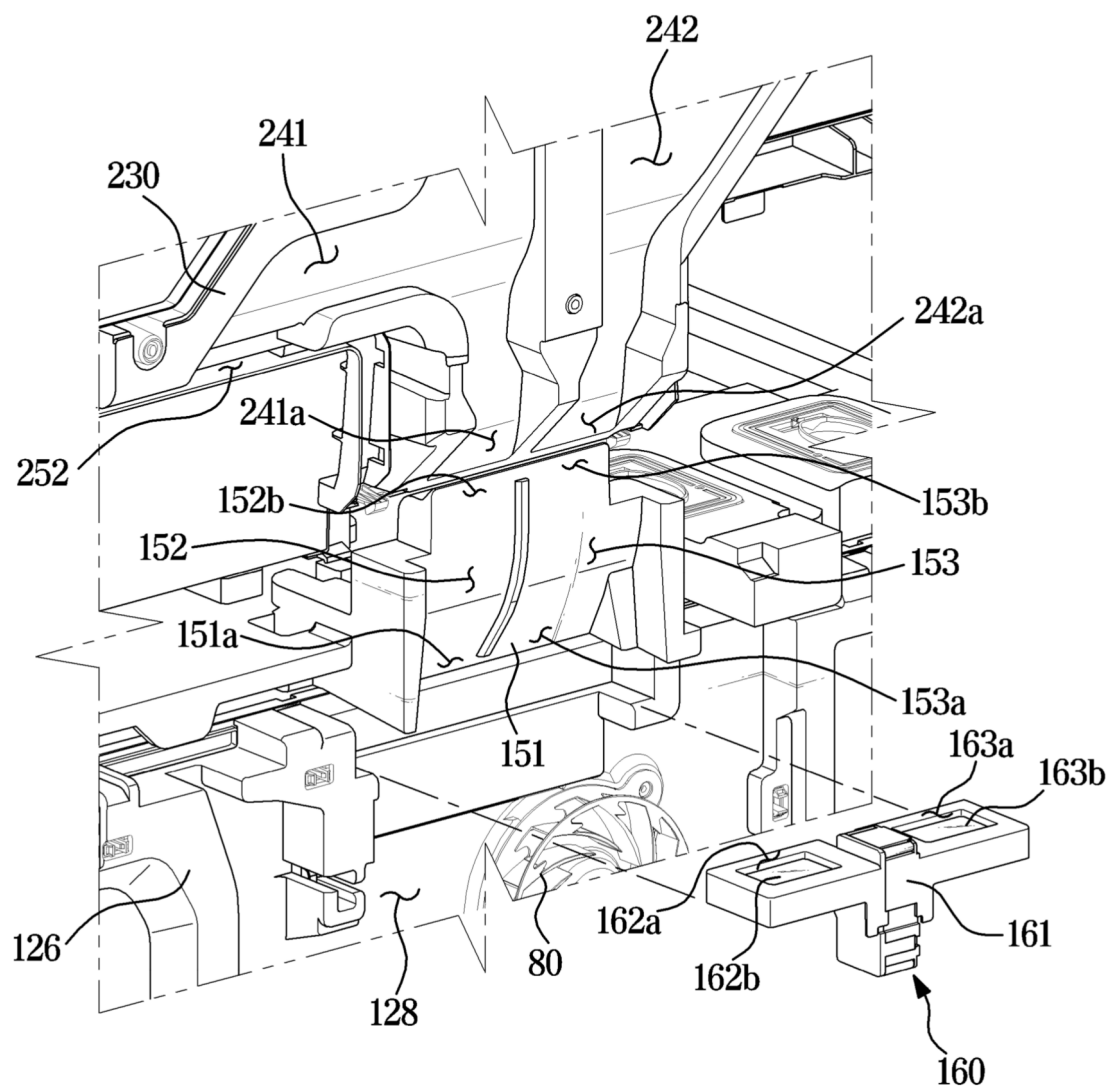


FIG. 10

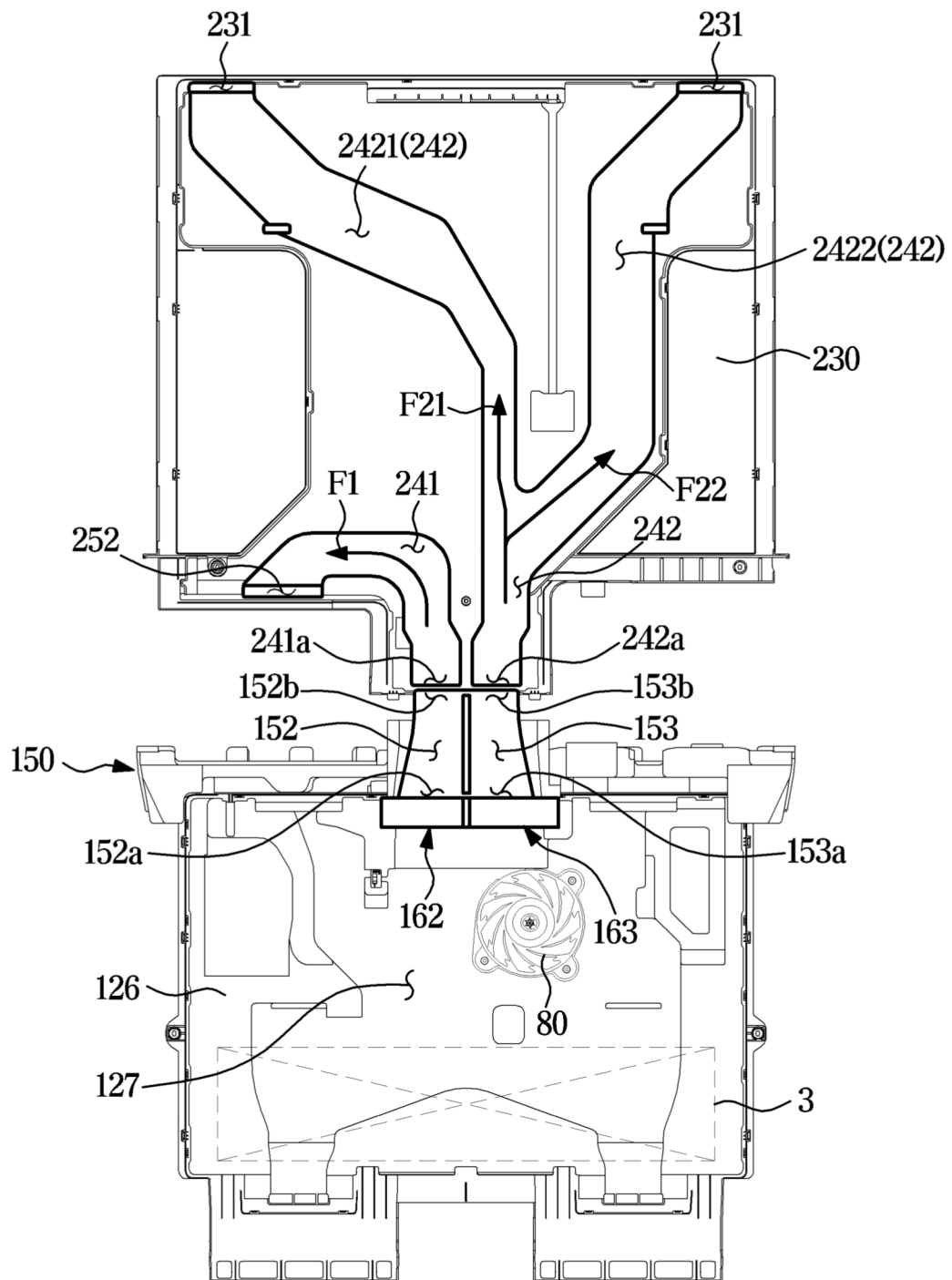


FIG. 11

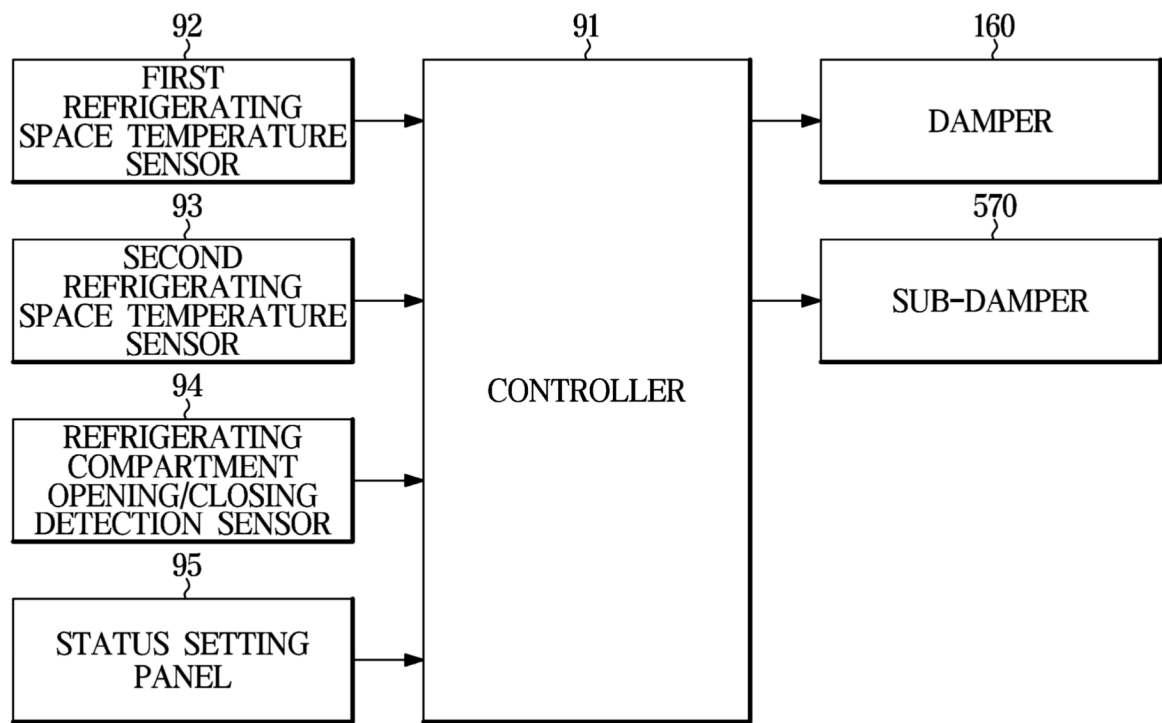


FIG. 12

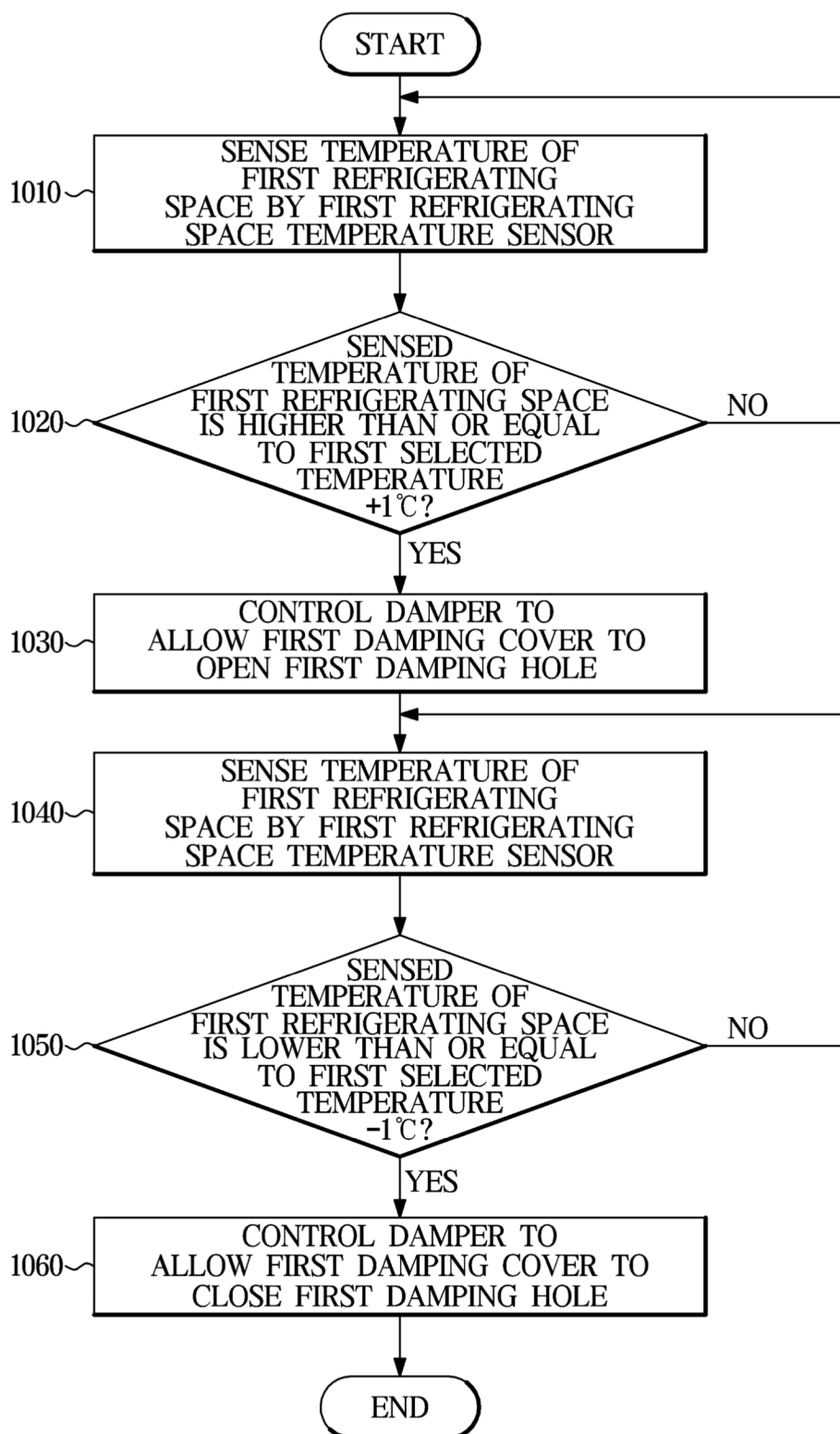


FIG. 13

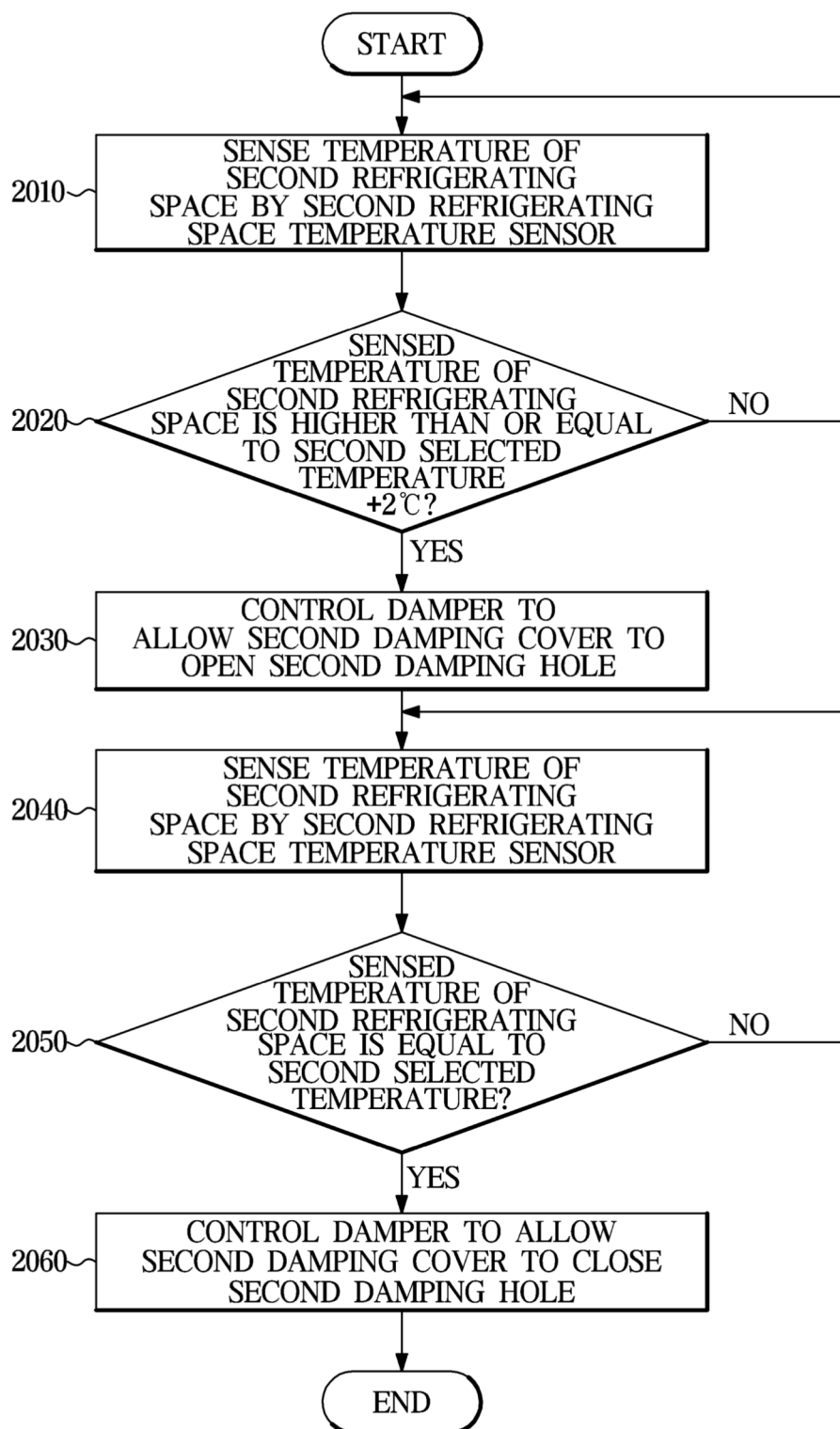


FIG. 14

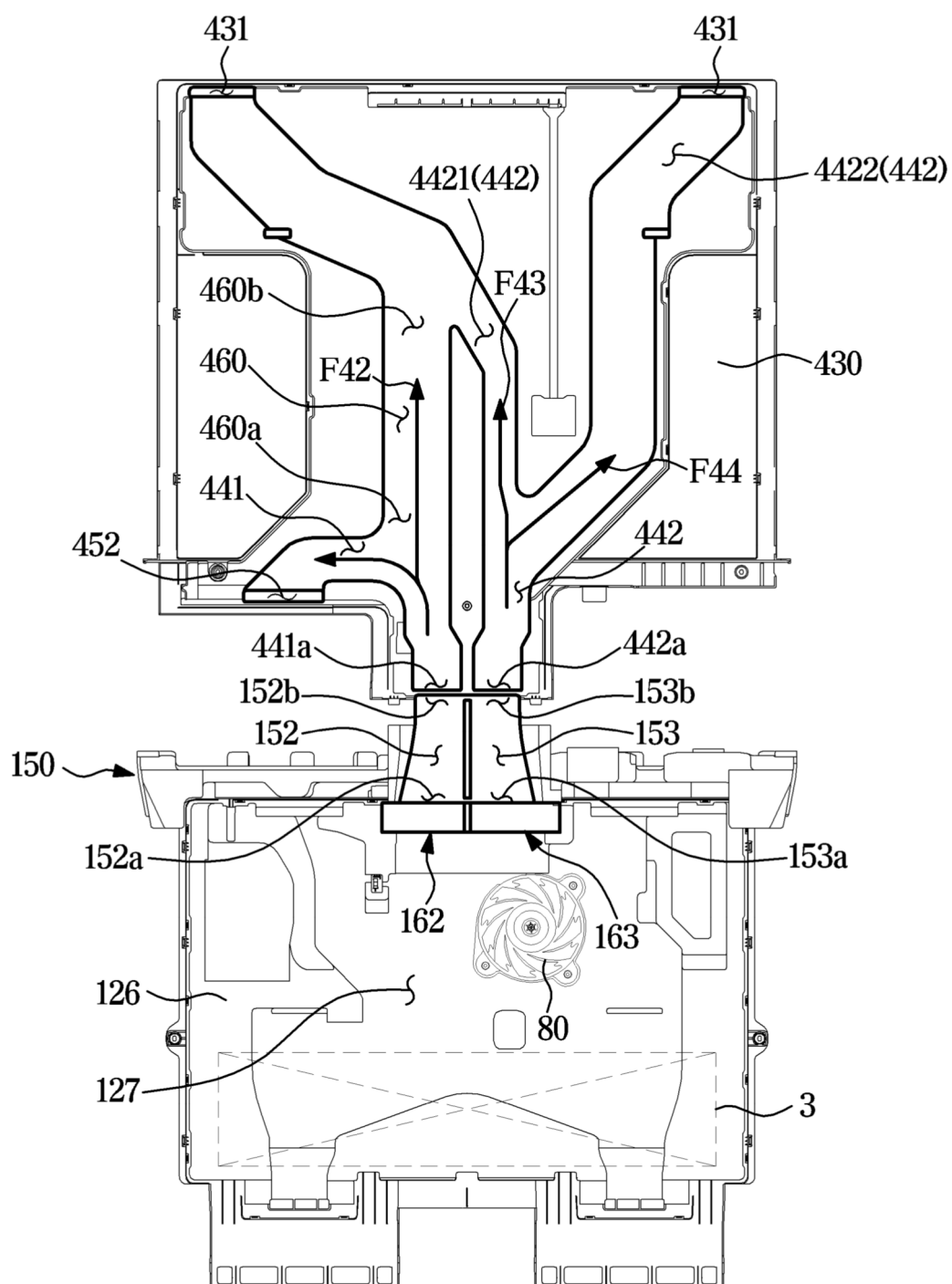


FIG. 15

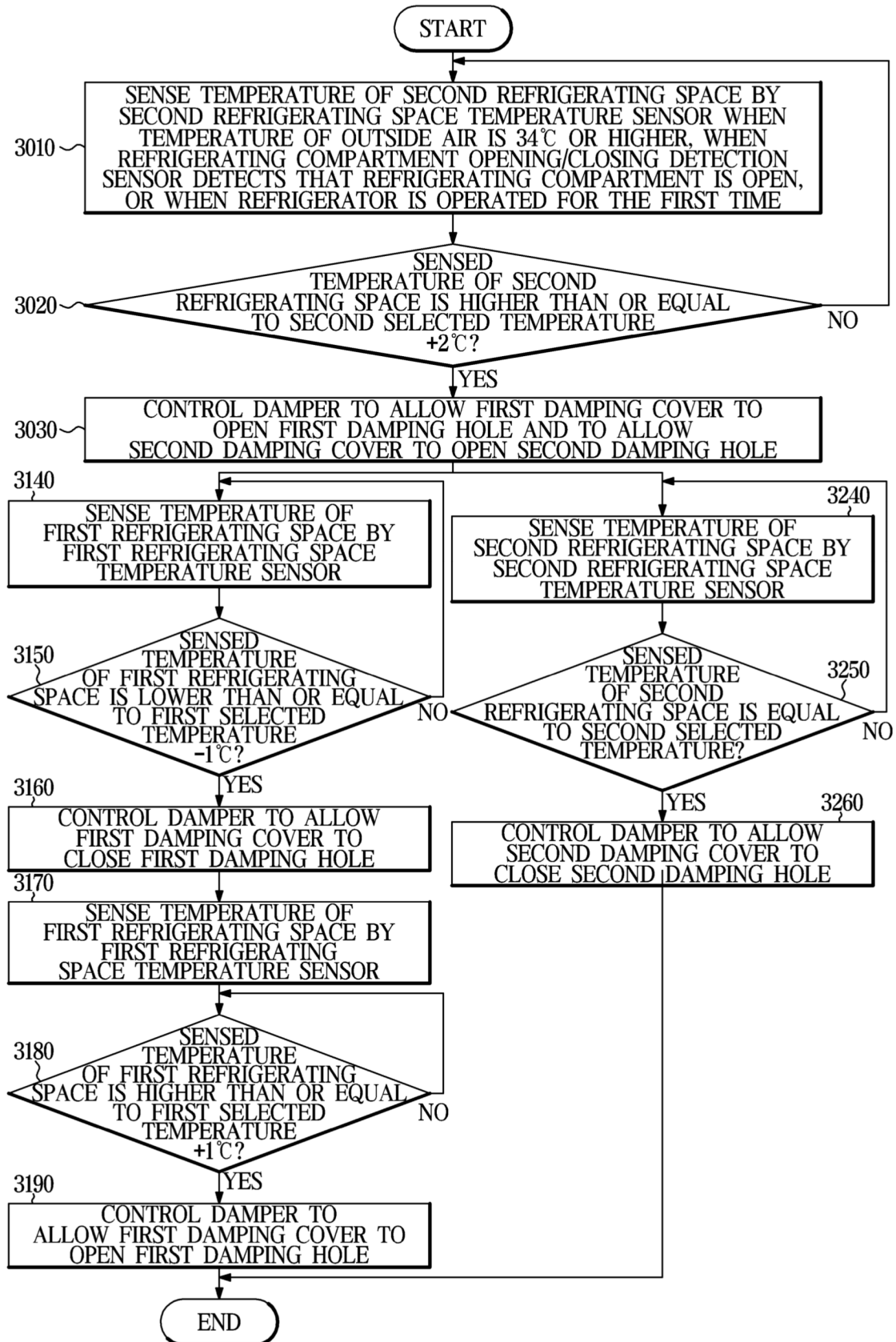


FIG. 16

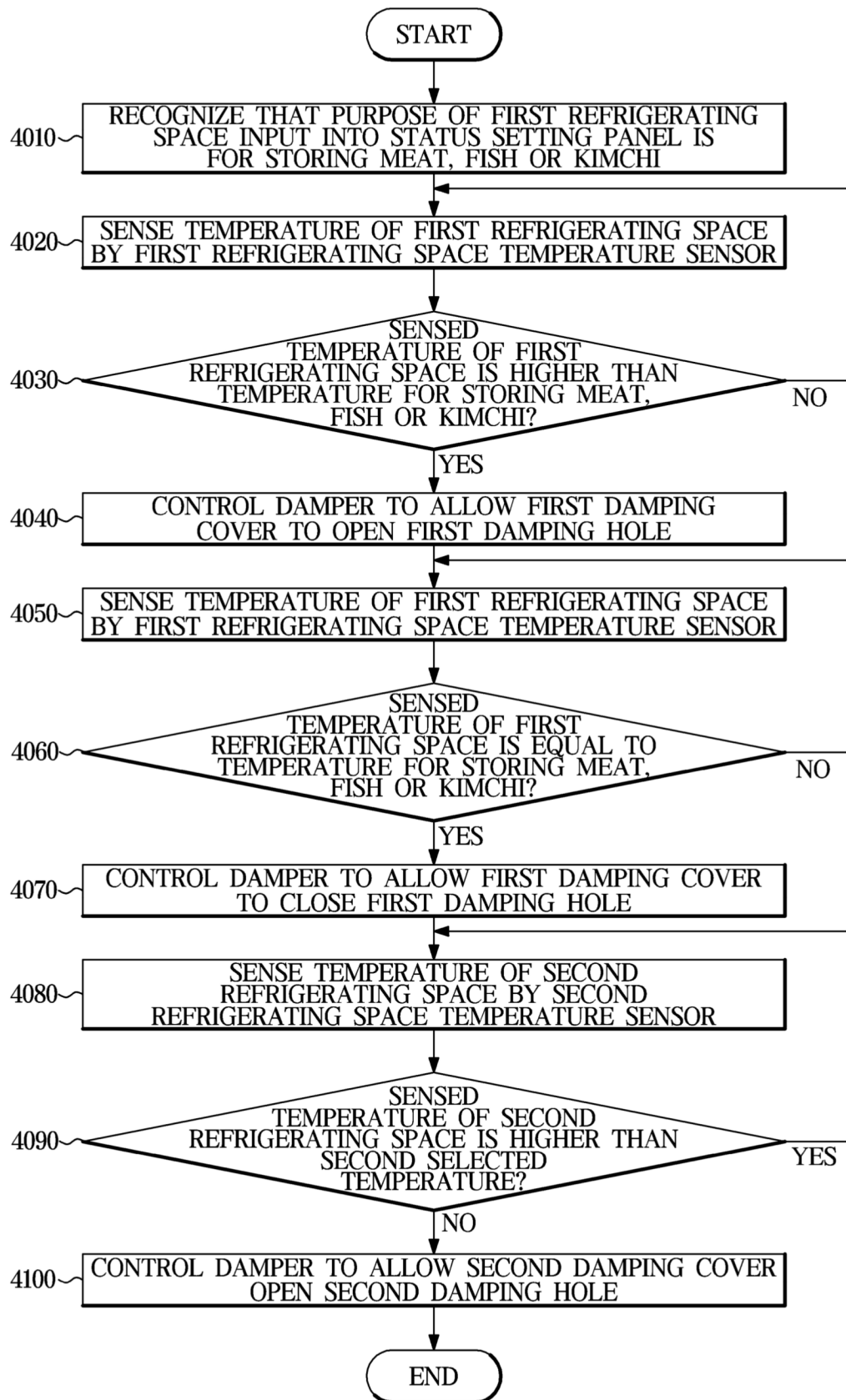


FIG. 17

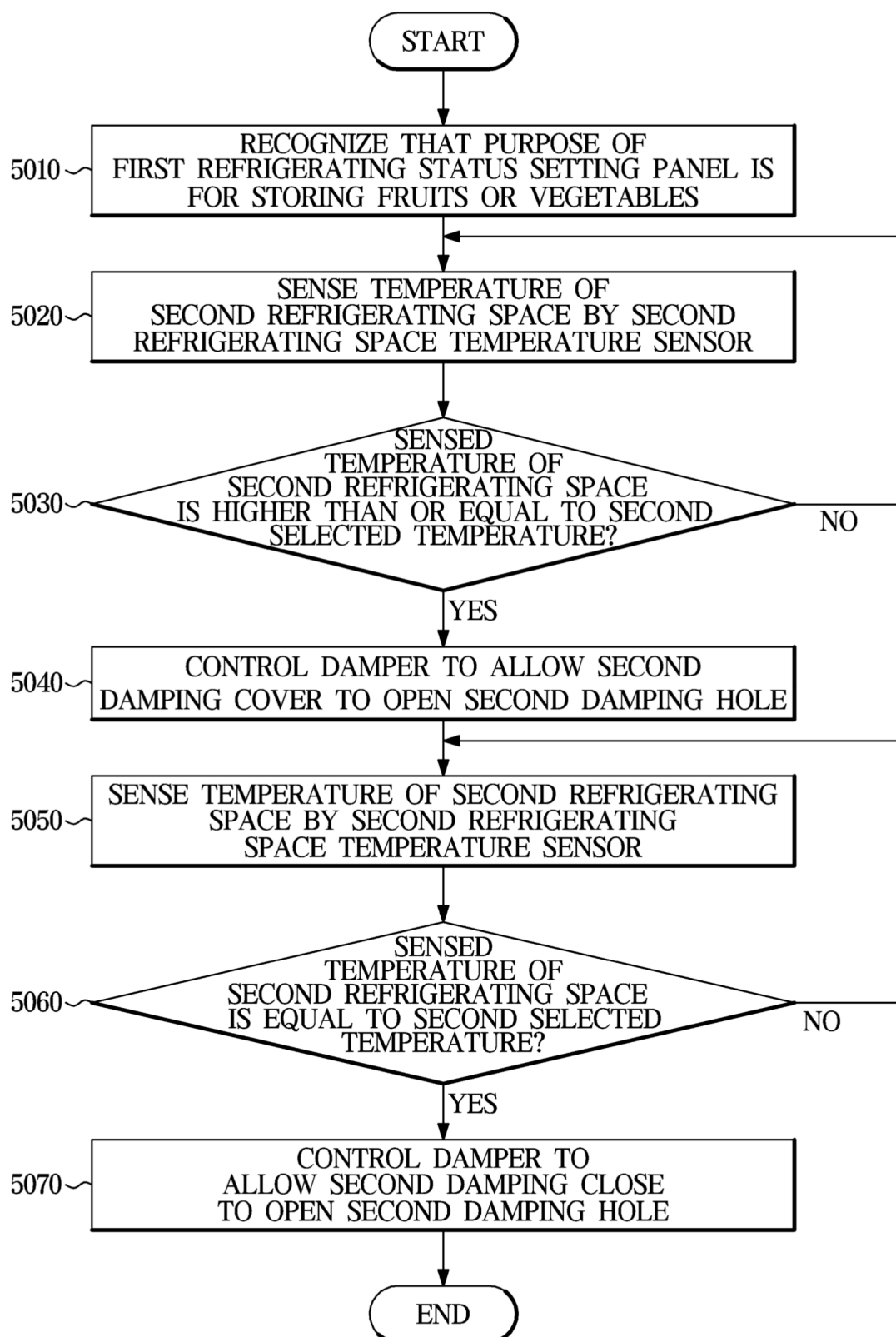


FIG. 18

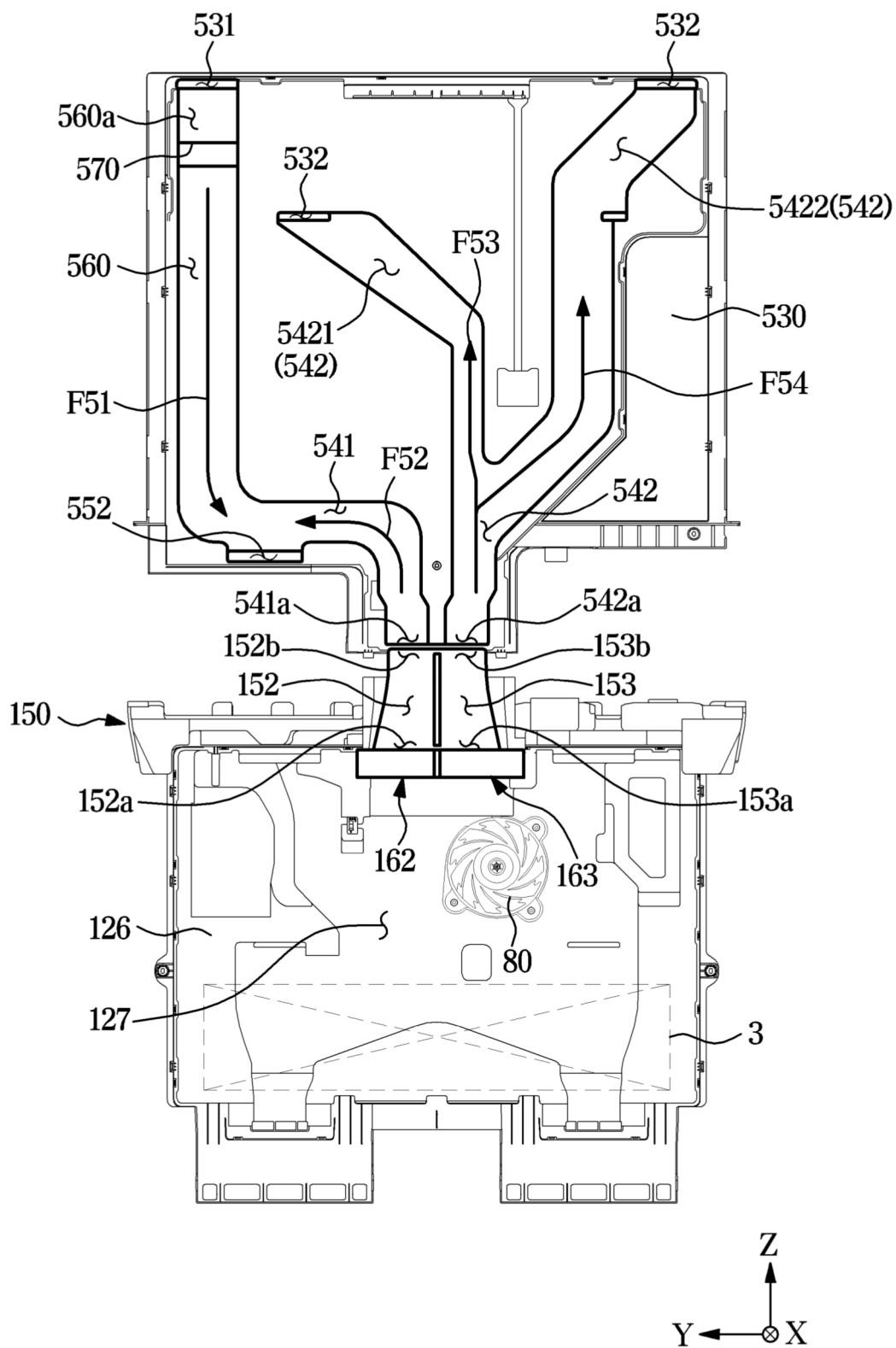


FIG. 19

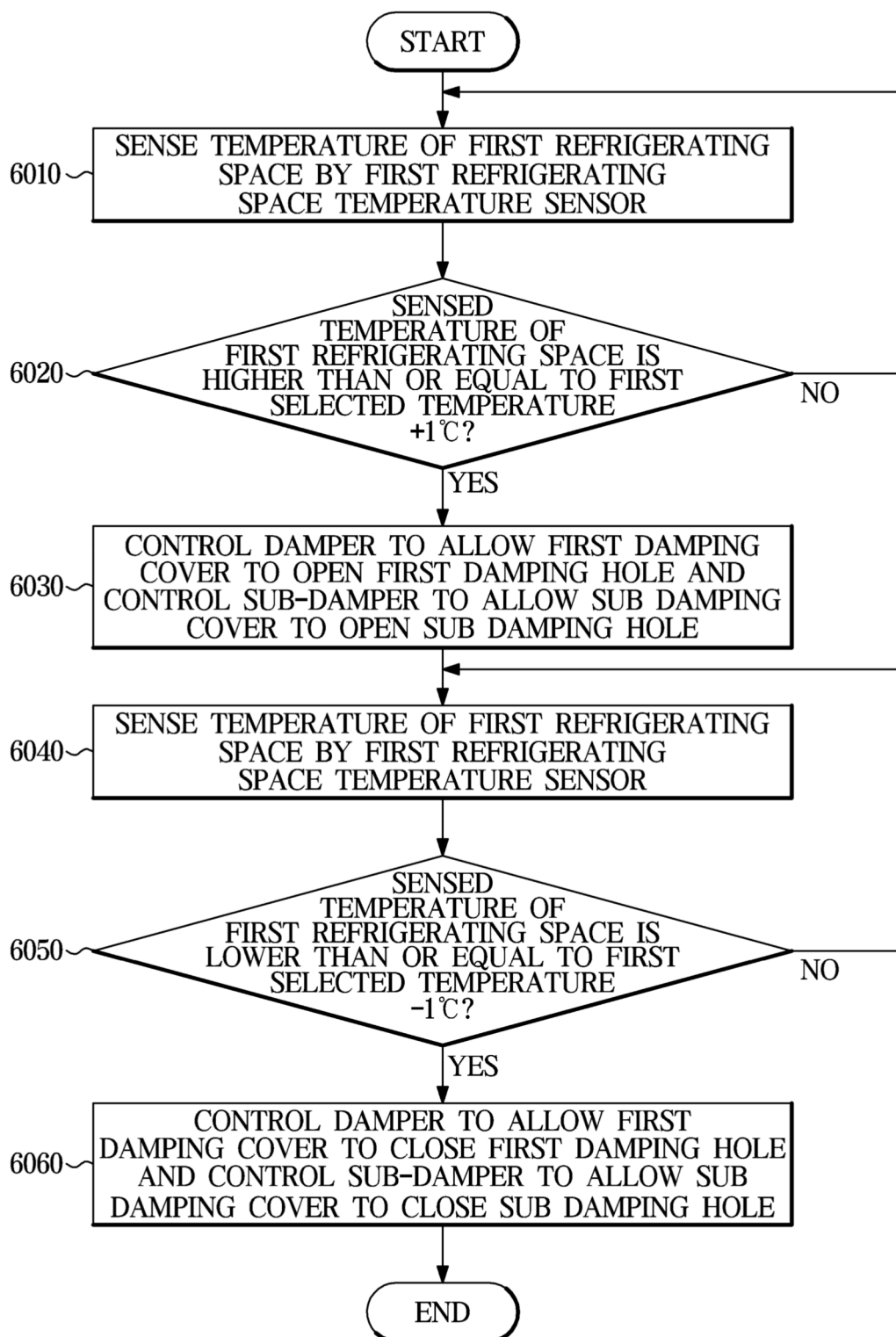


FIG. 20

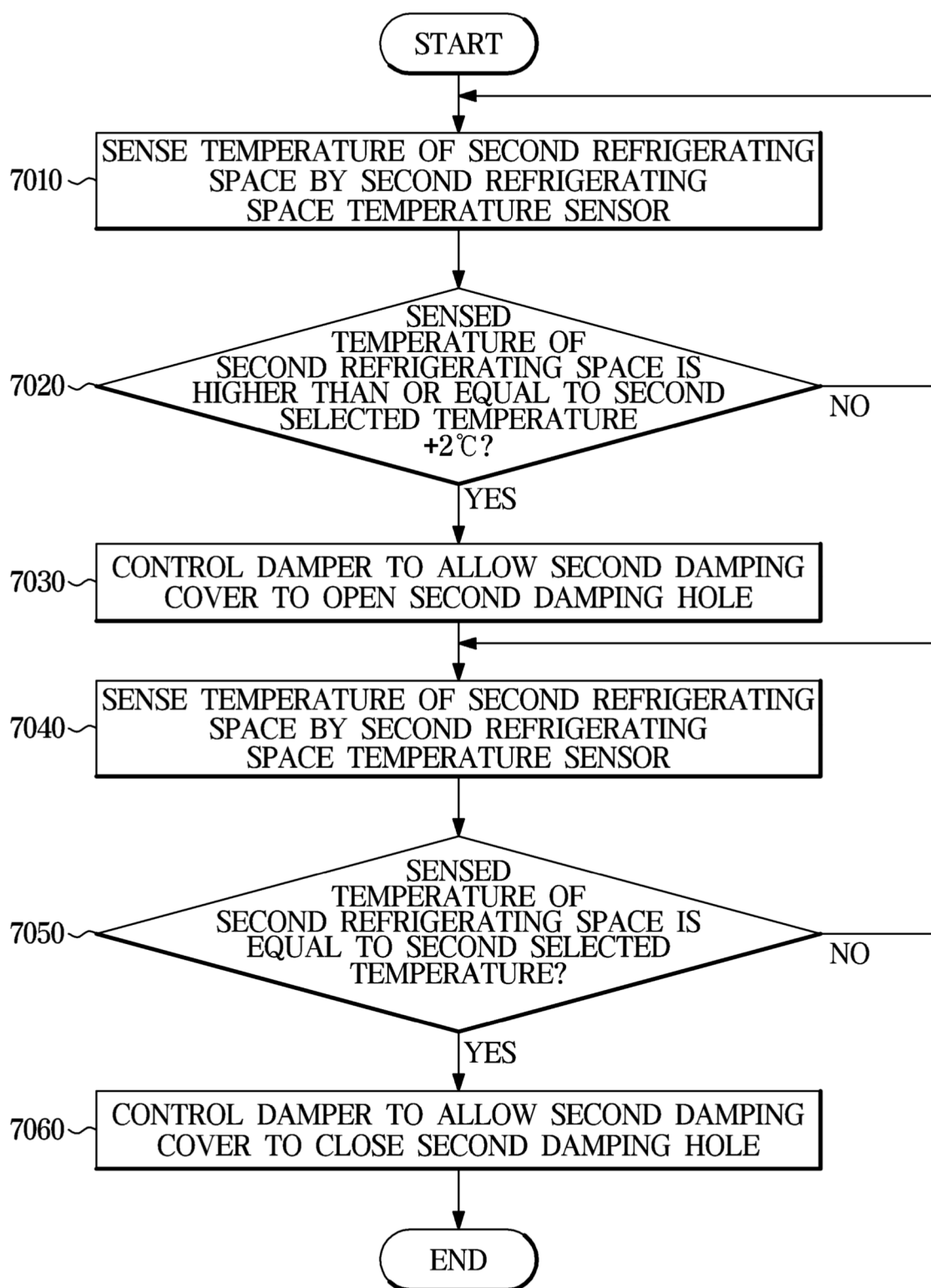


FIG. 21

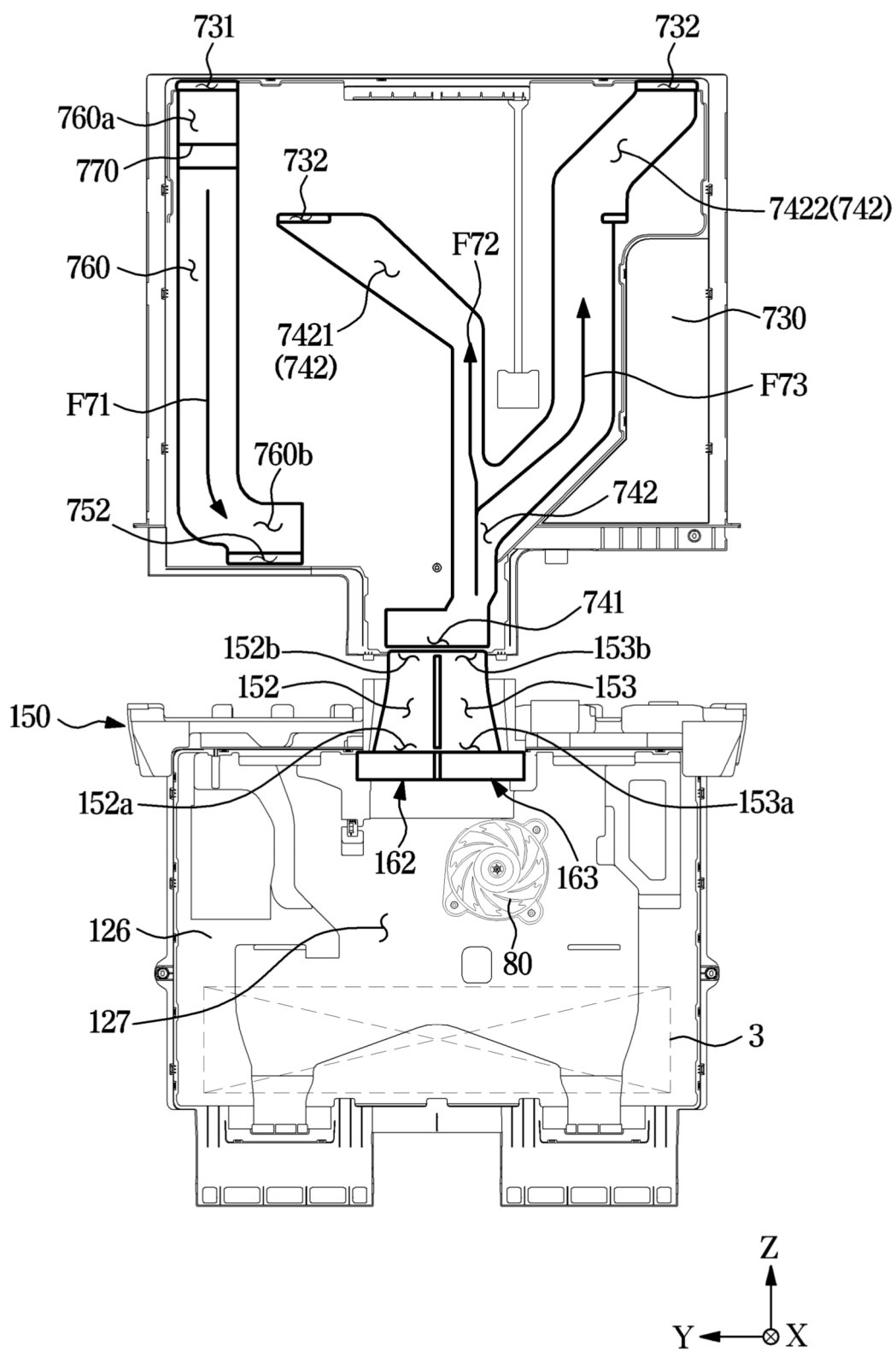


FIG. 22

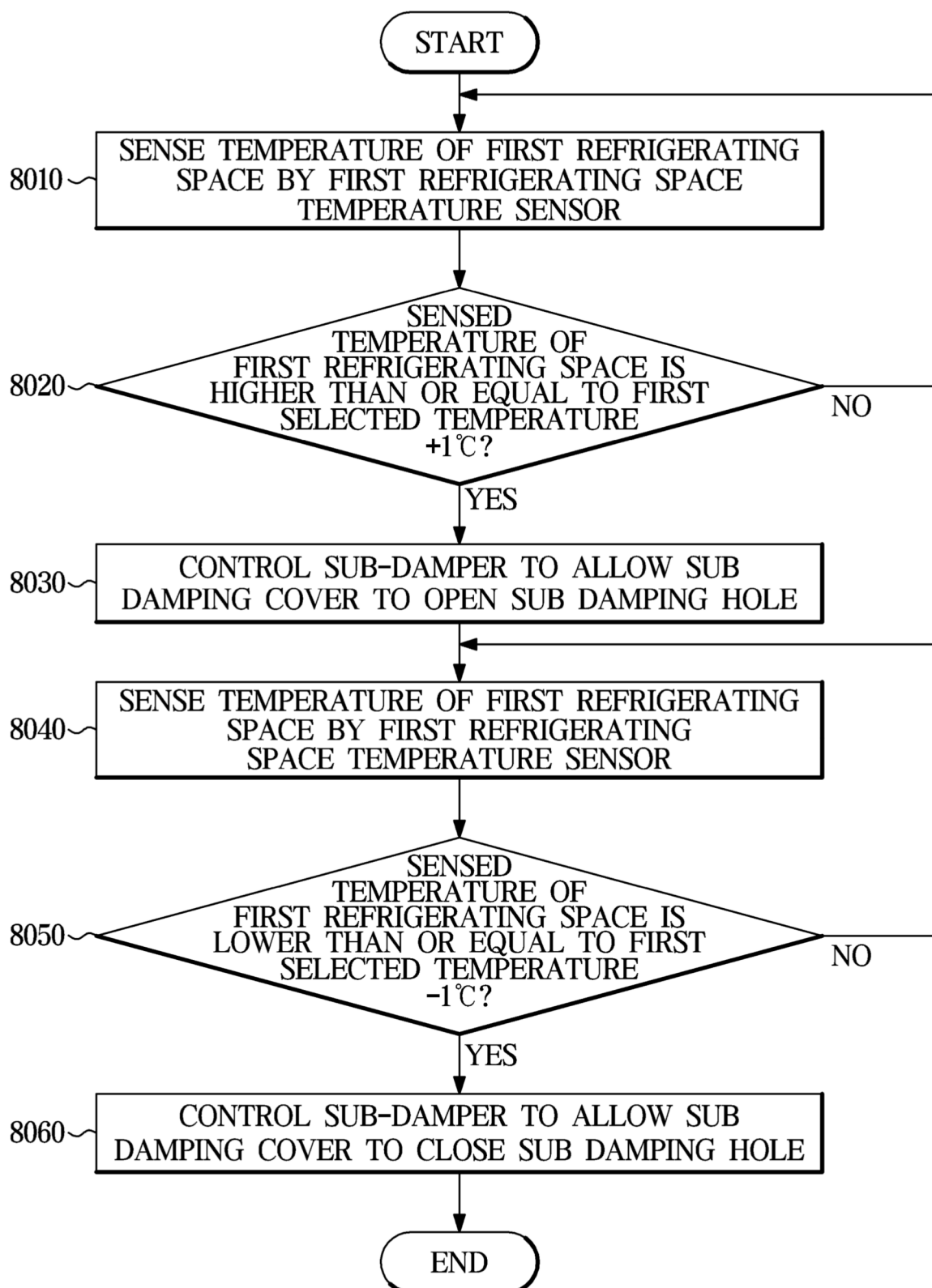
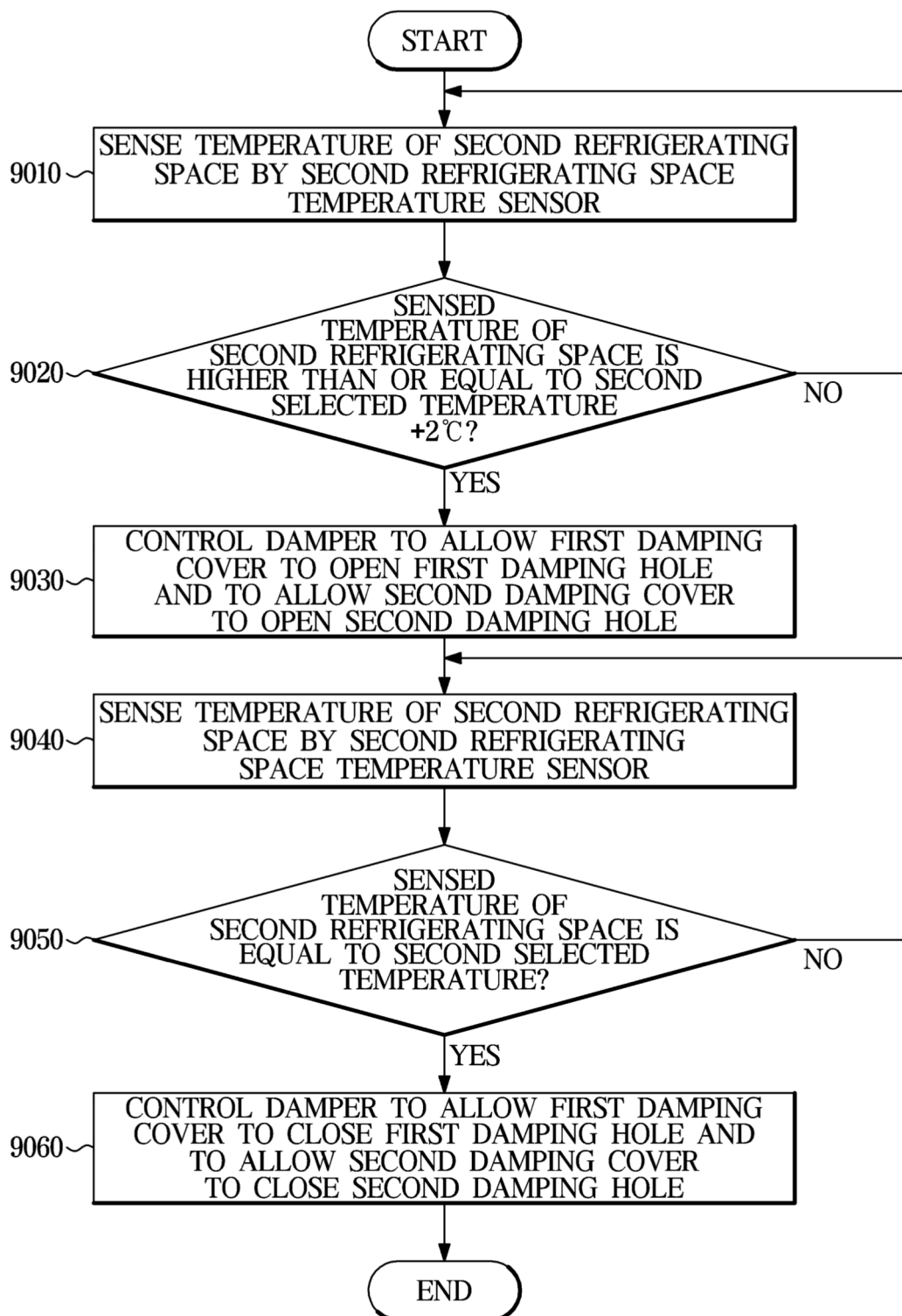


FIG. 23



INTERNATIONAL SEARCH REPORT

International application No.

PCT/KR2024/019555

A. CLASSIFICATION OF SUBJECT MATTER

F25D 17/08(2006.01)i; F25D 17/06(2006.01)i; F25D 17/04(2006.01)i; F25D 11/02(2006.01)i; F25D 19/04(2006.01)i;
F25D 15/00(2006.01)i; F25B 21/02(2006.01)i; F25D 23/12(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

F25D 17/08(2006.01); F25B 21/02(2006.01); F25D 11/02(2006.01); F25D 17/06(2006.01); F25D 23/00(2006.01);
F25D 23/02(2006.01); F25D 23/06(2006.01)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models: IPC as above

Japanese utility models and applications for utility models: IPC as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS (KIPO internal) & keywords: 증발기(evaporator), 연통덕트(flue duct), 냉장실 덕트(refrigerator duct), 댐퍼(damper), 냉장고(refrigerator)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	KR 10-2011-0128715 A (HITACHI APPLIANCES, INC.) 30 November 2011 (2011-11-30) See paragraphs [0020]-[0041] and [0139] and figures 1-6.	1,4,6-9
Y		2-3,5,10-15
Y	KR 10-2021-0158016 A (SAMSUNG ELECTRONICS CO., LTD.) 30 December 2021 (2021-12-30) See paragraphs [0063]-[0067] and [0071] and figures 4 and 7.	2-3,5
Y	KR 10-2021-0116836 A (LG ELECTRONICS INC.) 28 September 2021 (2021-09-28) See paragraphs [0129] and [0149] and figure 23.	10-11
Y	KR 10-1626651 B1 (LG ELECTRONICS INC.) 13 June 2016 (2016-06-13) See paragraphs [0046]-[0051] and figure 5.	12-15
A	JP 2006-183892 A (HITACHI HOME & LIFE SOLUTIONS INC.) 13 July 2006 (2006-07-13) See paragraphs [0020]-[0041] and figures 1-6.	1-15

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

* Special categories of cited documents:

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

“D” document cited by the applicant in the international application

“E” earlier application or patent but published on or after the international filing date

“L” document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

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

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

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

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

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

“&” document member of the same patent family

Date of the actual completion of the international search 18 March 2025	Date of mailing of the international search report 19 March 2025
Name and mailing address of the ISA/KR Korean Intellectual Property Office Government Complex-Daejeon Building 4, 189 Cheongsaro, Seo-gu, Daejeon 35208 Facsimile No. +82-42-481-8578	Authorized officer Telephone No.

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/KR2024/019555

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Patent document cited in search report				Publication date (day/month/year)		Patent family member(s)		Publication date (day/month/year)
KR	10-2011-0128715	A	30 November 2011	CN	102261790	A		30 November 2011
				CN	102261790	B		16 April 2014
				JP	2011-247440	A		08 December 2011
				JP	5350322	B2		27 November 2013
				KR	10-1145548	B1		15 May 2012
KR	10-2021-0158016	A	30 December 2021	US	2023-0098256	A1		30 March 2023
				WO	2021-261704	A1		30 December 2021
KR	10-2021-0116836	A	28 September 2021	WO	2021-187742	A1		23 September 2021
KR	10-1626651	B1	13 June 2016	KR	10-2015-0131715	A		25 November 2015
				US	10401073	B2		03 September 2019
				US	2015-0330678	A1		19 November 2015
JP	2006-183892	A	13 July 2006	None				