

DESCRIPTION

Title of Invention

REFRIGERATOR

5 Technical Field

[0001]

The present disclosure relates to a partitioning structure of a refrigerator.

Background Art

[0002]

10 A typical refrigerator has multiple storage compartments in a box. For example, the multiple storage compartments include a refrigerator compartment that is controlled to provide a chilled temperature zone, a freezer compartment that is controlled to provide a frozen temperature zone, and a vegetable compartment that is controlled to provide a vegetable-compartment temperature zone. As described above, spaces in
15 the storage compartments are set to provide different temperature zones for foods to be stored. In response to user needs, some refrigerators having the same volume have different arrangements of compartments, such as a vegetable compartment and a freezer compartment, in boxes.

[0003]

20 In a refrigerator having multiple storage compartments in a box, food stored varies from one compartment to another, so that a suitable height of an opening and a suitable set temperature vary from one compartment to another. To manufacture a refrigerator including a box having storage compartments arranged in a different manner from that in a traditional refrigerator, a partition mounting structure in an inner
25 casing needs to be changed because a plate-shaped partition is mounted in the box to suit the arrangement of the storage compartments. In general, boxes are individually formed for different types of refrigerators.

[0004]

30 Different models of refrigerators are provided by individually forming boxes and arranging storage compartments, which are to be controlled to provide different

temperature zones, in different manners. Providing such different models of refrigerators can increase options for consumers. However, a manufacturer needs to change a mounting position for a partition to be mounted in a box for each refrigerator because the openings of storage compartments of refrigerators having the same
5 volume have different suitable heights, and thus requires different molds for boxes with changed mounting positions. The need for manufacturing different molds results in an increase in cost.

[0005]

To reduce an increase in manufacturing cost caused by changing an arrangement
10 of storage compartments of a refrigerator and increase the convenience of users, a known refrigerator has multiple drawer type storage compartments that can be freely used as a refrigerator compartment or a freezer compartment by a user (refer to Patent Literature 1, for example).

[0006]

15 For the refrigerator disclosed in Patent Literature 1, a user can freely use each of the multiple drawer type storage compartments as a refrigerator compartment or a freezer compartment. Thus, refrigerators having the same volume but having different arrangements of storage compartments in boxes can be provided.

Citation List

20 Patent Literature

[0007]

Patent Literature 1: Japanese Patent No. 6655747

Summary of Invention

Technical Problem

25 [0008]

For the refrigerator in Patent Literature 1, the temperature in each of the storage compartments with the openings each having a fixed height is changed to another temperature. That is, each storage compartment does not have an opening suitable for the size of food to be stored, reducing user-friendliness.

30 [0009]

In response to the above issue, it is an object of the present disclosure to provide a refrigerator that achieves a reduction in manufacturing cost and an increase in user-friendliness.

Solution to Problem

5 [0010]

A refrigerator according to an embodiment of the present disclosure includes a box that includes an outer casing constituting a shell, an inner casing disposed to define a first space with the outer casing and having an injection port for thermal insulator injection, and a thermal insulator filling the first space and that has a storage space to
10 store food, and a partition including a partition body and a fastening portion fixing the partition body to the inner casing. The partition body has a second space inside and a partition aperture in a side thereof and divides the storage space into a plurality of storage compartments for different temperature zones. The inner casing includes a mounting portion on which the fastening portion is mounted. The mounting portion has
15 a mounting aperture in a surface that faces the side of the partition body when the fastening portion is mounted on the mounting portion and the partition body is fixed to the inner casing. The mounting aperture communicates with the first space. The partition body is mountable, in the inner casing, at a position where the partition aperture coincides with an upper part of the mounting aperture in side view of the inner casing or at a position where the partition aperture coincides with a lower part of the
20 mounting aperture in side view of the inner casing.

Advantageous Effects of Invention

[0011]

In the refrigerator according to the embodiment of the present disclosure, the
25 partition body is mountable, in the inner casing, at the position where the partition aperture coincides with the upper part of the mounting aperture in side view of the inner casing or at the position where the partition aperture coincides with the lower part of the mounting aperture in side view of the inner casing. In a longitudinal direction of the refrigerator, therefore, the position of the partition body mounted such that the partition
30 aperture is aligned with the upper part of the mounting aperture differs from the position

of the partition body mounted such that the partition aperture is aligned with the lower part of the mounting aperture. At each of the positions, the partition aperture is aligned with the mounting aperture. This allows the thermal insulator injected into the first space through the injection port to be injected into the second space of the partition body through the mounting aperture communicating with the first space and the partition aperture. As described above, a mounting position for the partition body to be mounted in the box can be changed. This allows each of the storage compartments to have a suitable opening, thus increasing the user-friendliness. In addition to that the mounting position for the partition body to be mounted in the box can be changed, the thermal insulator injected into the first space through the injection port can be injected into the second space of the partition body regardless of the position of the partition body mounted in the box, resulting in a reduction in manufacturing cost. In other words, an increase in user-friendliness and a reduction in manufacturing cost can be achieved.

Brief Description of Drawings

[0012]

[Fig. 1] Fig. 1 is a front view of a refrigerator according to Embodiment.

[Fig. 2] Fig. 2 is a front view of a refrigerator according to Embodiment.

[Fig. 3] Fig. 3 is a perspective view of the refrigerator according to Embodiment.

[Fig. 4] Fig. 4 is a longitudinal sectional view of the refrigerator according to Embodiment.

[Fig. 5] Fig. 5 is a longitudinal sectional view of the refrigerator according to Embodiment.

[Fig. 6] Fig. 6 is a diagram illustrating a refrigerant circuit of the refrigerator according to Embodiment.

[Fig. 7] Fig. 7 is a diagram illustrating connection of refrigerant pipes in the refrigerator according to Embodiment.

[Fig. 8] Fig. 8 is a diagram illustrating a modification of the connection of the refrigerant pipes in the refrigerator according to Embodiment.

[Fig. 9] Fig. 9 is a perspective view of a lower part of an inner casing on which a partition of the refrigerator according to Embodiment is to be mounted.

[Fig. 10] Fig. 10 is an enlarged view of an area C of the inner casing of Fig. 9.

[Fig. 11] Fig. 11 is a side view of a portion of the inner casing of the refrigerator
5 according to Embodiment that includes a recess.

[Fig. 12] Fig. 12 is a perspective view of the whole of a partition to be mounted on mounting portions of the inner casing of the refrigerator according to Embodiment.

[Fig. 13] Fig. 13 is a perspective view of the whole of a partition to be mounted on the mounting portions of the inner casing of the refrigerator according to Embodiment.

[Fig. 14] Fig. 14 is an enlarged perspective view of a front left part D1 of the
10 partition of Fig. 12.

[Fig. 15] Fig. 15 is an enlarged perspective view of a front left part D2 of the partition of Fig. 13.

[Fig. 16] Fig. 16 is a longitudinal sectional view of the refrigerator according to
15 Embodiment with the partition mounted in the inner casing illustrating a vegetable compartment.

[Fig. 17] Fig. 17 is a schematic enlarged view of an area F in Fig. 16 that includes the inner casing and the partition.

[Fig. 18] Fig. 18 is a diagram illustrating a left side of the inner casing and a
20 section of the partition having therein no urethane foam in Embodiment.

[Fig. 19] Fig. 19 is a diagram illustrating the left side of the inner casing and a section of the partition having therein no urethane foam in Embodiment.

[Fig. 20] Fig. 20 is a left side view of the partition of the refrigerator according to Embodiment illustrating a left side portion.

[Fig. 21] Fig. 21 is a left side view of the partition of the refrigerator according to Embodiment illustrating a left side portion.

[Fig. 22] Fig. 22 is an enlarged view of a mounting portion with the partition mounted on a right side of the inner casing in Embodiment.

[Fig. 23] Fig. 23 is an enlarged view of the mounting portion with the partition
30 mounted on the right side of the inner casing in Embodiment.

[Fig. 24] Fig. 24 is a diagram illustrating the positional relationship between mounting apertures of the inner casing and partition apertures of the partitions each mounted on the left side of the inner casing of the refrigerator according to Embodiment.

[Fig. 25] Fig. 25 is a transverse sectional view of the partition of Fig. 13 taken along line A-A as viewed in the direction of arrows A.

[Fig. 26] Fig. 26 is a diagram illustrating the positional relationship between mounting apertures of the inner casing and the partition apertures of the partitions each mounted on the left side of the inner casing in a first modification of the refrigerator according to Embodiment.

[Fig. 27] Fig. 27 is a diagram illustrating the positional relationship between the mounting apertures of the inner casing and the partition apertures of the partition mounted on the left side of the inner casing in a second modification of the refrigerator according to Embodiment.

[Fig. 28] Fig. 28 is a diagram illustrating the positional relationship between the mounting apertures of the inner casing and the partition apertures of the partition mounted on the left side of the inner casing in a second modification of the refrigerator according to Embodiment.

[Fig. 29] Fig. 29 is a diagram illustrating the positional relationship between the mounting apertures of the inner casing and the partition apertures of the partitions each mounted on the left side of the inner casing in a third modification of the refrigerator according to Embodiment.

Description of Embodiments

[0013]

An embodiment will be described below with reference to the drawings. It should be understood that the following description is not intended to limit the embodiment. Note that the relationship between the sizes of components in the following figures may differ from that of actual ones.

[0014]

Embodiment.

Fig. 1 is a front view of a refrigerator 100 according to Embodiment. Fig. 2 is a front view of a refrigerator 200 according to Embodiment. Fig. 3 is a perspective view of the refrigerator 100, 200 according to Embodiment. Fig. 4 is a longitudinal sectional view of the refrigerator 100 according to Embodiment. Fig. 5 is a longitudinal sectional view of the refrigerator 200 according to Embodiment. Fig. 3 illustrates an overall perspective view with no difference in shape of drawer panels between the refrigerator 100 and the refrigerator 200. Figs. 4 and 5 schematically illustrate longitudinal sections taken in a front-rear direction of the refrigerator.

[0015]

The configurations of the refrigerators 100 and 200 according to Embodiment will be described below. For the sake of understanding, terms representing directions, such as "upper", "lower", "right", "left", "front", and "rear", will be used as appropriate. These terms are used herein only for the purpose of convenience of description, and should not be construed as limiting Embodiment. In Embodiment, these terms, such as "upper", "lower", "right", "left", "front", and "rear", are used in front view of the refrigerator 100, 200 (or a box 101).

[0016]

The refrigerators 100 and 200 each having six doors, including drawer panels, will be described as examples. Embodiment is applicable to a refrigerator having five or less doors and a refrigerator having seven or more doors.

[0017]

As illustrated in Figs. 1, 3, and 4, the refrigerator 100 according to Embodiment is of Model A and includes the box 101. The box 101 includes an outer casing 22 constituting a shell, an inner casing 29 disposed to define an internal space 44 with the outer casing 22, and urethane foam 23, serving as a thermal insulator, filling the internal space 44. Hereinafter, the internal space 44 will also be referred to as a first space. The box 101 has a storage space to store food. Dividing the storage space with a partition 27a, which will be described later, provides multiple storage compartments for different temperature zones. Specifically, the multiple storage compartments include a refrigerator compartment 1, an ice-making compartment 2, a small freezer compartment

3, a freezer compartment 4 being a first storage compartment, and a vegetable compartment 5 being a second storage compartment.

[0018]

The refrigerator compartment 1 is located at the top of the refrigerator 100. The refrigerator compartment 1 has a front opening closed by double doors, or a refrigerator-compartment left door 6 and a refrigerator-compartment right door 7, which a user can open and close. Below the refrigerator compartment 1, the ice-making compartment 2 and the small freezer compartment 3 are arranged side by side such that a storage container in each of these compartments is slidable toward the user when the user pulls a drawer panel (not illustrated) of the compartment. The vegetable compartment 5 is located at the bottom of the refrigerator 100. The freezer compartment 4 is located above the vegetable compartment 5. The freezer compartment 4 is located below the ice-making compartment 2 and the small freezer compartment 3, which are arranged side by side, and is located above the vegetable compartment 5. Each of the freezer compartment 4 and the vegetable compartment 5 is also configured such that a storage container in the compartment is slidable toward the user when the user pulls a drawer panel of the compartment.

[0019]

The refrigerator 100 has a machine room 21 in a rear lower portion of the refrigerator 100, a cooling room 39 located above the machine room 21, and a duct 26 located above the cooling room 39. The machine room 21 contains, for example, a compressor 8. The cooling room 39 contains, for example, a cooler 17 and a cooling fan 25 located above the cooler 17.

[0020]

As illustrated in Figs. 2, 3, and 5, the refrigerator 200 according to Embodiment is of Model B. Like the refrigerator 100, the refrigerator 200 includes the box 101. The box 101 includes the outer casing 22 constituting a shell, the inner casing 29 disposed to define the internal space 44 with the outer casing 22, and the urethane foam 23, serving as a thermal insulator, filling the internal space 44. Hereinafter, the internal space 44 will also be referred to as a first space. The box 101 has a storage space to

store food. Dividing the storage space with a partition 27b, which will be described later, provides multiple storage compartments for different temperature zones.

Specifically, the multiple storage compartments include the refrigerator compartment 1, the ice-making compartment 2, the small freezer compartment 3, the freezer

5 compartment 4 being a second storage compartment, and the vegetable compartment 5 being a first storage compartment. For an arrangement of the storage compartments, the positions of the freezer compartment 4 and the vegetable compartment 5 in the refrigerator 200 are reversed as compared with those in the refrigerator 100.

[0021]

10 To increase the convenience of users, as illustrated in Figs. 1 and 2, openings of the freezer compartment 4 and the vegetable compartment 5 in each of the refrigerators 100 and 200 have different heights suitable for food to be stored. Although

Embodiment illustrates an example in which the height of the opening of the vegetable compartment 5 is larger than that of the freezer compartment 4, the height of the

15 opening of the freezer compartment 4 may be larger than that of the vegetable compartment 5.

[0022]

Fig. 6 is a diagram illustrating a refrigerant circuit 103 of the refrigerator 100, 200 according to Embodiment. Fig. 7 is a diagram illustrating connection of refrigerant

20 pipes in the refrigerator 100 according to Embodiment. Fig. 8 is a diagram illustrating a modification of the connection of the refrigerant pipes in the refrigerator 100 according to Embodiment. The configuration of the refrigerant circuit 103 in the refrigerator 100

is the same as that in the refrigerator 200. The refrigerator 100 will be described as an example. In Fig. 6, arrows represent the flow of refrigerant. In Figs. 7 and 8, open

25 arrows pointing obliquely downward to the right represent a front side of the refrigerator 100.

[0023]

The refrigerator 100 according to Embodiment includes the refrigerant circuit 103, through which the refrigerant is circulated. As illustrated in Fig. 6, the refrigerant circuit

30 103 includes the compressor 8, a fin-tube type machine-room condenser 9, a left-side

condensing pipe 10, a top-surface condensing pipe 11, a rear-surface condensing pipe 12, a right-side condensing pipe 13, a condensation preventing pipe 14, a dryer 15, a capillary tube 16 operating as a pressure reducing device, the cooler 17, a muffler (accumulator) 18, and a suction pipe 19. The machine-room condenser 9, the left-side condensing pipe 10, the top-surface condensing pipe 11, the rear-surface condensing pipe 12, the right-side condensing pipe 13, and the condensation preventing pipe 14 are condensing pipes.

[0024]

As illustrated in Fig. 7, the compressor 8, the machine-room condenser 9, and the dryer 15 are contained in the machine room 21, which is located in the rear lower portion of the refrigerator 100. A portion of the left-side condensing pipe 10, which is disposed in a left plate defining a left side of the box 101, extends to a top surface of the box 101 and connects to the top-surface condensing pipe 11, which is disposed in a top plate defining the top surface. Instead of the left-side condensing pipe 10 connecting to the top-surface condensing pipe 11, a portion of the right-side condensing pipe 13, which is disposed in a right plate defining a right side of the box 101, may extend to the top surface and connect to the top-surface condensing pipe 11. Although not illustrated, the left-side condensing pipe 10, the top-surface condensing pipe 11, the rear-surface condensing pipe 12, and the right-side condensing pipe 13 are fixed to an inner surface of the outer casing 22, which is made of metal, of the refrigerator 100 with an aluminum tape.

[0025]

The refrigerator 100 further includes a machine-room cooling fan (not illustrated) that is disposed in the machine room 21 to cool the machine-room condenser 9 and the compressor 8.

[0026]

Two capillary tubes 16 or multiple coolers 17 may be arranged downstream of the condensation preventing pipe 14, which is located downstream of the other condensing pipes. For arrangement of two capillary tubes 16, a three-way valve is disposed upstream of the capillary tubes 16. As long as only the left-side condensing pipe 10

and the right-side condensing pipe 13 provide sufficient condensing capacity, the machine-room condenser 9, the top-surface condensing pipe 11, and the rear-surface condensing pipe 12 can be eliminated without problems.

[0027]

5 As illustrated in Fig. 7, the condensation preventing pipe 14 is located in a front flange 24 and surrounds the refrigerator compartment 1, the ice-making compartment 2, the small freezer compartment 3, the freezer compartment 4, and the vegetable compartment 5, or the individual compartments. The condensation preventing pipe 14 is connected to the right-side condensing pipe 13 at a lower right rear corner of the refrigerator and is connected to the dryer 15, which is disposed in the machine room 21, at a lower left rear corner of the refrigerator.

[0028]

15 If thermal insulation between the outer casing 22 and an outer surface of the refrigerator compartment 1 exhibits good performance, the condensation preventing pipe 14 may be located in the front flange 24 and surround the compartments except the refrigerator compartment 1, as illustrated in Fig. 8. In other words, the condensation preventing pipe 14 does not need to be provided in portions of the front flange 24 that are located on upper, right, and left sides of the refrigerator compartment 1. In this case, the thermal insulation between the outer casing 22 and the outer surface of the refrigerator compartment 1 exhibits good performance, for example, when the distance between the outer casing 22 and the outer surface of the refrigerator compartment 1, or the thickness of the thermal insulator therebetween, is large, or when a vacuum thermal insulator is disposed between the outer casing 22 and the outer surface of the refrigerator compartment 1.

25 [0029]

For the refrigerator 100, cooled air produced by cooling air in the cooling room 39 through the refrigerant circuit 103 is sent by the cooling fan 25 located above the cooler 17, as illustrated in Fig. 4. The sent cooled air is supplied to the freezer compartment 4, the ice-making compartment 2, the small freezer compartment 3, and the refrigerator compartment 1 through the duct 26 located adjacent to a rear surface of the refrigerator

100. The cooled air returned from the refrigerator compartment 1 is supplied to the vegetable compartment 5 through a refrigerator-compartment feedback passage (not illustrated). The cooled air supplied to the vegetable compartment 5 is returned to the cooler 17 through a return duct (not illustrated). Temperatures of the storage compartments are detected by thermistors installed in the respective storage compartments. The temperature of each of the storage compartments is regulated to a preset temperature by adjusting, for example, the opening degree of a damper (not illustrated) disposed in the storage compartment, an output of the compressor 8, and the amount of air sent by the cooling fan 25.

[0030]

For the refrigerator 200, cooled air produced by cooling air in the cooling room 39 through the refrigerant circuit 103 is sent by the cooling fan 25 located above the cooler 17, as illustrated in Fig. 5. The sent cooled air is supplied to the freezer compartment 4, the ice-making compartment 2, the small freezer compartment 3, and the refrigerator compartment 1 through the duct 26 located adjacent to a rear surface of the refrigerator 200. The cooled air returned from the refrigerator compartment 1 is supplied to the vegetable compartment 5 through a refrigerator-compartment feedback passage (not illustrated). The cooled air supplied to the vegetable compartment 5 is returned to the cooler 17 through a return duct (not illustrated). In the refrigerator 200, the cooler 17 is located behind the vegetable compartment 5. To ensure thermal insulation between the vegetable compartment 5 and the cooler 17, a thermal insulator 28 is disposed therebetween. The thermal insulator 28 may include a vacuum thermal insulator. The temperatures of the storage compartments are detected by thermistors installed in the respective storage compartments. The temperature of each of the storage compartments is regulated to a preset temperature by adjusting, for example, the opening degree of a damper (not illustrated) disposed in the storage compartment, an output of the compressor 8, and the amount of air sent by the cooling fan 25.

[0031]

The refrigerator 100 and the refrigerator 200 each include the inner casing 29, which is represented by thick lines in Figs. 4 and 5. The inner casing 29 has a shape

common to the refrigerators 100 and 200. The types of storage compartments, such as the refrigerator compartment 1, the ice-making compartment 2, the small freezer compartment 3, the freezer compartment 4, and the vegetable compartment 5, of the refrigerator 100 are the same as those of the refrigerator 200. The refrigerator 100 has the vegetable compartment 5 at the bottom, whereas the refrigerator 200 has the freezer compartment 4 at the bottom. The dimension of a front opening of the vegetable compartment 5 in a longitudinal direction of the refrigerator differs from that of the freezer compartment 4. The partition 27a, 27b separating the vegetable compartment 5 from the freezer compartment 4 is provided between the vegetable compartment 5 and the freezer compartment 4. The position of the partition 27a in the longitudinal direction of the refrigerator 100 differs from the position of the partition 27b in the longitudinal direction of the refrigerator 200.

[0032]

Fig. 9 is a perspective view of a lower part of the inner casing 29 on which the partition 27a, 27b of the refrigerator 100, 200 according to Embodiment is to be mounted. Fig. 10 is an enlarged view of an area C of the inner casing 29 of Fig. 9. Fig. 11 is a side view of a portion of the inner casing 29 of the refrigerator 100, 200 according to Embodiment that includes a recess. As illustrated in Fig. 10, a left side 29a of the inner casing 29 has a recess 30, which is located at a position for mounting the partition 27a, 27b and is recessed outward from the inner casing 29 (leftward from the left side 29a in front view of the inner casing 29). The recess 30 substantially horizontally extends rearward from an opening of the inner casing 29 and has a constant width in the longitudinal direction of the refrigerator. The recess 30 has upper and lower borders defined by protrusions protruding inward in the refrigerator. A protrusion above the recess 30 will be referred to as an upper protrusion 31, and a protrusion below the recess 30 will be referred to as a lower protrusion 32. As illustrated in Fig. 11, the recess 30 has multiple mounting apertures 33 (33a to 33c), through which the urethane foam 23 is injected into the partition 27a, 27b. The multiple mounting apertures 33 communicate with the internal space 44 (refer to Figs. 4 and 5). The recess 30, the upper protrusion 31, and the lower protrusion 32 arranged

in and on the left side 29a of the inner casing 29 constitute a mounting portion 34a for mounting the partition 27a, 27b on the inner casing 29. The partition 27a, 27b is pressed to the back of the inner casing 29 such that an upper flange 35a, 40a and a lower flange 36a, 41a, which will be described later, of the partition 27a, 27b are slidable
5 relative to a side surface of the recess 30 between the upper protrusion 31 and the lower protrusion 32. Thus, the upper flange 35a, 40a and the lower flange 36a, 41a of the partition 27a, 27b are caught between the upper protrusion 31 and the lower protrusion 32, so that the partition 27a, 27b is mounted on the inner casing 29.

Although not illustrated, a mounting portion 34b having the same configuration as that of the mounting portion 34a is located on a right side 29b of the inner casing 29 such that
10 the mounting portion 34b is located at substantially the same level as that of the mounting portion 34a.

[0033]

Fig. 12 is a perspective view of the entire partition 27a to be mounted on the mounting portions 34a and 34b of the inner casing 29 of the refrigerator 100 according
15 to Embodiment. Fig. 13 is a perspective view of the entire partition 27b to be mounted on the mounting portions 34a and 34b of the inner casing 29 of the refrigerator 200 according to Embodiment. Fig. 14 is an enlarged perspective view of a front left part D1 of the partition 27a of Fig. 12. Fig. 15 is an enlarged perspective view of a front left
20 part D2 of the partition 27b of Fig. 13.

[0034]

The partition 27a (hereinafter, also referred to as a first partition) is a partition that is included in the refrigerator 100 of Model A. As illustrated in Figs. 12 and 14 and Fig. 22, which will be described later, the partition 27a includes a plate-shaped partition body
25 37a having an internal space 37aa (hereinafter, also referred to as a second space), a left side portion 38a defining a left side of the partition body 37a, a right side portion 42a defining a right side of the partition body 37a, the upper flanges 35a and 40a, and the lower flanges 36a and 41a. The partition 27b (hereinafter, also referred to as a second partition) is a partition that is included in the refrigerator 200 of Model B. As illustrated
30 in Figs. 13 and 15 and Fig. 23, which will be described later, the partition 27b includes a

plate-shaped partition body 37b having an internal space 37ba (hereinafter, also referred to as a second space), a left side portion 38b defining a left side of the partition body 37b, a right side portion 42b defining a right side of the partition body 37b, upper flanges 35b and 40b, and lower flanges 36b and 41b. The partition 27a includes the upper flanges 35a and 40a extending upward from the left and right side portions and the lower flanges 36a and 41a extending downward from the left and right side portions, and these flanges serve as fastening portions. Similarly, the partition 27b includes the upper flanges 35b and 40b extending upward from the left and right side portions and the lower flanges 36b and 41b extending downward from the left and right side portions, and these flanges serve as fastening portions. The upper flanges 35a and 40a and the lower flanges 36a and 41a of the partition 27a are secured to the inner casing 29 with screws (not illustrated) from the back side of the inner casing 29. The upper flanges 35b and 40b and the lower flanges 36b and 41b of the partition 27b are secured to the inner casing 29 with screws (not illustrated) from the back side of the inner casing 29. Securing the partition 27a, 27b in the above-described manner reduces or eliminates the leak of the urethane foam 23 between the partition 27a and the inner casing 29 or between the partition 27b and the inner casing 29.

[0035]

Fig. 16 is a longitudinal sectional view of the refrigerator 100 according to Embodiment with the partition 27a mounted in the inner casing 29 illustrating the vegetable compartment 5. Fig. 17 is a schematic enlarged view of an area F in Fig. 16 that includes the inner casing 29 and the partition 27a. Fig. 16 schematically illustrates a longitudinal section taken in a transverse direction of the refrigerator. Alternate long and short dashed lines represent the mounting portions 34a and 34b. In Fig. 16, the vegetable compartment 5 is located at the bottom of the refrigerator 100. Fig. 17 illustrates a flow path of the urethane foam 23 injected into the internal space 44 of the box 101 through an injection port (not illustrated) in the rear of the inner casing 29 of the box 101. Arrows represent the flow of the urethane foam 23.

[0036]

The internal space of the partition body 37a, 37b of the partition 27a, 27b is filled with the urethane foam 23, serving as a thermal insulator. During manufacture of the refrigerator 100, as illustrated in Figs. 16 and 17, after the partition 27a is mounted on the inner casing 29 of the box 101, the urethane foam 23 is injected into the internal space 44 (refer to Figs. 4 and 5) of the box 101 through the injection port in the rear of the inner casing 29 of the box 101 so that the internal space 37aa of the partition body 37a of the partition 27a is filled with the urethane foam 23 supplied through the mounting apertures 33 of the inner casing 29 and apertures (partition apertures 45, which will be described later) of the partition 27a. Similarly, during manufacture of the refrigerator 200, after the partition 27b is mounted on the inner casing 29 of the box 101, the urethane foam 23 is poured into the internal space 44 of the box 101 through the injection port in the rear of the inner casing 29 of the box 101 so that the internal space 37ba of the partition body 37b of the partition 27b is filled with the urethane foam 23 supplied through the mounting apertures 33 of the inner casing 29 and apertures (partition apertures 46, which will be described later) of the partition 27b. The partition apertures 45, 46 of the partition 27a, 27b mounted on the mounting portions 34a and 34b of the inner casing 29 are aligned with parts of the mounting apertures 33 of the inner casing 29. The urethane foam 23 passes through the aligned apertures and flows into the partition 27a, 27b.

[0037]

As illustrated in Fig. 11, of the multiple mounting apertures 33, the mounting aperture 33 (hereinafter, also referred to as a front mounting aperture 33c) located adjacent to the front of the inner casing 29 and the mounting aperture 33 (hereinafter, also referred to as a rear mounting aperture 33a) located adjacent to the rear of the inner casing 29 are larger than the mounting apertures 33 (hereinafter, also referred to as intermediate mounting apertures 33b) located between the front and rear mounting apertures. The reason is as follows. When the urethane foam 23 in a liquid state is injected into the internal space 44 through the injection port in the rear of the inner casing 29, the urethane foam 23 in the liquid state flows toward a front portion of the inner casing 29 while exhibiting high fluidity. The front mounting aperture 33c located

adjacent to the front of the inner casing 29 is larger than the intermediate mounting apertures 33b so that the inside of the partition 27a, 27b is fully filled with the urethane foam 23 injected from the rear of the inner casing 29 and having high fluidity. The rear mounting aperture 33a located adjacent to the rear of the inner casing 29 is larger than the intermediate mounting apertures 33b so that a rear portion of the inside of the partition 27a, 27b is filled with the urethane foam 23 having fluidity that decreases until the urethane foam 23 reaches the rear mounting aperture 33a.

[0038]

Foods to be stored in the vegetable compartment 5 include foods longer than frozen foods, for example, Japanese radish and burdock. It is therefore desirable that the opening of the vegetable compartment 5 be larger than that of the freezer compartment 4 in the longitudinal direction of the box 101. For the refrigerator 100 of Model A in which the vegetable compartment 5 is located below the freezer compartment 4, as illustrated in Fig. 14, the partition 27a is configured such that, of the upper flange 35a and the lower flange 36a, which are to be in contact with the recess 30, the lower flange 36a has a larger longitudinal width in the longitudinal direction than that of the upper flange 35a. The partition 27a with such a configuration is mounted at a first position in the inner casing 29. For the refrigerator 200 of Model B in which the vegetable compartment 5 is located above the freezer compartment 4, as illustrated in Fig. 15, the partition 27b is configured such that, of the upper flange 35a and the lower flange 36a, which are to be in contact with the recess 30, the upper flange 35b has a larger longitudinal width in the longitudinal direction than that of the lower flange 36b. The partition 27b with such a configuration is mounted at a second position in the inner casing 29. The second position is lower than the first position. The longitudinal width of the upper flange 35b of the partition 27b is larger than that of the upper flange 35a of the partition 27a. The longitudinal width of the lower flange 36b of the partition 27b is smaller than that of the lower flange 36a of the partition 27a. The inner casing 29 is common to the refrigerator 100 of Model A and the refrigerator 200 of Model B. A longitudinal width of the recess 30 is substantially the same as a maximum longitudinal width of a left side of the partition 27a, and the left side is defined by the upper flange

35a, the lower flange 36a, and the left side portion 38a. Furthermore, the longitudinal width of the recess 30 is substantially the same as a maximum longitudinal width of a left side of the partition 27b, and the left side is defined by the upper flange 35b, the lower flange 36b, and the left side portion 38b. The partition body 37a of the partition 27a, in which the longitudinal width of the lower flange 36a is larger than that of the upper flange 35a, mounted on the recess 30 having a fixed longitudinal width is located at a position higher than the position of the partition body 37b of the partition 27b, in which the longitudinal width of the upper flange 35b is larger than that of the lower flange 36b, mounted on the recess 30. This allows the opening of the vegetable compartment 5 to be larger than the opening of the freezer compartment 4.

[0039]

Fig. 18 a diagram illustrating the left side 29a of the inner casing 29 and a section of the partition 27a having therein no urethane foam 23 in Embodiment. Fig. 19 is a diagram illustrating the left side 29a of the inner casing 29 and a section of the partition 27b having therein no urethane foam 23 in Embodiment. Fig. 18 illustrates a section taken along line X-X in Fig. 17 as viewed in the direction of arrows X. Fig. 19 illustrates a section taken at the same position as that of line X-X in Fig. 17 as viewed in the direction of arrows X. Fig. 20 is a left side view of the partition 27a of the refrigerator 100 according to Embodiment illustrating the left side portion 38a. Fig. 21 is a left side view of the partition 27b of the refrigerator 200 according to Embodiment illustrating the left side portion 38b. In Fig. 20, a broken line represents the left side portion 38a. In Fig. 21, a broken line represents the left side portion 38b.

[0040]

As illustrated in Figs. 18 and 20, the left side portion 38a of the partition 27a has the multiple partition apertures 45 (45a to 45c). The mounting apertures 33 (refer to Fig. 11) arranged in the left side 29a of the inner casing 29 communicate with the multiple partition apertures 45. An area E1 including lower parts of the mounting apertures 33 arranged in the left side 29a of the inner casing 29 is covered with the lower flange 36a and the left side portion 38a of the partition 27a. This prevents the urethane foam 23 from leaking out of the partition 27a from the area E1 including the

lower parts of the mounting apertures 33 when injected into the partition 27a through the mounting apertures 33 of the inner casing 29. Similarly, as illustrated in Figs. 19 and 21, the left side portion 38b of the partition 27b has the multiple partition apertures 46 (46a to 46c). The mounting apertures 33 arranged in the left side 29a of the inner casing 29 communicate with the multiple partition apertures 46. An area E2 including upper parts of the mounting apertures 33 arranged in the left side 29a of the inner casing 29 is covered with the upper flange 35b and the left side portion 38b of the partition 27b. This prevents the urethane foam 23 from leaking out of the partition 27a from the area E2 including the upper parts of the mounting apertures 33 when injected into the partition 27b through the mounting apertures 33 of the inner casing 29.

[0041]

Fig. 22 is an enlarged view of the mounting portion 34b with the partition 27a mounted on the right side 29b of the inner casing 29 in Embodiment. Fig. 23 is an enlarged view of the mounting portion 34b with the partition 27b mounted on the right side 29b of the inner casing 29 in Embodiment. Fig. 22 illustrates an enlarged view of the area F of the inner casing 29 in Fig. 16. Fig. 23 illustrates an enlarged view of an area corresponding to the area F of the inner casing 29 in Fig. 16. In Fig. 22, an alternate long and short dashed line represents the mounting portion 34b, and a broken line represents the right side portion 42a. In Fig. 23, an alternate long and short dashed line represents the mounting portion 34b, and a broken line represents the right side portion 42b.

[0042]

As illustrated in Fig. 22, the partition body 37a of the partition 27a has, at its right end, the upper flange 40a, which is plate-shaped and protrudes upward from the partition body 37a mounted on the mounting portion 34b of the inner casing 29, and the lower flange 41a, which is plate-shaped and protrudes downward. The partition body 37a of the partition 27a further has, at its right end, the right side portion 42a included in the right side of the partition body 37a. As illustrated in Fig. 23, the partition body 37b of the partition 27b has, at its right end, the upper flange 40b, which is plate-shaped and protrudes upward from the partition body 37b mounted on the mounting portion 34b of

the inner casing 29, and the lower flange 41b, which is plate-shaped and protrudes downward. The partition body 37b of the partition 27b further has, at its right end, the right side portion 42b included in the right side of the partition body 37b.

[0043]

5 In the partition 27a, as illustrated in Fig. 22, the lower flange 41a is longer than the upper flange 40a so that the height of the opening (i.e., the longitudinal width of the front opening) of the compartment at the bottom is increased. In the partition 27b, as illustrated in Fig. 23, the upper flange 40b is longer than the lower flange 41b so that the height of the opening (i.e., the longitudinal width of the front opening) of the first
10 compartment from the compartment at the bottom is increased. Furthermore, the longitudinal width of the upper flange 40b of the partition 27b is larger than that of the upper flange 40a of the partition 27a, and the longitudinal width of the lower flange 41b of the partition 27b is smaller than that of the lower flange 41a of the partition 27a. In the refrigerator 100 of Model A, the longitudinal width of the recess 30 is substantially
15 the same as a maximum longitudinal width of the right side, which is defined by the upper flange 40a, the lower flange 41a, and the right side portion 42a, of the partition 27a. In the refrigerator 200 of Model B, the longitudinal width of the recess 30 is substantially the same as a maximum longitudinal width of the right side, which is defined by the upper flange 40b, the lower flange 41b, and the right side portion 42b, of
20 the partition 27b. Thus, the common inner casing 29 can be used to provide the two types of refrigerators 100 and 200 having the partitions 27a and 27b, respectively, which are mounted at different positions.

[0044]

Fig. 24 is a diagram illustrating the positional relationship between the mounting
25 apertures 33 of the inner casing 29 and the partition apertures 45 and 46 of the partitions 27a and 27b each mounted on the left side 29a of the inner casing 29 of the refrigerator 100, 200 according to Embodiment. For the partitions 27a and 27b each mounted on the mounting portions 34a and 34b of the inner casing 29, the position of the partition body 37a relative to the inner casing 29 of the refrigerator 100 differs from
30 the position of the partition body 37b relative to the inner casing 29 of the refrigerator

200. Therefore, the positions of the partition apertures 45 for urethane foam injection in the sides of the partition body 37a relative to the mounting apertures 33 for urethane foam injection in the inner casing 29 also differ from the positions of the partition apertures 46 for urethane foam injection in the sides of the partition body 37b relative to the mounting apertures 33 for urethane foam injection in the inner casing 29.

[0045]

When the partition 27a is mounted on the left side 29a of the inner casing 29, the intermediate partition apertures 45b of the partition 27a coincide with upper parts of the intermediate mounting apertures 33b in side view, and are situated toward the upper parts of the intermediate mounting apertures 33b. In contrast, when the partition 27b is mounted on the left side 29a of the inner casing 29, the intermediate partition apertures 46b of the partition 27b coincide with the intermediate mounting apertures 33b in side view, and are situated toward lower parts of the intermediate mounting apertures 33b. That is, as illustrated in Fig. 24, the intermediate mounting apertures 33b are arranged in the left side 29a of the inner casing 29 so that the apertures can be aligned with both the intermediate partition apertures 45b of the partition 27a and the intermediate partition apertures 46b of the partition 27b. In other words, when the partition 27a, 27b is mounted on the left side 29a of the inner casing 29, open regions of the intermediate mounting apertures 33b coincide with open regions of the intermediate partition apertures 45b, 46b in side view. Although not illustrated, an open region of the rear mounting aperture 33a coincides with an open region of the partition aperture 45a, 46a in side view. Although not illustrated, when the partition 27a, 27b is mounted on the right side 29b of the inner casing 29, the open regions of the intermediate mounting apertures 33b coincide with the open regions of the intermediate partition apertures 45b, 46b in side view. In addition, the open region of the rear mounting aperture 33a coincides with the open region of the partition aperture 45a, 46a in side view.

[0046]

Similarly, when the partition 27a is mounted on the left side 29a of the inner casing 29, the front partition aperture 45c of the partition 27a coincides with the front mounting aperture 33c in side view, and is situated toward an upper part of the front

mounting aperture 33c. In contrast, when the partition 27b is mounted on the left side 29a of the inner casing 29, the front partition aperture 46c of the partition 27b coincides with the front mounting aperture 33c in side view, and is situated toward a lower part of the front mounting aperture 33c. That is, as illustrated in Fig. 24, the front mounting aperture 33c is located in the left side 29a of the inner casing 29 so that the aperture can be aligned with both the front partition aperture 45c of the partition 27a and the front partition aperture 46c of the partition 27b. In other words, when the partition 27a, 27b is mounted on the left side 29a of the inner casing 29, an open region of the front mounting aperture 33c coincides with an open region of the front partition aperture 45c, 46c in side view. Although not illustrated, when the partition 27a, 27b is mounted on the right side 29b of the inner casing 29, the open region of the front mounting aperture 33c coincides with the open region of the front partition aperture 45c, 46c in side view.

[0047]

Such a configuration allows both the partition 27a and the partition 27b in the inner casings 29 having the same shape to be filled with the urethane foam 23. This allows commonality of a mold for forming the inner casing 29 between the refrigerator 100 and the refrigerator 200. This eliminates the need for making different molds, resulting in a reduction in manufacturing cost. The intermediate partition apertures 45b may overlap the intermediate partition apertures 46b. The front partition aperture 45c may overlap the front partition aperture 46c.

[0048]

When the partition 27b is mounted on the inner casing 29, the vegetable compartment 5 is located above the partition body 37b, and the freezer compartment 4 is located below the partition body 37b. In this case, the vegetable compartment 5 is located between the storage compartments, each having a lower temperature zone than that of the vegetable compartment 5, and is susceptible to cooling. To reduce heat transfer between the vegetable compartment 5 and the storage compartments located vertically next to the vegetable compartment 5, a vacuum thermal insulator 50 is disposed in the partition body 37b. The thermal conductivity of the vacuum thermal insulator 50 is approximately 10 times that of the urethane foam 23. Placing the

vacuum thermal insulator 50 in the partition body 37b allows the thickness of the partition body 37b in the longitudinal direction to be smaller than that of the partition body 37a. When the partition 27a is mounted on the inner casing 29, the vegetable compartment 5 is located below the partition body 37a, and the freezer compartment 4 is located above the partition body 37a. In this case, the partition body 37a may have lower thermal insulation performance than that in the configuration in which the vegetable compartment 5 is located above the freezer compartment 4. Instead of the vacuum thermal insulator 50, the urethane foam 23 fills the inside of the partition body 37a.

[0049]

Fig. 25 is a transverse sectional view of the partition 27b of Fig. 13 taken along line A-A as viewed in the direction of arrows A. As illustrated in Fig. 25, the partition 27b includes the vacuum thermal insulator 50 in the partition body 37b. The vacuum thermal insulator 50 is disposed in the internal space 37ba of the partition body 37b and is stuck on an inner surface of a lower side 37bb of the partition body 37b with an adhesive element 47. Since the vacuum thermal insulator 50 is disposed in a lower portion of the inside of the partition body 37b, a front portion of an upper side 37bc of the partition body 37b can be partly hollowed to form multiple protrusions 37bd and multiple recesses 37be (refer to Fig. 13) on and in the upper side 37bc. The recesses 37be in the upper side 37bc of the partition body 37b result in an increase in storage space of the vegetable compartment 5. The protrusions 37bd provide a plane at a constant level in the front-rear direction of the upper side 37bc. Thus, a common jig that reduces or eliminates deformation of the partition body 37b when the urethane foam 23 is injected into the partition body 37b can be used for the partition 27a and the partition 27b.

[0050]

To provide commonality of a punching die for the mounting apertures 33 of the inner casing 29 between Model A and Model B, the mounting apertures 33 of the inner casing 29 are shaped and sized to communicate with both the partition apertures 45 of the partition 27a and the partition apertures 46 of the partition 27a, as illustrated in Fig.

24. The punching die and the shapes and sizes of the mounting apertures 33 are not limited to those in the above example. A punching die for the mounting apertures 33 of Model A may differ from that of Model B. In this case, the mounting apertures 33 of the inner casing 29 may have smaller sizes than those of the mounting apertures 33 in the use of the punching die common to Model A and Model B. This leads to increased strength of the side surface of each recess 30 of the inner casing 29.

[0051]

Although the mounting apertures 33 of the inner casing 29 are sized to communicate with both the partition apertures 45 of the partition 27a and the partition apertures 46 of the partition 27a in Embodiment, the shapes of the mounting apertures 33 of the inner casing 29 are not limited to those in the above example. The inner casing 29 may be formed to have two types of mounting apertures 33, or apertures communicating only with the partition apertures 45 of the partition 27a of Model A and apertures communicating only with the partition apertures 46 of the partition 27b of Model B. If the positions of the mounting apertures 33 for the partition apertures 45 of the partition 27a mounted on the inner casing 29 are at a distance from those for the partition apertures 46 of the partition 27b mounted on the inner casing 29, the area of each of the mounting apertures 33 can be reduced. This leads to increased strength of the side surface of each recess 30 of the inner casing 29.

[0052]

Fig. 26 is a diagram illustrating the positional relationship between mounting apertures of the inner casing 29 and the partition apertures 45 and 46 of the partitions 27a and 27b each mounted on the left side 29a of the inner casing 29 in a first modification of the refrigerator 100, 200 according to Embodiment. Fig. 27 is a diagram illustrating the positional relationship between the mounting apertures of the inner casing 29 and the partition apertures 45, 46 of the partition 27a, 27b when the partition 27a is mounted on the left side 29a of the inner casing 29 in a second modification of the refrigerator 100 according to Embodiment. Fig. 28 is a diagram illustrating the positional relationship between the mounting apertures of the inner casing 29 and the partition apertures 45, 46 of the partition 27b when the partition 27b is

mounted on the left side 29a of the inner casing 29 in a second modification of the refrigerator 200 according to Embodiment. Fig. 29 is a diagram illustrating the positional relationship between the mounting apertures of the inner casing 29 and the partition apertures 45 and 46 of the partitions 27a and 27b each mounted on the left side 29a of the inner casing 29 in a third modification of the refrigerator 100, 200 according to Embodiment.

[0053]

In Fig. 24, the front partition aperture 45c and the front partition aperture 46c are aligned with one front mounting aperture 33c, and the intermediate partition aperture 45b and the intermediate partition aperture 46b are aligned with one intermediate mounting aperture 33b. The shapes and sizes of the mounting apertures 33 located in the left side 29a are not limited to those in the above example. As illustrated in Fig. 26, the left side 29a may have a first front mounting aperture 47c and a second front mounting aperture 48c spaced apart from each other so that the first front mounting aperture 47c coincides with the front partition aperture 45c in side view when the partition 27a is mounted on the left side 29a of the inner casing 29 and so that the second front mounting aperture 48c coincides with the front partition aperture 46c in side view when the partition 27b is mounted on the left side 29a of the inner casing 29. The left side 29a further has first intermediate mounting apertures 47b, second intermediate mounting apertures 48b, a first rear mounting aperture (not illustrated), and a second rear mounting aperture (not illustrated) arranged in the same manner as that for the first and second front mounting apertures 47c and 48c.

[0054]

Furthermore, as illustrated in Figs. 27 and 28, the left side 29a may have either one of the first front mounting aperture 47c and the second front mounting aperture 48c, which is selectively formed to fit the type of partition by punching. As illustrated in Fig. 27, in the case where the first front mounting aperture 47c is formed, the partition 27a is mounted on the left side 29a of the inner casing 29. As illustrated in Fig. 28, in the case where the second front mounting aperture 48c is formed, the partition 27b is mounted on the left side 29a of the inner casing 29. For each first intermediate

mounting aperture 47b, each second intermediate mounting aperture 48b, the first rear mounting aperture (not illustrated), and the second rear mounting aperture (not illustrated), either one of the upper aperture and the lower aperture is similarly formed to fit the type of partition. In this case, the common inner casing 29 can be used to provide the two types of refrigerators 100 and 200 having the partitions 27a and 27b, respectively, which are mounted at different positions.

[0055]

Although the front mounting aperture 33c and the intermediate mounting aperture 33b each have a longitudinally long shape in Fig. 24, the shapes of the mounting apertures 33 are not limited to those in the above example. As illustrated in Fig. 29, the front mounting aperture 33c, the intermediate mounting apertures 33b, and the rear mounting aperture 33a may have a shape other than the longitudinally long shape, for example, a laterally long shape or a square shape.

[0056]

As described above, the refrigerator 100, 200 according to Embodiment includes the box 101, which includes the outer casing 22 constituting a shell, the inner casing 29 disposed to define the first space with the outer casing 22 and having the injection port for thermal insulator injection, and the thermal insulator filling the first space and which has the storage space to store food, and the partition 27a, 27b including the partition body 37a, 37b and the fastening portions fixing the partition body 37a, 37b to the inner casing 29. The partition body 37a, 37b has the second space inside and divides the storage space into the multiple storage compartments for different temperature zones. The partition 27a, 27b has the partition apertures 45, 46 arranged in the sides of the partition body 37a, 37b. The inner casing 29 has the mounting portions 34a and 34b on which the fastening portions are mounted. Each of the mounting portions 34a and 34b has the mounting apertures 33 in a surface that faces the side of the partition body 37a, 37b when the fastening portions are mounted on the mounting portion 34a, 34b and the partition body 37a, 37b is fixed to the inner casing 29. The mounting apertures 33 communicate with the first space. The partition body 37a, 37b is mountable, in the inner casing 29, at a position where the partition apertures 45, 46 coincide with upper

parts of the mounting apertures 33 in side view of the inner casing 29 or at a position where the partition apertures 45, 46 coincide with lower parts of the mounting apertures 33 in side view of the inner casing 29.

[0057]

5 In the refrigerator 100, 200 according to Embodiment, the partition body 37a, 37b is mountable, in the inner casing 29, at the position where the partition apertures 45, 46 coincide with the upper parts of the mounting apertures 33 in side view of the inner casing 29 or at the position where the partition apertures 45, 46 coincide with the lower parts of the mounting apertures 33 in side view of the inner casing 29. In the
10 longitudinal direction of the refrigerator, therefore, the position of the partition body 37a, 37b mounted such that the partition apertures 45, 46 are aligned with the upper parts of the mounting apertures 33 differs from the position of the partition body 37a, 37b mounted such that the partition apertures 45, 46 are aligned with the lower parts of the mounting apertures 33. At each of the positions, the partition apertures 45, 46 are
15 aligned with the mounting apertures 33. This allows the thermal insulator injected into the first space through the injection port to be injected into the second space of the partition body 37a, 37b through the mounting apertures 33 communicating with the first space and the partition apertures 45, 46. As described above, a mounting position for the partition 27a, 27b to be mounted in the box 101 can be changed. This allows each
20 of the storage compartments to have a suitable opening, thus increasing the user-friendliness. In addition to that the mounting position for the partition 27a, 27b to be mounted in the box 101 can be changed, the thermal insulator injected into the first space through the injection port can be injected into the second space of the partition body 37a, 37b regardless of the position of the partition 27a, 27b mounted in the box
25 101. This allows commonality of a mold for forming the inner casing 29, thus eliminating the need for manufacturing multiple molds. This results in a reduction in manufacturing cost. In other words, a reduction in manufacturing cost can be achieved as well as an increase in user-friendliness. Furthermore, the box 101 is manufactured individually for each model. Such a configuration can provide an optimum cooling
30 structure and an optimum thermal insulating structure suitable for the positions of the

storage compartments, as compared with a traditional configuration that includes the common box 101 manufactured irrespective of the type of model and in which a user freely sets a temperature for each storage compartment. This reduces power consumption and loss of internal volume.

5 [0058]

In the refrigerator 100, 200 according to Embodiment, the multiple mounting apertures 33 include the rear mounting aperture 33a located adjacent to the rear of the inner casing 29, the front mounting aperture 33c located closer to the front of the inner casing 29 than the rear mounting aperture 33a, and the multiple intermediate mounting apertures 33b located between the rear mounting aperture 33a and the front mounting aperture 33c. The rear mounting aperture 33a and the front mounting aperture 33c each have a larger area than that of each of the intermediate mounting apertures 33b.

[0059]

In the refrigerator 100, 200 according to Embodiment, when the thermal insulator in a liquid state is injected into the internal space 44 through the injection port in the rear of the inner casing 29, the thermal insulator in the liquid state flows toward a front portion of the inner casing 29 while exhibiting high fluidity. For this reason, the front mounting aperture 33c, which is made larger than the intermediate mounting apertures 33b, allows the thermal insulator injected from the rear of the inner casing 29 and having high fluidity to fully fill the inside of the partition 27a, 27b. In addition, the rear mounting aperture 33a, which is made larger than the intermediate mounting apertures 33b, allows the thermal insulator having fluidity that decreases until the thermal insulator reaches the rear mounting aperture 33a to fill a rear portion of the inside of the partition 27a, 27b.

25 [0060]

In the refrigerator 100 according to Embodiment, the partition 27a is a first partition that is mounted in the inner casing 29 such that the partition apertures 45 are aligned with the upper parts of the mounting apertures 33. When the first partition is mounted in the inner casing 29, the mounting apertures 33 are partly closed by the lower flanges 36a and 41a, serving as the fastening portions of the first partition, and

the sides of the partition body 37a. In the refrigerator 200 according to Embodiment, the partition 27b is a second partition that is mounted in the inner casing 29 such that the partition apertures 46 are aligned with the lower parts of the mounting apertures 33. When the second partition is mounted in the inner casing 29, the mounting apertures 33 are partly closed by the upper flanges 35b and 40b, serving as the fastening portions of the second partition, and the sides of the partition body 37b.

[0061]

The configuration of the refrigerator 100, 200 according to Embodiment prevents the thermal insulator from leaking from the area E1 including the lower parts of the mounting apertures 33 or the area E2 including the upper parts of the mounting apertures 33 when injected into the partition 27a, 27b.

Reference Signs List

[0062]

1: refrigerator compartment, 2: ice-making compartment, 3: small freezer compartment, 4: freezer compartment, 5: vegetable compartment, 6: refrigerator-compartment left door, 7: refrigerator-compartment right door, 8: compressor, 9: machine-room condenser, 10: left-side condensing pipe, 11: top-surface condensing pipe, 12: rear-surface condensing pipe, 13: right-side condensing pipe, 14: condensation preventing pipe, 15: dryer, 16: capillary tube, 17: cooler, 18: muffler, 19: suction pipe, 20: machine room, 21: outer casing, 22: urethane foam, 23: front flange, 24: front flange, 25: cooling fan, 26: duct, 27a: partition, 27b: partition, 28: thermal insulator, 29: inner casing, 29a: left side, 29b: right side, 30: recess, 31: upper protrusion, 32: lower protrusion, 33: mounting apertures, 33a: rear mounting aperture, 33b: intermediate mounting aperture, 33c: front mounting aperture, 34a: mounting portion, 34b: mounting portion, 35a: upper flange, 35b: upper flange, 36a: lower flange, 36b: lower flange, 37a: partition body, 37aa: internal space, 37b: partition body, 37ba: internal space, 37bb: lower side, 37bc: upper side, 37bd: protrusion, 37be: recess, 38a: left side portion, 38b: left side portion, 39: cooling room, 40a: upper flange, 40b: upper flange, 41a: lower flange, 41b: lower flange, 42a: right side portion, 42b: right side portion, 44: internal space, 45: partition apertures, 45a: partition aperture, 45b: intermediate partition

aperture, 45c: front partition aperture, 46: partition apertures, 46a: partition aperture,
46b: intermediate partition aperture, 46c: front partition aperture, 47: adhesive element,
47b: first intermediate mounting aperture, 47c: first front mounting aperture, 48b:
second intermediate mounting aperture, 48c: second front mounting aperture, 50:
5 vacuum thermal insulator, 100: refrigerator, 101: box, 103: refrigerant circuit, 200:
refrigerator

CLAIMS

[Claim 1]

A refrigerator comprising:

5 a box including an outer casing constituting a shell, an inner casing disposed to define a first space with the outer casing and having an injection port for thermal insulator injection, and a thermal insulator filling the first space, the box having a storage space to store food; and

10 a partition including a partition body and a fastening portion fixing the partition body to the inner casing, the partition body having a second space inside and a partition aperture in a side thereof and dividing the storage space into a plurality of storage compartments for different temperature zones, wherein

the inner casing includes a mounting portion on which the fastening portion is mounted,

15 the mounting portion has a mounting aperture in a surface that faces the side of the partition body when the fastening portion is mounted on the mounting portion and the partition body is fixed to the inner casing,

the mounting aperture communicates with the first space, and

20 the partition body is mountable, in the inner casing, at a position where the partition aperture coincides with an upper part of the mounting aperture in side view of the inner casing or at a position where the partition aperture coincides with a lower part of the mounting aperture in side view of the inner casing.

[Claim 2]

The refrigerator of claim 1, wherein the fastening portion includes

an upper flange extending upward from the side of the partition body and

25 a lower flange extending downward from the side of the partition body.

[Claim 3]

The refrigerator of claim 2, wherein

the mounting portion includes an upper protrusion protruding from a side of the inner casing toward the storage space, a lower protrusion located below the upper

protrusion and protruding from the side of the inner casing toward the storage space, and a recess located between the upper protrusion and the lower protrusion, and the upper flange and the lower flange are interposed between the upper protrusion and the lower protrusion.

5 [Claim 4]

The refrigerator of claim 3, wherein the mounting portion is located in the side of the inner casing and extends in a front-rear direction of the box, and the mounting aperture is one of a plurality of mounting apertures arranged in the recess.

10

[Claim 5]

The refrigerator of claim 4, wherein the plurality of mounting apertures include a rear mounting aperture located adjacent to a rear of the inner casing, a front mounting aperture located closer to a front of the inner casing than the rear mounting aperture, and a plurality of intermediate mounting apertures located between the rear mounting aperture and the front mounting aperture, and

15

the rear and front mounting apertures each have a larger area than that of each of the plurality of intermediate mounting apertures.

20

[Claim 6]

The refrigerator of any one of claims 2 to 5, wherein the partition is a first partition that is mounted in the inner casing such that the partition aperture is aligned with the upper part of the mounting aperture, and the mounting aperture is partly closed by the lower flange included in the fastening portion of the first partition and the side of the partition body of the first partition mounted in the inner casing.

25

[Claim 7]

The refrigerator of claim 6, wherein the partition is a second partition that is mounted in the inner casing such that the partition aperture is aligned with the lower part of the mounting aperture, and

30

the mounting aperture is partly closed by the upper flange included in the fastening portion of the second partition and the side of the partition body of the second partition mounted in the inner casing.

[Claim 8]

5 The refrigerator of claim 6, wherein
the partition body is fixed at a first position higher than a second position in the inner casing, and
the partition body divides the storage space into a freezer compartment and a vegetable compartment located below the freezer compartment.

10 [Claim 9]

The refrigerator of claim 7, wherein
the partition body is fixed at a second position lower than a first position in the inner casing, and
the partition body divides the storage space into a freezer compartment and a
15 vegetable compartment located above the freezer compartment.