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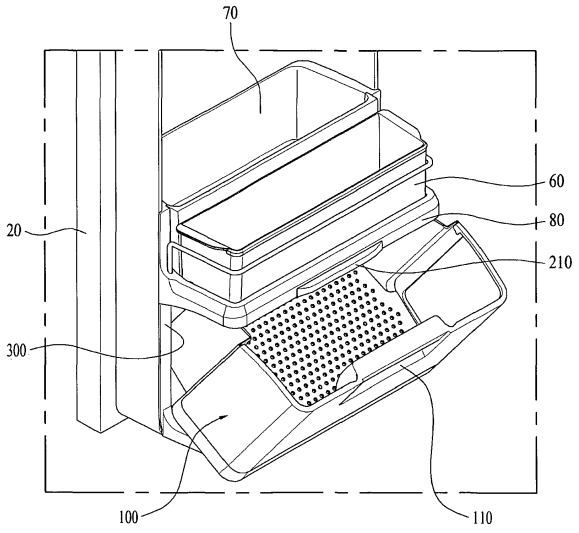
(54) Refrigerator

(57) A refrigerator is provided. The refrigerator may include a basket (100) to enhance utility of a storage space of a door (20) of the refrigerator. The refrigerator may include a cabinet having a storage space formed therein, one side of which is open, a door (20) rotatably coupled to the cabinet to open and close the open side of the storage space, a mounting frame (300) coupled to an inner surface of the door, and a basket (100) rotatably coupled to the mounting frame (300) so as to be rotatable between a closed airtight position and an open position. A locking device may be provided at the mounting frame (300) to lock or unlock the basket at the closed airtight position, and a rotation limiter may limit a maximum rotation angle of the basket (100) when the basket is opened.

FIG. 4



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Description

BACKGROUND

1. **Field**

[0001] This relates to a refrigerator, and more particularly to a refrigerator having a basket to enhance utility of a storage space of a door.

2. **Background**

[0002] A refrigerator may supply cold air, generated by a refrigeration cycle including a compressor, a condenser, an expansion valve, and an evaporator, into a storage compartment defined therein to maintain storage items at a freezing temperature or at a refrigerating temperature slightly above freezing. A refrigerator may include a freezing compartment in which items are kept frozen, and a refrigerating compartment in which items are kept at a low temperature. Kimchi refrigerator may keep, for example, food, such as Kimchi, and vegetables, fresh and at an appropriate temperature.

[0003] At least one door may be rotatably coupled to a main body to open or close an open front side of the main body. Additionally, a drawer type door, in which a door is mounted to a front side of a drawer, may be rearwardly pushed inward or forwardly pulled outward for access to a corresponding compartment of the refrigerator. Shelves provided in refrigerating compartment and the freezing compartment may divide the storage compartment to accommodate various sizes of storage items and to enhance utility of a storage space. One or more baskets may be affixed to the refrigerator door for storage of bottles, jars, tubes and the like having a high use frequency.

BRIEF DESCRIPTION OF THE DRAWINGS

[0004] The embodiments will be described in detail with reference to the following drawings in which like reference numerals refer to like elements wherein:

[0005] FIG. 1 is a front view of a refrigerator as embodied and broadly described herein;

[0006] FIG. 2 is a front view of the refrigerator shown in FIG. 1, with its doors open;

[0007] FIG. 3 is a perspective view of a basket assembly of a door of the refrigerator shown in FIG. 1;

[0008] FIG. 4 is a perspective view of a tilted state of the basket shown in FIG. 3;

[0009] FIG. 5 is a perspective view of a state in which the basket shown in FIG. 3 and a mounting frame are separated from the door;

[0010] FIG. 6 is an exploded perspective view of the basket assembly shown in FIGs. 3-6;

[0011] FIG. 7 is a bottom perspective view of the basket and the mounting frame shown in FIG. 5, separated from each other;

[0012] FIG. 8 is a side sectional view illustrating pivotal rotation of the basket relative to the mounting frame;

[0013] FIG. 9 is a perspective view of a porous bottom plate separated from the basket;

[0014] FIG. 10 is a perspective view of a basket assembly mounted to a door of a refrigerator, in accordance with another embodiment as broadly described herein;

[0015] FIG. 11 is a perspective view of a tilted state of a basket of the refrigerator shown in FIG. 10;

[0016] FIG. 12 is an exploded perspective view of the basket shown in FIG. 10;

[0017] FIG. 13 is an enlarged view of a grip portion of the basket shown in FIG. 10;

[0018] FIG. 14 is a side sectional view of the grip portion of the basket shown in FIGs. 10-13;

[0019] FIG. 15 is an enlarged fragmentary view of a hinge of the basket shown in FIGs. 10-14;

[0020] FIG. 16 is a plan view of a punching plate of the basket shown in FIG. 10; and

[0021] FIG. 17 is a plan view of a punching plate of the basket shown in FIG. 10.

DETAILED DESCRIPTION

[0022] Hereinafter, exemplary embodiments will be described in detail with reference to the accompanying drawings. In the following description, the same or similar elements are denoted by the same reference numerals. Wherever possible, and detailed description thereof will not be repeated.

[0023] Features of a refrigerator 10 may be applicable to a top mount type refrigerator in which a refrigerating compartment 22 is defined as a lower compartment and a freezing compartment 32 is defined as an upper compartment above the refrigerating compartment 22, a side by side type refrigerator in which the refrigerating compartment 22 and the freezing compartment 32 are defined as left and right compartments, and a bottom freezer type refrigerator in which the refrigerating compartment 22 is defined as an upper compartment and the freezing compartment 32 is defined as a lower compartment below the refrigerating compartment 22. Simply for ease of discussion and illustration, a bottom freezer type refrigerator will be described.

[0024] In general, the freezing compartment 32 may be maintained at below a freezing temperature (i.e. below 0 °C), and the refrigerating compartment 22 may remain at relatively higher temperatures than the freezing compartment 32.

[0025] The refrigerator 10 may include a cabinet which internally defines a storage space and externally defines an appearance of the refrigerator 10. The cabinet may provide for relatively airtight installation and protection of mechanical devices accommodated therein. The cabinet of the refrigerator 10 may include an outer cabinet 12 which defines the overall external appearance, and an inner cabinet 14 which internally defines one or more storage compartments, i.e. the freezing compartment 32

and the refrigerating compartment 22. A space defined between the outer cabinet 12 and the inner cabinet 14 may form, for example, a cold air circulation passage.

[0026] A machine room may be defined in the space between the outer cabinet 12 and the inner cabinet 14, and a refrigerant cycle device to generate cold air via circulation of refrigerant may be installed in the machine room. The refrigerant cycle device may keep the interior of the refrigerator at low temperatures so as to maintain freshness of storage items. The refrigerant cycle device includes, for example, a compressor that compresses refrigerant, and an evaporator that performs heat exchange between refrigerant and outside air via phase change from liquid phase refrigerant to gas phase refrigerant.

[0027] Doors 20 and 30 may open and close the refrigerating compartment 22 and the freezing compartment 32 respectively. One end of each door 20 or 30 may be pivotally connected to the cabinet of the refrigerator 10 by, for example, a hinge. The door 20 may include a plurality of doors. More specifically, as illustrated in FIG. 2, doors 20 may be installed on two opposite side edges of the refrigerator 10 so as to be opened forward.

[0028] A barrier 16 may be interposed between the freezing compartment 32 and the refrigerating compartment 22 to separate the freezing compartment 32 and the refrigerating compartment 22. The barrier 16 may have a predetermined thickness and may be integrally formed with the inner cabinet 14. The barrier 16 may extend horizontally such that the refrigerating compartment 22 and the freezing compartment 32 are divided into upper and lower compartments by the barrier 16.

[0029] A partition 18 may be installed, for example, at the center of the freezing compartment 32, or other location as appropriate, to divide the interior of the freezing compartment 32 into two spaces. The partition 18 may be a vertical wall to define left and right freezing compartments 32 separated from each other. As such, two freezing compartment doors 30 may be provided to open or close the respective freezing compartments 32.

[0030] The refrigerating compartment 22 shown in FIG. 2 does not include a center partition like the freezing compartment 32. However, installation of a similar partition in the refrigerating compartment 22 is possible.

[0031] The refrigerating compartment door 20 may be equipped with a variety of storage baskets 50, 60 and 100. The baskets 50, 60 and 100 may have an increased storage capacity corresponding to a larger refrigerator size and provide easily accessible storage spaces.

[0032] Hereinafter, a basket assembly according to an exemplary embodiment will be described in detail with reference to FIGs. 3 to 7. In this embodiment, simply for ease of discussion and illustration, the basket assembly is mounted to one of the refrigerator doors 20. However, such a basket assembly may be mounted to either/both of the refrigerator doors and/or either/both of the freezer doors 30, depending on a particular refrigerator arrangement.

[0033] As illustrated in FIG. 3, the basket 100 may be rotatably mounted to an inner surface of the refrigerating compartment door 20. The basket 100 may rotate between a closed substantially airtight position and an open position thereof, and may be mounted to the refrigerating compartment door 20 by a mounting frame 300, interposed therebetween, rather than being directly mounted to the inner surface of the door 20.

[0034] Additionally, baskets 60 and 70 may be provided above the basket 100. More specifically, in certain embodiments, the basket 70 may be an inner basket fitted in a recessed region of the door 20, and the basket 60 may be an outer basket seated on a door shelf 80 protruding from the door 20.

[0035] The outer basket 60 may be easily separable to facilitate removal of stored items received in the outer basket 60.

[0036] The inner basket 70 may also be separably installed at the inner surface of the door 20. However, separation of the inner basket 70 may be less frequent, such as for washing of the basket 70.

[0037] A grip 110 may be provided at an upper end of a front surface of the basket 100, and a button 210 to release the basket 100 from a closed position thereof may be provided, for example, at the door shelf 80 immediately above the grip 110.

[0038] As illustrated in FIG. 4, the basket 100 may be pivotally rotated to an open position thereof, in response to depression of the button 210 and pulling the grip 110 to tilt the basket 100.

[0039] As illustrated in the rear perspective view of FIG. 5, the basket 100 may be rotatably mounted to the mounting frame 300. Mounting protrusions 315 may be formed at the two opposite sidewalls of the mounting frame 300 and be configured to be separably inserted into mounting recesses formed in corresponding inner lateral surfaces of the door 20.

[0040] Similarly, in the case of the inner basket 70 positioned above the mounting frame 300, mounting protrusions 75 may be formed at the two opposite sidewalls of the inner basket 70 and be configured to be inserted into mounting recesses formed in corresponding inner lateral surfaces of the door 20. The door shelf 80 may be coupled to and supported by the inner basket 70, and may be seated on and supported by the door shelf 80.

[0041] As illustrated in FIG. 6, the basket assembly may include the mounting frame 300 fixed to the door 20, the basket 100 rotatably mounted to the mounting frame 300, and a locking device 200 to lock or unlock a position of the basket 100.

[0042] The mounting frame 300 may include two opposite sidewalls 310 to respectively cover portions of the two opposite sidewalls of the basket 100, a bottom wall 320 to cover a corresponding bottom portion of the basket 100, and a top wall 340 to selectively cover a top opening of the basket 100.

[0043] The sidewalls 310 of the mounting frame 300 may be configured such that rear portions of the sidewalls

of the basket 100 are inserted between the sidewalls 310 when the basket 100 is in the closed airtight position. The bottom wall 320 of the mounting frame 300 may be configured to cover a rear portion of the basket 100 when the basket 100 is in the closed airtight position. The top wall 340 of the mounting frame 300 may be configured to close the entire top opening of the basket 100 so as to keep the basket 100 sealed.

[0044] The basket 100 may have the form of a rectangular box including a bottom wall, front and rear walls, and two sidewalls. Each sidewall of the basket 100 may have a centrally stepped shape such that a front portion and a rear portion thereof have different widths.

[0045] The basket 100 may internally define a first chamber 120 that is located in front of the mounting frame 300 and a second chamber 140 that is positioned between the sidewalls 310 of the mounting frame 300. A width between the sidewalls of the basket 100 defining the second chamber 140 may be less than a width between the sidewalls of the basket 100 defining the first chamber 120. That is, first sidewalls 122 may define the first chamber 120 and second sidewalls 142 may define the second chamber 140, with a stepped portion 150 formed between the first sidewall 122 and the second sidewall 142. A distance between the first sidewall 122 and the second sidewall 142 traversed by the stepped portion 150 may correspond to a thickness of the respective sidewall of the mounting frame 300.

[0046] When the basket 100 is in the closed position, the second chamber 140 is positioned within the mounting frame 300 and comes into close contact with an indentation in the inner surface of the door 20 defining a door space. In this case, the first chamber 120 is not introduced into the door space, but is closed and sealed by the top wall 340 of the mounting frame 300. The stepped portion 150 may be supported by a front end of each sidewall 310 of the mounting frame 300 when the basket 100 is in the closed position. Additionally, the stepped portion 150 may also be selectively coupled to a detent 240 of the locking device 200.

[0047] Meanwhile, the inner basket 70 may include at a lower surface thereof a plurality of support protrusions 73, which may come into contact with and be supported by an upper surface of the mounting frame 300. The door shelf 80 coupled to the inner basket 70 may also be supported by the upper surface of the mounting frame 300. As such, the two baskets 60 and 70 and the door shelf 80 may not only be supported by the inner lateral surface of the door 20 via the mounting protrusions 75, but also be supported by the mounting frame 300, which results in provision of a more stable supporting force.

[0048] As illustrated in FIG. 7, a pair of pivot members 130 may protrude from a lower surface of the basket 100 and a pair of receiving members 321 may be formed at the bottom wall 320 of the mounting frame 300, such that the pivot members 130 are respectively inserted into the receiving members 321 to couple the basket 100 to the mounting frame 300. A virtual straight line passing through the pair of pivot members 130 and the pair of receiving members 321 defines a pivot axis of the basket 100.

[0049] The bottom wall 320 of the mounting frame 300, at which the receiving members 321 are formed, may have a somewhat U-shaped cross section when viewed from the bottom.

[0050] In certain embodiments, positions of the pivot members 130 and the receiving members 321 may be reversed, and these members may have different shapes from that illustrated in FIG. 7.

[0051] As described above, the locking device 200 may include the button 210 installed at the door shelf 80. A shaft 230 of the locking device 200, which is pivotally rotated when the button 210 is pressed, may be installed at the top wall 340 of the mounting frame 300. To this end, the top wall 340 of the mounting frame 300 may include a plurality of upwardly protruding support plates 370, such that the shaft 230 is separably received in one end of each of the upwardly protruding support plates 370. More specifically, one end of each of the plurality of upwardly protruding support plates 370 may include an insertion recess 372 into which reduced diameter portions 231 of the shaft 230 may be received.

[0052] More than one arm 232 may protrude upward from the shaft 230, and a bar shaped actuator 220 may be coupled to the button 210 so as to push the arm 232. The detent 240 may protrude from either/both ends of the shaft 230 and be engaged with the stepped portion 150 when the basket 100 is closed. A distal end of the detent 240, as illustrated in FIG. 7, may penetrate a through-hole 344 formed in corresponding end portions of the top wall 340 of the mounting frame 300.

[0053] The detent 240 may be fixed to the shaft 230 so as to be pivotally rotated along with the shaft 230, and may also be selectively caught by an upper end of the stepped portion 150. As such, when the basket 100 is in the closed position, the basket 100 is caught by the detent 240 without a risk of unintentional rotation thereof so long as the button 210 is not pressed to push the detent 240 upward. The detent 240 may have a shape suitable to be smoothly pushed upward by the upper end of the stepped portion 150 as the stepped portion 150 slides during pivotal rotation of the basket 100 from an open position to a closed position thereof.

[0054] Pivotal rotation of the shaft 230 is caused as the detent 240 is pushed upward when the user pivotally rotates the basket 100 from the open position to the closed position thereof, or when the actuator 220 pushes the arm 232 in response to pressure applied to the button 210. In this case, the shaft 230, the button 210 and the detent 240 are returned to their original positions as soon as force applied to rotate the shaft 230 is removed. To this end, the locking device 200 may also include an elastic member to return the rotated shaft 230 to an original position thereof.

[0055] FIG. 6 illustrates an exemplary elastic member in the form of a leaf spring 250 that extends from the shaft

230 in a given direction to come into contact at one end thereof with the upper surface of the mounting frame 300. The end of the leaf spring 250 may be supported by the upper surface of the mounting frame 300 and may be elastically deformed when the shaft 230 is pivotally rotated, thereby causing the shaft 230 to be pivotally rotated in an opposite direction when force is no longer applied to the shaft 230. Thereby, the detent 240, as illustrated in FIG. 7, is moved to protrude from the through-hole 344.

[0056] As illustrated in FIGs. 6 and 7, the top wall 340 of the mounting frame 300 may be curved at a substantially constant radius of curvature from the pivot axis. Upper rims of the sidewalls 122 and 142 defining the top opening of the basket 100 may also be curved to correspond to a curved lower surface of the top wall 340 of the mounting frame 300. As such, the basket 100 may smoothly slide without interference with the top wall 340 of the mounting frame 300 during pivotal rotation thereof.

[0057] One or more vertical guide grooves 360 may be formed in the top wall 340 of the mounting frame 300, and one or more guide pieces 160 may protrude from an upper end of a back wall of the basket 100 so as to be respectively inserted into the guide grooves 360. A lower end of the guide groove 360 may be positioned to come into contact with the guide piece 160 when the basket 100 is in the closed position, and an upper end of the guide groove 360 may be positioned to come into contact with the guide piece 160 when the basket 100 is in a maximum open position.

[0058] In particular, as illustrated in FIGs. 6 and 7, a support portion 364 having a shape corresponding to that of the guide piece 160 may be formed at the upper end of the guide groove 360 such that the guide piece 160 is caught and supported by the support portion 364. When the basket 100 is in the closed position, the stepped portion 150 may be supported by the front end of the sidewall 310 of the mounting frame 300, and therefore it may be unnecessary for the lower end of the guide groove 360 to support the guide piece 160. However, in certain embodiments, the lower end of the guide groove 360 may come into contact with the guide piece 160 when the basket 100 is in the closed position as described above.

[0059] Next, an operating procedure of the basket 100 will be described with reference to FIGs. 8A and 8B.

[0060] First, as shown in FIG. 8A, if the user presses the button 210 with the basket 100 closed against the mounting frame 300, the detent 240 of the locking device 200 is pushed upward. As the detent 240 is pushed upward, the stepped portion 150 of the basket 100 is released from the detent 240, and thus the basket 100 is pivotally rotatable to the open position, as shown in FIG. 8B, if the user pulls the grip 110 of the basket 100. As the basket 100 rotates to the open position, the guide piece 160 of the basket 100 is moved along the guide groove 360.

[0061] Once the basket 100 rotates to a maximum open position the guide piece 160 is caught and supported by the support portion 364 formed at the upper end of the guide groove 360, which prevents further rotation of the basket 100. At the maximum open position shown in FIG. 8B, the center of gravity of the basket 100 is located forward of a center vertical axis of the pivot member 130, and therefore the basket 100 may be kept at the maximum open position.

[0062] On the contrary, if the user pushes the basket 100 upward, the center of gravity of the basket 100 is moved. Once the center of gravity of the basket 100 is located rearward of the center vertical axis of the pivoting boss 130, the basket 100 is rotated even if no rotation force is not applied thereto. As such, the basket 100 may be rotated back to the closed position while pushing the detent 240 upward, and may be kept at the closed position as the stepped portion 150 is caught by the detent 240.

[0063] As shown in FIG. 9, a porous plate 180 may be provided on the bottom of the basket 100. The basket 100 may provide a sealed space for storing, for example, vegetables and fruits, and may also be used to store moist or wet food. This storage environment may cause water and/or condensation to be collected on the bottom of the basket 100, thus having a negative effect on stored food. To prevent water discharged from food stored in the basket 100 from coming into direct contact with the food, the porous plate 180 may be provided on the bottom surface of the basket 100.

[0064] The porous plate 180 may include a plurality of through-holes 181 to discharge water downward, and a plurality of spacers 184 formed at a lower surface thereof to achieve a predetermined distance between the porous plate 180 and the bottom surface of the basket 100. Although the spacers 184 in the embodiment shown in FIG. 9 have the form of bosses, the shape of the spacers is not limited thereto, and other shapes of spacers, such as ribs, may be used. The porous plate 180 may also include a finger hole 182 to facilitate removal of the porous plate 180 from the basket 100.

[0065] In this arrangement, as a result of the basket being rotatable so as to be opened away from or closed against the refrigerator door, a refrigerator as embodied and broadly described herein may achieve efficient utilization of storage space, fresh food storage, and easier and more convenient introduction and removal of storage items.

[0066] Hereinafter, a basket 400 according to another embodiment will be described in detail with reference to FIGs. 10 to 14. FIG. 10 is a perspective view of a closed state of the basket 400, FIG. 11 is a perspective view of an open state of the basket 400, and FIG. 12 is an exploded perspective view of the basket 400.

[0067] As shown in FIGs. 10 to 14, the, basket assembly may include the basket 400, a grip 460, a door shelf 410, a hinge portion 470, side frames 490, and a seal 418 all coupled to the door 20. The basket 400 may provide a storage space capable of storing various items, such as left over vegetables, for example, that would otherwise be received in an airtight container when stored

in the refrigerator.

[0068] In particular, the basket 400 may be installed on the door 20 to provide easy user access to frequently used items in small amounts, and to store left over food items, for example.

[0069] Although a position of the basket 400 provided on the door 20 is not necessarily limited, the basket 400 may be located at a lower end of the upper door 20, or at an upper end of the lower door 20, simply in terms of user convenience. For ease of explanation, in the embodiment shown in FIGs. 10-14, the basket 400 is located at the lower end of the upper door 20, but a position of the basket 400 is not necessarily limited in this regard.

[0070] The door shelf 410 protrudes from the door 20, with the bottom of the door shelf 410 engaged with a top opening of the basket 400 to shield a storage space of the basket 400 from the outside. The additional basket 60 for storage of food may be seated on the door shelf 410 as previously discussed.

[0071] In summary, the basket 400 may provide a storage space having a top opening, and the top opening of the basket 400 may be separably engaged with the bottom of the door shelf 410 to shield the storage space from the outside.

[0072] Next, a coupling relationship between the door shelf 410 and the basket 400 will be described in more detail with reference to FIGs. 13 and 14. FIG. 13 illustrates the top opening of the basket 400 and the door shelf 410, and FIG. 14 illustrates a coupled state of the basket 400 and the door shelf 410.

[0073] The seal 418 may be interposed between the door shelf 410 and the basket 400 and affixed to a lower surface of the door shelf 410 to fill a gap between the door shelf 410 and the basket 400 when the basket 400 is engaged with the door shelf 410, thereby providing for airtight closure of the storage space of the basket 400. The seal 418 may be formed of an elastic material that is typically used in an airtight container, such as urethane or silicone, for example. As illustrated in FIG. 13, the seal 418 affixed to the lower surface of the door shelf 410 may have a shape corresponding to the top opening of the basket 400.

[0074] In addition to facilitating the coupling and separating of the basket 400 to or from the door shelf 410, the grip 460 may also stably secure the basket 400 and the door shelf 410 coupled to each other. The grip 460 may be, for example, a bar shaped member as illustrated in FIGs. 12 and 13, coupled to an upper end of a front surface of the basket 400 by, for example, coupling bosses formed at both ends thereof. The upper end of the front surface of the basket 400, as illustrated in FIG. 12, may be molded so as to be partially depressed for insertion of the grip 460.

[0075] As illustrated in FIG. 14, the grip 460 may include a grip body 465, a grip portion 468, a locking portion 463, and a pivot shaft 466 penetrating the grip body 465. The grip portion 468 may be provided at one side of the grip 460 and the locking portion 463 is provided at the other side of the grip 460. Both ends of the grip body 465 may be hinged, or rotatably coupled, to the basket 400 about the pivot shaft 466.

[0076] The grip portion 468 may extend downward from one end of the grip body 465, in a direction perpendicular to the pivot shaft 466, to provide a portion of the grip 460 that the user may grasp and hold to open the basket 400. The locking portion 463 may be located at a side of the grip body 465 opposite the grip portion 468 and may protrude in a direction perpendicular to the pivot shaft 466. The locking portion 463, as illustrated in FIG. 14, may protrude upward from the grip body 465 and be fitted into a locking groove 412 formed in the lower surface of the door shelf 410. The locking groove 412 may be located near a lower end of a front surface of the door shelf 410 and may have a shape corresponding to the shape of the locking portion 463.

[0077] If the user grasps the grip portion 468 and applies an upward force, the grip 460 is rotated about the pivot shaft 466 and the locking portion 463 provided at the other end of the grip body 465 is separated from the locking groove 412, allowing the basket 400 to be opened.

[0078] The grip 460 may also include an elastic member 467, such as a spring, provided at one end thereof to maintain a locked configuration of the grip 460 as illustrated in FIG. 14.

[0079] The sealing member 418 may extend into the space between the locking portion 463 and the locking groove 412 as illustrated in FIG. 14, to maintain tight contact between the locking portion 463 and the locking groove 412 when the basket 400 is engaged with the bottom of the door shelf 410.

[0080] The hinge 470 may be formed at an inner surface of the door 20, at a position downwardly spaced from the door shelf 410. The hinge 470 may include a hinge shaft 475 for hinge coupling with the basket 400. The basket 400 may rotate about the hinge shaft 475, and an upper end of the basket 400 may be engaged with or disengaged from the bottom of the door shelf 410 via rotation of the basket 400 (see FIGs. 10 and 11). To provide for rotation of the basket 400, the hinge shaft 475 may be located at a distal end of the hinge 470.

[0081] The basket 400 may be separable from the hinge 470. That is, the basket 400 may be configured to selectively release its hinge coupling with the hinge 470 so as to be completely separated from the hinge 470.

[0082] A hinge shaft coupling portion 476 may be formed at a lower surface of the basket 400 to be coupled to the hinge shaft 475 in the form of a transverse groove in which more than one shaft coupling boss is formed, as shown in FIG. 17.

[0083] The hinge 470 illustrated in FIGs. 10 to 12 protrudes from the door 20 to stably support the basket 400 placed thereon. If the hinge 470 only slightly protrudes, the hinge 470 would be coupled to a rear end of the basket 400, which could cause excessive sagging when the basket 400 is opened. Accordingly, the hinge 470 may pro-

trude by a predetermined length.

[0084] On the contrary, if the hinge 470 excessively protrudes, for example, if the hinge 470 protrudes as for as the door shelf 410, the hinge 470 would be coupled to a front region of the basket 400, which could cause the rear end of the basket 400 to be excessively lifted during rotation about the hinge shaft 475. In this case, opening of the basket 400 may be obstructed as the basket 400 is caught by the door shelf 410. Therefore, the hinge 470 may be coupled to an intermediate, or middle position of the basket 400 as illustrated in FIGs. 10 and 11.

[0085] That is, a hinge coupling location suitable to prevent interference between the door shelf 410 and the basket 400 may be at an approximately middle position of the basket 400. Moreover, with a configuration in which a height of a rear end of the basket 400 is less than that of a front end of the basket 400, the rear end of the basket 400 is unlikely to be caught by the door shelf 410 upon opening of the basket 400. In this case, the bottom of the door shelf 410 may be partially inclined to conform to the shape of the basket 400, so as to achieve airtight closure of the basket 400.

[0086] The side frames 490 may be provided between the door shelf 410 and the hinge 470 so as to contact both sidewalls of the basket 400. The side frames 490 may facilitate the stable seating of the basket 400 on the door 20.

[0087] In this case, the basket 400 may be molded such that portions of the basket 400 corresponding to the side frames 490 are recessed by a depth equal to the thickness of the side frames 490. This may eliminate a stepped portion between the side frames 490 and the basket 400, thereby achieving enhanced convenience and a simplified external appearance.

[0088] A rotation stopper may restrict a rotation range of the basket 400 about the hinge shaft 475 to prevent items received in the basket 400 from falling out due to excessive rotation of the basket 475 about the hinge shaft 475.

[0089] As shown in FIG. 13, the rotation stopper may include an anti-rotation protrusion 415 formed at a lower surface of the door shelf 410. When the basket 400 is opened, a rear portion of the basket 400 may be caught by the anti-rotation protrusion 415, which prevents further rotation of the basket 400. The shape of the rotation stopper is not necessarily limited to the illustration of FIG. 13, and may be changed in number and/or shape. Alternatively, the anti-rotation protrusion 415 may be elongated in the horizontal direction, corresponding to the hinge shaft 475.

[0090] In another embodiment, the rotation stopper may include a beveled ledge 478 that protrudes from the distal end of the hinge 470 and has a beveled upper surface. Referring to FIG. 15, the basket 400 may be caught by the beveled ledge 478 as rotation of the basket 400 proceeds, which stops rotation of the basket 400. An allowable opening angle of the basket 40 may be adjusted based on an inclination of the beveled ledge 478.

[0091] A punching plate 480 having drain holes 481 perforated therethrough as illustrated in FIGs. 16 and 17 may also be provided. The punching plate 480 may be spaced apart from an inner bottom surface of the basket 400 by a predetermined distance. FIG. 16 is a plan view of the punching plate 480 of the basket 400 according to the second embodiment of the basket assembly, and FIG. 17 is a bottom view of the punching plate 480 of the basket 400 according to the second embodiment of the basket assembly.

[0092] Drain holes 481 may discharge condensation/water generated by, for example, storage of vegetables. The number and size of the drain holes 481 are not necessarily limited to the arrangement shown in FIGs. 16 and 17. The punching plate 480 may also include a separation hole 482, through which the user may insert, for example, a finger, to lift and separate the punching plate 480 from the basket 400.

[0093] To provide for a drainage space between the bottom surface of the basket 400 and the punching plate 480, a pedestal 484 may be formed at a lower surface of the punching plate 480. The pedestal 484 includes a plurality of bumps, which may be formed into a grid as illustrated in FIG. 17, or other arrangement as appropriate.

[0094] As is apparent from the above description, through provision of a basket capable of hermetically sealing a storage space thereof using a sealing member and a locking member, a refrigerator as embodied and broadly described herein may function to keep food fresh without using an airtight container.

[0095] Further, the basket as embodied and broadly described herein may be installed on the door, which provides easy user access. Furthermore, the hinge configuration of the basket may facilitate easy exposure of an opening of the basket, resulting in convenient access to items stored therein.

[0096] A basket is provided at a refrigerator door to achieve convenient storage of food having a need for airtight storage without an airtight container.

[0097] A refrigerator as embodied and broadly described herein may include a cabinet having an inner storage space, one side of which is open, a door pivotally rotatably coupled to the cabinet to open or close the open side of the storage space, a mounting frame coupled to an inner surface of the door, a basket mounted to the mounting frame so as to be pivotally rotatable between a closed airtight position and an open position, a locking device provided at the mounting frame to lock or unlock the basket at the closed airtight position, and a pivoting limiter configured to limit a maximum pivoting angle of the basket when the basket is opened.

[0098] The mounting frame may be separably coupled to the inner surface of the door.

[0099] The mounting frame may include a pair of sidewalls configured to cover a portion of both sidewalls of the basket, a bottom wall configured to cover a portion

of a bottom wall of the basket, and a top wall configured to selectively cover a top opening of the basket.

[0100] The refrigerator may further include a pair of pivot members configured to protrude from a lower surface of the basket, the pivot members defining a pivot axis of the basket, and a pair of receiving members formed at the bottom wall of the mounting frame and configured to receive the pair of pivot members, respectively.

[0101] The basket may include a first chamber configured to be introduced between the sidewalls of the mounting frame, and a second chamber located in front of the mounting frame, and a width between the sidewalls of the basket defining the second chamber may be greater than a width between the sidewalls of the basket defining the first chamber.

[0102] Each sidewall of the basket may include a first sidewall defining the first chamber, a second sidewall defining the second chamber, and a stepped portion connected between the first sidewall and the second sidewall.

[0103] The locking device may include a shaft mounted to the top wall of the mounting frame, a detent protruding from each of both ends of the shaft, the detent being configured to be engaged with the stepped portion when the basket is in the closed airtight position, and a button configured to pivotally rotate the shaft.

[0104] The detent may be selectively caught by the stepped portion of the basket so as to limit pivotal rotation of the basket.

[0105] The locking device may further include an elastic member configured to return the shaft to an original position thereof if pivotal rotation force is removed.

[0106] The elastic member may be a leaf spring protruding from one side of the shaft, and an end of the leaf spring may be pressed against an upper surface of the mounting frame.

[0107] The basket may include a grip formed at an upper end of a front surface thereof.

[0108] The top wall of the mounting frame may be curved at a constant radius of curvature from the pivot axis of the basket.

[0109] A guide groove may be vertically formed in the top wall of the mounting frame, and a guide piece may protrude from an upper end of a back wall of the basket and may be configured to be inserted into the guide groove.

[0110] The guide groove may include a support portion provided at an upper end thereof to support the guide piece when the basket is in a maximum open position.

[0111] A refrigerator in accordance with another embodiment as broadly described herein may include a cabinet having an inner storage space, one side of which is open, a door having one end hinged to the cabinet to open or close the open side of the storage space via pivotal rotation thereof, a door shelf formed at an inner surface of the door, and a basket having a storage space provided with a top opening, the top opening being engaged with a undersurface of the door shelf to block the storage space from the outside when the basket is coupled to the undersurface of the door shelf.

[0112] The refrigerator may further include an elastic sealing member interposed between the top opening of the basket and the door shelf when the basket is coupled to the undersurface of the door shelf.

[0113] The basket may include a grip formed at an upper end of a front surface thereof.

[0114] A locking groove may be formed in the undersurface of the door shelf, and the grip may include a grip body, both ends of which are hinged to the basket about a pivot shaft, a grip portion extending from one side of the grip body in a direction perpendicular to the pivot shaft, and a locking portion protruding from the other side of the grip body in a direction perpendicular to the pivot shaft, the locking portion being inserted into the locking groove.

[0115] A sealing member may be provided in the locking groove to realize close contact between the locking portion and the locking groove when the locking portion is inserted into the locking groove.

[0116] The pivot shaft may be provided with an elastic member to maintain coupling between the locking groove and the locking portion when no force is applied to the grip portion.

[0117] The refrigerator may further include a hinge portion formed at the inner surface of the door and spaced apart from the door shelf by a distance corresponding to a height of the basket, the hinge portion including a hinge shaft hinged to the bottom of the basket.

[0118] The refrigerator may further include a pair of side frames configured to come into contact with both sidewalls of the basket, and the sidewalls of the basket may be molded to be recessed by a depth corresponding to a thickness of the side frames.

[0119] The refrigerator may further include a rotation stopper configured to limit a rotation range such that pivotal rotation of the basket is performed within a predetermined angular range.

[0120] The rotation stopper may include an anti-rotation protrusion formed at a lower surface of the door shelf.

[0121] The rotation stopper may include a beveled ledge protruding from a distal end of the hinge portion and having a beveled upper surface.

[0122] The basket may be separable from the hinge portion as hinge coupling between the basket and the hinge portion is released.

[0123] The refrigerator may further include a punching plate spaced apart from an inner bottom surface of the basket by a predetermined distance, the punching plate having a drain hole perforated therethrough.

[0124] The refrigerator may further include a pedestal formed at a lower surface of the punching plate to provide a gap between the inner bottom surface of the basket and the punching plate.

[0125] Any reference in this specification to "one embodiment," "an embodiment," "example embodiment," etc., means that a particular feature, structure, or char-

acteristic described in connection with the embodiment is included in at least one embodiment of the invention. The appearances of such phrases in various places in the specification are not necessarily all referring to the same embodiment. Further, when a particular feature, structure, or characteristic is described in connection with any embodiment, it is submitted that it is within the purview of one skilled in the art to effect such feature, structure, or characteristic in connection with other ones of the embodiments.

[0126] Although embodiments have been described with reference to a number of illustrative embodiments thereof, it should be understood that numerous other modifications and embodiments can be devised by those skilled in the art that will fall within the spirit and scope of the principles of this disclosure. More particularly, various variations and modifications are possible in the component parts and/or arrangements of the subject combination arrangement within the scope of the disclosure, the drawings and the appended claims. In addition to variations and modifications in the component parts and/or arrangements, alternative uses will also be apparent to those skilled in the art.

Claims

1. A refrigerator, comprising:

a cabinet defining a storage space therein having one open side;
a door rotatably coupled to the cabinet to open and close the open side of the storage space;
a frame coupled to an inner surface of the door;
a basket rotatably coupled to the frame such that the basket is rotatable with respect to the frame between a closed position and an open position;
a locking device provided at the frame to selectively lock the basket at the closed position and release the basket for rotation from the closed position; and
a rotation limiter provided between the basket and the frame and configured to limit a rotation angle of the basket relative to the frame.

2. The refrigerator of claim 1, wherein the frame comprises:

a pair of sidewalls coupled to the inner surface of the door so as to extend across a portion of a corresponding pair of sidewalls of the basket;
a bottom wall configured to extend across a portion of a corresponding bottom wall of the basket; and
a top wall configured to selectively cover an open top of the basket.

3. The refrigerator of claim 2, further comprising:

a door shelf coupled to a top surface of the top wall of the frame;
a first auxiliary basket separably coupled to a top of the door shelf; and
a second auxiliary basket provided at a rear of the first auxiliary basket, between the first auxiliary basket and the inner surface of the door.

4. The refrigerator of claim 2, further comprising:

a pair of pivots that protrude from a lower surface of the basket, the pivots defining an axis of rotation of the basket; and
a corresponding pair of receivers formed at the bottom wall of the frame and configured to respectively receive the pair of pivots.

5. The refrigerator of claim 2, wherein the basket comprises:

a first chamber configured to be positioned between the pair of sidewalls of the frame; and
a second chamber positioned adjacent to the first chamber, and extending outside of frame,
wherein a distance between first portions of the pair of sidewalls of the basket defining the first chamber is less than a distance between second portions of the pair of sidewalls of the basket defining the second chamber.

6. The refrigerator of claim 5, wherein each of the pair of sidewalls of the basket comprises:

a first sidewall defining a corresponding lateral side of the first chamber;
a second sidewall defining a corresponding lateral side of the second chamber; and
a stepped portion connecting the first sidewall and the second sidewall.

7. The refrigerator of claim 6, wherein the locking device comprises:

a shaft coupled to the top wall of the frame;
a detent that protrudes from each of two opposite ends of the shaft, wherein each detent is configured to engage a corresponding stepped portion when the basket is in the closed position;
a button operably coupled to the shaft, wherein the shaft is configured to rotate in response to depression of the button; and
an elastic member coupled between the shaft and the frame and configured to restore an original position of the shaft in response to removal of a rotation force,
wherein the elastic member comprises at least one leaf spring protruding from an outer circumferential surface of the shaft, and wherein a dis-

tal end portion of the at least one leaf spring is pressed against an upper surface of the frame.

8. The refrigerator of claim 4, wherein the rotation limiter comprises:

at least one guide groove extending along the top wall of the frame, in a direction corresponding to a movement direction of the basket; and
at least one guide piece protruding from an upper end of a back wall of the basket and configured to be received in the at least one guide groove.

9. The refrigerator of claim 8, wherein the at least one guide groove includes a support portion provided at one end thereof, wherein the guide piece is supported against the support portion in a maximum open position of the basket.

10. The refrigerator of claim 1, wherein the frame comprises:

a door shelf that protrudes from an inner surface of the door; a hinge assembly provided at the inner surface of the door and spaced apart from the door shelf by a distance corresponding to a height of the basket, wherein the hinge assembly includes a hinge shaft coupled to a bottom of the basket; and
a pair of side frames coupled to the inner surface of the door and configured to come into contact with two opposite sidewalls of the basket, wherein each of the sidewalls of the basket includes a recessed portion having a depth corresponding to a thickness of its respective side frame,
wherein a basket coupled to the inner surface of the door, the basket defining a storage space having an open top, wherein the open top of the basket is selectively engaged with a bottom surface of the door shelf to cover the open top of the basket and block the storage space from an outside of the basket.

11. The refrigerator of claim 10, further comprising interposed seal positioned between the open top of the basket and the bottom surface of door shelf, wherein the seal forms a seal between the basket and the door shelf when the basket is coupled to the bottom surface of the door shelf.

12. The refrigerator of claim 10, further comprising a grip provided at an upper end of a front surface of the basket,
wherein the grip comprises:

a body having two opposite ends each rotatably coupled to the basket about a pivot shaft;
a grasping portion extending from a first edge of the body; and
a locking portion protruding from a second edge of the body, opposite the first edge thereof, wherein the locking portion is selectively received in a locking groove formed in the bottom surface of the door shelf.

13. The refrigerator of claim 12, further comprising:

a seal provided in the locking groove, wherein the seal seals a gap between the locking portion and the locking groove when the locking portion is received in the locking groove; and
an elastic member coupled to the pivot shaft, wherein the elastic member maintains coupling between the locking groove and the locking portion when no external force is applied to the grasping portion.

14. The refrigerator of claim 10, wherein the rotation limiter comprises an anti-rotation protrusion that extends downward from the bottom surface of the door shelf, and that selectively contacts a rear surface of the basket as the basket rotates with respect to the pair of side frames.

15. The refrigerator of claim 10, wherein the rotation limiter comprises a beveled ledge provided at an outer peripheral portion of hinge assembly that rotatably couples a bottom of the basket to the inner surface of the door, the beveled ledge having a beveled upper surface oriented at a predetermined angle such that the bottom of the basket contacts the beveled upper surface as the basket rotates to limit the rotation range of the basket.

FIG. 1

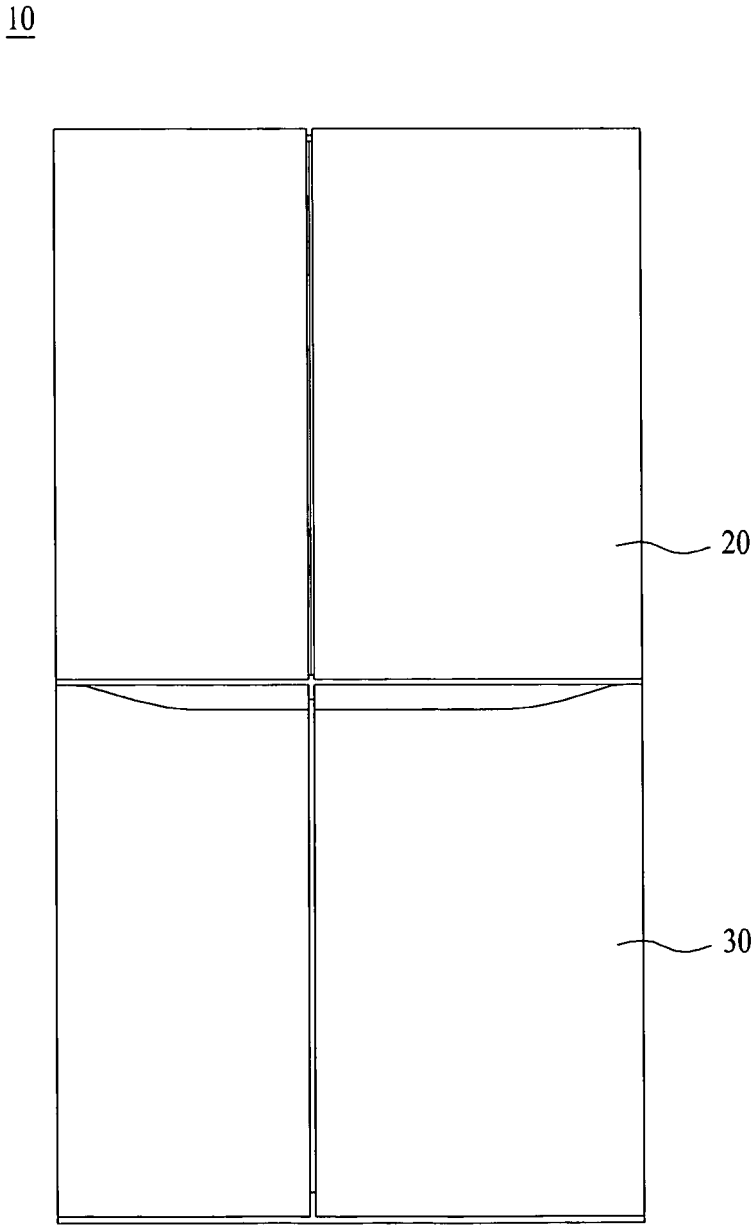

FIG. 2

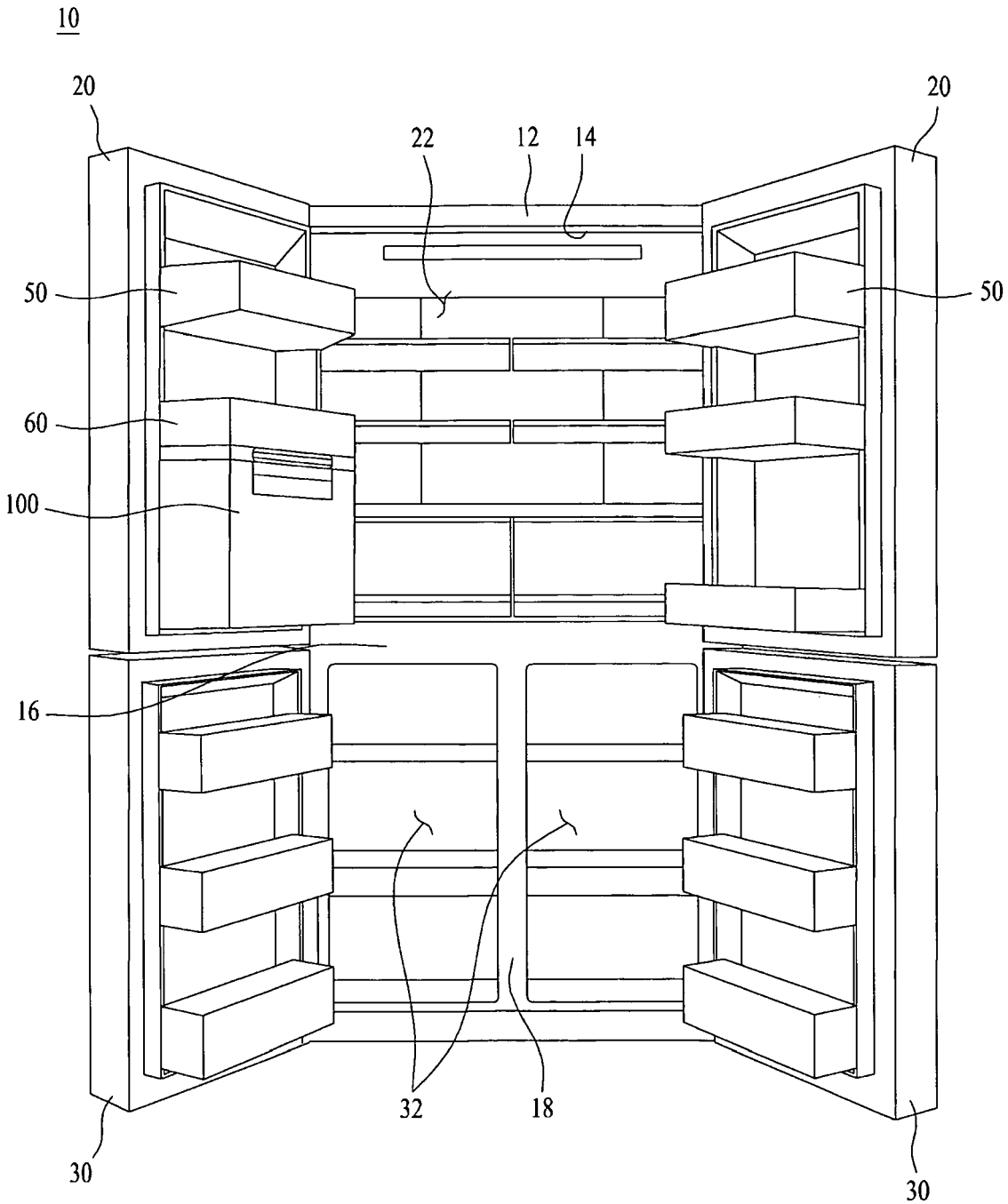

FIG. 3

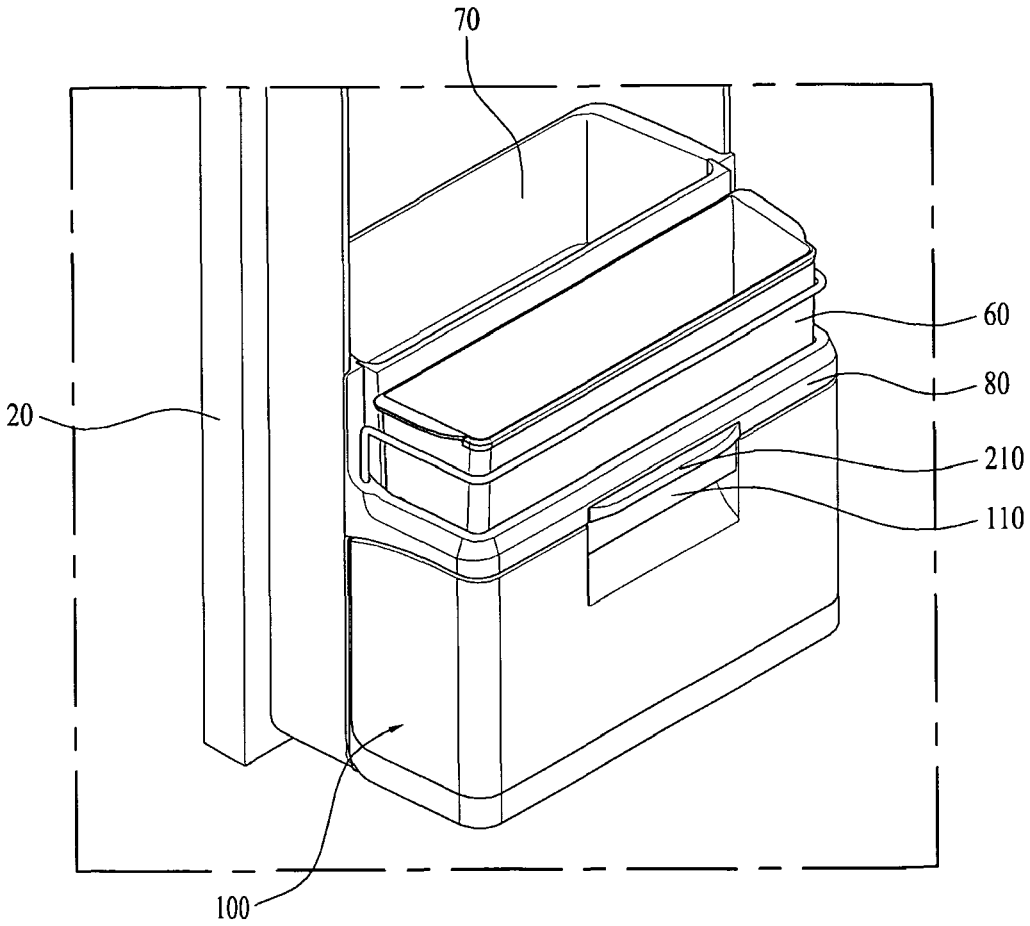

FIG. 4

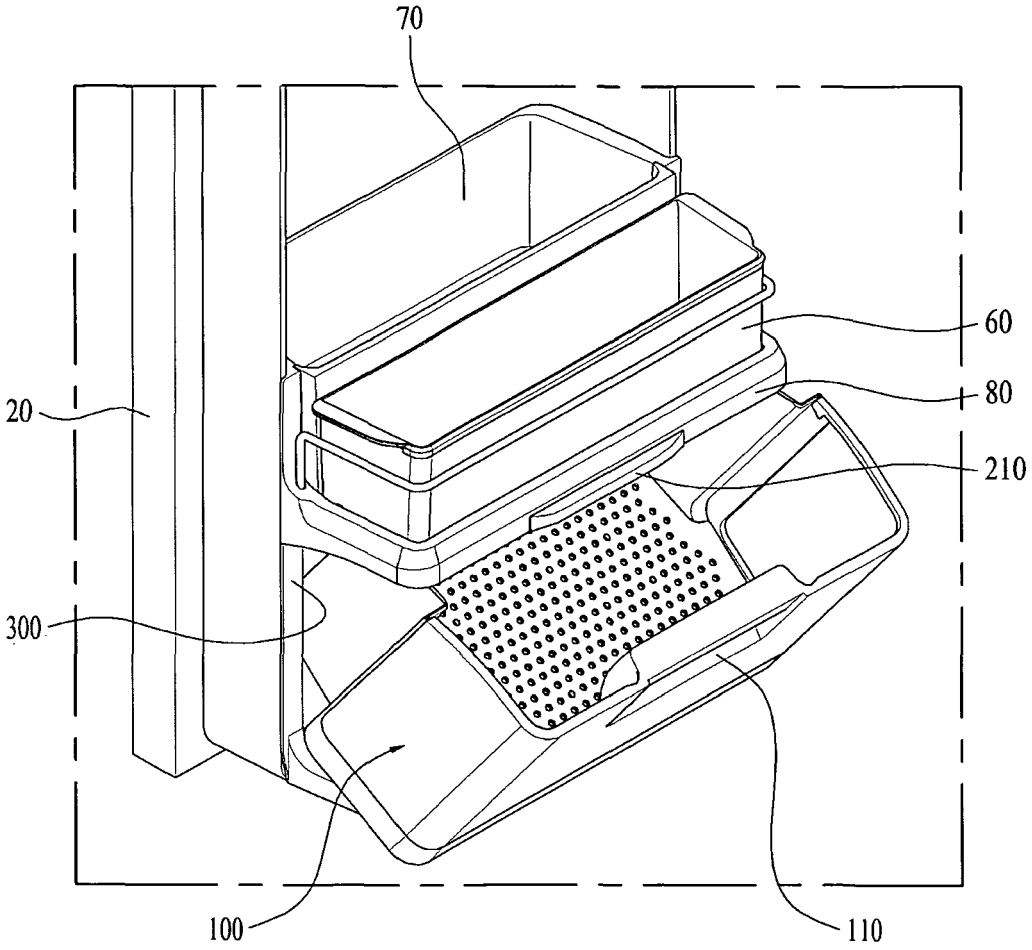

FIG. 5

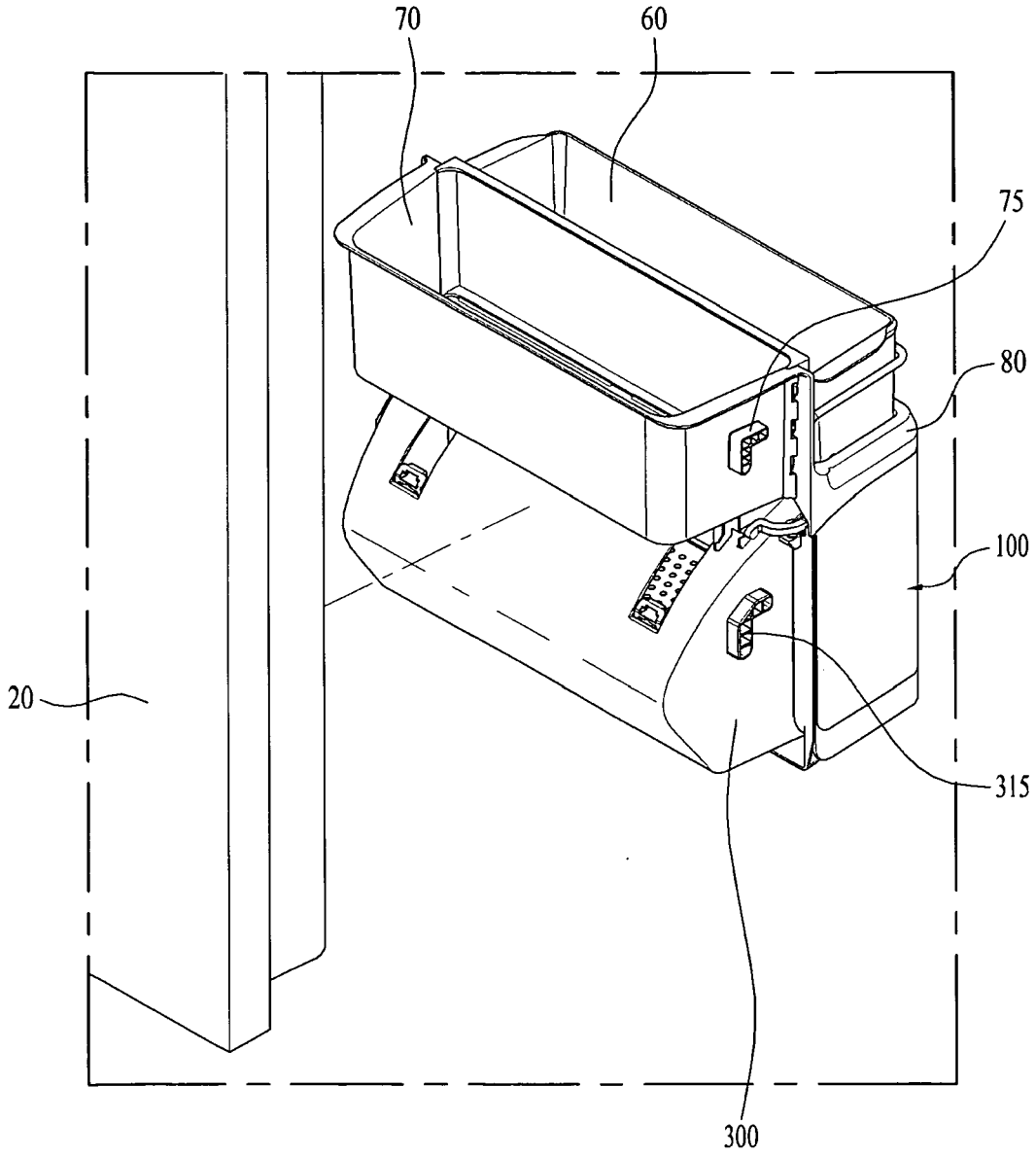

FIG. 6

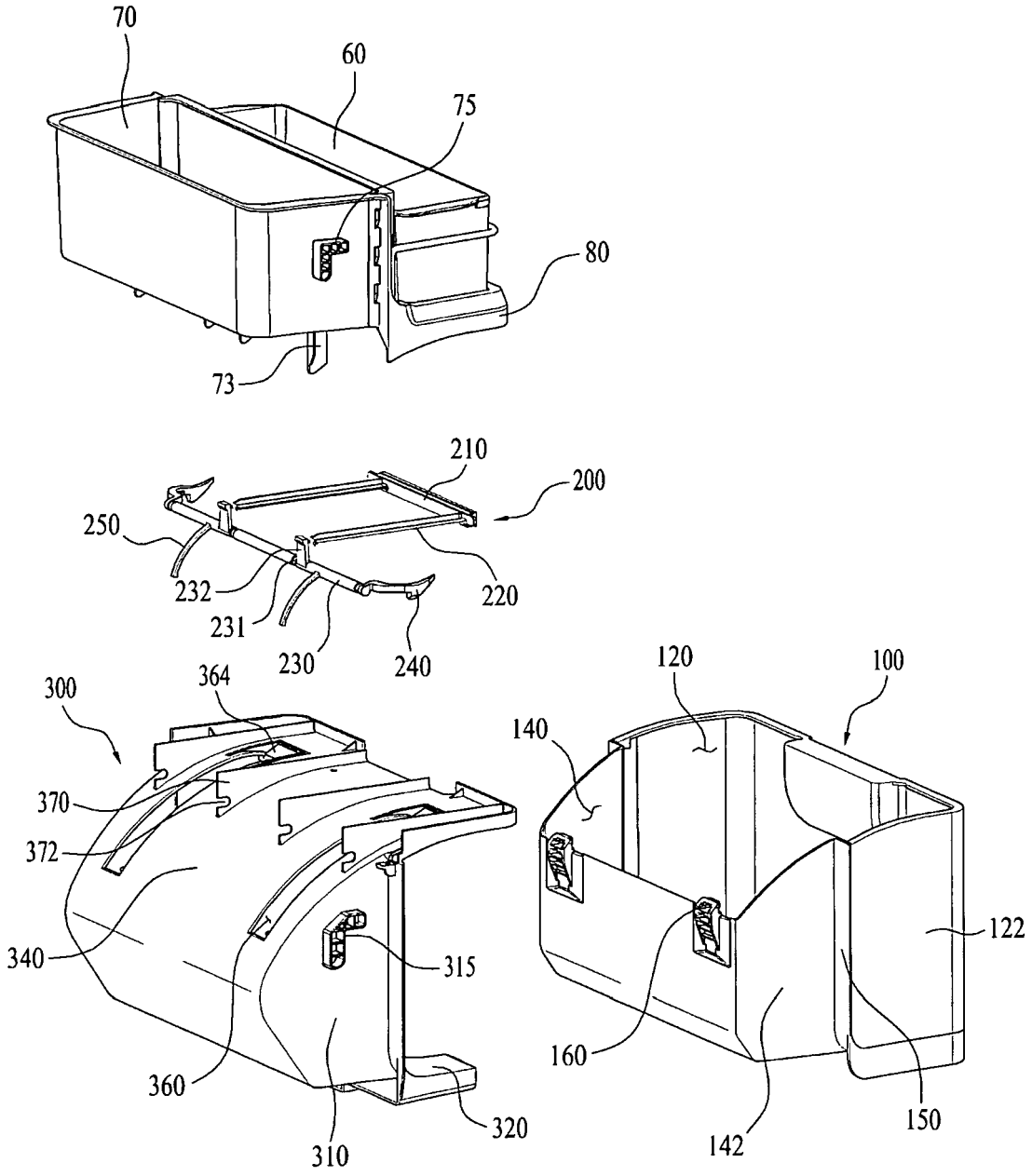
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FIG. 7

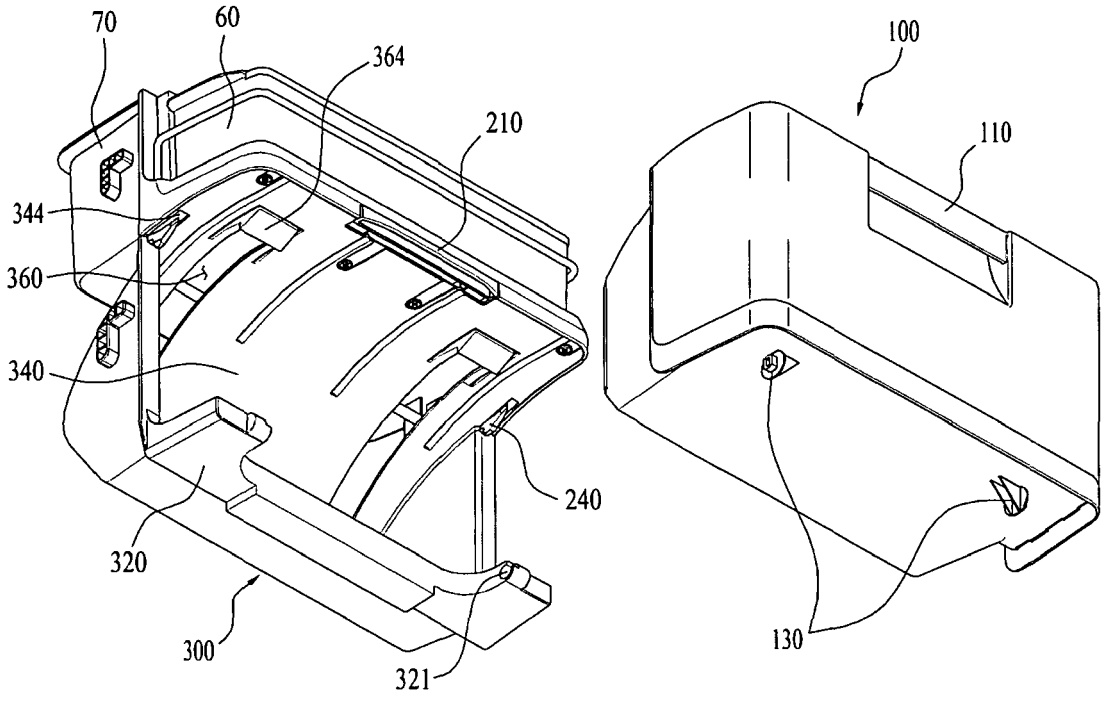

FIG. 8A

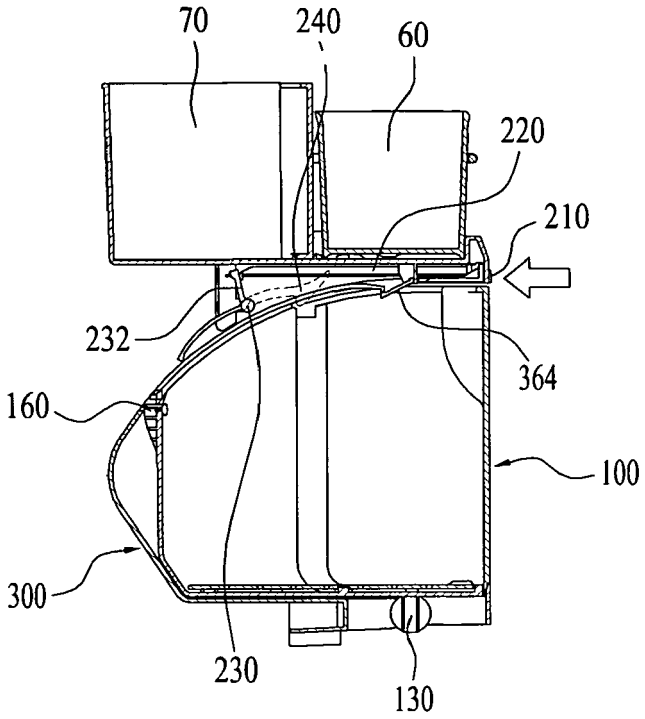

FIG. 8B

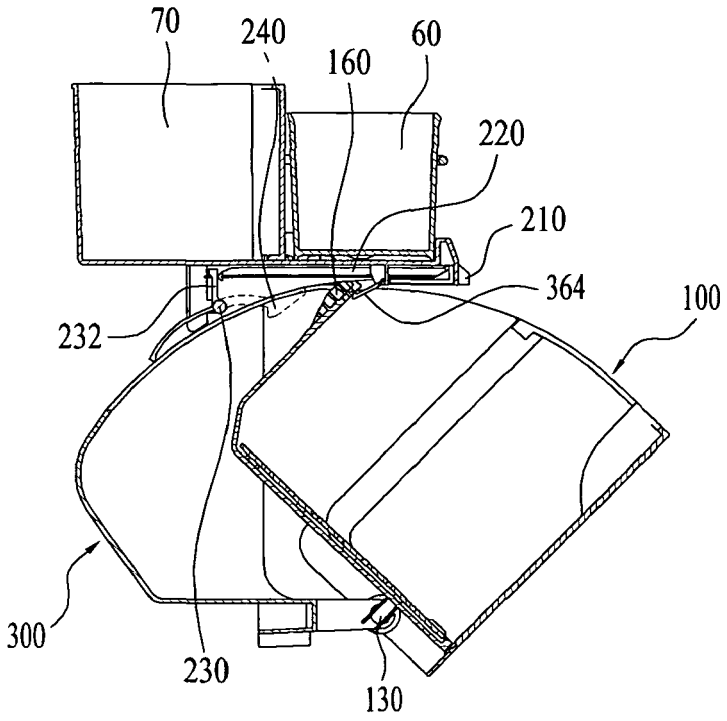

FIG. 9

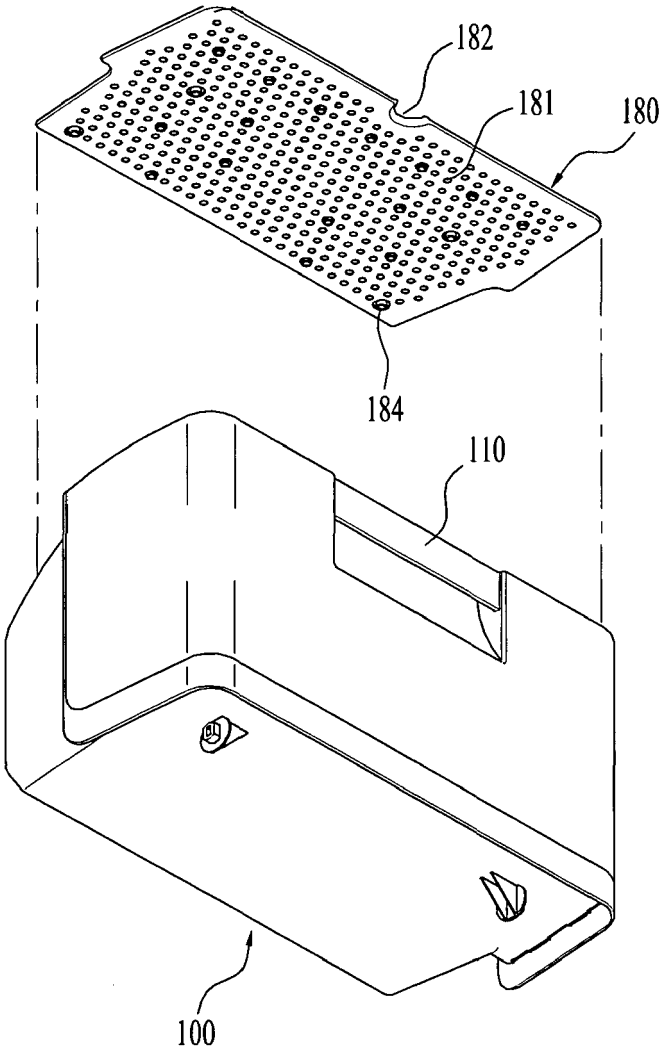

FIG. 10

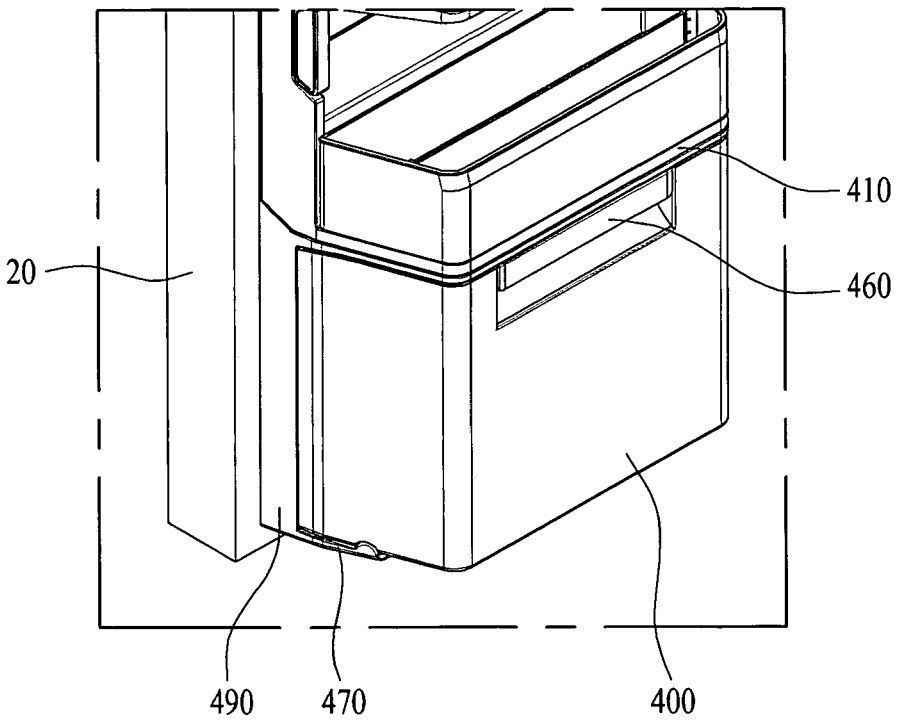

FIG. 11

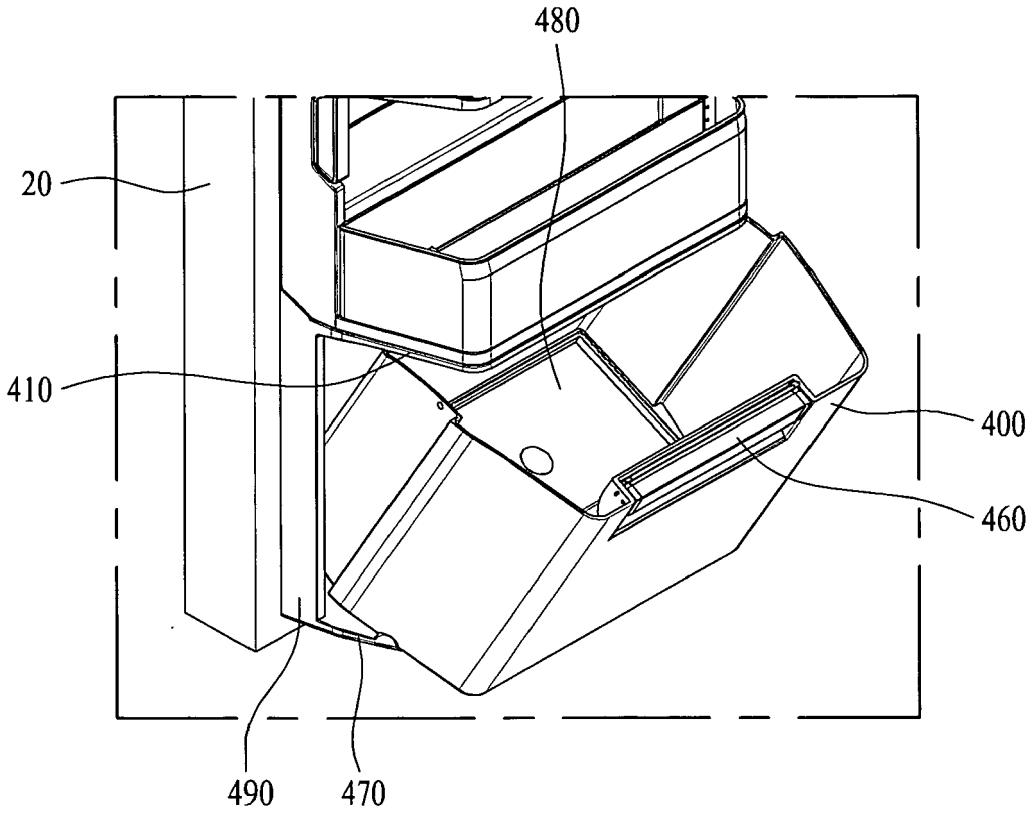

FIG. 12

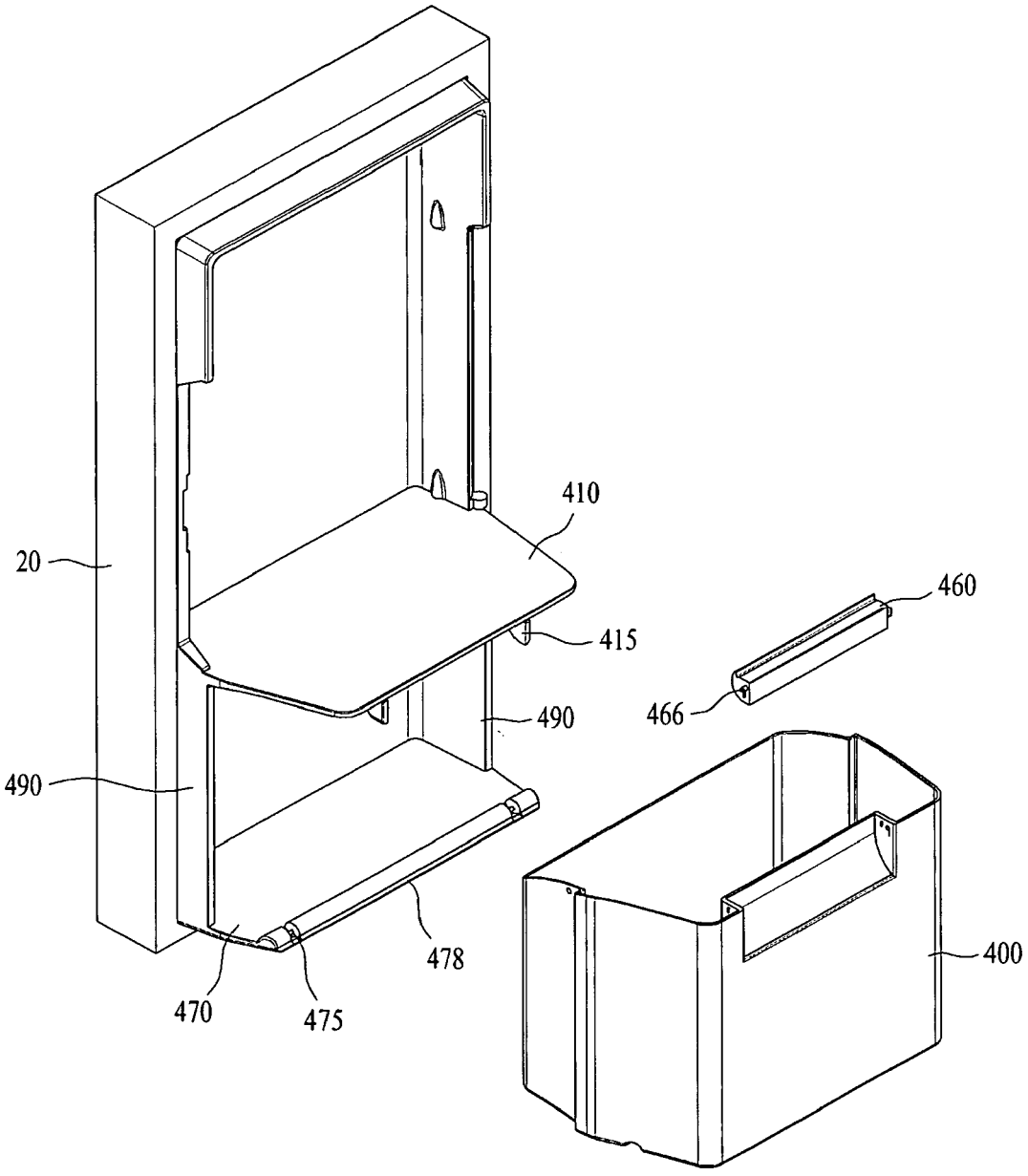

FIG. 13

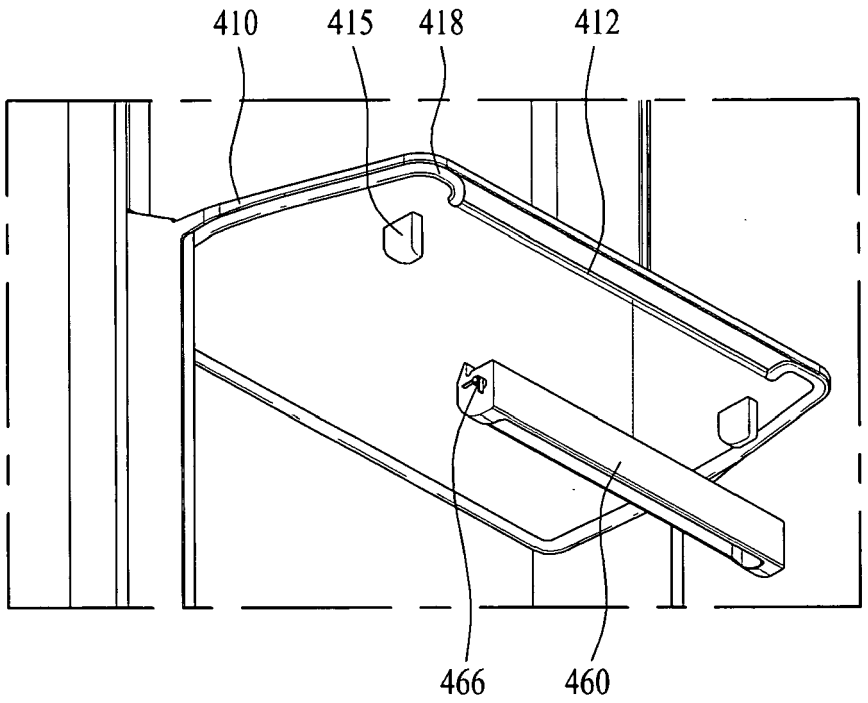

FIG. 14

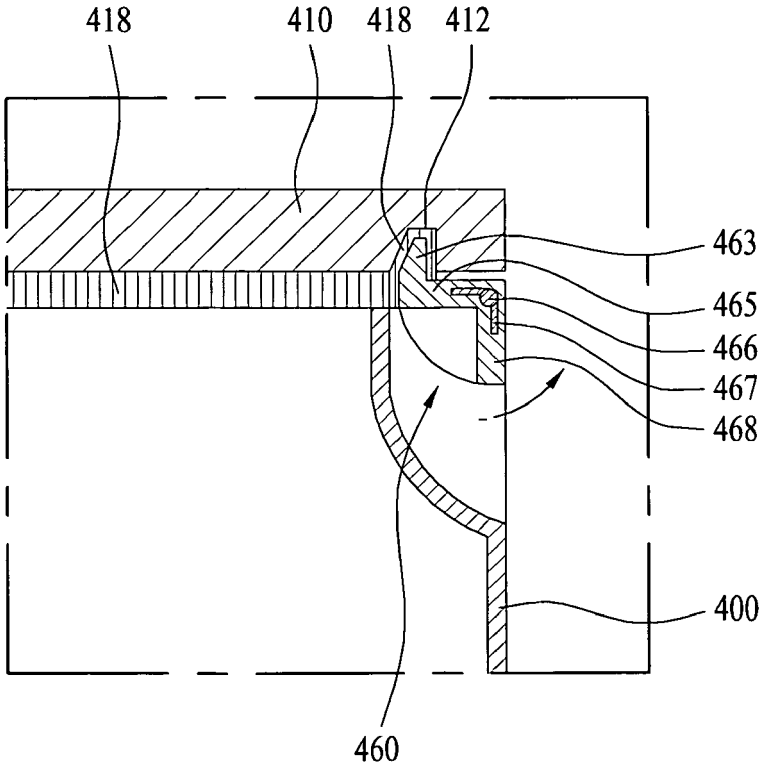

FIG. 15

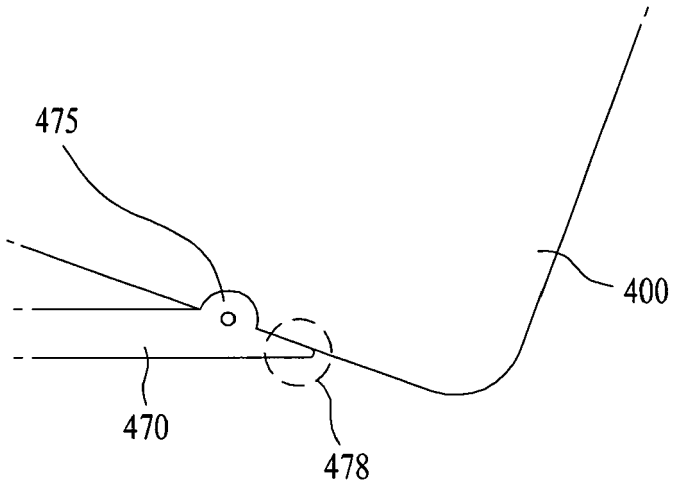

FIG. 16

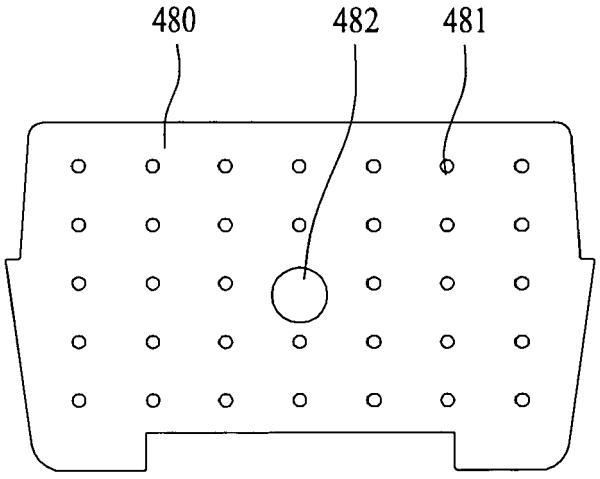

FIG. 17