

DESCRIPTION

Title of Invention

REFRIGERATOR

Technical Field

5 [0001]

The present invention relates to a refrigerator including an outside air humidity sensor.

Background Art

[0002]

10 A refrigerator according to the related art includes a temperature sensor that measures the temperature of outside air and a humidity sensor that measures the relative humidity of outside air. A measurement value obtained by the temperature sensor and a measurement value obtained by the humidity sensor are used to control, for example, electrification of a dew condensation prevention heater provided
15 in, for example, a partitioning portion between doors. A refrigerator including a humidity sensor disposed in a hinge cover of a hinge that connects a main body and a door has been proposed (see, for example, Patent Literature 1). According to Patent Literature 1, the humidity sensor is placed on a top surface of the main body, and the hinge cover reduces the influence of cold air from a storage compartment and
20 heat dissipated from a machine compartment on the measurement. Outside air is introduced through a ventilation hole in the hinge cover to ensure accurate measurement of the outside air humidity.

Citation List

Patent Literature

25 [0003]

Patent Literature 1: Japanese Patent No. 5391250

Summary of Invention

Technical Problem

[0004]

However, according the refrigerator of Patent Literature 1, a heat dissipation pipe is provided on the top and side surfaces of the main body, and heat from the heat dissipation pipe is transferred to the humidity sensor placed on the top surface of the main body. The transferred heat increases the difference between the measurement value obtained by the humidity sensor and the actual outside air humidity.

[0005]

The present invention has been made to solve the above-described problem, and an object of the present invention is to provide a refrigerator capable of accurately measuring the humidity of the outside air.

Solution to Problem

[0006]

A refrigerator according to an embodiment of the present invention includes a main body including an opening portion; a door that opens and closes the opening portion of the main body; a door connecting portion including a hinge fixed to the main body and the door, the door connecting portion connecting the door to the main body in an openable and closable manner; a heat dissipation pipe that is disposed in the main body and that dissipates heat; and an outside air humidity sensor that is disposed in the door connecting portion in an upper portion of the door, the outside air humidity sensor measuring an outside air humidity.

Advantageous Effects of Invention

[0007]

In the refrigerator according to the embodiment of the present invention, the outside air humidity sensor is disposed in the upper portion of the door. Accordingly, the influence of heat from the heat dissipation pipe on the measurement of the outside air humidity is less than that in the case where the outside air humidity sensor is placed on the main body as in the structure of the related art. Thus, the outside air humidity can be accurately measured.

Brief Description of Drawings

[0008]

[Fig. 1] Fig. 1 is a perspective view illustrating the overall structure of a refrigerator according to Embodiment 1 of the present invention.

[Fig. 2] Fig. 2 is a front perspective view illustrating a region including a door connecting portion in a state in which a hinge cover is opened according to Embodiment 1 of the present invention.

[Fig. 3] Fig. 3 is a rear perspective exploded view of the region including the door connecting portion according to Embodiment 1 of the present invention.

[Fig. 4] Fig. 4 is a bottom view of a portion of the hinge cover in a region including an outside air humidity sensor according to Embodiment 1 of the present invention.

[Fig. 5] Fig. 5 is a sectional view of Fig. 4 taken along line A-A.

[Fig. 6] Fig. 6 is a bottom view of a portion of a hinge cover in a region including an outside air humidity sensor according to Embodiment 2 of the present invention.

[Fig. 7] Fig. 7 is a sectional view of Fig. 6 taken along line B-B.

[Fig. 8] Fig. 8 is a bottom view of a portion of a hinge cover in a region including an outside air humidity sensor according to Embodiment 3 of the present invention.

[Fig. 9] Fig. 9 is a sectional view of Fig. 8 taken along line C-C.

[Fig. 10] Fig. 10 is a partial sectional view of a portion of a hinge cover in a region including an outside air humidity sensor according to Embodiment 4 of the present invention.

[Fig. 11] Fig. 11 is a partial sectional view of another example of a portion of a hinge cover in a region including an outside air humidity sensor according to Embodiment 4 of the present invention.

Description of Embodiments

[0009]

Embodiment 1.

Fig. 1 is a perspective view illustrating the overall structure of a refrigerator 100 according to Embodiment 1 of the present invention. The refrigerator 100 includes a main body 1 having an opening portion 1a at the front side thereof and a plurality of storage compartment doors 3 that open and close the opening portion 1a. The

refrigerator 100 has a plurality of storage compartments, such as a refrigerator compartment, an ice-making compartment, a switching compartment, a vegetable compartment, and a freezer compartment, which have different temperature zones. The refrigerator 100 also includes a plurality of temperature sensors disposed in the storage compartments, a fan that circulates cold air in the refrigerator 100, and a plurality of dampers for adjusting the amount of cold air introduced into each storage compartment.

[0010]

The refrigerator 100 includes a compressor, a heat dissipation pipe 2, a pressure reducing device, and a cooling device, which are connected to each other by refrigerant pipes. The compressor compresses refrigerant and discharges the compressed refrigerant. The heat dissipation pipe 2 condenses and liquefies the refrigerant compressed by the compressor. The pressure reducing device includes, for example, a capillary tube, and reduces the pressure of the refrigerant liquefied by the heat dissipation pipe 2. The cooling device evaporates the refrigerant that has been reduced in pressure by the pressure reducing device and cools ambient air by heat absorption. The air cooled by the cooling device is transferred to each storage compartment by the fan and the dampers.

[0011]

The main body 1 includes a shell and a heat insulator, and reduces heat penetration from the outside. The above-described heat dissipation pipe 2 is disposed on both side surfaces 11 and a top surface 12 of the main body 1. The heat dissipation pipe 2 is embedded in the heat insulator, and heat from the heat dissipation pipe 2 is dissipated to the outside of the refrigerator 100 through the shell.

[0012]

The storage compartment doors 3 are provided for the respective storage compartments. The storage compartment doors 3 open and close the opening portion 1a, and prevent leakage of cold air in each storage compartment to the outside of the refrigerator 100. Among the storage compartments, the refrigerator compartment, which is disposed in the uppermost section of the refrigerator 100, is

provided with two doors 31 at the front side thereof. The ice-making compartment, the switching compartment, the vegetable compartment, the freezer compartment, etc. are provided with drawer doors 32 at the front sides thereof.

[0013]

5 The refrigerator 100 includes a partitioning portion 33 provided between the two doors 31 of the refrigerator compartment. The partitioning portion 33 separates the spaces inside and outside the refrigerator 100 from each other, and is provided on the inner side of one of the two doors 31. A dew condensation prevention heater 4 that prevents dew condensation is disposed in the partitioning portion 33. The dew
10 condensation prevention heater 4 generates heat to maintain the temperature of the front side of the partitioning portion 33 at a set temperature to prevent dew condensation on the partitioning portion 33 due to heat conduction. The partitioning portion 33 is filled with a heat insulator in a space behind the dew condensation prevention heater 4. The heat insulator prevents an increase in the temperature in
15 the refrigerator 100 due to the dew condensation prevention heater 4.

[0014]

 The refrigerator 100 also includes a door connecting portion 5 that connects one door 31 of the refrigerator compartment to the main body 1 in an openable and closable manner, an outside air temperature sensor 6, an outside air humidity sensor
20 7 (see Fig. 2), and a controller 8. The door connecting portion 5 includes a hinge 51 that is fixed to an upper portion of the main body 1 and an upper portion of the door 31 of the refrigerator compartment.

[0015]

 The outside air temperature sensor 6 includes, for example, a thermistor, and
25 measures an outside air temperature T_{out} . The outside air temperature sensor 6 is disposed on the front surface of the door 31. The outside air humidity sensor 7 includes, for example, a moisture sensitive material, electrodes, and a substrate, and measures the relative humidity (outside air humidity H_{out}) based on the electric resistance or electric capacitance between the electrodes. The outside air humidity
30 sensor 7 is disposed in the door connecting portion 5. The outside air temperature

sensor 6 may be placed at any location as long as the outside air temperature T_{out} can be measured, and may be disposed in the door connecting portion 5 together with the outside air humidity sensor 7.

[0016]

5 The controller 8 includes, for example, a microcomputer, and is disposed in the main body 1. The controller 8 controls the frequency of the compressor and the open/closed state of each damper so that the temperature in each storage compartment becomes equal to a set temperature. The controller 8 also controls electrification of the dew condensation prevention heater 4 based on the outside air
10 temperature T_{out} measured by the outside air temperature sensor 6 and the outside air humidity H_{out} measured by the outside air humidity sensor 7. More specifically, the amount of heat generated by the dew condensation prevention heater 4 is controlled so that the surface temperature of the partitioning portion 33 is higher than or equal to a condensation temperature T_d and lower than or equal to the outside air
15 temperature T_{out} . The condensation temperature T_d is calculated by a known method based on the outside air temperature T_{out} measured by the outside air temperature sensor 6 and the outside air humidity H_{out} measured by the outside air humidity sensor 7.

[0017]

20 Fig. 2 is a front perspective view illustrating a region including the door connecting portion in a state in which the hinge cover is opened according to Embodiment 1 of the present invention. Fig. 3 is a rear perspective exploded view of the region including the door connecting portion according to Embodiment 1 of the present invention. Fig. 4 is a bottom view of a portion of the hinge cover in a region
25 including the outside air humidity sensor according to Embodiment 1 of the present invention. Fig. 5 is a sectional view of Fig. 4 taken along line A-A. The structure of the door connecting portion 5 and components surrounding the door connecting portion 5 will be described in detail with reference to Figs. 2 to 5.

[0018]

As illustrated in Figs. 2 and 3, the top surface 12 of the main body 1 has a wire hole 91 for a lead wire 9 of the outside air humidity sensor 7. One end of the lead wire 9 is connected to the controller 8 in the main body 1, and the other end of the lead wire 9 extends through the wire hole 91 and is connected to the outside air humidity sensor 7. A recess 31a that serves as an air path is formed in the upper portion of the door 31. The recess 31a is formed in the upper portion of the door 31 such that the recess 31a extends from a position behind a front edge portion 31b to a back edge portion 31c. Thus, the recess 31a is not formed in the front edge portion 31b of the door 31, and therefore can be formed without degrading the appearance of the refrigerator 100.

[0019]

The door connecting portion 5 includes the above-described hinge 51, a hinge cover 52 having a side surface 52c, and a lid cover 53 that is detachably attached to the hinge cover 52. The hinge 51 connects the main body 1 and the door 31 to each other at a side edge of the top surface 12 of the main body 1 in the left-right direction (direction of arrow X). The hinge 51 includes a first frame 51b having a shaft 51a and a second frame 51e having a shaft hole 51c and a plurality of screw holes 51d. The first frame 51b is rotatably connected to the second frame 51e by the shaft 51a. The shaft 51a of the first frame 51b is inserted into and fixed to a shaft hole formed in the door 31. The second frame 51e is fixed to the main body 1 by a plurality of screws. According to this structure, the door 31 is capable of rotating with respect to the main body 1 around the shaft 51a extending in the vertical direction (direction of arrow Z), thereby opening and closing the opening portion 1a of the main body 1. Although the hinge 51 at the left side of the refrigerator 100 is described above, a similar hinge is provided at the right side of the refrigerator 100, and is fixed to the main body 1 and the right door 31.

[0020]

The size of the hinge cover 52 is such that the hinge cover 52 covers the recess 31a in the door 31, the hinge 51, and the wire hole 91 in the main body 1.

The outside air humidity sensor 7 is fixed to an inner surface 52a of the hinge cover

52, and the lid cover 53 is arranged to cover the outside air humidity sensor 7 from below.

[0021]

As illustrated in Fig. 5, a projecting stopper 52v and a projecting portion 52w are provided on the inner surface 52a of the hinge cover 52. The stopper 52v is bent at an end thereof, and supports the outside air humidity sensor 7. The projecting portion 52w is in contact with the outside air humidity sensor 7 at an end thereof, so that a space is formed between the outside air humidity sensor 7 and the inner surface 52a of the hinge cover 52. As illustrated in Fig. 3, the outside air humidity sensor 7 is disposed above the recess 31a in the door 31 when the hinge cover 52 is closed.

[0022]

The hinge cover 52 has a cut 52b at a position corresponding to a side edge of the door 31. The cut 52b serves as an inlet that enables outside air to enter the recess 31a in the door 31. To enable fixation of the lid cover 53, a projecting engagement rib 52x (see Fig. 5) is provided on the inner surface 52a of the hinge cover 52, and an engagement hole 52d (see Fig. 3) is formed in the side surface 52c of the hinge cover 52.

[0023]

The lid cover 53 is made of an insulating material, such as a resin, and protects the outside air humidity sensor 7 from, for example, static electricity, dew condensation, water, and dust. As illustrated in Fig. 3, a lug 53d is provided on a side surface 53b of the lid cover 53 at a position that faces the engagement hole 52d in the hinge cover 52. When the lid cover 53 is fitted to the space between the side surface 52c and the engagement rib 52x of the hinge cover 52, the lug 53d of the lid cover 53 is engaged with the engagement hole 52d in the hinge cover 52 and the lid cover 53 is fixed to the hinge cover 52. A gap 54 through which outside air flows is provided between one side surface 53b of the lid cover 53 and the side surface 52c of the hinge cover 52 and between the other side surface 53b of the lid cover 53 and the engagement rib 52x of the hinge cover 52 in the upper portion of the door 31. In the

upper portion of the main body 1, the side surfaces 53b of the lid cover 53 are in contact with the hinge cover 52 with no gaps provided therebetween so that outside air does not flow into the wire hole 91 for the lead wire 9.

[0024]

5 The manner in which outside air flows in the door connecting portion 5 will now be described with reference to Figs. 2 to 5. Outside air is introduced through the cut 52b in the hinge cover 52, and flows into the recess 31a in the door 31. As shown by the broken line arrows in Fig. 5, the outside air that has flowed into the recess 31a flows into the lid cover 53 through the gap 54 between the hinge cover 52 and the
10 side surfaces 53b of the lid cover 53, passes through the region around the outside air humidity sensor 7, and flows out of the lid cover 53 through the gap 54. Thus, air passes through the space formed by a bottom surface 53c of the lid cover 53 and the inner surface 52a of the hinge cover 52, and the humidity of outside air can be measured by the outside air humidity sensor 7.

15 [0025]

 The lead wire is generally composed of, for example, a copper wire, and a portion thereof is disposed in the main body. Therefore, when the lead wire that has been cooled in the main body comes into contact with outside air in the wire hole, dew condensation occurs on the lead wire. Therefore, in the structure according to
20 the related art in which outside air flows through the door-side region and the main-body-side region in the hinge cover, the measurement accuracy of the outside air humidity sensor is reduced due to dew condensation on the lead wire. Alternatively, a member that prevents water from entering the main body needs to be provided.

[0026]

25 In contrast, the above-described door connecting portion 5 is configured such that the wire hole 91 for the lead wire 9 is separated from the cut 52b in the hinge cover 52. Therefore, the flow of outside air in the hinge cover 52 is reduced in the upper portion of the main body 1, so that the occurrence of dew condensation on the lead wire 9 is reduced. Accordingly, the outside air humidity sensor 7 is capable of

performing reliable measurement, and it is not necessary to additionally provide a member for preventing entrance of water.

[0027]

As described above, according to Embodiment 1, the outside air humidity sensor 7 is disposed in the door connecting portion 5 in the upper portion of the door 31. Accordingly, the outside air humidity sensor 7 can be separated from the main body 1 in which the heat dissipation pipe 2 is disposed, so that the influence of heat from the heat dissipation pipe 2 can be reduced. Therefore, the difference between the measurement value obtained by the outside air humidity sensor 7 and the actual outside air humidity can be reduced.

[0028]

According to the refrigerator 100 including the dew condensation prevention heater 4, electrification of the dew condensation prevention heater 4 is controlled based on the outside air humidity H_{out} obtained as described above, and therefore the amount of electrification can be minimized. According to the structure of the related art in which the outside air humidity sensor is provided on the top surface of the main body, to reliably prevent the occurrence of dew condensation on the partitioning portion, an error in the measurement of the outside air humidity needs to be compensated for by increasing the amount of electrification of the dew condensation prevention heater. In contrast, according to the refrigerator 100, the outside air humidity sensor 7 is disposed in the upper portion of the door 31, and the distance from the heat dissipation pipe 2 to the outside air humidity sensor 7 is greater than that in the structure of the related art, so that the measurement error of the outside air humidity H_{out} can be reduced. Therefore, it is not necessary to increase the amount of electrification to compensate for the measurement error, and the occurrence of dew condensation can be prevented with minimum power consumption. Thus, a high-quality refrigerator can be obtained.

[0029]

In addition, the door connecting portion 5 includes the hinge cover 52 disposed above the hinge 51, and the door 31 has the recess 31a at a position that faces the

outside air humidity sensor 7. Accordingly, external heat can be blocked and outside air can be guided to the outside air humidity sensor 7, so that the accuracy of measurement of the outside air humidity can be increased. In addition, it is not necessary to form a ventilation hole in the hinge cover 52 in the region adjacent to the main body 1, so that the occurrence of dew condensation on the lead wire 9 can be reduced.

[0030]

In addition, the door connecting portion 5 includes the lid cover 53 that faces the hinge cover 52 and surrounds the outside air humidity sensor 7, and the gap 54 through which outside air passes is formed between the hinge cover 52 and the lid cover 53. Accordingly, the outside air humidity sensor 7 is separated from the heat dissipation pipe 2, and the measurement error due to heat from the heat dissipation pipe 2 can be further reduced. In addition, since outside air flows into the space between the lid cover 53 and the hinge cover 52 through the gap 54, the outside air humidity sensor 7 is capable of accurately measuring the outside air humidity.

[0031]

Embodiment 2.

Fig. 6 is a bottom view of a portion of a hinge cover in a region including an outside air humidity sensor according to Embodiment 2 of the present invention. Fig. 7 is a sectional view of Fig. 6 taken along line B-B. According to Embodiment 1, outside air is introduced through the gap 54 between the lid cover 53 and the hinge cover 52. According to Embodiment 2, outside air is introduced through a ventilation hole 154 formed in a lid cover 153. In Embodiment 2, components similar to those in Embodiment 1 are denoted by the same reference signs, and description thereof is thus omitted.

[0032]

As illustrated in Fig. 6, the lid cover 153 has the ventilation hole 154 at a position that faces the outside air humidity sensor 7. The ventilation hole 154 may have any shape, such as a rectangular, circular, or elliptical shape, as long as a width W thereof is such that a human finger cannot be inserted therethrough (for example,

less than or equal to 3.5 mm). The minimum distance between the ventilation hole 154 and the outside air humidity sensor 7 is preferably greater than or equal to 20 mm. According to such a structure, the possibility that the outside air humidity sensor 7 will be short-circuited due to static electricity can be sufficiently reduced.

5 [0033]

Since the ventilation hole 154 ensures sufficient ventilation for the outside air humidity sensor 7, it is not necessary to provide the gap 54 between the hinge cover 52 and side surfaces 153b of the lid cover 153 as in Embodiment 1. One side surface 153b of the lid cover 153 is in contact with the side surface 52c of the hinge cover 52, and the other side surface 153b of the lid cover 153 is in contact with the engagement rib 52x of the hinge cover 52.

10 [0034]

As shown by the broken line arrows in Fig. 7, outside air in the recess 31a enters the lid cover 153 through the ventilation hole 154 in the lid cover 153, passes through the region around the outside air humidity sensor 7, and flows out of the lid cover 153 through the ventilation hole 154. The lid cover 153 may instead have both the gap 54 according to Embodiment 1 and the ventilation hole 154 to facilitate introduction of the outside air.

15 [0035]

As described above, according to Embodiment 2, the door connecting portion 5 includes the lid cover 153 in which the ventilation hole 154 having the width W of less than or equal to 3.5 mm is formed. Accordingly, the outside air humidity sensor 7 can be protected, and ventilation of the space inside the lid cover 153 can be provided by the ventilation hole 154, which has a simple structure. In addition, even when water enters the lid cover 53, the water can be discharged through the ventilation hole 154. Therefore, the influence of accumulation of moisture in the lid cover 153 on the measurement of the outside air humidity can be reduced.

20 [0036]

In addition, the ventilation hole 154 is formed at a position that faces the outside air humidity sensor 7, and a distance D1 from the outside air humidity sensor

7 to the ventilation hole 154 is greater than or equal to 20 mm. Accordingly, outside air that flows into the lid cover 153 efficiently flows through the region around the outside air humidity sensor 7, and the outside air humidity sensor 7 can accurately measure the humidity of outside air without receiving static electricity or water.

[0037]

Embodiment 3.

Fig. 8 is a bottom view of a portion of a hinge cover in a region including an outside air humidity sensor according to Embodiment 3 of the present invention. Fig. 9 is a sectional view of Fig. 8 taken along line C-C. According to Embodiment 3, the arrangement of ventilation holes 254 formed in a lid cover 253 differs from that in Embodiment 2. In Embodiment 3, components similar to those in Embodiment 2 are denoted by the same reference signs, and description thereof is thus omitted.

[0038]

As illustrated in Fig. 8, a plurality of ventilation holes 254 are formed in a bottom surface 253c of the lid cover 253 in a region around a position that faces the outside air humidity sensor 7. The number of ventilation holes 254 may instead be one. A distance D2 between each ventilation hole 254 and the outside air humidity sensor 7 may be greater than or equal to 20 mm to reduce the influence of static electricity. In Embodiment 3, when the distance D2 between the outside air humidity sensor 7 and each ventilation hole 254 is 20 mm, the distance from the outside air humidity sensor 7 to the bottom surface 253c of the lid cover 253 is less than that in the case where the distance D1 is set to 20 mm in Embodiment 2.

[0039]

As shown by the broken line arrows in Fig. 9, outside air in the recess 31a enters the lid cover 253 through the ventilation holes 254 in the lid cover 253, and passes through the region around the outside air humidity sensor 7 while reducing stagnation in the lid cover 253. The outside air that has passed the outside air humidity sensor 7 flows out of the lid cover 253 through the ventilation holes 254.

[0040]

As described above, according to Embodiment 3, one or more ventilation holes 254 are formed around the position that faces the outside air humidity sensor 7, and the minimum distance from the outside air humidity sensor 7 to each ventilation hole 254 is greater than or equal to 20 mm. Accordingly, the number of ventilation holes 254 can be increased to facilitate introduction of outside air into the lid cover 253, so that the outside air humidity can be accurately measured. In addition, since the ventilation holes 254 are formed around the position that faces the outside air humidity sensor 7, when the distance D2 is set to greater than or equal to 20 mm, the height (length in the direction of arrow Z) of side surfaces 253b of the lid cover 253 is less than that in Embodiment 2. Therefore, the outside air humidity sensor 7 can be prevented from being short-circuited due to static electricity or water, and the size of the refrigerator 100 can be reduced.

[0041]

Embodiment 4.

Fig. 10 is a partial sectional view of a portion of a hinge cover in a region including an outside air humidity sensor according to Embodiment 4 of the present invention. According to Embodiment 4, the structure of a lid cover 353 in a region around ventilation holes 354 formed in a bottom surface 353c thereof differs from that in Embodiment 3. In Embodiment 4, components similar to those in Embodiment 3 are denoted by the same reference signs, and description thereof is thus omitted.

[0042]

As illustrated in Fig. 10, the lid cover 353 is structured such that each ventilation hole 354 has a guide rib 355 at an edge portion thereof, the guide rib 355 projecting toward the hinge cover 52. Each guide rib 355 is formed on the edge portion at a position adjacent to the outside air humidity sensor 7 to block a straight path between the outside air humidity sensor 7 and the corresponding ventilation hole 354.

[0043]

As shown by the broken line arrows in Fig. 10, outside air in the recess 31a enters the lid cover 353 through the ventilation holes 354 in the lid cover 353, flows

along each guide rib 355, and passes through the region around the outside air humidity sensor 7. The path along which the outside air flows from each ventilation hole 354 to the outside air humidity sensor 7 is longer than that in the case where the guide ribs 355 are not provided. The outside air that has passed the outside air humidity sensor 7 flows along each guide rib 355 again, and flows out of the lid cover 353 through the ventilation holes 354. The guide ribs 355 may have any shape.

[0044]

Fig. 11 is a partial sectional view of another example of a portion of a hinge cover in a region including an outside air humidity sensor according to Embodiment 4 of the present invention. Each ventilation hole 454 in a lid cover 453 has a guide rib 455 at an edge portion thereof. The guide ribs 455 have rib end portions 455a that are bent toward side surfaces 453b of the lid cover 453. Outside air in the recess 31a enters the lid cover 453 through the ventilation holes 454 and flows along the guide ribs 455 that are bent. Assuming that the length of the path along which the outside air flows from the ventilation holes 454 to the outside air humidity sensor 7 is 20 mm, when the bent guide ribs 455 are provided, the height (length in the direction of arrow Z) of the guide ribs 455 is less than that in the case where the guide ribs 355 that are not bent are provided.

[0045]

As described above, according to Embodiment 4, the one or more ventilation holes (354 or 454) have the guide ribs (355 or 455) that project toward the hinge cover 52 at the edge portions thereof at positions adjacent to the outside air humidity sensor 7. Accordingly, the distance between the outside air humidity sensor 7 and the ventilation holes is less than that in the case where the guide ribs 355 are not formed, and the guide ribs are shaped so that the outside air humidity sensor 7 can be prevented from being short-circuited due to static electricity or water. In addition, the height (length in the direction of arrow Z) of the side surfaces (353b or 453b) of the lid cover can be reduced, so that the depth of the recess 31a in the door 31 can be reduced. Accordingly, the appearance can be improved, and the costs can be reduced by reducing the size of the components.

[0046]

Embodiments of the present invention are not limited to Embodiments 1 to 4 described above, and various modifications are possible. For example, the outside air temperature sensor 6 may also be placed on the hinge cover 52 together with the outside air humidity sensor 7. In addition, the refrigerator 100 may have one or more storage compartments, and the storage compartments may be arranged in any manner. The number of doors 31 of the uppermost storage compartment may instead be one.

Reference Signs List

[0047]

1 main body 1a opening portion 2 heat dissipation pipe 3 storage compartment door 4 dew condensation prevention heater 5 door connecting portion 6 outside air temperature sensor 7 outside air humidity sensor 8 controller 9 lead wire 11 both side surfaces 12 top surface 31 door 31a recess 31b front edge portion 31c back edge portion 32 drawer door 33 partitioning portion 51 hinge 51a shaft 51b first frame 51c shaft hole 51d screw hole 51e second frame 52 hinge cover 52a inner surface 52b cut 52c side surface 52d engagement hole 52v stopper 52w projecting portion 52x engagement rib 53, 153, 253, 353, 453 lid cover 53b, 153b, 253b, 353b, 453b side surface 53c, 253c, 353c bottom surface of lid cover 53d lug 54 gap 91 wire hole 100 refrigerator 154, 254, 354, 454 ventilation hole 355, 455 guide rib 455a rib end portion D1, D2 distance W width.

CLAIMS

[Claim 1]

A refrigerator comprising:

a main body including an opening portion;

5 a door that opens and closes the opening portion of the main body;

a door connecting portion including a hinge fixed to the main body and the door, the door connecting portion connecting the door to the main body in an openable and closable manner;

10 a heat dissipation pipe that is disposed in the main body and that dissipates heat; and

an outside air humidity sensor that is disposed in the door connecting portion in an upper portion of the door, the outside air humidity sensor measuring an outside air humidity.

[Claim 2]

15 The refrigerator of claim 1, wherein the door connecting portion includes a hinge cover disposed above the hinge, and

wherein a recess is formed in the door at a position that faces the outside air humidity sensor.

[Claim 3]

20 The refrigerator of claim 2, wherein the door connecting portion includes a lid cover that faces the hinge cover and that surrounds the outside air humidity sensor, and

wherein a gap through which outside air passes is formed between the hinge cover and the lid cover.

25 [Claim 4]

The refrigerator of claim 2 or 3, wherein the door connecting portion includes a lid cover that faces the hinge cover and that surrounds the outside air humidity sensor, and

30 wherein the lid cover has a ventilation hole having a width of less than or equal to 3.5 mm.

[Claim 5]

The refrigerator of claim 4, wherein the ventilation hole is formed at a position that faces the outside air humidity sensor, and wherein a minimum distance from the outside air humidity sensor to the ventilation hole is greater than or equal to 20 mm.

5 [Claim 6]

The refrigerator of claim 4, wherein the lid cover has one or more ventilation holes each having a width of less than or equal to 3.5 mm and being formed around a position that faces the outside air humidity sensor, and a minimum distance from the outside air humidity sensor to the one or more ventilation holes is greater than or
10 equal to 20 mm.

[Claim 7]

The refrigerator of claim 4, wherein the lid cover has one or more ventilation holes each having a width of less than or equal to 3.5 mm and being formed around a position that faces the outside air humidity sensor, and

15 wherein each of the one or more ventilation holes has a rib at an edge portion thereof, the rib projecting toward the hinge cover at a position adjacent to the outside air humidity sensor.

[Claim 8]

The refrigerator of any one of claims 1 to 7, further comprising:

20 an outside air temperature sensor that measures an outside air temperature;
a dew condensation prevention heater that prevents dew condensation at a position where the door is opened and closed; and

a controller that controls electrification of the dew condensation prevention heater based on the outside air temperature measured by the outside air temperature
25 sensor and the outside air humidity measured by the outside air humidity sensor.