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(54) **REFRIGERATOR**

(57) The present invention relates to a refrigerator. The refrigerator comprises a receiving chamber (3) including a front opening (4), the receiving chamber (3) further including a bottom wall (8); a low pressure storage container (6) which is removably received in the receiving chamber (3), the low pressure storage container including an air outlet for container (24) which fluidly communicates with an interior space of the low pressure storage container,; and an air extracting system, the air extracting system including a vacuum bump (16) and an extracting passage (17), the extracting passage (17) including a refrigerator body extraction opening (23) which is used to abut with the air outlet for container (24). According to the present invention, the refrigerator further comprises a guiding device (25) which is used to define a movement track of the low pressure storage container (6) in the receiving chamber (3), said guiding device (25) is provided such that after the low pressure storage container (25) is received in the receiving chamber (3), the air outlet for container (24) is appropriately aligned with the refrigerator body extraction opening (23).

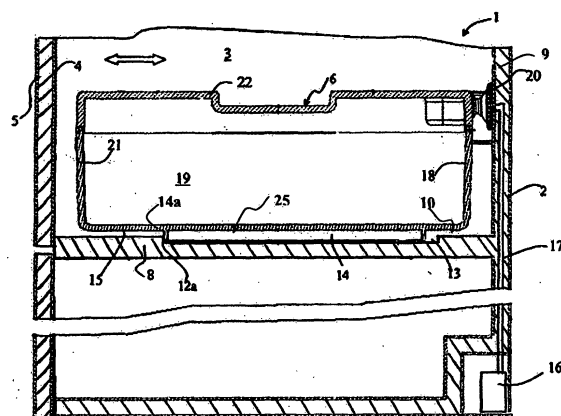


Figure 1

Description

FIELD OF THE INVENTION

[0001] The present invention relates to a refrigerator, more particularly to a house-hold or commercial refrigerator comprising a low pressure storage container.

BACKGROUND

[0002] A refrigerator comprising a low pressure storage container is well known in the art. For example, EP 0 450 680 A2 discloses a refrigerator, which refrigerator comprises a low pressure storage container received in a receiving chamber and an air extracting system used to extract air from the low pressure storage container. The air extracting system comprises a vacuum bump and an extracting pipe, which extracting pipe is at one end thereof connected with the vacuum bump, and the other end of the extracting pipe is provided on a rear wall of the receiving chamber so as to establish a connection with the low pressure storage container. The low pressure storage container is connected with a door of the receiving chamber and moves with the movement of the door. When the door is closed, a suction nozzle provided at a rear side of the low pressure storage container is connected with the end of the extracting pipe which is provided on the rear wall such that the vacuum bump is fluidly communicated with the low pressure storage container. Since the movement track of the door is unchanged, the suction nozzle after the door being closed can be naturally connected with the extracting pipe just by controlling the positional relationship between the door and the low pressure storage container and the positional relationship between the suction nozzle and the corresponding end of the extracting pipe during manufacturing.

[0003] However, if the movement of the low pressure storage container in the receiving chamber is irrelevant to the movement of the door, that is, if the movement track of the low pressure storage container is independent of the movement of the door, it will be most critical that an accurate and reliable connection is established between the low pressure storage container and the extracting pipe.

SUMMARY OF THE INVENTION

[0004] Therefore, it is an objective of the present invention to solve at least one of the above-mentioned technical problems such that independent of the movement of the door, an accurate and convenient connection may be established between the low pressure storage container which is removably held in the refrigerator and the air extracting system.

[0005] The present invention relates to a refrigerator, comprising: a receiving chamber including a front opening, the receiving chamber further including a bottom

wall; a door for selectively and at least partly opening and closing the front opening; a low pressure storage container which is removably received in the receiving chamber, the low pressure storage container including an air outlet for container which fluidly communicates with an interior space of the low pressure storage container, wherein the low pressure storage container can be placed into or taken out of the receiving chamber in a manner independent of the movement of the door; and an air extracting system, the air extracting system including a vacuum bump and an extracting passage which is used to implement fluid communication between the vacuum bump and the low pressure storage container, the extracting passage including a refrigerator body extraction opening which is used to abut with the air outlet for container; **characterized in that** the refrigerator further comprises a guiding device which is used to define a movement track of the low pressure storage container in the receiving chamber, said guiding device is provided such that after the low pressure storage container is received in the receiving chamber, the air outlet for container is appropriately aligned with the refrigerator body extraction opening.

[0006] In this way, the low pressure storage container can be conveniently and accurately introduced into the receiving chamber and the connection between the low pressure storage container and the air extracting system can be accurately established.

[0007] Other individual technical features or their combinations which are considered as technical features having the characteristic of the present invention will be explained in the attached claims.

[0008] According to a particularly preferred embodiment of the present invention, the guiding device comprises at least a guiding groove.

[0009] According to a preferred embodiment of the present invention, the guiding groove is provided on the bottom wall and extends in a fore-and-aft direction. The low pressure storage container comprises a projection which projects downwards from a bottom surface of the low pressure storage container. After the low pressure storage container is inserted in the receiving chamber, the projection is at least partly received in the guiding groove.

[0010] According to a preferred embodiment of the present invention, after the low pressure storage container is inserted in the receiving chamber, the projection bears against a front inner wall of the guiding groove to prevent the low pressure storage container from moving towards the front opening and thus to tightly connect the refrigerator body extraction opening to the air outlet for container.

[0011] According to a preferred embodiment of the present invention, the length of the guiding groove in the fore-and-aft direction is larger than the length of the projection in the fore-and-aft direction.

[0012] According to a preferred embodiment of the present invention, the guiding groove is located at a lower

wall of the low pressure storage container and extends in the fore-and-aft direction. The bottom wall comprises a projection projecting upwards from an upper surface of the bottom wall. When the low pressure storage container is inserted in the receiving chamber, the projection is at least partly received in the guiding groove.

[0013] According to a preferred embodiment of the present invention, when the low pressure storage container is received in the receiving chamber, there is a gap formed between the bottom surface of the low pressure storage container and the bottom wall, which gap fluidly communicates with the receiving chamber.

[0014] According to a particularly preferred embodiment of the present invention, the longitudinal height of the projection is larger than the longitudinal depth of the guiding groove such that a gap is formed between the low pressure storage container and the bottom wall. Particular preferably, the height of the projection is larger than the depth of the guiding groove at least by 3 millimeter, for example 4–5 millimeter.

[0015] According to a preferred embodiment of the present invention, the bottom wall comprises at least a depressed area which depresses downwards from the bottom wall and which is under the low pressure storage container and fluidly communicates with the receiving chamber. Therefore, the influence to air circulation in the receiving chamber due to the existence of the low pressure storage container can be greatly reduced.

[0016] According to a preferred embodiment of the present invention, the depressed area is between the guiding devices, and separates from the guiding devices by a predefined distance respectively.

[0017] According to a particularly preferred embodiment of the present invention, the bottom wall comprises at least a depressed area depressing downwards from the bottom wall. The depressed area is under the low pressure storage container and fluidly communicates with the receiving chamber, wherein the longitudinal depth of the depressed area is larger than the longitudinal depth of the guiding groove.

[0018] According to a preferred embodiment of the present invention, at least one of the air outlet for container and the refrigerator body extraction opening is formed by an elastic suction nozzle.

[0019] The construction of the present invention and other objectives and beneficial effects of the present invention will be well understood by the description of preferred embodiments in accompany with the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020] As a part of the description and in order to provide further explanation of the present invention, the drawings illustrate preferred embodiments of the present invention, and together with the description are used to explain the principle of the present invention. In the drawings:

Figure 1 shows a schematic partial sectional view of a refrigerator according to a preferred embodiment of the present invention;

Figure 2 shows a detailed sectional view of a suction nozzle and an extraction opening of the refrigerator according to the preferred embodiment of the present invention; and

Figure 3 shows a schematic partial assembly view of the refrigerator according to the preferred embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0021] Please refer to Figure 1. A refrigerator 1 comprises a refrigerator body 2 defining at least one receiving chamber 3. The receiving chamber 3 comprises a front opening 4, which front opening 4 can be opened or closed by a door 5 connected to the refrigerator body 2. Each of the refrigerator body 2 and the door 5 is provided with a thermally insulated foam layer so as to reduce heat exchange between the interior of the receiving chamber 3 and the exterior of the refrigerator 1.

[0022] The receiving chamber 3 comprises a rear wall 9 facing towards the front opening 4; left and right walls (not shown); and a bottom wall 8. The refrigerator 1 comprises at least a low pressure storage container 6 which is removably received in the receiving chamber 3. When the low pressure storage container 6 is received in the receiving chamber 3, the low pressure storage container 6 is supported on the bottom wall 8 of the receiving chamber 3. The low pressure storage chamber 6 defines a storage space 19 adapted to store food stuff therein. In the present embodiment, the low pressure storage container 6 has an outer contour of substantially tetrahedral shape.

[0023] The receiving chamber 3 can be generally formed from a refrigerating compartment of the refrigerator 1. For example, the receiving chamber 3 can be formed from a divided portion of the refrigerating compartment. In an alternative embodiment, the receiving chamber 3 can be formed from another compartment thermally insulated with the refrigerating compartment.

[0024] The low pressure storage container 6 comprises a container body 21 which forms the most part of the storage space 19 and a cover body 22 which is detachably connected to the container body 21. A sealing device is provided at a connection site between the container body 21 and the cover body 22 so as to establish a tight connection between them, such that air is prevented entering into the storage space 19 from the connection site between the container body 21 and the cover body 22.

[0025] A user can open the cover body 22 to implement an operation such as an operation of removing food stuff from the storage space 19 or placing food stuff into the storage space 19. The low pressure storage container 6 can be provided with a handle to facilitate moving and

carrying the low pressure storage container 6. The handle is preferably provided on the cover body 22.

[0026] The refrigerator 1 also comprises an air extracting system, which is used to extract air or gas from the low pressure storage container 6 so as to reduce the oxygen content in the low pressure storage container 6. In the present embodiment, the air extracting system comprises a vacuum bump 16 and an extracting passage 17 which connects between the low pressure storage container 6 and the vacuum bump 16. The extracting passage 17 connects at one end thereof with the vacuum bump 16. The other end of the extracting passage is provided at the rear side wall of the receiving chamber 3 so as to form a refrigerator body extraction opening 23 for the low pressure storage container 6.

[0027] As shown in Figure 1 and Figure 2, the low pressure storage container 6 has a suction nozzle 20 provided at a rear side thereof. The suction nozzle 20 has an air outlet for container 24 which fluidly communicates with the storage space 19. The suction nozzle 20 is made of elastic material and can be elastically deformed as being pressed.

[0028] When the door 5 is opened, the low pressure storage container 6 can be pushed into or pulled out of the receiving chamber 3 in a manner irrelevant to the movement of the door 5. In order to implement an accurate abutment of the suction nozzle 20 of the low pressure storage container 6 with the extracting passage 17, the refrigerator 1 comprises a guiding device 25 which is used to define a movement track of the low pressure storage container 6 in the receiving chamber 3. The guiding device 25 is provided such that after the low pressure storage container 6 is received in the receiving chamber 3, the suction nozzle 20 is exactly aligned with the refrigerator body extraction opening 23 and thus the air outlet for container 24 is exactly connected with the refrigerator body extraction opening 23.

[0029] According to a preferred embodiment of the present invention, the guiding device 25 comprises two guiding grooves 13 provided on the bottom wall 8 and two projections 14 projecting downwards from a bottom surface 15 of the low pressure storage container 6.

[0030] The guiding groove 13 and the projection 14 are both in an elongate strip shape and extend in a fore-and-aft direction. The lateral width of the guiding groove 13 is slightly larger than the lateral outer contour size of the projection 14 such that when the projection 14 is received in the guiding groove 13, the lateral movement of the low pressure storage container 6 is limited. The width of the guiding groove 13 is preferably no more than 2 centimeter, such as between 1 centimeter and 1.2 centimeter. In the illustrated embodiment, the projection 14 is hollow.

[0031] In order to place the low pressure storage container 6 into the receiving chamber 3, the user aligns the projections 14 with the guiding grooves 13 and then pushes the low pressure storage container 6 until the projections 14 wholly enter into the guiding grooves 13. After

the projections 14 wholly enter into the guiding grooves 13, the suction nozzle 20 is abutted with the refrigerator body extraction opening 23.

[0032] Preferably, before any deformation occurs, the distance between the front end face 14a of the projection 14 and the suction nozzle 20 is larger than the distance between the front inner wall 12a of the guiding groove 13 and the refrigerator body extraction opening 23 such that after the low pressure storage container 6 is received in the receiving chamber 3, the front end face 14a of the projection 14 abuts against the front inner wall 12a of the guiding groove 13 so as to prevent the low pressure storage container 6 from sliding out of the receiving chamber 3 in a direction towards the front opening 4. Meanwhile, the suction nozzle 20 is thus pressed so as being deformed and is thus tightly pressed to the refrigerator body extraction opening 23 such that an excellent sealing connection is established between the air outlet for container 24 and the refrigerator body extraction opening 23.

[0033] When the vacuum bump 16 is powered on, gas in the low pressure storage container 6 is extracted away such that the oxygen content in the low pressure storage container 6 is reduced and thus food stuff can be stored in the low pressure storage container 6 for an extended time. After the extraction process of the low pressure storage container 6 is accomplished, the storage space 19 is maintained in a low pressure state.

[0034] The term "low pressure" used in the present invention is referred relative to one standard atmosphere pressure. That is, the "low pressure" referred in the present invention is lower than one standard atmosphere pressure. According to a preferred embodiment of the present invention, the "low pressure" is between one standard atmosphere pressure and absolute vacuum. For example, when the absolute pressure in the storage space 2 is 500 - 600 millibar (the relative pressure is 400 ~ 500 millibar), it can be assumed that food stuff is adaptably stored. Since the air pressure in the storage space 19 is lower than one standard atmosphere pressure, the skilled person in the art also calls the low pressure storage container 6 as "a vacuum preservation container".

[0035] In a preferred embodiment, the low pressure storage container 6 is provided such that: after the low pressure storage container 6 is removed out of the receiving chamber 3, low air pressure is maintained in the storage space 19 such that the flexibility of use of the low pressure storage container 6 is improved. This can be achieved by a non-return valve (not shown) which is provided at the low pressure storage container 6, for example provided adjacent to the suction nozzle 20.

[0036] In order to facilitate pulling the low pressure storage container 6 out of the receiving chamber 3, the length of the guiding groove 13 in the fore-and-aft direction is larger than the length of the projection 14 in the fore-and-aft direction. Therefore, before pulling the low pressure storage container 6 out of the receiving chamber 3, the user first slightly pushes the low pressure storage container 6 and then lifts the low pressure storage

container 6 such that the front end face 14a of the projection 14 disengages from the front inner wall 12a of the guiding groove 13, and thereafter the low pressure storage container 6 can be pulled out of the receiving chamber 3.

[0037] In order that air is well circulated in the receiving chamber 3, it is preferable if a gap 10 is formed between the bottom surface 15 of the low pressure storage container 6 and the upper surface of the bottom wall 8, such that air is circulated by passing through the bottom of the low pressure storage container 6 and thus it is prevented that local air in the receiving chamber 3 is too low or too high. When the low pressure storage container 6 is received in the receiving chamber 3, the gap 10 fluidly communicates with the receiving chamber 3. Preferably, the gap 10 is opened along the whole circumferential edge of the bottom surface 15 of the low pressure storage container 6. Most preferably, a distance is formed between the rest portion of the low pressure storage container 6 other than the projection 14 contacting with the bottom wall 8 and the bottom wall 8.

[0038] In a preferred embodiment, the height of the projection 14 is larger than the depth of the guiding groove 13 such that the gap 10 is formed between the bottom surface 15 of the low pressure storage container 6 and the upper surface of the bottom wall 8. The longitudinal height of the projection 14 is preferably larger than the longitudinal depth of the guiding groove 14 at least by more than 3 millimeter, for example 4 ~ 5 millimeter.

[0039] As shown in Figure 3, the receiving chamber 3 can contain two low pressure storage containers 6 (one of them is removed in the Figure). Although a fan (not shown) is provided in the receiving chamber 3, the existence of the low pressure storage container or the low pressure storage containers may more or less influence air circulation in the receiving chamber 3. In order to further improve and reinforce air circulation in the receiving chamber 3, at a location corresponding to each low pressure storage container, the bottom wall 8 is provided with a depressed area 26 which is depressed downwards from the upper surface of the bottom wall. When the low pressure storage container 6 is received in the receiving chamber 3, the depressed area 26 is under the corresponding low pressure storage container 6 and fluidly communicates with the rest portion of the receiving chamber 3. The distance between the low pressure storage container 6 and the bottom wall 8 can be increased by the bottom wall 8 additionally being depressed downwards such that air circulation in the receiving chamber 3 is facilitated.

[0040] The depressed area 26 is provided between two corresponding guiding grooves 14 and separates from the guiding grooves 14 a predefined distance respectively. After the low pressure storage container 6 is inserted into the receiving chamber 3, the depressed area 26 is under the low pressure storage container 6. It is preferable if the longitudinal depth of the depressed area 26 is larger than the longitudinal depth of the guiding groove

14 such that between the low pressure storage container 6 and the bottom wall 8 is further increased.

[0041] In the illustrated embodiment, the depressed area 26 is a single area having a larger containing capacity. However, in an alternative embodiment, the bottom wall 8 can be provided with a plurality of depressed grooves which are separated from each other to form the above-mentioned depressed area.

[0042] In the above-mentioned embodiments, the guiding groove and the projection are respectively provided on the bottom wall 8 of the receiving chamber 3 and the bottom of the low pressure storage container 6. However, the present invention does not limit to this. For example, in an alternative embodiment, the guiding groove is provided on the lower wall of the low pressure storage container 6, and the projection is projected upwards from the upper surface of the bottom wall 8.

Claims

1. A refrigerator (1), comprising:

a receiving chamber (3) including a front opening (4), the receiving chamber (3) further including a bottom wall (8) and a rear wall (9);
a door (5) for selectively and at least partly opening and closing the front opening (4);
a low pressure storage container (6) which is removably received in the receiving chamber (3), the low pressure storage container (6) including an air outlet for container (24) which fluidly communicates with an interior space (19) of the low pressure storage container, wherein the low pressure storage container (6) can be placed into or taken out of the receiving chamber (3) in a manner independent of the movement of the door (5); and
an air extracting system, the air extracting system including a vacuum bump (16) and an extracting passage (17) which is used to implement fluid communication between the vacuum bump (16) and the low pressure storage container (6), the extracting passage (17) including a refrigerator body extraction opening (23) which is used to abut with the air outlet for container (24);

characterized in that the refrigerator further comprises a guiding device (25) which is used, to define a movement track of the low pressure storage container (6) in the receiving chamber (3), said guiding device (25) is provided such that after the low pressure storage container (25) is received in the receiving chamber (3), the air outlet for container (24) is appropriately aligned with the refrigerator body extraction opening (23).

2. The refrigerator (1) according to claim 1, **characterized in that** the guiding device (25) comprises at least a guiding groove (13).
3. The refrigerator (1) according to claim 2, **characterized in that** the guiding groove (13) is provided on the bottom wall (8) and extends in a fore-and-aft direction, the low pressure storage container (6) comprises a projection (4) projecting downwards from a bottom surface (15) of the low pressure storage container (6), and after the low pressure storage container (6) is inserted in the receiving chamber (3), the projection (14) is at least partly received in the guiding groove (13).
4. The refrigerator (1) according to claim 3, **characterized in that** after the low pressure storage container (6) is inserted in the receiving chamber (3), the projection (14) bears against a front inner wall (12a) of the guiding groove to prevent the low pressure storage container (6) from moving towards the front opening (4) and to tightly connect the refrigerator body extraction opening (23) to the air outlet for container (24).
5. The refrigerator (1) according to claim 3 or 4, **characterized in that** the length of the guiding groove (14) in the fore-and-aft direction is larger than the length of the projection (13) in the fore-and-aft direction.
6. The refrigerator (1) according to claim 2, **characterized in that** the guiding groove is provided at a lower wall of the low pressure storage container (6) and extends in the fore-and-aft direction, the bottom wall (8) comprises a projection which projects upwards from an upper surface of the bottom wall, and when the low pressure storage container (6) is inserted in the receiving chamber (3), the projection is at least partly received in the guiding groove.
7. The refrigerator (1) according to any one of the previous claims, **characterized in that** there is a gap (10) formed between the bottom surface (15) of the low pressure storage container (6) and the bottom wall (8), which gap (10) fluidly communicates with the receiving chamber (3).
8. The refrigerator (1) according to any one of claims 3 to 7, **characterized in that** the longitudinal height of the projection is larger than the longitudinal depth of the guiding groove such that a gap (10) is formed between the low pressure storage container (6) and the bottom wall (8).
9. The refrigerator (1) according to claim 8, **characterized in that** the longitudinal height of the projection is larger than the longitudinal depth of the guiding groove by at least 3 millimeter, for example 4 ~ 5 millimeter.
10. The refrigerator (1) according to any one of the previous claims, **characterized in that** the bottom wall (8) comprises at least a depressed area (26) depressing downwards from the bottom wall (8), the depressed area (26) is under the low pressure storage container (6) and fluidly communicates with the receiving chamber (3).
11. The refrigerator (1) according to claim 10, **characterized in that** the depressed area (26) is between the guiding devices (25), and separates from the guiding devices (25) by a predefined distance respectively.
12. The refrigerator (1) according to any one of claims 2 to 5, **characterized in that** the bottom wall (8) comprises at least a depressed area (26) which depresses downwards from the bottom wall (8), the depressed area (26) is under the low pressure storage container (6) and fluidly communicates with the receiving chamber (3), wherein the longitudinal depth of the depressed area (26) is larger than the longitudinal depth of the guiding groove (14).
13. The refrigerator (1) according to any one of the previous claims, **characterized in that** at least one of the refrigerator body extraction opening (23) and the air outlet for container (24) is formed by an elastic suction nozzle (20).

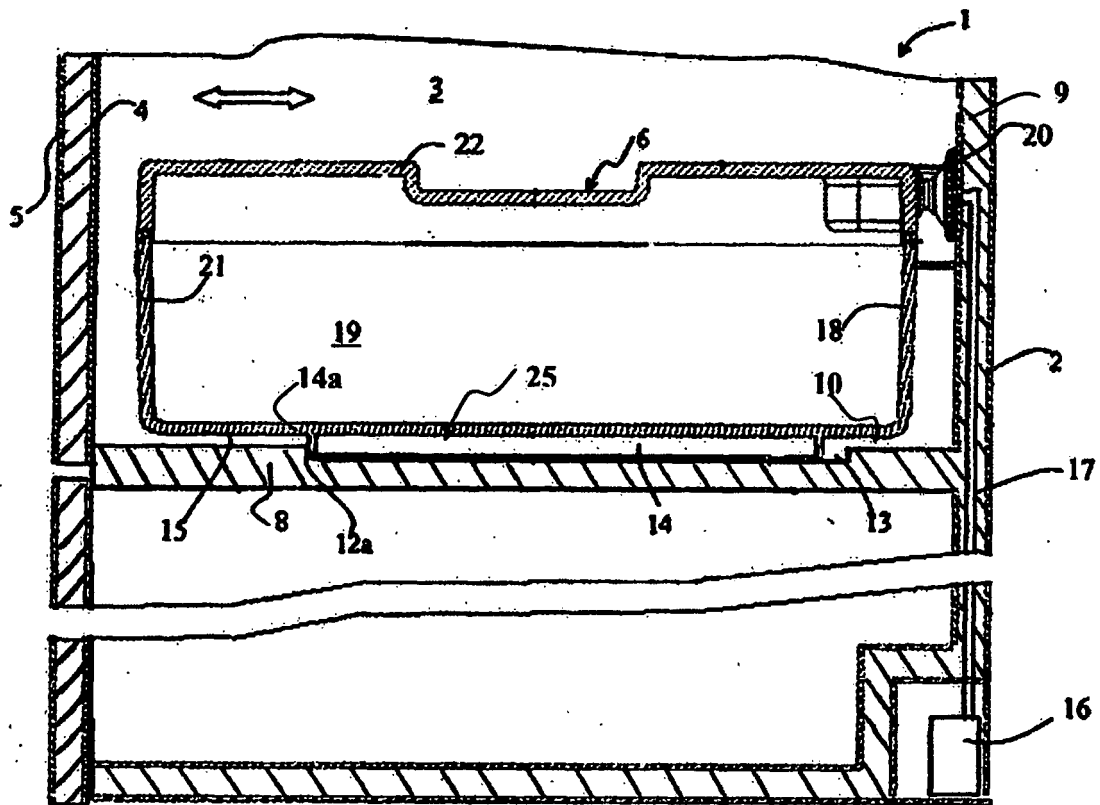


Figure 1

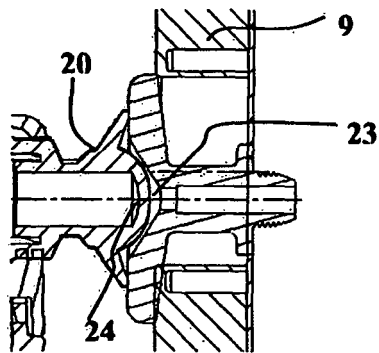


Figure 2

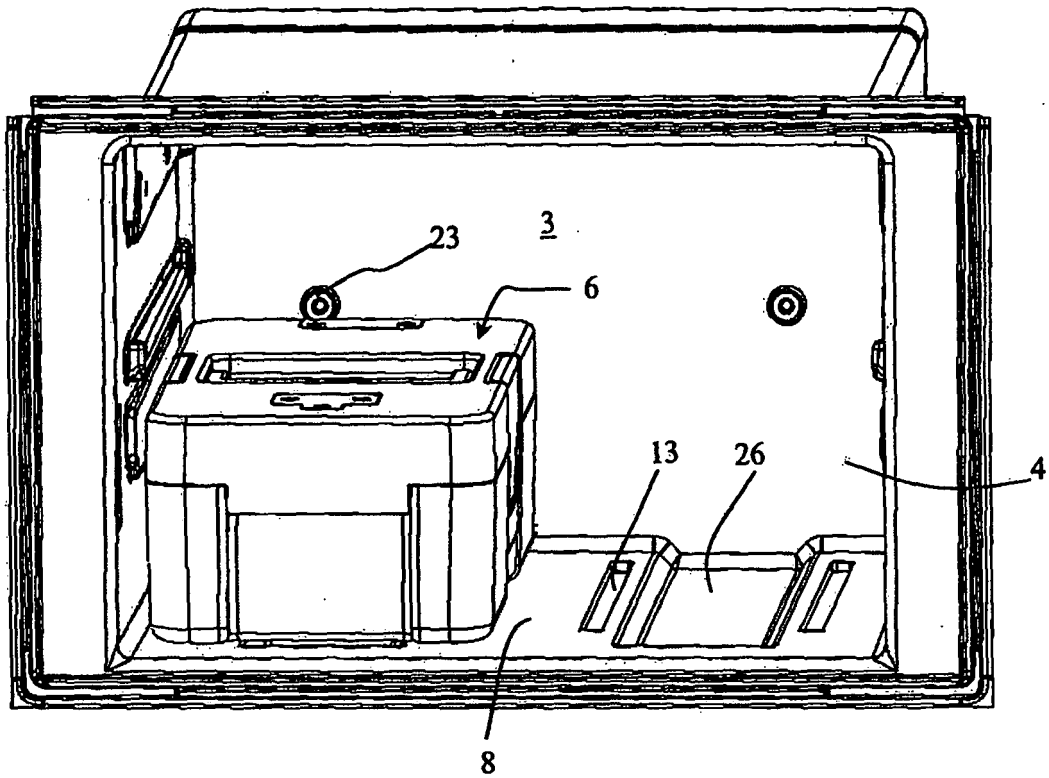


Figure 3

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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