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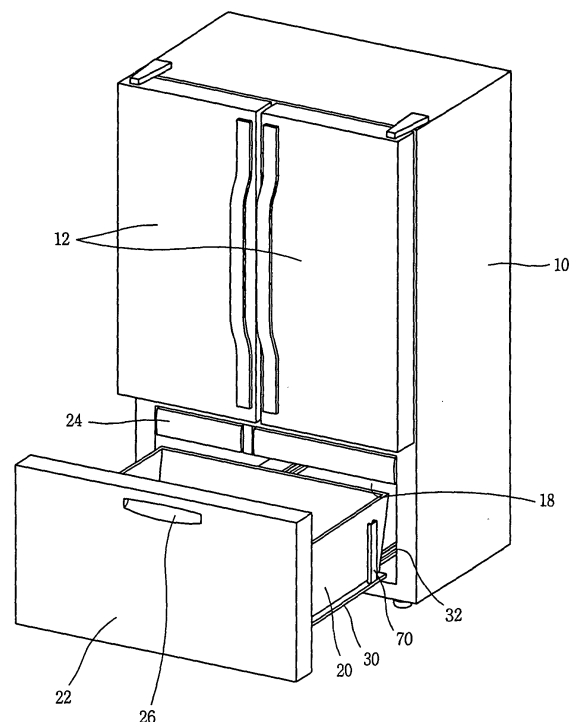
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(54) **Refrigerator with bottom drawer having basket lift device**

(57) A refrigerator includes a main body (10) having at least a lower cooling chamber (18) disposed at a lower portion of the main body (10), a base frame (30) disposed to be movable in inward/outward directions at the lower cooling chamber (18) and having a drawer door (22) at a front side thereof, a lift frame (36) disposed at an upper surface of the base frame (30), on which a basket (20) is placed, a gas spring (38) mounted vertically at an upper surface of the base frame (30) and connected with the lift frame (36) for lifting the lift frame (36), and lift rails (40) at a rear side of the drawer door (22) and guiding the lift frame (36) to be moved up and down.

FIG. 3



EP 1 621 836 A2

Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates to a refrigerator of the so-called 'drawer' type having a basket lift device and more particularly, to a basket lift device capable of lifting a basket received at a lower portion of a main body of such a refrigerator, to thereby enhance users' convenience.

2. Description of the Background Art

[0002] Figure 1 is a perspective view of a refrigerator and Figure 2 is a sectional view of a lower portion of the refrigerator showing how a basket is received in a main body of the refrigerator in accordance with the conventional art.

[0003] A typical bottom drawer-type refrigerator includes a main body 102 having an opened front side and a receiving space, an upper cooling chamber 106 disposed at an upper portion of the main body 102, having a pair of upper ('French' style side-by-side) doors 104 respectively opening swingably at both sides, for keeping food items stored therein cold, and a lower cooling chamber 112 (e.g. a freezer compartment) disposed at a lower portion of the main body 102, separated by a barrier wall 108 from the upper cooling chamber 106 and having a drawer door 110 opening slidably outwardly.

[0004] A mechanical chamber 116, which includes a compressor 114 and other components for generating cooling air supplied to the upper cooling chamber 106 and the lower cooling chamber 112, is provided at a rear portion of the main body 102.

[0005] A basket 120 for receiving food items therein is slidably disposed in the lower cooling chamber 112, and the drawer door 110 is fixed at the front side of the basket 120 like a drawer front panel. Accordingly, when the drawer door 110 is pulled out, the basket 120 is thereby opened, and when the drawer door 110 is pushed in, the basket 120 is thereby closed. A guide rail 124 is respectively installed between each of the outer sides of the basket 120 and inner sides of the lower cooling chamber 112 to guide the basket 120 to be slid the inward/outward directions.

[0006] One or more of drawers 126 for keeping food items therein may be provided above the basket 120 so as to be slidably opened.

[0007] In such conventional bottom drawer-type refrigerator, when a food item kept in the lower cooling chamber 112 needs to be taken out or a food item needs to be put into the lower cooling chamber 112, the drawer door 110 is pulled outwardly so that the basket 120 can be slidably moved and opened. After the food item stored in the basket 120 is taken out or the food item is put into the basket 120, the drawer door 110 is pushed inwardly

so that the basket 120 can be slidably closed.

[0008] However, the conventional bottom drawer-type refrigerator has a problem in that, because the installation position of the basket is too low, a user must lower his/her posture, that is, for example, the user must bend his/her back or crouch down in order to put in or take out the food items, causing users' inconvenience.

SUMMARY OF THE INVENTION

[0009] Therefore, an object of the present invention is to provide a bottom drawer type refrigerator having a basket lift device capable of enhancing users' convenience by lifting a position of the basket in such a manner that when a basket disposed at a lower portion of a main body of the refrigerator is drawn out, it is lifted upwardly.

[0010] To achieve these and other advantages and in accordance with the purpose of the present invention, as embodied and broadly described herein, there is provided a bottom drawer type refrigerator including: a main body having upper and lower cooling chambers respectively disposed at upper and lower portions of the main body; a base frame disposed to be movable inwardly/outwardly at the lower cooling chamber and having a drawer door at a front side thereof; a lift frame disposed atop the base frame, on which a basket is placed; a gas spring mounted vertically at an upper surface of the base frame and connected with the lift frame to generate force for lifting the lift frame; and a pair of lift rails mounted at a rear side of the drawer door and guiding the lift frame to be moved up and down.

[0011] The gas spring includes a cylinder charged with high pressure gas, fixed at the base frame and disposed vertically; and an operation rod inserted into the cylinder and movable up and down linearly, the operation rod being urged upwardly by the pressure of the gas charged inside the cylinder, and fixed at the lift frame.

[0012] A locking unit is installed between the lift rail and a guide protrusion, and locks the lift frame to maintain a maximum lifted position and a maximum lowered position. The locking unit includes an upper stopping groove formed at an upper side of the lift rail; a lower stopping groove formed at a lower side of the lift rail; a locking member inserted to be linearly moved into the guide protrusion and locked one of the upper stopping groove and the lower stopping groove; and a spring inserted into an insertion groove and gives an elastic force to allow the locking member to maintain the state of being caught by the stopping groove.

[0013] The foregoing and other objects, features, aspects and advantages of the present invention will become more apparent from the following detailed description of the present invention when taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] The accompanying drawings, which are includ-

ed to provide a further understanding of the invention and are incorporated in and constitute a part of this specification, illustrate embodiments of the invention and together with the description serve to explain the principles of the invention.

[0015] In the drawings:

Figure 1 is a frontal perspective view of a bottom drawer type refrigerator in accordance with the conventional art;

Figure 2 is a cross-sectional view of a lower portion of the bottom drawer type refrigerator in accordance with the conventional art;

Figure 3 is a frontal perspective view of a bottom drawer type refrigerator in accordance with a first embodiment of the present invention with a basket thereof shown in an opened condition;

Figure 4 is a elevation side view showing a basket lift device of the refrigerator in accordance with the first embodiment of the present invention;

Figure 5 is a rear perspective view of the basket lift device of the refrigerator in accordance with the first embodiment of the present invention;

Figure 6 is a top plan view of the basket lift device of the refrigerator in accordance with the first embodiment of the present invention;

Figure 7 is an enlarged view of a portion 'A' in Figure 6;

Figure 8 is a sectional view taken along line VIII-VIII in Figure 7;

Figure 9 is an enlarged view of a portion 'B' in Figure 6;

Figure 10 is a side elevation view showing an operation state of the basket lift device of the refrigerator in accordance with the first embodiment of the present invention;

Figure 11 is a top plan view of the basket lift device of the refrigerator in accordance with a second embodiment of the present invention;

Figure 12 is an enlarged view of a portion 'C' in Figure 11;

Figure 13 is a top plan view of the basket lift device of the refrigerator in accordance with a third embodiment of the present invention; and

Figure 14 is an enlarged view of a portion 'D' in Figure 13.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0016] A bottom drawer type refrigerator having a basket lift device in accordance with the present invention will now be described with reference to the accompanying drawings.

[0017] There can be several embodiments of the refrigerator having a basket lift device, of which the most preferred ones will be described.

[0018] Figure 3 is a frontal perspective view of a bottom

drawer refrigerator, with a basket thereof shown in an opened state in accordance with the first embodiment of the present invention, and Figure 4 is a side elevation view showing a basket lift device of the refrigerator in accordance with the first embodiment of the present invention.

[0019] The refrigerator implementing the basket lift device of the present invention includes a main body 10 having a receiving space, an upper cooling chamber 14 disposed at an upper portion of the main body 10 and having a pair of upper (e.g. 'French') swinging doors 12 open at both sides, a lower cooling chamber 18 separated by a barrier wall 16 from the upper cooling chamber 14 and disposed at a lower portion of the main body 10, a basket 20 disposed to be slidable in inward/outward directions at the lower cooling chamber 18 for keeping food items therein, and a lift unit for lifting the basket 20 upwardly when the basket 20 is drawn out.

[0020] The upper cooling chamber 14 is preferably used as a refrigerating chamber for keeping refrigerated food items and the lower cooling chamber 18 is preferably used as a freezing chamber for keeping frozen food items.

[0021] A drawer door 22 is disposed at a front side of the lower cooling chamber 18 and pushes in or draws out the basket 20 while being moved in inwardly/outwardly of the main body 10. A plurality of drawers 24 are optionally disposed at an upper portion of the lower cooling chamber 18, to keep food items, e.g. ice cubes, therein and can be drawn in or out.

[0022] The drawer door 22 includes a handle 26 at its front side and a base frame 30 mounted at its inner side, on which the basket 20 is mounted. A pair of guide rails 32 are installed between the lower cooling chamber 18 and the base frame 30 to slidably guide the base frame 30 inwardly/outwardly of the main body 10.

[0023] Each guide rail 32 includes a fixed rail 32a fixed at the bottom surface of the lower cooling chamber 18, a middle rail 32b slidably connected with the fixed rail 32a, and a moving rail 32c slidably connected with the middle rail 32b and fixed at the lower surface of the base frame 30.

[0024] Figure 5 is a rear perspective view of the basket lift device of the refrigerator in accordance with the first embodiment of the present invention, and Figure 6 is a top plan view of the basket lift device of the refrigerator in accordance with the first embodiment of the present invention.

[0025] The lift unit includes a lift frame 36 disposed above the base frame 30, on which the basket 20 is placed, a gas spring 38 installed at the base frame 30 and generating force for lifting the lift frame 36, and a pair of lift rails 40 for guiding the lift frame 36 to be moved linearly up and down.

[0026] The gas spring 38 includes a cylinder 42 charged with high pressure gas, fixed at the base frame 30 and disposed vertically; and an operation rod 44 inserted to be movable up and down in the cylinder 42 and

linearly moved by the pressure of the gas charged in the cylinder 42, an upper end of the operation rod 44 being fixed at the lift frame 36.

[0027] A vertical riser portion 46 is formed extending at a right angle upwardly at the front side of the lift frame 36, and a connection portion 48 is formed at an upper end of the vertical riser portion 46. An upper end of the operating rod 44 of the gas spring 38 is connected with the connection portion 48.

[0028] The gas spring 38, in which high pressure gas is charged in the hermetic cylinder 42, generates pressing force on the inner end of the operating rod 44 by the pressure of the gas. The gas spring 38 is small, light and smoothly operated, so the lift frame 36 can be smoothly lifted.

[0029] The gas pressure of the gas spring 38 is so high as to lift the basket 20 to a maximum lifted position when a maximum load is kept in the basket 20. The gas pressure of the gas spring can be variably implemented according to an application field. For example, the gas spring 38 can have such a pressure that can lift the basket 20 to a middle position.

[0030] The lift rails 40 are provided as pairs and are vertically mounted at a rear surface of the drawer door 22, each having a rail groove 50 formed in a longitudinal direction thereof. A pair of guide protrusions 52 are formed at the vertical riser portion 46 of the lift frame 36, which protrusions 52 are inserted in and moved along the respective rail grooves 50.

[0031] Upper stoppers 54 and lower stoppers 56 for preventing release of the guide protrusion 52s are mounted at upper ends and lower ends of the lift rails 40.

[0032] A locking unit is installed between at least one of the lift rails 40 and the corresponding guide protrusion 52 in order to lock a position of the lift frame 36 where the lift frame 36 is lowered to the bottom position, or in order to lock the position of the lift frame 36 where the lift frame 36 is lowered to the bottom position and also lock a position of the lift frame 36 where the lift frame 36 is lifted to the maximum lifted position.

[0033] As shown in Figures 7 and 8, the locking unit includes upper stopping detents 60 formed at an upper portion of at least one of the lift rails 40, lower stopping detents 62 formed at a lower portion of the lift rail 40, a pair of locking pins 66 movable linearly in insertion recesses 64 formed at both sides of the guide protrusion 52 and catchable in corresponding ones of the upper stopping detents 60 and the lower stopping detents 62, and springs 68 respectively inserted in the insertion recesses 64 and providing elastic outward urging force so that the locking members 66 can be caught in the stopping detents 60 and 62.

[0034] The upper stopping detents 60 are formed in both sides of the rail groove 50 of the lift rail 40 corresponding to where the guide protrusions 52 are positioned when the lift frame is lifted to the maximum lifted position, and the lower stopping detents 60 are formed in both sides of the rail groove 50 of the lift rail 40 corre-

sponding to where the guide protrusions 52 are positioned when the lift frame 36 is lowered down to the bottom position.

[0035] When the locking pins 66 are caught in the lower stopping detents 62, the locking unit thereby prevents the lift frame 36 from being lifted by virtue of the pressure of the gas spring 38. When a user pulls up the lift frame 36 with a certain force, the locking pins 66 are released by escaping from the lower stopping detents 62 and the lift frame 36 is able to be freely lifted by virtue of the gas spring 38. When the lift frame 36 is lifted to the maximum listed position, the locking pins 66 are caught in the upper stopping detents 60, preventing the lift frame 36 from being lowered.

[0036] The locking unit can be provided without the upper stopping detents 60 so that the locking member 66 is caught only in the lower stopping detents 62, preventing the lift frame 36 from being moved upwardly, and when the lift frame 36 is placed at the maximum lifted position, the guide protrusions 52 are caught by the stoppers 54, maintaining the lift frame at the maximum lifted position.

[0037] With reference to Figure 9, a pair of guide rails 70 are mounted extending in a vertical direction and guide the lift frame 36 to be moved up and down, and guide protrusions 72 are formed at both sides of the lift frame 70 and respectively inserted in the corresponding guide grooves 74 formed in the guide rails 70 and moved along the guide grooves 74.

[0038] The operation of the basket lift device of the present invention will now be described.

[0039] Figure 10 shows an operation state of the basket lift device of the refrigerator in accordance with the first embodiment of the present invention.

[0040] When the user wants to take a food item out of the basket 20, he/she pulls out the drawer door 22 to draw the basket 20 out of the lower cooling chamber 18. Then, locking between the lift frame 36 and the lift rail 40 is released and the lift frame 36 rises freely. Namely, as the locking members 66 installed at the guide protrusions 52 of the lift frame 36 are released from the lower stopping detents 62 formed in the lift rail 40, the lift frame 36 is unlocked.

[0041] At this time, the lift frame 36 is lifted by virtue of the pressure of the gas spring 38. Namely, the operation rod 44 is moved upward by the pressure of the high pressure gas charged in the cylinder 42 of the gas spring 38 and the lift frame 36 connected with the operation rod 44 is thereby lifted up.

[0042] When the lift frame 36 is lifted up to the maximum lifted position, the locking members 66 of the lift frame 36 are caught in the stopping detents 60 formed in the lift rail, locking the lift frame 36 to be maintained in the lifted state.

[0043] In this state, the user can put in or take out a food item and then press the lift frame 36 downwardly. Then, the locking members 66 are released from the upper stopping recesses 60 to free the lift frame 36. When

the lift frame 36 is moved down to the bottom, the locking members 66 are caught in the lower stopping detents 62, preventing the lift frame 36 from being lifted up.

[0044] Figure 11 is a top plan view of the basket lift device of the refrigerator in accordance with a second embodiment of the present invention, and Figure 12 is an enlarged view of a portion 'C' in Figure 11.

[0045] The basket lift device in accordance with the second embodiment has the same structure as the basket lift device of the first embodiment of the present invention, except for the locking unit for locking the lift frame 36.

[0046] In the second embodiment of the present invention, the locking unit includes buttons 76 mounted at both upper and lower portions of the drawer door 22, an operation rod 78 connected with each button 76 and rotatably disposed inside the drawer door 22 so as to be rotated when the button 76 is pressed, a spring 82 mounted at one side of each operation rod 78 and providing an urging elastic force to the operation rod 78, and a locking detent 80 formed in the guide protrusion 52, in which an end of each the operation rod 78 can be caught.

[0047] When the lift frame 36 is placed at the lowest position, the operation rod 78 mounted at a lower side of the drawer door 22 is inserted into the locking detent 80 in the guide protrusion 52, preventing the lift frame 36 from being lifted up.

[0048] In this state, when the user presses the button 76, the operation rod 78 is rotated, overcoming the elastic force of the spring 82, and released from the locking detent 80 in the guide protrusion 52, allowing the lift frame 36 to be freely lifted up by virtue of the pressure of the gas spring 38.

[0049] When the lift frame 36 reaches the maximum lifted position, the operation rod 78 mounted at the upper side of the drawer door 22 is caught in the locking detent 80 in the guide protrusion 52, maintaining the lift frame 36 at the lifted position.

[0050] And when the button 76 mounted at the upper side of the drawer door 22 is pressed, the operation rod 78 is released from the locking detent 80, freeing the lift frame 36. Then, the user can push down the lift frame 36.

[0051] Figure 13 is a top plan view of the basket lift device of the refrigerator in accordance with a third embodiment of the present invention, and Figure 14 is an enlarged view of a portion 'D' in Figure 13.

[0052] A basket lift device in accordance with the third embodiment of the present invention has the same structure except for the locking unit for locking the lift frame.

[0053] In the third embodiment of the present invention, the locking unit includes an actuator 86 mounted at a lower portion of the drawer door 22 or at both the upper and lower portions of the drawer door 22, an operation rod 88 connected with the actuator 86 and linearly moved according to driving of the actuator 86, and a locking detent 90 formed in the side of the guide protrusion 52 of the lift frame 36, in which the operation rod 52 can be insertedly caught.

[0054] The actuator 86 is preferably formed as a solenoid type for linearly and reciprocally moving the operation rod when power is applied thereto.

[0055] A through hole 92 is formed at one side of the lift rail 40 into which the guide protrusion 52 is inserted, allowing the operation rod 88 to pass therethrough.

[0056] As for the locking unit of the third embodiment of the present invention, when the user operates the actuator 86 by manipulating a switch or the like, the operation rod 88 is retracted and released from the locking detent 90, unlocking the lift frame 36. And when DC power of opposite polarity is applied to the actuator 86, the operation rod 88 is moved forward to be inserted into the locking detent 90, locking the lift frame 36.

[0057] As so far described, the basket lift device disposed at the lower side of the refrigerator in the present invention has the following advantages.

[0058] That is, for example, when the basket is drawn out, it can be lifted up to allow the user to take a food item out of the basket without having to bend his/her back, enhancing users' convenience.

[0059] As the present invention may be embodied in several forms without departing from the spirit or essential characteristics thereof, it should also be understood that the above-described embodiments are not limited by any of the details of the foregoing description, unless otherwise specified, but rather should be construed broadly within its spirit and scope as defined in the appended claims, and therefore all changes and modifications that fall within the metes and bounds of the claims, or equivalents of such metes and bounds are therefore intended to be embraced by the appended claims.

Claims

1. A bottom drawer type refrigerator comprising:

a main body having upper and lower cooling chambers respectively disposed at upper and lower portions of the main body;
a drawer base frame movable inwardly and outwardly at the lower cooling chamber and having a drawer door at a front side thereof for closing the lower cooling chamber;
a lift frame disposed at an upper surface of the drawer base frame, on which lift frame a basket may be placed;
a gas spring mounted so as to operate in a vertical direction at an upper surface of the drawer base frame and connected with the lift frame to generate force for lifting the lift frame; and
lift rails mounted at a rear side of the drawer door and guiding the lift frame to be moved up and down.

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

- a cylinder charged with high pressure gas, fixed at the base frame and disposed vertically; and an operation rod inserted into the cylinder and movable up and down linearly, the operation rod being urged upwardly by the pressure of the high pressure gas charged inside the cylinder, and being fixed at the lift frame.
3. The refrigerator of claim 1, wherein the lift rails are disposed vertically at a rear surface of the drawer door, a rail groove is formed in a longitudinal direction of each lift rail, and respective guide protrusions are provided at a front portion of the lift frame and inserted in and movable along the corresponding rail grooves.
 4. The refrigerator of claim 3, wherein upper and lower stoppers for preventing the guide protrusions from being released from the rail grooves are installed at upper and lower ends of the lift rails.
 5. The refrigerator of claim 3, further comprising:

a locking unit installed between at least one of the lift rails and the corresponding guide protrusion and locking the lift frame in order to maintain the lift frame at a bottommost lowered position and also maintain the lift frame at a maximum lifted position.
 6. The refrigerator of claim 4, wherein the locking unit comprises:

an upper stopping detent formed in an upper portion of the lift rail;

a lower stopping detent formed in a lower portion of the lift rail;

a locking pins linearly movable in the respective insertion recesses at each side of the guide protrusion and lockable in either one of the upper and lower stopping detents; and

a spring urging each of the locking pins outwardly for being caught in the stopping detents.
 7. The refrigerator of claim 6, wherein upper stopping detents are formed in both sides of the rail groove of the lift rail where the guide protrusion is positioned when the lift frame is lifted to its maximum lifted position, and lower stopping detents are formed in both sides of the rail groove of the lift rail where the guide protrusion is positioned when the lift frame is lowered down to its bottommost position.
 8. The refrigerator of claim 1, wherein guide rails for guiding vertical movement of the lift frame are vertically mounted at both respective sides of the base frame, and guide protrusions are formed at both respective sides of the lift frame and inserted in and
- movable along the corresponding guide rails.
9. The refrigerator of claim 1, further comprising:

a locking unit mounted at the door and locking the lift frame to be maintained at its bottommost lowered position and also to be maintained at its maximum lifted position.
 10. The refrigerator of claim 9, wherein the locking unit comprises:

push buttons mounted respectively at upper and lower portions of the drawer door;

an operation rod connected with each push button and rotatably disposed inside the drawer door so as to be rotated when the corresponding push button is pressed; and

a locking detent formed in the lift frame, in which the operation rods are able to be caught.
 11. The refrigerator of claim 10, wherein the locking unit further includes a spring mounted at one side of each operation rod and urging the operation rods to be caught in the locking groove.
 12. The refrigerator of claim 10, wherein the locking detent is formed at a front surface of the guide protrusion formed at the lift frame.
 13. The refrigerator of claim 9, wherein the locking unit comprises:

an actuator fixed at a rear surface of the drawer door;

an operation rod mounted at the actuator and linearly and reciprocally moved according to an operation of the actuator; and

a locking detent formed in one side of the lift frame, into which the operation rod is insertable.
 14. The refrigerator of claim 13, wherein the actuator is formed as a solenoid for linearly and reciprocally moving the operation rod when power is applied thereto.
 15. The refrigerator of claim 13, wherein the locking detent is formed in the side of the guide protrusion formed at the lift frame.

FIG. 1

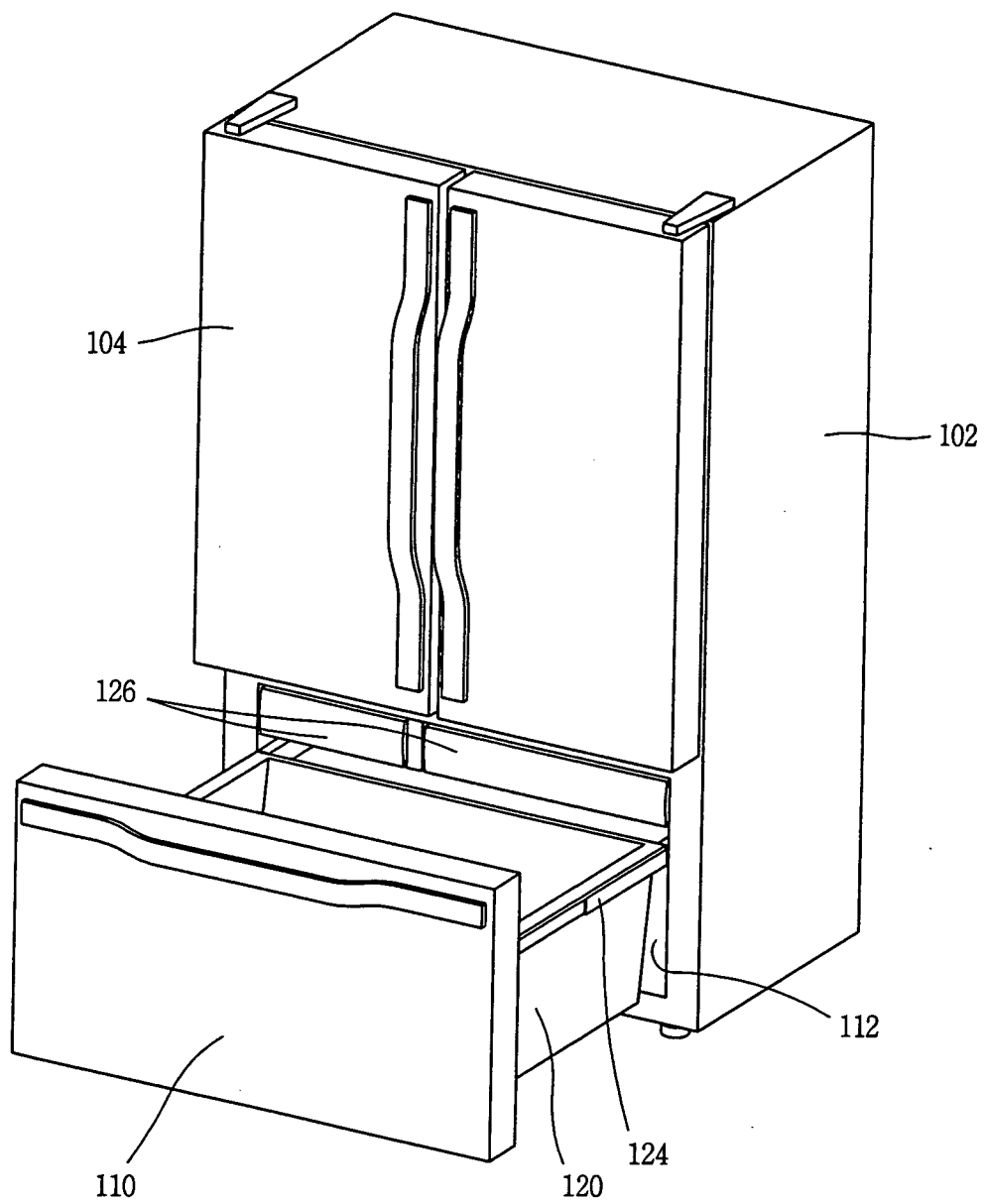


FIG. 2

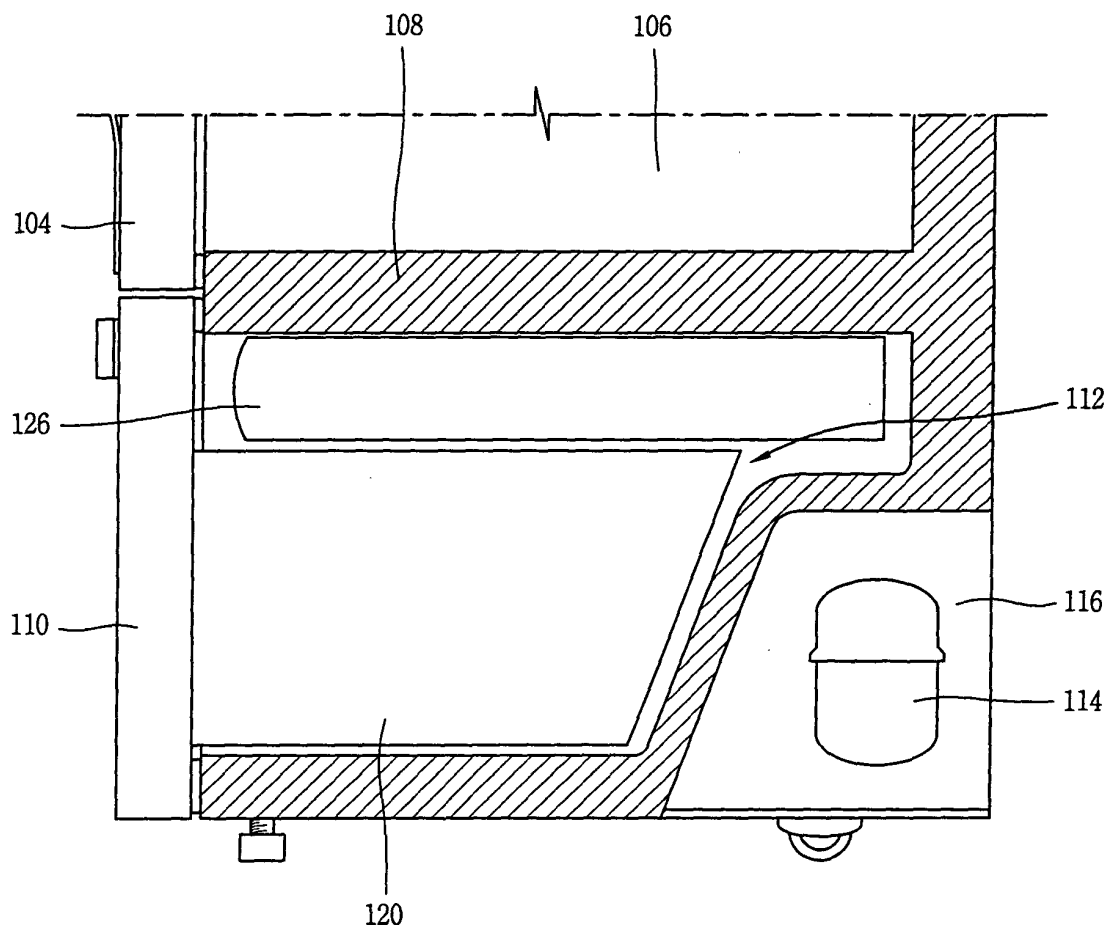


FIG. 3

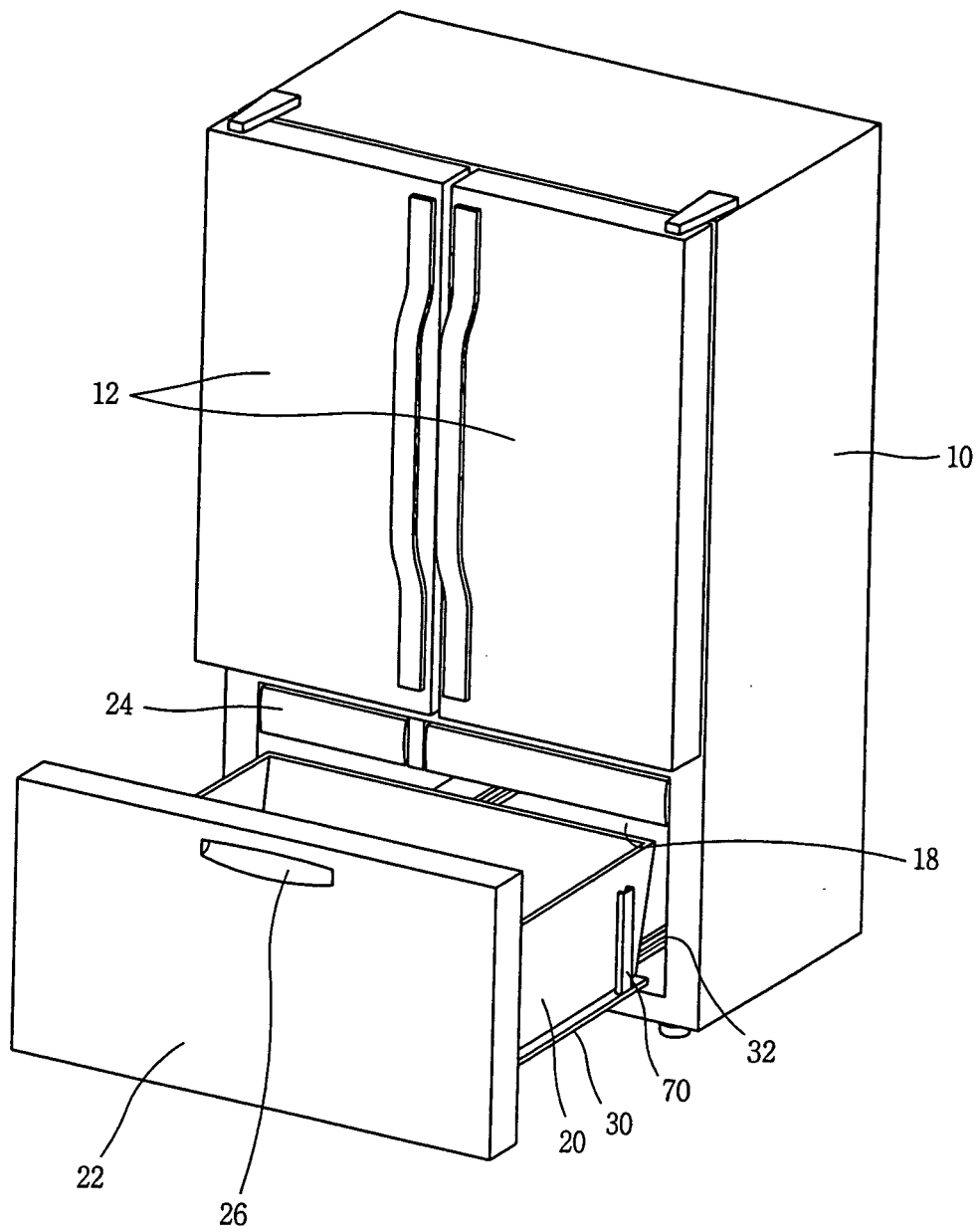


FIG. 4

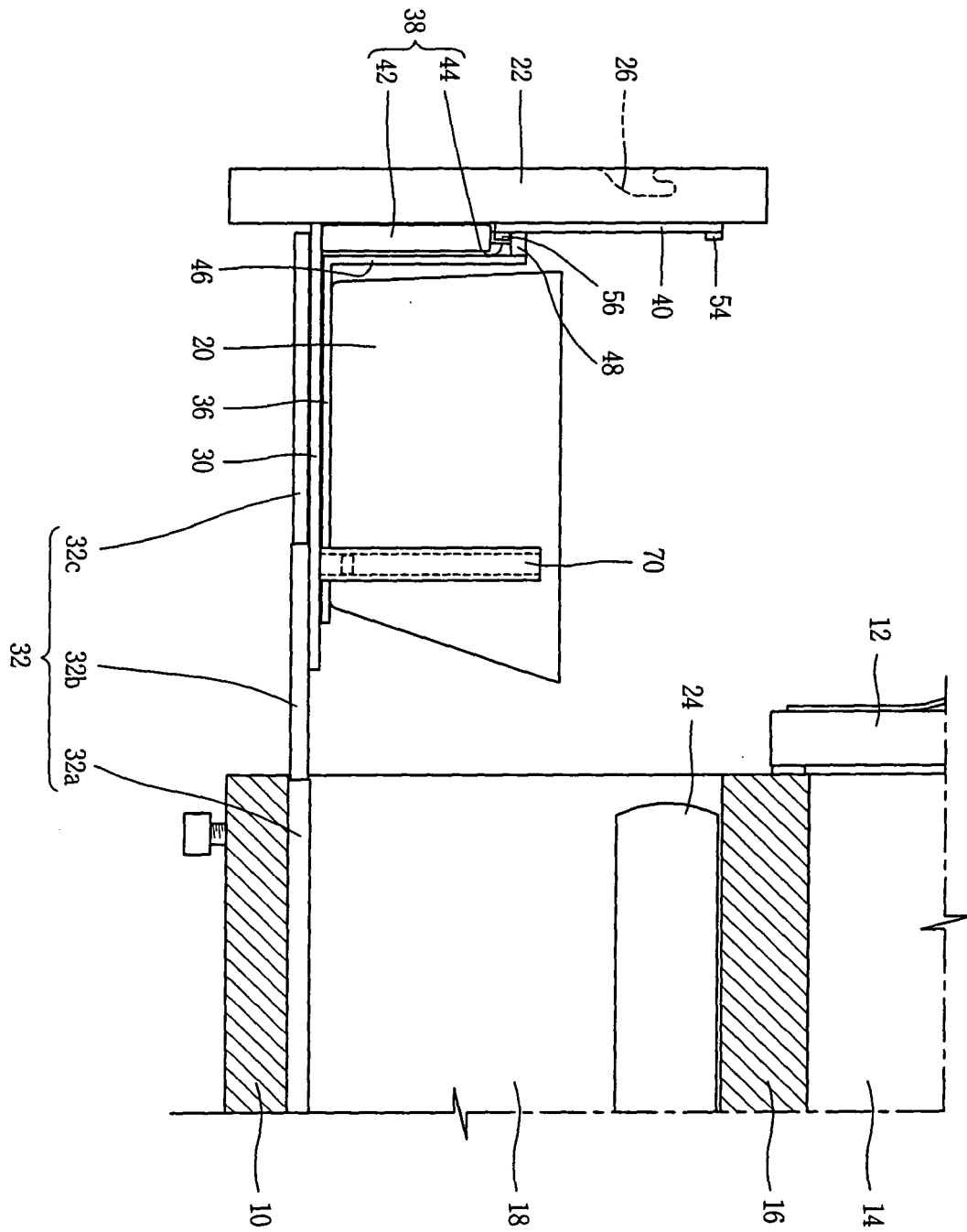


FIG. 5

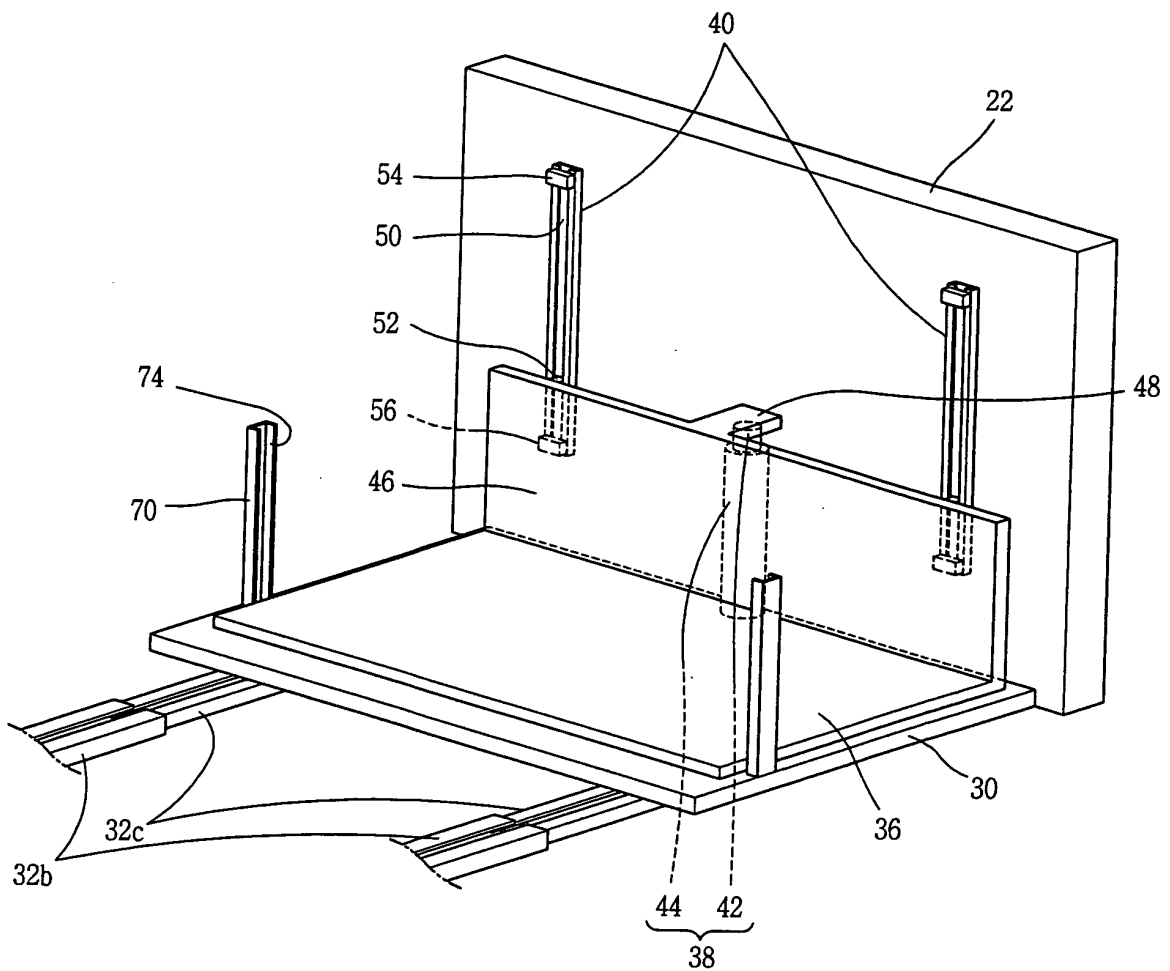


FIG. 6

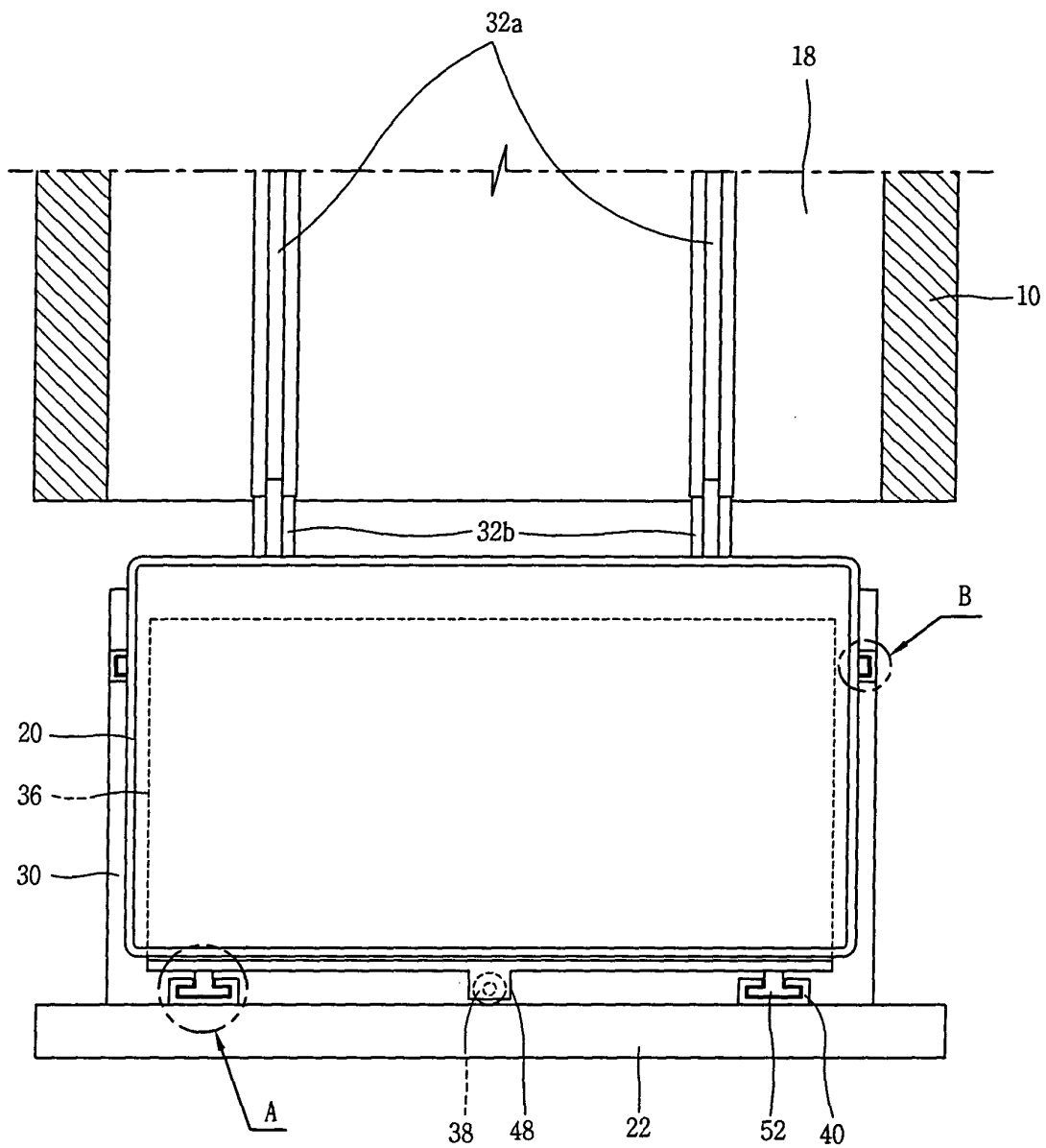


FIG. 7

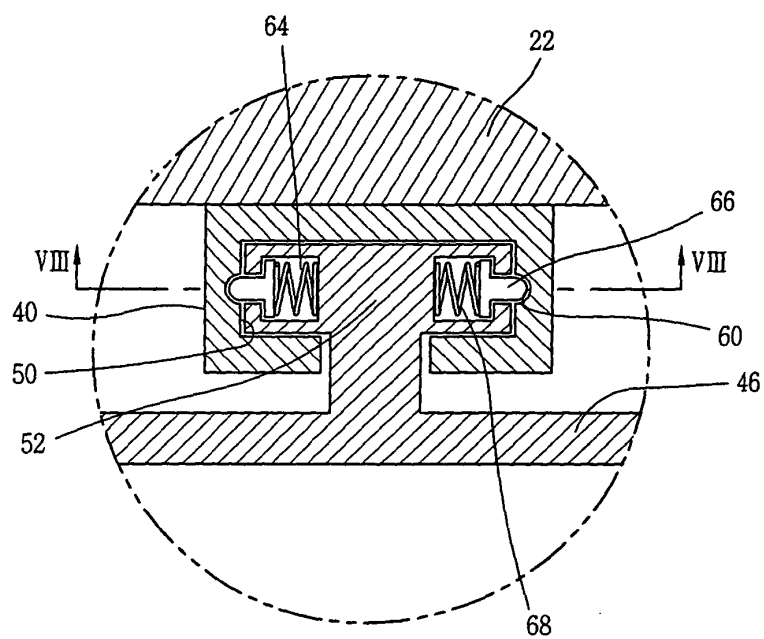


FIG. 8

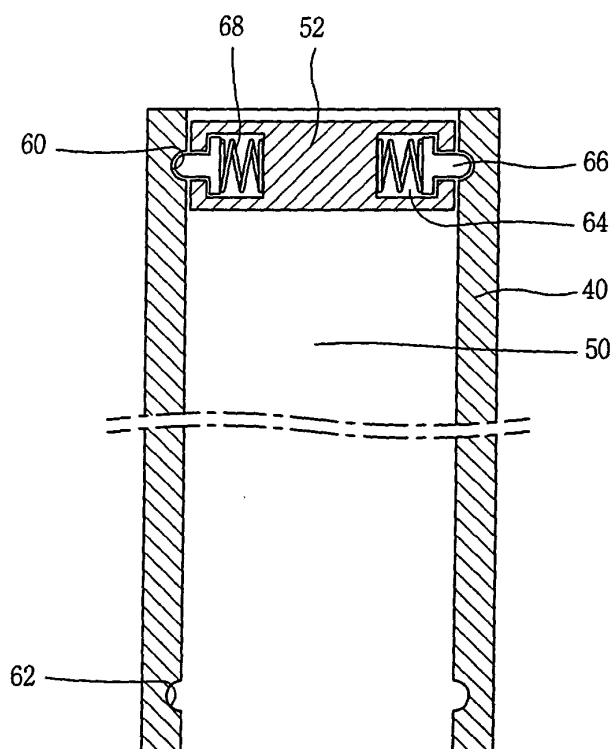


FIG. 9

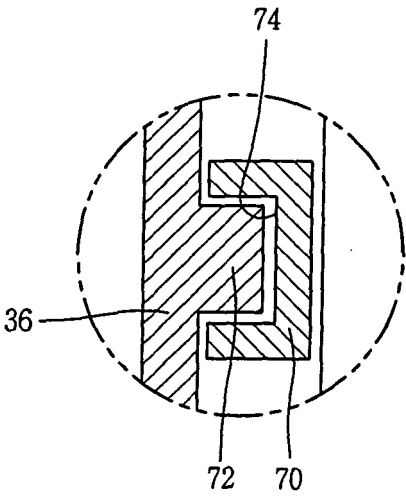


FIG. 10

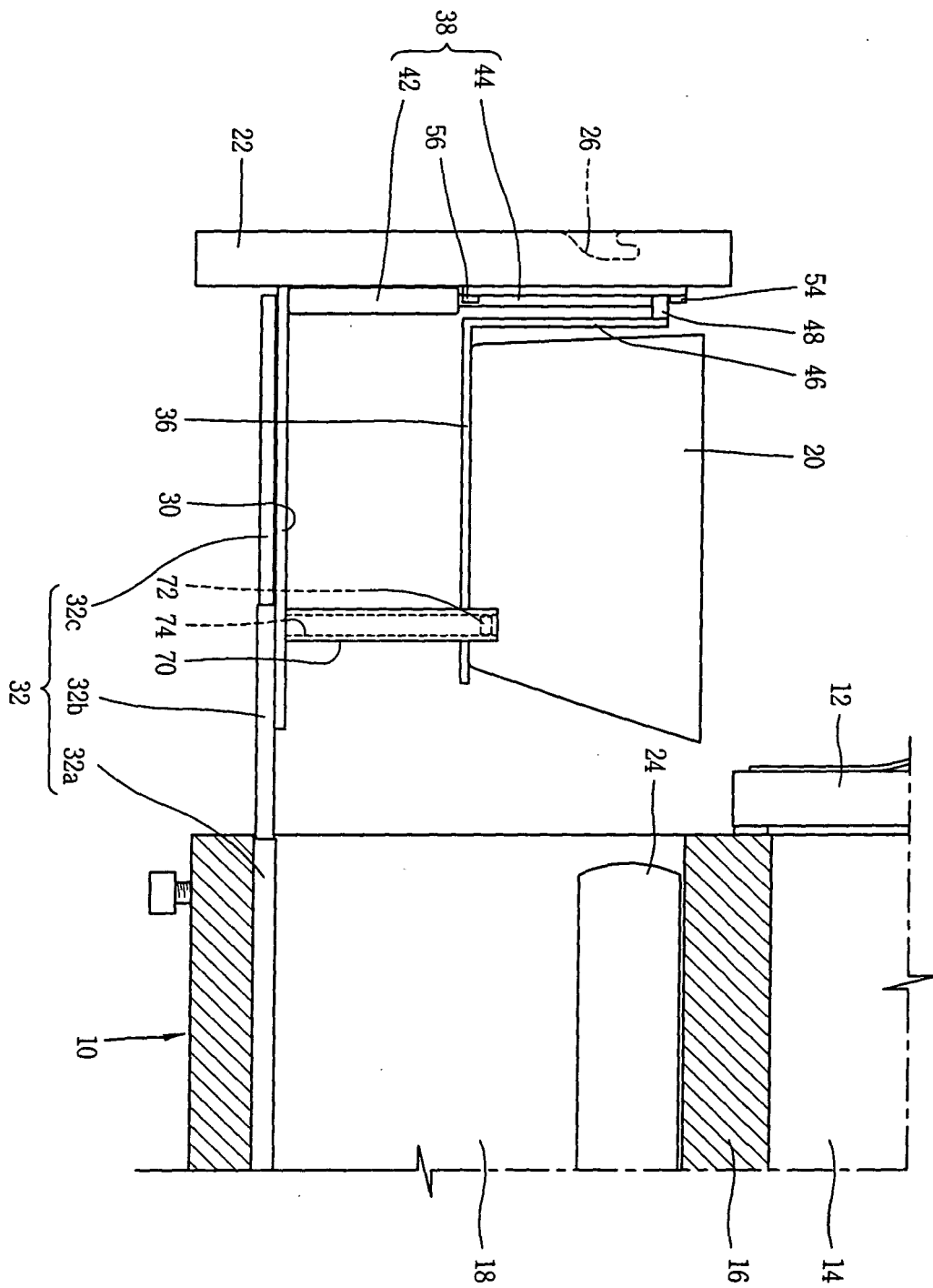


FIG. 11

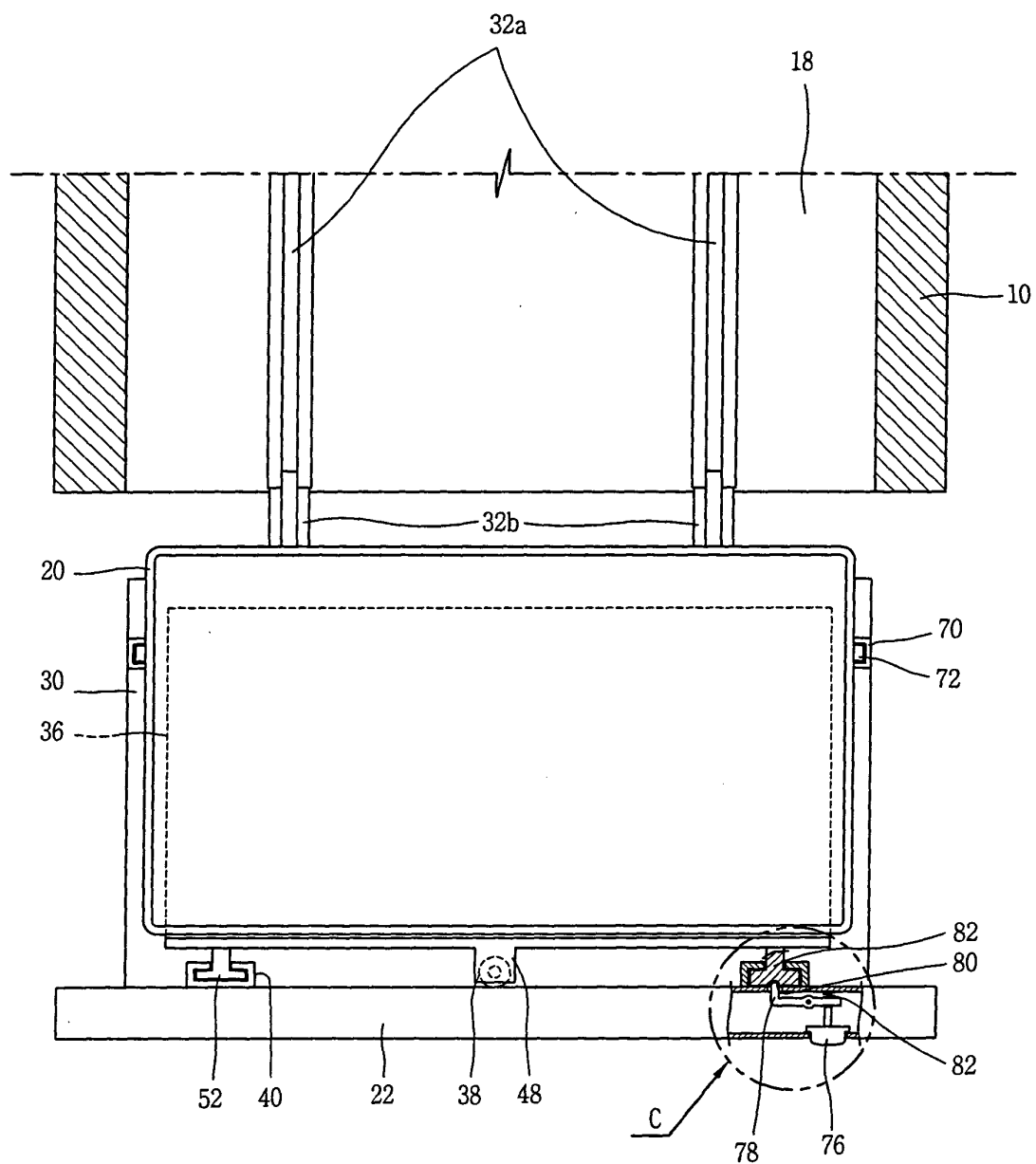


FIG. 12

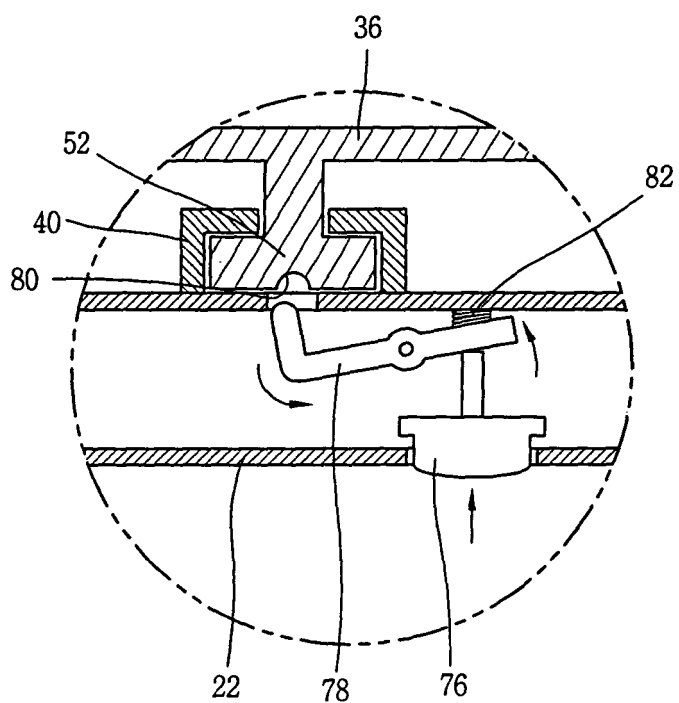


FIG. 13

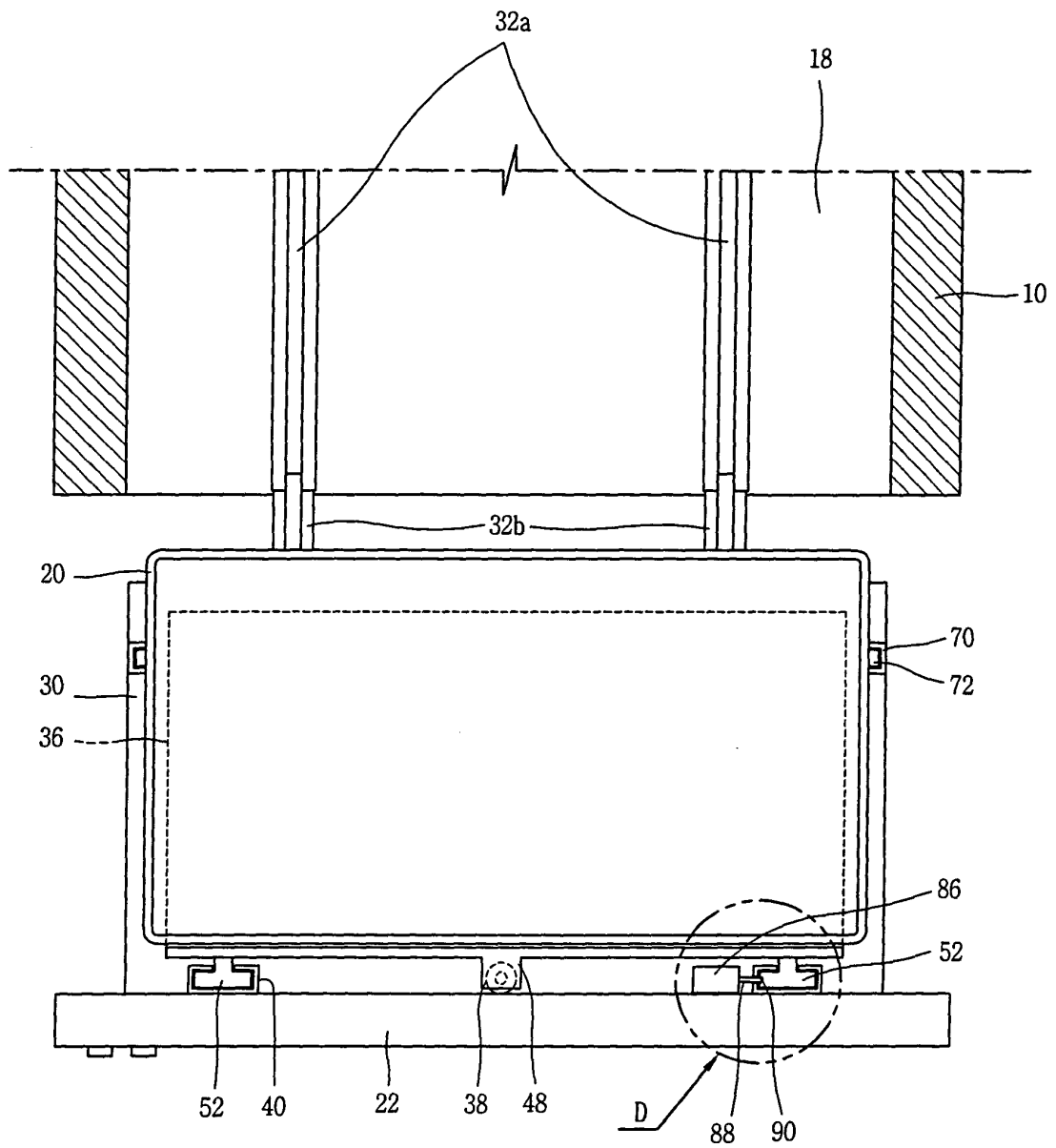


FIG. 14

