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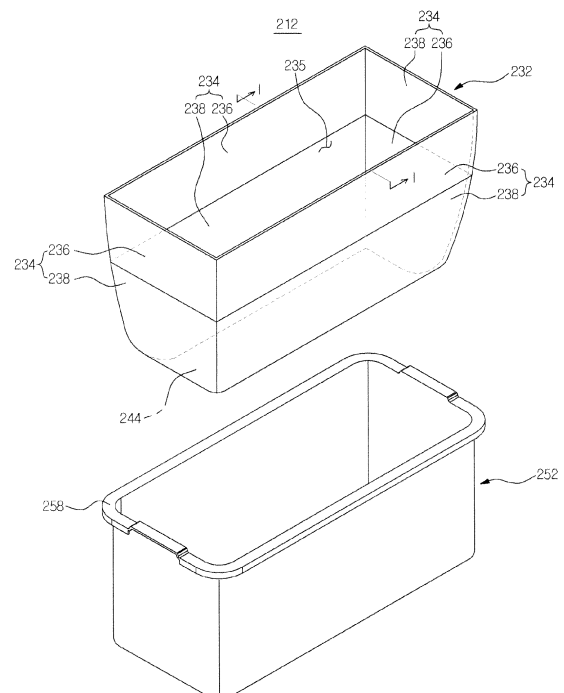
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(54) **Storage container and refrigerator having the same**

(57) A refrigerator includes a main body, a storage compartment provided in the main body and including a storage space, a partition plate to divide the storage space, and a storage container supported by the partition plate. The storage container includes a container body defining the external appearance of the storage container and having a top opening, a thickness reinforced portion formed at the lower part of the container body to prevent temperature of the lower part of the container body from rapidly changing by cold air of the storage compartment, and a thermal insulating member provided in a space between the thickness reinforced portion and the container body.

FIG. 2



EP 2 466 233 A2

Description

BACKGROUND

1. Field

[0001] Embodiments of the present disclosure relate to a storage container to keep food stored therein fresh for a long time and a refrigerator having the same.

2. Description of the Related Art

[0002] Kimchi refrigerators serve to store kimchi. An interior storage space of kimchi refrigerators is controlled to maintain a temperature range of approximately -5°C to 5°C to ripen and preserve kimchi.

[0003] In recent years, kimchi refrigerators have improved in such a way that independent interior storage spaces thereof are individually controllable in temperature, thus being used to store various kinds of food including vegetables, fruits and meat as well as kimchi.

[0004] Such kimchi refrigerators are classified into an upright type kimchi refrigerator and a top lid type kimchi refrigerator. The upright type kimchi refrigerator includes a hinged door to pivot leftward or rightward so as to open or close a forwardly open storage space and a drawer type door to slide forward from or rearward into a storage space. The top lid type refrigerator includes a lid to pivot upward or downward so as to open or close an upwardly open storage space.

[0005] In the case of a general upright type kimchi refrigerator, storage containers to store food such as kimchi are seated and supported on partition plates installed in a storage space which is opened or closed by a hinged door.

SUMMARY

[0006] Therefore, it is one aspect of the present disclosure to provide a storage container to prevent overcooling of food stored therein and a refrigerator having the same.

[0007] It is another aspect of the present disclosure to provide a storage container to allow efficient access of cold air and a refrigerator having the same.

[0008] Additional aspects of the disclosure will be set forth in part in the description which follows and, in part, will be apparent from the description, or may be learned by practice of the disclosure.

[0009] In accordance with one aspect of the present disclosure, a refrigerator includes a main body, a storage compartment provided in the main body and including a storage space, a partition plate to divide the storage space, and a storage container supported by the partition plate, wherein the storage container includes a container body defining the external appearance of the storage container and having a top opening, a thickness reinforced portion formed at the lower part of the container

body to prevent temperature of the lower part of the container body from rapidly changing by cold air of the storage compartment, and a thermal insulating member provided in a space between the thickness reinforced portion and the container body.

[0010] The thickness reinforced portion may connect a lateral surface and a bottom surface of the container body to each other.

[0011] The thickness reinforced portion may be formed of a curved surface connecting a point on the lateral surface of the container body, which is located at the height between one third and two thirds the height of the lateral surface of the container body on the basis of the bottom surface of the container body, to a point on the bottom surface of the container body, which is located at the width between one third and two thirds the width of the bottom surface of the container body on the basis of one lateral surface of the container body.

[0012] The container body may further include an auxiliary thermal insulating member to enclose the lateral surface and the bottom surface of the container body.

[0013] The bottom surface of the container body may be provided with a first boss array.

[0014] The lateral surface of the container body may be provided with a second boss array to assure uniform temperature distribution within the container body.

[0015] The partition plate may be provided with a third boss array to prevent the bottom surface of the container body and the partition plate from coming into close contact with each other.

[0016] The thickness reinforced portion may be integrally formed with the container body.

[0017] The lower part of the lateral surface of the container body may have a greater thickness than the upper part of the lateral surface.

[0018] The edge of the bottom surface of the container body may have a greater thickness than the central of the bottom surface.

[0019] In accordance with another aspect of the present disclosure, a storage container includes a container body having a top opening, and a cover to open or close the opening, wherein the container body includes a lateral surface provided with a thickness reinforced portion to provide the lower part of the container body with a greater thickness than the upper part of the container body, a bottom surface connected to the thickness reinforced portion such that the edge thereof has a greater thickness than the center thereof, and a thermal insulating member provided in a space between the lateral surface and the bottom surface of the container body .

[0020] The storage container may further include a boss array protruding from the lateral surface of the container body or the bottom surface of the container body.

[0021] In accordance with a further aspect of the present disclosure, a refrigerator includes a main body, a storage compartment provided in the main body and including a storage space, and a storage container arranged in the storage space, wherein the storage con-

tainer includes an inner case configured such that a distance between facing lateral surfaces thereof decreases downward, and an outer case coupled around the inner case to define a space in a lower region of the storage container along with the inner case, and a thermal insulating member provided in the space.

[0022] A sidewall of the storage container formed by coupling the inner case and the outer case to each other may have a greater thickness in the lower part of the storage container than the upper part of the storage container.

[0023] The refrigerator may further include a partition plate to support the storage container, and a bottom surface of the outer case may be provided with a first boss array.

[0024] A lateral surface of the outer case may be provided with a second boss array to increase a contact area between the outer case and cold air.

[0025] The inner case and the outer case may be made of the same material.

[0026] The inner case and the outer case may be integrally formed with each other.

BRIEF DESCRIPTION OF THE DRAWINGS

[0027] These and/or other aspects of the disclosure will become apparent and more readily appreciated from the following description of the embodiments, taken in conjunction with the accompanying drawings of which:

FIG. 1 is a perspective view illustrating a refrigerator having a storage container in accordance with an embodiment of the present disclosure;

FIG. 2 is an exploded perspective view of the storage container;

FIG. 3 is a sectional view taken along line I-I of FIG. 2;

FIG. 4 is a graph illustrating temperature change within a storage space;

FIGS. 5 and 6 are sectional views illustrating a storage container provided with a boss array;

FIG. 7 is a sectional view illustrating a partition plate provided with a boss array; and

FIG. 8 is a bottom perspective view illustrating an auxiliary thermal insulating member coupled to a storage container.

DETAILED DESCRIPTION

[0028] Reference will now be made in detail to the embodiments of the present disclosure, examples of which are illustrated in the accompanying drawings, wherein like reference numerals refer to like elements throughout.

[0029] FIG. 1 is a perspective view illustrating a refrigerator having a storage container in accordance with an embodiment of the present disclosure.

[0030] As illustrated in FIG. 1, the refrigerator 1 includes a main body 100 defining the external appearance of the refrigerator 1, an upper storage compartment 110 and a lower storage compartment 130 defined in the main body 100, an upper door 120 provided at a front side of the upper storage compartment 110 to selectively open or close the upper storage compartment 110, and a lower door 140 provided at a front side of the lower storage compartment 130 to selectively open or close the lower storage compartment 130.

[0031] The upper door 120 may be pivotally rotatable about a lateral edge of the upper storage compartment 110, and the lower door 140 may open or close the lower storage compartment 130 like a drawer.

[0032] The upper storage compartment 110 provides a forwardly open storage space 112, and at least one partition plate 114 is horizontally installed in the storage space 112 to divide the storage space 112 into several spaces.

[0033] The upper storage compartment 110 is provided at a rear wall thereof with cold air discharge holes 116 and cold air suction holes 118. Cold air discharged from the cold air discharge holes 116 is again suctioned into the cold air suction holes 118 after being heat-exchanged with the storage container 210.

[0034] An operating panel 122 is provided at a front surface of the lower door 140 to select, e.g., kinds, ripening time and temperature conditions of food stored in the upper storage compartment 110 and the lower storage compartment 130.

[0035] In the embodiment of the present disclosure, a storage container 210 is seated on and supported by the partition plate 114.

[0036] FIG. 2 is an exploded perspective view of the storage container, FIG. 3 is a sectional view taken along line I-I of FIG. 2, and FIG. 4 is a graph illustrating temperature change within a storage space.

[0037] As illustrated in FIGS. 1 to 3, the storage container 210 includes a container body 212, which defines the external appearance of the storage container 210 and is upwardly open to receive food, and a cover 214 coupled to the top of the container body 212.

[0038] The container body 212 has an approximately rectangular parallelepiped shape and consists of an inner case 232 providing a storage space to store food and an outer case 252 coupled around the inner case 232.

[0039] The inner case 232 includes a sidewall 234 defining a top opening 235 and a bottom wall 244 provided at a lower end of the sidewall 234.

[0040] The sidewall 234 includes a parallel zone 236, facing portions of which have a constant distance therebetween, and a tapered zone 238, facing portions of which have a downwardly decreasing distance therebetween. The parallel zone 236 may extend from an upper end of the sidewall 234 by a predetermined distance and

more particularly, may approximately have a height between one third and two thirds the height of the sidewall 234. The tapered zone 238 extends from the parallel zone 236 and is connected to the bottom wall 244.

[0041] The inner case 232 including the sidewall 234 and the bottom wall 244 is configured such that the area of the top opening 235 is greater than the area of the bottom wall 244.

[0042] The inner case 232 is inserted into the outer case 252. In this case, an inner surface of the outer case 252 is engaged with the parallel zone 236 and the bottom wall 244. The inner surface of the outer case 252 may be thermally bonded to the parallel zone 236 and the bottom wall 244.

[0043] A space 248 is defined between the sidewall 234 and bottom wall 244 of the inner case 232 and the inner surface of the outer case 252. The space 248 may be filled with a thermal insulating material, such as air, water, Styrofoam or urethane foam.

[0044] The outer case 252 may be provided at an outer surface thereof with a flange 258. The flange 258 serves to increase the strength of the outer case 252 and to assist a user in easily transferring the storage container 210.

[0045] The inner case 232 and the outer case 252 may be made of the same material and be integrally formed with each other to construct the container body 212.

[0046] The container body 212 includes a lateral surface region 220, which has a thickness reinforced portion 215 to provide the lower part of the container body 212 with a greater thickness than the upper part, and a bottom surface region 222 which is connected to the thickness reinforced portion 215 such that the edge of the bottom surface region 222 has a greater thickness than the center.

[0047] The thickness reinforced portion 215 is formed by connecting one point of the lateral surface region 220 and one point of the bottom surface region 222 to each other. More particularly, the thickness reinforced portion 215 may be a curved or flat slope connecting the point on the lateral surface region 220 of the container body 212, which is located at the height between one third and two thirds the height of the lateral surface region 220 of the container body 212 on the basis of the bottom surface region 222 of the container body 212, and the point on the bottom surface region 222 of the container body 212, which is located at the width between one third and two thirds the width of the bottom surface region 222 of the container body 212 on the basis of the lateral surface region 222 of the container body 212, to each other.

[0048] The thickness reinforced portion 215 prevents the temperature of the lower part of the container body 212 from rapidly changing by cold air directed from the cold air discharge holes 116.

[0049] As illustrated in FIG. 4, in a control process to set the interior temperature of the upper storage compartment 110 to a desired value (0°C), the interior temperature of the upper storage compartment 110 is not

continuously kept at 0°C, but changes within a predetermined range. Thus, the interior temperature of the container body 212 may drop to below 0°C by cold air directed from the cold air discharge holes 116 for a period in which the interior temperature of the upper storage compartment 110 is 0°C or less. Since moisture contained in food stored in the container body 212 is collected in the lower part of the container body 212 by gravity, the collected moisture may be overcooled and frozen if the interior temperature of the container body 212 drops to 0°C or less. The thickness reinforced portion 215 provided at the lower part of the container body 212 provides the lower part of the container body 212 with increased thermal insulation effects, which prevents the moisture collected in the container body 212 from being overcooled and frozen for the period in which the interior temperature of the upper storage compartment 110 is 0°C or less.

[0050] In addition, as a result of filling the space 248 defined between the thickness reinforced portion 215 and the container body 212 with the thermal insulating material, such as air, water, Styrofoam or urethane foam, overcooling of the collected moisture may be more effectively prevented.

[0051] FIGS. 5 and 6 are sectional views illustrating the storage container provided with a boss array, FIG. 7 is a sectional view illustrating the partition plate provided with a boss array, and FIG. 8 is a bottom perspective view illustrating an auxiliary thermal insulating member coupled to a storage container.

[0052] As illustrated in FIGS. 5 and 6, the lateral surface region 220 and the bottom surface region 222 of the container body 212 are respectively provided with a first boss array 270a or 270b and a second boss array 280a or 280b.

[0053] The first boss array 270a or 270b formed at the lateral surface region 220 of the container body 212 may consist of triangular bosses 272a having a triangular cross section or semicircular bosses 272b having a semicircular cross section. Although not illustrated, it is obvious that the bosses may have various other shapes excluding the triangular or semicircular shape.

[0054] The first boss array 270a or 270b serves to increase a contact area between cold air of the upper storage compartment 110 and the lateral surface region 220 of the container body 212, which assures uniform temperature distribution throughout the container body 212.

[0055] The second boss array 280a or 280b provides a space for movement of cold air directed from the cold air discharge holes 116 between the bottom surface region 222 of the container body 212 and the partition plate 114, which prevents temperature deviation between the upper and lower parts of the container body 212. In addition, the second boss array 280a or 280b prevents the bottom surface region 222 of the container body 212 from coming into close contact with the partition plate 114 so as to prevent low-temperature of the partition plate 114 from being directly conducted to the bottom surface region 222, which prevents the moisture collected in the

lower part of the container body 212 from being overcooled and frozen.

[0056] As illustrated in FIG. 7, the space between the bottom surface region 222 of the container body 212 and the partition plate 114 may be obtained by a third boss array 117 formed at an upper surface of the partition plate 114. The third boss array 117 includes bosses protruding from the upper surface of the partition plate 114 by a predetermined length. Like the second boss array 280a or 280b, the third boss array 117 prevents the bottom surface region 222 of the container body 212 and the partition plate 114 from coming into close contact with each other so as to prevent low-temperature of the partition plate 114 from being directly conducted to the bottom surface region 222, which prevents the moisture collected in the lower part of the container body 212 from being overcooled and frozen. Although FIG. 7 illustrates the bosses of the third boss array 117 as having a square cross section, it is apparent that the bosses of the third boss array 117 may have various other shapes including, e.g., triangular and semicircular shapes.

[0057] As illustrated in FIG. 8, an auxiliary thermal insulating member 290 may be further coupled to an outer surface of the container body 212. The auxiliary thermal insulating member 290 encloses the lower part of the lateral surface region 220 and the bottom surface region 222 of the container body 212, providing the lower part of the container body 212 with increased thermal insulation effects in cooperation with the thickness reinforced portion 215 and the thermal insulating material. This prevents the moisture collected in the lower part of the container body 212 from being overcooled and frozen for the period in which the interior temperature of the upper storage compartment 110 is 0°C or less.

[0058] The auxiliary thermal insulating member 290 may be made of a thermal insulating material, such as Styrofoam or rubber.

[0059] As is apparent from the above description, the embodiment of the present disclosure provides a storage container usable with a refrigerator, which does not exhibit rapid interior temperature change, thus preventing overcooling of food stored therein.

[0060] Further, the storage container assures efficient access of cold air, thus preserving food stored therein for a long time.

[0061] Although a few embodiments of the present disclosure have been shown and described, it would be appreciated by those skilled in the art that changes may be made in these embodiments without departing from the principles and spirit of the invention, the scope of which is defined in the claims and their equivalents.

Claims

1. A refrigerator comprising:

a main body;

a storage compartment provided in the main body and including a storage space;
a partition plate to divide the storage space; and
a storage container supported by the partition plate,

wherein the storage container includes:

a container body defining the external appearance of the storage container and having a top opening;
a thickness reinforced portion formed at the lower part of the container body to prevent temperature of the lower part of the container body from rapidly changing by cold air of the storage compartment; and
a thermal insulating member provided in a space between the thickness reinforced portion and the container body.

2. The refrigerator according to claim 1, wherein the thickness reinforced portion connects a lateral surface and a bottom surface of the container body to each other.

3. The refrigerator according to claim 2, wherein the thickness reinforced portion is formed of a curved surface connecting a point on the lateral surface of the container body, which is located at the height between one third and two thirds the height of the lateral surface of the container body on the basis of the bottom surface of the container body, to a point on the bottom surface of the container body, which is located at the width between one third and two thirds the width of the bottom surface of the container body on the basis of one lateral surface of the container body.

4. The refrigerator according to claim 3, wherein the container body further includes an auxiliary thermal insulating member to enclose the lateral surface and the bottom surface of the container body.

5. The refrigerator according to claim 1, wherein the bottom surface of the container body is provided with a first boss array.

6. The refrigerator according to claim 1, wherein the lateral surface of the container body is provided with a second boss array to assure uniform temperature distribution within the container body.

7. The refrigerator according to claim 1, wherein the partition plate is provided with a third boss array to prevent the bottom surface of the container body and the partition plate from coming into close contact with each other.

8. The refrigerator according to claim 2, wherein the thickness reinforced portion is integrally formed with the container body.
9. The refrigerator according to claim 8, wherein the lower part of the lateral surface of the container body has a greater thickness than the upper part of the lateral surface. 5
10. The refrigerator according to claim 9, wherein the edge of the bottom surface of the container body has a greater thickness than the central of the bottom surface. 10

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FIG. 2

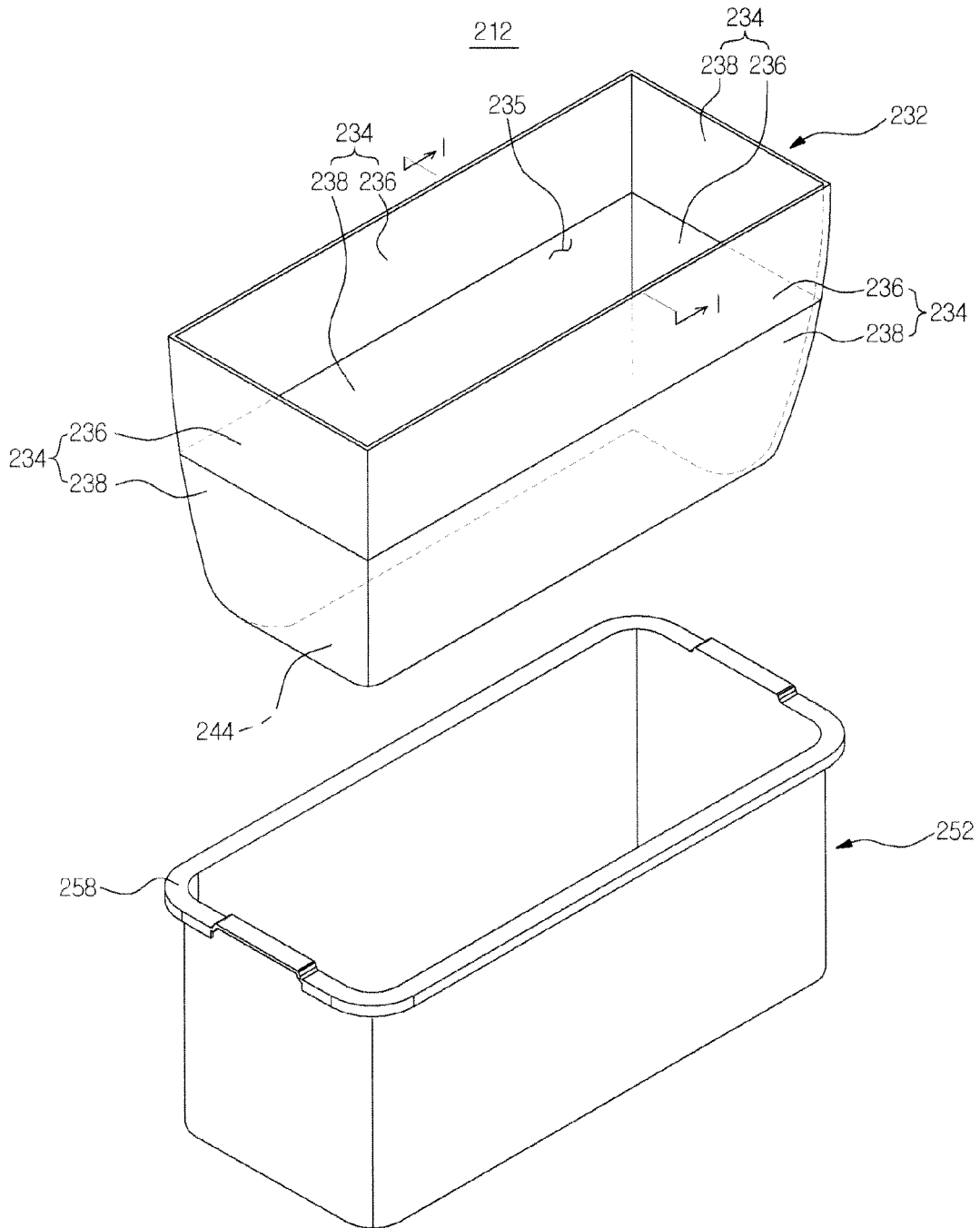


FIG. 3

212

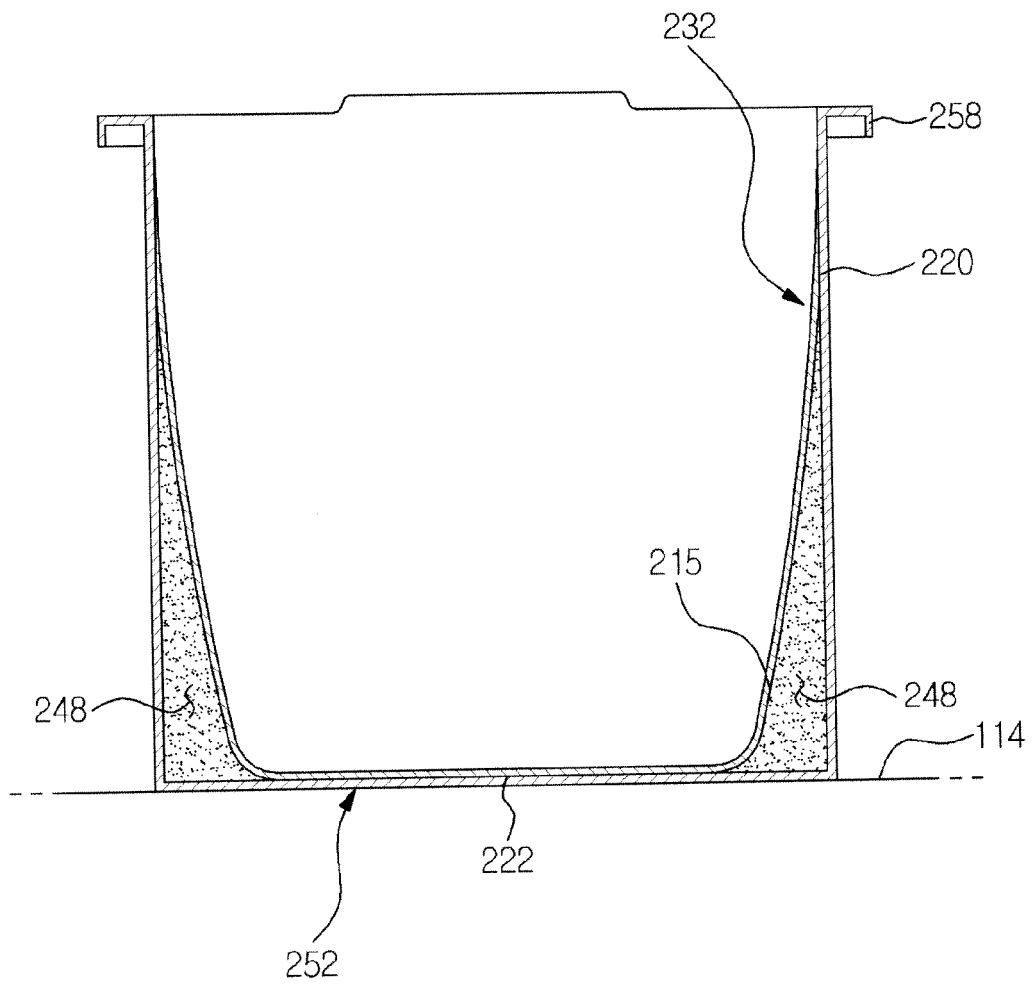


FIG. 4

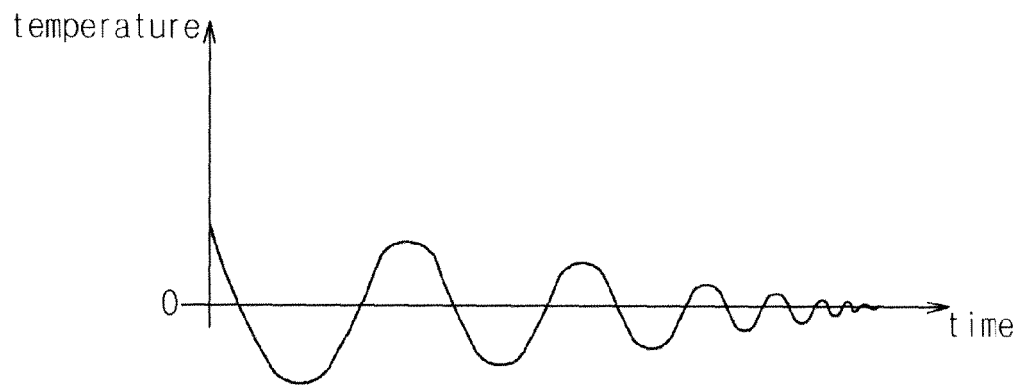


FIG. 5

212

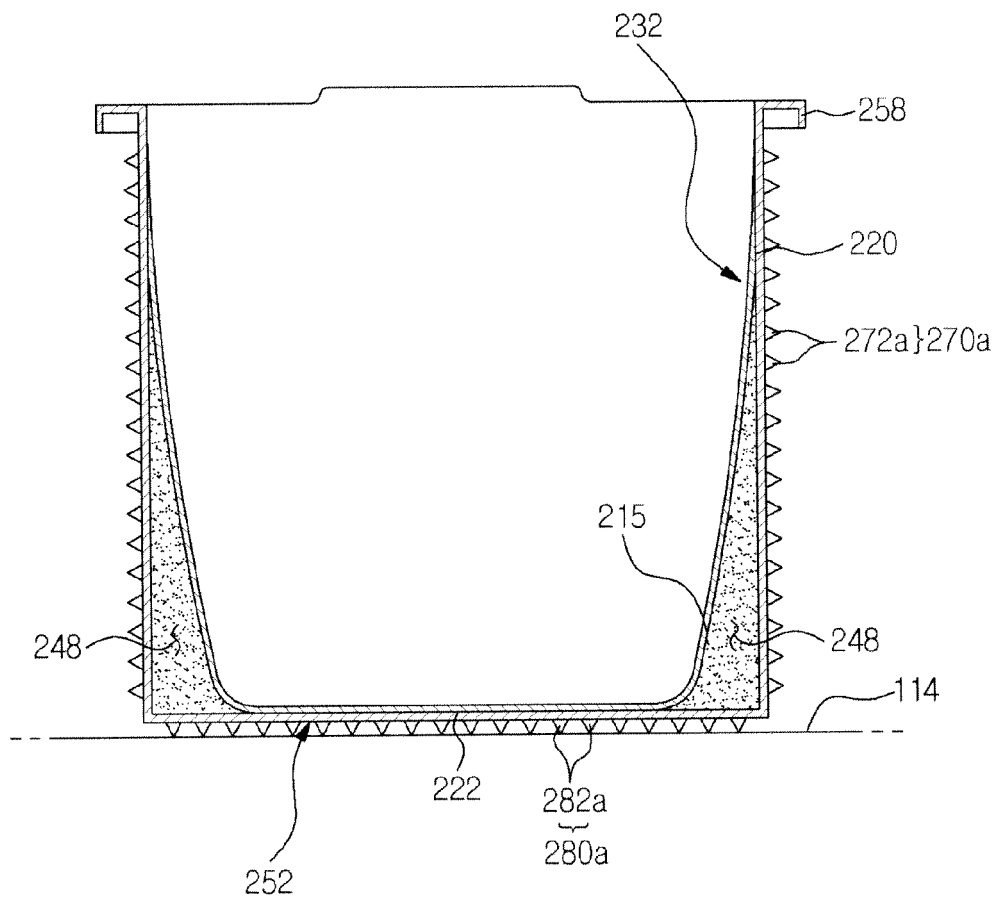


FIG. 6

212

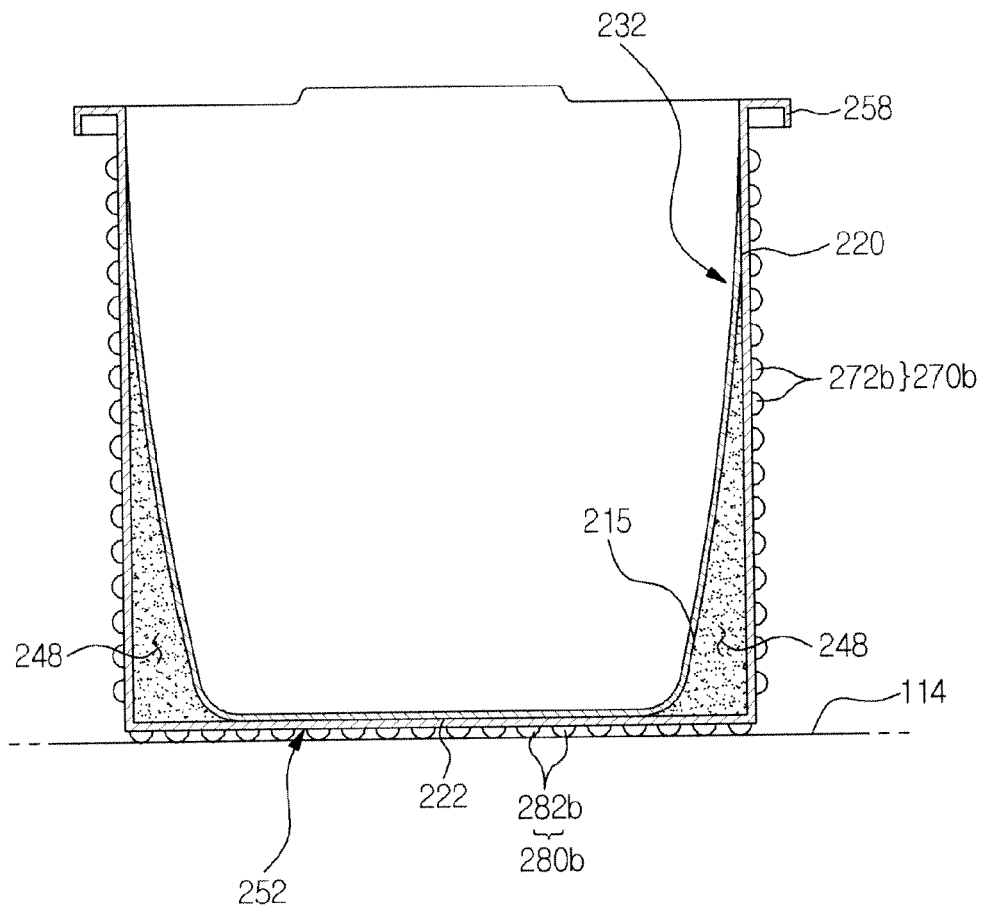


FIG. 7

212

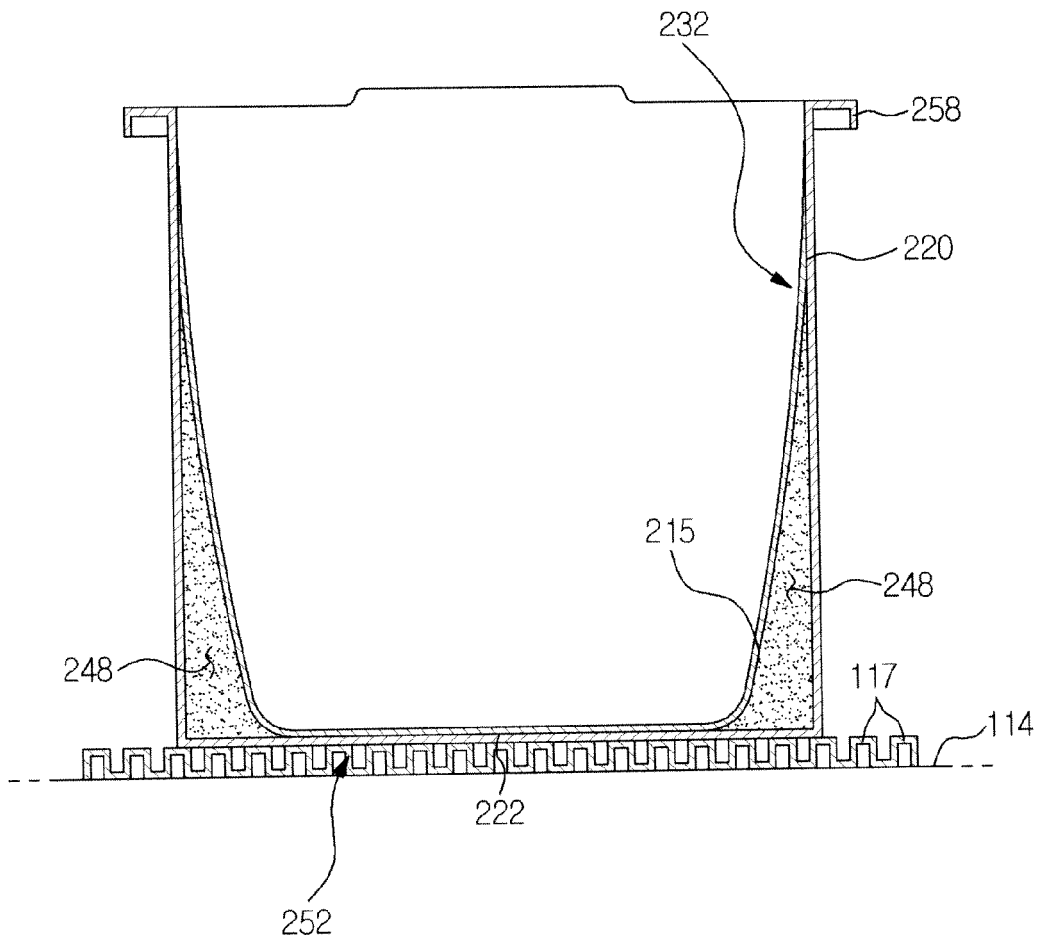


FIG. 8

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