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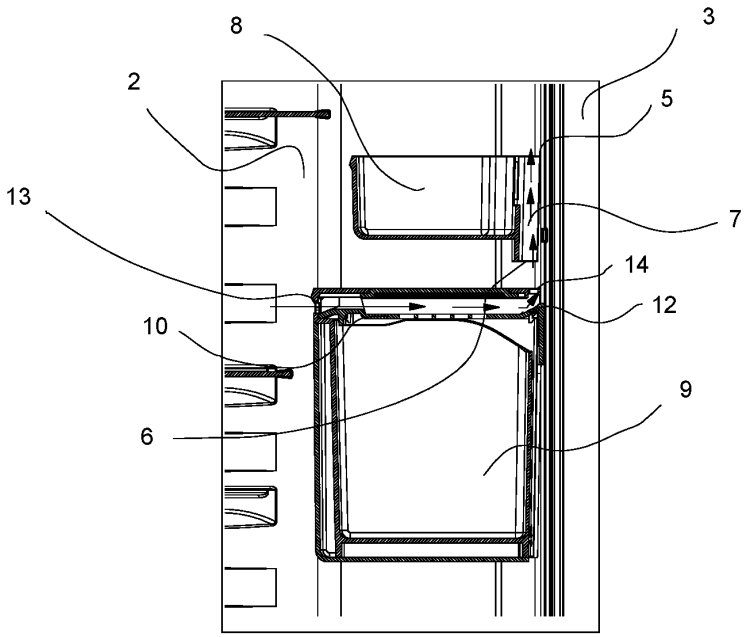
(54) **A REFRIGERATOR COMPRISING A RECEPTACLE WITH HUMIDITY CONTROL**

(57) The present invention relates to a refrigerator (1) comprising a body (2); a door (3) which provides access into the body (2); a receptacle (9) which is disposed on the door (3), which is suitable for vegetables and fruits therein and which has a perforated cover (10) for discharging the moisture therein and a lid (11) which is placed on the perforated cover (10); and a door shelf (8) which is disposed on the door (3) so as to remain above the receptacle (9), the receptacle (9) having an air inlet port (13) through which the cold air coming from the body (2) enters the receptacle (9), an air outlet port (14) through which said air exits the receptacle (9) and a ramp (12) which enables the air sweeping the perforated cover (10) to be guided towards the air outlet port (14); an air discharge hole (5) which is provided on the door shelf (8); and a guiding member (7) which enables the air exiting through the air outlet port (14) to be guided towards the air discharge hole (5).

Figure 3



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Description

[0001] The present invention relates to a refrigerator wherein humidity and sweating control is performed in a crisper which is disposed on the door.

[0002] The amount of water that vegetables and fruits contain in ideal storage conditions varies according to various criteria. Therefore, each vegetable or fruit cannot be kept fresh for longer when stored in the refrigerator at +4°C. Therefore, consumers do not prefer to store tropical fruits/vegetables such as avocados and bananas in the refrigerator, and they keep such fruits/vegetables at room temperature. However, foodstuffs start to deteriorate because they ripen quickly in this manner. A compartment warmer than +4°C is needed to keep vegetables and fruits which prefer hot climate and are sensitive cold like tomatoes, cucumbers, bananas, avocados, eggplants, zucchini and peppers fresh for a longer period of time. In some state of the art refrigerators, crispers are used where a temperature of +8 °C is provided by means of a heater. Moreover, in the state of the art, there are embodiments where receptacles placed in the door, which have a relatively higher temperature than the body temperature, are used as crisper. However, in such embodiments, various problems arise such as controlling the internal temperature of the refrigerator and ensuring the insulation of the compartment. For example, in a crisper comprising a heater, the heat effect created by the heater should not spread into the body and cause other foodstuffs to deteriorate. Moreover, it is known that the problem of humidity and sweating arises in crispers in the form of a receptacle placed on the door without any heater due to the failure to effectively discharge the cold air coming from the body from the compartment.

[0003] In the state of the art United States of America Patent Document No. US9097457B2, a leakproofing chamber is disclosed, which is positioned on the refrigerator door shelf. The document further discloses a U-shaped sealing member (gasket) which provides the leakproofing of said chamber. Thus, it is also disclosed that cold air is prevented from entering the chamber.

[0004] In the state of the Korean Utility Model Document No. KR19980057503U, a crisper is disclosed, which is provided on the door and which is received by a housing provided in the body when the door is closed.

[0005] The aim of the present invention is the realization of a refrigerator comprising a receptacle which can be placed on the door which allows the storage of vegetables and fruits requiring a temperature higher than + 4°C to keep fresh and wherein moisture/sweating can be controlled.

[0006] Another aim of the present invention is to keep tropical vegetables and fruits such as bananas and avocados fresh for a longer period of time in the refrigerator.

[0007] In the refrigerator of the present invention, the receptacle disposed on the inner surface (the plastic inner lining of the door) facing the body when the door is closed comprises a receptacle body suitable for placing fruits and vegetables, a perforated cover covering the receptacle body and having at least one perforation allowing air flow, and a lid placed on the perforated cover. The average temperature of the receptacle is at least 3 °C higher than the general set temperature of the refrigerator due to the position of the receptacle on the door inner lining.

[0008] In the refrigerator of the present invention, the receptacle placed on the door inner lining has a length and width so as not to touch the body shelves when the door is closed. For example, the receptacle can be attached to the door inner lining so as to enter between the two horizontal shelves placed in the body when the door is closed. In another embodiment, the refrigerator may comprise body shelves with dimensions (width and height) so as not to hit the receptacle when the door is closed.

[0009] The receptacle comprises an air inlet port which enables the air circulating in the body to enter the receptacle, and an air outlet port which enables the air to exit the receptacle. The air inlet port and the air outlet port are in the form of a hole/opening in the receptacle body. The cold air entering through the air inlet port sweeps over the perforated cover and moves towards the air outlet port. The receptacle has a ramp disposed on the perforated cover. The ramp is in the form of a curved end which extends from the perforated cover to the door inner lining.

[0010] In the refrigerator of the present invention, the door shelf is attached to the door by leaving some distance (for example, 3 cm to 10 cm) above the receptacle. The door shelf base and the receptacle cover are placed one above the other. The air circulating in the refrigerator body enters through the air inlet port, sweeps the perforated cover and passes through the ramp, and is thus directed towards the air outlet port. The air directed upwards comes out through the air outlet port. The door shelf comprises an air discharge hole which enables the air coming from the receptacle to be discharged back to the body.

[0011] In an embodiment of the present invention, the door shelf comprises an air inlet hole which is provided just above the air outlet port in the receptacle, a channel-shaped guiding member which extends from the air inlet hole and which enables the air coming out of the receptacle to be directed to the door shelf, and an air discharge hole through which air passing through the guiding member is discharged from the door shelf. Thus, the air coming from the receptacle passes to the door shelf through the channel-shaped guiding member and is discharged into the body through the air discharge hole. Consequently, moisture and sweating in the receptacle is controlled.

[0012] In an embodiment of the present invention, the length of the channel-shaped guiding member is almost equal to the length of the door shelf.

[0013] In an embodiment of the present invention, the inner lining of the refrigerator door is thinned at one part. The thinned part has a smaller thickness of insulation

than the insulation thickness of the door. The receptacle is placed in the thinned area formed in the form of a pocket on the door inner lining. Thus, the temperature inside the receptacle is increased even more than the temperature inside the body. For example, when the receptacle is installed in a thinned area on the door, the interior temperature of the receptacle is higher than when mounted on the door inner lining in the normal form (without thinned insulation).

[0014] In said embodiment, the receptacle is seated into the door pocket. In this embodiment, the air guided over the ramp and exiting the air outlet port rises towards the door shelf by means of the radial structure of a cavity-shaped guiding member in the door pocket behind the door shelf. By means of the air discharge hole on the door shelf, the air is discharged through the door shelf towards the body. In this embodiment of the present invention, the air discharge hole is at least one hole located on the rear wall of the door shelf.

[0015] In an embodiment of the present invention, the door pocket is formed by thinning the insulation on the door inner lining by 30 mm.

[0016] In the embodiment of the present invention where the door shelf of the refrigerator comprises the channel-shaped guiding member, the receptacle and the door shelf can be placed in the pocket on the door.

[0017] In the embodiment of the present invention where the door pocket comprises the cavity-shaped guiding member, the ramp and the cavity-shaped guiding member have an angle of 15 to 45 degrees. The angle of the ramp is the angle between the perforated cover and the protrusion-shaped structure of the ramp extending upwards. The angle of the guiding member is the angle formed due to the radial structure of the cavity form.

[0018] In an embodiment of the present invention, the receptacle has a double-walled structure formed by adding insulation material between a first wall and a second wall. In this embodiment, materials such as air, argon gas, styrofoam, polyurethane to increase insulation can be used for insulation.

[0019] By means of the present invention, a refrigerator is realized, comprising a door having a receptacle which has an inner temperature increased with respect to the temperature of the body without using a heater, which is controlled in terms of moisture and sweating and which is suitable for placing vegetables and fruits that can be stored for a long time at temperatures higher than +4 °C.

[0020] The model embodiments related to the refrigerator realized in order to attain the aim of the present invention are shown in the attached figures, where:

Figure 1 - is the front view of the refrigerator of the present invention in an embodiment.

Figure 2 - is the sideways view of the cross-section A-A in Figure 1.

Figure 3 - is the detailed view of the B region in Figure 2.

Figure 4 - is the detailed view of the receptacle and the door shelf in the refrigerator of the present invention in an embodiment.

Figure 5 - is the exploded view of the receptacle in the refrigerator of the present invention in an embodiment.

Figure 6 - is the front view of the refrigerator of the present invention in another embodiment.

Figure 7 - is the front view of the door inner lining and the cross-section B-B in the refrigerator of the present invention in an embodiment.

Figure 8 - is the sideways view of the cross-section F-F in Figure 6.

Figure 9 - is the detailed view of the region G in Figure 8.

Figure 10 - is the cutaway view of the region G in Figure 8 from another angle.

[0021] The elements illustrated in the figures are numbered as follows:

1. Refrigerator
2. Body
3. Door
4. Door pocket
5. Air discharge hole
6. Air inlet hole
7. Guiding member
8. Door shelf
9. Receptacle
10. Perforated cover
11. Lid
12. Ramp
13. Air inlet port
14. Air outlet port
15. First wall

16. Second wall

[0022] The refrigerator (1) comprises a body (2); a door (3) which provides access into the body (2); a receptacle (9) which is disposed on the door (3), which is suitable for vegetables and fruits therein and which has a perforated cover (10) for discharging the moisture therein and a lid (11) which is placed on the perforated cover (10); and a door shelf (8) which is disposed on the door (3) so as to remain above the receptacle (9).

[0023] The refrigerator (1) of the present invention comprises the receptacle (9) having an air inlet port (13) through which the cold air coming from the body (2) enters the receptacle (9), an air outlet port (14) through which said air exits the receptacle (9) and a ramp (12) which enables the air sweeping the perforated cover (10) to be guided towards the air outlet port (14); an air discharge hole (5) which is provided on the door shelf (8); and a guiding member (7) which enables the air exiting through the air outlet port (14) to be guided towards the air discharge hole (5).

[0024] In the refrigerator (1) of the present invention, a door shelf (8) is provided on a receptacle (9) placed on the door (3). The air inside the body (2) enters the receptacle (9) through the air inlet port (13). The air passing by sweeping the perforated cover (10) between the cover (11) and the perforated cover (10) is guided to the air outlet port (14) by means of the ramp (12). By means of the guiding member (7) which enables the air exiting through the air outlet port (14) to be guided to the door shelf (8), the air passing through the receptacle (9) reaches the air discharge hole (5) provided on the door shelf (8). Thus, the cold air coming from the body (2) is effectively discharged from the receptacle (9). Mixing of the air in the receptacle (9), which is warmer than the body (2), and the air coming from the body (2) in the receptacle (9) is prevented and the formation of sweating/moisture is eliminated.

[0025] In an embodiment of the present invention, the refrigerator (1) comprises a channel-shaped guiding member which is disposed between the door shelf (8) and the door (3) so as to be almost just above the air outlet port (14) and which has an air inlet hole (6) at one end and an air discharge hole (5) at the other end. In this embodiment, the air inlet hole (6) at the door shelf (8) is located just above the air outlet port (14) in the receptacle (9). The air exiting through the air outlet port (14) passes directly through the air inlet hole (6) and then passes through the channel-shaped guiding member (7) so as to rise towards the door shelf (8). The air exits through the air discharge hole (5) and leaves the door shelf (8) so as to be released back into the body (2) (Figure 2 and Figure 3).

[0026] The refrigerator (1) of the present invention comprises the receptacle (9) which is, when the door (3) is closed, placed in a door pocket (4) formed on the part of the door (3) facing the body (2); a cavity-shaped guiding member (7) which is provided on the door pocket (4) and which enables the air guided from the ramp (12) to the air outlet port (14) to be guided towards the door shelf (8); and at least one air discharge hole (5) which allows the air passing through the guiding member (7) to be discharged from the door shelf (8). In this embodiment, the cavity-shaped guiding member (7) at the door pocket (4) wherein the receptacle (9) is placed enables the air to be guided from the air outlet port (14) directly to the door shelf (8). Thus, the cold air entering the receptacle (9) is efficiently discharged (Figure 8, Figure 9 and Figure 10).

[0027] In an embodiment of the present invention, the refrigerator (1) comprises an air outlet port (14) with a cross-sectional area equal to or greater than the cross-sectional area of the air inlet port (13), and the door shelf (8) comprising a plurality of air discharge holes (5) with a cross-sectional area equal to the cross-sectional area of the air outlet port (14) or greater than the cross-sectional area of the air outlet port (14). By means of the relationship between said cross-sectional areas, the most effective air discharge is provided and the problem of sweating in the receptacle (9) is prevented.

[0028] In an embodiment of the present invention, the refrigerator (1) comprises the door pocket (4) having the cavity-shaped guiding member (7) with an angle of between 15 and 45 degrees, and the receptacle (9) having the ramp (12) with an angle of between 15 and 45 degrees. By means of said angles, the entire air coming from the ramp (12) sweeps the ramp (12) properly and is guided to the door shelf (8) from the cavity-shaped guiding member (7) without any loss.

[0029] In an embodiment of the present invention, the refrigerator (1) comprises the receptacle (9) having a ramp (12) with at an angle equal to that of the cavity-shaped guiding member (7). Thus, the air is enabled to be effectively swept from over the ramp (12) and the guiding member (7).

[0030] In an embodiment of the present invention, the refrigerator (1) comprises the receptacle (9) having a first wall (15), a second wall (16) and insulation disposed between the first wall (15) and the second wall (16). Thus, the temperature of the receptacle (9) is maintained.

[0031] In an embodiment of the present invention, the refrigerator (1) comprises the receptacle (9) having an insulation material such as air, argon gas, styrofoam, and polyurethane which increases insulation.

[0032] By means of the present invention, a refrigerator (1) is realized, comprising a moisture discharge system such that the air coming from the body (2) which is colder than the inside of the receptacle (9) is discharged without causing sweating problems in the receptacle placed on the door (3).

Claims

1. A refrigerator (1) **comprising** a body (2); a door (3) which provides access into the body (2); a receptacle

(9) which is disposed on the door (3), which is suitable for vegetables and fruits therein and which has a perforated cover (10) for discharging the moisture therein and a lid (11) which is placed on the perforated cover (10); and a door shelf (8) which is disposed on the door (3) so as to remain above the receptacle (9), **characterized by** the receptacle (9) having an air inlet port (13) through which the cold air coming from the body (2) enters the receptacle (9), an air outlet port (14) through which said air exits the receptacle (9) and a ramp (12) which enables the air sweeping the perforated cover (10) to be guided towards the air outlet port (14); an air discharge hole (5) which is provided on the door shelf (8); and a guiding member (7) which enables the air exiting through the air outlet port (14) to be guided towards the air discharge hole (5).

2. A refrigerator (1) as in Claim 1, **characterized by** a channel-shaped guiding member which is disposed between the door shelf (8) and the door (3) so as to be almost just above the air outlet port (14) and which has an air inlet hole (6) at one end and an air discharge hole (5) at the other end.

3. A refrigerator (1) as in Claim 1 or 2, **characterized by** the receptacle (9) which is, when the door (3) is closed, placed in a door pocket (4) formed on the part of the door (3) facing the body (2); a cavity-shaped guiding member (7) which is provided on the door pocket (4) and which enables the air guided from the ramp (12) to the air outlet port (14) to be guided towards the door shelf (8); and at least one air discharge hole (5) which allows the air passing through the guiding member (7) to be discharged from the door shelf (8).

4. A refrigerator (1) as in Claim 3, **characterized by** an air outlet port (14) with a cross-sectional area equal to or greater than the cross-sectional area of the air inlet port (13), and the door shelf (8) comprising a plurality of air discharge holes (5) with a cross-sectional area equal to the cross-sectional area of the air outlet port (14) or greater than the cross-sectional area of the air outlet port (14).

5. A refrigerator (1) as in Claim 3 or 4, **characterized by** the door pocket (4) having the cavity-shaped guiding member (7) with an angle of between 15 and 45 degrees, and the receptacle (9) having the ramp (12) with an angle of between 15 and 45 degrees.

6. A refrigerator (1) as in Claim 5, **characterized by** the receptacle (9) having a ramp (12) with at an angle equal to that of the cavity-shaped guiding member (7).

7. A refrigerator (1) as in any one of the above claims, **characterized by** the receptacle (9) having a first wall (15), a second wall (16) and insulation disposed between the first wall (15) and the second wall (16).

8. A refrigerator (1) as in Claim 7, **characterized by** the receptacle (7) having an insulation material such as air, argon gas, styrofoam, and polyurethane which increases insulation.

Figure 1

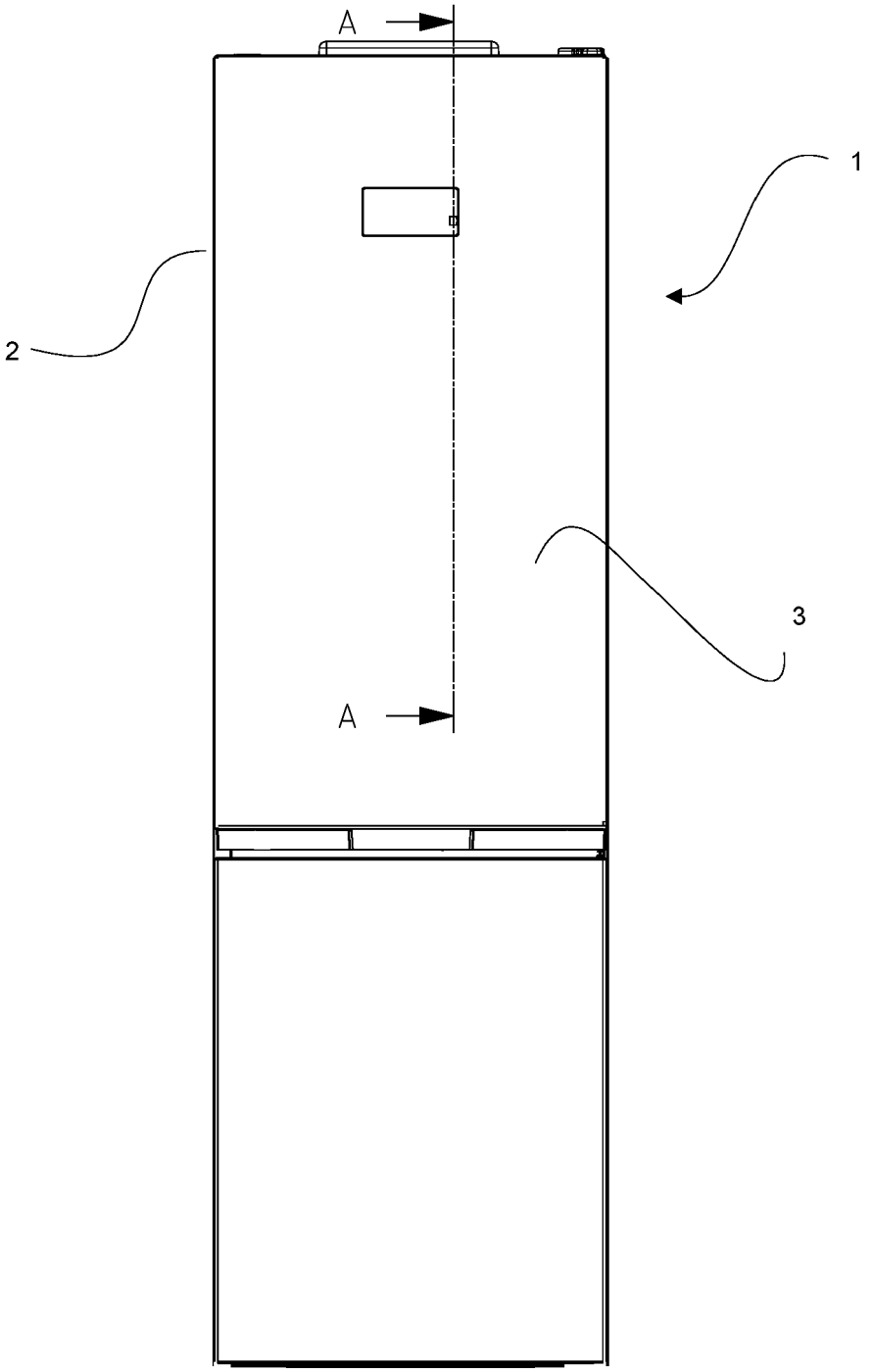


Figure 2

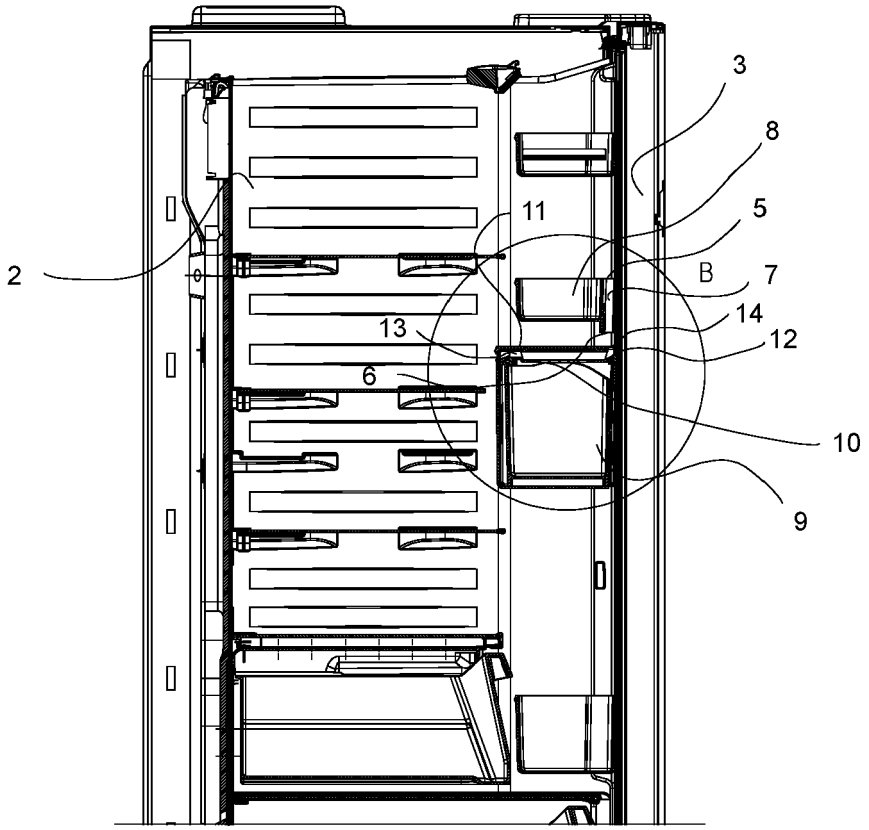


Figure 3

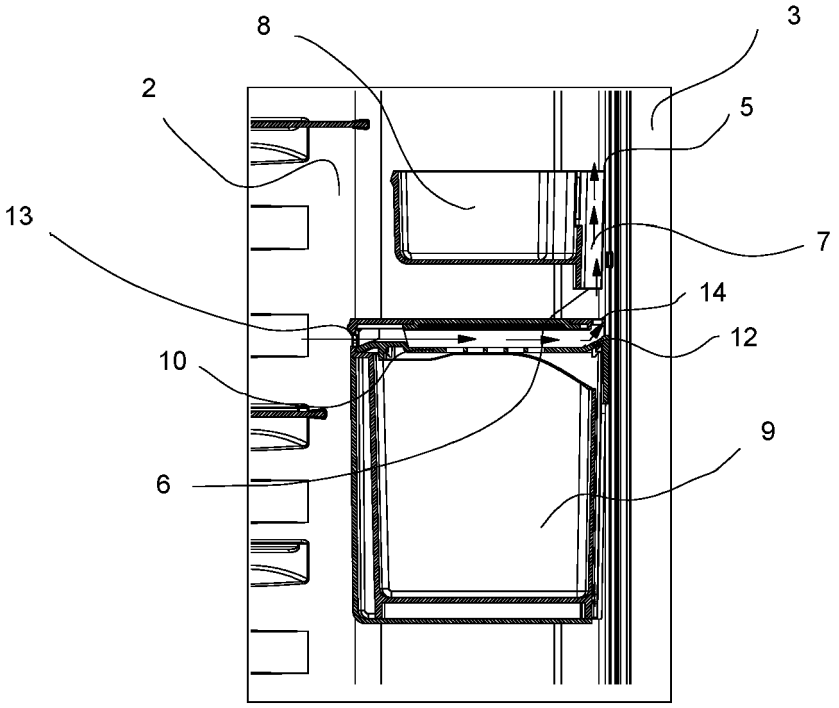


Figure 4

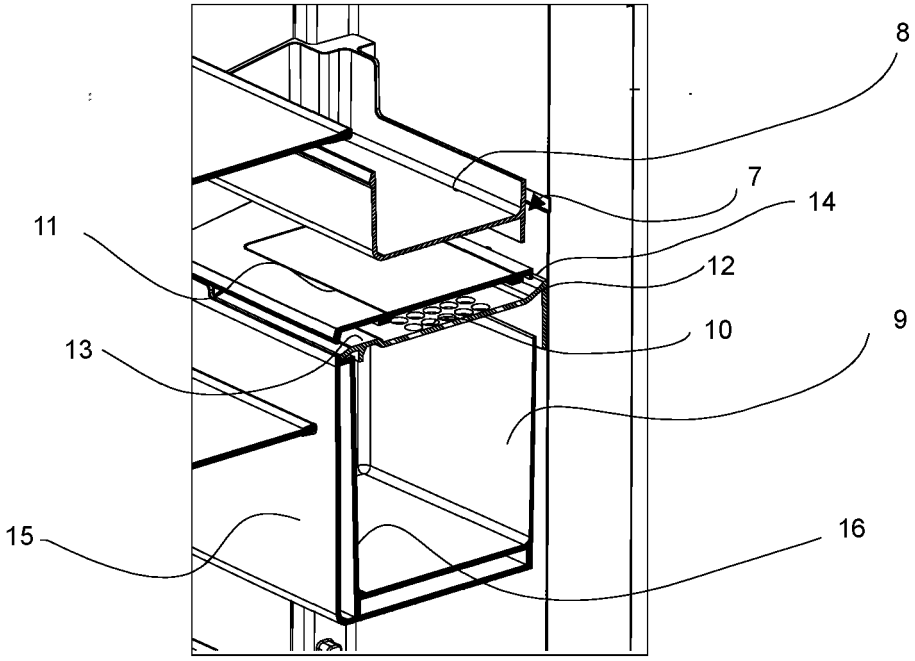


Figure 5

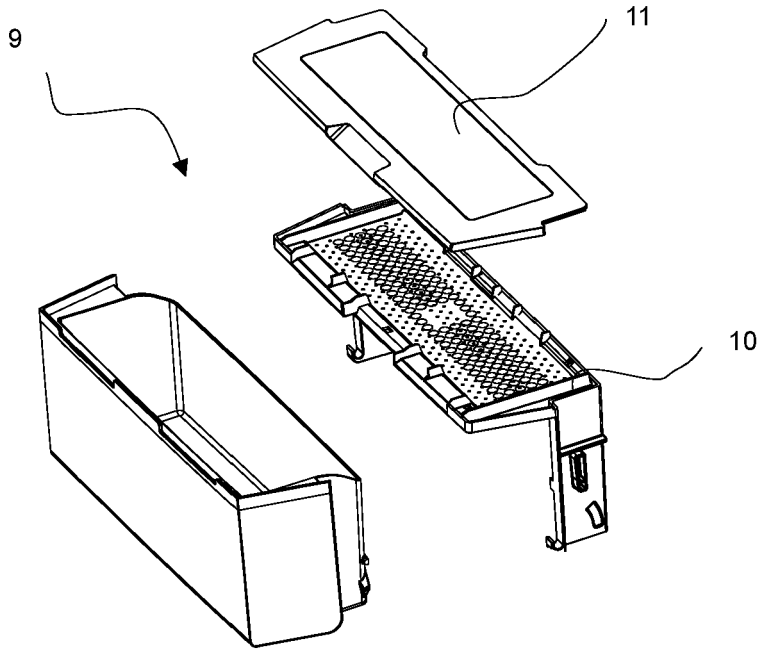


Figure 6

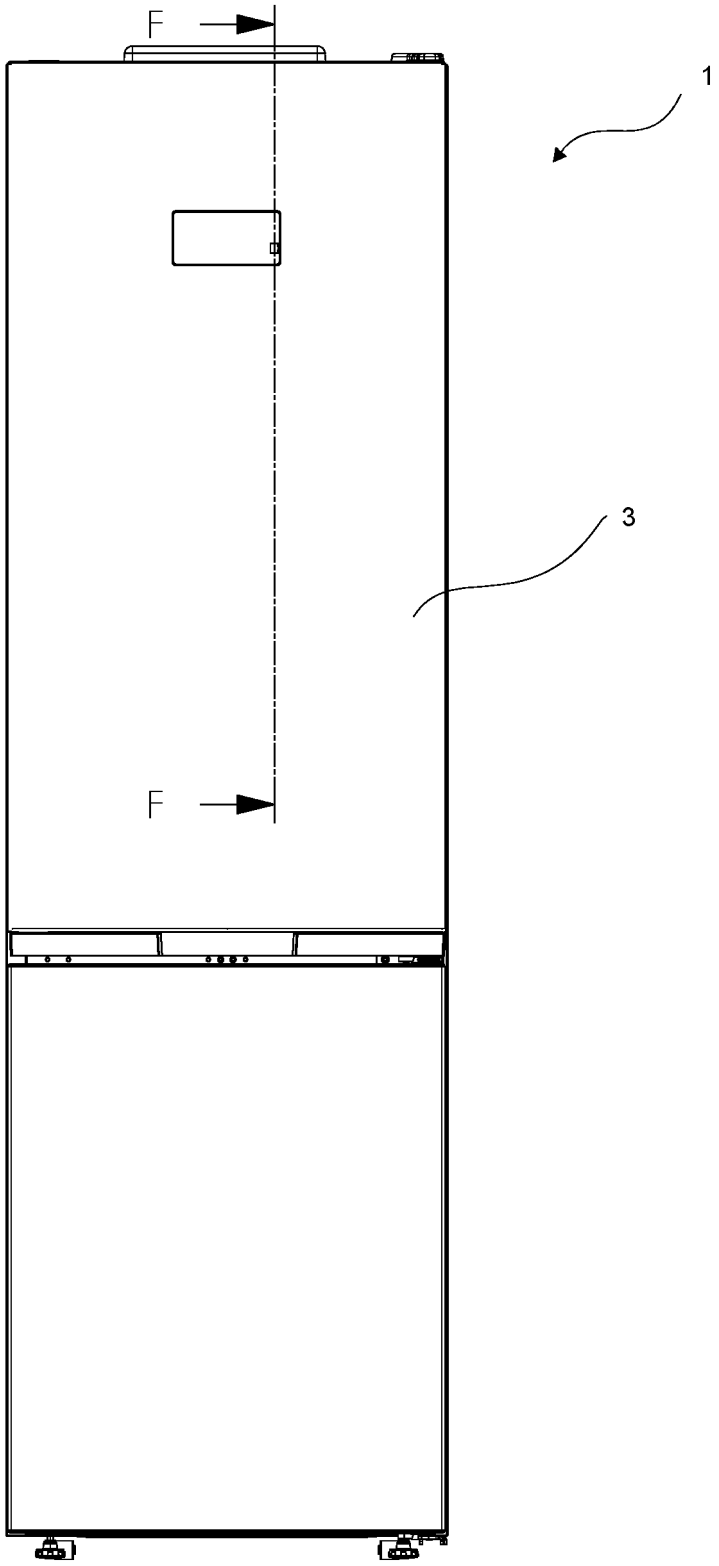


Figure 7

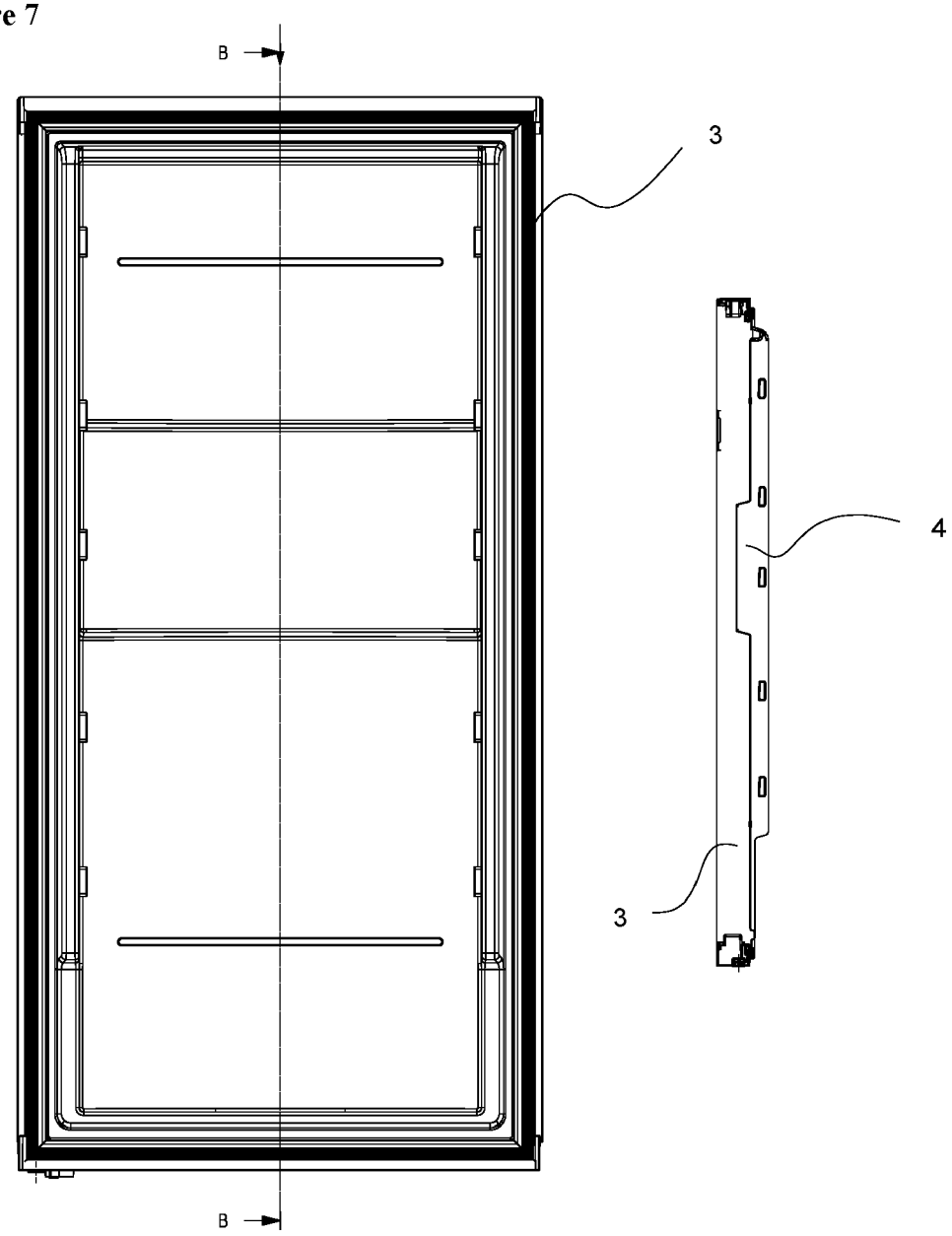


Figure 8

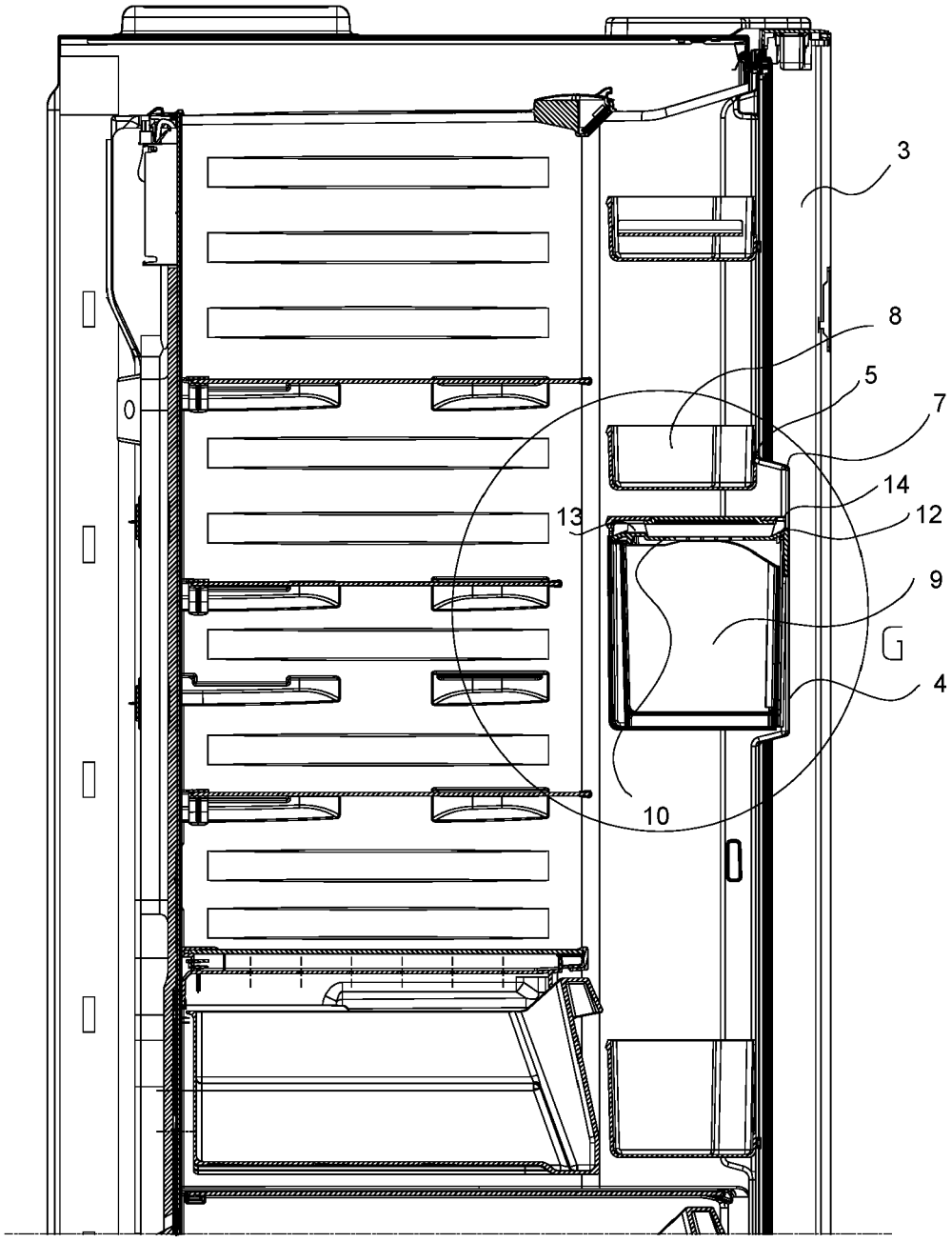


Figure 9

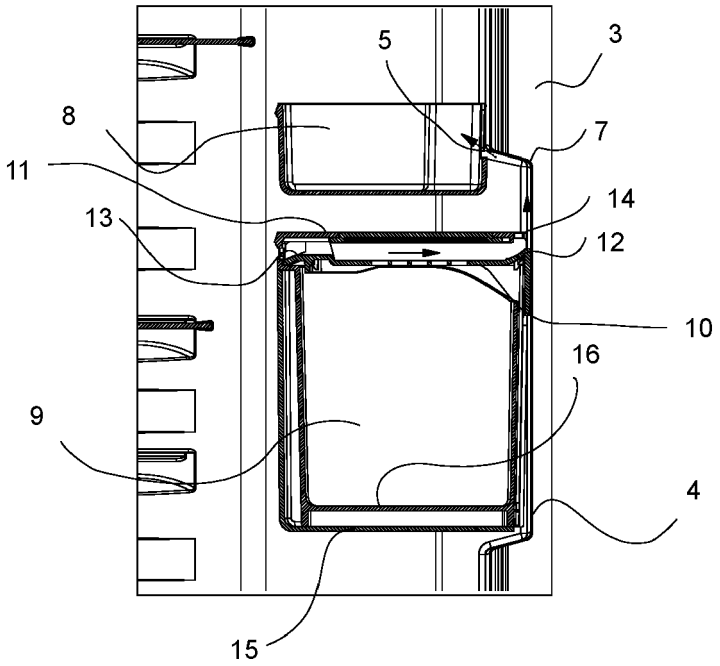
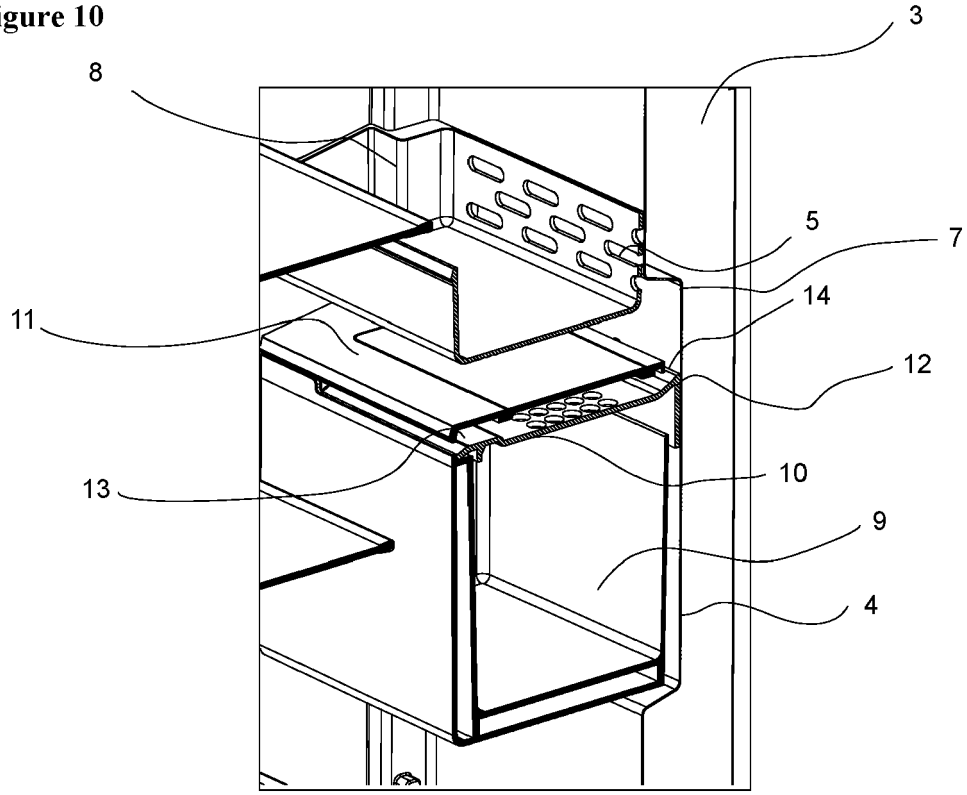


Figure 10



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EUROPEAN SEARCH REPORT

Application Number
EP 23 18 8653

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 2022/003487 A1 (KIM NAYOUNG [KR]) 6 January 2022 (2022-01-06) * figures 2,4 *	1-8	INV. F25D17/04 F25D23/04
A	CN 203 036 992 U (HEFEI MIDEA ROYALSTAR REFRIGER) 3 July 2013 (2013-07-03) * the whole document *	1-8	
A	WO 2022/140018 A1 (ELECTROLUX HOME PROD INC [US]) 30 June 2022 (2022-06-30) * the whole document *	1	

TECHNICAL FIELDS SEARCHED (IPC)

F25D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	12 February 2024	de Graaf, Jan Douwe

CATEGORY OF CITED DOCUMENTS

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2022003487 A1	06-01-2022	KR 20220003832 A	11-01-2022
		US 2022003487 A1	06-01-2022
CN 203036992 U	03-07-2013	NONE	
WO 2022140018 A1	30-06-2022	CN 116710722 A	05-09-2023
		US 11268750 B1	08-03-2022
		WO 2022140018 A1	30-06-2022

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Patent documents cited in the description

- US 9097457 B2 **[0003]**
- KR 19980057503 U **[0004]**