# DESCRIPTION

## Title of Invention REFRIGERATOR

### Technical Field

[0001]

The present disclosure relates to a refrigerator in which, in a storage compartment provided in a refrigerator body, a plurality of accommodation containers are disposed in such a way as to be able to be pulled out.

### Background Art

[0002]

A refrigerator has a plurality of storage compartments, such as a freezer compartment and a refrigerator compartment, in a refrigerator body. The position where each storage compartment is disposed is often determined depending on the application of each storage compartment. A storage compartment disposed at the lower portion of the refrigerator and having an especially large size is configured such that an accommodation container with an open upper side is pulled out of or pushed into the refrigerator body or the storage compartment along with the opening or closing of a drawer door. In this case, the accommodation container often includes a plurality of containers divided in the up-and-down direction, and there are many cases where the accommodation container includes three containers consisting of an upper accommodation container, a middle accommodation container, and a lower accommodation container. The handle of such a drawer door is disposed at the upper portion of the drawer door.

[0003]

As one example of a refrigerator in which three accommodation containers consisting of an upper accommodation container, a middle accommodation container, and a lower accommodation container are accommodated in a storage compartment, there is a refrigerator described in Patent Literature 1, for example. In the refrigerator described in Patent Literature 1, a pair of frames are fixed to the left portion and the right portion of the back side of a drawer type door, and a first

accommodation container is disposed on the frames. Further, a second accommodation container is disposed on flange sliding surfaces formed at upper end portions of side walls of the first accommodation container. A pair of rollers are provided at front portions of both side walls of the second accommodation container, and a pair of protrusions protruding from both side walls of the second accommodation container are provided to rear portions of both side walls. The pair of rollers and the pair of protrusions of the second accommodation container are in contact with the flange sliding surfaces of the first accommodation container.

[0004]

An object stored in the first accommodation container of the refrigerator described in Patent Literature 1 is taken out as follows. First, the first accommodation container is pulled forward along with the movement of the drawer type door. At this point of operation, the second accommodation container is pulled forward together with the first accommodation container. Therefore, the user holds, with the hand, the second accommodation container, which is disposed above the first accommodation container, and then pushes the second accommodation container rearward. With such an operation, the rollers of the second accommodation container that are in contact with the flange sliding surfaces of the first accommodation container move along and on the flange sliding surfaces, so that the second accommodation container is pushed rearward.

[0005]

In the refrigerator described in Patent Literature 1, a third accommodation container is further provided above the second accommodation container in such a way as to be movable in the front-and-rear direction. The third accommodation container is supported by rails provided to the left and right sides of the storage compartment. In the case of the refrigerator described in Patent Literature 1, the first accommodation container and the second accommodation container are pulled out along with the movement of the drawer door with only the third accommodation container remaining in the refrigerator body. When the user attempts to take out an object stored in the third accommodation container, in a state in which the drawer

type door is open, the user pulls out the third accommodation container forward along the rails to take out an object.

[0006]

However, in the case of the refrigerator described in Patent Literature 1, when an article is taken out of or put into the first accommodation container, the drawer type door is pulled out to pull out the first accommodation container and the second accommodation container together and, thereafter, only the second accommodation container is slid on the flange sliding surfaces of the first accommodation container to move the second accommodation container rearward. In this case, the second accommodation container moves on the first accommodation container in a state of being supported on the first accommodation container and hence, the area of the opening of the first accommodation container is restricted. As a result, there is a problem that articles stored at the rear portion of the fist accommodation container cannot be conveniently taken out of or put into.

[0007]

In contrast, in a refrigerator described in Patent Literature 2, for example, rails are newly provided to the left and right sides of a storage compartment to accommodate a second accommodation container into the storage compartment. When the user opens a drawer type door, the user pushes a second accommodation container rearward along the rails. With such an operation, the second accommodation container on a first accommodation container moves to the rails, thus moving to a position at which the second accommodation container is completely accommodated in a refrigerator body.

Citation List

Patent Literature

[0008]

Patent Literature 1: Japanese Unexamined Patent Application Publication No. 2001-349665

Patent Literature 2: Japanese Unexamined Patent Application Publication No. 2006-189224

Summary of Invention

Technical Problem

[0009]

In the refrigerator described in the above-mentioned Patent Literature 2, three rails consisting of a lower rail, a middle rail, and an upper rail are provided to each of the left and right side walls of the storage compartment, the lower rails supporting the frames of the drawer type door, the middle rails supporting the second accommodation container, the upper rails supporting a third accommodation container. In such a structure, it is necessary to dispose the three rails on each of the left and right side walls of the storage compartment in a spaced apart manner in the up-and-down direction and hence, the lower rails that engage with the frames are disposed at lower portions of the storage compartment. Therefore, there is a large distance in the height direction between the position of the handle disposed at the upper portion of the drawer type door and the position at which the frames are provided and fixed to the back side of drawer type door.

[0010]

As a result, when the user operates the handle of the drawer type door, large moment of rotation is generated between the handle of the drawer type door and the position at which the frames are fixed. Therefore, to suppress wobbling of the drawer type door and the deformation of the fixed portion of the frame, it is necessary to take measures against an increase in size and thickness of the frames. To avoid such measures, it is desirable to adopt a structure that avoids a large difference in the height direction between the position of the handle of the drawer type door and the position at which the frames of the drawer type door are fixed.

[0011]

The present disclosure seeks to provide a refrigerator in which user-friendliness of the accommodation container accommodated in the storage compartment may be maintained and a difference in the height direction between the position of the handle of the drawer type door and the position at which the frames of

the drawer type door are fixed may be reduced, thus avoiding an increase in size and thickness of the frames of the drawer type door, allowing the accommodation container to be smoothly pulled out of or pushed into the storage compartment, and achieving user-friendliness and low cost.

Solution to Problem

[0012]

A refrigerator according to an embodiment of the present disclosure includes: a refrigerator body having a storage compartment in the refrigerator body, the storage compartment having an opening on a front side of the storage compartment; a drawer type door provided at the opening of the storage compartment, and configured to open and close the storage compartment; first support parts provided to left and right side walls of the storage compartment, and extending in a first direction being a depth direction of the refrigerator body; second support parts provided to the left and right side walls of the storage compartment, disposed above the first support parts, and extending in the first direction; a pair of left and right frames fixed to a back side of the door, extending in the first direction from the back side, and moving, with an opening and closing operation of the door, in the first direction in a state of being guided by the first support parts; a first accommodation container including a first accommodation container body with an open upper side and first flange portions, the first accommodation container body being disposed in the storage compartment, the first flange portions being provided to left and right side portions of the first accommodation container body, protruding outward in directions away from each other from the left and right side portions of the first accommodation container body, and moving, with the opening and closing operation of the door, in the first direction in a state of being supported by the pair of left and right frames; a second accommodation container including a second accommodation container body with an open upper side, second flange portions, and stepped portions, the second accommodation container body being disposed in the storage compartment, the second flange portions being provided to left and right side portions of the second accommodation container body and protruding outward in directions away from each other from the left and right side

portions of the second accommodation container body, the stepped portions being each provided between an associated one of the left and right side portions of the second accommodation container body and an associated one of the second flange portions; and a third accommodation container including a third accommodation container body with an open upper side, third flange portions, and slider portions, the third accommodation container body being disposed in the storage compartment, the third flange portions being provided to left and right side portions of the third accommodation container body and protruding outward in directions away from each other from the left and right side portions of the third accommodation container body, the slider portions being provided at the left and right side portions of the third accommodation container body and protruding outward in directions away from each other, wherein the stepped portions are provided at the left and right side portions of the second accommodation container body, and protrude outward, in directions away from each other, from the left and right side portions of the second accommodation container body, each of the stepped portions being located inward of and below the associated one of the second flange portions, and when the third accommodation container is supported by the second accommodation container, the slider portions are in contact with upper sides of the stepped portions, and the third accommodation container is supported by the second accommodation container in such a way as to be slidable in the first direction relative to the second accommodation container.

Advantageous Effects of Invention

[0013]

In the refrigerator according to the embodiment of the present disclosure, it is possible to reduce the number of support parts to two (the first support part and the second support part), the support parts being provided to each of the left and right side walls of the storage compartment. For this reason, it is possible to set the position of each first support part, which holds the frame, at a high position. As a result, wobbling of the door can be reduced when the door is operated and hence, it is possible to reduce a load applied to the fixed portions at which the frames are fixed to the back side of the door. Therefore, it is possible to provide a refrigerator in which user-friendliness of the

accommodation container accommodated in the storage compartment is maintained, an increase in size and thickness of the frames of the door is avoided, the accommodation container is allowed to be smoothly pulled

out of or pushed into the storage compartment, and user-friendliness and low cost are achieved.

Brief Description of Drawings

[0014]

[Fig. 1] Fig. 1 is a perspective view showing the external appearance of a refrigerator 100 according to Embodiment 1.

[Fig. 2] Fig. 2 is a partially enlarged perspective view showing the configuration of the refrigerator 100 according to Embodiment 1.

[Fig. 3] Fig. 3 is a partially enlarged perspective view showing the refrigerator 100 according to Embodiment 1 with a door 11 pulled out.

[Fig. 4] Fig. 4 is a partially enlarged longitudinal cross-sectional view showing the configuration of the refrigerator 100 according to Embodiment 1.

[Fig. 5] Fig. 5 is a partially enlarged perspective view showing the configuration of the refrigerator 100 according to Embodiment 1, the illustration of the upper part of the refrigerator 100 and the door 11 being omitted.

[Fig. 6] Fig. 6 is an exploded perspective view showing the configurations of the door 11 and a freezer compartment 4 provided to the refrigerator 100 according to Embodiment 1.

[Fig. 7] Fig. 7 is a longitudinal cross-sectional view showing the configurations, as viewed from a front side, of the door 11 and the freezer compartment 4 provided to the refrigerator 100 according to Embodiment 1.

[Fig. 8] Fig. 8 is an enlarged view of a region A in Fig. 7.

[Fig. 9] Fig. 9 is a perspective view showing the configuration of a third accommodation container provided to a refrigerator according to Embodiment 2.

[Fig. 10] Fig. 10 is a cross-sectional view showing the configuration of a third accommodation container provided to a refrigerator according to Embodiment 3.

Description of Embodiments

[0015]

Hereinafter, Embodiments of a refrigerator according to the present disclosure will be described with reference to drawings. The present disclosure is not limited by

the following Embodiments, and various modifications are conceivable without departing from the gist of the present disclosure. Further, the present disclosure includes any combination of configurations that can be obtained by combining configurations shown in the following embodiments and in the modifications of the embodiments. In the respective drawings, components given the same reference symbols are identical or corresponding components, and the same goes for the entire DESCRIPTION. In the respective drawings, the relative size relationships, shapes, and other aspects of respective constitutional components may differ from those of actual constitutional components. In the respective drawings, the Z direction is the height direction of the refrigerator 100. The Z direction may be referred to as an "up-and-down direction". The Z direction is the vertical direction, for example. In the Z direction, "Z1" denotes the upward direction, and "Z2" denotes the downward direction. The X direction is the width direction of the refrigerator 100. The X direction may be referred to as a "lateral direction". The X direction is a direction intersecting with the Z direction, and is the horizontal direction, for example. In the X direction, "X1" denotes the rightward direction, and "X2" denotes the leftward direction. The Y direction is the depth direction of the refrigerator 100. The Y direction is a direction intersecting with the X direction and the Z direction. The Y direction is the horizontal direction, for example. In the Y direction, "Y1" denotes a frontward direction or a direction toward the front side, and "Y2" denotes the rearward direction or a direction toward the rear side. The Y direction may be referred to as a "first direction".

[0016]

Embodiment 1.

The configuration of a refrigerator according to Embodiment 1 will be described hereinafter with reference to Fig. 1 to Fig. 8.

[0017]

Fig. 1 is a perspective view showing the external appearance of a refrigerator 100 according to Embodiment 1. Fig. 2 is a partially enlarged perspective view showing the configuration of the refrigerator 100 according to Embodiment 1. Fig. 3

is a partially enlarged perspective view showing the refrigerator 100 according to Embodiment 1 with a door 11 pulled out. In Fig. 2 and Fig. 3, the illustration of the upper part of the refrigerator 100 is omitted.

[0018]

Fig. 4 is a partially enlarged longitudinal cross-sectional view showing the configuration of the refrigerator 100 according to Embodiment 1. In Fig. 4, the illustration of the upper part of the refrigerator 100 is omitted. Fig. 5 is a partially enlarged perspective view showing the configuration of the refrigerator 100 according to Embodiment 1, the illustration of the upper part of the refrigerator 100 and the door 11 being omitted. Fig. 6 is an exploded perspective view showing the configurations of the door 11 and a freezer compartment 4 provided to the refrigerator 100 according to Embodiment 1. Fig. 7 is a longitudinal cross-sectional view showing the configurations, as viewed from a front side, of the door 11 and the freezer compartment 4 provided to the refrigerator 100 according to Embodiment 1. Fig. 8 is an enlarged view of a region A in Fig. 7.

[0019]

As shown in Fig. 1, the refrigerator 100 includes a refrigerator body 1 having a box shape. As shown in Fig. 4, the refrigerator body 1 includes an outer box 50 and an inner box 51, and is formed by filling a heat insulating material 52 in a space formed between the outer box 50 and the inner box 51.

[0020]

The refrigerator body 1 has storage spaces 53 and 57 in the inside thereof. The storage space 53 is disposed at the lower part of the refrigerator body 1, and the storage space 57 is disposed at the upper part of the refrigerator body 1. The freezer compartment 4 and a refrigerator compartment 5, for example, are provided in the storage space 53 as a plurality of storage compartments. For example, the refrigerator compartment 5 is used as a vegetable compartment in which vegetables are stored. In each of the freezer compartment 4 and the refrigerator compartment 5, an accommodation container is disposed that accommodates objects, such as food. In contrast, a plurality of storage compartments, such as a refrigerator compartment,

an ice-making compartment, and a versatile compartment (chilling compartment), are provided in the storage space 57. In each of these storage compartments, a shelf or an accommodation container is disposed where objects, such as food, are accommodated. The respective storage compartments described above are given for the sake of example, and the choice of which storage compartment is disposed in which storage space may be suitably determined. In Embodiment 1, the configuration of the freezer compartment 4 in the storage space 53 will be mainly described.

[0021]

In the case of Embodiment 1, as shown in Fig. 1 and Fig. 4, a first partition plate 2 and a second partition plate 3 are provided in the storage space 53. The second partition plate 3 is disposed above the first partition plate 2. Each of the first partition plate 2 and the second partition plate 3 is a plate-like part having a rectangular shape as viewed in a plan view, and extends in the horizontal direction. The second partition plate 3 is a partition plate between the storage space 57, which is provided at the upper par, and the storage space 53, which is provided at the lower part of the refrigerator body 1. The first partition plate 2 is a partition plate that partitions the storage space 53 into an upper part and a lower part. The storage space 53 is divided into the freezer compartment 4 and the refrigerator compartment 5 by the first partition plate 2. In Embodiment 1, the freezer compartment 4 is disposed at the upper part of the storage space 53, and the refrigerator compartment 5 is disposed at the lower part of the storage space 53.

[0022]

As shown in Fig. 2, the door 11 is disposed on a front side 54 of the freezer compartment 4. As shown in Fig. 3, the door 11 is a drawer type door. A handle 11b is provided at the upper end portion of the door 11. As shown in Fig. 4, the handle 11b has a recessed portion that is recessed upward. The user inserts the fingers into the recessed portion of the handle 11b to grip the handle 11b, and then pulls out the door 11. As shown in Fig. 4, a rear wall 7 is provided on the rear side of the freezer compartment 4. As shown in Fig. 4, the refrigerator body 1 has a cooling

chamber 6 at a position rearward of the rear wall 7 of the freezer compartment 4. A cooler 8 and a freezing fan 9 are disposed in the cooling chamber 6. As shown by outline arrows, the cooler 8 and the freezing fan 9 cause air in the freezer compartment 4 and the refrigerator compartment 5 to cycle, and cool the cycled air to adjust the temperature in the freezer compartment 4 and the temperature in the refrigerator compartment 5 to appropriate temperatures.

[0023]

As shown in Fig. 4, a machine chamber 10 is formed at the lower rear portion of the refrigerator body 1. A compressor (not shown in the drawing) is disposed in the machine chamber 10. In the refrigerator body 1, the compressor, a condenser (not shown in the drawing), an expansion device (not shown in the drawing), the cooler 8, and other components form a refrigeration cycle device that cools cycled air. Each of the cooler 8 and the condenser is a heat exchanger that exchanges heat between refrigerant flowing through the cooler 8 or the condenser and air flowing around the cooler 8 or the condenser.

[0024]

As described above, the door 11 of the freezer compartment 4 is a drawer type door. As shown in Fig. 2 to Fig. 4, the door 11 moves forward from the front side 54 of the refrigerator body 1 to open an opening 4a of the freezer compartment 4. Further, the door 11 of the freezer compartment 4 moves rearward and is brought into contact with the front side 54 to close the opening 4a (the freezer compartment 4). A plurality of accommodation containers are accommodated in the freezer compartment 4. In Embodiment 1, the description will be made by taking, as an example, a case where three accommodation containers consisting of an upper accommodation container, a middle accommodation container, and a lower accommodation container are accommodated in the freezer compartment 4.

[0025]

In Fig. 6, which is an exploded perspective view, the door 11 to which frames 12 are attached, the upper accommodation container, the middle accommodation container, and the lower accommodation container are shown separately.

[0026]

In the description made hereinafter, the lower accommodation container is referred to as a "first accommodation container 20", the middle accommodation container is referred to as a "second accommodation container 30", and the upper accommodation container is referred to as a "third accommodation container 40".

[0027]

First, the configuration of the refrigerator 100 will be roughly described. The detail of the configuration of the refrigerator 100 will be described later.

[0028]

As shown in Fig. 5, a fixed rail 14 extending in the Y direction is provided to each of the left and right side walls of the refrigerator body 1 (specifically, the left and right sides of the freezer compartment 4). The inner box 51 forms the left and right side walls of the refrigerator body 1 (specifically, the left and right sides of the freezer compartment 4). The fixed rail 14 may be referred to as a "first support part". A second support part 17 is disposed above each fixed rail 14 in the upward direction Z1 of the Z direction. The second support part 17 extends in the Y direction on each of the left and right side walls of the freezer compartment 4. The fixed rail 14 and the second support part 17 are disposed parallel to or substantially parallel to each other in a spaced apart manner.

[0029]

In contrast, as shown in Fig. 1, the door 11 is disposed parallel to the XZ plane at the opening of the freezer compartment 4. As shown in Fig. 6, the door 11 includes the pair of left and right frames 12. Each of the left and right frames 12 is a rectangular plate-like part, and extends in the Y direction. The left and right frames 12 are disposed to face each other. The left and right frames 12 are disposed parallel to each other. The left and right frames 12 are disposed at the same height position. As shown in Fig. 4, each frame 12 is fixed to a back side 11a of the door 11. Accordingly, the frame 12 extends in a direction intersecting with the back side 11a from the back side 11a toward the inside of the freezer compartment 4. As shown in Fig. 6, the frame 12 includes a bent portion 12a and a roller 13. The bent portion

12a is disposed at the lower end of the frame 12 along the longitudinal direction. The roller 13 is disposed at a rear end portion 12b of the frame 12. The bent portion 12a and the roller 13 of the frame 12 are disposed in a recessed portion 14a of the fixed rail 14, and are guided by the fixed rail 14 when sliding in the recessed portion 14a of the fixed rail 14.

[0030]

As shown in Fig. 6, the first accommodation container 20 includes first flange portions 21 on side portions 20b. The first flange portions 21 are supported by the frames 12, thus moving in the Y direction along with the opening and closing operation of the door 11. With such a configuration, the first accommodation container 20 moves in the Y direction with the opening and closing operation of the door 11. As shown in Fig. 6, the first accommodation container 20 includes support surface portions 23 that support the second accommodation container 30.

[0031]

As shown in Fig. 6, the second accommodation container 30 includes stepped portions 31 and second flange portions 33 disposed above the stepped portions 31. The stepped portions 31 are placed on and supported by the support surface portions 23 of the first accommodation container 20. With such a configuration, the second accommodation container 30 moves in the Y direction together with the first accommodation container 20 with the opening and closing operation of the door 11. When the user takes out an object stored in the first accommodation container 20, the user pushes the second accommodation container 30 in the rearward direction Y2 of the Y direction. At this point of operation, the second flange portions 33 of the second accommodation container 30 slide on the support surface portions 23. The second flange portions 33 of the second accommodation container 30 in a state of being pushed rearward in this manner are supported by the second support parts 17 (see Fig. 5) provided to the left and right side walls of the freezer compartment 4.

[0032]

In the third accommodation container 40, third protruding portions 41 are provided to left and right side portions 40b. The third protruding portions 41 are

placed on the upper sides of the stepped portions 31 of the second accommodation container 30. A first protruding portion 36 and a second protruding portion 37 are provided to the upper side of each stepped portion 31 of the second accommodation container 30, the first protruding portion 36 and the second protruding portion 37 restricting the movement of the third protruding portion 41 in the Y direction. Each third protruding portion 41 is fitted between the first protruding portion 36 and the second protruding portion 37. With such a configuration, the third accommodation container 40 moves in the Y direction together with the first accommodation container 20 and the second accommodation container 30 with the opening and closing operation of the door 11. When the user takes out an object stored in the second accommodation container 30, the user pushes only the third accommodation container 40 in the rearward direction Y2 of the Y direction. At this point of operation, due to a pushing force from the user, the third protruding portions 41 of the third accommodation container 40 cross over the second protruding portions 37 provided to the upper sides of the stepped portions 31 of the second accommodation container 30. The third accommodation container 40 also includes third flange portions 43 at the side portions 40b. By causing the third flange portions 43 to slide on the second support parts 17 provided to the left and right inner walls of the refrigerator body 1, the third accommodation container 40 moves rearward in the Y direction.

[0033]

In Embodiment 1, the handle 11b is provided at the upper portion of the door 11, and is gripped by the user when the user opens or closes the door 11. In Embodiment 1, two rails consisting of the fixed rail 14, serving as "first support part", and the second support part 17 are provided to each of the left and right inner walls of the refrigerator body 1. In contrast, in Patent Literature 2 described above, three rails are provided. In Patent Literature 2, it is necessary to dispose three rails in a spaced apart manner in the up-and-down direction and hence, the lower rail is disposed at an extremely lower position of the storage compartment. As a result, there is a large distance in the height direction between each frame that slides in the lower rail and the handle of the door. Therefore, when the door is pulled out, a large

moment of rotation is generated between the frames and the handle of the door. In contrast, in Embodiment 1, the number of rails can be reduced and hence, it is possible to set the position of the fixed rails 14, being the lower rails, at a high position. For this reason, it is possible to reduce a distance L1 (see Fig. 6) in the height direction between each frame 12 that slides in the lower rail and the handle 11b of the door 11. As a result, the generation of moment of rotation can be suppressed and hence, it is possible to avoid an increase in size and thickness of the frames 12 attached to the door 11. Accordingly, a manufacturing cost of the refrigerator 100 can be reduced.

[0034]

Hereinafter, the configuration of the refrigerator 100 will be described in detail with reference to Fig. 3 to Fig. 8.

[0035]

Fig. 7, which is a cross-sectional view, shows a state in which the first accommodation container 20, the second accommodation container 30, and the third accommodation container 40 are accommodated in the freezer compartment 4. Fig. 7, which is a cross-sectional view, shows a cross section of the refrigerator 100 taken along a vertical imaginary plane that passes through the second flange portion 33 of the second accommodation container 30 and the third protruding portion 41 of the third accommodation container 40. Fig. 8 shows the region A in Fig. 7 in an enlarged manner.

[0036]

As shown in Fig. 6, the pair of left and right frames 12 are fixed to the back side 11a of the door 11, and are pulled out with the opening of the door 11. An example of a material used for forming the frames 12 includes a steel plate cold commercial (SPCC) (cold rolled steel sheet). The left and right frames 12 are fixed to the back side 11a of the door 11 in a cantilever manner. Therefore, the rear end portions 12b of the left and right frames 12 are free ends. A method for attaching the frame 12 is not particularly limited. However, for example, a method may be adopted where a screw hole is formed in the frame 12, a bolt is inserted into the screw hole, and the

distal end of the bolt is fixed by a nut. Each of the left and right frames 12 is an elongated plate-like part, and extends in the Y direction. The left and right frames 12 are disposed parallel to each other in a state of facing each other. Each frame 12 is a support part that supports the first accommodation container 20. A frame coupling portion 55 that couples the two frames 12 with each other is provided to the rear end portions of the frames 12, the rear end portions of the frames 12 being free ends. As shown in Fig. 6, the frame coupling portion 55 includes a first frame coupling portion 55a, a second frame coupling portion 55b, and a third frame coupling portion 55c, the first frame coupling portion 55a and the second frame coupling portion 55b being attached to the left and right frames 12 and extending downward, the third frame coupling portion 55c coupling the first frame coupling portion 55a with the second frame coupling portion 55b between the first frame coupling portion 55a and the second frame coupling portion 55b. The frame coupling portion 55 is formed by bending one thin rod-like part, for example. The third frame coupling portion 55c, being the center portion of the frame coupling portion 55, extends in a direction intersecting with the extending direction of the left and right frames 12. The frame coupling portion 55 is attached to the rear end portion of each of the left and right frames 12 in the Y direction at the inner lower portion. Further, the roller 13 is attached to the rear end portion 12b of each of the left and right frames 12 in the Y direction at the outer lower portion. A method for attaching the roller 13 is not particularly limited. However, for example, a method may be adopted where a screw portion having a screw thread is provided to the roller 13, the screw portion is inserted into a screw hole formed in the frame 12, and the distal end of the screw portion is fixed with a nut. The bent portion 12a is provided at the lower end portion of each frame 12. The bent portion 12a protrudes outward (in the lateral direction) from the lower end portion of the frame 12. The left and right frames 12 and the frame coupling portion 55 may be collectively referred to as a "support frame 120".

[0037]

The first accommodation container 20 is placed on the frames 12 of the door 11. The first accommodation container 20 has a bottomed cuboid box shape with an open

upper side. The first accommodation container 20 includes a first accommodation container body 20a with an open upper side. The first accommodation container body 20a includes the pair of left and right side portions 20b, a rear side portion 20c, a front side portion 20e, and a bottom plate 20f (see Fig. 7). The pair of left and right side portions 20b face each other. The rear side portion 20c and the front side portion 20e face each other.

[0038]

The first flange portions 21 are provided to outer sides 20b1 of the left and right side portions 20b. The first flange portions 21 are disposed in the vicinity of the opening of the first accommodation container body 20a, that is, are disposed at upper portions of the outer sides 20b1 of the left and right side portions 20b. The left and right first flange portions 21 protrude, from the outer sides 20b1, outward in directions away from each other (in the lateral direction). The longitudinal direction of each first flange portion 21 extends in the Y direction. The first flange portion 21 may be provided to extend over the entire length of the outer side 20b1 in the Y direction, or as shown in Fig. 6, may be provided to extend over a portion of the entire length of the outer side 20b1 in the Y direction. The first flange portions 21 are supported by the frames 12 of the door 11. Therefore, the first accommodation container 20 moves in the front-and-rear direction (the Y direction) with the opening and closing operation of the door 11. The first accommodation container 20 is placed on the frames 12 from above. The first accommodation container 20 is supported by the frames 12 and the door 11 in a detachable manner as described above.

[0039]

As shown in Fig. 6, the height of the rear side portion 20c of the first accommodation container 20 is set to a height one step lower than the height of the left and right side portions 20b, thus preventing the rear side portion 20c from coming into contact with the second accommodation container 30. The rear side portion 20c of the first accommodation container 20 also includes rear stopper portions 20d. The rear stopper portions 20d come into contact with protrusions 35, which will be described later, provided to the second accommodation container 30, thus restricting

the rearward movement of the second accommodation container 30. The height of each rear stopper portion 20d is one step higher than the height of the rear side portion 20c.

[0040]

The height of each first flange portion 21 is reduced by one step at a position in the vicinity of a connection portion between each of the left and right side portions 20b and the rear side portion 20c and at the rear side portion 20c, thus preventing the first flange portions 21 from coming into contact with the second accommodation container 30. For example, a gap of approximately 5 mm is formed between the second accommodation container 30 and the position in the vicinity of the connection portion between the first flange portion 21 and the rear side portion 20c.

[0041]

As shown in Fig. 6, the support surface portions 23 are provided to the left and right side portions 20b of the first accommodation container 20 to support the stepped portions 31 of the second accommodation container 30, which will be described later. The support surface portions 23 protrude outward in directions away from each other from the left and right side portions 20b of the first accommodation container 20. As shown in Fig. 8, the upper side of each support surface portion 23 has a flat surface. The flat surface has a width in the lateral direction. As shown in Fig. 6, the longitudinal direction of the support surface portion 23 extends in the Y direction. As shown in Fig. 6, the support surface portion 23 is disposed at a position inward of the first flange portion 21 and higher than the first flange portion 21 in the Z direction. A locking portion 24 protruding in the upward direction Z1 is provided to the upper side of each support surface portion 23. The locking portions 24 are engaged with recessed portions 32a formed in the stepped portions 31 of the second accommodation container 30.

[0042]

As shown in Fig. 6, with respect to the frames 12, the roller 13 is attached to the outer lower portion of the rear end portion 12b of each of the left and right frames 12. In contrast, as shown in Fig. 5, the refrigerator 100 includes two protruding

portions 19a and 19b for each roller 13. The protruding portions 19a and 19b protrude toward the inside of the freezer compartment 4 from each of left and right sides 18 of the freezer compartment 4, the left and right sides 18 being formed by the inner box 51. The longitudinal directions of the protruding portions 19a and 19b extend in the front-and-rear direction (the Y direction) of the refrigerator body 1. The protruding portions 19a and 19b are disposed at positions different from each other in the up-and-down direction with a separation set in advance. In Embodiment 1, the protruding portion 19b is disposed at a lower position, and the protruding portion 19b is disposed at an upper position. The protruding portions 19a and 19b and the fixed rail 14 may be collectively referred to as a "first support part". A region that is recessed inward is formed between the protruding portion 19a and the protruding portion 19b. The metal-made fixed rail 14 having a recessed shape is attached to the region. Hereinafter, the recess of the fixed rail 14 is referred to as the "recessed portion 14a" of the fixed rail 14. As shown in Fig. 5, a roller 15 is attached to a front portion of a lower bent portion 14b of the fixed rail 14 (or the protruding portion 19b).

[0043]

As shown in Fig. 6, the bent portion 12a is provided at the lower portion of each frame 12. The bent portion 12a is formed by bending the lower end portion of the frame 12, for example. The left and right bent portions 12a protrude, from the lower end portions of the frames 12, outward in directions away from each other (in the lateral direction). The bent portion 12a and the roller 13 are inserted into the recessed portion 14a of the fixed rail 14 provided to each of the left and right sides 18 of the freezer compartment 4. The roller 13 rolls on the upper side of the lower protruding portion 19b, and the roller 15 rotates on the lower side of the bent portion 12a of the frame 12. With such a configuration, the "support frame 120" (the left and right frames 12 and the frame coupling portion 55) slides in the recessed portions 14a of the fixed rails 14. By assembling the fixed rails 14, the rollers 15, the frames 12 and the rollers 13 as described above, the "support frame 120" is pulled out of or pushed into the refrigerator body 1 in the front-and-rear direction together with the first accommodation container 20 with the opening and closing of the door 11. The

"support frame 120" is pulled out of or pushed into the refrigerator body 1 by opening or closing (by moving in the front-and-rear direction) the door 11. The first accommodation container 20 is also pulled out of or pushed into the refrigerator body 1 together with the "support frame 120" by opening or closing (by moving in the front-and-rear direction) the door 11.

[0044]

As shown in Fig. 6, the second accommodation container 30, being the middle accommodation container, has a bottomed cuboid box shape with an open upper side. The second accommodation container 30 is disposed above the first accommodation container 20 in such a way as to cover the entire or substantially the entire open upper side of the first accommodation container 20. The second accommodation container 30 includes a second accommodation container body 30a with an open upper side. The second accommodation container body 30a is shallower than the first accommodation container body 20a, so that the volume of the second accommodation container body 30a is smaller than the volume of the first accommodation container body 20a.

[0045]

The second accommodation container body 30a includes a pair of left and right side portions 30b, a rear side portion 30c, a front side portion 30e, and a bottom plate 30d. The pair of left and right side portions 30b face each other. The rear side portion 30c and the front side portion 30e face each other.

[0046]

As shown in Fig. 8, the upper end of each side portion 30b of the second accommodation container body 30a protrudes outward (in the lateral direction) at two stages along the upward direction Z1 of the Z direction. Specifically, each side portion 30b includes the stepped portion 31 and the second flange portion 33, which is disposed above the stepped portion 31, thus protruding outward at two stages.

[0047]

The left and right stepped portions 31 are disposed at the upper ends of the left and right side portions 30b of the second accommodation container body 30a, and

protrude outward in directions away from each other (in the lateral direction). Each stepped portion 31 is disposed between the side portion 30b of the second accommodation container body 30a and the second flange portion 33. The stepped portion 31 is disposed inward and downward of the second flange portion 33.

[0048]

A lower side 32 of the stepped portion 31 has the recessed portion 32a (a region surrounded by a broken line in Fig. 8) that is recessed upward. The longitudinal direction of the recessed portion 32a extends in the Y direction. As shown in Fig. 6, a rib 32b (stopper piece) extending downward is provided at the front end of the recessed portion 32a.

[0049]

As shown in Fig. 8, each second flange portion 33 extends upward from an outer edge portion 31b of the stepped portion 31, and includes a bent portion 33a at a position above the stepped portion 31, thus protruding outward. The longitudinal direction of the second flange portion 33 extends in the Y direction.

[0050]

As shown in Fig. 6, the height of the rear side portion 30c of the second accommodation container 30 is set to a height one step lower than the height of the left and right side portions 30b, thus preventing the rear side portion 30c from coming into contact with the third accommodation container 40. The second accommodation container 30 includes one protrusion 35 at each of the left front portion and the right front portion of the lower side of the bottom plate 30d. Each protrusion 35 protrudes in the downward direction from the lower side of the bottom plate 30d of the second accommodation container 30. The leading edge portion of the protrusion 35 has an inclined surface of 45 degrees, and the trailing edge portion of the protrusion 35 has a substantially vertical surface. The size (height dimension) of the protrusion 35 in the Z direction is approximately 15 mm.

[0051]

As shown in Fig. 6, the support surface portion 23 is provided to the upper end of each of the left and right side portions 20b of the first accommodation container 20,

the support surface portion 23 extending in the Y direction and having a width in the lateral direction. The left and right support surface portions 23 protrude, from the left and right side portions 20b, outward in directions away from each other. The locking portion 24 protruding upward is provided at a front portion of the upper side of each support surface portion 23. The locking portion 24 engages with the rib 32b (stopper piece) provided at the front end of the recessed portion 32a of the stepped portion 31. Each rib 32b (stopper piece) comes into contact and engages with each locking portion 24, so that the movement of the second accommodation container 30 in the Y direction and the X direction relative to the first accommodation container 20 is suppressed. The recessed portion 32a may be referred to as an "engagement receiving portion". When at least a portion of the locking portion 24 provided to the first accommodation container 20 is located in the recessed portion 32a, being the "engagement receiving portion", the movement of the second accommodation container 30 in the Y direction relative to the first accommodation container 20 is suppressed.

[0052]

The stepped portions 31 are placed on the support surface portions 23 of the first accommodation container 20. In this state, as shown in Fig. 8, the stepped portions 31 are placed on the support surface portions 23 such that the recessed portions 32a of the stepped portions 31 overlap with the support surface portions 23 of the first accommodation container 20 in the up-and-down direction. The stepped portions 31 are in contact with the upper sides of the support surface portions 23 as described above, so that the second accommodation container 30 is supported by the first accommodation container 20 in such a way as to be slidable in the Y direction relative to the first accommodation container 20.

[0053]

As shown in Fig. 6, an inclined surface portion 25 is also provided to the rear terminal portion of each support surface portion 23 of the first accommodation container 20, the height of the inclined surface portion 25 reducing toward the rearward direction.

[0054]

When the second accommodation container 30 is placed on the first accommodation container 20, the locking portions 24 of the first accommodation container 20 enter the recessed portions 32a of the second accommodation container 30. With such a configuration, each locking portion 24 forms the front side of the recessed portion 32a. When the second accommodation container 30 is viewed from a front side, the front side of each rib 32b (stopper piece) can be visually recognized. The ribs 32b (stopper pieces) come into contact with the locking portions 24, so that the movement of the second accommodation container 30 in the Y direction relative to the first accommodation container 20 is suppressed. The second accommodation container 30 is configured to be able to be pulled out of or pushed into the refrigerator body 1 together with the first accommodation container 20 as described above.

[0055]

When the second accommodation container 30 is placed on the first accommodation container 20, as shown in Fig. 8, a lower end 31a of each stepped portion 31 comes into contact with the upper side of each support surface portion 23. In such a state, each second flange portion 33 is disposed above the second support part 17 in a spaced apart manner from the second support part 17 as shown in Fig. 8. For example, a gap of a distance L2 is formed between the second flange portion 33 and the upper side of the second support part 17. The distance L2 is approximately 5 mm. That is to say, when the second accommodation container 30 is placed on the first accommodation container 20, the second flange portions 33 of the second accommodation container 30 are not in contact with the second support parts 17. In contrast, when the second accommodation container 30 is pushed rearward in the Y direction and drops out of the first accommodation container 20, the second flange portions 33 of the second accommodation container 30 are placed on and supported by the second support parts 17.

[0056]

When the user pushes the second accommodation container 30 rearward with a force greater than an engagement force between the locking portions 24 and the ribs 32b in a state in which the door 11 is pulled out, the locking portions 24 cross over the ribs 32b. Then, the second accommodation container 30 slides rearward on the support surface portions 23, thus moving rearward.

[0057]

When the second accommodation container 30 is further slid rearward, the second flange portions 33 of the second accommodation container 30 begins to slide on the second support parts 17 (see Fig. 5). As shown in Fig. 5 and Fig. 8, the second support part 17 is provided to each of the left and right sides 18 of the freezer compartment 4, the left and right sides 18 being formed by the inner box 51. When the user pushes the second accommodation container 30 rearward with the door 11 in an open state, the second accommodation container 30 slides on the second support parts 17 and moves rearward, and is then accommodated in the freezer compartment 4.

[0058]

When the second accommodation container 30 is further slid rearward, the protrusions 35, which are provided at the front portions of the lower side of the bottom plate 30d of the second accommodation container 30, come into contact with the rear stopper portions 20d provided to the rear side portion 20c of the first accommodation container 20, thus suppressing rearward slide of the second accommodation container 30.

[0059]

As shown in Fig. 6, the first protruding portion 36 and the second protruding portion 37 are formed on the upper side of each stepped portion 31 of the second accommodation container 30. The first protruding portion 36 and the second protruding portion 37 are protruding portions protruding from the upper side of the stepped portion 31 in the upward direction. The first protruding portion 36 and the second protruding portion 37 are disposed at positions different from each other in the Y direction at the back of the center point of the second accommodation container 30

in the Y direction. Each third protruding portion 41 of the third accommodation container 40, which will be described later, is fitted between each first protruding portion 36 and each second protruding portion 37. Therefore, the first protruding portion 36 and the second protruding portion 37 are formed with a separation that allows the third protruding portion 41 of the third accommodation container 40 to be fitted between the first protruding portion 36 and the second protruding portion 37. The height of the second protruding portion 37 is lower than the height of the first protruding portion 36. The second protruding portion 37 has a low mountain shape with a gentle inclined surface (mountain shape) for the third protruding portion 41 of the third accommodation container 40, which will be described later.

[0060]

The second accommodation container 30 also includes recessed portions 38 on the upper sides of the stepped portions 31. Each recessed portion 38 is disposed at a position rearward of the second protruding portion 37. The recessed portion 38 is recessed in the downward direction from the upper side of the stepped portion 31. The front side of the recessed portion 38 is a gentle inclined surface, and the rear side of the recessed portion 38 is a substantially vertical surface.

[0061]

As shown in Fig. 6, in the second accommodation container 30, a rear flange portion 39 is formed at a position rearward of the second flange portion 33. The length in the Y direction (the dimension in the depth direction) of the rear flange portion 39 is set to a length corresponding to the length in the Y direction (the dimension in the depth direction) of the third flange portion 43 of the third accommodation container 40. The height of the rear flange portion 39 in the Z direction is lower than the height of the second flange portion 33.

[0062]

Next, the third accommodation container 40, being the upper accommodation container, will be described. As shown in Fig. 6 to Fig. 8, the third accommodation container 40 has a bottomed cuboid box shape with an open upper side. The third accommodation container 40 is disposed above the second accommodation

container 30 in such a way as to cover a portion of the open upper side of the second accommodation container 30. In Embodiment 1, as shown in Fig. 3, the third accommodation container 40 is disposed in such a way as to cover the rear portion of the second accommodation container 30 in the Y direction. The third accommodation container 40 includes a third accommodation container body 40a with an open upper side. The third accommodation container body 40a is shallower than the second accommodation container body 30a, so that the volume of the third accommodation container body 40a is smaller than the volume of the second accommodation container body 30a.

[0063]

The third accommodation container body 40a includes the pair of left and right side portions 40b, a rear side portion 40c, a front side portion 40e, and a bottom plate 40d. The pair of left and right side portions 40b face each other. The rear side portion 40c and the front side portion 40e face each other.

[0064]

In Embodiment 1, as shown in Fig. 3, the third accommodation container 40 covers approximately rear half of the second accommodation container 30. Therefore, the size in the Y direction (the dimension in the depth direction) of the third accommodation container 40 is approximately half of the second accommodation container 30 in the Y direction. However, the size in the Y direction of the third accommodation container 40 is not limited to the above, and may be set to a size substantially the same as the size in the Y direction of the second accommodation container 30.

[0065]

In the third accommodation container 40, the third protruding portion 41 and a fourth protruding portion 42 are provided to an outer side 40b1 of each of the left and right side portions 40b. One third protruding portion 41 and one fourth protruding portion 42 are respectively provided at the front portion and the rear portion along each of both left and right sides of the bottom plate 40d. Specifically, the third protruding portion 41 is disposed at a position forward of the fourth protruding portion

42 in the Y direction. Accordingly, the third protruding portion 41 is a protruding portion disposed at the front portion, and the fourth protruding portion 42 is a protruding portion disposed at the rear portion. Of the third protruding portion 41 and the fourth protruding portion 42, at least the third protruding portion 41 may be referred to as a "slider portion".

[0066]

The third protruding portions 41 are placed on the upper sides of the stepped portions 31 of the second accommodation container 30. With such a configuration, the third accommodation container 40 is supported by the second accommodation container 30 in such a way as to be slidable in the Y direction relative to the second accommodation container 30. In contrast, when each third protruding portion 41 is fitted between each first protruding portion 36 and each second protruding portion 37 of the second accommodation container 30, the movement of the third accommodation container 40 in the Y direction relative to the second accommodation container 30 is restricted.

[0067]

The third protruding portions 41 and the fourth protruding portions 42 are resin parts made of a material same as a material used for forming the third accommodation container body 40a and the second accommodation container body 30a. The third protruding portion 41 and the fourth protruding portion 42 are attached by being inserted into attachment portions 40b2 provided to each outer side 40b1 of the third accommodation container body 40a. Alternatively, the third protruding portions 41 and the fourth protruding portions 42 may be molded integrally with the third accommodation container body 40a or the second accommodation container body 30a.

[0068]

The third accommodation container 40 also includes the third flange portions 43 provided at the upper ends of the left and right side portions 40b. The third accommodation container 40 also includes fifth protruding portions 44 and sixth protruding portions 45 disposed below the third flange portions 43. The fifth

protruding portion 44 and the sixth protruding portion 45 are arranged in a row below each third flange portion 43 along the lower end portion of the third flange portion 43. One fifth protruding portion 44 and one sixth protruding portion 45 are respectively provided at a front portion and a rear portion along the lower end portion of the third flange portion 43. Specifically, the fifth protruding portion 44 is disposed at a position forward of the sixth protruding portion 45 in the Y direction. Accordingly, the fifth protruding portion 44 is a protruding portion disposed at the front portion, and the sixth protruding portion 45 is a protruding portion disposed at the rear portion. Each fifth protruding portion 44 and each sixth protruding portion 45 extend in the downward direction Z2 of the Z direction from the lower end portion of the third flange portion 43. The fifth protruding portions 44 and the sixth protruding portions 45 slide on the second support parts 17 when the third accommodation container 40 is pushed rearward and accommodated in the freezer compartment 4.

[0069]

The third flange portions 43 of the third accommodation container 40 are disposed at the upper ends of the left and right side portions 40b, and extend in the Y direction. Each third flange portion 43 has a width in the lateral direction. When the third accommodation container 40 is accommodated in the freezer compartment 4 in a state in which the door 11 is in an open state, the third flange portions 43 are located on the second support parts 17. In contrast, irrespective of the door 11 being in an open state or in a closed state, when the third accommodation container 40 is placed on the second accommodation container 30, the third flange portions 43 are located on the rear flange portions 39 of the second accommodation container 30 as shown in Fig. 3. When the third flange portions 43 are placed on the rear flange portions 39 of the second accommodation container 30, the third flange portions 43 are located at positions higher than the positions of the second flange portions 33 of the second accommodation container 30 in the Z direction.

[0070]

The third accommodation container 40 is installed above the second accommodation container 30 such that the third flange portions 43 are located directly

above the rear flange portions 39 of the second accommodation container 30. In this state, a gap of approximately 1 mm is formed between the third flange portion 43 of the third accommodation container 40 and the rear flange portion 39. Therefore, friction is not generated between the third flange portion 43 and the rear flange portion 39 and hence, it is possible to suppress the generation of excess friction when the third protruding portions 41 slide on the stepped portions 31.

[0071]

As shown in Fig. 6, the second accommodation container 30 includes upper side portions 34 at positions higher than the stepped portions 31. Each upper side portion 34 is disposed between the stepped portion 31 and the rear flange portion 39. When the third accommodation container 40 is supported by the second accommodation container 30, the left and right side portions 40b of the third accommodation container 40 are disposed inward of the upper side portions 34. When the first accommodation container 20 is pulled out of the freezer compartment 4 and both the second accommodation container 30 and the third accommodation container 40 are located in the freezer compartment 4, both the second flange portions 33 and the third flange portions 43 are supported by the second support parts 17. Specifically, the second flange portions 33 are placed on the second support parts 17, and the third flange portions 43 are indirectly supported by the second support parts 17 since the third flange portions 43 are placed on the rear flange portions 39.

[0072]

By forming the second accommodation container 30 and the third accommodation container 40 as described above, the third accommodation container 40 can be pulled out of or pushed into the freezer compartment 4 together with the second accommodation container 30 when the door 11 is opened or closed. When the user pushes the third accommodation container 40 rearward with a force that causes the third protruding portions 41 of the third accommodation container 40 to cross over the second protruding portions 37, being the rear portions, of the second accommodation container 30, the third protruding portions 41 of the third

accommodation container 40 cross over the second protruding portions 37. With such an operation, it is possible to cause the third accommodation container 40 to slide on the second support parts 17 to move rearward. At this point of operation, the second support parts 17 are in contact with the third flange portions 43.

[0073]

After the third accommodation container 40 slides rearward, the third protruding portions 41 of the third accommodation container 40 are fitted into the recessed portions 38 of the second accommodation container 30, thus suppressing further rearward movement of the third accommodation container 40.

[0074]

The user lifts the third accommodation container 40 to release the engagement between the third protruding portions 41 and the recessed portions 38, and then causes the third accommodation container 40 to further slide rearward. At this point of operation, the fifth protruding portions 44 and the sixth protruding portions 45 provided below the third flange portions 43 slide on the second support parts 17. With such an operation, the third accommodation container 40 is, as a whole, placed on the second support parts 17 formed on the left and right sides of the freezer compartment 4. The third accommodation container 40 is accommodated in the freezer compartment 4 in a state of being supported by the second support parts 17 as described above. The third accommodation container 40 is accommodated in the refrigerator body 1, so that the opening of the second accommodation container 30 is brought into a fully-open state.

[0075]

In the case where the third accommodation container 40 is pushed rearward in the Y direction, such as a case where the user closes the door 11, the third accommodation container 40 is stopped due to contact of rear ends 46 of the third flange portions 43 with the rear ends of the second support parts 17 formed on the left and right sides 18 of the freezer compartment 4. Accordingly, it is possible to prevent the third accommodation container 40 from excessively moving rearward, thus falling off from the second support parts 17.

[0076]

As described above, due to contact between the locking portions 24 of the first accommodation container 20 and the ribs 32b of the second accommodation container 30, the movement of the second accommodation container 30 in the front-and-rear direction (that is, the movement in the Y direction) is suppressed. Further, each third protruding portion 41 of the third accommodation container 40 is fitted between each first protruding portion 36 and each second protruding portion 37 of the second accommodation container 30 and hence, the movement of the third accommodation container 40 in the front-and-rear direction (that is, the movement in the Y direction) is suppressed. In addition to the above, the frames 12 of the door 11 and the first accommodation container 20 are engaged with each other and hence, the third accommodation container 40, the second accommodation container 30, and the first accommodation container 20 are pulled out together with the pulling out of the door 11.

[0077]

When the user takes out an object stored in the third accommodation container 40 or in the front portion of the second accommodation container 30 or when the user puts an object into the third accommodation container 40 or into the front portion of the second accommodation container 30, it is sufficient for the user to open the door 11. In contrast, when the user takes out an object stored in the rear portion of the second accommodation container 30 or when the user puts an object into the rear portion of the second accommodation container 30, it is sufficient for the user to push the third accommodation container 40 rearward. Further, when the user takes out an object stored in the first accommodation container 20 or puts an object into the first accommodation container 20, it is sufficient for the user to push the second accommodation container 30 rearward. The third accommodation container 40 is placed on the second accommodation container 30 and hence, when the second accommodation container 30 is pushed rearward, the second accommodation container 30 and the third accommodation container 40 move rearward

simultaneously. With such an operation, the opening of the first accommodation container 20 is brought into an open state.

[0078]

When the third accommodation container 40 is pushed rearward in a state in which the second accommodation container 30 and the third accommodation container 40 are pulled out, the rearward movement of the third accommodation container 40 is temporarily stopped at the rear portion of the second accommodation container 30. This is due to the third protruding portions 41 of the third accommodation container 40 fitting into the recessed portions 38 of the second accommodation container 30. When the third accommodation container 40 is in such a state, the third accommodation container 40 is located at a position accessible to the user.

[0079]

In the same manner, when the second accommodation container 30 is pushed rearward in a state in which the second accommodation container 30 and the third accommodation container 40 are pulled out, the rearward movement of the second accommodation container 30 is temporarily stopped at the rear portion of the first accommodation container 20. This is due to the protrusions 35 of the second accommodation container 30 being locked by the rear stopper portions 20d of the first accommodation container 20. When the second accommodation container 30 is in such a state, the second accommodation container 30 is located at a position accessible to the user.

[0080]

When the third accommodation container 40 or the second accommodation container 30 is pushed rearward as described above, at a position accessible to the user, the third accommodation container 40 or the second accommodation container 30 is temporarily stopped at the rear portion of the accommodation container disposed below the third accommodation container 40 or the second accommodation container 30. Therefore, when the user desires to take out an object stored in the third accommodation container 40 or in the second accommodation container 30 or to

put an object into the third accommodation container 40 or into the second accommodation container 30, it is sufficient for the user to pull out the third accommodation container 40 or the second accommodation container 30 again.

[0081]

Due to the above-mentioned configuration, in the refrigerator 100 of Embodiment 1, the support parts disposed on each of the left and right sides 18 of the freezer compartment 4 and extending in the Y direction are two rails, that is, the fixed rail 14, serving as the first support part, and the second support part 17. In the conventional refrigerator described above, three support parts are provided. Therefore, compared with the conventional refrigerator, the position of the fixed rail 14, being the lower rail, can be set at a higher position and hence, it is possible to reduce a distance in the up-and-down direction between the frame of the door and the handle disposed at the upper portion of the front side of the door. For this reason, it is possible to reduce moment of rotation generated between the handle 11b of the door 11 and the fixed portion of the frame 12 at the time of opening or closing the door 11. Therefore, the direction in which the door 11 is pulled out approximates the direction of the force with which the user pulls out the door 11, so that wobbling of the door 11 and the frame 12 is eliminated. As a result, it is possible to smoothly pull out the first accommodation container 20, the second accommodation container 30, and the third accommodation container 40. Further, an excessive rotational torque is not applied to the frame 12 and hence, it is possible to reduce a load on the fixed portions at which the frames 12 are fixed to the door 11. As a result, it is possible to avoid an increase in size and thickness of the frames 12.

[0082]

In Embodiment 1, three accommodation containers are used to maintain user-friendliness of the accommodation containers accommodated in the freezer compartment 4, being the storage compartment. As described above, in Embodiment 1, it is possible to reduce a manufacturing cost of the refrigerator 100 while user-friendliness is maintained by achieving smooth pulling out or pushing in of

the accommodation containers from or into the freezer compartment 4, being the storage compartment.

[0083]

In addition to the above, in Embodiment 1, each of the third accommodation container 40 and the second accommodation container 30 may be made of a transparent material, that is, may be made of a material having transmitting properties. In this case, the user can perceive the contents of objects accommodated in the third accommodation container 40 and the second accommodation container 30 at a glance. Therefore, it is desirable that each of the third accommodation container 40 and the second accommodation container 30 be made of a transparent material. In this case, the third accommodation container 40 and the second accommodation container 30 are made of a material containing a light transmitting resin, for example.

[0084]

Embodiment 2.

Fig. 9 is a perspective view showing the configuration of a third accommodation container provided to a refrigerator according to Embodiment 2. In Embodiment 2, components identical to the corresponding components in Embodiment 1 are given the same reference symbols and the repeated description of such components will be omitted, and the description will be made only for components that make Embodiment 2 different from Embodiment 1.

[0085]

In a third accommodation container 40 provided to a refrigerator 100 of Embodiment 2, two slider parts 47 are provided in place of the third protruding portion 41 and the fourth protruding portion 42 in Embodiment 1 described above. The slider parts 47 are made of a material different from a material used for forming the second accommodation container 30, being the middle accommodation container. Other configurations are identical to corresponding configurations in Embodiment 1.

[0086]

In Embodiment 2, as shown in Fig. 9, attachment portions 49 are provided to the outer side 40b1 of each side portion 40b of the third accommodation container 40

to attach the slider parts 47. A slider portion 56 is formed by attaching the slider part 47 to the attachment portion 49. The slider parts 47 are made of a material different from a material used for forming the second accommodation container 30.

[0087]

In contrast, the attachment portions 49 are molded integrally with the outer side 40b1 of each side portion 40b of the third accommodation container 40. Therefore, the attachment portions 49 are resin parts made of a material same as a material used for forming the second accommodation container 30 and the third accommodation container 40.

[0088]

As described in the above-mentioned Embodiment 1, in the case where the third accommodation container 40 and the second accommodation container 30 are made of the same transparent resin material, the user can perceive objects at a glance. However, in such a case, the third protruding portions 41 and the fourth protruding portions 42 of the third accommodation container 40 are made of a material same as the material used for forming the second accommodation container 30. The third protruding portions 41 of the third accommodation container 40 slide on the second accommodation container 30. In the case where parts that slide against each other are made of the same material, a frictional force (friction coefficient) increases compared with the case where the parts that slide against each other are made of different materials.

[0089]

In view of the above, in Embodiment 2, in place of the third protruding portions 41 and the fourth protruding portions 42 of the third accommodation container 40, the slider parts 47 made of a material different from a material used for forming the second accommodation container 30 are inserted into and attached to the attachment portions 49 of the third accommodation container 40. With such a configuration, it is possible to reduce a frictional force (or friction coefficient) between the slider parts 47 of the third accommodation container 40 and the second accommodation container 30. By merely adopting the configuration where the slider parts 47 are made of a

material different from a material used for forming the second accommodation container 30, it is possible to reduce a frictional force (or friction coefficient) compared with the case where the slider parts 47 and the second accommodation container 30 are made of the same material. However, for a combination of a material used for forming the slider parts 47 and a material used for forming the second accommodation container 30, it is more desirable to adopt a combination of materials that can reduce a frictional force (or friction coefficient) as much as possible. An example of a material used for forming the slider parts 47 includes a polyoxymethylene (POM) material having excellent sliding properties.

[0090]

As described above, in Embodiment 2, the slider parts 47 provided to the third accommodation container 40 are made of a material different from a material used for forming the second accommodation container 30. With such a configuration, it is possible to reduce a frictional force (friction coefficient) between the slider parts 47 of the third accommodation container 40 and the second accommodation container 30. As a result, it is possible to avoid the problem of the slider parts 47 of the third accommodation container 40 being difficult to slide against the second accommodation container 30.

[0091]

Embodiment 3.

Fig. 10 is a cross-sectional view showing the configuration of a third accommodation container provided to a refrigerator according to Embodiment 3. In Embodiment 3, components identical to the corresponding components in Embodiment 1 are given the same reference symbols and the repeated description of such components will be omitted, and the description will be made only for components that make Embodiment 3 different from Embodiment 1.

[0092]

In a third accommodation container 40 provided to a refrigerator 100 of Embodiment 3, in the same manner as Embodiment 2, two slider parts 47 are provided in place of the third protruding portion 41 and the fourth protruding portion

42 in Embodiment 1 described above. Other configurations are identical to corresponding configurations in Embodiment 1.

[0093]

A difference between Embodiment 2 and Embodiment 3 is that, in Embodiment 3, as shown in Fig. 10, the first protruding portion 36, which is formed on the upper side of each stepped portion 31 of the second accommodation container 30, has a fixing opening port 60 on a rear inclined surface 36a (that is, a rear side) thereof. The fixing opening port 60 is a through hole that penetrates through the wall of the first protruding portion 36. Alternatively, the fixing opening port 60 may be a recessed portion that is formed on the first protruding portion 36 and that has a recessed shape that is recessed forward.

[0094]

In Embodiment 3, as shown in Fig. 10, of the two slider parts 47, the front slider part 47 has an insertion portion 48 on the front side thereof, the insertion portion 48 having a protruding shape that protrudes forward in the Y direction. The insertion portion 48 is fitted into the fixing opening port 60.

[0095]

Other configurations are identical to the corresponding configurations in Embodiment 2.

[0096]

In the above-mentioned Embodiments 1 and 2, the third accommodation container 40 and the second accommodation container 30 are fixed by merely placing the third accommodation container 40 on the second accommodation container 30 in the height direction. Therefore, when the door 11 is pulled out vigorously, there may be cases where the third accommodation container 40 jumps, thus generating noise. For this reason, in Embodiment 3, the insertion portions 48 having a protruding shape are formed on the third accommodation container 40, and the fixing opening ports 60 are formed in the second accommodation container 30. The third accommodation container 40 and the second accommodation container 30 are fixed by fitting the insertion portions 48 into the fixing opening ports 60. With such a configuration, the

movement of the third accommodation container 40 in the up-and-down direction can be suppressed by fitting of the insertion portions 48 into the fixing opening ports 60. Therefore, jumping of the third accommodation container 40 can be prevented and hence, it is possible to reduce the generation of noise.

[0097]

In Embodiment 3, the description has been made for an example in which the insertion portion 48 is provided to each slider part 47 shown in Embodiment 2. However, the configuration is not limited to such a case, and the insertion portion 48 may be provided to each third protruding portion 41 shown in Embodiment 1. Also in such a case, in the same manner, the fixing opening port 60 is formed in each first protruding portion 36. The third accommodation container 40 and the second accommodation container 30 are fixed by fitting the insertion portions 48 of the third protruding portions 41 into the fixing opening ports 60.

[0098]

As described above, in Embodiment 3, the insertion portions 48 having a protruding shape are formed on the third accommodation container 40, and the fixing opening ports 60 are formed in the second accommodation container 30. The third accommodation container 40 and the second accommodation container 30 are fixed by fitting the insertion portions 48 into the fixing opening ports 60. With such a configuration, the movement of the third accommodation container 40 in the up-and-down direction can be restricted and hence, jumping of the third accommodation container 40 can be prevented. Accordingly, it is possible to suppress the generation of noise.

[0099]

Also in Embodiment 3, as described in Embodiment 1 and Embodiment 2, each slider portion 56 (the third protruding portion 41 in Embodiment 1) is fitted between the first protruding portion 36 and the second protruding portion 37 provided to each stepped portion 31, so that the movement of the third accommodation container 40 in the Y direction is restricted. With such a configuration, in Embodiment 3, it is

possible to restrict the movement of the third accommodation container 40 in the Y direction and the up-and-down direction.

[0100]

The present disclosure is not limited to the configurations in the above-mentioned Embodiments 1 to 3 shown in the drawings. Particularly, the inside of the refrigerator body 1 at the back of the door 11 may be a storage compartment other than the freezer compartment 4. Further, the number of accommodation containers accommodated in the storage compartment including the freezer compartment 4 may be greater than three. Various modifications are conceivable without departing from the gist of the present disclosure.

Reference Signs List

[0101]

1: refrigerator body, 2: first partition plate, 3: second partition plate, 4: freezer compartment (storage compartment), 4a: opening, 5: refrigerator compartment, 6: cooling chamber, 7: rear wall, 8: cooler, 9: freezing fan, 10: machine chamber, 11: door, 11a: back side, 11b: handle, 12: frame, 12a: bent portion, 12b: end portion, 13: roller, 14: fixed rail (first support part), 14a: recessed portion, 14b: bent portion, 15: roller, 17: second support part, 18: side, 19a: protruding portion, 19b: protruding portion, 20: first accommodation container, 20a: first accommodation container body, 20b: side portion, 20b1: outer side, 20c: rear side portion, 20d: rear stopper portion, 20e: front side portion, 20f: bottom plate, 21: first flange portion, 23: support surface portion, 24: locking portion, 25: inclined surface portion, 30: second accommodation container, 30a: second accommodation container body, 30b: side portion, 30c: rear side portion, 30d: bottom plate, 30e: front side portion, 31: stepped portion, 31a: lower end, 31b: outer edge portion, 32: lower side, 32a: recessed portion (engagement receiving portion), 32b: rib, 33: second flange portion, 33a: bent portion, 34: upper side portion, 35: protrusion, 36: first protruding portion, 36a: inclined surface, 37: second protruding portion, 38: recessed portion, 39: rear flange portion, 40: third accommodation container, 40a: third accommodation container body, 40b: side portion, 40b1: outer side, 40b2: attachment portion, 40c: rear side portion, 40d:

bottom plate, 40e: front side portion, 41: third protruding portion (slider portion), 42: fourth protruding portion, 43: third flange portion, 44: fifth protruding portion, 45: sixth protruding portion, 46: rear end, 47: slider part, 48: insertion portion, 49: attachment portion, 50: outer box, 51: inner box, 52: heat insulating material, 53: storage space, 54: front side, 55: frame coupling portion, 55a: first frame coupling portion, 55b: second frame coupling portion, 55c: third frame coupling portion, 56: slider portion, 57: storage space, 60: fixing opening port, 100: refrigerator, 120: support frame, A: region, L1: distance, L2: distance, Y2: rearward direction, Z1: upward direction, Z2: downward direction.

CLAIMS

[Claim 1]

A refrigerator comprising:

a refrigerator body having a storage compartment in the refrigerator body, the storage compartment having an opening on a front side of the storage compartment;

a drawer type door provided at the opening of the storage compartment, and configured to open and close the storage compartment;

first support parts provided to left and right side walls of the storage compartment, and extending in a first direction being a depth direction of the refrigerator body;

second support parts provided to the left and right side walls of the storage compartment, disposed above the first support parts, and extending in the first direction;

a pair of left and right frames fixed to a back side of the door, extending in the first direction from the back side, and moving, with an opening and closing operation of the door, in the first direction in a state of being guided by the first support parts;

a first accommodation container including a first accommodation container body with an open upper side and first flange portions, the first accommodation container body being disposed in the storage compartment, the first flange portions being provided to left and right side portions of the first accommodation container body, protruding outward in directions away from each other from the left and right side portions of the first accommodation container body, and moving, with the opening and closing operation of the door, in the first direction in a state of being supported by the pair of left and right frames;

a second accommodation container including a second accommodation container body with an open upper side, second flange portions, and stepped portions, the second accommodation container body being disposed in the storage compartment, the second flange portions being provided to left and right side portions of the second accommodation container body and protruding outward in directions away from each other from the left and right side portions of the second

accommodation container body, the stepped portions being each provided between an associated one of the left and right side portions of the second accommodation container body and an associated one of the second flange portions; and

a third accommodation container including a third accommodation container body with an open upper side, third flange portions, and slider portions, the third accommodation container body being disposed in the storage compartment, the third flange portions being provided to left and right side portions of the third accommodation container body and protruding outward in directions away from each other from the left and right side portions of the third accommodation container body, the slider portions being provided at the left and right side portions of the third accommodation container body and protruding outward in directions away from each other, wherein

the stepped portions are provided at the left and right side portions of the second accommodation container body, and protrude outward, in directions away from each other, from the left and right side portions of the second accommodation container body, each of the stepped portions being located inward of and below the associated one of the second flange portions, and

when the third accommodation container is supported by the second accommodation container, the slider portions are in contact with upper sides of the stepped portions, and the third accommodation container is supported by the second accommodation container in such a way as to be slidable in the first direction relative to the second accommodation container.

[Claim 2]

The refrigerator of claim 1, wherein

when the second accommodation container is located above the first accommodation container in a state in which the first accommodation container is pulled out of the storage compartment, the second accommodation container is supported by the first accommodation container,

when the second accommodation container is located in the storage compartment in the state in which the first accommodation container is pulled out of

the storage compartment, the second flange portions are supported by the second support parts, and

when the third accommodation container is located in the storage compartment in a state in which the first accommodation container and the second accommodation container are pulled out of the storage compartment, the third flange portions are supported by the second support parts.

[Claim 3]

The refrigerator of claim 1 or 2, wherein

the first accommodation container includes

support surface portions provided to the left and right side portions of the first accommodation container body and extending outward in directions away from each other from the left and right side portions of the first accommodation container body, and

locking portions provided to upper sides of the support surface portions and protruding in an upward direction,

the second accommodation container includes

engagement receiving portions provided to lower sides of the stepped portions and recessed in the upward direction from the lower sides of the stepped portions,

each of the support surface portions is disposed at a position inward and upward of each of the first flange portions,

in a case where the second accommodation container is supported by the first accommodation container,

the stepped portions are in contact with the upper sides of the support surface portions, and the second accommodation container is supported by the first accommodation container in such a way as to be slidable in the first direction relative to the first accommodation container, and

in a case where at least a portion of a locking portion of the locking portions of the first accommodation container is inserted into and engaged with an engagement receiving portion of the engagement receiving portions of the second accommodation

container, movement of the second accommodation container in the first direction relative to the first accommodation container is restricted.

[Claim 4]

The refrigerator of any one of claims 1 to 3, wherein

the second accommodation container includes a first protruding portion and a second protruding portion provided to each of the upper sides of the stepped portions at positions different from each other in the first direction, and

in a case where a slider portion of the slider portions of the third accommodation container is fitted between the first protruding portion and the second protruding portion, movement of the third accommodation container in the first direction relative to the second accommodation container is restricted.

[Claim 5]

The refrigerator of any one of claims 1 to 4, wherein

the slider portion of the third accommodation container includes

an attachment portion disposed on an outer side of each of the left and right side portions of the third accommodation container body, and

a slider part attached to the attachment portion.

[Claim 6]

The refrigerator of claim 5, wherein

the second accommodation container and the slider part are made of materials different from each other.

[Claim 7]

The refrigerator of any one of claims 4 to 6, wherein

the slider portion of the third accommodation container includes an insertion portion on a front side of the slider portion, the insertion portion having a protruding shape,

the first protruding portion of the second accommodation container has a fixing opening port on a rear side of the first protruding portion, and

in a case where the slider portion of the third accommodation container is fitted between the first protruding portion and the second protruding portion and the

insertion portion of the slider portion is inserted into the fixing opening port of the first protruding portion, movement of the third accommodation container in the first direction and an up-and-down direction relative to the second accommodation container is restricted.

[Claim 8]

The refrigerator of any one of claims 1 to 7, wherein

the second accommodation container includes upper side portions provided at positions higher than the stepped portions,

in a case where the third accommodation container is supported by the second accommodation container, each of the left and right side portions of the third accommodation container body is disposed inward of each of the upper side portions of the second accommodation container, and

when the second accommodation container and the third accommodation container are located in the storage compartment in a state in which the first accommodation container is pulled out of the storage compartment, the second flange portions and the third flange portions are supported by the second support parts.

[Claim 9]

The refrigerator of any one of claims 1 to 8, wherein

the second accommodation container body and the third accommodation container body are made of a material containing a light transmitting resin.