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(54) **REFRIGERATOR**

KÜHLSCHRANK

RÉFRIGÉRATEUR

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(73) Proprietor: **LG Electronics Inc.**

Seoul 150-721 (KR)

(72) Inventors:

- **KIM, Ju-Hyun**
Changwon City
Gyeongnam-do 641-711 (KR)

• **SHIN, Jong-Min**

Changwon City
Gyeongnam-do 641-711 (KR)

(74) Representative: **Boult Wade Tennant**

Verulam Gardens
70 Gray's Inn Road
London WC1X 8BT (GB)

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Description

Technical Field

[0001] This document relates to a refrigerator.

Background Art

[0002] Generally, a refrigerator is home appliance for storing foods in a low temperature state to maintain them in a fresh state for a long time.

[0003] Specifically, the refrigerator comprises a refrigerating chamber maintained at a range of 1 to 4° C to store foods such as vegetables in a fresh state and a freezing chamber maintained at -18° C to store foods such as meat or fish in a frozen state.

[0004] Also, the refrigerator has a type wherein the freezing chamber is positioned on an upper side of the refrigerating chamber, a type wherein the freezing chamber is positioned on a lower side of the refrigerating chamber, and a type wherein the freezing chamber and the refrigerating chamber are provided to be adjacent left and right, according to an installation way.

[0005] Also, the refrigerator may be sorted into a side by side door type refrigerator wherein a door is installed left and right, respectively, and a one swing door type refrigerator wherein a door is installed up and down, respectively.

[0006] Meanwhile, any one side of the refrigerating chamber or the freezing chamber is provided with an ice-maker for making ice and a container for storing the made ice.

[0007] Concretely, when the ice maker and the container are positioned in the freezing chamber, water stored in the ice maker is made into ice by means of a refrigerant passing through an evaporator, wherein the made ice is dropped to the container provided on a lower side of the ice maker and then stored therein.

[0008] On the other hand, in the case of some refrigerators, the ice maker is provided in the refrigerating chamber and the container is provided in the door of the refrigerating chamber. In this case, since the refrigerating chamber is maintained at temperature above zero, the ice stored in the container is melted, making it possible to cause a phenomenon that the ice sticks to each other.

[0009] In detail, when the ice sticks to each other due to the melting of ice, a problem of applying overload to an ice crusher provided in an inside of the container occurs. More specifically, when the overload is applied to the ice crusher, a phenomenon that components such as a motor driving the ice crusher or a blade crushing ice are damaged occurs. As a result, a lifetime of the container is shortened, thereby causing a disadvantage that additional cost consumed for repairing and replacing the components is not required.

[0010] US2005/0061018 discloses a refrigerator according to the preamble of claim 1 having a structure for

supplying ice to an outside through a dispenser provided at a door.

[0011] US6062037 discloses a refrigerator having refrigerated air supplying apparatus.

Disclosure of Invention

Technical Problem

[0012] It is an object of the present invention to provide a refrigerator capable of maintaining ice stored in a container in a freezing state without the melting of ice.

[0013] Specifically, it is an object of the present invention to provide a refrigerator capable of preventing a damage of a ice crusher by preventing a phenomenon that the ice sticks to each other due to the melting of ice stored in the container.

Technical Solution

[0014] In order to accomplish the objects, there is provided a refrigerator according to claim 1.

Advantageous Effects

[0015] With the refrigerator configured as above according to the present invention, although the container storing ice is provided at the door for the refrigerating chamber, it has an effect of preventing the phenomenon that the ice sticks to each other due to the melting of ice.

[0016] Furthermore, the present invention has an effect of preventing the phenomenon that overload is applied to the ice crusher provided in the inside of the container by preventing the phenomenon that the ice sticks to each other due to the melting of ice.

[0017] Also, the present invention has an effect of preventing the damage of the components such as the motor driving the ice crusher and the blade crushing ice by preventing the phenomenon that overload is applied to the ice crusher. As a result, it has an advantage that the lifetime of the container is long so that additional cost consumed for repairing and replacing the components is not required.

[0018] In addition, since an end portion of a cooling duct is provided at the front of the refrigerating chamber, the present invention has an effect that an air curtain is formed by the discharged cooling air.

[0019] Moreover, the present invention has an effect of lowering manufacturing cost of the refrigerator by using the cooling air supplied through the evaporator, without having a separate freezing maintaining apparatus for preventing the melting of ice stored in the inside of the container exposed to the refrigerating chamber

Brief Description of the Drawings

[0020]

FIG. 1 is a front view of a refrigerator according to an embodiment of the present invention.

FIG. 2 is a side cross-sectional view of a refrigerator according to an embodiment.

FIG. 3 is a schematic view of a cooling air discharging structure of a refrigerator according to an embodiment of the present invention.

FIG. 4 is a schematic view of a structure of an ice maker provided in a refrigerator according to an embodiment of the present invention.

Mode for the Invention

[0021] Hereinafter, concrete embodiments of the present invention will be described with reference to the accompanying drawings.

[0022] FIG. 1 is a front view of a refrigerator according to an embodiment of the present invention, FIG. 2 is a side cross-sectional view of a refrigerator according to an embodiment, and FIG. 3 is a schematic view of a cooling air discharging structure of a refrigerator according to an embodiment of the present invention.

[0023] Referring to FIGS. 1 to 3, the refrigerator will be described with reference to, as one preferred embodiment, a bottom freezer type wherein a refrigerating chamber is provided on an upper side and a freezing chamber is provided on a lower side.

[0024] *Specifically, the refrigerator 10 according to one embodiment of the present invention comprises a main body 11 having a refrigerating chamber 15 and a freezing chamber 16 provided on an upper side and a lower side, respectively, a door 12 for the refrigerating chamber opening and closing the refrigerating chamber 15, a door 13 for the freezing chamber opening and closing the freezing chamber 16. In detail, the refrigerating chamber 15 and the freezing chamber 16 are separated by a barrier 111.

[0025] Also, one side surface of a ceiling of the refrigerating chamber 15 is provided with an ice maker 20 and a cooling duct 18 is extended along wall and ceiling surfaces of the refrigerating chamber. And, the door 12 for the refrigerating chamber is rotatably installed at front surfaces of the left and right of the main body 11, respectively. And, a dispenser 14 capable of dispensing water and ice is installed at any one front surface of the door 12 for the refrigerating chamber 12.

[0026] On the other hand, the door 13 for the freezing chamber is provided in a drawer form and a basket 19 storing frozen foods is detachably provided at a rear surface of the door 13 for the freezing chamber.

[0027] In detail, both sides of a rear surface of the door 13 for the freezing chamber are provided with door frames extended backward. The side surfaces of the door frame and the freezing chamber 16 are connected by means of a rail member. Therefore, the door 13 for the freezing chamber is drawn out in a horizontal direction by means of the rail member.

[0028] Also, the rear surface of the door 12 for the re-

frigerating chamber installed with the ice maker 20 is installed with an ice bank 21 storing ice. Therefore, ice made in the ice maker 20 is deiced so that it is dropped to the ice bank 21.

[0029] Concretely, an upper surface of the ice bank 21 is opened and in the state where the door 12 for the refrigerating chamber is closed, an opening part of the ice bank 21 is positioned at a lower portion of the ice maker 20. And, ice can be made by directly supplying cooling air to the ice maker 20 or by providing a separate refrigerant pipe. In the present embodiment, the ice maker 20 can be configured of a structure having the separate refrigerant pipe. And, in the case of the structure where the refrigerant pipe is provided in the ice maker 20, it has an advantage in rapidly making ice when the ice maker 20 is exposed to the cooling air for the refrigerating chamber with a relatively high temperature. Therefore, in the refrigerator with the structure where the ice maker is provided in the refrigerating chamber, the ice maker provided with the refrigerant pipe may be advantageous. The structure and operation of the ice maker 20 provided with the refrigerant pipe will be described in detail below with reference to the accompanying drawings.

[0030] On the other hand, in the case where the ice bank 21 is installed at the freezing chamber 15 or the door 12 for the refrigerating chamber, when considering characteristics of the refrigerating chamber 15 maintained at temperature above zero, a phenomenon that ice sticks to each other due to the melting of ice can be caused.

[0031] In order to solve such a problem, the inside of the ice bank 21 should be always maintained at sub-zero temperature to prevent the melting of ice.

[0032] Hereinafter, a method for maintaining the inside of the ice bank 21 at a state where ice is not melted will be described in detail.

[0033] Also, the refrigerator 10 further comprises a compressor 32 installed at a bottom surface of the freezing chamber 16 to compress a refrigerant, an evaporator 31 installed at a rear of the freezing chamber 16 to form cooling air, and a blowing fan 30 supplying the cooling air formed through the evaporator 31 to the refrigerating chamber 15 and the freezing chamber 16.

[0034] Furthermore, the refrigerator comprises a freezing duct 17 supplying the cooling air ventilated from the blowing fan 30 to the freezing chamber 16 and a cooling duct 18 supplying the cooling air to the refrigerating chamber 15. The freezing duct 17 and the cooling duct 18 may be defined by the cooling air duct.

[0035] In detail, the freezing duct 17 is provided with a plurality of cooling air holes for discharging the cooling air to the freezing chamber 16. Herein, the evaporator 31 and the blowing fan 30 are disposed in the inside of the freezing duct 17 as well as the evaporator 31 and the blowing fan 30 are disposed in a separate space of the main body 11. The freezing duct 17 connected to the freezing chamber 16 may be formed separately.

[0036] Also, the cooling duct 18 is extended from a

space accommodating the evaporator 31 and passes through the barrier 111 and then is connected to the refrigerating chamber 15. Herein, the cooling duct 18 may have a structure that it is directly communicated with the space accommodating the evaporator 31 as well as a structure that it is branched from the freezing duct 17.

[0037] With the structure as above, the ice made in the ice maker 20 installed at the ceiling of the refrigerating chamber 15 is separated so that it is dropped to the ice bank 21. Herein, a guide extended from the ice maker 20 or the ice bank 21 may be provided so that the ice separated from the ice maker 20 is safely dropped to the ice bank 21.

[0038] Concretely, the ice bank 21 is provided with a container 211 in a cylindrical form whose upper portion is opened, an auger 212 provided at a lower side of the inside of the container to guide ice downward, a crusher 213 integrally connected to a lower end of the auger 212 to crush the ice, a motor 214 driving the crusher 213, and a shaft 215 connecting the motor 214 to the crusher 213 to transfer the rotatory power of the motor.

[0039] Also, any one side of the ceiling portion of the refrigerating chamber 15 is provided with the ice maker 20. In detail, the ice maker 20 is disposed at the upper side of the ice bank 21 so that the discharged ice is directly dropped to the container 211 or it is configured to drop the ice to the container 211 by means of the guide after the ice is dropped.

[0040] Meanwhile, the inside of the refrigerating chamber 15 is provided a plurality of shelves on which foods are safely seated. And, the cooling duct 18 is communicated with the space accommodating the evaporator 31, is raised along the wall surface of the refrigerating chamber 15, and is extended to the front of the refrigerating chamber 15 along the shelf 112.

[0041] With the structure as above, at least a portion of the cooling air passing through the evaporator 31 to be cooled at low temperature is directly discharged to the container 211, thereby preventing the phenomenon that the ice received in the inside of the container 211 sticks to each other due to the melting of ice.

[0042] Also, the door 12 for the refrigerating chamber is provided as a side by side door as shown. The door 13 for the freezing chamber may be provided in a drawer form, but is not limited thereto. Likewise, the door 13 for the freezing chamber may be also provided as the side by side door.

[0043] On the other hand, in addition to the structure that the cooling duct 18 extended to the container 211 of the ice bank 21 is extended along the bottom surface of the shelf 112 as shown, it may be extended along the upper or side surface of the shelf 112. In other words, the arrangement structure of the cooling duct 18 can be properly determined according to the installation position of the ice bank 21 provided to the door 12 for the refrigerating chamber. And, the cooling duct 18 is extended from the rear of the shelf end to the front end thereof, wherein its width may be equal to or smaller than a width

of the cooling duct 18.

[0044] For example, when the ice bank 21 is installed at an one side edge of the door 12 for the refrigerating chamber 12, the cooling duct 18 can be extended along the side surface of the shelf 112.

[0045] Also, the end of the discharge side of the cooling duct 18 is formed to be inclined at a predetermined angle so that the cooling air can be discharged downward. This is to directly discharge the cooling air to the inside of the container 211 of the ice bank 21. In other words, at least a portion of the cooling air passing through the evaporator 31 to be cooled at low temperature is directly discharged to the container 211, thereby preventing the phenomenon that the ice received in the inside of the container 211 sticks to due to the melting of ice.

[0046] In addition, when the cooling air is discharged downward, an air curtain effect can be obtained by means of the discharged cooling air so that when the door for the refrigerating chamber is opened, an amount of the cooling air discharged to the outside can be reduced.

[0047] FIG. 4 schematically shows a structure of a ice maker provided in a refrigerator according to an embodiment of the present invention.

[0048] Referring to FIG. 4, the ice maker 20 provided in the refrigerator according to the embodiment of the present invention comprises a tray 201 storing water for making ice, a ice making pipe 40 extended to the inside of the tray 201, and a water supply apparatus for supplying water to the tray 201.

[0049] In detail, the water supply apparatus comprises a water pail 42 storing water, a pump 41 pumping the water in the inside of the water pail 42, and a water pipe 43. And, a dispenser connecting pipe 44 can be branched from any one side of the water pipe 43 and a switching valve 45 is installed at the branch point to selectively control a flow direction of water. More specifically, the dispenser connecting pipe 44 is extended to the dispenser so that a user can dispense portable water. And, a rotating axis 202 is extended to both sides of the tray 201. And, the water pail 42 may be buried in the inside of the body 11 or provided at one side of the wall surface of the refrigerating chamber.

[0050] Further, the ice making pipe 40 is a pipe in which a portion of the refrigerant performing a refrigerant cycle flows. The pipe is curved and bent several times to form projecting parts 401 as shown. And, the projecting part 401 may be formed at a length that can be submerged in water supplied to the tray 201.

[0051] Briefly describing the ice making process of the ice maker 20 forming such a structure, portable water for making ice is first supplied from an outside water pipe to the water pail 42. And, when the ice making process starts, the pump 41 is operated so that the water stored in the water pail 42 is supplied to the tray 201. And, when the water supplied to the tray 201 reaches a set water level, the supply of water stops and the refrigerant in low temperature and low pressure flows in the refrigerant pipe 40. The refrigerant pipe 40 is formed in a structure

that a portion of the pipes configuring a freezing cycle is branched to be extended the tray 201. In other words, the refrigerant pipe may be formed in a structure that it is branched from any point of the pipe connected to an inlet side of the evaporator 31 to be extended to the tray 201. And, the refrigerant pipe 40 may be connected back to an outlet side of the compressor 32.

[0052] On the other hand, in performing the ice making process, the ice making should be completed before the ice formed in the projection 401 contacts the ice formed at the neighboring projection 401. And, water remaining in the tray 201 is removed. Herein, as a method of removing the remain water, there may be a method of removing the remain water by a rotation of the tray 201 or a method of removing the remain water by a connection of a separate drain pump. And, if the remain water is completed, the tray 201 is rotated at 180° and in this state, the ice from the refrigerant pipe 400 is deiced.

[0053] In detail, as a method of deicing the ice from the refrigerant pipe 400, there may be a method of flowing a high temperature of refrigerant in the refrigerant pipe 400 in the deicing process or a method of heating the refrigerant pipe 400 by attaching a heater to the surface of the refrigerant pipe 400.

[0054] With the process as described above, the deiced ice is directly dropped to the ice bank 21 or dropped thereto by means of the guide. And, the ice dropped to the ice bank 21 is maintained at sub-zero temperature by means of the cooling air supplied from the cooling duct 18 or an auxiliary duct 28. In other words, the phenomenon that a lump of ice stored in the ice bank 21 sticks to each other due to the melting of ice is prevented.

[0055] And, the ice maker 20 with the structure that the refrigerant pipe is extended to the inner space of the tray 201 can perform a rapid ice making even when it is directly exposed to the cooling air for the refrigerating chamber. Therefore, a separate heat insulating wall or heat insulating case structure for preventing the ice maker 20 from being exposed to the cooling air for the refrigerating chamber is not needed.

Claims

1. A refrigerator, comprising:

a main body (11) having a freezing chamber (16), an evaporator (31) provided at a rear of the freezing chamber, and a refrigerating chamber (15) provided on an upper side of the freezing chamber;
a door (12) opening and closing the refrigerating chamber;
a shelf (112) provided in the inside of the refrigerating chamber;
an ice maker (20) provided in the inside of the refrigerating chamber;

a container (21) provided at a rear surface of the door and storing ice therein;

said refrigerator being **characterized by** :

a cooling air duct (18) extending along the rear surface of the refrigerating chamber and the shelf (112), whose one end is communicated with a space accommodating the evaporator and other end is positioned at a front end of the shelf (112);
the said other end of the cooling air duct (18) includes a discharge hole, and wherein the other end of the cooling air duct (18) is positioned at a place higher than an opening part of the container, and has a downwardly inclined surface to discharge the cold air into the container.

2. The refrigerator according to claim 1, further comprising a partition wall (111) partitioning the refrigerating chamber and the freezing chamber, wherein the cooling air duct penetrates through the partition wall to be extended to the refrigerating chamber.

3. The refrigerator according to claim 1, wherein the cooling air duct (18) is configured to have a width equal to or smaller than that of the shelf.

4. The refrigerator according to claim 1, wherein the ice maker (20) comprises:

a tray configured to receive water for making ice; and
a refrigerant pipe extended to an inner space of the tray,
wherein ice is directly generated on a surface of the refrigerant pipe.

5. The refrigerator according to claim 4, wherein the ice maker (20) is installed at a ceiling surface of the refrigerating chamber.

6. The refrigerator according to claim 1, wherein the cooling air duct (18) is installed at any one side of upper, lower, and side surfaces of the shelf.

7. The refrigerator according to claim 5, further comprising a guide member being extended from an upper side of the container (21) or from the ice maker, so as to guide ice dropped from the ice maker to the inside of the container.

Patentansprüche

1. Kühlschrank, der Folgendes aufweist:

ein Hauptgehäuse (11), das eine Gefrierkammer (16), einen Verdampfer (31), der an einer Rückseite der Gefrierkammer bereitgestellt ist, und eine Kühlkammer (15) aufweist, die an einer Oberseite der Gefrierkammer bereitgestellt ist; eine Tür (12), die die Kühlkammer öffnet und schließt;
 ein Regal (112), das im Inneren der Kühlkammer bereitgestellt ist;
 einen Eismacher (20), der im Inneren der Kühlkammer bereitgestellt ist;
 einen Behälter (21), der an einer Rückseite der Tür bereitgestellt ist und Eis darin lagert;
 wobei der Kühlschrank durch Folgendes gekennzeichnet ist:

eine Kühlluftleitung (18), die sich entlang der hinteren Fläche der Kühlkammer und des Regals (112) erstreckt und deren eines Ende mit einem Raum verbunden ist, der den Verdampfer aufnimmt, und deren anderes Ende an einem vorderen Ende des Regals (112) positioniert ist;
 wobei das andere Ende der Kühlluftleitung (18) eine Ausströmöffnung einschließt; und
 wobei das andere Ende der Kühlluftleitung (18) an einem Platz positioniert ist, der höher als ein Öffnungsteil des Behälters ist, und eine nach unten geneigte Fläche zur Abgabe der kalten Luft in den Behälter aufweist.

2. Kühlschrank nach Anspruch 1, der ferner eine Trennwand (111) aufweist, die die Kühlkammer und die Gefrierkammer voneinander trennt, wobei die Kühlluftleitung die Trennwand durchdringt, um sich zur Kühlkammer zu erstrecken.

3. Kühlschrank nach Anspruch 1, wobei die Kühlluftleitung (18) dazu ausgestaltet ist, eine Breite aufzuweisen, die der Breite des Regals entspricht oder kleiner ist.

4. Kühlschrank nach Anspruch 1, wobei der Eismacher (20) Folgendes aufweist:

ein Fach, das zur Aufnahme von Wasser zur Herstellung von Eis ausgestaltet ist; und
 ein Kühlmittelrohr, das sich zu einem Innenraum des Faches erstreckt,
 wobei Eis direkt auf einer Oberfläche des Kühlmittelrohrs erzeugt wird.

5. Kühlschrank nach Anspruch 4, wobei der Eismacher (20) an einer Deckenfläche der Kühlkammer angebracht ist.

6. Kühlschrank nach Anspruch 1, wobei die Kühlluftlei-

tung (18) an einer beliebigen Seite der oberen, unteren und seitlichen Flächen des Regals angebracht ist.

7. Kühlschrank nach Anspruch 5, der ferner ein Führungselement aufweist, das sich von einer Oberseite des Behälters (21) oder von dem Eismacher erstreckt, so dass Eis, das aus dem Eismacher fällt, zur Innenseite des Behälters geleitet wird.

Revendications

1. Réfrigérateur, comprenant :

un corps principal (11) ayant une chambre de congélation (16), un évaporateur (31) prévu à l'arrière de la chambre de congélation et une chambre de réfrigération (15) prévue sur un côté supérieur de la chambre de congélation ;
 une porte (12) ouvrant et fermant la chambre de réfrigération ;
 une étagère (112) prévue à l'intérieur de la chambre de réfrigération ;
 une machine à glaçons (20) prévue à l'intérieur de la chambre de réfrigération ;
 un récipient (21) prévu au niveau d'une surface arrière de la porte et stockant de la glace dans celui-ci ;
 ledit réfrigérateur étant **caractérisé par** :

un conduit d'air de refroidissement (18) s'étendant le long de la surface arrière de la chambre de réfrigération et de l'étagère (112), dont une extrémité est en communication avec un espace recevant l'évaporateur et l'autre extrémité est positionnée au niveau d'une extrémité avant de l'étagère (112) ;
 ladite autre extrémité du conduit d'air de refroidissement (18) comporte un trou de décharge ; et
 dans lequel l'autre extrémité du conduit d'air de refroidissement (18) est positionnée à un emplacement plus élevé qu'une partie d'ouverture du récipient, et a une surface inclinée vers le bas pour décharger l'air froid dans le récipient.

2. Réfrigérateur selon la revendication 1, comprenant en outre une paroi de séparation (111) séparant la chambre de réfrigération et la chambre de congélation,
 dans lequel le conduit d'air de refroidissement pénètre à travers la paroi de séparation pour s'étendre vers la chambre de réfrigération.

3. Réfrigérateur selon la revendication 1, dans lequel

le conduit d'air de refroidissement (18) est configuré pour avoir une largeur inférieure ou égale à celle de l'étagère.

4. Réfrigérateur selon la revendication 1, dans lequel la machine à glaçons (20) comprend :

un plateau configuré pour recevoir de l'eau pour fabriquer de la glace ; et
un serpentín réfrigérant s'étendant vers un espace intérieur du plateau,
dans lequel la glace est directement générée sur une surface du serpentín réfrigérant.

5. Réfrigérateur selon la revendication 4, dans lequel la machine à glaçons (20) est installée au niveau d'une surface de plafond de la chambre de réfrigération.

6. Réfrigérateur selon la revendication 1, dans lequel le conduit d'air de refroidissement (18) est installé au niveau d'un côté quelconque des surfaces supérieure, inférieure et latérale de l'étagère.

7. Réfrigérateur selon la revendication 5, comprenant en outre un élément de guidage qui s'étend depuis un côté supérieur du récipient (21) ou depuis la machine à glaçons, de manière à guider la glace tombée de la machine à glaçons à l'intérieur du récipient.

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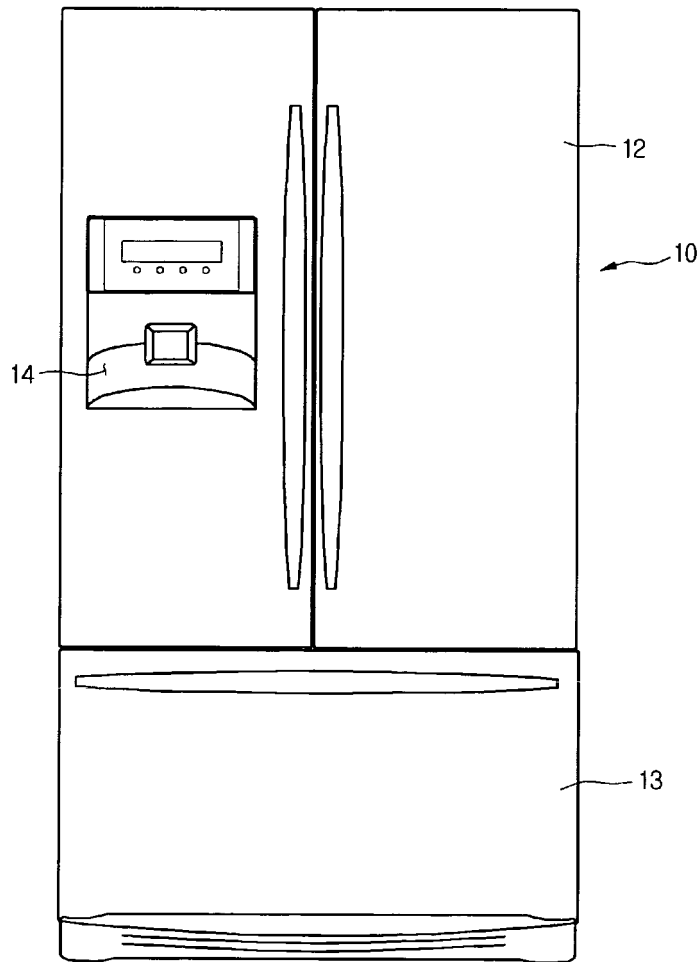
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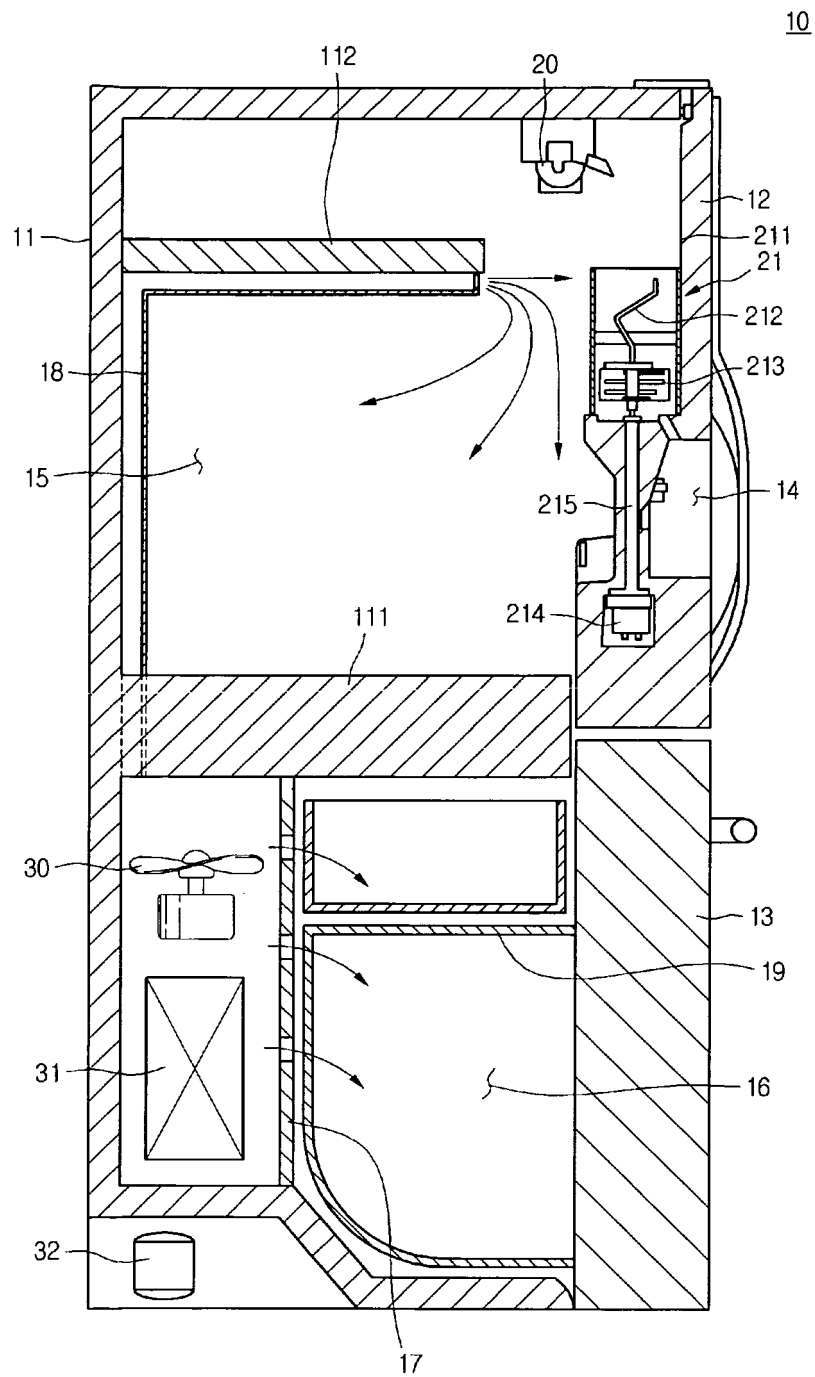
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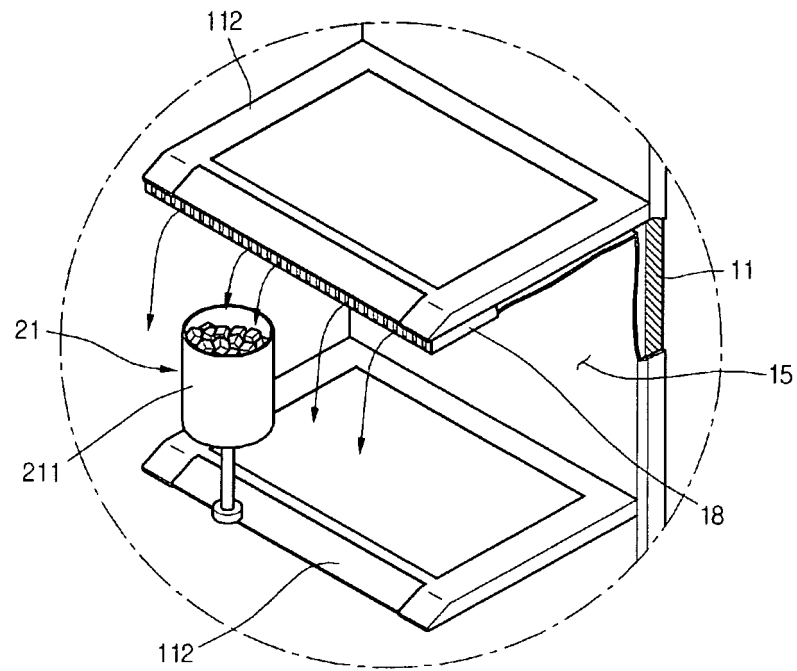
[Fig. 1]



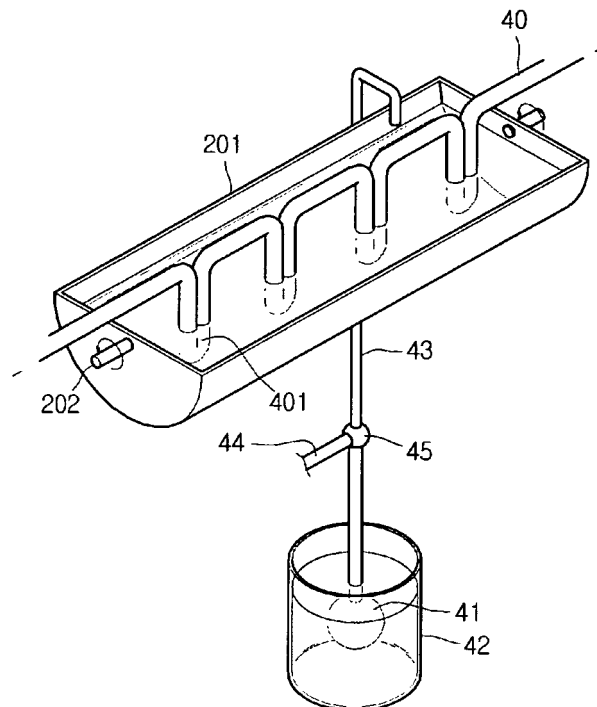
[Fig. 2]



[Fig. 3]



[Fig. 4]



REFERENCES CITED IN THE DESCRIPTION

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