(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
5 February 2009 (05.02.2009)

PCT

(10) International Publication Number
WO 2009/017282 A1

(51) International Patent Classification:
F25C 1/24 (2006.01)

(21) International Application Number:
PCT/KR2007/005988

(22) International Filing Date:
26 November 2007 (26.11.2007)

(25) Filing Language: Korean

(26) Publication Language: English

(30) Priority Data:
10-2007-0076721 31 July 2007 (31.07.2007) KR

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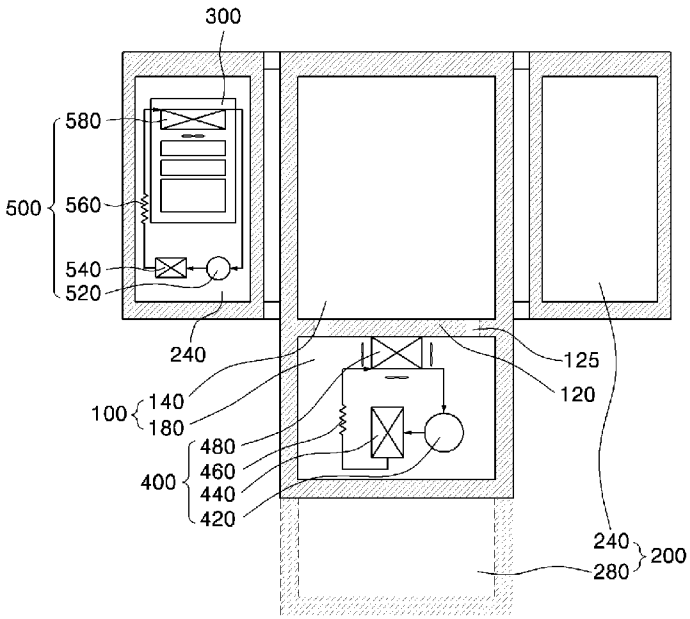
(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— *with international search report*

(54) **Title:** REFRIGERATOR WITH REFRIGERATION SYSTEM OF ICE_MAKING ROOM INSTALLED IN DOOR

[Fig. 6]



(57) **Abstract:** A refrigerator with refrigeration system of ice making room installed in a door is disclosed that is capable of independently cooling the ice making room to enhance the freezing efficiency, to reduce the electric power consumption and to maximize the ice making effect by determining the quantity of ice making of the ice making room in response to a user's selection.

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Description

REFRIGERATOR WITH REFRIGERATION SYSTEM OF ICE_MAKING ROOM INSTALLED IN DOOR

Technical Field

[1] The following description relates generally to a refrigerator, and more particularly to a refrigerator with refrigeration system of ice making room installed in a door capable of independently cooling the ice making room to enhance the freezing efficiency, to reduce the electric power consumption and to maximize the ice making effect by determining the quantity of ice making of the ice making room in response to a user's selection.

[2]

Background Art

[3] Generally, a refrigerator is an apparatus for freezing and refrigerating food in a freezing compartment and a refrigerating compartment by changing phase of refrigerant according to a refrigerant cycle of compression, condensation, expansion, and evaporation. In other words, a refrigerator is an electrical appliance in which a refrigerating cycle of compression, condensation, expansion, and evaporation is repeated using refrigerant to store food at a low temperature.

[4]

[5] Referring to FIG.1 illustrating a configuration of a freezing cycle of a typical refrigerator, the refrigerator essentially includes a compressor (10) for compressing refrigerant to a high temperature and high pressure gas refrigerant, a condenser (20) for condensing the high pressure refrigerant compressed in the compressor (10) by radiating heat of the high pressure refrigerant, an expansion unit (30) for reducing a pressure of the refrigerant condensed in the condenser (20), an evaporator (40) for evaporating the refrigerant in the expansion unit (30) to a low pressure and low temperature gas refrigerant, absorbing heat inside the refrigerating chamber or a freezing chamber and maintaining the temperature inside the refrigerating chamber or the freezing chamber at a low temperature.

[6]

[7] The refrigerator is classified into an integration type using an inner space of a body that has no partition between a refrigerating chamber and a freezing chamber, and a separation type using the inner space that has a partition separating a refrigerating chamber from a freezing chamber. The freezing chamber and the refrigeration chamber are separated in from one another in this separation type refrigerator. The separation type is classified into a top mount-type refrigerator having a freezing chamber and a re-

frigerating chamber partitioned up and down, a bottom freezer-type refrigerator having a refrigerating chamber and a freezing chamber partitioned up and down, and a side by side-type refrigerator having a freezing chamber and a refrigerating chamber partitioned left and right. Each of the top mount-type refrigerator, the bottom freezer-type refrigerator and the side by side-type refrigerator has its own merits and demerits, where the choice of the refrigerators depends on user's tastes and usages.

[8]

[9] Hereinafter, the separation type refrigerator will be mainly explained as the integration type is rather simple over the separation type.

[10]

[11] FIG.2 is a schematic configurative diagram of a conventional bottom freezer-type chamber having an ice making room in a door, FIG.3 is schematic configurative diagram of a conventional side by side-type refrigerator having an ice making room in a door, FIG.4 is a schematic configurative diagram of the conventional refrigerator of FIG.2 having a separate evaporator at each of the refrigerating chamber and the freezing chamber, FIG.5 is a schematic configurative diagram of the conventional refrigerator of FIG.3 having a separate evaporator at each of the refrigerating chamber and the freezing chamber. The top mount-type refrigerator will not be explained herein because the bottom freezer-type refrigerator can be easily converted to a top mount-type refrigerator by changing positions of the refrigerating chamber and the freezing chamber.

[12]

[13] Referring to FIGS. 2 and 3, the conventional refrigerator having an ice making chamber in a door includes a refrigerator body (50) partitioned by a refrigerating chamber (54) and a freezing chamber (58) using a partitioner (55) up and down or left and right, a refrigerating chamber door (64) and a freezing chamber door (68) opening or closing the refrigerating chamber (54) and the freezing chamber (58), a compressor (10) installed at an inner wall of the refrigerator body (50), a condenser (20), an expansion unit (30) and an evaporator (40). Furthermore, the refrigerator includes one evaporator (40) to form a cooling air circulating passage (70) penetrating the partitioner (55) to circulate the cooling air of the refrigerating chamber (54) and the freezing chamber (58), such that the cooling air heat-exchanged by the evaporator (40) can be circulated. Meanwhile, an ice making room (80) may be installed at inner sides of the refrigerating chamber doors (64, 68), and a cooling duct (90) may be formed at a lateral wall of the refrigerator body (50) so that the cooling air of the freezing chamber (58) can be supplied to the ice maker (80).

[14]

[15] Referring to FIGS. 4 and 5, each of the refrigerating chamber (54) and the freezing

chamber (58) of FIGS. 2 and 3 is mounted with a refrigerating chamber evaporator (44) and a freezing chamber evaporator (48), and the partition (55) for partitioning the refrigerating chamber (54) and the freezing chamber (58) is closed to allow the cooling air of the refrigerating chamber (54) and the freezing chamber (58) to independently be circulated.

[16]

Disclosure of Invention

Technical Problem

[17] The conventional refrigerator having an ice making room in the door suffers from disadvantages in that a cooling air duct for supplying the cooling air of the refrigerating chamber into the ice making chamber must be formed, and an ice making cannot be performed properly when there is generated an adiabatic problem in the cooling duct to result in waste of electric power. Another problem is that the ice making varies according to operation of the evaporator heat-exchanging with the cooling air of the freezing chamber as the cooling air of the freezing chamber is supplied into the ice making room, thereby making it difficult to independently control the ice making room and the freezing chamber.

[18]

Technical Solution

[19] This disclosure is provided to solve the aforementioned problems and an object of this disclosure is to provide a refrigerator with an evaporator installed in a door capable of maximizing an ice making effect, and determining ice making capacity of the ice making room in response to a user's selection. Another object is to provide a refrigerator with an evaporator installed in a door capable of enhancing a cooling efficiency and reducing the power consumption at the same time.

[20]

[21] Additional aspects and/or advantages of the disclosure will be set forth in part in the description which follows and, in part, will be apparent from the Detailed Description and accompanying drawings or may be learned by exemplary implementations of the disclosure.

[22]

[23] In one general aspect, a refrigerator with an evaporator installed in a door is characterized by: a refrigerator body for storing food in a low temperature state; a refrigerator door for opening and closing the refrigerator body; an ice making room independently installed at an inner side of the refrigerator door to make and store ice from supplied water lest the ice making room be influenced by the cooling air inside the refrigerator body; a main freezing system installed inside the refrigerator body and

mounted with a main compressor, a main condenser, a main expansion unit and a main evaporator for heat exchanging the cooling air inside the refrigerator body by compressing, condensing and pressure-reducing refrigerant inside the refrigerator; and a sub freezing system installed inside the refrigerator body and mounted with a sub compressor, a sub condenser, a sub expansion unit and a sub evaporator for heat exchanging the cooling air inside the ice making room by compressing, condensing and pressure-reducing refrigerant inside the refrigerator.

[24]

[25] Implementations of this aspect may include one or more of the following features.

[26]

[27] The refrigerator body may be partitioned by a partitioner into a refrigerating chamber and a freezing chamber, and the refrigerator door may be separated by a refrigerating chamber door and a freezing chamber door for respectively opening and closing the refrigerating chamber and the freezing chamber.

[28]

[29] The ice making chamber and the sub freezing system may be installed either in the refrigerating chamber door or in the freezing chamber door.

[30]

[31] The main evaporator of the main freezing system may be installed either in the refrigerating chamber or in the freezing chamber, and may further include a cooling air circulating passage formed to penetrate the partitioner, such that the cooling air in the refrigerating chamber and the freezing chamber can be circulatively mixed.

[32]

[33] The main evaporator of the main freezing system may be divided into a refrigerating chamber evaporator and a freezing chamber evaporator respectively installed at the refrigerating chamber and the freezing chamber.

[34]

[35] The sub condenser of the sub freezing system may be installed at an upper side of the refrigerator door to radiate the condensed heat of the sub condenser upwards.

[36]

[37] The refrigerator may further include a blowing fan for moving the condensed heat radiated from the sub condenser toward the rear side of the refrigerator body.

[38]

[39] The sub condenser of the sub freezing system may be installed at a lower side of the refrigerator door to radiate the condensed heat of the sub condenser downwards.

[40]

[41] The sub condenser of the sub freezing system may be a capacity-variable compressor capable of varying the flow quantity of refrigerant in response to a user's selection.

Advantageous Effects

[42] The refrigerator with refrigeration system of ice making room installed in a door according to the instant disclosure utilizes the refrigerator body as the main freezing system to heat-exchange the ice making room installed in the refrigerator door using the sub freezing system, whereby the refrigerator body and the ice making room can be independently frozen to improve the refrigerating efficiency and simultaneously reduce the electric power consumption.

[43]

[44] The sub condenser of the sub freezing system utilizes a capacity-variable compressor to enable to vary the flow quantity of refrigerant in response to a user's selection, thereby determining the ice making efficiency.

[45]

[46] The ice making room is installed at an inner side of the refrigerator door to facilitate an easy take-out of ice, thereby maximizing the ice making efficiency.

[47]

Brief Description of the Drawings

[48] FIG.1 is a schematic diagram of a configuration of a freezing cycle of a conventional refrigerator.

[49] FIG.2 is a schematic configurative diagram of a conventional bottom freezer-type chamber having an ice making room in a door.

[50] FIG.3 is schematic configurative diagram of a conventional side by side-type refrigerator having an ice making room in a door.

[51] FIG.4 is a schematic configurative diagram of the conventional refrigerator of FIG.2 having a separate evaporator at each of the refrigerating chamber and the freezing chamber.

[52] FIG.5 is a schematic configurative diagram of the conventional refrigerator of FIG.3 having a separate evaporator at each of the refrigerating chamber and the freezing chamber.

[53] FIG.6 is a schematic configurative diagram of a refrigerator with refrigeration system of an ice making room installed in a door according to a first exemplary implementation.

[54] FIG.7 is a schematic configurative diagram of the refrigerating chamber and the freezing chamber of FIG.6 having a separate evaporator at each of the refrigerating chamber and the freezing chamber.

[55] FIG.8 is a schematic configurative diagram of a refrigerator with refrigeration system of ice making room installed in a door according to a second exemplary implementation.

[56] FIG.9 is a schematic configurative diagram of the refrigerating chamber and the freezing chamber of FIG.8 having a separate evaporator at each of the refrigerating chamber and the freezing chamber.

[57] FIG.10 is a lateral configurative diagram of the ice making room of FIG.8 and a refrigerator with refrigeration system of ice making room installed in a refrigerator door according to a first exemplary implementation.

[58] FIG.11 is a lateral configurative diagram of the ice making room of FIG.8 and a refrigerator with refrigeration system of ice making room installed in a refrigerator door according to a second exemplary implementation.

[59]

Mode for the Invention

[60] Exemplary implementations of a refrigerator with refrigeration system of ice making room installed in a door according to the present novel concept will be described in detail with reference to the accompanying drawings.

[61]

[62] FIG.6 is a schematic configurative diagram of a refrigerator with refrigeration system of an ice making room installed in a door according to a first exemplary implementation, FIG.7 is a schematic configurative diagram of the refrigerating chamber and the freezing chamber of FIG.6 having a separate evaporator at each of the refrigerating chamber and the freezing chamber, FIG.8 is a schematic configurative diagram of a refrigerator with refrigeration system of ice making room installed in a door according to a second exemplary implementation, FIG.9 is a schematic configurative diagram of the refrigerating chamber and the freezing chamber of FIG.8 having a separate evaporator at each of the refrigerating chamber and the freezing chamber, FIG.10 is a lateral configurative diagram of the ice making room of FIG.8 and a refrigerator with refrigeration system of ice making room installed in a refrigerator door according to a first exemplary implementation, and FIG.11 is a lateral configurative diagram of the ice making room of FIG.8 and a refrigerator with refrigeration system of ice making room installed in a refrigerator door according to a second exemplary implementation.

[63]

[64] Referring to FIGS. 6 to 9, a refrigerator with refrigeration system of ice making room installed in a refrigerator door may include a refrigerator body (100), a refrigerator door (200), an ice making room (300), a main freezing chamber (400) and a sub freezing system (500). The main freezing system (400) may include a main compressor (420), a main condenser (440), a main expansion unit (460) and a main evaporator (480). The sub freezing system (500) may include a sub compressor (520), a sub

condenser (440), a sub expansion unit (560) and a sub evaporator (580).

[65]

[66] The refrigerator body (400) serves to store food at a low temperature by lowering an inner temperature of the refrigerator. Furthermore, the refrigerator body (100) may be partitioned by a partition wall (120) into a refrigerating chamber (140) and a freezing chamber (180). In other words, a refrigerator may be classified into an integration type in which the refrigerator body (100) is integrated, and a separation type in which the refrigerating chamber (140) and the freezing chamber (180) are separated.

[67]

[68] Although FIGS. 6 to 9 illustrate the separation type refrigerator, and if the partition wall (120) is removed, the separation type refrigerator becomes the same as the integration type refrigerator, such that there will be no detailed explanation on the integration type refrigerator. Therefore, the present novel concept may be applied to any type of refrigerator, i.e., the top mount-type refrigerator, the bottom freezer-type refrigerator and the side by side-type refrigerator, without reference to integration type or separation type refrigerator.

[69]

[70] In other words, the instant disclosure has a feature of a refrigerator with sub freezing system (500) of ice making room (400) installed in a refrigerator door (200. to be described later), such that any type of refrigerator will suffice as long as a refrigerator door (200) is installed with an ice making room (400) and a sub freezing system (500) for heat-exchanging the cooling air inside the ice making room (400). Although not illustrated in the drawings, the refrigerator body (100) is formed therein with an inner space for effectively accommodating various foods using various types of baskets, shelves and drawers.

[71]

[72] The refrigerator door (200) may open and close the refrigerator body (100). The refrigerator door (200) may be divided into a refrigerating chamber door (240) and a freezing chamber door (280) respectively opening and closing the refrigerating chamber (140) and the freezing chamber (180). The refrigerator door (200) may comprise any structure, such as one or more doors, but when the refrigerator is partitioned into a refrigerating chamber (140) and a freezing chamber (180), the refrigerator door (200) must be separated into a refrigerating chamber door (240) and a freezing chamber door (280). Each of the refrigerating chamber door (240) and freezing chamber door (280) may also comprise any structure, such as one or more doors.

[73]

[74] The partition wall (120) is installed to divide the refrigerator into the refrigerating

chamber (140) and the freezing chamber (180), where the refrigerating chamber (140) and the freezing chamber (180) are installed for refrigerating or freezing foods by differentiating respective inner temperatures according to the kinds of foods. The integration type refrigerator needs no partition wall (120), while the separation type of refrigerator needs the partition wall (120).

[75]

[76] Furthermore, a plurality of main evaporators (480. described later) may be needed to respectively circulate the cooling air of each of the refrigerating chamber (140) and the freezing chamber (180), while only one main evaporator (480) may be needed to circulate the cooling air of both the refrigerating chamber (140) and the freezing chamber (180). When one main evaporator (480) is installed, a partition wall (120) is formed between the refrigerating chamber (140) and the freezing chamber (180) to interrupt the circulation of the cooling air. As a result, a cooling air circulation passage (125) is needed.

[77]

[78] Referring to FIG.6, the cooling air circulation passage (125) may penetrate the partition wall (120) to allow the cooling air of both the refrigerating chamber (140) and the freezing chamber (180) to be met and convergently circulated. In a case of separation type of refrigerator in which the refrigerating chamber (140) and the freezing chamber (180) are separated, an inner cooling air passage may be formed to allow the cooling air heat-exchanged by the main evaporator (described later) to move to the refrigerating chamber (140) via the freezing chamber (180) in the first place. For example, a plurality of fans for forcibly moving the cooling air may be installed, or a cooling air passage may be formed to allow the cooling air to move. In any case, a cooling air circulation passage (125) should be formed to penetrate the partition wall (120), such that the cooling air in the refrigerating chamber (140) and the freezing chamber (180) can meet and be circulated.

[79]

[80] However, in a case of a refrigerating chamber evaporator (640) and a freezing chamber evaporator (680) being respectively installed at the refrigerating chamber (140) and the freezing chamber (180), there is no need of cooling air circulation passage (125). It is because a refrigerating chamber evaporator (484. described later) and a freezing chamber evaporator (488. described later) are respectively installed in order to effectively control the temperatures of the refrigerating chamber (140) and the freezing chamber (180).

[81]

[82] Referring to FIGS.6 to 9, an ice making room (300) may be installed at an inner side of the refrigerator door (200) lest the ice making room (300) be influenced by the inner

cooling air of the refrigerator body (100), and store ice made from supplied water. The ice making room (300) may include an ice container (320), an ice separator (340) and a dispenser (360). The ice container (320) may serve to make ice from supplied water, and the ice separator (340) may be disposed underneath the ice container (320) to separate the ice and store the ice. Furthermore, the dispenser (360) may be exposed to a front side of the refrigerator to facilitate the ice to be taken out without opening the refrigerator door (122).

[83]

[84] The ice container (320), the ice separator (340) and the dispenser (360) that form the ice making room (300) will be deleted of detailed explanation thereto as these components can be easily embodied by prior arts. The ice making room (300) installed inside of the refrigerator door (200) may be installed either at the refrigerating chamber door (240) or at the freezing chamber door (280), and in this case, the sub freezing system (500. described later) should be installed along at the refrigerator door (200) installed with the ice making room (300). Therefore, the sub freezing system (500) may heat-exchange the cooling air inside the ice making room (300) separately from the main freezing system (400. described later).

[85]

[86] The main freezing system (400) may be installed at the refrigerator body (100) and may include a main compressor (420), a main condenser (440), a main expansion unit (460) and a main evaporator (480) for heat-exchanging the cooling air inside the refrigerator body (100) by compressing, condensing and pressure-reducing the refrigerant. Generally, the main compressor (420) and the main condenser (440) are installed together at a chamber, so-called a mechanical chamber disposed underneath the refrigerator body (100). Technical explanation of each component of the main freezing system (400) will be deleted as the components are the same as those used in the freezing cycle according to the prior art.

[87]

[88] However, the main evaporator (480) may be installed either at the refrigerating chamber (140) and the freezing chamber (180), if the refrigerator boby (100) is divided into the refrigerating chamber (140) and the freezing chamber (180). In other words, as illustrated in FIGS. 6 and 8, in case of one main evaporator (480) controlling the cooling air of the refrigerating chamber (140) and the freezing chamber (180), a cooling air circulation passage (125) should be formed to penetrate the partition wall (120) in order to allow the cooling air of the refrigerating chamber (140) and the freezing chamber (180) to meet and to be circulated.

[89]

[90] Furthermore, as illustrated in FIGS. 7 and 9, the main evaporator (480) may be

separately divided to the refrigerating chamber evaporator (484) and the freezing chamber evaporator (488) respectively installed at the refrigerating chamber (140) and the freezing chamber (180). In other words, the refrigerating chamber evaporator (484) is operated to control the temperature of cooling air circulating inside the refrigerating chamber (140) and the freezing chamber evaporator (488) is operated to control the temperature of cooling air circulating inside the freezing chamber (180). Therefore, the inner temperatures of the refrigerating chamber (140) and the freezing chamber (180) can be accurately controlled.

[91]

[92] The sub freezing system (500) may be installed at the refrigerator door (200) and may include a sub compressor (520), a sub condenser (540), a sub expansion unit (560) and a sub evaporator (580) for heat-exchanging the cooling air inside the ice making room (300) by compressing, condensing and pressure-reducing the refrigerant. Explanation on the sub compressor (520), the sub condenser (540), the sub expansion unit (560) and the sub evaporator (580) comprising the sub freezing system (500) will be deleted as the main freezing system (400) and the operating process of freezing cycle are the same as those of the sub freezing system. However, it should be noted that the sub compressor (520) of the sub freezing system (500) may be a capacity-variable compressor capable of variably changing the flow quantity of the refrigerant in response to the user's selection. As a result, the ice making quantity can be determined by the user's tastes and usages and electric power consumption can be reduced.

[93]

[94] Now, referring to FIGS. 10 and 11, because the sub compressor (540) of the sub freezing system (500) may generate condensation heat (545) in the course of condensing the refrigerant, and may cause an unpleasant feeling to a user if the sub compressor (540) is installed at the refrigerator door (200), there is a need of radiating the condensation heat (545) to an area other than the front side of the refrigerator body (100) where the user may stand. To this end, the sub condenser (540) may be installed on an upper side of the refrigerator door (200) to allow the condensation heat (545) to be radiated upwards, or may be installed underneath the refrigerator door (200) to radiate the condensation heat downwards.

[95]

[96] Furthermore, a blowing fan (550) may be further installed to allow the condensation heat (545) radiated upwards and downwards from the sub condenser (540) to flow towards the rear side of the refrigerator body (100). It should be essential that the blowing fan (550) be concurrently installed at the upper side or the lower side of the refrigerator body (100) disposed with the sub condenser (540) to thereby enable the blowing of the condensation heat (545) radiated from the sub condenser (540).

[97]

Industrial Applicability

[98] As noted from the foregoing, the refrigerator with refrigeration system of ice making room installed in a door according to the instant disclosure utilizes the refrigerator body as the main freezing system to heat-exchange the ice making room installed in the refrigerator door using the sub freezing system, whereby the refrigerator body and the ice making room can be independently cooled to improve the refrigerating efficiency and simultaneously reduce the electric power consumption.

[99]

[100] The sub condenser of the sub freezing system utilizes a capacity-variable compressor to enable to vary the flow quantity of refrigerant in response to a user's selection, thereby determining the ice making efficiency.

[101]

[102] The ice making room is installed at an inner side of the refrigerator door to facilitate an easy take-out of ice, thereby maximizing the ice making efficiency.

[103]

[104] While the present disclosure has been particularly shown and described with reference to exemplary implementations thereof, the general inventive concept is not limited to the above-described implementations. It will be understood by those of ordinary skill in the art that various changes and variations in form and details may be made therein without departing from the spirit and scope of the present invention as defined by the following claims.

Claims

[1] A refrigerator with an evaporator installed in a door, characterized by: a refrigerator body for storing food in a low temperature state; a refrigerator door for opening and closing the refrigerator body; an ice making room independently installed at an inner side of the refrigerator door to make and store ice from supplied water lest the ice making room be influenced by the cooling air inside the refrigerator body; a main freezing system installed inside the refrigerator body and mounted with a main compressor, a main condenser, a main expansion unit and a main evaporator for heat exchanging the cooling air inside the refrigerator body by compressing, condensing and pressure-reducing refrigerant inside the refrigerator; and a sub freezing system installed inside the refrigerator body and mounted with a sub compressor, a sub condenser, a sub expansion unit and a sub evaporator for heat exchanging the cooling air inside the ice making room by compressing, condensing and pressure-reducing refrigerant inside the refrigerator.

[2] The refrigerator as claimed in claim 1, characterized in that the refrigerator body is partitioned by a partitioner into a refrigerating chamber and a freezing chamber, and the refrigerator door is separated by a refrigerating chamber door and a freezing chamber door for respectively opening and closing the refrigerating chamber and the freezing chamber.

[3] The refrigerator as claimed in claim 2, characterized in that the ice making room and the sub freezing system are installed either in the refrigerating chamber door or in the freezing chamber door.

[4] The refrigerator as claimed in claim 2, characterized in that
the main evaporator of the main freezing system is installed either in the refrigerating chamber or in the freezing chamber, and further includes a cooling air circulation passage formed to penetrate the partitioner, such that the cooling air in the refrigerating chamber and the freezing chamber can be circulatively mixed.

[5] The refrigerator as claimed in claim 2, characterized in that
the main evaporator of the main freezing system is divided into a refrigerating chamber evaporator and a freezing chamber evaporator respectively installed at the refrigerating chamber and the freezing chamber.

[6] The refrigerator as claimed in claim 1, characterized in that
the sub condenser of the sub freezing system is installed at an upper side of the refrigerator door to radiate the condensed heat of the sub condenser upwards.

[7] The refrigerator as claimed in claim 6, characterized in that

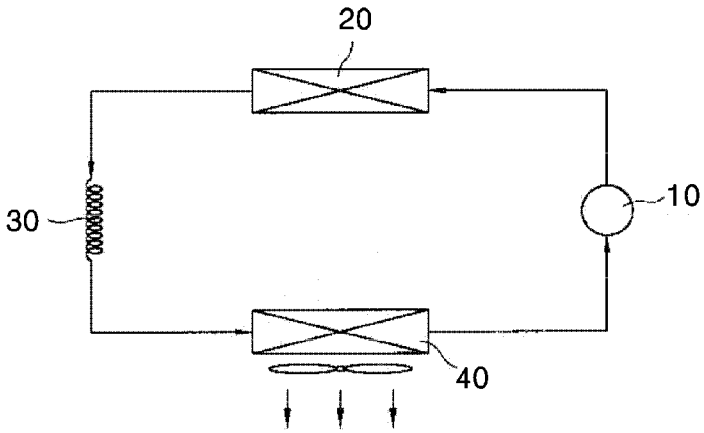
the refrigerator further includes a blowing fan for moving the condensed heat radiated from the sub condenser toward the rear side of the refrigerator body.

[8] The refrigerator as claimed in claim 1, characterized in that the sub condenser of the sub freezing system is installed at a lower side of the refrigerator door to radiate the condensed heat of the sub condenser downwards.

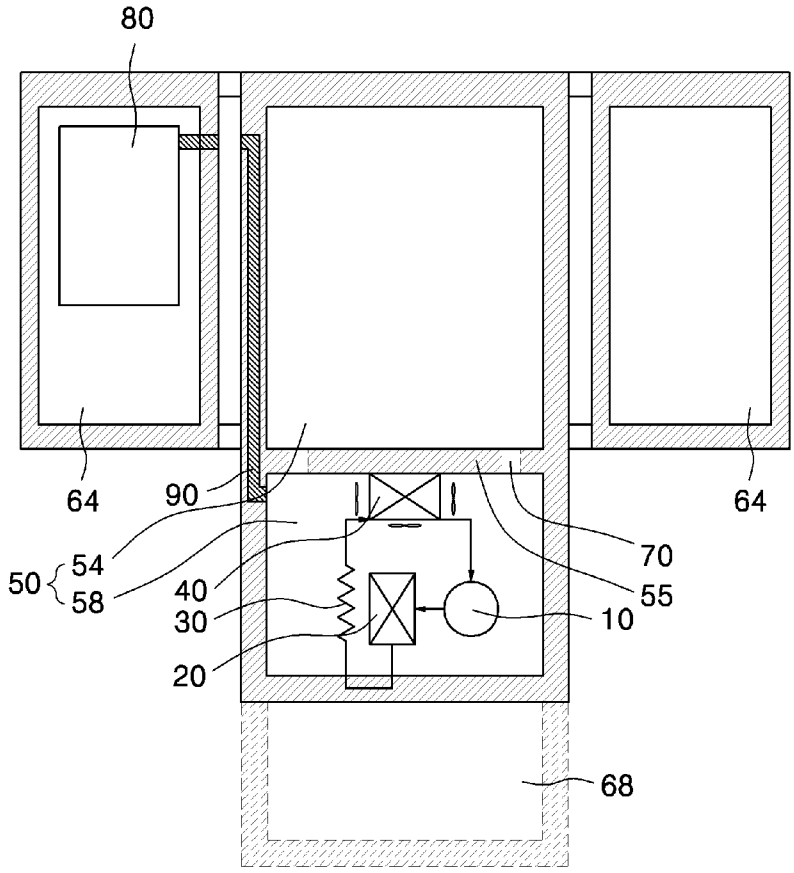
[9] The refrigerator as claimed in claim 8, characterized in that the refrigerator further includes a blowing fan for moving the condensed heat radiated from the sub condenser toward the rear side of the refrigerator body.

[10] The refrigerator as claimed in claim 1, characterized in that the sub condenser of the sub freezing system is a capacity-variable compressor capable of varying the flow quantity of refrigerant in response to a user's selection.

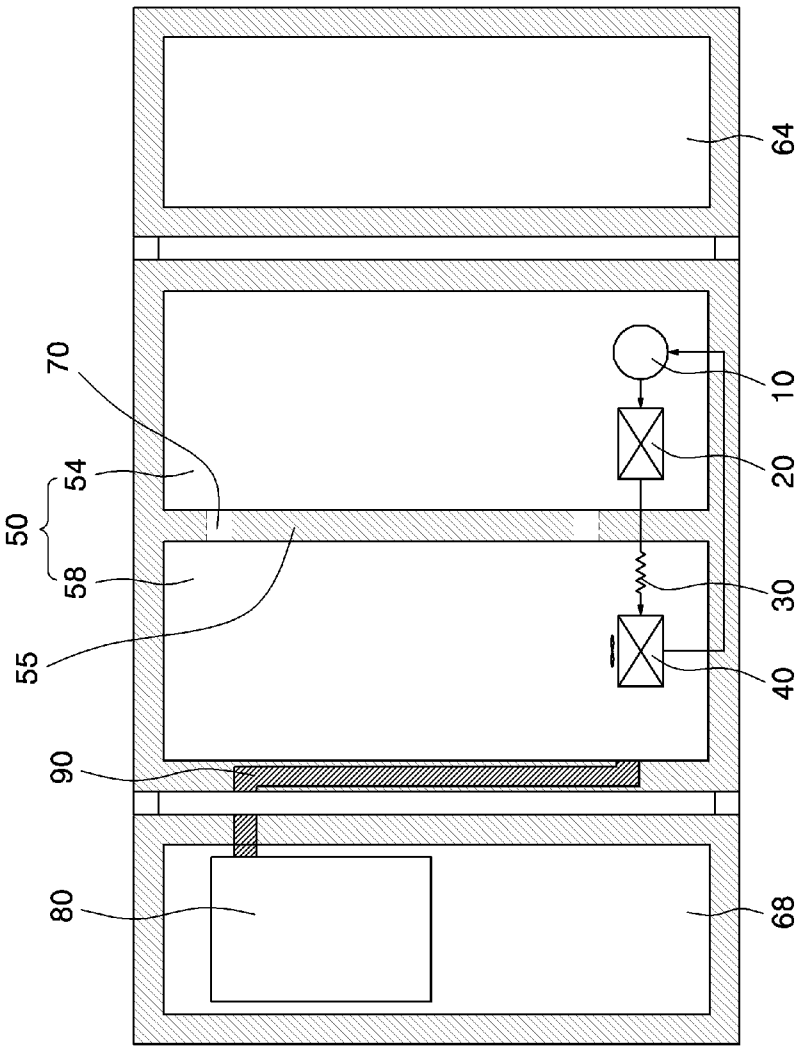
[Fig. 1]



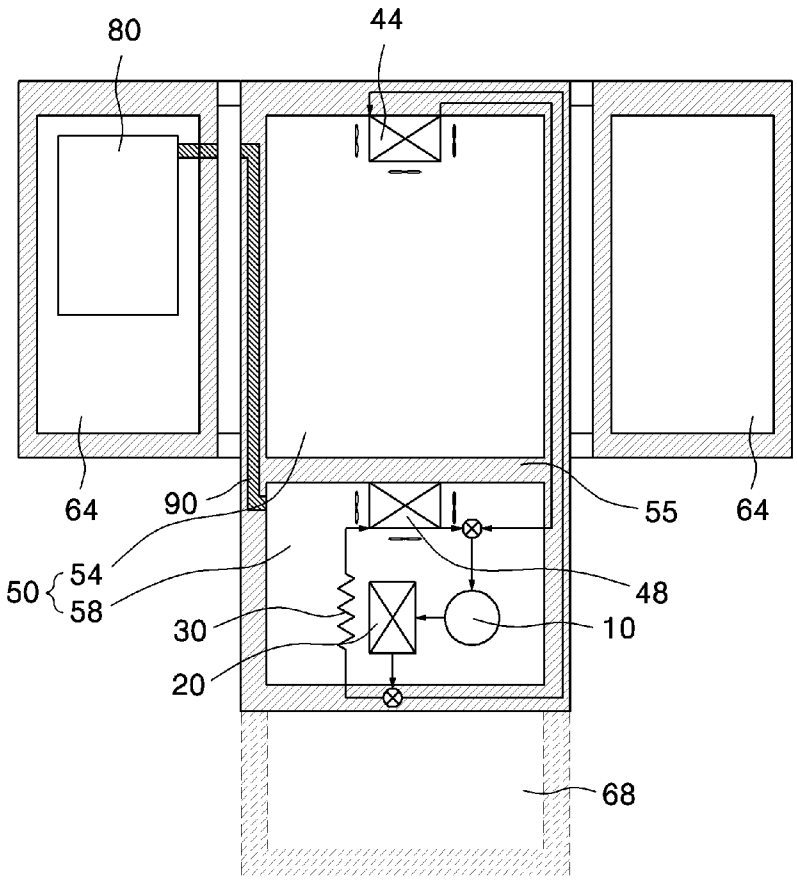
[Fig. 2]



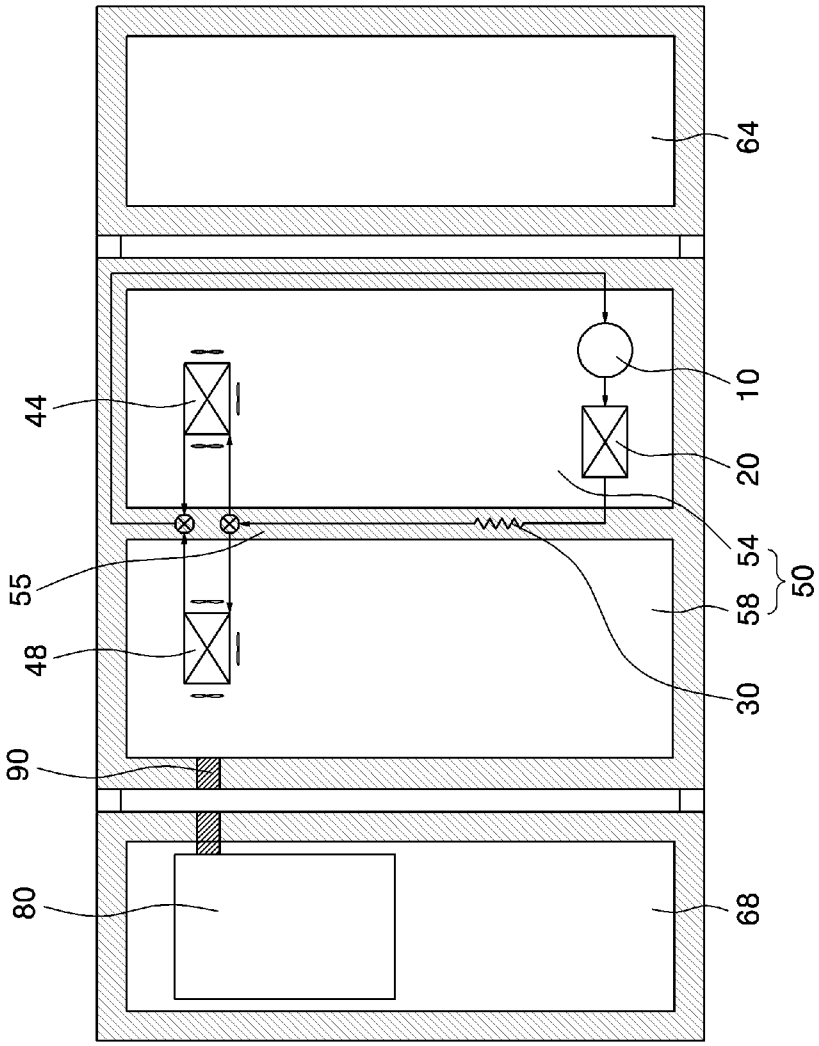
[Fig. 3]



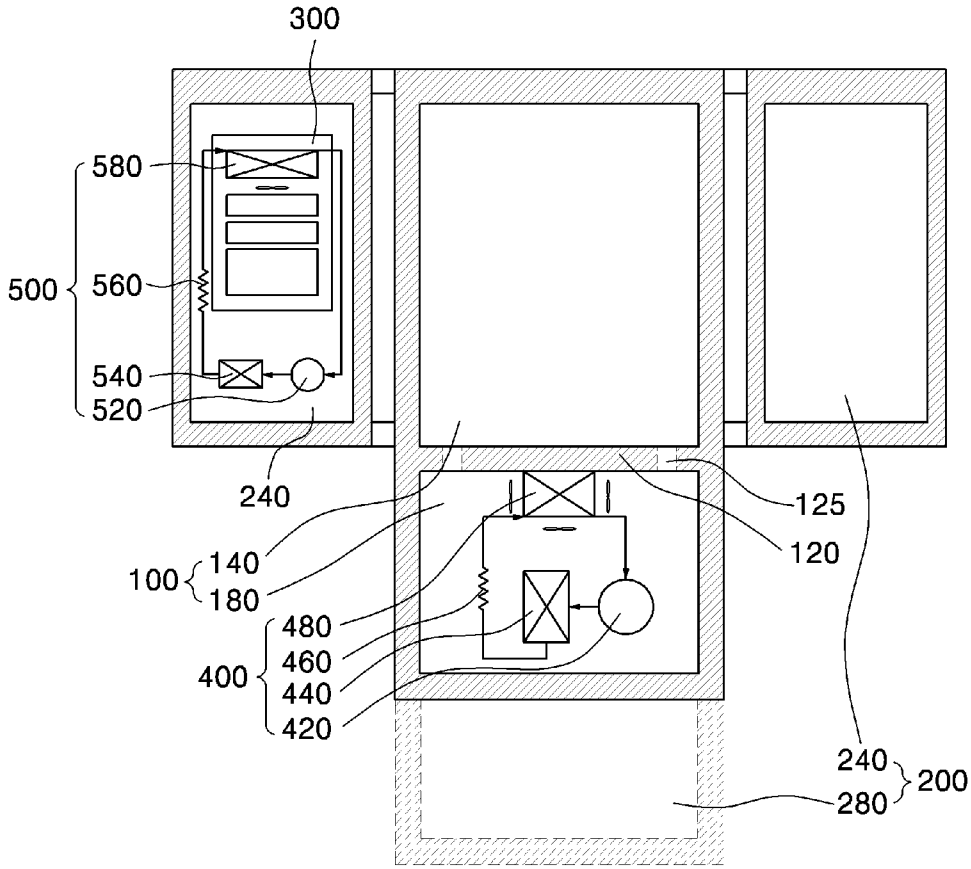
[Fig. 4]



[Fig. 5]



[Fig. 6]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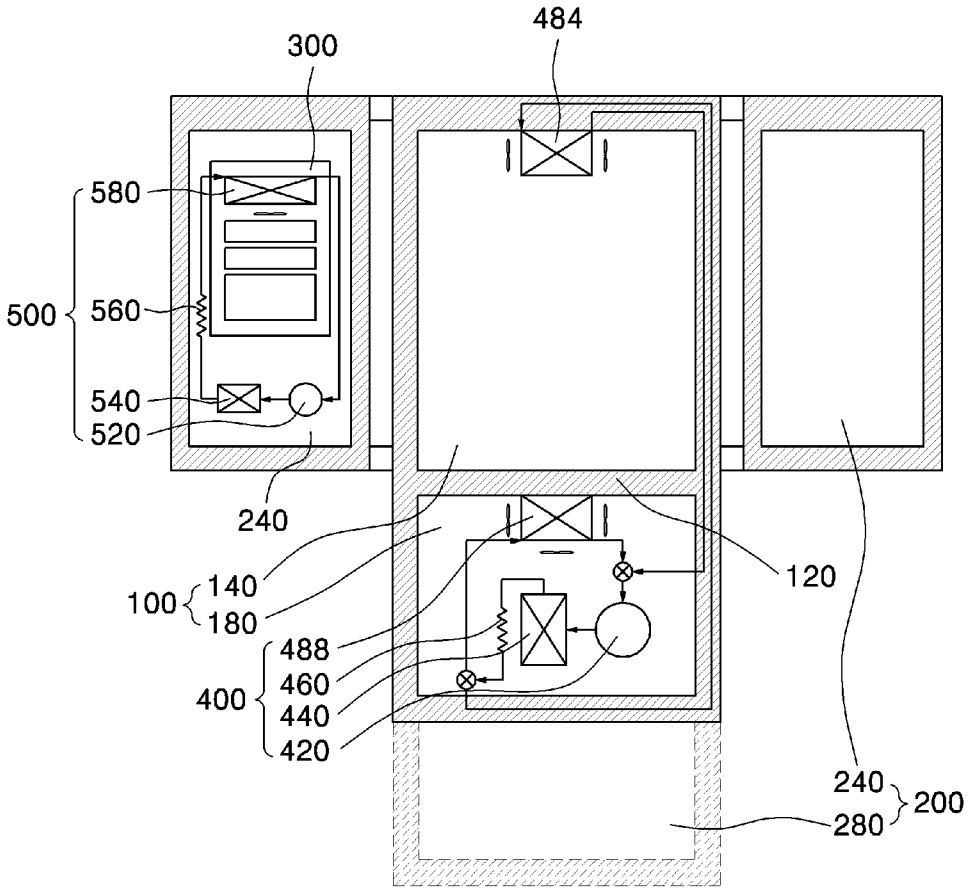
[Fig. 7]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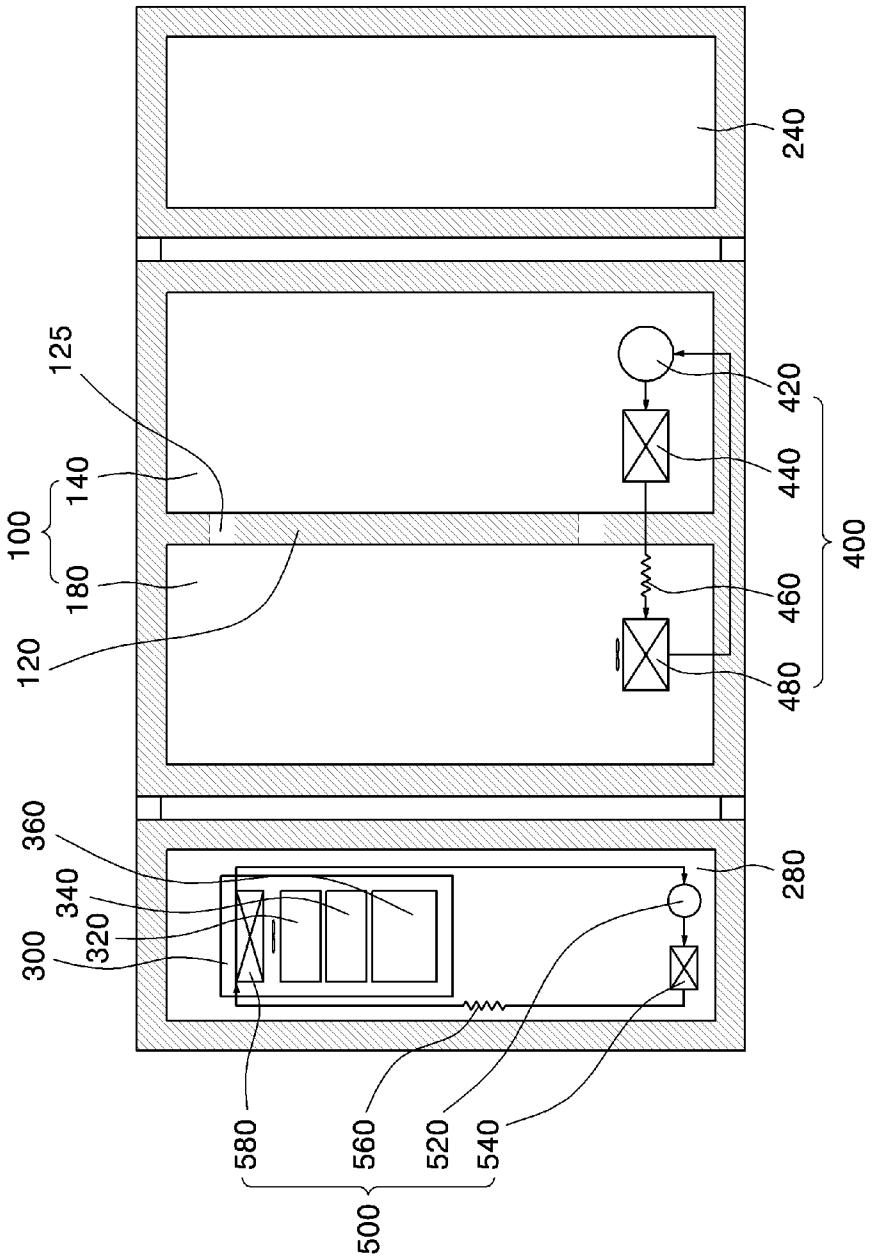
[Fig. 8]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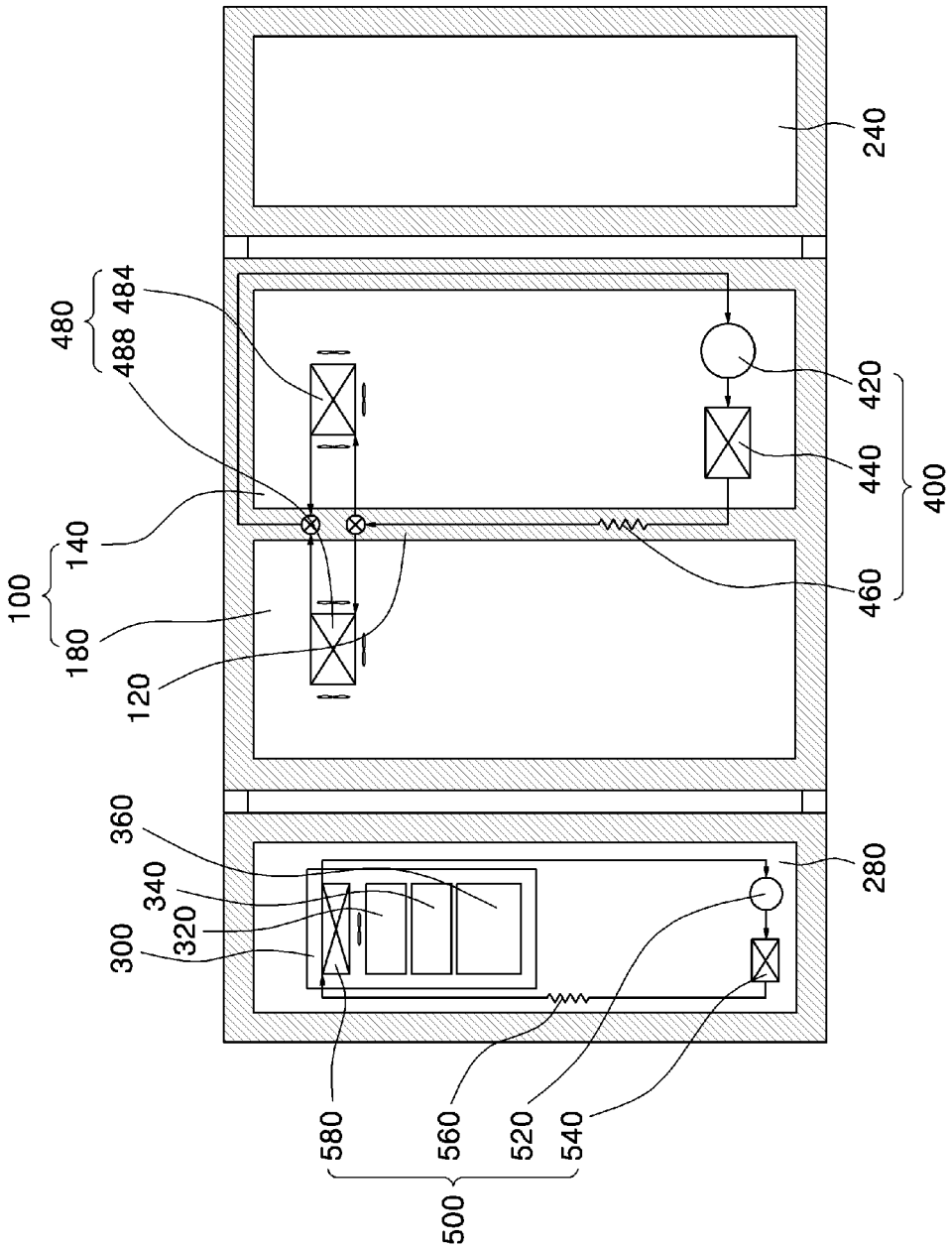
[Fig. 9]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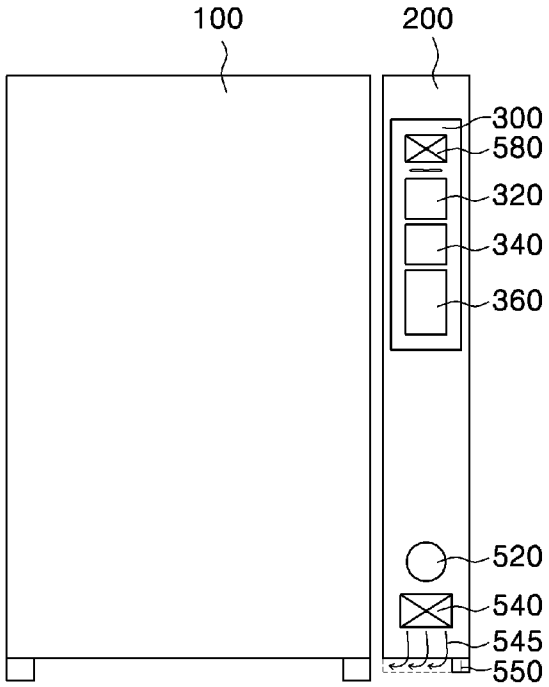
[Fig. 10]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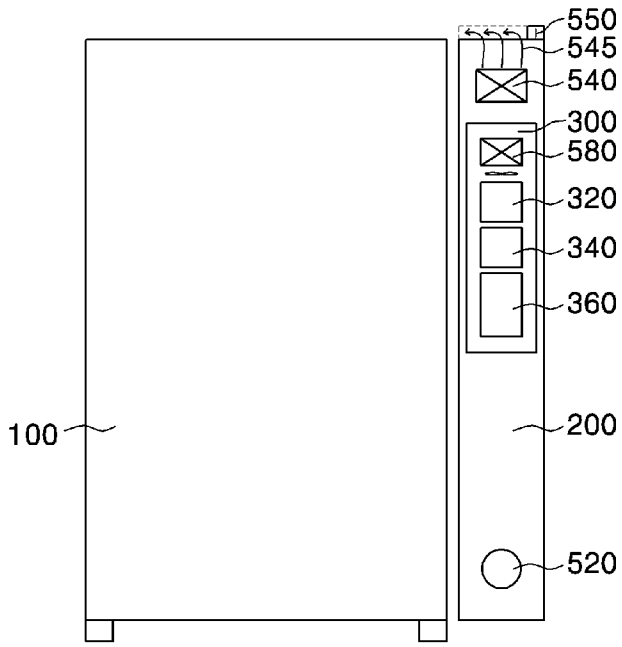
[Fig. 11]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INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2007/005988

A. CLASSIFICATION OF SUBJECT MATTER

F25C 1/24(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)

IPC 8: F25C 1/24

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 since 1975
Japanese Utility Models and applications for Utility Models since 1975

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

eKIPASS (KIPO internal) & keywords: "refrigerator", "compressor", "condenser", "expansion", "evaporator"

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 7062936 B2 (RAND et al.) 20 June 2006 See the abstract; Figs. 13-20; column 6, line 10 - column 10, line 26.	1-10
A	US 5406805 A (RADERMACHER et al.) 18 April 1995 See the abstract; Figs. 1 and 2; column 3, line 12 - column 6, line 59.	1-10
A	KR 20-0129494 Y1 (SAMSUNG ELECTRONICS CO., LTD.) 15 January 1999 See the abstract; Fig. 2; page 2, lines 34 - 49.	1-10
A	JP 63-123974 A (HITACHI CO., LTD.) 27 May 1988 See the abstract; Figs. 1 and 2; column 3, line 9 - column 4, line 15.	1-10
A	JP 59-145467 A (ITOU AKIRA) 20 August 1984 See the abstract; Fig. 1; column 2, line 11 - column 4, line 1.	1-10

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:
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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
24 APRIL 2008 (24.04.2008)	**25 APRIL 2008 (25.04.2008)**

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Telephone No. 82-42-481-5476

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/KR2007/005988

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JP 59-145467 A	20-08-1984	None	