

(19)



(11)

EP 2 320 175 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention
of the grant of the patent:
02.01.2019 Bulletin 2019/01

(51) Int Cl.:
F25D 11/02 ^(2006.01) **F25C 1/00** ^(2006.01)
F25B 21/02 ^(2006.01)

(21) Application number: **09768804.8**

(86) International application number:
PCT/CN2009/072477

(22) Date of filing: **26.06.2009**

(87) International publication number:
WO 2009/155879 (30.12.2009 Gazette 2009/53)

(54) **REFRIGERATOR WITH ICE MAKER**

KÜHLSCHRANK MIT EISZUBEREITUNGSVORRICHTUNG

RÉFRIGÉRATEUR AVEC UNE MACHINE À GLAÇONS

(84) Designated Contracting States:
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL
PT RO SE SI SK TR**

(30) Priority: **26.06.2008 CN 200810017144**

(43) Date of publication of application:
11.05.2011 Bulletin 2011/19

(73) Proprietors:
• **Haier Group Corporation**
Qingdao, Shandong 266101 (CN)
• **Qingdao Haier Joint Stock Co., Ltd**
Shandong 266101 (CN)

(72) Inventors:
• **WANG, Dongning**
Shandong 266101 (CN)
• **ZHAO, Minghua**
Shandong 266101 (CN)

• **MA, Jie**
Shandong 266101 (CN)
• **CHEN, Lei**
Shandong 266101 (CN)
• **YANG, Hongyan**
Shandong 266101 (CN)

(74) Representative: **Ziebig & Hengelhaupt**
Patentanwälte PartG mbB
Leipziger Straße 49
10117 Berlin (DE)

(56) References cited:
EP-A2- 1 653 179 WO-A1-2009/017282
CA-A1- 2 614 802 CN-A- 1 653 306
CN-A- 101 191 690 CN-A- 101 315 245
US-A- 3 192 726 US-A- 4 003 214
US-A1- 2004 237 565 US-A1- 2006 086 130
US-A1- 2008 127 670 US-A1- 2008 141 699
US-A1- 2008 141 699

Note: Within nine months of the publication of the mention of the grant of the European patent in the European Patent Bulletin, any person may give notice to the European Patent Office of opposition to that patent, in accordance with the Implementing Regulations. Notice of opposition shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

EP 2 320 175 B1

Description

Field of the Invention

[0001] The present invention relates to the refrigerating technical field, and in particular to a refrigerator with an ice maker.

Background of the invention

[0002] In the prior art, cold air for making ice by a refrigerator comes from cold air generated around a freezing chamber/refrigerating chamber evaporator. The cold air around the freezing chamber/refrigerating chamber evaporator is led into an ice maker via pipes, for implementing refrigeration and the ice-making. This manner has a prominent defect, i.e. the ice maker uses evaporator(s) in other chambers of the refrigerator to implement the refrigeration and the ice-making, thereby causing excess heavy refrigerating load to the evaporator of the chamber in which it is located, which decreases the refrigerating effect of this chamber and also makes the ice maker incapable of quickly performing the refrigeration and the ice-making.

[0003] On the other hand, as the ice maker uses the evaporators of other chambers for performing the refrigeration and the ice-making, when fault occurs in a refrigerating system of other chambers, for instance, fault in the evaporator, in the compressor, etc., not only the chamber cannot perform refrigeration but also the ice maker cannot perform refrigeration and the ice-making.

[0004] US20040237565A1 disclosed a refrigerator with an improved structure for supplying ices at an outside of a dispenser provided at a door. The refrigerator includes a supplementary freezer, a cavity, an icemaker and a dispenser. The supplementary freezer is provided in a cooling chamber of the refrigerator. The cavity is provided in the door and is connected with the supplementary freezer when the door is closed. The icemaker produces ices using cool air in the cooling chamber. The dispenser is connected with the cavity provided at the door. In this case, the icemaker is provided in the supplementary freezer or in the cavity.

[0005] CA2614802A1 disclosed a refrigerator includes a first storage compartment defining a first interior volume. A first evaporator is disposed in a first evaporator compartment and is configured to provide cool air to the first interior volume. A second storage compartment defines a second interior volume, the second interior volume configured to be cooled by cool air received from the first interior volume. A door is positionable to permit and prohibit access to the second interior volume through a front of the second interior volume. A third interior volume is defined in an interior of the door. A second evaporator is disposed in a second evaporator compartment and is configured to provide cool air to the third interior volume. An air flow channel extends from the second evaporator compartment to the third interior volume. A

fan is disposed in the third interior volume. A mold is disposed in the third interior volume and is configured to receive water and to retain the water during cooling of the water.

[0006] US20080127670A1 disclosed a refrigerator having an ice making apparatus installed at a cooling chamber door that opens/closes a cooling chamber. The refrigerator includes a body having a cooling chamber therein, a cooling chamber door to open/close the cooling chamber, and an ice making apparatus installed in the cooling chamber door to make ice. An ice making evaporator is provided in the ice making apparatus to independently supply the ice making apparatus with cooling air and an ice making evaporator chamber, in which an ice making evaporator is installed, is provided adjacent to the cooling chamber door while being partitioned from the cooling chamber.

[0007] EP1653179A2 disclosed an ice making and dispensing system suitable for making and dispensing ice through the refrigerator compartment door of a bottom freezer refrigerator. The ice maker is positioned in an insulated sub-compartment in the refrigerator compartment maintained at a temperature below 0° C. An insulated ice cube storage bin and ice dispenser are positioned on the refrigerator compartment door for dispensing ice cubes through the face of the refrigerator compartment door.

Summary of the Invention

[0008] The object of the present invention is to provide a refrigerator with an ice maker independently performing refrigeration and making ice.

[0009] In order to address the above technical problem, the present invention provides a refrigerator with an ice maker according to claim 1, inter alia comprising:

a machine chamber having a freezing chamber and a refrigerating chamber;

a door body selectively opening and closing the refrigerating chamber and the freezing chamber; and an ice maker provided in the freezing chamber, the refrigerating chamber or the door body, for making ice;

wherein the ice maker is connected with a refrigerating system independent from the refrigerating system of the freezing chamber and the refrigerating chamber, to form a separate cold air circulating system of the ice maker.

[0010] In the above, the door body has a cavity in which the ice maker is located; the cavity further comprises an ice container located therein for storing the ice; the refrigerator further comprises a distributor provided in the door body for communicate with the cavity.

[0011] In the above, the refrigerating system is in the form of a compressor refrigerating system.

[0012] According to the invention, the refrigerating sys-

tem is in the form of a compressor refrigerating system that comprises a compressor, a condenser, an evaporator, capillary tubes and a drier filter;

the door body further comprises another cavity in which the compressor is provided; the evaporator is provided around the ice maker to provide cold air for refrigeration.

[0013] Preferably, the another cavity is provided in a lower portion of the door body; and the cavity accommodating the ice maker is provided in an upper portion of the door body.

[0014] In the above, the condenser may be provided in a lower layer of an outer surface of the door body.

[0015] In the above, the compressor refrigerating system may be provided in the door body.

[0016] As the ice maker is provided with a separate refrigerating system in the present invention, it will not be affected by refrigerating conditions of other chambers and can make the ice independently.

[0017] Moreover, as the ice maker and its refrigerating system are provided on the door body, it also simplifies operation of the user for taking out ice.

Brief Description of the Drawings

[0018]

Figure 1 is a schematic structure diagram of the refrigerator with an ice maker according to one embodiment of the present invention; and

Figure 2 is a vertical sectional view of the door body of the refrigerating chamber according to the embodiment shown in Figure 1.

Detailed Description of Embodiments

[0019] Firstly, the principle of the present invention defined by claim 1 is illustrated briefly. In the present invention, refrigeration is performed and ice is made by providing an independent refrigerating system for the ice maker, therefore the load of generating cold air by using other chambers can be reduced. Moreover, the function thereof does not depend upon the operational situations of other refrigerating systems of the refrigerator.

[0020] Next, the present invention will be illustrated in detail with reference to the drawings.

[0021] With reference to Figure 1, it shows a schematic structure diagram of the refrigerator with an ice maker of an embodiment of the present invention. As shown in the figure, it comprises a machine chamber 1, a freezing chamber 3, a refrigerating chamber 2 and an ice-taking opening 4.

[0022] In the above, the machine chamber 1 is divided into the freezing chamber 3 and the refrigerating chamber 2, and the ice-taking opening 4 is provided on the door body of the refrigerating chamber 2.

[0023] The refrigerating chamber 2 comprises a door body 21 and a space enclosed by the door body 21; and

the freezing chamber 3 comprises a door body 31 and a space enclosed by the body 31.

[0024] With reference to Figure 2, it shows a vertical sectional view of the door body of the refrigerating chamber according to the embodiment shown in Figure 1. As shown in the figure, the door 21 comprises a first cavity 210 in the upper portion and a second cavity 220 in the lower portion.

[0025] The first cavity 210 is provided therein with an ice maker 211 (merely illustratively shown in the figure) which is provided in the top portion of the first cavity 210. The first cavity 210 is further provided with an ice distributor 212 located in the lower portion of the first cavity 210. And the ice distributor 212 is communicated with the ice-taking opening 4 in Figure 1, so as to convey ice blocks to the ice-taking opening 4 under triggering of the user after the ice maker 211 completes the ice-making.

[0026] The second cavity 220 is provided therein with a compressor 221. The door body 21 further comprises an evaporator 231, a drier filter 232 and a condenser 233.

[0027] In the above, the evaporator 231 is close to the first cavity 210, and the condenser 233 is close to an outer surface 200 of the door body 21. Particularly, the condenser 233 is located in the lower layer of the outer surface 200.

[0028] Between the evaporator 231 and the condenser 233 is a heat insulation layer 201 provided.

[0029] Between the compressor 220 and the evaporator 231 are the drier filter 232 and a capillary tube (not shown in the figure) further connected. The condenser 233 is connected to the compressor 221.

[0030] In the refrigerator with an ice maker according to another embodiment of the present invention, the ice maker is provided in the door body of the refrigerator. In an alternative embodiment which does not fall within the scope of protection defined by claim 1, a semiconductor refrigerating plate is provided around the ice maker that performs the refrigeration and makes ice by means of the semiconductor refrigerating plate. Preferably, the semiconductor refrigerating plate can be provided in the ice-making chamber where the ice maker is located. That is, taking the embodiment as shown in Figure 2 as an example, if the semiconductor refrigerating plate is used to perform the refrigeration, the semiconductor refrigerating plate can be placed in a position in the first cavity 210 close to the ice maker 211.

[0031] As the semiconductor refrigerating plate is conventional means in the art, details will not be given herein. Use of the semiconductor refrigerating plate, on the one hand, can reduce the weight of the door body, and on the other hand can retrench the space of the door body.

[0032] In the refrigerator with an ice maker according to another embodiment of the present invention, the ice maker is provided in the freezing chamber or the refrigerating chamber of the refrigerator. Moreover, the ice maker performs the refrigeration and makes the ice by a complete set of refrigerating system of its own.

[0033] As both compressor refrigerating system and

semiconductor refrigerating system are well known by the person skilled in the art, their specific functions and connection manners are not further illustrated herein.

[0034] The descriptions above are only preferable embodiments of the present invention, which are not used to restrict the present invention, defined by the appended claims.

Claims

1. A refrigerator with an ice maker, comprising:

a machine chamber (1) having a freezing chamber (3) and a refrigerating chamber (2);
a door body (21) selectively opening and closing the refrigerating chamber (2) and the freezing chamber (3); and
an ice maker (211) provided in the freezing chamber (3), the refrigerating chamber (2) or the door body (21), for making ice;

wherein the ice maker (211) is connected with a refrigerating system independent from the refrigerating system of the freezing chamber (3) and the refrigerating chamber (2), to form a separate cold air circulating system of the ice maker (211);

wherein the door body (21) has a cavity (210) in which the ice maker (211) is located; the cavity (210) further comprises an ice container located therein for storing the ice;

wherein the refrigerator further comprises a distributor (212) provided in the door body (21) for communicating with the cavity,

characterized in that

the refrigerating system connected to the ice maker (211) is in the form of a compressor refrigerating system that comprises a compressor (221), a condenser (233), an evaporator (231), capillary tubes and a drier filter (232);

the door body (21) further comprises another cavity (220) in which the compressor (221) is provided; the evaporator (231) is provided around the ice maker (211) to provide cold air for refrigeration.

2. The refrigerator according to Claim 1, **characterized in that**, the another cavity (220) is provided in a lower portion of the door body (21); and the cavity (210) accommodating the ice maker (211) is provided in an upper portion of the door body (21).

3. The refrigerator according to Claim 1, **characterized in that**, the condenser (221) is provided in a lower layer of an outer surface of the door body (21).

4. The refrigerator according to Claim 1, **characterized in that**, the compressor refrigerating system is provided in the door body (21).

Patentansprüche

1. Kühlschrank mit Eisbereiter, umfassend:

eine Maschinenkammer (1) mit einer Gefrierkammer (3) und einer Kühlkammer (2);
einen Türkörper (21), der die Kühlkammer (2) und die Gefrierkammer (3) selektiv öffnet und schließt; und
einen in der Gefrierkammer (3), der Kühlkammer (2) oder dem Türkörper (21) vorgesehenen Eisbereiter (211) zum Bereiten von Eis;

wobei der Eisbereiter (211) mit einem von dem Kühlsystem der Gefrierkammer (3) und der Kühlkammer (2) unabhängigen Kühlsystem verbunden ist, um ein separates Kaltluftzirkulationssystem des Eisbereiters (211) auszubilden;

wobei der Türkörper (21) einen Hohlraum (210) aufweist, in dem der Eisbereiter (211) angeordnet ist; der Hohlraum (210) ferner einen darin angeordneten Eisbehälter zum Aufbewahren des Eises umfasst; wobei der Kühlschrank ferner einen in dem Türkörper (21) vorgesehenen Spender (212) zum Verbinden mit dem Hohlraum umfasst,

dadurch gekennzeichnet, dass

das mit dem Eisbereiter (211) verbundene Kühlsystem in Form eines Kompressor-Kühlsystems vorliegt, das einen Kompressor (221), einen Verflüssiger (233), einen Verdampfer (231), Kapillarröhren und einen Trocknerfilter (232) umfasst; der Türkörper (21) ferner einen weiteren Hohlraum (220) umfasst, in dem der Kompressor (221) vorgesehen ist; der Verdampfer um den Eisbereiter (211) herum vorgesehen ist, um kalte Luft zur Kühlung bereitzustellen.

2. Kühlschrank nach Anspruch 1, **dadurch gekennzeichnet, dass** der weitere Hohlraum (220) in einem unteren Abschnitt des Türkörpers (21) vorgesehen ist; und der Hohlraum (210), der den Eisbereiter (211) aufnimmt, in einem oberen Abschnitt des Türkörpers (21) vorgesehen ist.

3. Kühlschrank nach Anspruch 1, **dadurch gekennzeichnet, dass** der Verflüssiger (221) in einer unteren Schicht einer äußeren Oberfläche des Türkörpers (21) vorgesehen ist.

4. Kühlschrank nach Anspruch 1, **dadurch gekennzeichnet, dass** das Kompressor-Kühlsystem in dem Türkörper (21) vorgesehen ist.

Revendications

1. Réfrigérateur avec un générateur de glace, comprenant :

une chambre de machine (1) ayant une chambre de congélation (3) et une chambre de réfrigération (2) ;
 un corps de porte (21) ouvrant et fermant la chambre de réfrigération (2) et la chambre de congélation (3) de façon sélective ; et
 un générateur de glace (211) fourni dans la chambre de congélation (3), la chambre de réfrigération (2) ou le corps de porte (21), pour fabriquer de la glace ;

le générateur de glace (211) étant raccordé à un système de réfrigération indépendant du système de réfrigération de la chambre de congélation (3) et de la chambre de réfrigération (2), pour former un système de circulation d'air froid du générateur de glace (211) séparé ;
 le corps de porte (21) ayant une cavité (210) dans laquelle le générateur de glace (211) est situé ; la cavité (210) comprenant en outre un compartiment à glace y étant situé pour stocker la glace ;
 le réfrigérateur comprenant en outre un distributeur (212) fourni dans le corps de porte (21) pour communiquer avec la cavité,

caractérisé en ce que
 le système de réfrigération raccordé au générateur de glace (211) est sous la forme d'un système de réfrigération à compresseur qui comprend un compresseur (221), un condenseur (233), un évaporateur (231), des tubes capillaires et un filtre de déshydrateur (232) ;
 le corps de porte (21) comprenant en outre une autre cavité (220) dans laquelle le compresseur (221) est fourni ; l'évaporateur (231) étant fourni autour du générateur de glace (211) pour fournir de l'air froid pour réfrigération.

2. Réfrigérateur selon la revendication 1, **caractérisé en ce que** l'autre cavité (220) est fournie dans une partie inférieure du corps de porte (21) ; et la cavité (210) accueillant le générateur de glace (211) est fournie dans une partie supérieure du corps de porte (21).
3. Réfrigérateur selon la revendication 1, **caractérisé en ce que** le condenseur (221) est fourni dans une couche inférieure d'une surface extérieure du corps de porte (21).
4. Réfrigérateur selon la revendication 1, **caractérisé en ce que** le système de réfrigération à compresseur est fourni dans le corps de porte (21).

55

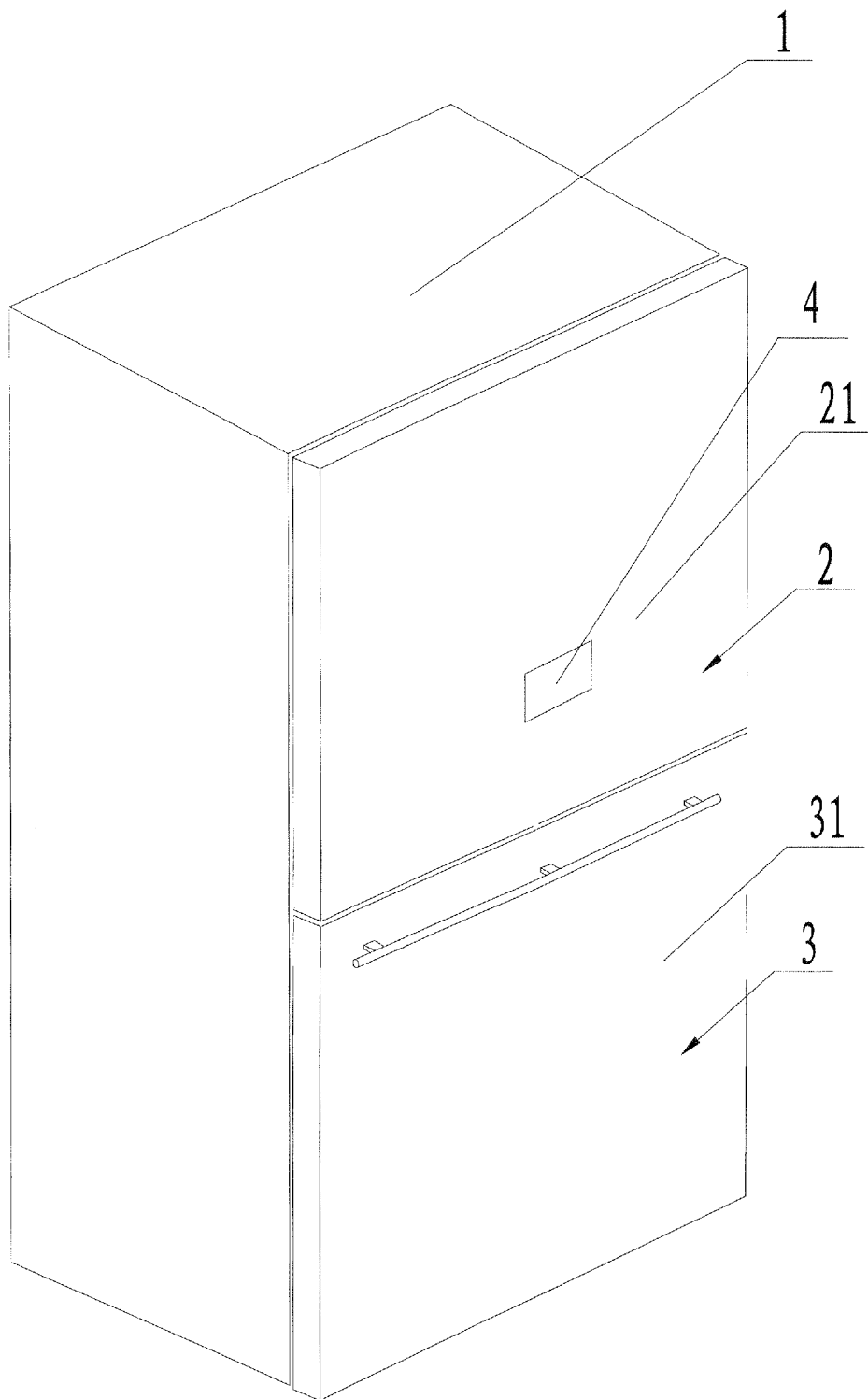


Fig.1

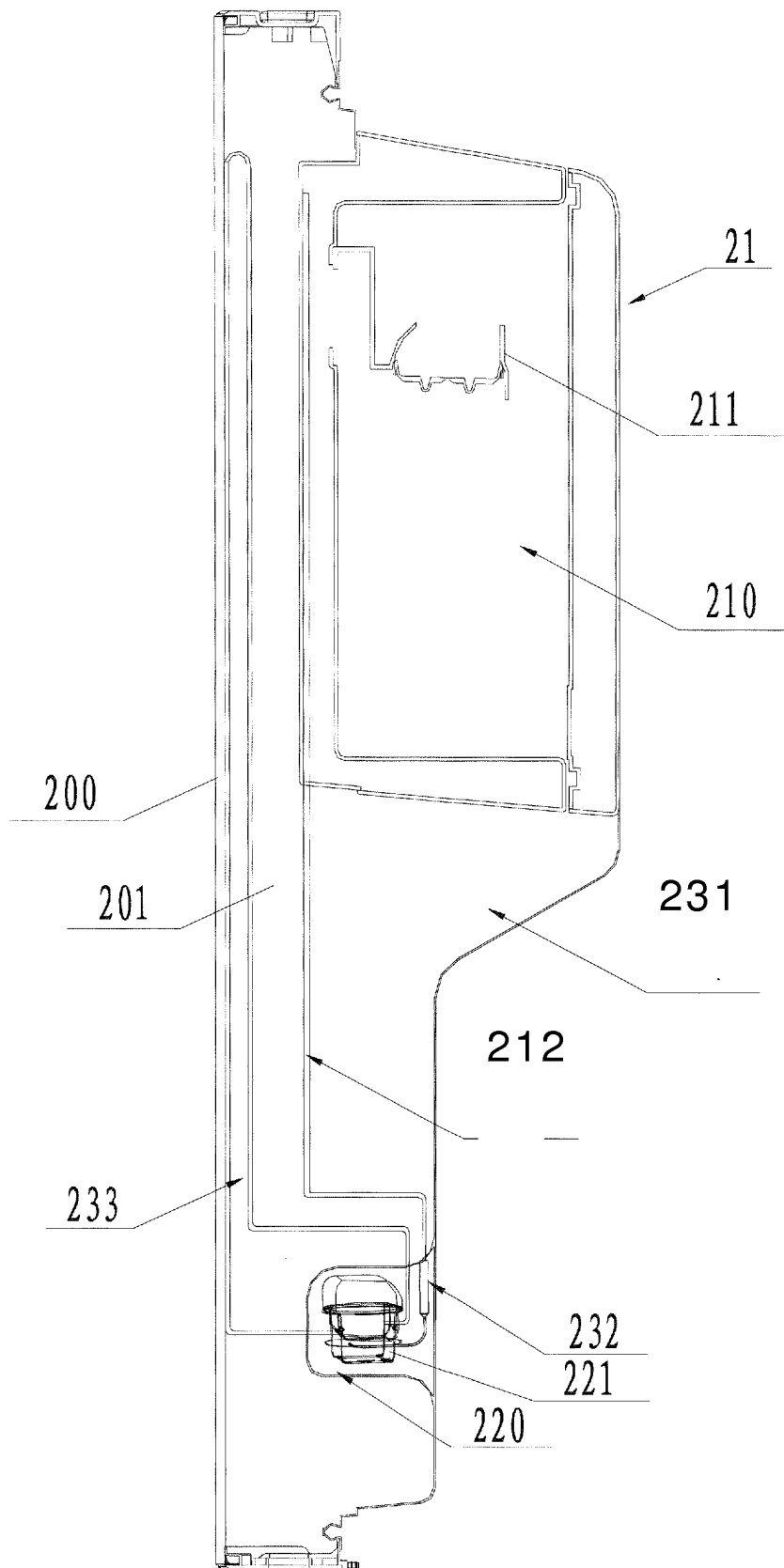


Fig.2

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- US 20040237565 A1 [0004]
- CA 2614802 A1 [0005]
- US 20080127670 A1 [0006]
- EP 1653179 A2 [0007]