

DESCRIPTION

Title of Invention

REFRIGERATOR

5 Technical Field

[0001]

The present disclosure relates to a refrigerator including a storage container in a space inward of a door.

Background Art

10 [0002]

A refrigerator includes a storage container located behind a door, that is, a so-called door pocket. In the storage container, an egg holder is accommodated, and by placing eggs in holes of the egg holder, it is possible to hold the eggs in the storage container, while reducing the movement of the eggs. In such a refrigerator, when a door is closed, the storage container occupies a certain amount of space within a storage space of the refrigerator. Thus, the storage container unnecessarily reduces the storage space even when no items are stored therein.

[0003]

20 In view of the above, a refrigerator has been proposed in which a storage container is removably set in a space inward of the door and can be removed from the space when not being used. An existing refrigerator is provided with a door and a pocket for medium-sized items that is attached to an inner surface of the door. In the refrigerator, the pocket for medium-sized items has recessed portions formed at respective lower corners of left and right side surfaces of the pocket, and projections are formed in such a manner as to protrude in the up-down direction from the inner surface of the door and to hold the pocket from left and right sides. The projections have respective raised portions for the recessed portions of the pocket for medium-sized items. In such a refrigerator, the recessed portions are fitted to the raised portions of the projections from an upper side toward a lower side, while a back surface of the

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pocket is being brought into contact with the inner surface of the pocket, whereby the pocket is attached (see, for example, Patent Literature 1).

Citation List

Patent Literature

[0004]

Patent Literature 1: Japanese Unexamined Patent Application Publication No. 2007-147202

Summary of Invention

Technical Problem

[0005]

In a technique described in Patent Literature 1, recessed portions of a pocket for small and medium-sized items each have a width in a front-back direction that is nearly equal to the radius of each of circular holes of the egg holder, and a width in a lateral direction that is approximately one-fifth of the diameter of the circular hole. Since the circular hole for a chicken egg generally has a diameter of approximately 5 cm, the width of the recessed portion in the front-back direction is approximately 2.5 cm, and the width of the recessed portion in the lateral direction is approximately 1 cm. To provide such large recessed portions at a side surface of the pocket for small and medium-sized items, the technique of Patent Literature 1 is required to increase the width of the pocket for small and medium-sized items in the depth direction to provide a space for the recessed portions or reduce the width of the egg holder in the lateral direction to provide a space for the recessed portions. As a result, the storage capacity of the pocket for small and medium-sized items is reduced. In order to solve such a problem, the recessed portions provided in the pocket for small and medium-sized items are required to have a smaller size.

[0006]

However, in the case of reducing the size of each of the recessed portions to increase the storage capacity of the pocket for small and medium-sized items, the following problems arise.

[0007]

In the case where the size of the recessed portions of the pocket for small and medium-sized items is reduced, the size of the raised portions on the door side is also reduced. In the case where a raised portion that corresponds in size to the recessed portion described in Patent Literature 1 is molded integrally with the door, vacuum molding is generally used. In the vacuum molding, a thermoplastic resin sheet is heated with a heater, air between a mold and the thermoplastic resin sheet is let out by a vacuum pump, and the sheet-like thermoplastic resin is brought into tight contact with the mold, deformed, and then cooled, as a result of which the thermoplastic resin sheet is molded. The thickness of the thermoplastic resin sheet that has not yet subjected to the processing is approximately 0.8 to 2 mm.

[0008]

In the vacuum molding, when the width, in the front-back direction, of the raised portion on the door side falls at 4 mm or less, the thermoplastic resin sheet may not enter a groove in the mold for molding the raised portion during vacuuming because the thickness of the sheet before the process is approximately 0.8 to 2 mm. Even if the sheet enters the groove, it may not come into tight contact with the groove of the mold. In such a case, failures such as distortion of the raised portion after the vacuum molding or a failure to form the raised portion may occur. Furthermore, even in the case where the raised portion is formed as designed, since a space inside the raised portion is narrow, air or foaming gas may accumulate in the raised portion during injection of urethane foam, and the urethane foam may not enter the space in the raised portion. In such cases, the strength of the raised portion after the forming process is reduced.

[0009]

The present disclosure is applied to solve the above problems and relates to a refrigerator that is improved in the storage capacity of a storage container by reducing the size of a raised portion provided on a rib of a door of the refrigerator and disposing a recessed portion on a storage container side, which corresponds to the raised portion, in a gap between a corner of an egg tray and a corner of the storage container.

Solution to Problem

[0010]

A refrigerator according to an embodiment of the present disclosure is a refrigerator provided to solve the above problems, and includes: a box body in which a storage compartment having an opening at a front side thereof is formed; a door attached to the box body, located in front of the front side of the storage compartment, and configured to open and close at least part of the storage compartment, the door including a first rib on a back side thereof, the first rib protruding backward when the storage compartment is in a closed state; a first engagement portion provided at an inner wall of the first rib, an interior of the first engagement portion being filled with resin; a storage container having a storage space defined therein by a bottom plate that is rectangular as viewed in plan view and a side wall portion raised at a peripheral edge of the bottom plate, the storage container having a first fitting recessed portion in a wall portion of the side wall portion, the wall portion being raised at an associated one side of the bottom plate; and an egg tray including a tray and a leg, the tray having a plurality of holes to support eggs, the tray having, at a peripheral edge thereof, a short side, a long side, and a chamfered portion being located between the short side and the long side, the leg being raised on the tray and supporting the tray on the bottom plate. The first engagement portion is inserted into the first fitting recessed portion, thereby causing the storage container to be attached to the first rib. With the egg tray accommodated in the storage container, the first fitting recessed portion is provided inward of an extension line of the long side and a line that extends parallel to the long side while passing through a connection portion between the chamfered portion and the short side, as the tray is viewed in plan view. The distance between the short side and the side wall in a direction along the long side is smaller than a width of the first fitting recessed portion in the direction along the long side, and the tray and the first fitting recessed portion do not overlap each other as viewed in plan view.

Advantageous Effects of Invention

[0011]

In the refrigerator according to the embodiment of the present disclosure, the interior of the first engagement portion to be provided at the rib of the door of the refrigerator is filled with resin through injection molding, and as a result, the size of the

first engagement portion is reduced. With the egg tray accommodated in the storage container, the first fitting recessed portion on the storage container side, which is associated with the first engagement portion, is provided inward of the extension line of the long side as the tray is viewed from the top and the line that extends parallel to the long side while passing through the connection portion between the chamfered portion and the short side. The distance between the short side and the side wall in the direction along the long side is smaller than the width of the first fitting recessed portion in the direction along the long side. The tray and the first fitting recessed portion are arranged not to overlap each other as viewed from above. With this configuration, the recessed portion on the storage container side can be provided in a gap between the corner of the egg tray and the corner of the storage container, thereby improving the storage capacity of the storage container.

Brief Description of Drawings

[0012]

[Fig. 1] Fig. 1 is a perspective view of a refrigerator according to Embodiment 1 of the present disclosure.

[Fig. 2] Fig. 2 is another perspective view of the refrigerator according to Embodiment 1 of the present disclosure.

[Fig. 3] Fig. 3 is a perspective view of a back surface side of a refrigerator-compartment right door of the refrigerator according to Embodiment 1 of the present disclosure.

[Fig. 4] Fig. 4 is another perspective view of the back surface side of the refrigerator-compartment right door according to Embodiment 1 of the present disclosure, in the case where a storage container is removed from the refrigerator-compartment right door.

[Fig. 5] Fig. 5 includes a sectional view of the refrigerator-compartment right door that is taken along line A-A and a sectional view of the refrigerator-compartment right door that is taken along line B-B, in Embodiment 1 of the present disclosure.

[Fig. 6] Fig. 6 includes a perspective view and a top view of the storage container and an egg tray in Embodiment 1 of the present disclosure.

[Fig. 7] Fig. 7 includes enlarged views of an area D in the storage container and the egg tray in Embodiment 1 of the present disclosure.

[Fig. 8] Fig. 8 includes a side view and a perspective view of the storage container in Embodiment 1 of the present disclosure.

5 [Fig. 9] Fig. 9 is a plan view of a back surface of the refrigerator-compartment right door in Embodiment 1 of the present disclosure, in the case where the storage container is attached to the refrigerator-compartment right door.

[Fig. 10] Fig. 10 is a sectional view of the refrigerator-compartment right door that is taken along line F-F in Embodiment 1 of the present disclosure.

10 [Fig. 11] Fig. 11 includes sectional views of a refrigerator-compartment right door in Embodiment 2 of the present disclosure.

[Fig. 12] Fig. 12 includes a top view of a storage container and an egg tray, an enlarged view of an area G of the storage container, and a sectional view of the refrigerator-compartment right door in the case where the storage container is attached to the refrigerator-compartment right door, in Embodiment 2 of the present disclosure.

15 [Fig. 13] Fig. 13 is a sectional view of the storage container and the egg tray that is taken along line H-H according to Embodiment 2 of the present disclosure.

[Fig. 14] Fig. 14 is a perspective view of a back surface side of a refrigerator-compartment right door according to Embodiment 3 of the present disclosure.

20 [Fig. 15] Fig. 15 includes a sectional view of the refrigerator-compartment right door that is taken along line J-J, and a sectional view of the refrigerator-compartment right door that is taken along line J-J in the case where the storage container is attached to the refrigerator-compartment right door, in Embodiment 3 of the present disclosure.

Description of Embodiments

25 [0013]

A refrigerator according to each of the embodiments of the present disclosure will be described below with reference to the drawings. In each of figures of the drawing, components that are the same as or equivalent to those in a previous figure or previous figures are denoted by the same reference numerals, and the same is true of the entire text of the specification. Configurations of the components illustrated and described in

the figures and the entire text of the specification are merely examples, and are not limited to the embodiments described in the specification. In particular, the shapes of the components are not limited only to those in the embodiments. The figures may illustrate an actual configuration in a simplified form. Furthermore, the size of each component and/or the positional relationship between components in the figures may differ from those of actual ones.

In this specification, unless otherwise specified, up, down, left, and right are defined with reference to the direction in which the refrigerator is viewed from a user standing in front of the refrigerator. In addition, it is assumed that of sides of a refrigerator body to be referred to below, a side where an opening is formed is a front side, and a side where a storage compartment is formed with reference to the front side is "back". In this specification, "width direction" means the lateral direction in the above assumption. In this specification, "depth direction" means the front-back direction in the above assumption, and "up-down direction" means the height direction of the refrigerator.

The description concerning the door of the refrigerator in the present disclosure will be made based on the location of the door in the case where the door is in a closed state, unless otherwise specified. For example, even in the case where a swing door is referred to, the description will be made on the assumption that the above lateral direction is a direction in which the door is fixed. Unless otherwise specified, the description concerning the storage container and ribs of the present disclosure will be made based on the location of the door in the case where the door is closed (the storage compartment is closed by the door), with the storage container attached to the door.

[0014]

Embodiment 1

Fig. 1 is a schematic perspective view of a refrigerator 100 according to Embodiment 1 as viewed obliquely from above. In the refrigerator 100 as illustrated in the schematic perspective view of Fig. 1, a plurality of storage compartments 6 are closed.

As illustrated in Fig. 1, the refrigerator 100 includes a box body 1 that is a main refrigerator body. The box body 1 includes an outer box 2 made of a steel plate, an inner box 3 made of resin, and a heat insulating material 4 (not illustrated) filled between the outer box 2 and the inner box 3.

5 [0015]

Fig. 2 is a perspective view of the refrigerator 100 according to Embodiment 1 in the case where a refrigerator-compartment right door 14 is opened. The box body 1 includes a refrigerator compartment 7 that is opened or closed by the refrigerator-compartment right door 14 and a refrigerator-compartment left door 15. Referring to Fig. 2, the refrigerator compartment 7 is opened by the refrigerator-compartment right door 14.

10 [0016]

The refrigerator 100 includes the plurality of storage compartments 6 in the box body 1. As the plurality of storage compartments 6, the refrigerator compartment 7, an ice-making compartment 8 (not illustrated), and a convertible compartment 9 (not illustrated) are provided, and the ice-making compartment 8 and the convertible compartment 9 are arranged side by side on left and right sides under the refrigerator compartment 7. The convertible compartment 9 is capable of switching a temperature zone between plural temperature zones. A freezer compartment 10 (not illustrated) is provided below the ice-making compartment 8 and the convertible compartment 9, and a vegetable compartment 11 (not illustrated) is provided below the freezer compartment 10. As illustrated in Fig. 2, the refrigerator compartment 7 has an opening 13 at a front side 12 of the box body 1.

20 [0017]

The refrigerator 100 includes the refrigerator-compartment right door 14, the refrigerator-compartment left door 15, an ice-making compartment door 16, a convertible compartment door 17, a freezer-compartment door 18, and a vegetable-compartment door 19. The refrigerator-compartment right door 14 and the refrigerator-compartment left door 15 are located in front of the refrigerator compartment 7 to open and close the refrigerator compartment 7. The ice-making compartment door 16 is

located in front of the ice-making compartment 8 to open and close the ice-making compartment 8. The convertible compartment door 17 is located in front of the convertible compartment 9 to open and close the convertible compartment 9. The freezer-compartment door 18 is located in front of the freezer compartment 10 to open and close the freezer compartment 10. The vegetable-compartment door 19 is located in front of the vegetable compartment 11 to open and close the vegetable compartment 11. The refrigerator-compartment right door 14 is rotatably fixed to the box body 1 by a first hinge 5a, and the refrigerator-compartment left door 15 is rotatably fixed to the box body 1 by a second hinge 5b. The refrigerator-compartment right door 14 and the refrigerator-compartment left door 15 open and close part of the opening 13 (at least part of the refrigerator compartment 7) in front of the front side 12 of the box body 1, and open and close the refrigerator compartment 7 in a double-door manner. The ice-making compartment door 16, the convertible compartment door 17, the freezer-compartment door 18, and the vegetable-compartment door 19 are configured as pull-out drawers to open and close the ice-making compartment 8, the convertible compartment 9, the freezer compartment 10, and the vegetable compartment 11, respectively. The above description concerning Embodiment 1 is not limiting, and the refrigerator 100 may be configured such that the refrigerator compartment 7 is opened and closed by a single refrigerator-compartment door.

[0018]

With respect to Embodiment 1, although the above description refers to an example of the refrigerator 100 that includes the refrigerator compartment 7, the ice-making compartment 8, the convertible compartment 9, the freezer compartment 10, and the vegetable compartment 11 as the plurality of storage compartments 6, it is not limiting, and for example, the refrigerator 100 may be configured without provision of the ice-making compartment 8 or convertible compartment 9. The refrigerator 100 may be configured such that the positions of the freezer compartment 10 and the vegetable compartment 11 are interchanged. The number of storage compartments 6 included in the refrigerator 100 is not limited to five. Furthermore, the present embodiment can also be applied to the case where all the storage compartments 6 are one or more

refrigerator compartments and/or one or more freezer compartments. In such a case, it may still be referred to as a refrigerator. A door that opens and closes the refrigerator compartment 7 may be a single hinged door.

[0019]

5 The refrigerator 100 includes a compressor 21 (not illustrated) and a cooler 22 (not illustrated) on a side where a back surface 20 of the box body 1 is located. The compressor 21 (not illustrated), the cooler 22 (not illustrated), a condenser 23 (not illustrated), a capillary tube 24 (not illustrated), and other components are configured to perform a refrigeration cycle.

10 [0020]

Fig. 3 is a perspective view of the refrigerator-compartment right door 14 included in the refrigerator 100 according to Embodiment 1 as viewed from the back.

Hereinafter, a configuration of the refrigerator-compartment right door 14 will be described as that of the door 14.

15 The door 14 has a front surface portion 25 that forms part of a front surface of the refrigerator 100 and a front surface of the door 14 when the door 14 is in a closed state, a back surface portion 27 that forms a back side of the door 14, and side surface portions 26 that form side surfaces of the door 14 between the front surface portion 25 and the back surface portion 27. The front surface portion 25 is formed of glass or a
20 steel plate, for example. The side surface portions 26 are door frames 28 made of resin. The back surface portion 27 is formed of resin such as polypropylene. Polypropylene is material suitable for injection molding.

[0021]

25 As illustrated in Fig. 3, the door 14 has the back surface portion 27 including a left rib 31 that is a first rib and a right rib 32 that is a second rib. The back surface portion 27 has a back surface 30 between the left rib 31 and the right rib 32. The left rib 31 and the right rib 32 are provided on the back side of the door 14 such that they protrude backward when the refrigerator compartment 7 is closed by the door 14. The left rib 31 and the right rib 32 protrude backward from the back surface 30 when the refrigerator
30 compartment 7 is closed by the door 14.

The left rib 31 is provided to the left of the center in the lateral direction of the door 14 when the door 14 is in the closed state, as viewed from the front side. The right rib 32 is provided to the right of the center in the lateral direction of the door 14 when the door 14 is in the closed state, as viewed from the front side. The left rib 31 and the right rib 32 are structural elements for use in attachment of a storage container 36 (to be described below) to the door 14, and are arranged in parallel with each other. These ribs 31 and 32 each have a predetermined width in the lateral direction, extend in the up-down direction, and protrude backward from the door 14. The back surface portion 27 is formed by injection molding using the resin. A fitting portion 34 is provided at the back surface portion 27 along the door frame 28 to surround the left rib 31 and the right rib 32. A packing 33 is inserted into the fitting portion 34 and attached to the back surface portion 27.

[0022]

Free pockets 35 for storing groceries and other items, the storage container 36, which is a pocket for small and medium-sized items, for storing chicken eggs, beverages, seasonings, and other items, and a bottle pocket 37 for storing beverages and other items are removably attached, in order from top to bottom, to the left rib 31 and right rib 32 of the door 14.

An egg tray 38 for aligning and storing eggs inside the storage container 36 is removably accommodated in the container 36. Although the eggs are, for example, chicken eggs, but this is not limiting.

[0023]

Fig. 4 is a perspective view of the door 14 as viewed from the back. Referring to Fig. 4, the free pockets 35, the storage container 36, and the bottle pocket 37 are removed from the door 14. At a first inner wall 40, which is the side surface of the left rib 31 to which the free pockets 35, the storage container 36, and the bottle pocket 37 are to be attached, protrusions 45 that allow the free pockets 35 to be engaged therewith, a first engagement portion 46 that allows the storage container 36 to be engaged therewith, and protrusions 47 that allow the bottle pocket 37 to be engaged therewith are provided to protrude outward. At a second inner wall 41 of the right rib

32, a second engagement portion 48 that allows the storage container 36 to be engaged therewith is provided to protrude outward. The second engagement portion 48 is illustrated by a dashed line in Fig. 4. It should be noted that in Fig. 4, illustration of the protrusions provided on the right rib 32 to allow the free pockets 35 and the bottle pocket 37 to be engaged with the protrusions are omitted.

[0024]

The back surface portion 27 including the left rib 31, the right rib 32, the back surface 30, the first engagement portion 46, and the second engagement portion 48 is molded by injection molding from resin such as polypropylene. The first and second engagement portions 46 and 48 are formed such that their interiors are filled with resin. The left rib 31, the right rib 32, the back surface 30, the first engagement portion 46, and the second engagement portion 48 are formed of resin and molded continuously and integrally with each other.

[0025]

Fig. 5, part (a), is a sectional view of the door 14 that is taken along line A-A and that illustrates the first engagement portion 46 provided on the left rib 31 and its surroundings. Fig. 5, part (b), is a sectional view of the door 14 that is taken along line B-B and a horizontal sectional view of the left rib 31. Fig. 5, (b), illustrates the first engagement portion 46 and its surroundings as viewed from above.

Although being omitted in Fig. 5, parts (a) and (b), a heat insulating material is provided in the door 14.

[0026]

The first engagement portion 46 will be described with reference to Fig. 5, parts (a) and (b). The first engagement portion 46 is provided on the first inner wall 40, which is the side surface (the right side surface, and the inner side surface of the left rib 31) of the left rib 31 to which the storage container 36 is to be attached. The first engagement portion 46 is a structural element that enables the storage container 36 to be removably attached to the left rib 31. Similarly, the second engagement portion 48 is provided on the second inner wall 41, which is the side surface (the left side surface, and the inner side surface of the right rib 32) of the right rib 32 to which the storage

container 36 is attached. The second engagement portion 48 is a structural element that enables the storage container 36 to be removably attached to the right rib 32.

That is, the first engagement portion 46 and the second engagement portion 48 are structural elements that enable the storage container 36 to be removably attached to

the door 14. The second engagement portion 48 and the first engagement portion 46 are symmetrical in the lateral direction in configuration and shape.

[0027]

The first engagement portion 46 has a first reinforcing protrusion 50 that extends in the depth direction and a first engagement protrusion 51 that extends upward from the first reinforcing protrusion 50. The first reinforcing protrusion 50 is provided at an area located below a dashed line L2 of the first engagement portion 46 as illustrated in Fig. 5, part (a). The first engagement protrusion 51 is connected to the first reinforcing protrusion 50 at the dashed line L2.

[0028]

The back surface portion 27 has a connecting surface 53 connecting the back surface 30 and the first inner wall 40. The connecting surface 53 is a curved surface, but this is not limiting, and the connecting surface 53 may be flat.

The first reinforcing protrusion 50 connected to the first inner wall 40, the connecting surface 53, and the back surface 30 and protruding outward (rightward) relative to the first inner wall 40 is provided on the left rib 31. The first reinforcing protrusion 50 protrudes outward (rightward) from the first inner wall 40. The first engagement protrusion 51 connected to the first inner wall 40, extending upward relative to the first reinforcing protrusion 50, and protruding outward relative to the first inner wall 40 is provided on the left rib 31. The first engagement protrusion 51 extends upward relative to the first reinforcing protrusion 50 and protrudes outward relative to the first inner wall 40. The first engagement protrusion 51 has a distal end portion 55 and a body 56 in order from the top to bottom. As illustrated in Fig. 5, part (a), the distal end portion 55 is provided at an area located above a dashed line L1 of the first engagement portion 46, and the body 56 and the distal end portion 55 are formed continuously with each other at the dashed line L1. The distal end portion 55 has an

upwardly curved surface or an upwardly chamfered protrusion structure. The body 56 is provided at an area located below the dashed line L1 and above the dashed line L2 of the first engagement portion 46, as illustrated in Fig. 5, part (a). The body 56 is connected to the first reinforcing protrusion 50 at the dashed line L2. The body 56 has a greater width in the up-down direction than a width in the depth direction and is shaped such that the width of the body 56 in the depth direction gradually increases in a direction toward a lower side.

[0029]

The first reinforcing protrusion 50 and the first engagement protrusion 51 are formed by injection molding from resin, and the interior of each of the first reinforcing protrusion 50 and the first engagement protrusion 51 is filled with the resin. Therefore, the first reinforcing protrusion 50 and the first engagement protrusion 51 can be made smaller in the width in the depth direction, the width in the lateral direction, and the width in the up-down direction, while reducing occurrence of defects during formation, as compared with protrusions of the related art that are formed by vacuum molding.

[0030]

As an example, the first reinforcing protrusion 50 has a width X1 of 7.6 mm in the lateral direction and a width Z1 of 17.2 mm in the depth direction. As an example, a connection portion between the distal end portion 55 and the body 56 of the first engagement protrusion 51 at the position indicated by the dashed line L1 has a width X2 of 7.6 mm in the lateral direction and a width Z2 of 3.6 mm in the depth direction. As an example, a connection portion between the body 56 and the first reinforcing protrusion 50 at the position indicated by the dashed line L2 has a width X3 of 7.6 mm in the lateral direction and a width Z3 of 7.4 mm in the depth direction. As an example, the first engagement portion 46 has a width Y1 of 29 mm in the up-down direction. As an example, the first reinforcing protrusion 50 has a width Y2 of 3.6 mm in the up-down direction.

[0031]

The second engagement portion 48 has a second reinforcing protrusion 150

extending in the depth direction and a second engagement protrusion 151 extending upward relative to the second reinforcing protrusion 150.

[0032]

The back surface portion 27 has a connecting surface 153 that connects the back surface 30 and the second inner wall 41. The connecting surface 153 is a curved surface, but this is not limiting, and the connecting surface 153 may be flat.

The second reinforcing protrusion 150 that is connected to the second inner wall 41, the connecting surface 153, and the back surface 30 and protrudes outward (rightward) relative to the second inner wall 41 is provided on the right rib 32. The second engagement protrusion 151 that is connected to the second inner wall 41, extends upward relative to the second reinforcing protrusion 150, and protrudes outward relative to the second inner wall 41 is provided on the right rib 32.

[0033]

The second reinforcing protrusion 150 and the second engagement protrusion 151 are formed by resin injection molding, and the interior of each of the second reinforcing protrusion 150 and the second engagement protrusion 151 is filled with the resin. Therefore, the second reinforcing protrusion 150 and the second engagement protrusion 151 can be made smaller in the width in the depth direction, the width in the lateral direction, and the width in the up-down direction while reducing occurrence of defects during formation, as compared with protrusions of the related art that are formed by vacuum molding.

[0034]

In Embodiment 1, since the first engagement protrusion 51 and the second engagement protrusion 151 are formed by injection molding, the interiors of the first and second engagement protrusions 51 and 151 can be filled with resin, and thus do not need to be filled with foam heat insulating material. Thus, the first engagement protrusion 51 and the second engagement protrusion 151 can be made smaller in the width in the depth direction and the width in the lateral direction, as compared with the case of applying vacuum molding. Similarly, a first fitting recessed portion 68 and a first fitting recessed portion 69, which are provided in the storage container 36 to be

described later, can be made smaller in the width in the depth direction and the width in the lateral direction, as compared with those of the related art.

[0035]

Furthermore, the first reinforcing protrusion 50 is provided to extend from the first inner wall 40 of the left rib 31 to the back surface 30, and the first engagement protrusion 51 extending upward relative to the first reinforcing protrusion 50 is provided on the first inner wall 40, whereby the first reinforcing protrusion 50 serves as a supporting portion that supports a bottom plate 61 of the storage container 36.

The first reinforcing protrusion 50 is integrally molded, using the resin, with the back surface 30, the connecting surface 53, and the first inner wall 40. The first reinforcing protrusion 50 reinforces the left rib 31, thereby reducing deformation of the left rib 31 that would occur when the interior of the left rib 31 is filled with foamed urethane. It is therefore unnecessary to apply a jig that is difficult to install in the related art and that is required to hold down an area C between the first engagement protrusion 51 and the back surface 30, thereby simplifying the manufacturing process of the door 14.

When the left rib 31 is cooled by cold air in the refrigerator compartment 7, the air contained in the urethane foam within the left rib 31 contracts, thus reducing the width of the left rib 31 in the lateral direction. However, in Embodiment 1, the first reinforcing protrusion 50 is connected to the back surface 30, the connecting surface 53, and the first inner wall 40, and is integrally molded, using the resin, with the back surface 30, the connecting surface 53, and the first inner wall 40, thereby fixing and reinforcing the left rib 31 onto the back surface 3. Thus, by providing the first reinforcing protrusion 50 on the left rib 31, it is possible to reduce a decrease in the width of the left rib 31 in the lateral direction that is caused by cooling of the left rib 31, and thus reduce wobble of the storage container 36 in the lateral direction that occurs when the storage container 36 is attached to the left rib 31.

[0036]

Fig. 6, part (a) is a perspective view of the storage container 36 and the egg tray 38, as viewed obliquely from above.

Fig. 6, part (b) is a top view of the storage container 36 and the egg tray 38.

[0037]

The storage container 36 that is attached to the first engagement portion 46 and the second engagement portion 48 behind the door 14 will be described with reference to Fig 6, parts (a) and (b).

[0038]

As illustrated in Fig. 6, parts (a) and (b), the storage container 36 is a box-shaped storage container having an open top surface 60, and has the bottom plate 61 supporting a stored item and side walls 62 extending upward from the bottom plate 61. An outer side surface of the side walls 62 will be referred to as an outer side surface 63. The bottom plate 61 and the side walls 62 define a storage space S1 of the storage container 36. The bottom plate 61 and the side walls 62 are integrally molded together from resin.

[0039]

The bottom plate 61 is a substantially oblong flat plate, which is rectangular as viewed in plan view. The side walls 62 are provided around the entire periphery of the bottom plate 61 and raised upward from a peripheral edge 61b. The bottom plate 61 and the side walls 62 define the storage space S1 of the storage container 36. The bottom plate 61 has a pair of long sides 61b1 and 61b2 and a pair of short sides 61b3 and 61b4 on the peripheral edge 61b. The side walls 62 include a first long side wall 66a and a second long side wall 66b raised on the pair of long sides 61b1 and 61b2, respectively, and a first short side wall 66c and a second short side wall 66d raised on the pair of short sides 61b3 and 61b4, respectively. The side walls 62 have curved surface portions 65 (65a, 65b, 65c, and 65d) having respective curved surfaces, each of the curved surface portions being located between an associated one of the first long side wall 66a and the second long side wall 66b and an associated one of the first short side wall 66c and the second short side wall 66d. The curved surface portions 65 correspond to respective corners of the storage container 36.

In the case where the storage container 36 is attached to the door 14, of the four curved surface portions 65, a curved surface portion 65 between the first long side wall

66a and the first short side wall 66c (on the left front side) will be referred to as a curved surface portion 65a, and a curved surface portion 65 between the first long side wall 66a and the second short side wall 66d (on the right front side) will be referred to as the curved surface portion 65b. In the case where the storage container 36 is attached to the door 14, the first long side wall 66a is located closer to the back surface 30 (front side) than the second long side wall 66b. The first long side wall 66a is substantially parallel to the longitudinal direction of the bottom plate 61. In the case where the storage container 36 is attached to the door 14, the first short side wall 66c is located on the left, and the second short side wall 66d is located on the right, with the first long side wall 66a interposed between these short side walls. The first short side wall 66c is a first wall, and the second short side wall 66d is a second wall.

[0040]

The storage container 36 has the first fitting recessed portion 68 that is formed in the first short side wall 66c, which is the first wall to be attached to the left rib 31, such that the first fitting recessed portion 68 is recessed inward and protrudes in the storage space S1. The first fitting recessed portion 68 has a structural element in which the first engagement portion 46 is to be inserted and enables the storage container 36 to be removably attached to the left rib 31. Similarly, the storage container 36 has the second fitting recessed portion 69 formed at the second short side wall 66d, which is the second wall to be attached to the right rib 32. The second fitting recessed portion 69 is recessed inward in the storage container 36. The second fitting recessed portion 69 has a structural element in which the second engagement portion 48 is to be inserted and enables the storage container 36 to be detachably attached to the right rib 32.

[0041]

The egg tray 38 is a tray to hold eggs, such as chicken eggs, and is accommodated in the storage container 36. The egg tray 38 includes a rectangular tray 70 and legs 71 that are bent downward at a substantially right angle from the peripheral edge of the tray 70, as viewed from above. The legs 71 support the tray 70 horizontally against the bottom plate 61.

[0042]

The tray 70 has a pair of long sides, that is, a first long side 75a and a second long side 75b, and a pair of short sides, that is, a first short side 75c and a second short side 75d, on a peripheral edge 75, as viewed from above. In the case where the egg tray 38 is accommodated in the storage container 36, and the storage container 36 is attached to the door 14, the first long side 75a is located closer to the front side (a side where the back surface 30 is located) than the second long side 75b; and the short side 75c is located on the left side (on a first rib side) and the second short side 75d is located on the right side (on a second rib side), with the long side 75a interposed between these short sides. The tray 70 has chamfered portions 73a, 73b, 73c, and 73d each of which is located between associated ones of the first long side 75a, the second long side 75b, the first short side 75c, and the second short side 75d. The chamfered portion 73a, which is a first chamfered portion, is located between the first long side 75a and the first short side 75c. The chamfered portion 73b, which is a second chamfered portion, is located between the first long side 75a and the second short side 75d. The chamfered portions 73a, 73b, 73c, and 73d are the corners of the egg tray 38 (tray 70).

[0043]

In the tray 70, a plurality of holes 72 are formed at regular intervals as holes to hold chicken eggs. In parts (a) and (b) of Fig. 6, twelve holes 72 are provided such that six holes 72 are arranged along in the long sides of the tray 70 and two holes 72 are arranged along the short sides of the tray 70, but this is not limiting.

The chamfered portions 73a, 73b, 73c, and 73d are obtained by performing chamfering on the respective corners along holes that are located closest to the chamfered portions 73a, 73b, 73c, and 73d among the plurality of holes 72. For example, the chamfered portion 73a has a chamfered corner along a first hole 72a that is the closest to the chamfered portion 73a as the tray 70 is viewed from above. The first hole 72a is an opening for a chicken egg that is formed adjacent to the first long side 75a (front side) and is the closest to the first short side 75c (left side) of the tray 70, among the holes 72.

[0044]

When the egg tray 38 is accommodated in the storage container 36, a gap of 1 to 3 mm is provided between the first short side 75c and the first short side wall 66c, which are adjacent to each other. This gap is smaller than the width of the first fitting recessed portion 68 in the direction parallel to the first long side 75a (lateral direction). Also, a gap of 1 to 3 mm is provided between the first long side 75a and the first long side wall 66a, which are adjacent to each other. This gap is smaller than the width of the first fitting recessed portion 68 in the direction parallel to the first short side 75c (depth direction).

[0045]

Fig. 7, parts (a) and (b), are enlarged views of an area D, which illustrate the first fitting recessed portion 68 and the surroundings thereof in the storage container 36, with the egg tray 38 accommodated in the storage container 36.

Fig. 8, part (a), is a side view of the first short side wall 66c of the storage container 36.

Fig. 8, (b), is a perspective view of the storage container 36 as viewed from a lower side of a front left side.

[0046]

A configuration of the first fitting recessed portion 68 provided at the first short side wall 66c of the storage container 36 will be described with reference to Fig. 7, parts (a) and (b) and Fig. 8, parts (a) and (b).

The first fitting recessed portion 68 is formed at the first short side wall 66c, which is the first wall, such that the first fitting recessed portion 68 is recessed inward (rightward).

The chamfered portion 73a is arcuately rounded as viewed from above, as illustrated in part (a) of Fig. 7. A curvature R1 of the chamfered portion 73a is greater than a curvature R2 of the curved surface portion 65a of the storage container 36. Thus, a gap S2 is provided between the chamfered portion 73a of the tray 70 and each of the first long side wall 66a, the curved surface portion 65a, and the first short side wall 66c of the storage container 36, as the storage container 36 and the egg tray 38

are viewed from above. A center P2 of the arc of the chamfered portion 73a is closer to the center of the tray 70 than a center P1 of the first hole 72a is. Furthermore, as an example, the chamfered portion 73a is shaped in a linear form as illustrated in part (b) of Fig. 7. Also in this case, a gap S3 is provided between the chamfered portion 73a of the tray 70 and each of the first long side wall 66a, the curved surface portion 65a, and the first short side wall 66c of the storage container 36, as the storage container 36 and the egg tray 38 are viewed from the top.

In both parts (a) and (b) of Fig. 7, with the egg tray 38 accommodated in the storage container 36, the first fitting recessed portion 68 is provided inward of an extension line L4 (L6 in the case of part (b) of Fig. 7) of the first long side 75a as the tray 70 is viewed from above and inward of a line L5 (L7 in the case of part (b) of Fig. 7) that extends parallel to the first long side 75a while passing through a connection portion P5 (P7 in the case part (b) of Fig. 7)) between the chamfered portion 73a and the first short side 75c.

The distance between the first short side 75c and the first wall in the direction parallel to the first long side 75a (in the lateral direction) is smaller than the width of the first fitting recessed portion 68 in the direction along the first long side 75a.

Furthermore, the tray 70 and the first fitting recessed portion 68 do not overlap each other in the up-down direction.

[0047]

The first fitting recessed portion 68 is located within the gap S2 as the storage container 36 and the egg tray 38 are viewed from above. The first fitting recessed portion 68 has a groove 76 therein. The groove 76 is recessed inward (rightward) of the outer side surface 63 of the storage container 36 (outer side surface 63a of the first short side wall 66c). A dashed line in the first fitting recessed portion 68 as indicated in Fig. 7, parts (a) and (b) indicates the groove 76 in a horizontal section at a height of a plane passing through the tray 70.

[0048]

As illustrated in parts (a) and (b) of Fig. 8, the groove 76 has substantially the same shape as that of the first engagement protrusion 51. The first fitting recessed

portion 68 is provided to extend upward from a bottom surface 61a of the bottom plate 61 up to a predetermined height along a connection portion 78 between the curved surface portion 65a and the first short side wall 66c of the storage container 36. The first engagement protrusion 51 of the first engagement portion 46 is inserted into the first fitting recessed portion 68, and the storage container 36 is attached to the left rib 31.

[0049]

In part (a) of Fig. 8, a straight line L3 is a line where a connection portion between the distal end portion 55 and the body 56, that is, a portion indicated by the straight line L1 of the first engagement protrusion 51 as indicated in part (a) of Fig. 5, is located when the first engagement protrusion 51 is inserted into the first fitting recessed portion 68. A point P3 is a point where the straight line L3 and the front end of the groove 76 intersect. In Embodiment 1, the first fitting recessed portion 68 is formed at the first short side wall 66c such that the point P3 is located behind the connection portion 78 of the storage container 36. Since the point P3 is located behind the curved surface portion 65a, the depth of the groove 76 from the outer side surface 63 (left side surface 63a) can be kept constant at the position of the straight line L3. With this structure, the first engagement protrusion 51 does not easily disengage from the first fitting recessed portion 68, as compared with the case where the groove 76 is provided across the curved surface portion 65a of the storage container 36 at all heights. Accordingly, the widths of the first fitting recessed portion 68 and the groove 76 increase in a direction toward its lower side, and at the same time, a holding function of the first fitting recessed portion 68 is maintained.

With respect to the width of the first engagement protrusion 51 in the depth direction, the first engagement protrusion 51 widens forward toward its lower end. Thus, the first fitting recessed portion 68 and the groove 76, which are provided in the storage container 36, are shaped to gradually widen downward in conformity with the shape of the first engagement protrusion 51, and an inlet 77 formed on the bottom surface 61 is provided to extend across the curved surface portion 65a and the first short side wall 66c. With this configuration, the first engagement protrusion 51 can be

easily fitted into the first fitting recessed portion 68 and the storage container 36 can be easily attached to the left rib 31.

[0050]

The attachment of the storage container 36 to the door 14 is performed as follows.

When a user brings the first long side wall 66a of the storage container 36 into contact with the back surface 30 of the door 14 and slides the storage container 36 downward, the first engagement protrusion 51 of the first engagement portion 46 provided on the left rib 31 is inserted into the first fitting recessed portion 68 of the storage container 36, and the second engagement protrusion 151 of the second engagement portion 48 provided on the right rib 32 is inserted into the second fitting recessed portion 69 of the storage container 36, whereby the storage container 36 is attached to the left rib 31 and the right rib 32 (that is, the door 14). The first reinforcing protrusion 50 and the second reinforcing protrusion 150 support the storage container 36 while being in contact with the bottom plate 61 of the storage container 36 when the storage container 36 is attached to the door 14.

[0051]

Fig. 9 is a plan view of the door 14 as viewed from the back in the case where the storage container 36 is attached to the door 14.

Fig. 10 is a sectional view that is taken along line F-F in Fig. 9, and illustrates the surroundings of the first fitting recessed portion 68 of the storage container 36 as viewed from the above, with the egg tray 38 accommodated in the storage container 36 and the storage container 36 attached to the door 14.

[0052]

In Fig. 10, a dashed line in the first fitting recessed portion 68 indicates the groove 76 and the first engagement protrusion 51 inserted into the groove 76, in a horizontal section passing through the tray 70.

In Embodiment 1, the first engagement portion 46 is molded by injection molding. Thus, the width, in the depth direction, of the connection portion between the distal end portion 55 of the first engagement protrusion 51 and the body 56 can be set to 4 mm or

less, and the width, in the depth direction, of the connection portion between the first engagement protrusion 51 and the first reinforcing protrusion 50 can be set to 8 mm or less.

By injection molding, the first engagement protrusion 51 is formed to have a width of 1.5 mm or more and 4 mm or less in the depth direction, and a width of 4 mm or more and 8 mm or less in the lateral direction, in a horizontal section passing through the tray 70. Thus, the size of the first fitting recessed portion 68 can also be reduced, as compared with the related art.

[0053]

Thus, the size of the first fitting recessed portion 68 that is provided in the storage container 36 can be reduced, as compared with the case where the first engagement portion 46 is molded by the vacuum molding in the related art. Therefore, with the egg tray 38 accommodated in the storage container 36, the first fitting recessed portion 68 can be provided in the gap S2 between the chamfered portion 73a and each of the first short side wall 66c and the curved surface portion 65a. A front end 68a and a back end 68b of the fitting recessed portion 68 can be provided between a front end P4 and a back end P5 of the chamfered portion 73a. In addition, the tray 70 and the first fitting recessed portion 68 do not overlap each other in the up-down direction.

[0054]

As illustrated in Fig. 10, the first fitting recessed portion 68 is provided inward of the extension line L4 of the first long side 75a of the tray 70 and the line L5 that extends parallel to the first long side 75a while passing through P5, which is the connection portion between the chamfered portion 73a and the first short side 75c. The distance between the first short side 75c and the first short side wall 66c in the direction along the first long side 75a is smaller than the width of the first fitting recessed portion 68 in the direction along the first long side 75a. In addition, the tray 70 and the first fitting recessed portion 68 do not overlap each other in the up-down direction.

[0055]

The first fitting recessed portion 68 is provided behind the front end P4 of the chamfered portion 73a and in front of the back end P5 of the chamfered portion 73a as

the storage container 36 is viewed from the top. The chamfered portion 73a is arc-shaped. The first fitting recessed portion 68 is located between the first short side wall 66c of the storage container 36 and the chamfered portion 73a. With this configuration, the gap S2 provided by the difference in shape between the chamfered portion 73a, which is the corner of the egg tray 38, and the curved surface portion 65a, which is the corner of the storage container 36, can be effectively used. Thus, it is not necessary to provide an additional notch for a fitting recessed portion in the tray 70. In addition, the distance between the first short side wall 66c and the tray 70 in a direction parallel to the first long side 75a (lateral direction) can be made narrower than the width of the first fitting recessed portion 68 in the lateral direction. Furthermore, since the first reinforcing protrusion 50 and the second reinforcing protrusion 150 support the bottom plate 61 of the storage container 36 from the below, with the storage container 36 attached to the door 14, a sufficient strength can be obtained even if the width of the first engagement protrusion 51 in the depth direction and that of the first engagement protrusion 51 in the lateral direction are reduced when injection molding is performed.

[0056]

The first fitting recessed portion 68 is located within the gap S2 as the storage container 36 and the egg tray 38 are viewed from above. Thus, the tray 70 does not need to have a notch to prevent interference with the first fitting recessed portion 68, and the design of the tray 70 is thus improved. In addition, the plurality of holes 72 formed in the tray 70 can be provided in an area that is widened to the left and right of the tray 70, as compared with the related art, whereby the distance between the adjacent holes 72 is increased and the strength of the egg tray 38 is improved. Furthermore, the first fitting recessed portion 68 and the tray 70 do not interfere with each other as viewed from above. Thus, when eggs are not stored, the egg tray 38 can be turned upside down when being accommodated in the storage container 36. In addition, by turning the egg tray 38 upside down when accommodating the egg tray 38 in the storage container 36, it is possible to easily achieve temporary fixation of the egg tray during packaging. It should be noted that by forming each of the storage container 36 and the egg tray 38 such that each of them has a symmetrical shape in both the

lateral direction and the front-back direction, the storage container 36 can be attached to the left rib 31 and the right rib 32 even when the storage container 36 is rotated by 180 degrees in the horizontal direction. The egg tray 38 can also be accommodated in the storage container 36 even when the egg tray 38 is rotated by 180 degrees in the horizontal direction.

[0057]

In addition, since the first fitting recessed portion 68 is provided along the connection portion 78, even when the egg tray 38 is not used, the stored items do not easily come into contact with the first fitting recessed portion 68, thereby improving the storage capacity of the storage container 36, as compared with a configuration of the related art in which a fitting recessed portion is provided close to the center of a side wall of a storage container.

[0058]

In Embodiment 1, the first engagement portion 46 to be provided on the left rib 31 of the door 14 and the second engagement portion 48 to be provided on the right rib 32 of the door 14 are formed by injection molding. It should be noted that an error that occurs in the case of forming the first and second engagement portions 46 and 48 by injection molding can be reduced to approximately 0.1 mm, whereas an error that occurs in the case of forming them in vacuum molding is approximately 0.8 mm. Thus, by forming the first and second engagement portions 46 and 48 by injection molding, it is possible to reduce rattling that occurs when the storage container 36 is attached to the left rib 31, as compared with when these locking portions are formed by vacuum molding.

[0059]

By forming the first engagement portion 46 by injection molding, it is possible to reduce the widths of the first and second engagement protrusions 51 and 151 in the depth direction to 1.5 mm or more and 4 mm or less (for example, 3.6 mm), though the first and second engagement protrusions 51 and 151 are difficult to form using vacuum molding. It is therefore possible to reduce the sizes of the first fitting recessed portion 68 and the second fitting recessed portion 68, into which the first engagement

protrusion 51 and the second engagement protrusion 151 are inserted, respectively, and to provide the first fitting recessed portion 68 in the gap S2, which is the space between the chamfered portion 73a of the egg tray 38 and each of the first long side wall 66a, the curved surface portion 65a, and the first short side wall 66c as the storage container 36 is viewed from above. Also, it is possible to provide the second fitting recessed portion 69 in the gap, which is the space between the chamfered portion 73b of the egg tray 38 and each of the first long side wall 66a, the curved surface portion 65b, and the second short side wall 66d. Thus, in Embodiment 1, it is not necessary to decrease the width of the egg tray 38 in the lateral direction or provide a notch in the egg tray 38, to provide the fitting recessed portion in the storage container 36.

[0060]

Embodiment 2

A refrigerator 200 according to Embodiment 2 will be described. The following description concerning Embodiment 2 is made by referring mainly to the differences between Embodiments 1 and 2, and descriptions concerning components that are the same as or equivalent to the components described above will be simplified or omitted. In Embodiment 1, the first engagement portion 46 that is provided on the left rib 31 includes one first engagement protrusion 51 on the first reinforcing protrusion 50, whereas in Embodiment 2, a first engagement portion 203 that is provided on a left rib 202 includes two engagement protrusions on a reinforcing protrusion 204. Furthermore, a storage container 207 includes a first fitting recessed portion 209 and a second fitting recessed portion 210 at a first short side wall 208, which is a wall corresponding to the first short side wall 66c. The configurations of other components of the refrigerator 200 according to Embodiment 2 are the same as those of the refrigerator 100 of Embodiment 1.

[0061]

Fig. 11, part (a), is a sectional view of a door 201 in Embodiment 2 that is taken along the same location as line A-A in Fig. 4.

Fig. 11, part (b), is a sectional view of the door 201 in Embodiment 2 that is taken along the same location as line B-B in Fig. 4.

The first engagement portion 203 in Embodiment 2 will be described with reference to Fig. 11, parts (a) and (b).

[0062]

The first engagement portion 203 that allows the storage container 207 to be engaged therewith is provided at an inner wall 211 of the left rib 202 in such a manner as to protrude outward. A second engagement portion 214 is also provided at an inner wall 213 of a right rib 212. The right rib 212 and the left rib 202 are symmetrical in the lateral direction and the second engagement portion 214 and the first engagement portion 203 are symmetrical in the lateral direction, and descriptions and illustrations concerning the right rib 212 and the second engagement portion 214 will be omitted.

The first engagement portion 203 includes the reinforcing protrusion 204, a first engagement protrusion 205, and a second engagement protrusion 206 located behind the first engagement protrusion 205. The reinforcing protrusion 204 is longer in the depth direction than the first reinforcing protrusion 50 of Embodiment 1, and is connected to and integrally molded with the back surface 30, the connecting surface 53, and the inner wall 211. The first engagement protrusion 205 is provided at the inner wall 211 to extend upward relative to the reinforcing protrusion 204 and to protrude outward (rightward) relative to the inner wall 211. The shape of the first engagement protrusion 205 and the position of the first engagement protrusion 205 relative to the inner wall 211 are substantially the same as those of the first engagement protrusion 51 of Embodiment 1, and their descriptions will thus be omitted. The second engagement protrusion 206 is located above the reinforcing protrusion 204 and protrudes outward (rightward) relative to the inner wall 211. The width of the second engagement protrusion 206 in the up-down direction is smaller than that of the first engagement protrusion 205 in the up-down direction. The second engagement protrusion 206 includes a second distal end portion 217 and a second body 218 in order from top to bottom. The second distal end portion 217 has a curved surface that is raised upward or a chamfered configuration that is raised upward. The second body 218 is provided below the second distal end portion 217, is shaped to widen downward in the depth direction, and is connected to the reinforcing protrusion 204.

[0063]

Fig. 12, part (a), is a plan view of the storage container 207 according to Embodiment 2.

Fig. 12, part (b), is an enlarged view of an area G in part (a) of Fig. 12.

5 Fig. 12, part (c), is a sectional view that is taken along the same location as line F-F in Fig. 9 in the case where the egg tray 38 is accommodated in the storage container 207 and the storage container 207 is attached to the left rib 202 and that illustrates the area G and its surroundings.

10 The first fitting recessed portion 209 and the second fitting recessed portion 210 in Embodiment 2 will be described with reference to Fig. 12, parts (a), (b), and (c).

[0064]

15 The storage container 207 includes the first fitting recessed portion 209 and the second fitting recessed portion 210 in the first short side wall 208, which corresponds to the first short side wall 66c. The storage container 207 includes a third fitting recessed portion 220 and a fourth fitting recessed portion 221 in a second short side wall 219 corresponding to the second short side wall 66d. However, since the third fitting recessed portion 220 and the first fitting recessed portion 209 are symmetrical in the lateral direction and the fourth fitting recessed portion 221 and the second fitting recessed portion 210 are symmetrical in the lateral direction, descriptions concerning
20 the third fitting recessed portion 220 and the fourth fitting recessed portion 221 will be omitted.

The configuration of the first fitting recessed portion 209 is the same as that of the first fitting recessed portion 68 of Embodiment 1, and its description will thus be omitted.

25 The second fitting recessed portion 210 is located behind the first fitting recessed portion 209 and closer to the second long side wall 66b. The second fitting recessed portion 210 is recessed inward in the first short side wall 208. The second fitting recessed portion 210 has a structural element into which the second engagement protrusion 206 is inserted, and which enables the storage container 207 to be attached to the left rib 202. With the storage container 207 attached to the left rib 202, upper
30 ends of the second fitting recessed portion 210 and the second engagement protrusion

206 are located below the tray 70. In Fig. 12, part (b), since the second fitting recessed portion 210 is located lower than the tray 70, part of the second fitting recessed portion 210 that overlaps the tray 70 is indicated by a dashed line.

[0065]

5 The first fitting recessed portion 209 has a groove 222 therein. The groove 222 has the same configuration as the groove 76 of Embodiment 1, and its description will thus be omitted. The second fitting recessed portion 210 has a groove 223 therein. The groove 223 is shaped to substantially match the shape of the second engagement protrusion 206. In Fig. 12, parts (b) and (c), a dashed line in the first fitting recessed portion 209 indicates the shapes of the groove 222 and the first engagement protrusion 205 in a horizontal section passing through the tray 70, and a dashed line in the second fitting recessed portion 210 indicates the shapes of the groove 223 and the second engagement protrusion 206 at the bottom surface 61a.

[0066]

15 Fig. 13 is a sectional view of the storage container 207 and the egg tray 38 in the up-down direction that is taken along straight line H-H in the lateral direction that passes through the second fitting recessed portion 210 in Fig. 12, part (b).

Fig. 13 illustrates a section of each of the storage container 207 and the egg tray 38, with an egg 110 placed in the hole 72a and supported by the tray 70.

20 An upper end of the second fitting recessed portion 210 is located at a lower position than the tray 70. The second fitting recessed portion 210 and the groove 223 are inclined inward (rightward) in a direction toward the bottom surface 61a of the storage container 207 such that they are shaped to widen downward in the lateral direction. The second fitting recessed portion 210 does not interfere with the egg 110. 25 With this structure, a space between the egg 110 and the bottom plate 61 can be effectively utilized as a space where the second fitting recessed portion 210 is provided.

[0067]

In the refrigerator 200 of Embodiment 2, in addition to the first engagement protrusion 205, the second engagement protrusion 206 is provided at the left rib 202.

30 The first engagement protrusion 205 is inserted into the first fitting recessed portion 209,

and the second engagement protrusion 206 is inserted into the second fitting recessed portion 210, whereby the storage container 207 is attached to the left rib 202. Thus, as compared with the refrigerator 100 of Embodiment 1, the movement of the storage container 207 relative to the door 201 in the front-back direction is further reduced when a force is applied to the storage container 207 or when the door 201 is opened or closed. In addition, the rotation of the storage container 207 about an axis extending the lateral direction is reduced. Therefore, as compared with the refrigerator 100 of Embodiment 1, the rattling of the storage container 207 and occurrence of falling thereof from the door 14 are reduced.

Because of the presence of the second engagement protrusion 206 at the left rib 202, when into either the first fitting recessed portion 209 or the second fitting recessed portion 210, part of an associated one of the first and second engagement protrusions 205 and 206 is fitted, due to the weight of the storage container 207, the first engagement protrusion 205 comes into contact with the first fitting recessed portion 209, or the second engagement protrusion 206 comes into contact with the second fitting recessed portion 210. As a result, the first engagement protrusion 205 is inserted into the first fitting recessed portion 209, or the second engagement protrusion 206 is inserted into the second fitting recessed portion 210. Thus, the storage container 207 is more easily attached to the left rib 202 than in Embodiment 1. In addition, the first engagement protrusion 205 is formed to widen downward in a direction toward the front side, and the second engagement protrusion 206 is formed to widen downward in a direction toward the back side. The first fitting recessed portion 209 and the second fitting recessed side portion 210 are formed to have inclined surfaces that match the first engagement protrusion 205 and the second engagement protrusion 206, respectively, thereby widening respective openings in the first fitting recessed portion 209 and the second fitting recessed portion 210 at the bottom surface 61a. Accordingly, the first engagement protrusion 205 and the second engagement protrusion 206 can be easily inserted into the first fitting recessed portions 209 and the second fitting recessed portions 210, respectively.

[0068]

When the left rib 202 and the right rib 212 of the door 201 are cooled by cold air from the refrigerator compartment 7, the air contained in the urethane foam contracts, thereby widening the distance between the left rib 202 and the right rib 212. Thus, in the case where the first engagement protrusion 205 is made smaller, when the first engagement protrusion 205 is attached to the first fitting recessed portion 209, an overlap area between the first engagement protrusion 205 and the first fitting recessed portion 209 in the lateral direction decreases due to cooling, the first engagement protrusion 205 may thus be disengaged from the first fitting recessed portion 209, causing the storage container 207 to fall. In the refrigerator 200 of Embodiment 2, the first engagement portion 203 has the reinforcing protrusion 204, which horizontally widens, in order to reduce occurrence of such a fall. The reinforcing protrusion 204 has such a trapezoidal or fan-like shape as to widen laterally toward the back, in the case where the refrigerator compartment 7 is closed by the door 14, as viewed from above. Since the reinforcing protrusion 204 has such a shape, even when the left rib 202 and the right rib 212 are cooled by the refrigerator compartment 7 and the distance between the left rib 202 and the right rib 212 thus increases, the overlap area between the storage container 207 and the reinforcing protrusion 204 can be ensured and occurrence of falling of the storage container 207 is thus reduced. Since the width of the second engagement protrusion 206 in the lateral direction is greater than that of the first engagement protrusion 205 in the lateral direction, even when the distance between the left rib 202 and the right rib 212 increases due to cooling, the overlap area between the second engagement protrusion 206 and the second fitting recessed portion 210 can be ensured and occurrence of falling of the storage container 207 can be reduced.

[0069]

In addition, in Embodiment 2, the first engagement protrusion 205 is provided closer to the back surface 30 of the left rib 202 than the center thereof in the front-back direction. Thus, the first engagement protrusion 205 is not easily affected by deformation of the left rib 202 and the right rib 212 that is caused by cooling, and the

overlap area between the first engagement protrusion 205 and the first fitting recessed portion 209 can be ensured even in the case where the first engagement protrusion 205 is made smaller.

[0070]

5 Embodiment 3

A refrigerator 300 according to Embodiment 3 will be described. The following description concerning Embodiment 3, as well as that concerning Embodiment 2, is made by referring mainly to its difference from Embodiment 1. Components that are the same as or equivalent to those in Embodiment 1 will be referred to as the same names, and their descriptions will thus be simplified or omitted. In Embodiment 1, the first engagement portion 46 includes one first engagement protrusion 51 at the first reinforcing protrusion 50, and the storage container 36 has the first fitting recessed portion 68 at the first short side wall 66c. In Embodiment 3, a first engagement portion 303 includes two engagement protrusions at a reinforcing protrusion 304, and a storage container 305 has one fitting recessed portion at a first short side wall 306, which corresponds to the first short side wall 66c, and one fitting recessed portion at a first long side wall 307, which corresponds to the first long side wall 66a. The configurations of the other components of the refrigerator 300 of Embodiment 3 are the same as those of the refrigerator 100 of Embodiment 1.

[0071]

Fig. 14 is a perspective view illustrates a door 301 included in the refrigerator 300 in Embodiment 3 as viewed from the back.

Fig. 15, part (a), is a sectional view of the door 301 that is taken along line J-J. Line J-J is located at the position corresponding to the position of line B-B in Embodiment 1.

Fig. 15, part (b), is a top view illustrating a first fitting recessed portion 319 and a second fitting recessed portion 320 of the storage container 305 and their surroundings, with the egg tray 38 accommodated in the storage container 305 and the storage container 305 attached to the door 301. Fig. 15, part (b), illustrates a section of the

door 301 and the storage container 305 that is taken along the same location as line F-F in Fig. 9.

The door 301 and the storage container 305 in Embodiment 3 will be described with reference to Fig. 15, parts (a) and (b).

5 The first engagement portion 303 that allows the storage container 305 to be engaged therewith is provided on an inner wall 308 of a left rib 302 included in the door 301 and is formed to protrude outward. A second engagement portion 324 is also provided on an inner wall 310 of a right rib 309, but its description will be omitted, because the second engagement portion 324 and the first engagement portion 303 are
10 symmetrical in the lateral direction.

[0072]

 The reinforcing protrusion 304 provided in the door 301 is integrally molded with a back surface 311, a connecting surface 312, and the inner wall 308 of the left rib 302 by injection molding. The reinforcing protrusion 304 has a configuration in which a first
15 protrusion 315 extending along the inner wall 308 and a second protrusion 316 extending along the back surface 311 are coupled together, and the reinforcing protrusion 304 is L-shaped as viewed from above.

 A first engagement protrusion 317 is provided on the first protrusion 315. The first engagement protrusion 317 has the same configuration as the first engagement
20 protrusion 51 of Embodiment 1, and its description will thus be omitted.

 A second engagement protrusion 318 is provided on the second protrusion 316. The second engagement protrusion 318 is provided above the second protrusion 316 and protrudes backward on the back surface 311.

 The reinforcing protrusion 304, the first engagement protrusion 317, and the
25 second engagement protrusion 318 are continuously and integrally molded together by injection molding.

[0073]

 The storage container 305 has the first fitting recessed portion 319 at the first short side wall 306 and the second fitting recessed portion 320 at the first long side wall
30 307. The first fitting recessed portion 319 has the same configuration as the first fitting

recessed portion 68 of Embodiment 1, and its description will thus be omitted. The second fitting recessed portion 320 is formed to protrude inward (back side) of the first long side wall 307 in the storage container 305.

As illustrated in Fig. 15, part (b), the first fitting recessed portion 319 and the second fitting recessed portion 320 are coupled together by a coupling portion 321. The first fitting recessed portion 319, the second fitting recessed portion 320, the coupling portion 321, the bottom plate 61, and a side wall 322 corresponding to the side wall 66 are integrally molded from resin by injection molding.

[0074]

The first engagement protrusion 317 and the second engagement protrusion 318 extend in the up-down direction. When the storage container 305 is slid downward such that the first long side wall 307 of the storage container 305 is brought into contact with the back surface 311 of the door 301, the first engagement protrusion 317 is inserted into the first fitting recessed portion 319, and the second engagement protrusion 318 is inserted into the second fitting recessed portion 320, thereby attaching the storage container 305 to the left rib 302 and the back surface 311.

[0075]

As illustrated in Fig. 15, part (b), the second fitting recessed portion 320 is provided inward of the extension line L6 of the first short side 75c of the tray 70 and the line L7 that extends parallel to the first short side 75c while passing through P4 that is a connection portion between the chamfered portion 73a and the first long side 75a. The distance between the first long side 75a and the first long side wall 307 in the direction along the first short side 75c is smaller than the width of the second fitting recessed portion 320 in the direction along the first short side 75c (depth direction). In addition, the tray 70 and the first fitting recessed portion 68 do not overlap each other in the up-down direction.

The second fitting recessed portion 320 is located to the left of the front end P4 of the chamfered portion 73a of the egg tray 38 and to the right of the back end P5 of the chamfered portion 73a, the chamfered portion 73a being arcuately rounded along the periphery of the hole 72. In addition, the second fitting recessed portion 320 is located

within the gap S2, which is a space between the chamfered portion 73a of the egg tray 38 and each of the first long side wall 307, a curved surface portion 323, and the first short side wall 306.

[0076]

5 In Embodiment 3, the storage container 305 has the first fitting recessed portion 319 at the first short side wall 306 and the second fitting recessed portion 320 at the first long side wall 307. Thus, when the storage container 305 is attached to the door 301, the second engagement protrusion 318 is inserted into the second fitting recessed portion 320, and the first long side wall 307 is attached to the back surface 311.

10 Accordingly, in addition to the advantages of Embodiment 1, it is possible to obtain the following advantage in which the movement of the storage container 305 in the lateral direction is restricted, thus reducing wobbling of the storage container 305 in the lateral direction.

15 Furthermore, in Embodiment 3, the first fitting recessed portion 319 and the second fitting recessed portion 320 are coupled together by the coupling portion 321 and integrally molded from the resin. As a result, in addition to the advantages of Embodiment 1, the following advantage is obtained: the first fitting recessed portion 319 and the second fitting recessed portion 320 are reinforced, thereby improving the strength of the first fitting recessed portion 319 and the second fitting recessed portion 20 320.

Reference Signs List

[0077]

1: box body, 2: outer box, 3: inner box, 5: hinge, 6: storage compartment, 7: refrigerator compartment, 12: front side, 13: opening, 14: refrigerator-compartment right door, 15: refrigerator-compartment left door, 20: back surface, 25: front surface, 26: side surface, 27: back surface portion, 30: back surface, 31: left rib, 32: right rib, 36: storage container, 38: egg tray, 40: inner wall, 46: first engagement portion, 48: second engagement portion, 48: protrusion, 50: reinforcing protrusion, 51: engagement protrusion, 53: connecting surface, 55: distal end portion, 56: body, 57: connection portion, 60: top surface, 61: bottom plate, 62: side wall, 63: outer side surface, 65:

curved surface portion, 66: side wall, 67: fitting recessed portion, 68: first fitting recessed portion, 69: second fitting recessed portion, 70: tray, 71: supporting portion, 72: hole, 73: chamfered portion, 74: corner, 75: peripheral edge, 76: groove, 77: inlet, 78: connection portion

CLAIMS

[Claim 1]

A refrigerator comprising:

5 a box body in which a storage compartment having an opening at a front side thereof is formed;

a door attached to the box body, located in front of the front side of the storage compartment, and configured to open and close at least part of the storage compartment, the door including a first rib on a back side thereof, the first rib protruding backward when the storage compartment is in a closed state;

10 a first engagement portion provided at an inner wall of the first rib, an interior of the first engagement portion being filled with resin;

15 a storage container having a storage space defined therein by a bottom plate that is rectangular as viewed in plan view and a side wall portion raised at a peripheral edge of the bottom plate, the storage container having a first fitting recessed portion in a wall portion of the side wall portion, the wall portion being raised at an associated one side of the bottom plate; and

an egg tray including

20 a tray in which a plurality of holes to support eggs are formed, the tray having, at a peripheral edge thereof, a short side, a long side, and a chamfered portion being located between the short side and the long side, and

a leg raised on the tray and supporting the tray on the bottom plate,
wherein

the first engagement portion is inserted into a first fitting recessed portion, thereby causing the storage container to be attached to the first rib,

25 with the egg tray accommodated in the storage container, the first fitting recessed portion is provided inward of an extension line of the long side and a line that extends parallel to the long side while passing through a connection portion between the chamfered portion and the short side, as the tray is viewed in plan view,

a distance between the short side and the side wall in the direction along the long side is smaller than a width of a first fitting recessed portion in the direction along the long side, and

the tray and the first fitting recessed portion do not overlap each other as viewed in plan view.

[Claim 2]

The refrigerator of claim 1, wherein

the bottom plate has a pair of long sides and a pair of short sides at the peripheral edge,

the side wall portions include a pair of long side wall portions raised along the pair of long sides of the bottom plate and a pair of short side wall portions raised along the pair of short sides of the bottom plate,

one of the pair of short side wall portions is the wall portion,

the side wall portions each have a curved surface portion having a curved surface, the curved surface portion being located between the wall portion and an associated one of the pair of long side wall portions, and

the first fitting recessed portion is provided to extend upward relative to the bottom plate along a connection portion between the wall portion and the curved surface portion adjacent to the wall portion.

[Claim 3]

The refrigerator of claim 1, wherein

the first engagement portion has a first engagement protrusion that is inserted into a first fitting recessed portion, and

the first engagement protrusion is shaped to widen downward.

[Claim 4]

The refrigerator of claim 3, wherein the first engagement protrusion is shaped to widen downward toward a front side as viewed from a front of the door, when the storage compartment is made by the door to be in the closed state.

[Claim 5]

The refrigerator of claim 1, wherein

the first engagement portion includes a reinforcing protrusion extending in a depth direction,

the first engagement protrusion is in contact with the reinforcing protrusion, and extends upward relative to the reinforcing protrusion, and

5 with the storage container attached to the first rib, the reinforcing protrusion is in contact with the bottom plate and supports the storage container.

[Claim 6]

The refrigerator of claim 5, wherein

a second rib extending backward is provided on the back side of the door,

10 the door has a back surface between the first rib and the second rib, and

the reinforcing protrusion is integrally molded with the back surface and the inner wall.

[Claim 7]

The refrigerator of claim 5, wherein the reinforcing protrusion is shaped to widen laterally toward a back when the storage compartment is made by a door to be in the closed state.

[Claim 8]

The refrigerator of claim 3, wherein

20 the first engagement portion has a second engagement protrusion behind the first engagement protrusion,

a second fitting recessed portion is provided in the wall portion, and

the first engagement protrusion is inserted into the first fitting recessed portion, and the second engagement protrusion is inserted into the second fitting recessed portion, thereby causing the storage container to be attached to the first rib.

25 [Claim 9]

The refrigerator of claim 8, wherein

with the storage container attached to the first rib, the second engagement protrusion is located below the tray, and

a width of the second engagement protrusion in a lateral direction is greater than a width of the first engagement protrusion in the lateral direction.

30

[Claim 10]

The refrigerator of claim 6, wherein

a second engagement protrusion is provided at the back surface,

a second fitting recessed portion is provided at one of the pair of the long side
5 wall portions that is attached to the back surface, and

the first engagement protrusion is inserted into the first fitting recessed portion,
and the second engagement protrusion is inserted into the second fitting recessed
portion, thereby causing the storage container to be attached to the first rib and the
back surface.

10 [Claim 11]

The refrigerator of claim 10, wherein

the first fitting recessed portion and the second fitting recessed portion are
coupled together by a coupling portion, and

the first fitting recessed portion, the second fitting recessed portion, and the
15 coupling portion are integrally molded from resin.

[Claim 12]

The refrigerator of claim 1, wherein the chamfered portion has a corner
chamfered along a first hole of the plurality of holes that is the closest to the chamfered
portion.

20 [Claim 13]

The refrigerator of claim 1, wherein the chamfered portion is chamfered linearly
as the tray is viewed in plan view.

[Claim 14]

The refrigerator of claim 1, wherein the chamfered portion is arcuately chamfered
25 as the tray is viewed in plan view.