

DESCRIPTION

Title of Invention

REFRIGERATOR

5 Technical Field

[0001]

The present disclosure relates to a refrigerator, and in particular to a drainage structure.

Background Art

10 [0002]

In general, a refrigerator cools foods by generating cold air in a cooler compartment provided on the rear side of the refrigerator body and circulating the cold air in a refrigerator compartment by a cooling fan. The amount of cold air supplied to the refrigerator compartment is adjusted by opening and closing the refrigerator compartment damper installed in an air passage, and the temperature of the refrigerator compartment is controlled by controlling the opening and closing of the refrigerator compartment damper.

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[0003]

Cold air flowing into the refrigerator compartment is distributed into the refrigerator compartment through an air passage in the refrigerator compartment duct on the rear side of the refrigerator compartment. For example, in Patent Literature 1, a refrigerator compartment damper is provided in the air passage at a lower part of the refrigerator compartment duct.

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Citation List

25 Patent Literature

[0004]

Patent Literature 1: Japanese Unexamined Patent Application Publication No. 2018-109501

Summary of Invention

30 Technical Problem

[0005]

In the related-art technology described in Patent Literature 1, a refrigerator compartment damper is installed at a position above joint surfaces between the refrigerator compartment duct and the partition plate that forms a floor of the refrigerator compartment, and a drainage member is installed at a position above the refrigerator compartment damper. With this configuration, the condensation water does not reach the vicinity of the refrigerator compartment damper in the process of flowing downward from above by gravity, but is guided to flow to other harmless places, such as the cooler compartment.

[0006]

If the refrigerator compartment damper is installed below the floor surface of the refrigerator compartment, for example, in one corner of the cooler compartment cover, it cannot prevent condensation water generated below the drainage member from entering the air passage through the joint surfaces between the refrigerator compartment duct and the partition plate and adhering to the refrigerator compartment damper. Therefore, the installation position of the refrigerator compartment damper is restricted to the inside of the refrigerator compartment duct above the floor of the refrigerator compartment.

[0007]

Considering factors such as easy routing of wires for power supply to the damper as well as control wires, easy assembly of air passage components, easy repair, and a large food storage space inside the refrigerator compartment, installing the refrigerator compartment damper in an air passage located below the refrigerator compartment duct, separately from the refrigerator compartment duct, tends to result in a refrigerator that is flexible in design and easy to use. However, related-art technologies only allow the refrigerator compartment damper to be installed in the refrigerator compartment duct, which may require some compromises such as reducing the food storage space inside the refrigerator compartment. Additionally, since the drainage member in related-art technologies is an independent part, additional material and manufacturing costs are required for mounting of such a drainage member.

[0008]

The present disclosure has been made in order to solve the problems mentioned above, and aims at providing a refrigerator capable of suppressing condensation water from adhering to a damper while controlling material and manufacturing costs.

5 Solution to Problem

[0009]

10 The refrigerator according to the present disclosure is a refrigerator comprising: a heat-insulating box including therein a refrigerator compartment and a cooler compartment; a cooler disposed in the cooler compartment, the cooler being configured to cool air supplied to the refrigerator compartment; a refrigerator compartment duct defining a part of an air passage that guides air cooled by the cooler from the cooler compartment to the refrigerator compartment; a refrigerator compartment floor part disposed below the refrigerator compartment duct and forming a floor of the refrigerator compartment; and a damper installed in the air passage, the damper being configured to regulate a flow rate of cold air flowing in the air passage, wherein the refrigerator compartment floor part includes: a refrigerator compartment air return passage port that is positioned lateral to the refrigerator compartment duct and serves as an inlet of a refrigerator compartment air return passage through which air is allowed to pass to return to the cooler compartment after the air cools the refrigerator compartment; and a groove extending from directly below the refrigerator compartment duct to the refrigerator compartment air return passage port.

Advantageous Effects of Invention

[0010]

25 In the refrigerator according to an embodiment of the present disclosure, the refrigerator compartment floor part forming the floor of the refrigerator compartment is formed with the groove extending from directly below the refrigerator compartment duct to the refrigerator compartment air return passage port. In other words, the groove defines a drainage channel from directly below the refrigerator compartment duct to the refrigerator compartment air return passage. Consequently, even when the damper is installed in the air passage located below the refrigerator compartment floor part,

condensation water on the joining surfaces between the refrigerator compartment duct and the refrigerator compartment floor part flows along the groove and is discharged into the refrigerator compartment air return passage, which is outside of the air passage in which the damper is installed. The refrigerator can thus prevent the condensation water from entering the air passage through the joining surfaces between the refrigerator compartment duct and the refrigerator compartment floor part and adhering to the damper. Additionally, material and manufacturing costs can be reduced as the drainage groove is formed integrally with the refrigerator compartment floor part.

Brief Description of the Drawings

[0011]

[Fig. 1] Fig. 1 is a schematic front view of a refrigerator according to an embodiment of the present disclosure.

[Fig. 2] Fig. 2 is a schematic longitudinal sectional view of the refrigerator according to the embodiment of the present disclosure as viewed from the left side.

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

[Fig. 4] Fig. 4 shows components associated with major parts inside the refrigerator as viewed in the direction of an arrow in Fig. 3.

[Fig. 5] Fig. 5 is a schematic front view of the refrigerator according to the embodiment of the present disclosure, with indications of respective sectional views.

[Fig. 6] Fig. 6 is a sectional view taken along a line Y-Y in Fig. 5.

[Fig. 7] Fig. 7 is a sectional view taken along a line X-X in Fig. 5.

[Fig. 8] Fig. 8 is a sectional view taken along a line W-W in Fig. 5.

[Fig. 9] Fig. 9 is a sectional view taken along a line U-U in Fig. 5.

Description of the Embodiments

[0012]

An embodiment of the present disclosure will be described below with reference to the drawings. The embodiment is, however, not restrictive. Also, in the following drawings, the relationship between the sizes of each component may differ from the actual ones.

[0013]

Embodiment

Fig. 1 is a front schematic view of a refrigerator 100 according to an embodiment of the present disclosure. Fig. 2 is a schematic longitudinal sectional view of the refrigerator 100 according to an embodiment of the present disclosure as viewed from the left side. Fig. 3 is a top view of the refrigerator 100 according to an embodiment of the present disclosure. Fig. 4 shows components associated with major parts inside the refrigerator as viewed in the direction of an arrow in Fig. 3. The dashed arrows shown in Fig. 4 indicate the flow of condensation water.

[0014]

An entire configuration of the refrigerator 100 according to the present embodiment will be made with reference to Figs. 1 to 4. In the following description, directional terms (e.g., "up", "down", "right", "left", "front", and "back") that may be used when necessary to help understanding are for explanatory purposes only and not intended to be restrictive. In the present embodiment, references such as "up", "down", "right", "left", "front", and "back" are made in a state where a viewer looks the front of the refrigerator 100.

[0015]

The refrigerator 100 of the present embodiment includes a heat-insulating box 100A, the front of which is open and a storage space is formed inside. This heat-insulating box 100A is composed of an outer box made of a steel plate defining an exterior of the heat-insulating box 100A, and an inner box made of a thin rigid resin such as ABS resin disposed inside the outer box, between which a heat-insulating material such as rigid urethane foam is filled.

[0016]

The storage space formed inside the insulated box 100A is partitioned by a plurality of partition members (not shown) into a plurality of storage compartments for storing food. The refrigerator 100 includes, as the plurality of storage compartments, a refrigerator compartment 101 arranged at an uppermost portion of the refrigerator 100, an ice-making compartment 102 arranged below the refrigerator compartment 101, and

an upper freezer compartment 103 arranged adjacent to the side of, and in parallel with the ice-making compartment 102. Further, it has a vegetable compartment 104 disposed below the ice-making compartment 102 and the upper freezer compartment 103, and a bottom freezer compartment 105 disposed below the vegetable compartment 104.

[0017]

The refrigerator compartment 101, the ice-making compartment 102, and the upper freezer compartment 103 are divided vertically by horizontally extending partition members. The ice-making compartment 102 and the upper freezer compartment 103 are divided into left and right sections by vertically extending partition members. The ice-making compartment 102 and the upper freezer compartment 103 are divided vertically from the vegetable compartment 104 by horizontally extending partition members. The vegetable compartment 104 and the freezer compartment 105 are divided vertically by a horizontally extending partition member.

[0018]

The refrigerator compartment 101 has a swing refrigerator compartment door 101a configured to open and close an opening formed at the front of the refrigerator compartment 101. The refrigerator compartment 101 may have double doors configured to open to the right and left from the center of the opening formed at the front of the refrigerator compartment 101. The ice-making compartment 102, the upper freezer compartment 103, the vegetable compartment 104, and the freezer compartment 105 each have an ice-making compartment drawer 102a, an upper freezer compartment drawer 103a, a vegetable compartment drawer 104a, and a freezer compartment drawer 105a to open and close respective openings formed at the front of these compartments.

[0019]

The refrigerator compartment 101 is a storage compartment of which the temperature is kept at a temperature at which the stored items do not freeze. The refrigerator compartment 101 is controlled to a temperature in the refrigeration temperature range (e.g., about 2 to 5 degrees C). The inside of the refrigerator

compartment 101 is divided into a plurality of sections by a plurality of shelves 5e. A chiller compartment (e.g., about 0 degrees C), which is lower than the temperature of the refrigerator compartment 101 (e.g., about 2 to 5 degrees C), is provided under the bottom shelf 5e in the refrigerator compartment 101. This chiller compartment is composed of an upper chiller compartment 6b and a lower chiller compartment 6c, which are separated by a chiller compartment partition 6a.

[0020]

A refrigerator compartment floor part 5f is provided below the chiller compartment, and a top face of the refrigerator compartment floor part 5f forms a floor of the refrigerator compartment 101.

[0021]

The ice-making compartment 102 is a storage compartment that includes therein an ice-making machine and stores ice produced by the ice-making machine. The ice-making compartment 102 has a temperature that falls within a freezing temperature zone (e.g., about -18 degrees C). The upper freezer compartment 103 is a storage compartment whose temperature zones can be switched depending on purposes. The temperature zones of the upper freezer compartment 103 can be switched between the freezing temperature zone (e.g., about -18 degrees C) and a soft freezing temperature zone (e.g., about -7 degrees C).

[0022]

The vegetable compartment 104 is a storage compartment mainly for storing vegetables, and a temperature of the vegetable compartment 104 is controlled within the refrigeration temperature zone (e.g., about 2 to 9 degrees C), similarly to the refrigerator compartment 101. The freezer compartment 105 is a storage compartment whose temperature is controlled such that it falls within the freezing temperature zone (e.g., about -18 degrees C).

[0023]

Needless to say, the above arrangement of the storage compartments is not restrictive. For example, another arrangement is possible in which the ice-making compartment 102 and the upper freezer compartment 103 are disposed side by side

with each other and below the refrigerator compartment 101 located uppermost, and the freezer compartment 105 is disposed below these ice-making compartment 102 and upper freezer compartment 103 and above the vegetable compartment 104 located lowermost. In the arrangement, which is known as middle-freezer arrangement in which the freezer compartment 105 is located between the vegetable compartment 104 and these ice-making compartment 102 and upper freezer compartment 103 disposed side by side with each other, low-temperature compartments (e.g., the ice-making compartment 102, the upper freezer compartment 103, and the freezer compartment 105) is brought to close to each other. Therefore, use of the middle-freezer arrangement to arrange the storage compartments eliminates the need for putting heat insulators between the low-temperature compartments, and due to this arrangement, energy consumption and cost can be also reduced as it is less likely to suffer heat leak. [0024]

The refrigerator 100 of the present embodiment has a refrigerant circuit in which refrigerant circulates, and the refrigerant circuit is provided with a compressor 17a, a condenser (not shown), a pressure reducing device (not shown), and a cooler 16a. The compressor 17a is disposed in a machine room 17 at the bottom of the rear side of the refrigerator 100. The cooler 16a is disposed in the cooler compartment 16 provided at the rear side of the refrigerator 100 and above the machine room 17. The cooler compartment 16 is provided below the refrigerator compartment floor part 5f. [0025]

With respect to the flow of refrigerant in the refrigerant circuit, the refrigerant compressed in the compressor 17a is condensed by the condenser. The refrigerant condensed in the condenser is depressurized in a pressure reducing device such as a capillary tube or an expansion valve. The refrigerant depressurized in the pressure reducing device is evaporated in the cooler 16a. Due to an endothermic effect associated with this evaporation, air around the cooler 16a is cooled. [0026]

A cold air circulation fan 16b is provided inside the cooler compartment 16 and near the cooler 16a. The cold air circulation fan 16b sends cold air cooled around the

cooler 16a to each storage compartment through air passages (described later). Also provided inside the cooler compartment 16 is a defrost heater 16c to melt frost developed on the cooler 16a. A drip tray 16d is provided at the bottom of the cooler compartment 16. The drip tray 16d receives drops of defrosting water generated from melting of the frost on the cooler 16a.

[0027]

A water conducting pipe 17c is provided between the machine room 17 and the cooler compartment 16 to connect the cooler compartment 16 to the machine room 17. In addition, a drain pan 17b is provided above the compressor 17a in the machine room 17. This drain pan 17b stores the defrosting water that drips onto the drip tray 16d through the water conducting pipe 17c. The defrosting water stored in the drain pan 17b is heated by the heat of the compressor 17a, evaporates, and is released as vapor into the atmosphere.

[0028]

The air passages configured to supply the cold air cooled by the cooler 16a from the cooler compartment 16 to each storage compartment includes a first air passage 21 formed inside a refrigerator compartment duct 5d, a second air passage 22 formed between a cooler compartment cover 16e and an inner back side of the heat-insulating box 100A, and a third air passage 23 formed inside a duct portion 5h provided to the refrigerator compartment floor part 5f. Air return passages for allowing air to return to the cooler compartment 16 after the air has cooled each storage compartment include a refrigerator compartment air return passage 14 formed between a lateral side of the cooler compartment 16 and an inner lateral side of the heat-insulating box 100A and a vegetable compartment air return passage (not shown). In the present embodiment, all of the above air passages and air return passages are located on the rear side of the refrigerator 100.

[0029]

The second air passage 22 is connected with a first air passage 21 through a third air passage 23 formed inside the duct portion 5h provided in the refrigerator compartment floor part 5f that is disposed above the cooler compartment cover 16e and

forms the floor of the refrigerator compartment 101. Therefore, cold air blown by the cold air circulation fan 16b from the second air passage 22 passes through the first air passage 21 after passing through the third air passage 23, and is distributed and supplied into the refrigerator compartment 101.

5 [0030]

A damper 5c is provided in the air passage from the cold air circulation fan 16b for circulating cold air to the refrigerator compartment 101. By opening and closing the damper 5c, the flow rate of the cold air flowing through the air passage is adjusted, and the temperature of the refrigerator compartment 101 is adjusted. The warmed air after cooling the refrigerator compartment 101 returns to the cooler compartment 16 through the refrigerator compartment air return passage 14. After being cooled again, the air is redistributed to each storage compartment by the cold air circulation fan 16b.

10 [0031]

The damper 5c is installed in the second air passage 22, but it is not restrictive. The damper 5c can be installed in the first air passage 21, the second air passage 22, or the third air passage 23.

15 [0032]

Fig. 5 is a schematic front view of the refrigerator 100 according to the embodiment of the present disclosure, with indications of respective sectional views.

20 Fig. 6 is a sectional view taken along a line Y-Y in Fig. 5. Fig. 7 is a sectional view taken along a line X-X in Fig. 5. Fig. 8 is a sectional view taken along a line W-W in Fig. 5. Fig. 9 is a sectional view taken along a line U-U in Fig. 5. A dashed arrow in Fig. 9 indicates a flow of condensation water.

[0033]

25 Next, the main parts of the refrigerator 100 will be described with reference to Figs. 3 through 9.

In the related-art technologies, a gap is formed between joining surfaces of the refrigerator compartment duct 5d and the refrigerator compartment floor part 5f, and an attempt was made to eliminate the gap as much as possible by affixing a sealing material or fixing screws. However, due to manufacturing variations or aging, minute

gaps may be generated between the refrigerator compartment duct 5d and the refrigerator compartment floor part 5f. Cold air leaks from such gaps, and when this leaked cold air comes into contact with the humid air in the refrigerator compartment 101, condensation occurs. The generated condensation water accumulates on the refrigerator compartment floor part 5f, causing mold and bacteria to be generated, and such mold and bacteria adhere to electrical parts, causing failure and malfunction.

[0034]

Therefore, in the refrigerator 100 according to the present embodiment, as shown in Fig. 4 and Figs. 6 to 9, a groove 5f-1 for drainage is formed in the refrigerator compartment floor part 5f. Also, on the rear side of the refrigerator compartment floor part 5f and on the right side of the refrigerator compartment duct 5d, a refrigerator compartment air return passage port 5b, which serves as an inlet of the refrigerator compartment air return passage 14, is formed. The groove 5f-1 extends horizontally from just below the refrigerator compartment duct 5d toward the refrigerator compartment air return passage port 5b. The groove 5f-1 is sloped downward from directly below the refrigerator compartment duct 5d to the refrigerator compartment air return passage port 5b at an angle of 2 degrees or more, and this facilitates the flow of condensation water on the groove 5f-1.

[0035]

The condensation water having moved from directly below the refrigerator compartment duct 5d to the refrigerator compartment air return passage port 5b is guided by gravity to the cooler compartment 16 through the refrigerator compartment air return passage 14 located below the refrigerator compartment air return passage port 5b. The condensation water is eventually accumulated on the drain pan 17b together with defrosting water. The condensation water accumulated on the drain pan 17b evaporates by being heated by the heat of the compressor 17a and is released into the atmosphere as water vapor.

[0036]

As shown in Fig. 4, a connector box 5g, storing connectors for supplying power to electrical components of the refrigerator compartment 101, is located lateral to the

refrigerator compartment duct 5d and opposite from the refrigerator compartment air return passage port 5b, that is, to the left side of the refrigerator compartment duct 5d. In other words, since the connector box 5g is located away from the groove 5f-1, which serves as a drainage passage, problems such as corrosion of electrodes and the like caused by adhesion of condensation water to the connector box 5g can be prevented. [0037]

By configuring the refrigerator 100 as described above, even if the damper 5c is installed lower than a refrigerator compartment floor part 5f, condensation water can be prevented from entering through joint surfaces between the refrigerator compartment duct 5d and a refrigerator compartment floor part 5f and adhering to the damper 5c. Therefore, the damper 5c can be installed lower than the refrigerator compartment floor part 5f, and a highly reliable refrigerator 100 that is free from failure due to adhesion of condensation water can be obtained without reducing the food storage space. Furthermore, since the drainage groove 5f-1 is formed integrally with the refrigerator compartment floor part 5f, material and manufacturing costs can be reduced. [0038]

As described hereinabove, the refrigerator 100 according to the present embodiment includes the heat-insulating box 100A including therein the refrigerator compartment 101 and the cooler compartment 16; and the cooler 16a disposed in the cooler compartment 16 and configured to cool air supplied to the refrigerator compartment 101. The refrigerator 100 further includes the refrigerator compartment duct 5d defining a part of the air passage that guides cold air cooled by the cooler 16a from the cooler compartment 16 to the refrigerator compartment 101. The refrigerator 100 further includes the refrigerator compartment floor part 5f disposed below the refrigerator compartment duct 5d and forming the floor of the refrigerator compartment 101, and the damper 5c installed in the air passage and configured to adjust the flow rate of cold air flowing in the air passage. The refrigerator compartment floor part 5f includes the refrigerator compartment air return passage port 5b positioned lateral to the refrigerator compartment duct 5d and serving as an inlet of the refrigerator compartment air return passage 14 through which air is allowed to pass to return to the cooler

compartment 16 after the air has cooled the refrigerator compartment 101. The refrigerator compartment floor part 5f further includes the groove 5f-1 extending from directly below the refrigerator compartment duct 5d to the refrigerator compartment air return passage port 5b.

5 [0039]

In the refrigerator 100 according to the present embodiment, the refrigerator compartment floor part 5f forming the floor of the refrigerator compartment 101 is provided with the groove 5f-1 extending from directly below the refrigerator compartment duct 5d to the refrigerator compartment air return passage port 5b. In other words, the groove 5f-1 defines a drainage channel from directly below the refrigerator compartment duct 5d to the refrigerator compartment air return passage 14. As a result, even when the damper 5c is installed in the air passage below the refrigerator compartment floor part 5f, condensation water on the joining surfaces between the refrigerator compartment duct 5d and the refrigerator compartment floor part 5f flows along the groove 5f-1 and is discharged into the refrigerator compartment air return passage 14, which is outside of the air passage in which the damper 5c is installed. The refrigerator 100 can thus prevent the condensation water from entering through the joining surfaces between the refrigerator compartment duct 5d and the refrigerator compartment floor part 5f and adhering to the damper 5c. Additionally, material and manufacturing costs can be reduced as the drainage groove 5f-1 is formed integrally with the refrigerator compartment floor part 5f.

15 [0040]

In the refrigerator 100 according to the present embodiment, the groove 5f-1 has a downward slope from directly below the refrigerator compartment duct 5d to the refrigerator compartment air return passage port 5b.

25 [0041]

In the refrigerator 100 according to the present embodiment, the groove 5f-1 has a downward slope from directly below the refrigerator compartment duct 5d to the refrigerator compartment air return passage port 5b, so that condensation water can easily flow through the groove 5f-1.

[0042]

In the refrigerator 100 according to the present embodiment, the cooler compartment 16 is provided at its bottom with the drip tray 16d to receive drops of water generated from melting of the frost on the cooler 16a. The machine room 17
5 connected to the cooler compartment 16 is provided below the cooler compartment 16, and the machine room 17 is provided with the drain pan 17b to accumulate water dropped onto the drip tray 16d.

[0043]

In the refrigerator 100 according to the present embodiment, the machine room
10 17 connected to the cooler compartment 16 is provided below the cooler compartment 16, and the machine room 17 is provided with the drain pan 17b to accumulate water dropped onto the bottom of the cooler compartment 16. Thus, condensation water flowing along the groove 5f-1 is guided to the cooler compartment 16 by way of the refrigerator compartment air return passage 14 and eventually accumulated on the drain
15 pan 17b together with the defrosting water. As such, efficient drainage can be realized.

[0044]

In the refrigerator 100 of the present embodiment, the connector box 5g storing
20 connectors for supplying power to electrical components of the refrigerator compartment 101 is disposed laterally to the refrigerator compartment duct 5d and opposite from the refrigerator compartment air return passage port 5b.

[0045]

In the refrigerator 100 according to the present embodiment, the connector box
25 5g is disposed laterally to the refrigerator compartment duct 5d and opposite from the refrigerator compartment air return passage port 5b, that is, away from the groove 5f-1, which serves as a drainage passage. Therefore, it is possible to prevent occurrence of problems caused by corrosion of electrodes and the like due to condensation water adhering to the connector box 5g.

Reference Signs List

[0046]

5b: refrigerator compartment air return passage port, 5c: damper, 5d: refrigerator compartment duct, 5e: shelf, 5f: refrigerator compartment floor part, 5f-1: groove, 5g: connector box, 5h: duct portion, 6a: chiller compartment partition, 6b: upper chiller compartment, 6c: lower chiller compartment, 14: refrigerator compartment air return passage, 16: cooler compartment, 16a: cooler, 16b: cold air circulation fan, 16c: defrost heater, 16d: drip tray, 16e: cooler compartment cover, 17: machine room, 17a: compressor, 17b: drain pan, 17c: water conduit pipe, 21: first air passage, 22: second air passage, 23: third air passage, 100: refrigerator, 100A: heat-insulating box, 101: refrigerator compartment, 101a: refrigerator compartment door, 102: ice-making compartment, 102a: ice-making compartment drawer; 103: upper freezer compartment, 103a: upper freezer compartment drawer, 104: vegetable compartment, 104a: vegetable compartment drawer, 105: freezer compartment, 105a: freezer compartment drawer.

CLAIMS

[Claim 1]

A refrigerator comprising:

5 a heat-insulating box including therein a refrigerator compartment and a cooler compartment;

a cooler disposed in the cooler compartment,

the cooler being configured to cool air supplied to the refrigerator compartment;

10 a refrigerator compartment duct defining a part of an air passage that guides air cooled by the cooler from the cooler compartment to the refrigerator compartment;

a refrigerator compartment floor part disposed below the refrigerator compartment duct and forming a floor of the refrigerator compartment; and

a damper installed in the air passage,

15 the damper being configured to regulate a flow rate of cold air flowing in the air passage, wherein

the refrigerator compartment floor part includes:

20 a refrigerator compartment air return passage port that is positioned lateral to the refrigerator compartment duct and serves as an inlet of a refrigerator compartment air return passage through which air is allowed to pass to return to the cooler compartment after the air cools the refrigerator compartment; and

a groove extending from directly below the refrigerator compartment duct to the refrigerator compartment air return passage port.

[Claim 2]

The refrigerator of claim 1, wherein

25 the groove has a downward slope from directly below the refrigerator compartment duct to the refrigerator compartment air return passage port.

[Claim 3]

The refrigerator of claim 1 or 2, wherein

30 a machine room connected to the cooler compartment is provided below the cooler compartment, and

the machine room is provided with a drain pan that accumulates water dropped onto a bottom of the cooler compartment.

[Claim 4]

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

5 a connector box accommodating connectors for power supply to electrical components of the refrigerator compartment is disposed lateral to the refrigerator compartment duct and opposite from the refrigerator compartment air return passage port.