

DESCRIPTION

Title of Invention

REFRIGERATOR

5 Technical Field

[0001]

The present disclosure relates to a refrigerator, and in particular, to a refrigerator having a door including grip portions.

[0002]

10 Background Art

[0002]

An existing refrigerator has a configuration in which storage compartments are formed in a box and are opened and closed by respective doors. For example, a refrigerator described in Patent Literature 1 is provided with a door including a grip portion that is defined, at a side thereof, by a front outer plate and a rear outer plate.

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Citation List

Patent Literature

[0003]

Patent Literature 1: Japanese Patent No. 5178208

20 Summary of Invention

Technical Problem

[0004]

In the door of the refrigerator described in Patent Literature 1, a front outer plate that forms most part of the front of the door includes a grip portion projection that is used by the user to open and close the door, and a rear outer plate formed at the rear of the grip portion projection includes an insertion recess into which a user's hand is to be inserted, and a rear projection. The front outer plate and the rear outer plate are connected by a retainer, and the grip portion is formed on the side of the door.

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However, an upper cap provided on the door of the refrigerator described in Patent

30 Literature 1 holds an upper end of the front outer plate in a front-back direction and is

thus increased in width in an up-down direction, and the front of the upper cap projects to a region located in front of the front outer plate, thus affecting the design of the refrigerator.

[0005]

5 The present disclosure is applied to solve the above problem, and relates to a refrigerator that is improved in the design of a door including a grip portion at a side thereof.

Solution to Problem

[0006]

10 A refrigerator according to an embodiment of the present disclosure includes: a box having an opening at a front thereof and having therein a storage space; and a door including a grip portion on a first side that is one side of the door in a lateral direction, attached to the box at on a second side that is the opposite side of the first side, and configured to open and close the opening. The door further includes: a front outer
15 plate; a rear outer plate provided behind the front outer plate; a connection component connecting the front outer plate and the rear outer plate in a front-back direction and forming at least part of the first side of the door; and an upper cap provided on the front outer plate, the rear outer plate, and the connection component and forming a top of the door. The front outer plate includes: a front plate forming at least part of a front of the
20 door; a front folded portion located behind the front plate, and folded toward the second side, from an end portion of the front plate that is adjacent to the first side; and a first flange provided at an upper end of the front folded portion and extending toward a region surrounded by the front folded portion and the front plate. The rear outer plate includes: a rear plate forming at least part of a rear of the door, a rear folded portion
25 located ahead of the rear plate, and folded toward the second side, from an end portion of the rear plate that is adjacent to the first side; and a second flange provided at an upper end of the rear folded portion and extending toward a region surrounded by the rear folded portion and the rear plate. The upper cap includes: an upper wall; an outer peripheral wall extending downward from an outer peripheral portion of the upper wall; a
30 first flange accommodating portion formed in the shape of a groove, provided at the

outer peripheral wall, and accommodating the first flange; and a second flange
accommodating portion formed in the shape of a groove, provided at the outer
peripheral wall, and accommodating the second flange. The grip portion is defined by
the front folded portion, part of the connection component, and the rear folded portion,
and is recessed toward the second side.

Advantageous Effects of Invention

[0007]

In the door of the refrigerator according to the embodiment of the present
disclosure, the front outer plate and the rear outer plate are connected by the
connection component at the first side that is the one side of the door in the lateral
direction. The grip portion is defined by the front outer plate, the rear outer plate, and
the connection component and is recessed in the first side of the door. The front outer
plate and the rear outer plate include the respective flanges and are connected to the
upper cap when the respective flanges are fitted into the flange accommodating
portions provided at the upper cap. Thus, the grip portion is provided on the side of the
door without affecting the design, and the design of the door is thus improved.

Brief Description of Drawings

[0008]

[Fig. 1] Fig. 1 is a perspective view illustrating an external appearance of a
refrigerator according to Embodiment 1.

[Fig. 2] Fig. 2 is a perspective view illustrating an external appearance of a door
of the refrigerator according to Embodiment 1.

[Fig. 3] Fig. 3 is an exploded perspective view of the door of the refrigerator
according to Embodiment 1.

[Fig. 4] Fig. 4 is an enlarged view of a region A as illustrated in Fig. 3.

[Fig. 5] Fig. 5 is an enlarged front perspective view of the region A as illustrated in
Fig. 3.

[Fig. 6] Fig. 6 is an enlarged front perspective view of a region B as illustrated in
Fig. 3.

[Fig. 7] Fig. 7 is a bottom view of an upper cap of the refrigerator according to Embodiment 1.

[Fig. 8] Fig. 8 is an enlarged view of a region C as illustrated in Fig. 7.

[Fig. 9] Fig. 9 is an enlarged view of a region D as illustrated in Fig. 7.

[Fig. 10] Fig. 10 is a top view of the door of the refrigerator according to Embodiment 1.

[Fig. 11] Fig. 11 is a sectional view taken along line E-E in Fig. 10.

[Fig. 12] Fig. 12 is a sectional view taken along line F-F in Fig. 11.

[Fig. 13] Fig. 13 is a front view of the door of the refrigerator according to Embodiment 1.

[Fig. 14] Fig. 14 is a sectional view taken along line G-G in Fig. 13.

[Fig. 15] Fig. 15 is an enlarged view of a region J as illustrated in Fig. 14.

[Fig. 16] Fig. 16 is a sectional view taken along line H-H in Fig. 13.

[Fig. 17] Fig. 17 is a sectional view taken along line I-I in Fig. 13.

[Fig. 18] Fig. 18 is an exploded perspective view of an upper part of one side of a door of a refrigerator according to Embodiment 2.

[Fig. 19] Fig. 19 is an exploded front perspective view of the upper part of the one side of the door of the refrigerator according to Embodiment 2.

[Fig. 20] Fig. 20 is an enlarged sectional view of a grip portion of the door of the refrigerator according to Embodiment 2 that is taken along line G-G in Fig. 13.

Description of Embodiments

[0009]

Embodiments of the present disclosure will be described below with reference to the drawings. In each of figures including Fig. 1 that will be referred to below, components that are the same as or equivalent to those in a previous figure or previous figures are denoted by the same reference signs, and the same is true of the entire text of descriptions that will be made regarding the embodiments described below. In addition, regarding each of the embodiments, matters that are the same as or equivalent to those described in a previous embodiment or previous embodiments will be denoted by the same reference signs, and their descriptions may be omitted. The

configurations of structural elements described in the entire text of the specification are merely examples and are not limited to those described in the specification.

Furthermore, configurations regarding the embodiments can be partially combined without causing any problem even if not particularly specified.

[0010]

For example, in the figures, relationships in, for example, size or shape between components may differ from those of actual ones. In addition, in the following, the up-down direction of a refrigerator 100 may be also referred to as “height direction”; the lateral direction of the refrigerator 100 may be also referred to as “width direction”; and the front-back direction of the refrigerator 100 may be also referred to as “depth direction.”

[0011]

Embodiment 1

Fig. 1 is a perspective view illustrating an external appearance of the refrigerator 100 according to Embodiment 1. The refrigerator 100 includes a box 1 that has an opening at its front and includes therein a refrigerator compartment 2, a vegetable compartment 3, and a freezer compartment 4 as storage spaces, and a door 10 attached to the box 1 to open and close the opening. The refrigerator compartment 2 is opened and closed by the door 10. The door 10 includes a grip portion 50 at the left side in the lateral direction and a second grip portion 51 at the top thereof. The door 10 is a hinge-type door, and an upper right side and a lower right side thereof are fixed to the box 1 by hinges 5. When being rotated around the hinges 5, which serve as axes, the door 10 opens and closes the refrigerator compartment 2. A drawer 20 configured to open and close the vegetable compartment 3 and a drawer 30 configured to open and close the freezer compartment 4 are both provided as pull-out drawers. When being moved in the front-back direction, the pull-out drawers 20 and 30 can open and close the vegetable compartment 3 and the freezer compartment 4.

[0012]

Fig. 1 illustrates an example in which the box 1 includes the refrigerator compartment 2, the vegetable compartment 3, and the freezer compartment 4 as

storage spaces. However, the refrigerator 100 may include only one refrigerator compartment 2 to be opened and closed by the door 10. In addition, the refrigerator 100 may include a refrigerator compartment 2 having two or more storage spaces to be opened and closed by a plurality of hinge-type doors 10.

5 [0013]

The present disclosure describes a configuration in which the grip portion 50 is provided at the left side and the hinges 5 are provided at the right side in front view of the door 10. However, in the refrigerator 100 according to the present disclosure, the door 10 can be configured to be laterally symmetrical. Thus, the grip portion 50 may
10 be provided at the right side of the door, and the hinges 5 may be provided at the left side of the door.

[0014]

Fig. 2 is a perspective view illustrating an external appearance of the door 10 of the refrigerator 100 according to Embodiment 1. The door 10 includes a front outer plate 110, a rear outer plate 120, a connection component 130, an upper cap 140, a lower cap 150, and an inner plate 160. The front outer plate 110 forms the front of the door 10. The rear outer plate 120 and the inner plate 160 are provided behind the front outer plate 110 and form the rear of the door 10. The connection component 130 is provided between the front outer plate 110 and the rear outer plate 120 in the front-back
15 direction and connects the front outer plate 110 and the rear outer plate 120 in the front-back direction. The connection component 130 is made of resin and forms at least part of the left side of the door 10. The grip portion 50 is defined at the left side of the door 10 by the front outer plate 110, the connection component 130, and the rear outer plate 120. The grip portion 50 is shaped such that a recess portion recessed toward
20 the right side extends in the up-down direction. The grip portion 50 will be described later in detail.

25 [0015]

The upper cap 140 is a component that is provided on the front outer plate 110, the rear outer plate 120, and the connection component 130 and that covers the upper
30 ends of the front outer plate 110, the rear outer plate 120, and the connection

component 130. In the upper cap 140, the second grip portion 51 is formed. The second grip portion 51 is recessed downward such that part of the top of the upper cap 140 is recessed downward and extends in the lateral direction. The lower cap 150 is provided under the front outer plate 110, the rear outer plate 120, and the connection component 130. In the lower cap 150, a third grip portion 52 is formed. The third grip portion 52 is recessed upward such that part of the bottom of the lower cap 150 is recessed upward and extends in the lateral direction. The recessed part of the grip portion 50, the recessed part of the second grip portion 51, and the recessed part of the third grip portion 52 are continuous with each other to form a continuous grip portion.

[0016]

Fig. 3 is an exploded perspective view of the door 10 of the refrigerator 100 according to Embodiment 1. In Fig. 3, illustration of the inner plate 160 is omitted.

[0017]

The door 10 is configured to be symmetrical in the up-down direction, and the upper cap 140 and the lower cap 150 are located symmetrical in up-down direction. Thus, the configuration of the upper cap 140 and the second grip portion 51 will be described below, but descriptions of the lower cap 150 and the third grip portion 52 corresponding to the second grip portion 51 will be omitted.

[0018]

The front outer plate 110 includes a front plate 110a, a second front plate 110b, a third front plate 110c, a fourth front plate 110d, a fifth front plate 110e, and a first flange 115. The front plate 110a forms at least part of the front of the door 10. The second front plate 110b extends from a left end portion of the front plate 110a toward the rear and forms part of the left side of the door 10. The third front plate 110c extends from a rear end of the second front plate 110b toward the right side. The fourth front plate 110d extends from a right end portion of the front plate 110a toward the rear and forms the right side of the door 10. The fifth front plate 110e extends from a rear end of the fourth front plate 110d toward the left side.

[0019]

The second front plate 110b and the third front plate 110c form a front folded portion 110A. The front folded portion 110A is located behind the front plate 110a and is shaped such that it is folded from the left end portion of the front plate 110a toward the right side. The front folded portion 110A forms part of the grip portion 50.

5 [0020]

The first flange 115 is provided at the upper end of the front outer plate 110. The first flange 115 extends, at an upper end of the front folded portion 110A, toward a region surrounded by the front folded portion 110A and the front plate 110a. The first flange 115 will be described later in detail.

10 [0021]

The rear outer plate 120 includes a rear plate 120a, a second rear plate 120b, a third rear plate 120c, and a second flange 125. The rear plate 120a is a plate extending parallel to the front plate 110a and forms at least part of the rear of the door 10 in Embodiment 1. The second rear plate 120b extends from a left end portion of the rear plate 120a toward the front and forms part of the left side of the door 10. The third rear plate 120c extends from a front end of the second rear plate 120b toward the right side. The second rear plate 120b and the third rear plate 120c form a rear folded portion 120A. The rear folded portion 120A is located ahead of the rear plate 120a and is shaped such that it is folded toward the right side, from the left end portion of the rear plate 120a. The rear folded portion 120A forms part of the grip portion 50.

20 [0022]

The second flange 125 is provided at the upper end of the rear outer plate 120. The second flange 125 extends toward a region surrounded by the rear folded portion 120A and the rear plate 120a. The second flange 125 will be described later in detail.

25 [0023]

The connection component 130 includes a connection plate 130a, a second connection plate 130b, a third connection plate 130c, a first fixing portion 131, and a second fixing portion 132. The connection plate 130a extends in the front-back direction and the up-down direction and forms part of the grip portion 50. The second connection plate 130b extends from a front end of the connection plate 130a toward the

right side. The third connection plate 130c extends from a rear end of the connection plate 130a toward the right side.

[0024]

The first fixing portion 131 is provided at the second connection plate 130b. The second fixing portion 132 is provided at the third connection plate 130c. The first fixing portion 131 and the second fixing portion 132 will be described later in detail.

[0025]

The upper cap 140 includes an upper wall 140a and an outer peripheral wall 140b. The upper wall 140a forms the top of the door 10. The second grip portion 51 is provided in part of the upper wall 140a, is recessed downward, and extends in the lateral direction. The outer peripheral wall 140b extends downward from an outer peripheral portion of the upper wall 140a. The upper cap 140 has a left end portion divided into two and is recessed toward the right side as viewed in plan view.

[0026]

Next, the connection between the front outer plate 110, the rear outer plate 120, the connection component 130, and the upper cap 140 will be described with reference to Figs. 4 to 6. Fig. 4 is an enlarged view of a region A as illustrated in Fig. 3. Fig. 5 is an enlarged front perspective view of the region A as illustrated in Fig. 3. Fig. 6 is an enlarged front perspective view of a region B as illustrated in Fig. 3.

[0027]

As illustrated in Figs. 4 and 5, the first flange 115 of the front outer plate 110 includes a first flange portion 115a, a second flange portion 115b, and a third flange portion 115c. The first flange portion 115a is provided at an upper end of the front plate 110a and extends toward the rear; the second flange portion 115b is provided at an upper end of the second front plate 110b and extends toward the right side; and the third flange portion 115c is provided at an upper end of the third front plate 110c and extends toward the front. As illustrated in Fig. 6, the first flange 115 further includes a fourth flange portion 115d that is provided at an upper end of the fourth front plate 110d and extends toward the left side. The first flange portion 115a, the second flange portion 115b, the third flange portion 115c, and the fourth flange portion 115d are

continuous with each other to surround a region surrounded by the front plate 110a, the second front plate 110b, the third front plate 110c, the fourth front plate 110d, and the fifth front plate 110e.

[0028]

5 As illustrated in Figs. 4 to 6, the first flange portion 115a extends, at the upper end of the front plate 110a, from the left end to the right end thereof. As illustrated in Figs. 4 and 5, the second flange portion 115b extends, at the upper end of the second front plate 110b, from the front end portion to the rear end portion thereof.

[0029]

10 The third flange portion 115c extends, at the upper end of the third front plate 110c, from the left end toward the right end thereof but is not provided at an upper end of a right end portion 111. The upper end of the third front plate 110c has a cutout 116, which will be described later. The third flange portion 115c is provided, at the upper end of the third front plate 110c, between the left end portion thereof and the cutout 116.

15 [0030]

As illustrated in Fig. 6, the fourth flange portion 115d extends, at the upper end of the fourth front plate 110d, from the front end portion to the rear end portion thereof. An upper end of the fifth front plate 110e has a cutout 117, which will be described later, but does not include the first flange 115.

20 [0031]

As illustrated in Figs. 4 and 5, the second flange 125 of the rear outer plate 120 includes a first flange portion 125a that is provided at an upper end of the second rear plate 120b and extends toward the right side, and a second flange portion 125b that is provided at an upper end of the third rear plate 120c and extends toward the rear. The first flange portion 125a is provided to extend from a front end portion to a rear end portion of the second rear plate 120b. The second flange portion 125b extends, at the upper end of the third rear plate 120c, from the left end toward the right end thereof but is not provided at an upper end of a right end portion 121. The upper end of the third rear plate 120c has a cutout 126, which will be described later. The second flange portion 125b is provided, at the upper end of the third rear plate 120c, between the left

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end portion thereof and the cutout 126. The first flange portion 125a and the second flange portion 125b are continuous with each other to surround a region surrounded by the rear plate 120a, the second rear plate 120b, and the third rear plate 120c.

[0032]

5 As illustrated in Figs. 4 and 5, the first fixing portion 131 of the connection component 130 is formed such that a right end portion of the second connection plate 130b is folded toward the left side and fixes the front outer plate 110 to the connection component 130. The first fixing portion 131 overlaps with part of an outer peripheral surface of the second connection plate 130b at the front side. The second fixing

10 portion 132 of the connection component 130 is formed such that a right end portion of the third connection plate 130c is folded toward the left side and fixes the rear outer plate 120 to the connection component 130. The second fixing portion 132 overlaps with part of an outer peripheral surface of the third connection plate 130c at the rear side. The connection component 130 and each of the first fixing portion 131 and the

15 second fixing portion 132 are formed integrally with each other. In Embodiment 1, the upper end faces of the connection plate 130a, the second connection plate 130b, the third connection plate 10c, the first fixing portion 131, and the second fixing portion 132 will be collectively referred to as an upper end face 133 of the connection component 130.

20 [0033]

As illustrated in Figs. 4 and 5, the outer peripheral wall 140b of the upper cap 140 includes flange accommodating portions 142 that are formed in the shape of a groove and extend horizontally. The upper cap 140 has the left end portion divided into two, and includes a first projection 143 located at the front side and a second projection 144

25 located at the rear side. The flange accommodating portions 142 include a first flange accommodating portion 142a formed in the shape of a groove and provided at the outer peripheral wall 140b of the first projection 143, and a second flange accommodating portion 142b formed in the shape of a groove and provided at the outer peripheral wall 140b of the second projection 144. The first flange accommodating portion 142a

provided at the outer peripheral wall 140b of the first projection 143 extends to the right end portion.

[0034]

It suffices that the second flange accommodating portion 142b is provided at part of the outer peripheral wall 140b of the second projection 144 at the left side and the front side. The second flange accommodating portion 142b does not need to be provided at the rear side of the outer peripheral wall 140b.

[0035]

As indicated by dashed arrows in Fig. 4, the front outer plate 110 and the rear outer plate 120 are connected to the connection component 130. The end portion 111 of the third front plate 110c is held between the first fixing portion 131 and the second connection plate 130b of the connection component 130. The end portion 121 of the third rear plate 120c is held between the second fixing portion 132 and the third connection plate 130c of the connection component 130. Thus, the front outer plate 110 and the rear outer plate 120 are connected by the connection component 130.

[0036]

The first flange 115 of the front outer plate 110 is accommodated in the first flange accommodating portion 142a of the upper cap 140. Specifically, the first flange portion 115a of the front outer plate 110 is inserted into the first flange accommodating portion 142a provided at the outer peripheral wall 140b at the front side of the upper cap 140. The second flange portion 115b and the third flange portion 115c of the front outer plate 110 are inserted into the first flange accommodating portion 142a provided at the first projection 143 of the upper cap 140. The fourth flange portion 115d of the front outer plate 110 is inserted into the first flange accommodating portion 142a provided at a part of the outer peripheral wall 140b at the right side.

[0037]

The second flange 125 of the rear outer plate 120 is accommodated in the second flange accommodating portion 142b of the upper cap 140. Specifically, the first flange portion 125a and the second flange portion 125b of the rear outer plate 120 are

inserted into the second flange accommodating portion 142b provided at the left side and the front side of the second projection 144 of the upper cap 140.

[0038]

The upper cap 140 is connected onto the front outer plate 110, the connection component 130, and the rear outer plate 12, which are connected to each other. The first flange 115 of the front outer plate 110 is accommodated in the first flange accommodating portion 142a of the upper cap 140. The second flange 125 of the rear outer plate 120 is accommodated in the second flange accommodating portion 142b. The upper end face 133 of the connection component 130 is connected to and continuous with a lower surface of the upper wall 140a, which is formed in the shape of a recess and forms the second grip portion 51 of the upper cap 140.

[0039]

Next, the cutout 116 and the cutout 117 of the front outer plate 110 and the cutout 126 and a cutout 127 of the rear outer plate 120 will be described with reference to Figs. 5 and 6. Each of the cutouts is invisible from the outside of the assembled door 10 and is provided in a place where a user cannot come into contact therewith.

[0040]

The cutout 116 is provided in the upper end of the third front plate 110c, the cutout 117 is provided in the upper end of the fifth front plate 110e, and the cutouts 116 and 117 are recessed downward from above. The cutout 116 is located below the second grip portion 51 of the upper cap 140 in the up-down direction. The cutout 117 is located at the right side of the fifth front plate 110e.

[0041]

The cutout 126 is provided in the upper end of the third rear plate 120c, the cutout 127 is provided in the upper end of the rear plate 120a, and the cutouts 126 and 127 are recessed downward. The cutout 126 is located below the second grip portion 51 of the upper cap 140. The cutout 127 is located on the left side of the rear plate 120a.

[0042]

Referring to Figs. 5 and 6, the length of each of the cutout 117 and the cutout 127 in the lateral direction is greater than that of each of the other cutouts in the lateral direction. However, the length of each of the cutouts in the lateral direction and the height of each cutout are not particularly limited. It suffices that the cutouts are formed in the upper ends of the front outer plate 110 and the rear outer plate 120 such that they are recessed downward.

[0043]

Next, claw portions to be fitted in the respective cutouts 116, 117, 126, and 127 (see Figs. 5 and 6) will be described with reference to Figs. 7 to 12. Fig. 7 is a bottom view of the upper cap 140 of the refrigerator 100 according to Embodiment 1. Fig. 8 is an enlarged view of a region C as illustrated in Fig. 7. In Fig. 8, a side located below the plane of the figure corresponds to the upper side, and a side located above the plane of the figure corresponds to the lower side. Fig. 9 is an enlarged view of a region D as illustrated in Fig. 7. Fig. 10 is a top view of the door 10 of the refrigerator 100 according to Embodiment 1. Fig. 11 is a sectional view taken along line E-E in Fig. 10. Fig. 12 is a sectional view taken along line F-F in Fig. 11.

[0044]

As illustrated in Fig. 8, in the region C as illustrated in Fig. 7, a first claw portion 145a is provided on a lower surface of the first projection 143 of the upper cap 140, and second claw portions 146a and 146b are provided on a lower surface of the second projection 144 of the upper cap 140. In addition, as illustrated in Fig. 9, in the region D as illustrated in Fig. 7, a first claw portion 145b is provided on a lower surface of a right rear end of the upper cap 140. The first claw portions 145a and 145b and the second claw portions 146a and 146b project downward.

[0045]

As illustrated in the section taken along line E-E in Fig. 10, the second claw portion 146a is fitted in the cutout 126 of the third rear plate 120c. As illustrated in Fig. 11, the second claw portion 146a and the cutout 126 are formed to project downward, and the second claw portion 146a is fitted in the cutout 126. In addition, as illustrated

in Fig. 12, the second claw portion 146a also projects toward the rear. Thus, the second claw portion 146a is fitted in the cutout 126.

[0046]

In addition, as illustrated in Fig. 12, the first claw portion 145a has a similar shape to that of the second claw portion 146a and projects toward the front. The first claw portion 145a is fitted in the cutout 116 of the third front plate 110c. In addition, although it is not illustrated, the first claw portion 145b is fitted in the cutout 117 of the fifth front plate 110e (see Fig. 6), and the second claw portion 146b is fitted in the cutout 127 of the rear plate 120a (see Fig. 5).

[0047]

In the present disclosure, the claw portions to be fitted in the respective cutouts provided in the front outer plate 110 will be each referred to as “first claw portion 145”, and the claw portions to be fitted in the respective cutouts provided in the rear outer plate 120 will be each referred to as “second claw portion 146”. The length of each of the first claw portion 145 and the second claw portion 146 in the lateral direction, the height of each of projecting portions of each of the first claw portion 145 and the second claw portion 146, and the length of each of the first claw portion 145 and the second claw portion 146 in the front-back direction are not particularly limited. It suffices that those claw portions are fitted in respective cutouts. In addition, the first claw portion 145a and the first claw portion 145b will be each referred to as “first claw portion 145” in the case where these claw portions do not need to be particularly distinguished from each other, and the second claw portion 146a and the second claw portion 146b will be each referred to as “second claw portion 146” in the case where these claw portions do not need to be particularly distinguished from each other. It suffices that the claw portions and the cutouts are provided as occasion demands, and the numbers thereof are not particularly limited.

[0048]

The front outer plate 110 and the rear outer plate 120 are easily spread out due to springback after being assembled into the refrigerator 100. However, when the first claw portion 145a is fitted into the cutout 116, the third front plate 110c and the upper

cap 140 are prevented from being displaced from each other in the lateral direction; when the first claw portion 145b is fitted into the cutout 117, the fifth front plate 110e and the upper cap 140 are prevented from being displaced from each other in the lateral direction; when the second claw portion 146a is fitted in the cutout 126, the third rear plate 120c and the upper cap 140 are prevented from being displaced from each other in the lateral direction; and when the second claw portion 146b is fitted into the cutout 127, the rear plate 120a and the upper cap 140 are prevented from being displaced from each other in the lateral direction. As a result, the upper cap 140 and each of the front outer plate 110 and the rear outer plate 120 are fixed so as not to be displaced from each other in the lateral direction.

[0049]

As illustrated in Fig. 8, a cover portion 147 is provided at a lower end face 148 of the second grip portion 51 of the upper cap 140. The cover portion 147 is provided at a lower end face of a left end portion of the second grip portion 51 and is configured to be in surface contact with the upper end face of the connection plate 130a of the connection component 130. In addition, as illustrated in Figs. 11 and 12, a foam heat insulation material 17, which will be described later, is filled into a region surrounded by the upper cap 140, the front outer plate 110, and the rear outer plate 120. In the case where the connection component 130 is a resin component that is formed by extrusion molding, in some cases, upper and lower end portions of the connection component 130 formed by cutting are sharpened and need to be subjected to end face processing. Even in this case, the end portion is covered by the cover portion 147 from the outside, thus reducing, when the user uses the door 10, the probability that the user's finger or other portions will come contact with the end portion of the connection component 130.

[0050]

Next, the connection component 130 and the foam heat insulation material 17 will be described with reference to Figs. 13 to 15. Fig. 13 is a front view of the door 10 of the refrigerator 100 according to Embodiment 1. It should be noted that Fig. 13 is a view for facilitating understanding of which sections of the door 10 are illustrated by Figs 14 to 17. Fig. 14 is a sectional view taken along line G-G in Fig. 13. Fig. 15 is an

enlarged view of a region J as illustrated in Fig. 14. Fig. 16 is a sectional view taken along line H-H in Fig. 13. Fig. 17 is a sectional view taken along line I-I in Fig. 13.
[0051]

As illustrated in Fig. 14, the foam heat insulation material 17 is filled into the door
10. The foam heat insulation material 17 is, for example, urethane. The second
connection plate 130b, the third connection plate 130c, the first fixing portion 131, and
the second fixing portion 132 of the connection component 130 are embedded in the
foam heat insulation material 17. In addition, part of the third front plate 110c of the
front outer plate 110 that is held between the first fixing portion 131 and the second
10 connection plate 130b of the connection component 130 and part of the third rear plate
120c of the rear outer plate 120 that is held between the second fixing portion 132 and
the third connection plate 130c of the connection component 130 are also embedded in
the foam heat insulation material 17.

[0052]

As illustrated in Fig. 15, a holding piece 131a to be in contact with the outer
peripheral surface of the second connection plate 130b at the front side is provided at a
distal end of the first fixing portion 131 of the connection component 130. In addition,
the first fixing portion 131 has a retaining portion 131b that projects toward the second
connection plate 130b, between the holding piece 131a and a folded portion 131c. A
20 space is provided between the retaining portion 131b and the second connection plate
130b.

[0053]

The right end portion 111 of the third front plate 110c is inserted and held between
the outer peripheral surface of the second connection plate 130b and the holding piece
25 131a and between the outer peripheral surface of the second connection plate 130b
and the retaining portion 131b. The end portion 111 is pushed against the outer
peripheral surface of the second connection plate 130b and held by the holding piece
131a. Thus, the end portion 111 is not easily displaced in the lateral direction and the
front-back direction. In addition, the retaining portion 131b reduces occurrence of
30 wobbling of the end portion 111 in the front-back direction in the space between the

retaining portion 131b and the second connection plate 130b. In such a manner, the end portion 111 of the third front plate 110c is fixed with the holding piece 131a and the retaining portion 131b of the first fixing portion 131. Thus, it is possible to reduce occurrence of wobbling and movement of the front outer plate 110 in the front-back direction.

[0054]

As illustrated in Fig. 15, a holding piece 132a to be in contact with the outer peripheral surface of the third connection plate 130c at the rear side is provided at the distal end of the second fixing portion 132 of the connection component 130. In addition, the second fixing portion 132 includes a retaining portion 132b that projects toward the third connection plate 130c, between the holding piece 132a and a folded portion 132c. Between the retaining portion 132b and the third connection plate 130c, a space is provided.

[0055]

The right end portion 121 of the third rear plate 120c is inserted and held between the outer peripheral surface of the third connection plate 130c and the holding piece 132a and between the outer peripheral surface of the third connection plate 130c and the retaining portion 132b. The end portion 121 is pushed against the outer peripheral surface of the third connection plate 130c and held by the holding piece 132a. Thus, the end portion 121 is not easily displaced in the lateral direction or the front-back direction. In addition, the retaining portion 132b reduces occurrence of wobbling of the end portion 121 in the front-back direction in the space between the retaining portion 132b and the third connection plate 130c. In such a manner, the end portion 121 of the third rear plate 120c is fixed with the holding piece 132a and the retaining portion 132b of the second fixing portion 132. Thus, it is possible to reduce occurrence of wobbling and movement of the rear outer plate 120 in the lateral direction and the front-back direction.

[0056]

Furthermore, as illustrated in Fig. 15, the length of each of the second connection plate 130b and the third connection plate 130c in the lateral direction is smaller than the

length of the connection plate 130a in the front-back direction and is greater than the length of each of the first fixing portion 131 and the second fixing portion 132 in the lateral direction. Thus, the end portion 111 of the third front plate 110c can be inserted between the holding piece 131a of the first fixing portion 131 and the third front plate 110c by using the second connection plate 130b as a guide. In addition, the end portion 121 of the third rear plate 120c can be inserted between the holding piece 132a of the second fixing portion 132 and the third rear plate 120c by using the third connection plate 130c as a guide.

[0057]

Next, the arrangement of the upper cap 140 and the front plate 110a will be described with reference to Figs. 13, 16, and 17. Fig. 16 is a sectional view taken along line H-H in Fig. 13. Fig. 17 is a sectional view taken along line I-I in Fig. 12.

[0058]

As illustrated in Figs. 16 and 17, the first flange portion 115a of the front plate 110a is accommodated in the first flange accommodating portion 142a of the upper cap 140. Thus, the front of the door 10 has no unevenness.

[0059]

When the door 10 is assembled, it is advisable that the front outer plate 110 and the rear outer plate 120 are connected by the connection component 130, and the upper cap 140 and the lower cap 150 are then attached to the front outer plate 110 and the rear outer plate 120. Furthermore, a vacuum heat insulation material may be provided in the door 10 before injection of the foam heat insulation material 17. In addition, such a vacuum heat insulation material is allowed not to be provided, and whether or not to provide the vacuum heat insulation material may be determined depending on the temperature difference between a set temperature in the storage space and an outdoor air temperature. Furthermore, the foam heat insulation material 17 may be injected after the front outer plate 110, the rear outer plate 120, the connection component 130, the upper cap 140, and the lower cap 150 are connected to each other. In this case, the inner plate 160 can be attached to the front outer plate

110, the rear outer plate 120, the upper cap 140, and the lower cap 150 after injection of the foam heat insulation material 17.

[0060]

Advantages of the refrigerator 100 according to Embodiment 1 will be described below. The refrigerator 100 according to Embodiment 1 includes the box 1 having the opening at the front thereof and having therein the storage space, and the door 10 including the grip portion 50 at a first side that is one side of the door 10 in the lateral direction, attached to the box 1 at positions closer to a second side that is the opposite side of the first side, and configured to open and close the opening. The door 10 further includes: the front outer plate 110; the rear outer plate 120 provided behind the front outer plate 110, the connection component 130 connecting the front outer plate 110 and the rear outer plate 120 in the front-back direction and forming at least part of the first side of the door 10, and the upper cap 140 provided on the front outer plate 110, the rear outer plate 120, and the connection component 130 and forming the top of the door 10. The front outer plate 110 includes the front plate 110a forming at least part of the front of the door 10, the front folded portion 110A folded from the end portion of the front plate 110a that is closer to the first side, toward the second side behind the front plate 110a, and the first flange 115 provided at the upper end of the front folded portion 110A and extending toward the region surrounded by the front folded portion 110A and the front plate 110a. The rear outer plate 120 includes: the rear plate 120a forming at least part of the rear of the door 1; the rear folded portion 120A that is located ahead of the rear plate 120a and folded toward the second side, from the end portion of the rear plate 120a that is adjacent to the first side; and the second flange 125 provided at the upper end of the rear folded portion 120A and extending toward the region surrounded by the rear folded portion 120A and the rear plate 120a. The upper cap 140 includes the upper wall 140a, the outer peripheral wall 140b extending downward from the outer peripheral portion of the upper wall 140a, the first flange accommodating portion 142a formed in the shape of a groove, provided at the outer peripheral wall 140b, and accommodating the first flange 115, and the second flange accommodating portion 142b formed in the shape of a groove, provided at the outer peripheral wall

140b, and accommodating the second flange 125. The grip portion 50 is formed to include the front folded portion 110A, part of the connection component 130, and the rear folded portion 120A, and is recessed toward the second side.

[0061]

5 With the above configuration, at the first side of the door 10 of the refrigerator 100, the grip portion 50 is defined by the front outer plate 110, the rear outer plate 120, and the connection component 130 such that the grip portion 50 is formed in the shape of a recess. Thus, the user can open the door 10 while holding the first side of the door 10. Therefore, the usability of the refrigerator 100 is improved.

10 [0062]

Furthermore, the first flange 115 is accommodated in the first flange accommodating portion 142a, thereby connecting the front outer plate 110 to the upper cap 140. The second flange 125 is accommodated in the second flange accommodating portion 142b, thereby connecting the rear outer plate 120 to the upper cap 140. Since the first flange 115 is inserted into the outer peripheral wall 140b of the upper cap 140, the dimension, in the up-down direction, of part of the upper cap 140 that is exposed to the outside can be decreased, as compared with a configuration in which the upper cap 140 covers the upper end of the front outer plate 110. Thus, the upper cap 140 is inconspicuous in external view of the door 10. Accordingly, the upper cap 140 does not greatly affect the design. In addition, since the flanges are accommodated in the respective flange accommodating portions, the front outer plate 110 and the upper cap 140 are firmly connected to each other, and the rear outer plate 120 and the upper cap 140 are firmly connected to each other.

[0063]

25 In addition, in Embodiment 1, the front outer plate 110 including the front folded portion 110A and the rear outer plate 120 including the rear folded portion 120A are connected by the connection component 130, which is a component other than the above components. It should be noted that in the case where the front outer plate 110 and the rear outer plate 120 are formed to have flange portions, when the flange is bent in the opposite direction to the direction in which the flange extends, the flange may

tear, thus causing leakage of foam heat insulation material. In Embodiment 1, the front folded portion 110A and the rear folded portion 120A including the flange portions are connected by the connection component 130. Thus, it is possible to form the grip portion 50 without the need to bend the flanges in directions in which the flanges tear. Accordingly, the front outer plate 110 and the upper cap 140 can be connected by the flange that reduces the possibility that the foam heat insulation material 17 may leak. As a result, it is possible to improve the design of the door 10 including the grip portion 50 on the side of the door 10.

[0064]

In the door 10 of the refrigerator 100 according to Embodiment 1, the connection component 130 includes the first fixing portion 131 fixed to the front outer plate 110, the second fixing portion 132 fixed to the rear outer plate 120, and the connection plate 130a provided between the first fixing portion 131 and the second fixing portion 132, extending in the front-back direction and the up-down direction of the door 10, and forming part of the grip portion 50. Thus, the front outer plate 110 and the rear outer plate 120 are firmly fixed to the connection component 130 with the first fixing portion 131 and the second fixing portion 132.

[0065]

The first fixing portion 131 of the connection component 130 is provided at the second connection plate 130b of the connection component 130. The third front plate 110c is held between the first fixing portion 131 and the second connection plate 130b. Thus, the third front plate 110c can be firmly held between the first fixing portion 131 and the second connection plate 130b. In addition, the second fixing portion 132 of the connection component 130 is provided at the third connection plate 130c of the connection component 130. The third rear plate 120c is held between the second fixing portion 132 and the third connection plate 130c. Thus, the third rear plate 120c can be firmly held between the first fixing portion 131 and the second connection plate 130b.

[0066]

The first fixing portion 131 of the connection component 130 is formed to be folded toward the first side, from the end portion of the second connection plate 130b that is adjacent to the second side. In addition, the second fixing portion 132 of the connection component 130 is formed such that it is folded toward the first side, from the end portion of the third connection plate 130c that is adjacent to the second side. Thus, the connection component 130, the first fixing portion 131, and the second fixing portion 132 do not need to be manufactured or connected to each other, as separate components. Accordingly, it is possible to simplify the manufacturing process of the refrigerator 100.

[0067]

In addition, in the door 10 of the refrigerator 100 according to Embodiment 1, the connection component 130 is made of resin, and the upper end face 133 of the connection component 130 is in surface contact with the lower end face 148 of the upper cap 140. Thus, the connection component 130 and the upper cap 140 are connected to be flush with each other. Thus, the effect of these components on the design of the door 10 can be reduced .

[0068]

In addition, since the connection component 130 is made of resin, the end portion of the connection component 130 is unlikely to do injury to the user. Therefore, it is not necessary to cover the end portion of the connection component 130 with a cover for preventing injury. Accordingly, it is possible to simplify the manufacturing process of the refrigerator 100. In addition, since the end portion of the connection component 130 does not need to be covered by a cover, the upper end face 133 of the connection component 130 and the lower end face 148 of the upper cap 140 can be brought into surface contact with each other and thus directly connected to each other. Since connected portions of the connection component 130 and the upper cap 140 that are in contact with each other have no unevenness, it is possible to reduce the effect of these components on the design of the door 10. In addition, since the connection component 130 is made of resin, the variation in the sizes of the connection components 130 can be easily corrected. It is therefore possible to easily manage the size of the door 10.

[0069]

In addition, in the door 10 of the refrigerator 100 according to Embodiment 1, the upper cap 140 includes the first claw portions 145 projecting downward and the second claw portions 146 projecting downward. The front outer plate 110 has, at part of the upper end portions thereof where the first flange 115 is not provided, the cutouts 116 and 117 into which the first claw portions 145a and 145b are fitted. The rear outer plate 120 has, at part of the upper end portions thereof where the second flange 125 is not provided, the cutouts 126 and 127 into which the second claw portions 146a and 146b are fitted.

[0070]

With the above configuration, in the upper cap 140 and the front outer plate 110, the first claw portion 145a is fitted into the cutout 116 and the first claw portion 145b is fitted into the cutout 117, with the first flange 115 accommodated in the first flange accommodating portion 142a. Thus, movement of the front outer plate 110 in the front-back direction and the lateral direction is reduced. In addition, in the upper cap 140 and the rear outer plate 120, the second claw portion 146a is fitted into the cutout 126 and the second claw portion 146b is fitted into the cutout 127, with the first flange 115 accommodated in the first flange accommodating portion 142a. Thus, movement of the rear outer plate 120 in the front-back direction and the lateral direction is reduced. Thus, the possibility that the front outer plate 110 and the rear outer plate 120 may be detached from the upper cap 140 when the door 10 is assembled is reduced, thus improving the manufacturing efficiency of the refrigerator 100. In addition, it is possible to stably assemble doors 10 in each of which the front outer plate 110 and the rear outer plate 120 are firmly connected to the upper cap 140 and which have the same quality. Thus, it is possible to reduce the variation in the quality of refrigerators 100.

[0071]

In addition, each of the cutout 116 of the third front plate 110c, the cutout 117 of the fifth front plate 110e, the cutout 127 of the rear plate 120a, and the cutout 126 of the third rear plate 120c is provided in a place where the user is unable to touch the cutout,

in order to prevent the user from being injured by the cutout. Thus, the refrigerator 100 is improved in safety.

[0072]

In the door 10 of the refrigerator 100 according to Embodiment 1, the first fixing portion 131 and the second fixing portion 132 of the connection component 130 are embedded in the foam heat insulation material 17 filled between the front outer plate 110 and the rear outer plate 120. With this configuration, connected portions of the front outer plate 110 and the connection component 130, which are connected to each other, and connected portions of the rear outer plate 120 and the connection component 130, which are connected to each other, are invisible in external view of the door 10, thus improving the design of the door 10. The connected portions of the front outer plate 110 and the connection component 130 correspond to the second connection plate 130b and the first fixing portion 131 of the connection component 130, and the end portion 111 of the third front plate 110c that is held between the second connection plate 130b and the first fixing portion 131. In addition, connected portions of the rear outer plate 120 and the connection component 130, which are connected to each other correspond to the third connection plate 130c and the second fixing portion 132 of the connection component 130, and the end portion 121 of the third rear plate 120c held between the third connection plate 130c and the second fixing portion 132.

[0073]

In the door 10 of the refrigerator 100 according to Embodiment 1, the second grip portion 51 is provided at the upper wall 140a of the upper cap 140 such that the second grip portion 51 is recessed downward and extends in the lateral direction. The second grip portion 51 is continuous with the grip portion 50 at a position adjacent to the first side. The user can open and close the door 10 while holding the second grip portion 51 provided at the top of the door 10. Thus, the usability of the refrigerator 100 is improved.

[0074]

The door 10 of the refrigerator 100 according to Embodiment 1 includes the hinges 5 provided adjacent to the second side. The hinges 5 support the door 10 in

such a manner as to allow the door 10 to be rotated. With this configuration, the user can open and close the door 10 with the grip portion 50.

[0075]

The door 10 may include the lower cap 150 that is provided such that the upper cap 140 and the lower cap 150 are arranged symmetrically in the up-down direction. Since the lower cap 150 includes the third grip portion 52, the user can open and close the door 10 while holding the third grip portion 52 provided at the bottom of the door 10. In addition, since the recessed part of the grip portion 50, the recessed part of the second grip portion 51, and the recessed part of the third grip portion 52 are continuous with each other, the grip portions that are continuous with each other at one side in the up-down direction are provided. Thus, the user can more easily open and close the door 10. In addition, the user can open and close the door 10 by holding any of the top, the bottom, and the one side of the door 10 even if the user does not visually recognize the grip portion 50, the second grip portion 51, or the third grip portion 52. Thus, the usability of the refrigerator 100 is improved.

[0076]

Embodiment 2

The following description concerning Embodiment 2 is made by referring mainly to the differences between Embodiments 1 and 2. Regarding Embodiment 2, components that are the same as those in Embodiment 1 will be denoted by the same reference signs, and their descriptions will thus be omitted. The differences between Embodiments 1 and 2 reside in the configurations of the front outer plate 110, the rear outer plate 120, the connection component 130, and the upper cap 140. The connection component 130 according to Embodiment 2 is made of a steel plate, and the first fixing portion 131 and the second fixing portion 132 are provided as separate components. Accordingly, the configurations of the front outer plate 110, the rear outer plate 120, and the upper cap 140 differ from those in Embodiment 1.

[0077]

The connection component 130 according to Embodiment 2 will be described with reference to Figs. 18 to 20. Fig. 18 is an exploded perspective view of an upper

part of the one side of the door 10 of the refrigerator 100 according to Embodiment 2. Fig. 19 is an exploded front perspective view of the upper part of the one side of the door 10 of the refrigerator 100 according to Embodiment 2. Fig. 20 is an enlarged sectional view of the grip portion 50 of the door 10 of the refrigerator 100 according to Embodiment 2 that is taken along line G-G in Fig. 13.

[0078]

As illustrated in Figs. 18 and 19, the connection component 130 includes a main body 130A including the connection plate 130a, the second connection plate 130b, and the third connection plate 130c. The first fixing portion 131 is provided as a component separate from the main body 130A and at an outer peripheral surface of the second connection plate 130b at the right side. The second fixing portion 132 is provided as a component separate from the main body 130A and at an outer peripheral surface of the third connection plate 130c at the right side.

[0079]

A third flange 135 extending toward the right side is provided at an upper end of the connection plate 130a. At the outer peripheral wall 140b of the upper cap 140, a third flange accommodating portion 142c formed in the shape of a groove is provided to accommodate the third flange 135. Specifically, the third flange accommodating portion 142c is provided at part of the outer peripheral wall 140b that extends downward from a left outer peripheral portion of the second grip portion 51.

[0080]

As illustrated in Fig. 19, a cutout 136 is provided in an upper end of the second connection plate 130b, and a cutout 137 is provided in an upper end of the third connection plate 130c. The cutout 136 and the cutout 137 are each recessed downward. In Embodiment 2, the right end portion of the second connection plate 130b will be referred to as "end portion 138". In addition, the right end portion of the third connection plate 130c will be referred to as "end portion 139".

[0081]

As illustrated in Fig. 20, the first fixing portion 131 and the second fixing portion 132 are identical components having the same configuration. The first fixing portion

131 includes a base portion 171 extending in the front-back direction, a first holding piece 172 extending from a front end of the base portion 171 toward the left side, and a second holding piece 173 extending obliquely from a rear end of the base portion 171 toward a left end portion of the first holding piece 172; and the second fixing portion 132 includes a base portion 181 extending in the front-back direction, a first holding piece 182 extending from a front end of the base portion 181 toward the left side, and a second holding piece 183 extending obliquely from a rear end of the base portion 181 toward a left end portion of the first holding piece 182. The first holding piece 172 and the second holding piece 173 are configured to come into contact with each other and hold an object between them. The first holding piece 182 and the second holding piece 183 are configured to come into contact with each other and hold an object between them. A retaining portion 176 extending toward the left side is provided at the base portion 171. A retaining portion 186 extending toward the left side is provided at the base portion 181. The retaining portion 176 is configured to project into a space surrounded by the first holding piece 172, the second holding piece 173, and the base portion 171, and hold an object between the retaining portion 176 and the first holding piece 172. The retaining portion 186 is configured to project into a space surrounded by the first holding piece 182, the second holding piece 183, and the base portion 181 and hold an object between the retaining portion 186 and the first holding piece 182. A space is provided between the retaining portion 176 and the first holding piece 172; and a space is provided between the retaining portion 186 and the first holding piece 182.

[0082]

In the first fixing portion 131, the first holding piece 172, the second holding piece 173, and the retaining portion 176 form a holding portion 174. The holding portion 174 of the first fixing portion 131 holds the second connection plate 130b of the connection component 130 and the third front plate 110c of the front outer plate 110, with the second connection plate 130b and the third front plate 110c stacked together. Specifically, the second holding piece 173 retains the end portion 138 of the second connection plate 130b, and the first holding piece 172 retains the end portion 111 of the third front plate 110c, thereby holding the second connection plate 130b and the third

front plate 110c. The second connection plate 130b and the third front plate 110c are held between the first holding piece 172 and the second holding piece 173 and are not easily displaced in the lateral direction and the front-back direction. In addition, the end portion 138 of the second connection plate 130b and the end portion 111 of the third front plate 110c are inserted into the space between the retaining portion 176 and the first holding piece 172. The second connection plate 130b and the third front plate 110c are held between the retaining portion 176 and the first holding piece 172, and wobbly of the second connection plate 130b and the third front plate 110c in the front-back direction is thus reduced.

[0083]

In the second fixing portion 132, the first holding piece 182, the second holding piece 183, and the retaining portion 186 form a holding portion 184. The holding portion 184 of the second fixing portion 132 holds the third connection plate 130c of the connection component 130 and the third rear plate 120c of the rear outer plate 120, with the third rear plate 120c and the third connection plate 130c stacked together. Specifically, the second holding piece 183 retains the end portion 121 of the third rear plate 120c, and the first holding piece 182 retains the end portion 139 of the third connection plate 130c, thereby holding the third connection plate 130c and the third rear plate 120c. The third connection plate 130c and the third rear plate 120c are held between the first holding piece 182 and the second holding piece 183 and are not easily displaced in the lateral direction or the front-back direction. In addition, the end portion 139 of the third connection plate 130c and the end portion 121 of the third rear plate 120c are inserted into the space between the retaining portion 186 and the first holding piece 182. The third connection plate 130c and the third rear plate 120c are held between the retaining portion 186 and the first holding piece 182 and wobbly of the third connection plate 130c and the third rear plate 120c in the front-back direction is thus reduced.

[0084]

Next, the front outer plate 110 and the rear outer plate 120 will be described with reference to Fig. 19. In the third front plate 110c of the front outer plate 110, the cutout

116 and an upper end of the end portion 111 are located below the third flange portion 115c. In addition, in the third rear plate 120c of the rear outer plate 120, the cutout 126 and an upper end of the end portion 121 are located below the second flange portion 125b. When the front outer plate 110 and the rear outer plate 120 are connected by the connection component 130, the cutout 116 of the third front plate 110c and the cutout 136 of the second connection plate 130b are located to coincide with each other, and the cutout 137 of the third connection plate 130c and the cutout 126 of the third rear plate 120c are located to coincide with each other. In addition, the cutout 116 of the third front plate 110c, the cutout 136 of the second connection plate 130b, the cutout 137 of the third connection plate 130c, and the cutout 126 of the third rear plate 120c are aligned on a straight line in the front-back direction.

[0085]

The first claw portion 145a of the upper cap 140 is fitted into the cutout 116 of the third front plate 110c and the cutout 136 of the second connection plate 130b. The second claw portion 146a of the upper cap 140 is fitted into the cutout 137 of the third connection plate 130c and the cutout 126 of the third rear plate 120c. It suffices that the first claw portion 145a and the second claw portion 146a are fitted in the associated cutouts. Thus, the positions where the first claw portion 145a and the second claw portion 146a are provided or the shapes of the first claw portion 145a and the second claw portion 146a are not particularly limited.

[0086]

Advantages of the refrigerator 100 according to Embodiment 2 will be described below. In the door 10 of the refrigerator 100 according to Embodiment 2, the connection component 130 includes the main body 130A that includes the connection plate 130a, the second connection plate 130b extending from the front end of the connection plate 130a toward the second side, and the third connection plate 130c extending from the rear end of the connection plate 130a toward the second side. The first fixing portion 131 and the second fixing portion 132 are provided as components separate from the main body 130A. The first fixing portion 131 includes the holding portion 174 configured to hold the second connection plate 130b of the connection

component 130 and the third front plate 110c of the front outer plate 110, which are stacked together. The second fixing portion 132 includes the holding portion 184 configured to hold the third connection plate 130c of the connection component 130 and the third rear plate 120c of the rear outer plate 120, which are stacked together.

5 [0087]

In Embodiment 2, the connection component 130 that includes the main body 130A, the first fixing portion 131, and the second fixing portion 132 is configured to connect the front outer plate 110 and the rear outer plate 120. However, the configurations of the first flange 115 of the front outer plate 110 and the first flange
10 accommodating portion 142a of the upper cap 140 are the same as those in Embodiment 1. Thus, the upper cap 140 is inconspicuous in external view of the door 10. Accordingly, the upper cap 140 is unlikely to affect the design.

[0088]

Furthermore, as in Embodiment 1, the first flange 115 of the front outer plate 110
15 is provided at the upper end of the front folded portion 110A, and the second flange 125 of the rear outer plate 120 is provided at the upper end of the rear folded portion 120A. Also, in Embodiment 2, since the front folded portion 110A and the rear folded portion 120A are connected by the connection component 130, it is possible to form the grip portion 50 without the need to bend the flanges in directions in which the flanges tear. Accordingly, it is possible to obtain advantages similar to those in Embodiment 1.

20 [0089]

In addition, in Embodiment 2, the holding portion 174 of the first fixing portion 131 includes a pair of holding pieces that hold a target object at their distal ends, and the base portion 171 connecting the pair of holding pieces; and the holding portion 184 of
25 the second fixing portion 132 includes a pair of holding pieces that hold a target object at their distal ends, and the base portion 181 connecting the pair of holding pieces. The base portion 171 is provided with the retaining portion 176 that projects toward the space defined between the pair of holding pieces and the base portion 171 to be in contact with the target object. The base portion 181 is provided with the retaining
30 portion 186 that projects into the space defined between the pair of holding pieces and

the base portion 181 to be in contact with the target object. It should be noted that the pair of holding pieces of the holding portion 174 are the first holding piece 172 and the second holding piece 173; and the pair of holding pieces of the holding portion 184 are the first holding piece 182 and the second holding piece 183.

5 [0090]

With the above configuration of the first fixing portion 131 and the second fixing portion 132, the front outer plate 110 and the rear outer plate 120 are firmly fixed to the connection component 130. Thus, the front outer plate 110 and the rear outer plate 120 are not easily displaced in the lateral direction or the front-back direction and wobbly of the front outer plate 110 and the rear outer plate 120 in the front-back direction is reduced. Therefore, the quality of the refrigerator 100 can be improved.

10 [0091]

Furthermore, in the door 10 of the refrigerator 100 according to Embodiment 2, the connection component 130 is made of a steel plate. The connection component 130 includes, at the upper end of the connection plate 130a, the third flange 135 extending toward the second side in a horizontal direction. In addition, the outer peripheral wall 140b of the upper cap 140 includes the third flange accommodating portion 142c that is formed in the shape of a groove and accommodates the third flange 135 of the connection component 130.

15 [0092]

With the above configuration, the connection component 130 is made of a steel plate, thus improving the design of the door 10. In addition, since the third flange 135 at the upper end of the connection plate 130a is accommodated in the third flange accommodating portion 142c of the upper cap 140, the user does not touch the end face of the connection plate 130a made of a steel plate, when holding the grip portion 50. Thus, the refrigerator 100 is improved in safety. In addition, since the third flange 135 is accommodated in the third flange accommodating portion 142c, the connection component 130 and the upper cap 140 are connected to be flush with each other. It is therefore possible to reduce the effect of those components on the design of the door 10.

Reference Signs List

[0093]

1: box, 2: refrigerator compartment, 3: vegetable compartment, 4: freezer compartment, 5: hinge, 10: door, 17: foam heat insulation material, 20: vegetable compartment drawer, 30: freezer compartment drawer, 50: grip portion, 51: second grip portion, 52: third grip portion, 100: refrigerator, 110: front outer plate, 110A: front folded portion, 110a: front plate, 110b: second front plate, 110c: third front plate, 110d: fourth front plate, 110e: fifth front plate, 111: end portion, 115: first flange, 115a: first flange portion, 115b: second flange portion, 115c: third flange portion, 115d: fourth flange portion, 116: cutout, 117: cutout, 120: rear outer plate, 120A: rear folded portion, 120a: rear plate, 120b: second rear plate, 120c: third rear plate, 121: end portion, 125: second flange, 125a: first flange portion, 125b: second flange portion, 126: cutout, 127: cutout, 130: connection component, 130A: main body, 130a: connection plate, 130b: second connection plate, 130c: third connection plate, 131: first fixing portion, 131a: holding piece, 131b: retaining portion, 131c: folded portion, 132: second fixing portion, 132a: holding piece, 132b: retaining portion, 132c: folded portion, 133: upper end face, 135: third flange, 136: cutout, 137: cutout, 138: end portion, 139: end portion, 140: upper cap, 140a: upper wall, 140b: outer peripheral wall, 142: flange accommodating portion, 142a: first flange accommodating portion, 142b: second flange accommodating portion, 142c: third flange accommodating portion, 143: first projection, 144: second projection, 145: first claw portion, 145a: first claw portion, 145b: first claw portion, 146: second claw portion, 146a: second claw portion, 146b: second claw portion, 147: cover portion, 148: lower end face, 150: lower cap, 160: inner plate, 171: base portion, 172: first holding piece, 173: second holding piece, 174: holding portion, 176: retaining portion, 181: base portion, 182: first holding piece, 183: second holding piece, 184: holding portion, 186: retaining portion

CLAIMS

[Claim 1]

A refrigerator comprising:

a box having an opening at a front thereof and having therein a storage space;

and

a door including a grip portion on a first side that is one side of the door in a lateral direction, attached to the box on a second side that is the opposite side of the first side, and configured to open and close the opening,

wherein the door further includes

a front outer plate,

a rear outer plate provided behind the front outer plate,

a connection component connecting the front outer plate and the rear outer plate in a front-back direction and forming at least part of the first side of the door, and

an upper cap provided on the front outer plate, the rear outer plate, and the connection component and forming a top of the door,

wherein the front outer plate includes

a front plate forming at least part of a front of the door,

a front folded portion located behind the front plate, and folded toward the second side, from an end portion of the front plate that is adjacent to the first side, and

a first flange provided at an upper end of the front folded portion and extending toward a region surrounded by the front folded portion and the front plate,

wherein the rear outer plate includes

a rear plate forming at least part of a rear of the door,

a rear folded portion located ahead of the rear plate, and folded toward the second side, from an end portion of the rear plate that is adjacent to the first side, and

a second flange provided at an upper end of the rear folded portion and extending toward a region surrounded by the rear folded portion and the rear plate,

wherein the upper cap includes

an upper wall,

an outer peripheral wall extending downward from an outer peripheral portion of the upper wall,

a first flange accommodating portion formed in the shape of a groove, provided at the outer peripheral wall, and accommodating the first flange, and

5 a second flange accommodating portion formed in the shape of a groove, provided at the outer peripheral wall, and accommodating the second flange, and

wherein the grip portion is defined by the front folded portion, part of the connection component, and the rear folded portion, and is recessed toward the second side.

10 [Claim 2]

The refrigerator of claim 1, wherein the connection component includes

a first fixing portion fixed to the front outer plate,

a second fixing portion fixed to the rear outer plate, and

15 a connection plate provided between the first fixing portion and the second fixing portion, extending in the front-back direction and an up-down direction of the door, and forming part of the grip portion.

[Claim 3]

The refrigerator of claim 2,

wherein the front folded portion of the front outer plate includes

20 a second front plate extending toward the rear, from the end portion of the front plate that is adjacent to the first side and forming part of the first side of the door, and

a third front plate extending from a rear end of the second front plate toward the second side,

wherein the rear folded portion of the rear outer plate includes

25 a second rear plate extending toward the front, from the end portion of the rear plate of the rear outer plate that is adjacent to the first side and forming part of the first side of the door, and

a third rear plate extending from a front end of the second rear plate of the rear outer plate toward the second side,

30 wherein the connection component further includes

a second connection plate extending from a front end of the connection plate toward the second side, and

a third connection plate extending from a rear end of the connection plate toward the second side,

5 wherein the first fixing portion of the connection component is provided at the second connection plate of the connection component and holds the third front plate between the first fixing portion and the second connection plate, and

 wherein the second fixing portion of the connection component is provided at the third connection plate of the connection component and holds the third rear plate
10 between the second fixing portion and the third connection plate.

[Claim 4]

The refrigerator of claim 3, wherein

 the first fixing portion of the connection component is formed to be folded toward the first side, from an end portion of the second connection plate that is adjacent to the
15 second side, and

 the second fixing portion of the connection component is formed to be folded toward the first side, from an end portion of the third connection plate that is adjacent to the second side.

[Claim 5]

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

 the connection component is made of resin, and

 an upper end face of the connection component is in surface contact with a lower end face of the upper cap.

[Claim 6]

25 The refrigerator of claim 2, wherein the front folded portion of the front outer plate includes

 a second front plate extending toward the rear, from the end portion of the front plate that is adjacent to the first side and forming part of the first side of the door, and

 a third front plate extending from a rear end of the second front plate toward the
30 second side,

wherein the rear folded portion of the rear outer plate includes

a second rear plate extending toward the front, from the end portion of the rear plate of the rear outer plate that is adjacent to the first side and forming part of the first side of the door, and

5 a third rear plate extending from a front end of the second rear plate of the rear outer plate toward the second side,

wherein the connection component includes a main body including the connection plate, a second connection plate extending from a front end of the connection plate toward the second side, and a third connection plate extending from a rear end of the connection plate toward the second side,

10 wherein the first fixing portion and the second fixing portion are provided as components separate from the main body,

wherein the first fixing portion includes a holding portion that holds the second connection plate of the connection component and the third front plate of the front outer plate, with the second connection plate and the third front plate stacked together, and

15 wherein the second fixing portion includes a holding portion that holds the third connection plate of the connection component and the third rear plate of the rear outer plate, with the third connection plate and the third rear plate stacked together.

[Claim 7]

20 The refrigerator of claim 6, wherein the holding portion of the first fixing portion and the holding portion of the second fixing portion each include

a pair of holding pieces that hold a target object at distal ends thereof, and

a base portion connecting the pair of holding pieces, the base portion having a retaining portion that projects into a space defined between the pair of holding pieces and the base portion and comes into contact with the target object.

25 [Claim 8]

The refrigerator of claim 6 or 7, wherein

the connection component is made of a steel plate and further includes, at an upper end of the connection plate, a third flange extending toward the second side in a horizontal direction, and

the outer peripheral wall of the upper cap includes a third flange accommodating portion formed in the shape of a groove and accommodating the third flange of the connection component.

[Claim 9]

5 The refrigerator of any one of claims 3 to 8, wherein
the upper cap further includes

 a first claw portion projecting downward, and

 a second claw portion projecting downward,

10 the front outer plate has, at part of the upper end thereof where the first flange is
not provided, a cutout into which the first claw portion is fitted, the cutout being formed
in the shape of a recess, and

 the rear outer plate has, at part of the upper end thereof where the second flange
is not provided, a cutout into which the second claw portion is fitted, the cutout being
formed in the shape of a recess.

15 [Claim 10]

 The refrigerator of any one of claims 3, 4, and 6 to 9, wherein the first fixing
portion and the second fixing portion of the connection component are embedded in a
foam heat insulation material filled between the front outer plate and the rear outer
plate.

20 [Claim 11]

 The refrigerator of any one of claims 1 to 10, wherein

 a second grip portion recessed downward and extending in the lateral direction is
provided at the upper wall of the upper cap, and

25 the second grip portion is continuous with the grip portion at a position adjacent to
the first side.

[Claim 12]

 The refrigerator of any one of claims 1 to 11, further comprising

 a hinge provided adjacent to the second side of the door,

 wherein the hinge supports the door such that the door is rotatable.