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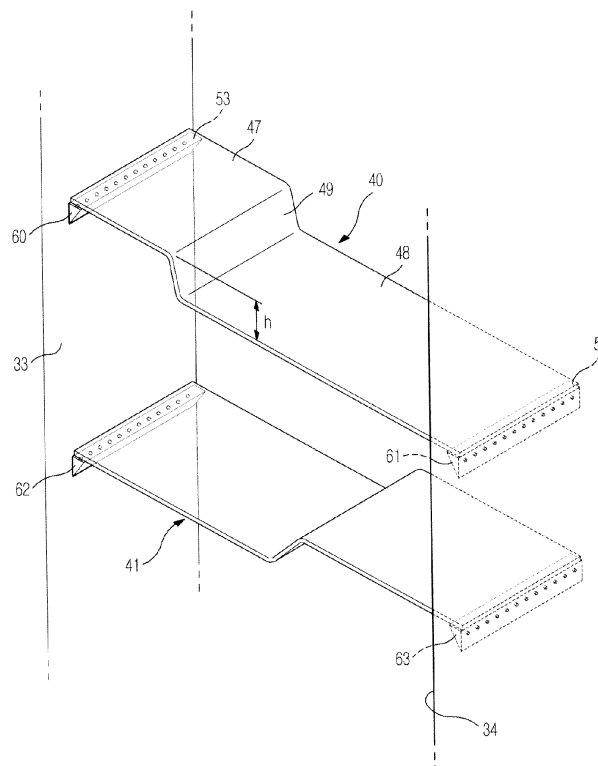
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(54) **Refrigerator**

(57) A refrigerator including a shelf having a step between shelf portions at different heights, light devices to illuminate the interior of a storage chamber, and support ribs to support the shelf and having grooves to receive the light devices. The inner space of the refrigerating

chamber is partitioned using the shelves according to the tastes of a user. The interior of the refrigerating chamber is illuminated by light emitted from the support ribs and shelves, thereby providing the interior of the refrigerating chamber with an aesthetically pleasing appearance.

FIG. 4



Description

BACKGROUND

1. Field

[0001] Embodiments of the present invention relate to a shelf of a refrigerator and a lighting device to illuminate the interior of a storage chamber of the refrigerator.

2. Description of the Related Art

[0002] A French door refrigerator (FDR) includes an upper storage chamber and a lower storage chamber. The upper storage chamber is used as a refrigerating chamber, and the lower storage chamber is used as a freezing chamber.

[0003] The refrigerating chamber is opened and closed by a pair of rotation type doors hinged to opposite sides of a refrigerator body. A drawer type sliding door is mounted in the freezing chamber to move in and out of the freezing chamber.

[0004] Door guards, in which small items of food are stored, are provided at the rear of each of the left and right doors. A dispenser is provided at one of the left and right doors so that a user may take out beverages or ice without opening the doors.

[0005] Also, the refrigerator further includes an ice maker, a filter to purify water supplied from an external water supply source, and a water tank to store water and supply the water to the dispenser according to user manipulation.

[0006] A pantry having a width corresponding to the refrigerating chamber to store wide items of food is provided at the lower part of the refrigerating chamber. A plurality of drawer type vegetable containers is provided above the pantry.

[0007] Meanwhile, a plurality of cantilever shelves is mounted above the drawer type vegetable containers. Rails to guide the cantilever shelves are provided at the refrigerating chamber so that a user may freely locate the cantilever shelves on the rails as needed.

[0008] Generally, each of the cantilever shelves is manufactured by attaching a frame to the edge of tempered glass and coupling a metal cantilever to the frame.

SUMMARY

[0009] It is an aspect of the present invention to provide a refrigerator having a shelf to variously partition the storage space of a refrigerating chamber and a light device to provide the interior of the refrigerating chamber with an aesthetically pleasing appearance.

[0010] Additional aspects of the invention will be set forth in part in the description which follows and, in part, will be obvious from the description, or may be learned by practice of the invention.

[0011] In accordance with one aspect of the present

invention, a refrigerator, having a storage chamber open at the front thereof, a rotary door to open and close a portion of the open front of the storage chamber and another rotary door to open and close the remaining portion of the open front of the storage chamber, includes at least one shelf, bent so that the shelf has a step, to partition the space of the storage chamber into upper and lower spaces having varying heights and at least one pair of support ribs provided at opposite inner liners of the storage chamber to support the shelf, wherein the shelf on the support ribs is rearranged to change how the storage chamber is partitioned.

[0012] The shelf may include a first shelf part, a second shelf part and an inclined part connected between the first shelf part and the second shelf part.

[0013] The shelf may be turned upside down and detachably mounted at the support ribs to change how the storage chamber is partitioned.

[0014] The shelf may be made of transparent tempered glass or reinforced plastic.

[0015] The shelf may be provided at the edge thereof with a water overflow preventing protrusion extending upward and downward.

[0016] The shelf may be formed by injection molding.

[0017] The refrigerator may further include at least one pair of lighting devices provided at the opposite inner liners of the storage chamber to illuminate the interior of the storage chamber, and each of the support ribs has a lighting device receiving groove to receive a corresponding one of the lighting devices.

[0018] Each of the support ribs may extend in the forward and backward direction of the refrigerator and may include a flat support plane to support the shelf and a coupling plane fixedly coupled to a corresponding one of the inner liners of the refrigerating chamber, and the lighting device receiving groove may be formed by cutting out a corresponding one of the support ribs at the coupling plane.

[0019] Each of the support ribs may be made of a transparent material transmitting light emitted from a corresponding one of the lighting devices.

[0020] Each of the lighting devices may include a plurality of light emitting diodes arranged at predetermined intervals.

[0021] In accordance with another aspect of the present invention, a refrigerator includes a storage chamber, at least one shelf, bent so that the shelf has two shelf parts forming a step, to partition the inner space of the storage chamber and at least one pair of support ribs provided at opposite inner liners of the storage chamber to support the shelf, wherein the shelf is turned upside down and detachably mounted at the support ribs to change how the storage chamber is partitioned.

[0022] The refrigerator may further include at least one pair of lighting devices provided at the opposite inner liners of the storage chamber to illuminate the interior of the storage chamber, and the lighting devices may be received in the respective support ribs.

[0023] The shelf may be provided at the edge thereof with a water overflow preventing protrusion extending upward and downward.

[0024] The shelf may be made of transparent tempered glass or reinforced plastic.

[0025] Each of the lighting devices may include a plurality of light emitting diodes, and light emitted from the light emitting diodes may illuminate the interior of the storage chamber via a corresponding one of the support ribs.

BRIEF DESCRIPTION OF THE DRAWINGS

[0026] These and/or other aspects of the invention 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 showing a refrigerator according to an embodiment of the present invention;

FIG. 2 is a front view showing a door open state of the refrigerator according to an embodiment of the present invention;

FIG. 3 is a view showing a different disposition of shelves in the refrigerator according to another embodiment of the present invention;

FIG. 4 is an enlarged view showing shelves and support ribs of the refrigerator of FIG. 2;

FIG. 5 is a perspective view showing a support rib of the refrigerator according to an embodiment of the present invention;

FIG. 6 is a sectional view showing the support rib of the refrigerator according to an embodiment of the present invention; and

FIG. 7 is a perspective view showing shelves each having a water overflow preventing protrusion according to an embodiment of the present invention.

DETAILED DESCRIPTION

[0027] Reference will now be made in detail to embodiments of the present invention, examples of which are illustrated in the accompanying drawings, wherein like reference numerals refer to like elements throughout.

[0028] FIG. 1 is a perspective view showing a refrigerator according to an embodiment of the present invention, and FIG. 2 is a front view showing a door open state of the refrigerator according to the embodiment of the present invention.

[0029] FIG. 3 is a view showing a different disposition of shelves in the refrigerator according to another embodiment of the present invention, and FIG. 4 is an en-

larged view showing shelves and support ribs of the refrigerator of FIG. 2.

[0030] Referring to FIGS. 1 and 2, a refrigerator according to an embodiment of the present invention is, e.g., a French door refrigerator. A refrigerator body 6 includes a top plate 1, a bottom plate 2, side plates 3 and 4, and a rear plate 5. The interior of the refrigerator body 6 is divided into storage chambers 31 and 32, i.e. an upper refrigerating chamber 31 and a lower freezing chamber 32, separated by a horizontal partition 7.

[0031] The refrigerating chamber 31 is open at the front thereof. The refrigerating chamber 31 is opened and closed by left and right doors 10 and 11 hingedly coupled to opposite sides of the refrigerator body 6 by hinge members so that the doors 10 and 11 can rotate to open and close.

[0032] A dispenser 16 is provided at the left hinged rotation type door 10 so that a user may take out beverages or ice without opening the doors 10 and 11.

[0033] Door guards 22, in which small items of food are stored, are provided at the rear of each of the doors 10 and 11.

[0034] A drawer type sliding door 12 is provided in the freezing chamber 32 so that the sliding door 12 moves forward from the freezing chamber 32 and backward into the freezing chamber 32.

[0035] An ice maker 15 is mounted at one side of the upper part of the refrigerating chamber 31. A pantry 17 having a width corresponding to the refrigerating chamber to store wide items of food is provided at the lower part of the refrigerating chamber 31.

[0036] Drawer type vegetable containers 20 to store vegetables are provided above the pantry 17.

[0037] The refrigerating chamber 31 includes shelves 40 and 41 on which food is placed. The storage space in the refrigerating chamber 31 is divided by the shelves 40 and 41.

[0038] The shelves 40 and 41 may be formed by injection molding tempered glass or reinforced plastic. The shelves 40 and 41 may be transparent or variously colored.

[0039] The shelf 40 is formed by bending a flat sheet. The shelf 40 includes a first shelf part 47, a second shelf part 48 and an inclined part 49.

[0040] The first shelf part 47 and the second shelf part 48 have flat planes on which food is placed. The sizes of the first shelf part 47 and the second shelf part 48 may be different from each other.

[0041] In this embodiment, the size of the first shelf part 47 is smaller than that of the second shelf part 48.

[0042] The inclined part 49 is connected between the first shelf part 47 and the second shelf part 48 which is parallel to the first shelf part 47. The inclined part 49 has a predetermined height h and tilt angle. The tilt angle may be a right angle or an oblique angle, relative to the shelf parts. Opposite ends 53 and 54 of the shelf 40 are placed on a pair of support ribs 60 and 61 provided at opposite inner liners 33 and 34 of the refrigerating chamber 31 so

that the shelf 40 is supported by the support ribs 60 and 61.

[0043] The support ribs 60 and 61 are provided at the left and right inner liners 33 and 34 of the refrigerating chamber 31 so that the support ribs 60 and 61 have the same height h as the shelf 40.

[0044] The length of the shelf 40 is slightly smaller than the distance between the opposite inner liners 33 and 34 so that the opposite ends 53 and 54 of the shelf 40 may be placed on or removed from the support ribs 60 and 61, and therefore, the shelf 40 is easily detachably mounted in the refrigerating chamber 31.

[0045] As shown in FIG. 2, the shelf 40 may be mounted so that the first shelf part 47 is located higher than the second shelf part 48. On the other hand, as shown in FIG. 3, the shelf 40 may be turned upside down so that the second shelf part 48 is located higher than the first shelf part 47.

[0046] That is, since the shelf 40 is formed of a single material, the shelf 40 may be turned upside down and placed on the support ribs 60 and 61. Also, since the height h of the shelf 40 is equal to those of the support ribs 60 and 61, the shelf 40 may be turned about an axis perpendicular to the rear plate 5 and placed on the support ribs 60 and 61. In this case, the second shelf part 48 is located higher than the first shelf part 47.

[0047] At this time, the space partitioned by the shelf 40 may be changed since the sizes of the first shelf part 47 and the second shelf part 48 are different from each other.

[0048] In this embodiment, the refrigerator includes two shelves 40 and 41 supported by two respective pairs of support ribs 60, 61, 62 and 63. Alternatively, a greater number of shelves and support ribs may be included.

[0049] Also, in a case in which a plurality of shelves is included, the shelves may be configured so that the shelf parts have different sizes and an inclined part has different heights. As a result, a user may variously partition the space of the refrigerating chamber 31 to taste.

[0050] Meanwhile, in this embodiment, a water overflow preventing protrusion 80 may be formed at each of the shelves (see FIG. 7).

[0051] The water overflow preventing protrusion 80 extends upward and downward from the edge of each of the shelves to approximately the same height.

[0052] The water overflow preventing protrusion 80 prevents water from overflowing each of the shelves while food is placed on each of the shelves regardless of whether the shelves are in a first upside position, or a second, upside down position.

[0053] FIG. 5 is a perspective view showing a support rib of the refrigerator according to an embodiment of the present invention, and FIG. 6 is a sectional view showing the support rib of the refrigerator according to this embodiment.

[0054] Referring to FIGS. 5 and 6, the support rib 60 can be formed in a triangular shape in section and extends in the forward and backward direction of the refrig-

erator.

[0055] The support rib 60 includes a flat support plane 66 to support the shelf 40 and a coupling plane 67, perpendicular to the support plane 66, attached to the inner liner 33 of the refrigerating chamber 31 in tight contact to couple the support rib 60 to the refrigerating chamber 31.

[0056] The support rib 60 is fixedly coupled to the refrigerating chamber 31 to support the shelf 40 on which food is placed. The support rib 60 may be coupled to the refrigerating chamber 31 in various ways.

[0057] A predetermined portion of the support rib 60 can be cut out inward at the coupling plane 67 to form a cutout plane 68. Between the cutout plane 68 and the inner liner 33 of the refrigerating chamber 31 is defined a lighting device receiving groove 65 extending in the forward and backward direction of the refrigerator.

[0058] A lighting device 70 is received in the lighting device receiving groove 65. Using this structure, i.e., incorporating the lighting in a physical support, helps save space in the storage chamber.

[0059] The lighting device 70 can include a circuit board 72 and a plurality of light emitting diodes 71 arranged at the circuit board 72 in a line at predetermined intervals.

[0060] The circuit board 72 contacts and is fixed to the inner liner 33 of the refrigerating chamber 31, and is received in the lighting device receiving groove 65 of the support rib 60 together with the light emitting diodes 71.

[0061] The support rib 60 is made of a transparent material transmitting light emitted from the light emitting diodes 71.

[0062] Although not shown, the refrigerator further includes a sensor to sense opening and closing of the doors 10 and 11 and a controller to control the supply of electric current to the light emitting diodes 71 upon opening of the doors 10 and 11 so that light is generated from the light emitting diodes 71 and to interrupt the supply of electric current upon closing of the doors 10 and 11.

[0063] Upon opening of the left door 10, the controller controls electric current to the support ribs 60 and 62 provided at the left inner liner 33. Upon opening of the right door 11, on the other hand, the controller controls electric current to the support ribs 61 and 63 provided at the right inner liner 34.

[0064] That is, upon opening of one of the doors 10 and 11, only the open region of the refrigerating chamber 31 may be illuminated, thereby reducing energy consumption.

[0065] In this embodiment, the shelf 40 is made of transparent tempered glass or reinforced plastic. Consequently, the shelf 40 functions as a light guide plate through which the interior of the refrigerating chamber 31 is uniformly illuminated.

[0066] As is apparent from the above description, each of the shelves can be made of a single material. Consequently, the shelves are simply manufactured at low cost, and the interior of the refrigerating chamber is neat, there-

by providing the interior of the refrigerating chamber with an aesthetically pleasing appearance. Also, the shelves, which can be bent in a Z shape, may be disposed at different positions in different directions, and therefore, the storage space of the refrigerating chamber may be partitioned in various ways.

[0067] The lighting device receiving space is provided in each of the support ribs to support the shelves so that light emitted from the lighting device projects onto the shelves via the support ribs, thereby providing the interior of the refrigerating chamber with an aesthetically pleasing appearance.

[0068] Although various embodiments of the present invention 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 having a storage chamber, and a door to open and close the storage chamber, the refrigerator comprising:

at least one shelf having a step, to partition a space of the storage chamber into upper and lower spaces having varying heights and at least one pair of support ribs provided at opposite sides of the storage chamber to support the shelf, wherein the shelf on the support ribs is rearranged to change how the storage chamber is partitioned.

2. The refrigerator according to claim 1, wherein the shelf comprises a first shelf part, a second shelf part and an inclined part connected between the first shelf part and the second shelf part.

3. The refrigerator according to claim 1, wherein the shelf is rearranged by being turned upside down and detachably mounted at the support ribs.

4. The refrigerator according to claim 1, wherein the shelf is made of transparent tempered glass or reinforced plastic.

5. The refrigerator according to claim 1, wherein the shelf is provided at an edge thereof with a water overflow preventing protrusion extending upward and downward.

6. The refrigerator according to claim 1, wherein the shelf is formed by injection molding.

7. The refrigerator according to claim 1, further com-

prising at least one pair of lighting devices provided at the sides of the storage chamber to illuminate an interior of the storage chamber, wherein each of the support ribs has a lighting device receiving groove to receive a corresponding one of the lighting devices.

8. The refrigerator according to claim 7, wherein each of the support ribs extends in a forward and backward direction of the refrigerator and comprises a flat support plane to support the shelf and a coupling plane attached to a corresponding side of the storage chamber, and the lighting device receiving groove is formed in the coupling plane.

9. The refrigerator according to claim 7, wherein each of the support ribs is made of a transparent material transmitting light emitted from a corresponding one of the lighting devices.

10. The refrigerator according to claim 7, wherein each of the lighting devices comprises a plurality of light emitting diodes arranged at predetermined intervals.

FIG. 1

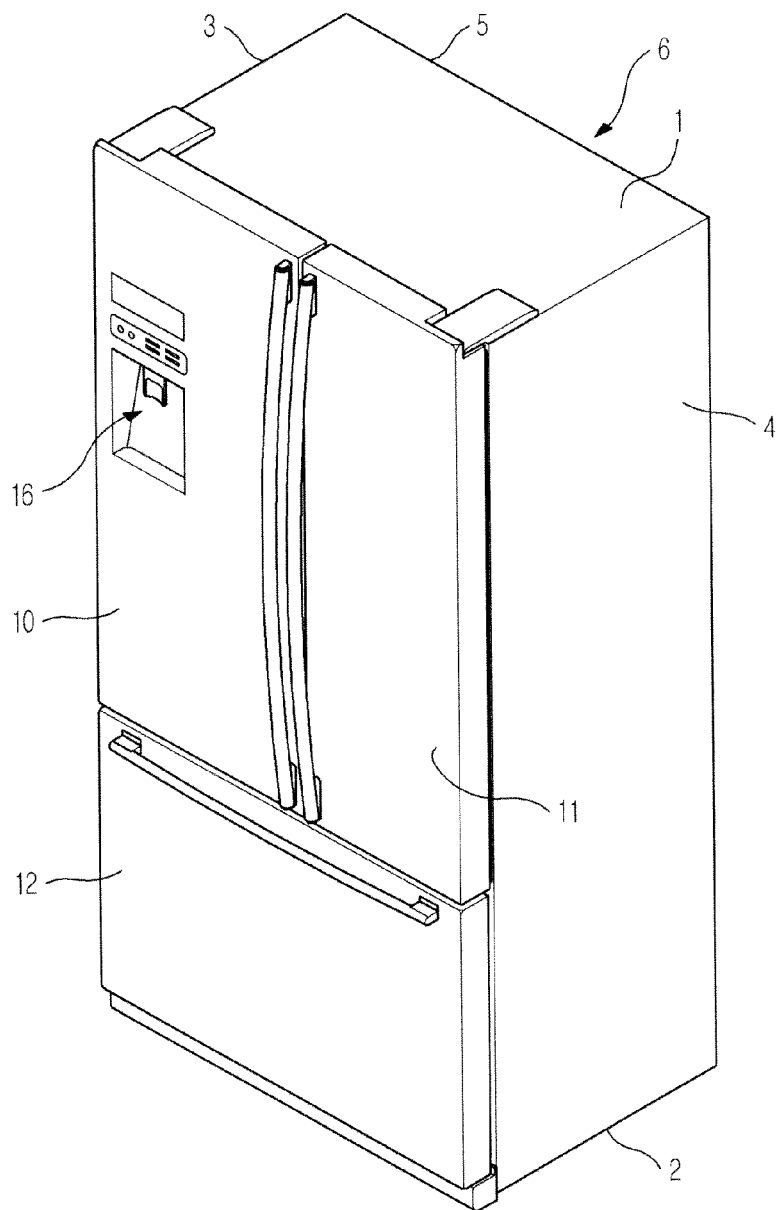


FIG. 2

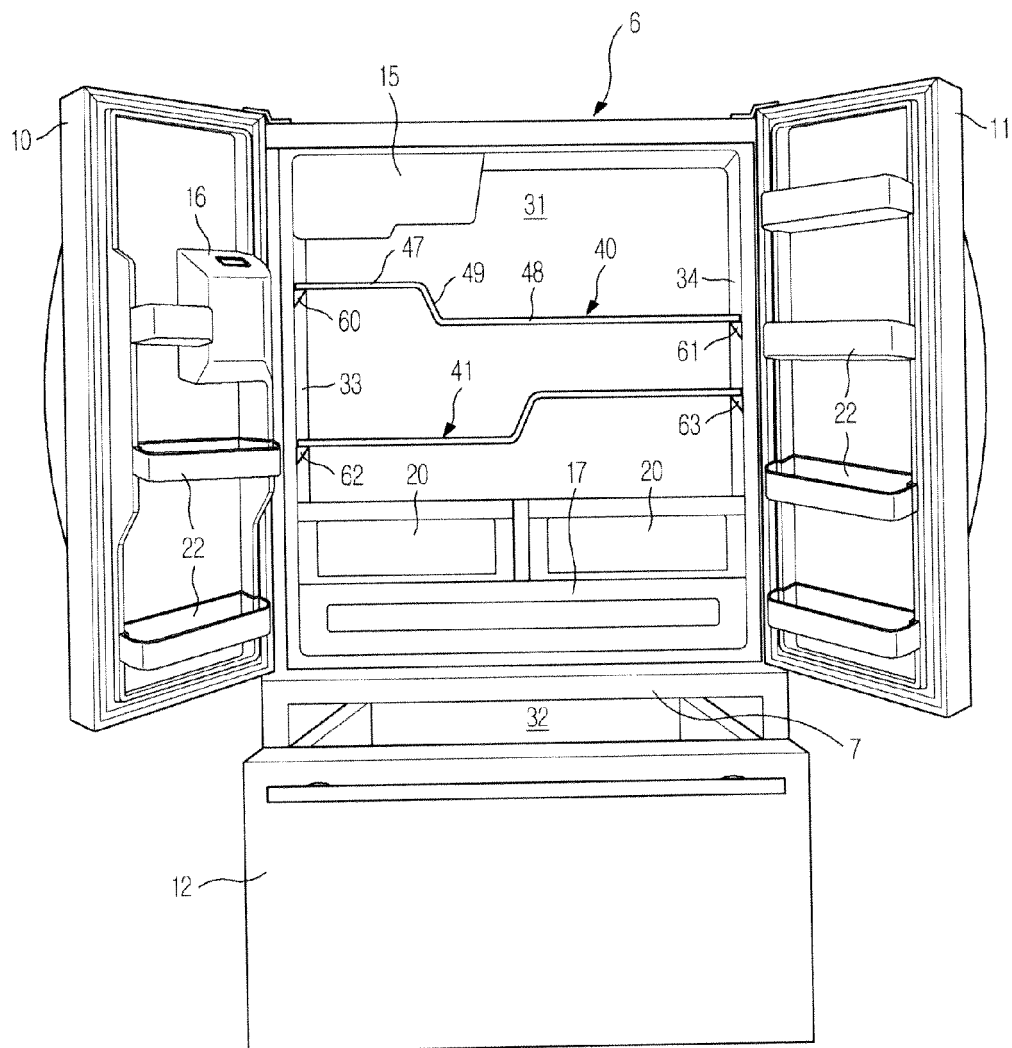


FIG. 3

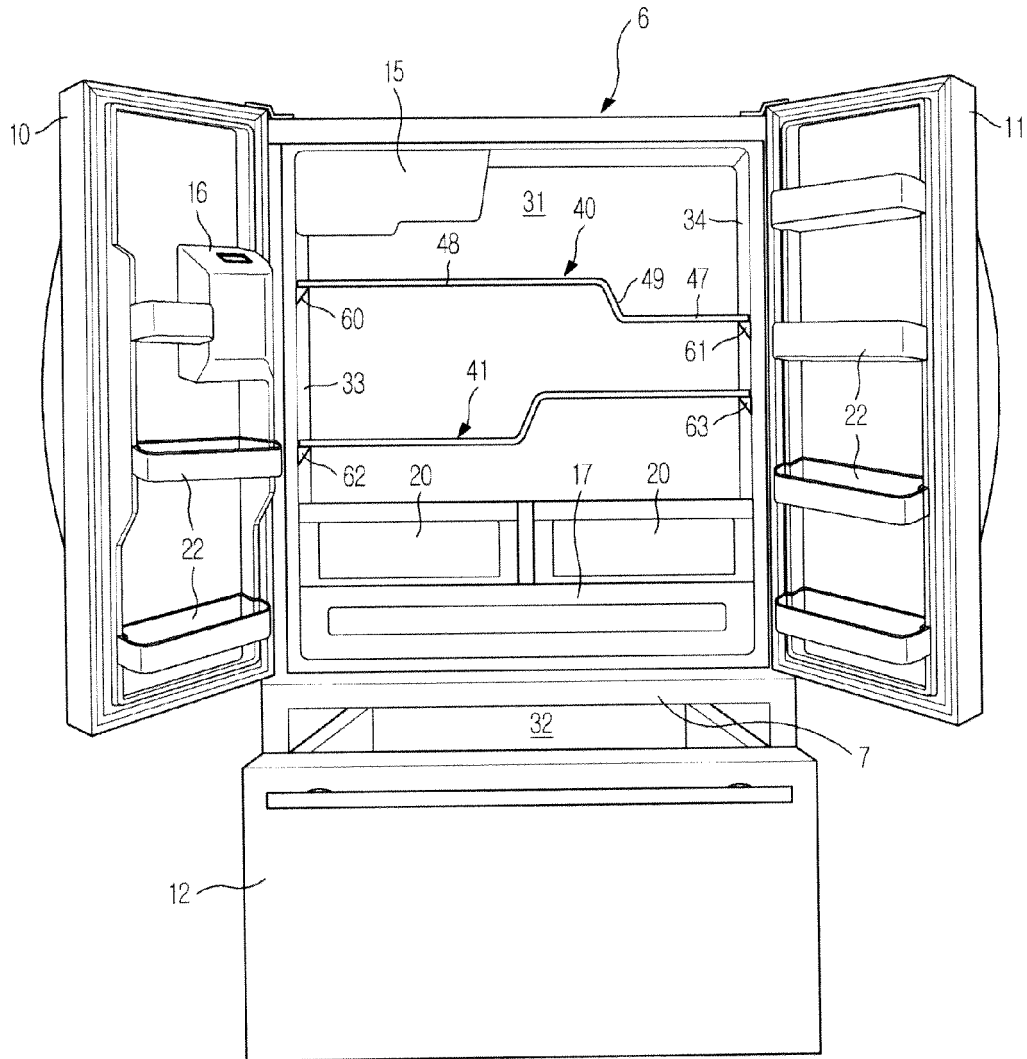


FIG. 4

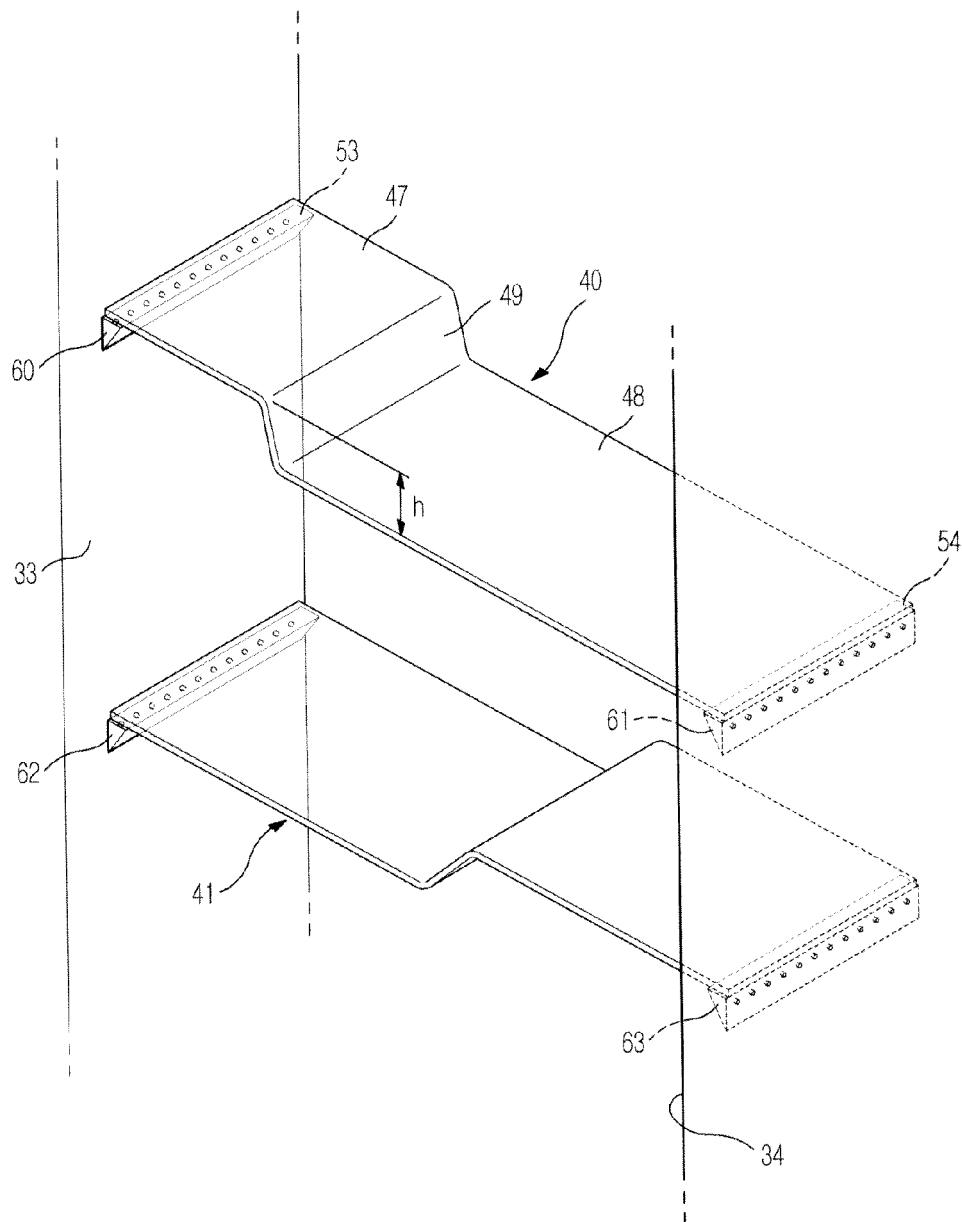


FIG. 5

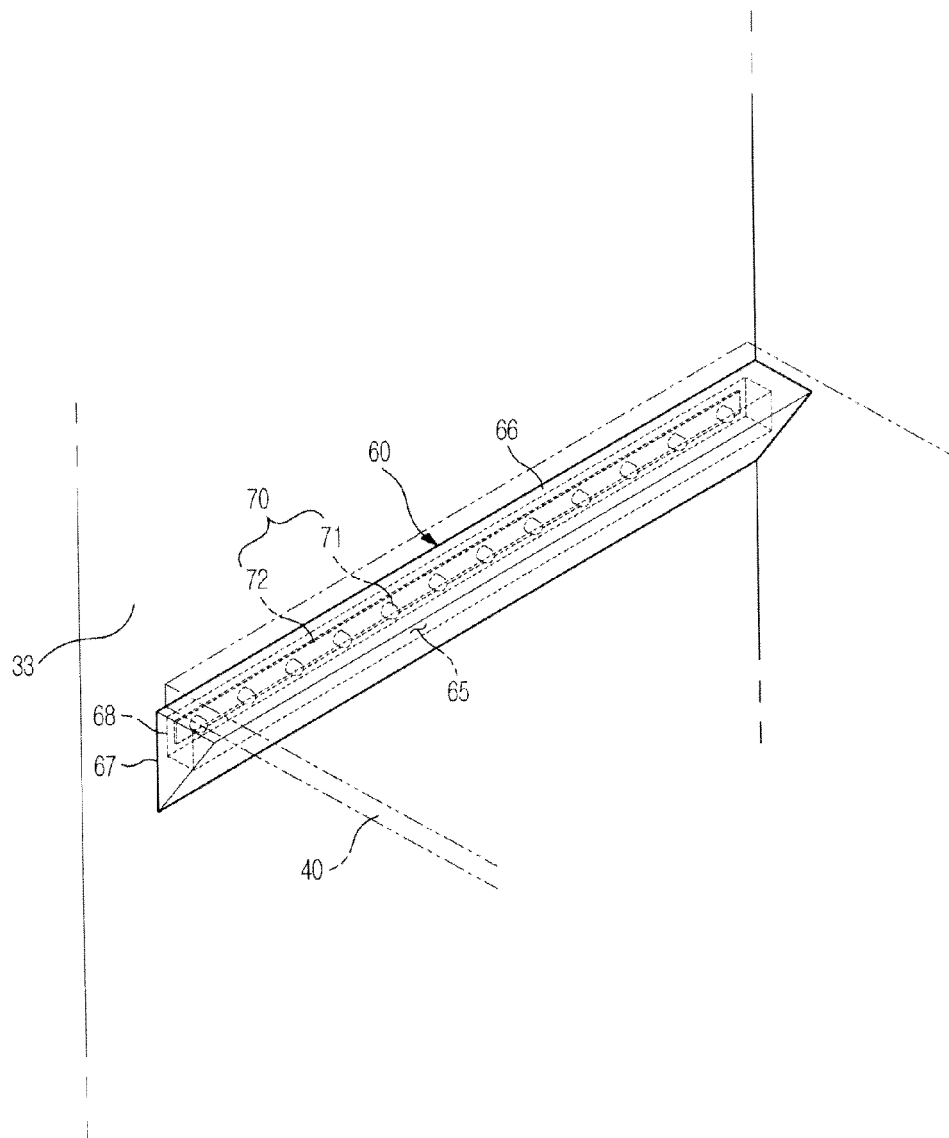


FIG. 6

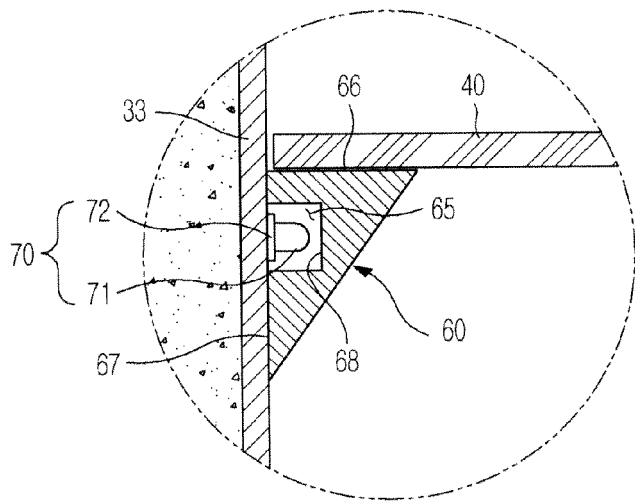


FIG. 7

