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(54) **REFRIGERATOR**

(57) The present utility model provides a refrigerator, including a first storage chamber (11) and a second storage chamber (12), wherein a set temperature of the first storage chamber (11) is higher than that of the second storage chamber (12), the first storage chamber (11) has a first drain hole (5) and a first drain pipe (6) connecting the first drain hole (5), and the second storage chamber (12) has a second drain hole (17) and a second drain pipe (21) connecting the second drain hole (17), and as suggested by the present utility model: further including an exhaust pipe (19), wherein the first storage chamber (11) has an exhaust hole (16), the exhaust pipe (19) is connected with the second drain pipe (21) and the exhaust hole (16) is in communication with the second drain hole (17).

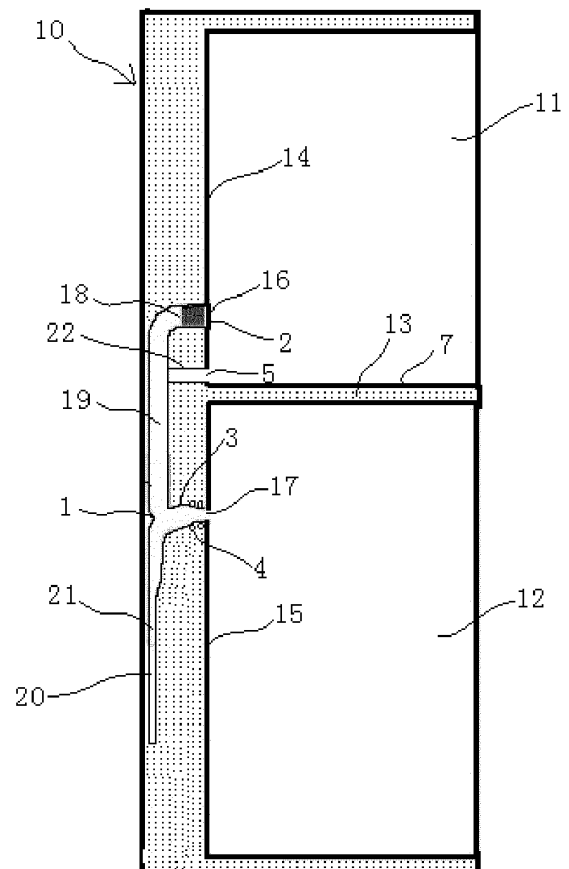


FIG. 1

Description

BACKGROUND

Technical Field

[0001] The present utility model relates to the field of household appliances, and particularly to a refrigerator.

Related Art

[0002] The prior art discloses that a refrigerating chamber and a freezing chamber of a refrigerator are provided with drain pipes, used to discharge condensate water or defrosting water in compartments. As the drain pipes are directly in communication with the outside or a water pan in a machine room, in order to prevent cool air in the freezing chamber from flowing out along the drain pipe into the freezing chamber or outside hot air from entering into the freezing chamber, a coiled pipe structure is used at the tail of the drain pipe of the freezing chamber, some condensate water discharged out of the freezing chamber remains in a coiled pipe section at the tail of the drain pipe, to prevent the freezing chamber from communicating with the outside.

[0003] Although the aforementioned structure has effectively avoided reduction of refrigerating efficiency caused by that the drain pipe of the freezing chamber directly communicates with the outside, a new problem may arise. A user opens the door of the freezing chamber, some hot air may enter into the freezing chamber, after the door is closed for a period of time, the hot air is cooled, air pressure in the freezing chamber is reduced, water in the drain pipe of the freezing chamber will flow towards the direction of the freezing chamber under the action of outside atmospheric pressure, and although the possibility that the water will flow back to the freezing chamber is quite low, the flowing water will make a sound easy to make the user perceive, the user's product experience is affected.

SUMMARY

[0004] To overcome at least one problem mentioned in the Related Art, the present utility model provides a refrigerator that can improve users' product experience.

[0005] To achieve the aforementioned object, the present utility model provides a refrigerator, including a first storage chamber and a second storage chamber, wherein a set temperature of the first storage chamber is higher than that of the second storage chamber, the first storage chamber has a first drain hole and a first drain pipe connecting the first drain hole, and the second storage chamber has a second drain hole and a second drain pipe connecting the second drain hole, and further including an exhaust pipe, wherein the first storage chamber has an exhaust hole, the exhaust pipe is connected with the second drain pipe and the exhaust hole

is in communication with the second drain hole.

[0006] The first storage chamber may be a refrigerating chamber or a zero degree chamber, the second storage chamber may be a freezing chamber, the exhaust hole of the first storage chamber is in communication with the second drain hole of the second storage chamber, when air pressures in the first storage chamber and the second storage chamber are not equal, air will flow from a high-pressure compartment to a lower-pressure compartment, so as to balance the air pressure between the first storage chamber and the second storage chamber. When the second storage chamber is a freezing chamber, in order to decrease loss of the cool air, the drain pipe of the freezing chamber may use a siphon, that is, one part of the drain pipe of the freezing chamber is a U-shaped pipe, and is provided therein with water that blocks air passing. When the hot air entering into the freezing chamber is cooled to cause reduction of the air pressure in the freezing chamber, the air will enter into the freezing chamber from the refrigerating chamber through the exhaust pipe, thereby reducing a situation where too low pressure in the second storage chamber causes backflow of the water in the second drain pipe to make noise.

[0007] Optionally, the exhaust hole is provided thereon with a water retaining device that blocks water in the first storage chamber from entering into the exhaust pipe, the exhaust pipe does not want water to enter therein, and disposing a water retaining device in the exhaust hole can reduce the possibility that water enters into the exhaust pipe.

[0008] Optionally, the water retaining device is an exhaust hole cover that can allow air passing, and the exhaust hole cover can be provided with multiple small ribs used to guide water, to guide water to flow along walls of the first storage chamber, so as to avoid water entering into the exhaust pipe.

[0009] Optionally, the exhaust pipe is internally provided with an air filtering device, to filter odors in the air passing through the exhaust pipe; as, in most cases, the air flows from the refrigerating chamber to the freezing chamber, and the air in the refrigerating chamber is easy to become odors, the air filtering device can avoid that odors in the refrigerating chamber enter into the freezing chamber.

[0010] Optionally, the exhaust hole is formed on a vertical wall of the first storage chamber, and an opening direction of the exhaust hole is perpendicular to the vertical wall, so it is very difficult for the condensate water on the walls of the first storage chamber to enter into the exhaust pipe.

[0011] Optionally, the second drain pipe includes a U-shaped pipe, that is, part of the second drain pipe is siphon, to avoid that the cool air in the freezing chamber leaks out and avoids that external hot air enters into the freezing chamber along the second drain pipe.

[0012] Optionally, the second storage chamber is internally provided with an evaporator, the second drain

hole is located below the evaporator, and the second drain hole is used to discharge defrosting water of the evaporator.

[0013] Optionally, a heater strip is disposed in a position that is on the second drain pipe and is near the second drain hole, to prevent the position that is on the second drain pipe and is near the second drain hole from frosting.

[0014] Optionally, the heater strip is disposed on the second drain pipe in a winding manner.

[0015] Optionally, a three-way joint is further included, and the exhaust pipe is connected to the second drain pipe through the three-way joint.

[0016] Optionally, the first storage chamber is a refrigerating chamber, and the second storage chamber is a freezing chamber.

The structure and other utility model objectives as well as beneficial effects of the present utility model will be more comprehensible with reference to the accompanying drawings and the description about preferable embodiments.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017]

FIG. 1 is a side sectional view of a refrigerator according to the present utility model; and

FIG. 2 is a rear view of the refrigerator according to the present utility model.

DETAILED DESCRIPTION

[0018] Embodiments of the present utility model are elaborated below in combination with FIGs. 1-2.

[0019] This embodiment provides a double-door refrigerator 10 having an up door and a down door, the refrigerator 10 includes a refrigerating chamber 11 and a freezing chamber 12 located below the refrigerating chamber 11, and the refrigerating chamber 10 and the freezing chamber 11 are separated through an adiabatic wall 13.

[0020] A refrigerating chamber drain hole 5 is disposed in a position that is on a refrigerating chamber rear wall 14 and is near a refrigerating chamber bottom wall 7, and condensate water on the refrigerating chamber rear wall 14 is collected to the refrigerating chamber drain hole 5 and discharged via a refrigerating chamber drain pipe 6.

[0021] The freezing chamber 12 is internally provided with an evaporator (not shown) that provides a cold source, a freezing chamber drain hole 17 used to collect defrosting water of the evaporator is disposed below the evaporator, and the collected defrosting water enters into the freezing chamber drain hole 17 and then is discharged via a freezing chamber drain pipe 21.

[0022] It can be seen from FIG. 2 that a discharge section of the freezing chamber drain pipe 21 is a U-shaped siphon, which can prevent cool air in the freezing cham-

ber from leaking out and block outside hot air from entering into the refrigerating chamber 10. Water discharged by the freezing chamber drain pipe 21 can be directly discharged to the outside of the refrigerator or be discharged into a water pan located in a machine room of the refrigerator, and is evaporated by heat from a condenser or a compressor.

[0023] When a user opens the door of the freezing chamber 12 to take an article, a lot of hot air will enter into the freezing chamber 12 from the outside, the hot air is cooled in the freezing chamber 12, due to the principle of heat expansion and cold contraction, the volume of the hot air decreases, so that pressure in the freezing chamber 12 is reduced, and reduction of the air pressure in the freezing chamber 12 will at least bring about two influences: 1. a pressure difference of two sides of the door of the freezing chamber 12 increases, and the user requires a greater force to open the door; and 2. as the pressure in the freezing chamber 12 is reduced, water in the siphon, under the action of atmospheric pressure, will flow to the direction of the freezing chamber 12, and although it is very difficult for the water in the siphon to flow back to the freezing chamber due to the pressure difference, noise which is evident and easy to make the user perceive will be made during flowing. Based on the aforementioned disadvantageous influences, in this embodiment, an exhaust pipe 19 that allows air flow is disposed between the refrigerating chamber 11 and the freezing chamber 12, used to balance the pressure between the refrigerating chamber 11 and the freezing chamber 12.

[0024] An exhaust hole 16 is disposed on a rear wall 14 of the refrigerating chamber 11, the exhaust pipe 19 is connected onto the freezing chamber drain pipe 21 through a three-way joint 1, so as to enable communication between the refrigerating chamber exhaust hole 16 and the freezing chamber drain hole 17, and air can flow freely between the refrigerating chamber 11 and the freezing chamber 12. The size of the exhaust hole 16 is greater than that of the refrigerating chamber drain hole 5.

[0025] The position of the exhaust hole 16 is higher than that of the refrigerating chamber drain hole 5 in a vertical direction, the exhaust hole 16 is provided thereon with an exhaust hole cover 2, the exhaust hole cover 2 has multiple small holes thereon to allow air passing, and in order to avoid that condensate water on the refrigerating chamber rear wall 14 enters into the exhaust hole 16, a surface of the exhaust hole cover 2 is provided with multiple ribs used to guide water.

[0026] As the refrigerating chamber 11 is easy to smell bad when storing food therein, in order to prevent odors from entering into the freezing chamber 12, an air filtering device 18 is disposed in the exhaust pipe 19, the air filtering device 18 can use a carbon bag with strong adsorption, and the carbon bag, in addition to absorbing odors in the air, can also adsorb a small amount of water vapor contained in the air entering into the exhaust pipe 19.

[0027] The air filtering device 18 is disposed on one side of the exhaust pipe 19 that is near the refrigerating chamber exhaust hole 16, which can avoid that the air filtering device 18 is condensed due to absorbing water vapor.

[0028] The three-way joint 1 divides the freezing chamber drain pipe 21 into two parts, the first part 3 of the freezing chamber drain pipe 21 is a section between the three-way joint 1 and the freezing chamber drain hole 17, and the second part 20 of the freezing chamber drain pipe 21 is a remaining part of the freezing chamber drain pipe 21 connected with the three-way joint 1. As the first part 3 of the freezing chamber drain pipe 21 is near the freezing chamber 12, in order to prevent water coated on inner walls of the freezing chamber drain pipe 21 from condensing here to produce blockage, an outer wall of the first part 3 of the freezing chamber drain pipe 21 is wound with a heater strip for periodic heating.

Reference signs:

[0029]

- 1: three-way joint;
- 2: exhaust hole plug;
- 3: first part of the freezing chamber drain pipe;
- 4: heater strip;
- 5: refrigerating chamber drain hole;
- 6: refrigerating chamber drain pipe;
- 7: refrigerating chamber bottom wall;
- 10: refrigerator;
- 11: refrigerating chamber;
- 12: freezing chamber;
- 13: gap wall;
- 14: refrigerating chamber rear wall;
- 15: freezing chamber rear wall;
- 16: refrigerating chamber exhaust hole;
- 17: freezing chamber drain hole;
- 18: air filtering device;
- 19: exhaust pipe;
- 20: second part of the freezing chamber drain pipe;
- 21: freezing chamber drain pipe.

Claims

1. A refrigerator, comprising a first storage chamber (11) and a second storage chamber (12), wherein a set temperature of the first storage chamber (11) is higher than that of the second storage chamber (12), the first storage chamber (11) has a first drain hole (5) and a first drain pipe (6) connecting the first drain hole (5), and the second storage chamber (12) has a second drain hole (17) and a second drain pipe (21) connecting the second drain hole (17), **characterized by:** further comprising an exhaust pipe (19), wherein the first storage chamber (11) has an exhaust hole (16), the exhaust pipe (19) is connected

with the second drain pipe (21) and the exhaust hole (16) is in communication with the second drain hole (17).

2. The refrigerator according to claim 1, **characterized in that:** the exhaust hole (16) is provided thereon with a water retaining device (2) that blocks water in the first storage chamber (11) from entering into the exhaust pipe (19).
3. The refrigerator according to claim 2, **characterized in that:** the water retaining device (2) is an exhaust hole cover that can allow air passing.
4. The refrigerator according to claim 1, **characterized in that:** the exhaust pipe (19) is internally provided with an air filtering device (18).
5. The refrigerator according to claim 1, **characterized in that:** the exhaust hole (16) is formed on a vertical wall (14) of the first storage chamber (11), and an opening direction of the exhaust hole (16) is perpendicular to the vertical wall (14).
6. The refrigerator according to claim 1, **characterized in that:** the second drain pipe (21) comprises a U-shaped pipe.
7. The refrigerator according to claim 1, **characterized in that:** the second storage chamber (12) is internally provided with an evaporator, the second drain hole (17) is located below the evaporator, and the second drain hole (17) is used to discharge defrosting water of the evaporator.
8. The refrigerator according to claim 1, **characterized in that:** a heater strip (4) is disposed in a position that is on the second drain pipe (21) and is near the second drain hole (17).
9. The refrigerator according to claim 8, **characterized in that:** the heater strip (4) is disposed on the second drain pipe (21) in a winding manner.
10. The refrigerator according to claim 1, **characterized by:** further comprising a three-way joint (1), wherein the exhaust pipe (19) is connected to the second drain pipe (21) through the three-way joint (1).
11. The refrigerator according to claim 1, **characterized in that:** the first storage chamber (11) is a refrigerating chamber, and the second storage chamber (12) is a freezing chamber.

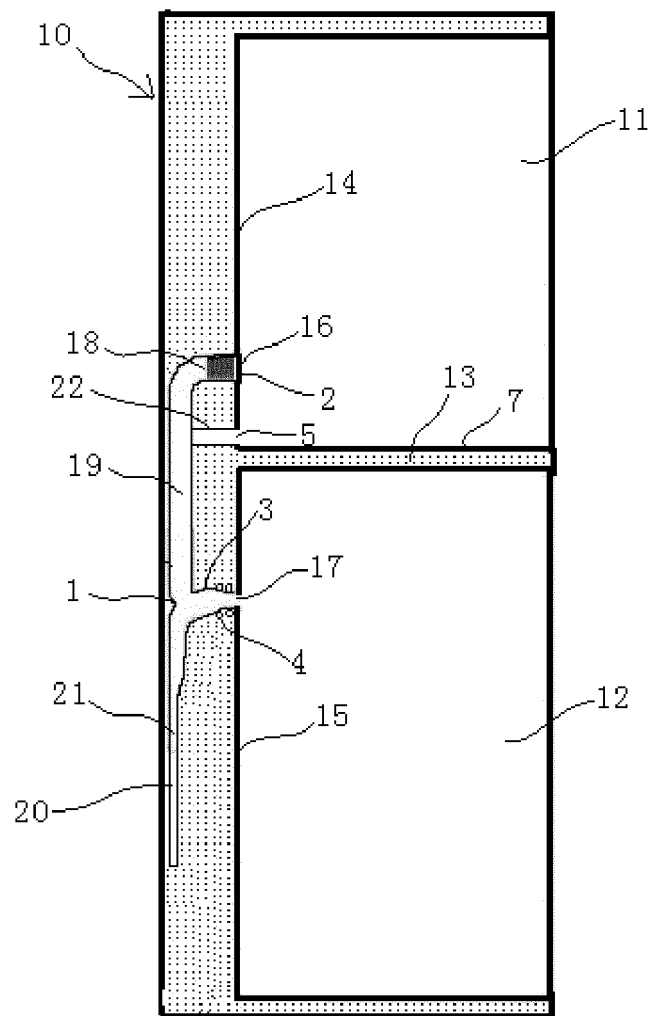


FIG. 1

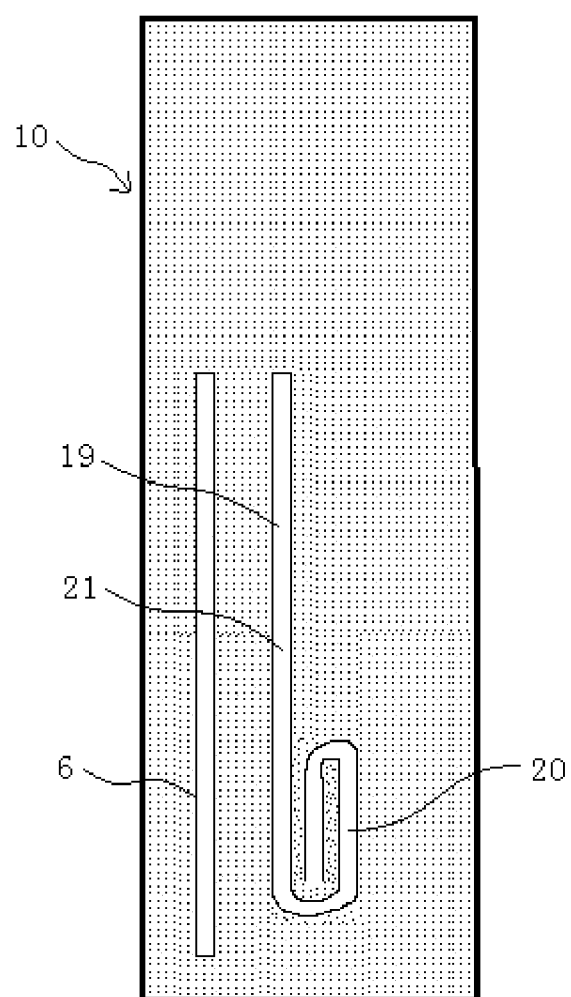


FIG. 2



EUROPEAN SEARCH REPORT

Application Number
EP 15 19 7476

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	JP H11 132640 A (SANYO ELECTRIC CO) 21 May 1999 (1999-05-21)	1-5,7-11	INV. F25D21/14
Y	* paragraphs [0004] - [0029]; figures 1-5 *	6	
Y	----- JP H02 272286 A (SANYO ELECTRIC CO) 7 November 1990 (1990-11-07) * the whole document * -----	6	
			TECHNICAL FIELDS SEARCHED (IPC)
			F25D
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 14 April 2016	Examiner Kolev, Ivelin
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03/02 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 15 19 7476

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP H11132640 A	21-05-1999	JP 3634600 B2 JP H11132640 A	30-03-2005 21-05-1999
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JP H02272286 A	07-11-1990	NONE	
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82