

DESCRIPTION

Title of Invention

REFRIGERATOR DOOR AND REFRIGERATOR

Technical Field

5 [0001]

The present invention relates to a refrigerator, especially, a refrigerator door.

Background Art

[0002]

10 A typical refrigerator includes a casing having a refrigerator compartment and a freezer compartment. The refrigerator compartment is sealed with an openable refrigerator-compartment door, and the freezer compartment also is sealed with an openable freezer-compartment door. The refrigerator-compartment door and the freezer-compartment door have holds for opening and closing the doors with the hand of the user.

15 [0003]

Patent Literature 1 discloses a handle or handhold fit into a notch provided in an external panel of a refrigerator door. The handle disclosed in Patent Literature 1 includes a body, a base, and a trim. The handle and the external and internal panels are fixed to the door by a foam insulator infilling the space between the external and internal panels.

20 [0004]

Patent Literature 2 discloses a handhold provided on an external panel of a refrigerator door. Specifically, the external panel of the refrigerator door of the refrigerator disclosed in Patent Literature 2 includes an external front subpanel that constitutes the major portion of the front face of the door, an external rear subpanel that constitutes the minor portion of the front face, and a connector (retainer) that connects the external front subpanel and the external rear subpanel. The external rear subpanel is disposed behind the external front subpanel to provide a concave space between the external rear subpanel and the external front subpanel in which the hand of the user can be placed to open or close the door. One end of the

external front panel is bent into a U-shaped cross-section to serve as a handhold.

Citation List

Patent Literature

5 [0005]

Patent Literature 1: Japanese Unexamined Patent Application Publication No. 6-159916 (Fig. 2)

Patent Literature 2: Japanese Unexamined Patent Application Publication No. 2009-168302 (Figs. 4 to 6).

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Summary of Invention

Technical Problem

[0006]

15 The production of the handhold described in Patent Literature 1 requires notching and bending of the external panel of the door. In addition, the handhold or handle includes a large number of components that leads to an increase in workload with a complicated assembly process.

[0007]

20 In the case of the door disclosed in Patent Literature 2, the production of the handhold requires bending of the external front subpanel into a U-shaped cross-section. Since the external panel of the door is a decorative component, work should be carried out with extreme caution to avoid damage. Furthermore, a small width (for example, 8.5 mm) of the handhold to be bent disturbs bending work. Moreover, the external rear subpanel and the external front subpanel are clamped
25 together with the retainer. This configuration needs alignment of the external rear subpanel and the external front subpanel before clamping. Misalignment of the panels in the vertical or horizontal direction after clamping requires a troublesome operation of realignment by detaching both the external rear panel and the external front panel from the retainer.

30 [0008]

Known refrigerators require a large number of man-hours for fabrication of the handhold and assembling of the refrigerator with a complicated working process. Such assembly requires time and leads to a low production yield as a result.

[0009]

5 An object of the present invention, which has been conceived to solve the drawbacks described above, is to reduce the production time and increase the production yield through enhancement of fabrication and assembling efficiency of the refrigerator door, and thus to provide a high-quality refrigerator.

10 Solution to Problem

[0010]

 A refrigerator door according to the present invention includes an inner panel; and an external panel, the external panel comprising a front outer subpanel constituting a portion of a front face of the door, a rear outer subpanel disposed
15 behind the front outer subpanel and constituting a portion of the front face of the door, and a connector connecting the front outer subpanel and the rear outer subpanel, the connector comprising a front insertion groove into which the front outer subpanel is inserted; and a rear insertion groove into which the rear outer subpanel is inserted, wherein a handhold is defined by a recess formed by the rear outer subpanel
20 disposed in the rear insertion groove and the connector, the recess being between the rear insertion groove and the connector when the front outer subpanel is disposed in the front insertion groove and the rear outer subpanel is disposed in the rear insertion groove.

25 Advantageous Effects of Invention

[0011]

 The refrigerator door according to the present invention can be readily fabricated and assembled, thereby reducing the working time and increasing the production yield. As a result, a high-quality refrigerator can be provided.

Brief Description of Drawings

[0012]

[Fig. 1] Fig. 1 is an external perspective view of a refrigerator according to an embodiment of the present invention.

[Fig. 2] Fig. 2 is a front view of the refrigerator according to an embodiment of the present invention.

[Fig. 3] Fig. 3 is a top view of the refrigerator according to an embodiment of the present invention.

[Fig. 4] Fig. 4 is a lateral cross-sectional view of a freezer-compartment door of the refrigerator according to an embodiment of the present invention.

[Fig. 5] Fig. 5 is an exploded perspective view of the freezer-compartment door according to an embodiment of the present invention.

[Fig. 6] Fig. 6 is a partially enlarged view of the lateral cross-section of the freezer-compartment door illustrated in Fig. 4.

[Fig. 7] Fig. 7 is a partially enlarged view of the lateral cross-section of the freezer-compartment door illustrated in Fig. 6.

Description of Embodiments

[0013]

A refrigerator and a refrigerator door according to an embodiment of the present invention will now be described in detail with reference to the accompanying drawings.

[0014]

Fig. 1 is an external perspective view of a refrigerator 1 according to an embodiment of the present invention; Fig. 2 is a front view of the refrigerator 1; and Fig. 3 is a top view of the refrigerator 1. With reference to Figs. 1 to 3, the refrigerator 1 includes a casing 2, a freezer-compartment door 3 and a refrigerator-compartment door 4 covering an opening in the front face of the casing 2. The casing 2 is composed of a steel outer box and a resin inner box. The space defined between the outer and inner boxes is filled with a foam insulator. The storage space

inside the casing 2 is separated into a freezer compartment and a refrigerator compartment with an insulated partition. The freezer-compartment door 3 and the refrigerator-compartment door 4, which can be opened and closed, seal the freezer compartment and the refrigerator compartment, respectively, inside the casing 2. The freezer-compartment door 3 and the refrigerator compartment door 4 are pivotable about a hinge 6 supporting a door rotary shaft 6a. The hinge 6 is disposed on the top portion of the refrigerator 1 at the right front edge and is covered with a hinge cover 5. A handhold A extending in the vertical direction is disposed on the left portion of the front faces of the freezer-compartment door 3 and the refrigerator-compartment door 4.

[0015]

The configuration of the handhold A according to this embodiment in the freezer-compartment door 3 will now be described with reference to Figs. 4 to 7. The refrigerator-compartment door 4 has the same configuration as the freezer-compartment door 3 described below. Fig. 4 is a lateral cross-sectional view taken along line Z-Z in Fig. 2 illustrating the freezer-compartment door 3 according to this embodiment. Fig. 5 is an exploded perspective view of the freezer-compartment door 3 according to this embodiment. With reference to Figs. 4 and 5, the freezer-compartment door 3 includes an external panel 10 constituting the front face of the freezer-compartment door 3 and an inner panel 15 constituting the rear face. With reference to Fig. 5, an upper door cap 13 is fixed to the upper face of the external panel 10 and a lower door cap 14 is fixed to the lower face. A space on the inner side of the external panel 10 is filled with a foam insulator 40, such as polyurethane resin. The freezer-compartment door 3 is assembled by installing the inner panel 15 before the foam insulator 40 is hardened in the inner side of the external panel 10.

[0016]

With reference to Fig. 4, the external panel 10 includes a front outer subpanel 11, a rear outer subpanel 12, and a connector (hereinafter, referred to as a "door trim") 30 connecting the front outer subpanel 11 and the rear outer subpanel 12. The front outer subpanel 11 and the rear outer subpanel 12 are formed by bending a single thin steel plate. The front outer subpanel 11 includes a flat portion 11a

constituting a major portion of the front face of the freezer-compartment door 3, a side portion 11b bent rearward from the flat portion 11a and constituting a side face of the freezer-compartment door 3, and a connecting portion 11c connected to the inner panel 15.

[0017]

Fig. 6 is a partially enlarged view of the lateral cross-section of the freezer-compartment door 3 illustrated in Fig. 4. In detail, Fig. 6 is an enlarged view of the rear outer subpanel 12 and its vicinity. With reference to Fig. 6, the rear outer subpanel 12 includes a flat portion 12a constituting a portion of the front face of the freezer-compartment door 3, a side portion 12b bent rearward from one end of the flat portion 12a and constituting a side of the freezer-compartment door 3, a bent portion 12c bent forward from the other end of the flat portion 12a and extending forward, an insertion portion 12d bent from the bent portion 12c and extending parallel to the flat portion 12a, and a connecting portion 12e connected to the inner panel 15. With reference to Figs. 4 and 6, the rear outer subpanel 12 is disposed behind the front outer subpanel 11, and the flat portion 12a and the bent portion 12c of the rear outer subpanel 12 are disposed in an L-shape, to define a recess constituting the handhold A on the front face of the freezer-compartment door 3.

[0018]

Fig. 7 is a partially enlarged view of the lateral cross-section of the freezer-compartment door 3 illustrated in Fig. 6. In detail, Fig. 7 is an enlarged view of the door trim 30 and its vicinity. The door trim 30 according to this embodiment is formed through extrusion or injection molding of resin. The door trim 30 has a vertical length substantially identical to vertical length of the external panel 10. The door trim 30 includes a front insertion groove 30a into which the front outer subpanel 11 is inserted, a rear insertion groove 30b into which the rear outer subpanel 12 is inserted, a guide rib 30c that guides the rear outer subpanel 12, a handhold face 30d and a protrusion 30e at which the hand of the user is to be placed to open the freezer-compartment door 3, and a serrated face 30f preventing separation of the foam insulator 40.

[0019]

The front insertion groove 30a is disposed near the right edge on the front face of the door trim 30. The rear insertion groove 30b is disposed near the left edge on the rear face of the door trim 30 and parallel to the front insertion groove 30a. The front insertion groove 30a and the rear insertion groove 30b are concave in horizontally opposite directions. During assembly of the external panel 10, the edge of the flat portion 11a of the front outer subpanel 11 is inserted into the front insertion groove 30a from the right, whereas the edge of the insertion portion 12d of the rear outer subpanel 12 is inserted into the rear insertion groove 30b from the left. In this way, the front outer subpanel 11 and the rear outer subpanel 12 are aligned by the front insertion groove 30a and the rear insertion groove 30b of the door trim 30, preventing misalignment in the horizontal direction of the external panel 10. The front outer subpanel 11 and the rear outer subpanel 12 are independently connected to the door trim 30. Thus, if the front outer subpanel 11 and the rear outer subpanel 12 are misaligned in the vertical direction, the subpanels can be individually realigned, and thus the misalignment can be readily corrected.

[0020]

The guide rib 30c extends diagonally rearward from the opening edge of the rear insertion groove 30b. During assembly of the external panel 10, the insertion portion 12d of the rear outer subpanel 12 is guided into the rear insertion groove 30b by the guide rib 30c, and thus the assembling can be facilitated.

[0021]

The handhold face 30d is the flat rear face of the door trim 30 (the face opposite to the flat portion 12a of the rear outer subpanel 12). The handhold face 30d, and the flat portion 12a and the bent portion 12c of the rear outer subpanel 12 constitute the handhold A. Since a portion of the handhold A is composed of the door trim 30, the front outer subpanel 11 can have a simple shape (a substantial L shape in this embodiment), resulting in a reduction in fabrication time.

[0022]

The protrusion 30e protrudes forward by 5 to 10 mm, for example, from the

front outer subpanel 11 on the side remote from the handhold face 30d. The handhold face 30d and the protrusion 30e can be held by the user to open the freezer-compartment door 3. This enhances the grip feeling and allows the freezer-compartment door 3 to be readily opened and closed. Additionally, the protrusion 30e prevents direct contact with the external panel 10 by the hand and fingers of the user, thus preventing contamination of the external panel 10. Further, the protrusion 30e disposed in front of the front insertion groove 30a facilitates insertion of the front outer subpanel 11 and increases the strength of the front insertion groove 30a.

[0023]

The serrated face 30f is opposed to the front outer subpanel 11. The protrusion disposed behind the front insertion groove 30a defines a space between the serrated face 30f and the front outer subpanel 11, which is to be filled with the foam insulator 40. The serrated face 30f comes into contact with the foam insulator 40 to prevent the foam insulator 40 infilling the space from separating. In this way, the door trim 30 firmly connects the front outer subpanel 11 and the rear outer subpanel 12.

[0024]

As described above, the door trim 30 according to this embodiment connects the front outer subpanel 11 and the rear outer subpanel 12 to constitute the external panel 10. Thus, the external panel 10 includes a reduced number of components and can be readily fabricated and assembled. This reduces the assembling time of the refrigerator 1 and improves the production yield, thereby reducing cost and enhancing the quality of the refrigerator 1.

[0025]

The embodiments of the present invention described above should not be construed to limit the invention, and various modifications and combinations may be made within the scope of the invention. For example, alternative to the freezer-compartment door 3, which has a single door, the present invention may be applied to double doors, and handholds A may be provided on the two doors. The handhold A may be provided not only on a rotary door but also on the front of a drawer of the

refrigerator. Other than the freezer-compartment door 3 and the refrigerator-compartment door 4, the handhold A may be provided on the doors of various different storage compartments of the refrigerator 1, such as a vegetable compartment and an ice compartment.

5 [0026]

In the embodiments described above, the front face of the freezer-compartment door 3 (the flat portion 11a and the flat portion 12a of the external panel 10) is flat. Alternatively, the front face (external panel 10) of the freezer-compartment door 3 may be curved. In such a case, the door trim 30 should have a shape corresponding to the shape of the external panel 10. The handhold face 30d of the door trim 30 is also not limited to a flat surface. Alternatively, recesses and protrusions may be provided to enhance the grip feeling. The door trim 30 may be formed by two-color molding, the handhold face 30d in one color and the protrusion 30e in another color. This can enhance the design of the refrigerator 1.

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Reference Signs List

[0027]

1 refrigerator 2 casing 3 freezer-compartment door 4 refrigerator-compartment door 5 hinge cover 6 hinge 6a door rotary shaft 10 external panel 11 front outer subpanel 12 rear outer subpanel 11a, 12a flat portion 11b, 12b side portion 11c, 12e connector 12c bent portion 12d insertion portion 13 upper door cap 14 lower door cap 15 inner panel 30 door trim 30a front insertion groove 30b rear insertion groove 30c guide rib 30d handhold face 30e protrusion 30f serrated face 40 foam insulator A handhold

CLAIMS

[Claim 1]

A refrigerator door comprising:

an inner panel; and

5 an external panel,

the external panel comprising

a front outer subpanel constituting a portion of a front face of the door,

a rear outer subpanel disposed behind the front outer subpanel and

constituting a portion of the front face of the door, and

10 a connector connecting the front outer subpanel and the rear outer
subpanel,

the connector comprising

a front insertion groove into which the front outer subpanel is inserted,

and

15 a rear insertion groove into which the rear outer subpanel is inserted,

wherein the front outer subpanel is disposed in the front insertion groove,

the rear outer subpanel is disposed in the rear insertion groove, and a

handhold is defined by a recess formed by the rear outer subpanel, the recess

being between the rear insertion groove and the connector .

20

[Claim 2]

The refrigerator door of claim 1, wherein the front insertion groove and the rear
insertion groove are disposed parallel to each other and depressed in opposite
directions to each other.

25

[Claim 3]

The refrigerator door of claim 1 or 2, wherein the connector further comprises a
guide rib guiding an end of the rear outer subpanel into the rear insertion groove.

30

[Claim 4]

The refrigerator door of any one of claims 1 to 3, wherein the connector further comprises a handhold face constituting a portion of the handhold.

[Claim 5]

- 5 The refrigerator door of claim 4, wherein the connector further comprises a protrusion protruding forward from the front outer subpanel on a side opposite from the handhold face.

[Claim 6]

- 10 The refrigerator door of any one of claims 1 to 5, further comprising a foam insulator infilling a space between the inner panel and the external panel, wherein the connector further comprises a serrated face disposed in contact with the foam insulator.

[Claim 7]

- 15 The refrigerator door of any one of claims 1 to 6, wherein the connector is formed through extrusion molding or injection molding.

[Claim 8]

- 20 A refrigerator comprising the refrigerator door of any one of claims 1 to 7, and a casing having a storage compartment sealed with the refrigerator door in an openable manner.