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REFRIGERATOR

Abstract

A refrigerator includes an inner case including a storage compartment; an evaporator to generate cold air; and a duct at rear of the storage compartment to supply the cold air to the storage compartment, the duct including a cooling space in which the evaporator is installed, and a contact portion protruding rearwardly from an edge of the cooling space so that a contact surface contacts a surface of the inner case, and forming a passageway recessed from the contact surface in which an electric wire is arrangeable, the contact portion including a first and second inner surfaces forming the passageway, a first protrusion from the first inner surface toward the second inner surface, and a second protrusion protruding from the second inner surface toward the first inner surface, wherein an end of the second protrusion is closer to the first inner surface than an end of the first protrusion.

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Background/Summary

CROSS-REFERENCE TO RELATED APPLICATIONS [0001] This application is a continuation application of International Application No. PCT/KR2025/000303, filed on Jan. 7, 2025, which is based on and claims the benefit of Korean Patent Application Number 10-2024-0021705, filed on Feb. 15, 2024, the disclosures of which are incorporated by reference herein in their entireties.

TECHNICAL FIELD
[0002] The disclosure relates to a refrigerator including a wire holding structure.
BACKGROUND ART
[0003] In general, a refrigerator, an appliance for keeping food fresh, includes a main body having a storage compartment and a cold air supply system for supplying cold air to the storage compartment. The storage compartment includes a refrigerating compartment in which the food is kept refrigerated at a temperature of about 0° C. to 5° C., and a freezing compartment an inner surface.
[0004] Cold air supplied to the storage compartment of the refrigerator may be heat exchanged in an evaporator and introduced into the storage compartment. The cold air passing through the evaporator may be guided through a duct and move into the storage compartment.
[0005] The duct through which the cold air flows may include a plurality of flow paths to flow the cold air to different parts of the storage compartment. And, some of the plurality of flow paths may be provided with dampers configured to open or close the flow paths, thereby selectively opening and closing given flow paths.
DISCLOSURE
Technical Problem
[0006] An embodiment of the disclosure provides a refrigerator including a structure for positioning wires while maintaining a tight fit between the duct and the inner case. An embodiment of the disclosure provides a refrigerator including a structure capable of effectively receiving and supporting wires.
[0007] Technical tasks to be achieved in this document are not limited to the technical tasks mentioned above, and other technical tasks not mentioned will be clearly understood by those skilled in the art from the description below.
Technical Solution
[0008] Aspects of embodiments of the disclosure will be set forth in part in the description which follows and, in part, will be apparent from the description, or may be learned by practice of the presented embodiments.
[0009] According to an embodiment of the disclosure, a refrigerator may include an inner case including a storage compartment; an evaporator configured to generate cold air; and a duct at rear side of the storage compartment and configured to supply the cold air generated by the evaporator to the storage compartment. The duct may include a cooling space recessed in a rear side of the duct, and in which the evaporator is installed, and a contact portion protruding rearwardly from an edge of the cooling space so that a contact surface of the contact portion contacts a surface of the

inner case, and forming a passageway recessed from the contact surface in which an electric wire is arrangeable. The contact portion may include a first inner surface forming the passageway, a second inner surface forming the passageway and facing the first inner surface, a first protrusion protruding from the first inner surface toward the second inner surface, a second protrusion protruding from the second inner surface toward the first inner surface. An end of the second protrusion is closer to the first inner surface than an end of the first protrusion.

[0010] According to an embodiment of the disclosure, the first protrusion and the second protrusion may be spaced apart from each other.

[0011] According to an embodiment of the disclosure, the passageway may include a first passageway between the end of the first protrusion and the second inner surface, a second passageway between the end of the second protrusion and the first inner surface, and a communicating portion formed by a side surface of the first protrusion and a side surface of the second protrusion spaced apart from each other, and communicating the first passageway with the second passageway.

[0012] According to an embodiment of the disclosure, the passageway may be recessed from the contact surface in a forward direction of the refrigerator. A diameter of the communicating portion may decrease in the forward direction.

[0013] According to an embodiment of the disclosure, a diameter of a first end of the communicating portion at the contact surface may be larger than a diameter of the electric wire. A diameter of a second end of the communicating portion may be smaller than the diameter of the electric wire.

[0014] According to an embodiment of the disclosure, a sum of a protruding length of the first protrusion and a protruding length of the second protrusion may be longer than a diameter of the passageway.

[0015] According to an embodiment of the disclosure, the passageway may include an opening that is open toward a rearward direction of the refrigerator to allow insertion of the electric wire. The contact portion may include a lead portion that extends downwardly from the first protrusion to cover a portion of the opening.

[0016] According to an embodiment of the disclosure, an end of the lead portion facing downward may be spaced apart from the second inner surface.

[0017] According to an embodiment of the disclosure, a distance between the end of the lead portion and the second inner surface may be greater than a diameter of the electric wire.

[0018] According to an embodiment of the disclosure, when arranged in the passageway, the electric wire may include a first portion in contact with the first protrusion, and a second portion different from the first portion and in contact with the second protrusion.

[0019] According to an embodiment of the disclosure, the duct may include a guide passage configured to guide the cold air to the storage compartment, and a damper configured to open or close the guide passage. A first end of the electric wire may be connectable to the damper when the electric wire is arranged in the passageway.

[0020] According to an embodiment of the disclosure, the refrigerator may further include a power supply arranged on a side of the contact surface opposite to the damper, and connectable to a second end of the electric wire.

[0021] According to an embodiment of the disclosure, the refrigerator may further include a sealing member arranged between the inner case and the contact portion.

[0022] According to an embodiment of the disclosure, the sealing member may be attached to the contact surface to cover the opening.

[0023] According to an embodiment of the disclosure, the sealing member may include an insulating material.

[0024] According to various embodiments of the disclosure, a refrigerator includes an inner case forming a storage compartment, an evaporator configured to generate cold air, a fan configured to

cause the cold air to flow into the storage compartment, a duct including a guide passage configured to guide the cold air into the storage compartment and a contact portion disposed on a rear side of the storage compartment and in contact with the inner case, a damper configured to open or close the guide passage, a power supply disposed on the opposite side of the damper with respect to the contact portion and configured to supply power to the damper, and an electric wire arranged to pass the contact portion and connecting the damper and the power supply. The contact portion includes a contact surface in contact with one surface of the inner case, a passageway formed to be recessed in the contact surface to allow installation of the electric wire, a first inner surface forming the passageway, a second inner surface forming the passageway and facing the first inner surface, a first protrusion protruding in a first direction from the first inner surface toward the second inner surface, and a second protrusion protruding in a second direction from the second inner surface toward the first inner surface, wherein an end of the second protrusion is closer to the first inner surface than an end of the first protrusion.

[0025] According to various embodiments of the disclosure, a refrigerator includes an inner case forming a storage compartment, a duct including a contact portion in contact with the inner case and installable in the inner cases, and an electric wire arranged to pass the contact portion. The contact portion includes a contact surface in contact with one surface of the inner case, a passageway in which the wire is arranged, wherein the passageway is formed to be recessed from the contact surface and separates the contact surface into a first contact surface and a second contact surface distinct from the first contact surface, a first protrusion forming a portion of the passageway and protruding in a first direction from a first inner surface adjacent to the first contact surface toward a second inner surface forming another portion of the passageway and adjacent to the second contact surface, and a second protrusion protruding in a second direction from the second inner surface toward the first inner surface and arranged to be spaced apart from the first protrusion.

Description

DESCRIPTION OF DRAWINGS

[0026] These and/or other aspects of the disclosure will become apparent and more readily appreciated from the following description of embodiments, taken in conjunction with the accompanying drawings listed below.

[0027] FIG. **1** is a view illustrating a refrigerator according to an embodiment of the disclosure.

[0028] FIG. **2** is a side cross-sectional view illustrating the refrigerator according to an embodiment of the disclosure.

[0029] FIG. **3** is a view showing a portion of the inner case, the fan, wires, and the duct separately in a refrigerator according to an embodiment of the disclosure.

[0030] FIG. **4** is an exploded view of FIG. **3**.

[0031] FIG. **5** is a view of FIG. **4** from a different angle.

[0032] FIG. **6** is an enlarged view illustrating a portion of a contact portion of the duct, in the refrigerator according to an embodiment of the disclosure.

[0033] FIG. **7** is a view of FIG. **6** from another angle.

[0034] FIG. **8** is a cross-sectional view of FIG. **6**, cut along the a-a′ line.

[0035] FIG. **9** is a cross-sectional view of FIG. **6** cut along the b-b′ line.

[0036] FIG. **10** is a cross-sectional view of FIG. **6** cut along the c-c′ line.

MODES OF THE INVENTION

[0037] Various embodiments of the disclosure and terms used herein are not intended to limit the technical features described herein to specific embodiments, and should be understood to include various modifications, equivalents, or substitutions of the corresponding embodiments.

[0038] In describing of the drawings, similar reference numerals may be used for similar or related elements.
[0039] The singular form of a noun corresponding to an item may include one or more of the items unless clearly indicated otherwise in a related context.
[0040] In the disclosure, phrases, such as “A or B”, “at least one of A and B”, “at least one of A or B”, “A, B or C”, “at least one of A, B and C”, and “at least one of A, B, or C” may include any one or all possible combinations of the items listed together in the corresponding phrase among the phrases.
[0041] As used herein, the term “and/or” includes any and all combinations of one or more of the associated listed items.
[0042] Terms such as “1st”, “2nd”, “primary”, or “secondary” may be used simply to distinguish an element from other elements, without limiting the element in other aspects (e.g., importance or order).
[0043] Further, as used in the disclosure, the terms “front”, “rear”, “top”, “bottom”, “side”, “left”, “right”, “upper”, “lower”, and the like are defined with reference to the drawings, and are not intended to limit the shape and position of any element. It will be understood that when the terms “includes”, “comprises”, “including”, and/or “comprising” are used in the disclosure, they specify the presence of the specified features, figures, steps, operations, components, members, or combinations thereof, but do not preclude the presence or addition of one or more other features, figures, steps, operations, components, members, or combinations thereof.
[0044] When a given element is referred to as being “connected to”, “coupled to”, “supported by” or “in contact with” another element, it is to be understood that it may be directly or indirectly connected to, coupled to, supported by, or in contact with the other element. When a given element is indirectly connected to, coupled to, supported by, or in contact with another element, it is to be understood that it may be connected to, coupled to, supported by, or in contact with the other element through a third element.
[0045] It will also be understood that when an element is referred to as being “on” another element, it may be directly on the other element or intervening elements may also be present.
[0046] A refrigerator according to an embodiment of the disclosure may include a main body.
[0047] The “main body” may include an inner case, an outer case positioned outside the inner case, and an insulation provided between the inner case and the outer case.
[0048] The “inner case” may include a case, a plate, a panel, or a liner forming a storage compartment (also referred to as a storage room). The inner case may be formed as one body, or may be formed by assembling a plurality of plates together. The “outer case” may form an appearance of the main body, and be coupled to an outer side of the inner case such that the insulation is positioned between the inner case and the outer case.
[0049] The “insulation” may insulate an inside of the storage compartment from an outside of the storage compartment to maintain inside temperature of the storage compartment at appropriate temperature without being influenced by an external environment of the storage compartment. According to an embodiment of the disclosure, the insulation may include a foaming insulation. The foaming insulation may be molded by fixing the inner case and the outer case with jigs, etc. and then injecting and foaming urethane foam as a mixture of polyurethane and a foaming agent between the inner case and the outer case.
[0050] According to an embodiment of the disclosure, the insulation may include a vacuum insulation in addition to a foaming insulation, or may be configured only with a vacuum insulation instead of a forming insulation. The vacuum insulation may include a core material and a cladding material accommodating the core material and sealing the inside with vacuum or pressure close to vacuum. However, the insulation is not limited to the above-mentioned foaming insulation or vacuum insulation, and may include various materials capable of being used for insulation.
[0051] The “storage compartment” may include a space defined by the inner case. The storage

compartment may further include the inner case defining the space corresponding to the storage compartment. The storage compartment may store a variety of items, such as food, medicines, cosmetics, and the like, and the storage compartment may be configured to be open on at least one side for insertion and removal of the items.

[0052] The refrigerator may include one or more storage compartments. In a case in which two or more storage compartments are formed in the refrigerator, the respective storage compartments may have different purposes of use, and may be maintained at different temperatures. To this end, the respective storage compartments may be partitioned by a partition wall including an insulation.

[0053] The storage compartment may be maintained within an appropriate temperature range according to a purpose of use, and may include a “refrigerating compartment”, a “freezing compartment”, and a “temperature conversion compartment” according to purposes of use and/or temperature ranges. The refrigerating compartment may be maintained at an appropriate temperature to keep food refrigerating, and the freezing compartment may be maintained at an appropriate temperature to keep food frozen. The “refrigerating” may be keeping food cold without freezing the food, and for example, the refrigerating compartment may be maintained within a range of 0 degrees Celsius to 7 degrees Celsius. The “freezing” may be freezing food or keeping food frozen, and for example, the freezing compartment may be maintained within a range of-20 degrees Celsius to-1 degrees Celsius. The temperature conversion compartment may be used as either a refrigerating compartment or a freezing compartment according to or regardless of a user's selection.

[0054] The storage compartment may also be referred to by various terms, such as “vegetable compartment”, “freshness compartment”, “cooling compartment”, and “ice-making compartment”, in addition to “refrigerating compartment”, “freezing compartment”, and “temperature conversion compartment”, and the terms, such as “refrigerating compartment”, “freezing compartment”, “temperature conversion compartment”, etc., as used below are to be understood as representing storage compartments having the corresponding purposes of use and the corresponding temperature ranges.

[0055] The refrigerator according to an embodiment of the disclosure may include at least one door configured to open or close the open side of the storage compartment. The respective doors may be provided to open and close one or more storage compartments, or a single door may be provided to open and close a plurality of storage compartments. The door may be rotatably or slidably mounted to the front of the main body.

[0056] The “door” may seal the storage compartment in a closed state. The door, like the main body, may include an insulation to insulate the storage compartment in a closed state.

[0057] According to an embodiment, the door may include an outer door plate forming the front surface of the door, an inner door plate forming the rear surface of the door and facing the storage compartment, an upper cap, a lower cap, and a door insulation provided therein.

[0058] A gasket may be provided on the edge of the inner door plate to seal the storage compartment by coming into close contact with the front surface of the main body when the door is closed. The inner door plate may include a dyke that protrudes rearward to allow a door basket for storing items to be fitted.

[0059] According to an embodiment, the door may include a door body and a front panel that is detachably coupled to the front of the door body and forming the front surface of the door. The door body may include an outer door plate forming the front surface of the door body, an inner door plate forming the rear surface of the door body and facing the storage compartment, an upper cap, a lower cap, and a door insulator provided therein.

[0060] The refrigerator may be classified as French Door Type, Side-by-side Type, Bottom Mounted Freezer (BMF), Top Mounted Freezer (TMF), or Single Door Refrigerator according to the arrangement of the doors and the storage compartments.

[0061] The refrigerator according to an embodiment of the disclosure may include a cold air supply

device for supplying cold air to the storage compartment.
[0062] The “cold air supply device” may include a machine, an apparatus, an electronic device, and/or a combination system thereof, capable of generating cold air and guiding the cold air to cool the storage compartment.
[0063] According to an embodiment of the disclosure, the cold air supply device may generate cold air through a cooling cycle including compression, condensation, expansion, and evaporation processes of refrigerants. To this end, the cold air supply device may include a refrigeration cycle device having a compressor, a condenser, an expander, and an evaporator to drive the refrigeration cycle. According to an embodiment of the disclosure, the cold air supply device may include a semiconductor, such as a thermoelectric element. The thermoelectric element may cool the storage compartment by heating and cooling actions through the Peltier effect.
[0064] The refrigerator according to an embodiment of the disclosure may include a machine compartment in which at least some components belonging to the cold air supply device are installed.
[0065] The “machine compartment” may be partitioned and insulated from the storage compartment to prevent heat generated by the components installed in the machine compartment from being transferred to the storage compartment. To dissipate heat from the components installed in the machine compartment, the machine compartment may communicate with outside of the main body.
[0066] The refrigerator according to an embodiment of the disclosure may include a dispenser provided on the door to provide water and/or ice. The dispenser may be provided on the door to allow access by the user without opening the door.
[0067] The refrigerator according to an embodiment of the disclosure may include an ice-making device that produces ice. The ice-making device may include an ice-making tray that stores water, an ice-moving device that separates ice from the ice-making tray, and an ice-bucket that stores ice produced in the ice-making tray.
[0068] The refrigerator according to an embodiment of the disclosure may include a controller for controlling the refrigerator.
[0069] The “controller” may include a memory for storing and/or recording data and/or programs for controlling the refrigerator, and a processor for outputting control signals for controlling the cold air supply device, etc. in accordance with the programs and/or data stored in the memory.
[0070] The memory may store or record various information, data, instructions, programs, and the like necessary for operation of the refrigerator. The memory may store temporary data generated while generating control signals for controlling components included in the refrigerator. The memory may include at least one of a volatile memory or a non-volatile memory, or a combination thereof.
[0071] The processor may control the overall operation of the refrigerator. The processor may control the components of the refrigerator by executing programs stored in memory. The processor may include a separate neural processing unit (NPU) that performs an artificial intelligence (AI) model operation. In addition, the processor may include a central processing unit (CPU), a graphics processor (GPU), and the like. The processor may generate a control signal to control the operation of the cold air supply device. For example, the processor may receive temperature information of the storage compartment from a temperature sensor and generate a cooling control signal to control an operation of the cold air supply device based on the temperature information of the storage compartment.
[0072] Furthermore, the processor may process a user input of a user interface and control an operation of the user interface in accordance with the programs and/or data memorized/stored in the memory. The user interface may be provided with an input interface and an output interface. The processor may receive the user input from the user interface. In addition, the processor may transmit a display control signal and image data for displaying an image on the user interface to the

user interface in response to the user input.
[0073] The processor and memory may be provided integrally or may be provided separately. The processor may include one or more processors. For example, the processor may include a main processor and at least one sub-processor. The memory may include one or more memories.
[0074] The refrigerator according to an embodiment of the disclosure may include a processor and a memory for controlling all of the components included in the refrigerator, and may include a plurality of processors and a plurality of memories for individually controlling the components of the refrigerator. For example, the refrigerator may include a processor and a memory for controlling the operation of the cold air supply device in accordance with to an output of the temperature sensor. In addition, the refrigerator may be separately provided with a processor and a memory for controlling the operation of the user interface in accordance with the user input.
[0075] A communication module may communicate with external devices, such as servers, mobile devices, and other home appliances via a nearby access point (AP). The AP may connect a local area network (LAN) to which a refrigerator or a user device is connected to a wide area network (WAN) to which a server is connected. The refrigerator or the user device may be connected to the server via the WAN.
[0076] The input interface may include keys, a touch screen, a microphone, and the like. The input interface may receive the user input and pass the received user input to the processor.
[0077] The output interface may include a display, a speaker, and the like. The output interface may output various notifications, messages, information, and the like generated by the processor.
[0078] Hereinafter, various embodiments according to the disclosure will be described in detail with reference to the accompanying drawings.
[0079] FIG. **1** is a view showing a refrigerator according to an embodiment. FIG. **2** is a side cross-sectional view showing the refrigerator according to an embodiment.
[0080] Referring to FIGS. **1** and **2**, a refrigerator **1** may include a cabinet **10** forming a storage compartment **20**, and a door **30** configured to open or close the storage compartment **20**.
[0081] The cabinet **10** may include an outer case **11** and inner cases **13***a* and **13***b* coupled to an inner side of the outer case **11**. The outer case **11** may be formed of a metallic material.
[0082] The inner cases **13***a* and **13***b* may form the storage compartment **20**. In an example, the inner cases **13***a* and **13***b* may be formed by injection molding of a plastic material. The inner cases **13***a* and **13***b* may include the first inner case **13***a* forming an upper storage compartment **21** and the second inner case **13***b* forming a lower storage compartment **23**.
[0083] An insulation may be provided between the outer case **11** and the inner cases **13***a* and **13***b*. In an example, the insulation may be urethane foam insulation, and a vacuum insulation panel may be used together as required.
[0084] The cabinet **10** may include an intermediate member **17** disposed between the first inner case **13***a* and the second inner case **13***b*. The intermediate member **17** may be configured to partition the storage chamber **20** into the upper storage compartment **21** and the lower storage compartment **23**.
[0085] The intermediate member **17** may include an intermediate insulation therein to prevent heat exchange between the upper storage compartment **21** and the lower storage compartment **23**. The intermediate insulation may be configured to prevent cold air from being lost to the outside from a portion of a rear side of the lower storage compartment **23**.
[0086] The storage compartment **20** may be configured to be open at a front side to allow food to be taken in and out. The storage compartment **20** may include the upper storage compartment **21** and the lower storage compartment **23**.
[0087] The upper storage compartment **21** may be used as the refrigerating compartment **21** in which the food is kept refrigerated at a temperature of about 0° C. to 5° C. The upper storage compartment **21** may be referred to as a first storage compartment **21**.
[0088] The lower storage compartment **23** may be used as a freezing compartment in which the

food is kept frozen at a temperature of about 0° C. to −30° C. The lower storage compartment **23** may be referred to as a second storage compartment **23**.

[0089] In an example, a first fan **110** that generates airflow flowing into the first storage compartment **21** and a first evaporator **120** that cools the airflow may be arranged in the first storage compartment **21**. In an example, a second fan **280** that generates airflow flowing into the second storage compartment **23** and a second evaporator **282** that cools the airflow may be arranged in the second storage compartment **23**. The refrigerator **1** may include a compressor **18** that compresses a refrigerant.

[0090] While the fans **110** and **280** and the evaporators **120** and **282** are shown in the drawings as being positioned in the first storage compartment **21** and the second storage compartment **23**, respectively, to cool the storage compartment **20**, but this is by way of example only, and it is also possible to use of a method in which a fan and an evaporator are installed only in either the first storage compartment **21** or the second storage compartment **23**, and the cooled airflow flows to the storage compartment where the fan and evaporator are not installed to cool the storage compartment.

[0091] The first storage compartment **21** may accommodate a storage container **27** including a separate storage space **272** therein.

[0092] The storage container **27** may include a container body **273** forming the storage space **272** and a container cover **271** formed on one side of the container body **273** and configured to open or close the storage space **272**. The storage space **272** may be partitioned from the first storage compartment **21** by the container body **273** and the container cover **271**.

[0093] In an example, a container inlet hole **274** (see FIG. **5**) may be formed on a rear side of the container body **273** into which a portion of the airflow discharged through a duct **100**, which will be described later, may enter. This will be described in more detail later.

[0094] The inner cases **13***a* and **13***b* may include a first cooling space **132** formed on an inner surface of the inner cases **13***a* and **13***b* forming the first storage compartment **21** to receive the first evaporator **120**. In an example, the first cooling space **132** may be formed at a rear (−X direction) of the first storage compartment **21**. The first cooling space **132** may have a shape corresponding to the outer shape of the first evaporator **120**.

[0095] The inner cases **13***a* and **13***b* may include a first fan receiving groove **131** in which the first fan **110** is received. In an example, the first fan receiving groove **131** may be positioned on an upper side (+Z portion) of the first evaporator **120**. In response to operation of the first fan **110**, airflow may enter the first cooling space **132** from the first storage compartment **21** and pass through the first evaporator **120**. The airflow may be cooled while passing through the first evaporator **120**.

[0096] The airflow passing through the first evaporator **120** may flow from the first cooling space **132** to the first fan receiving groove **131**, and then may pass through the first fan **110** and exit to the first storage compartment **21**.

[0097] The inner cases **13***a* and **13***b* may include a second cooling space **283** formed on an inner surface of the second inner case **13***b* forming the second storage compartment **23** to receive the second evaporator **282**. In an example, the second cooling space **283** may be formed on a rear side of the second storage compartment **23**. The second cooling space **283** may include a shape corresponding to the outer shape of the second evaporator **282**.

[0098] The second inner case **13***b* may include a second fan receiving groove **281** in which the second fan **280** is received. In an example, the second fan receiving groove **281** may be positioned on an upper side of the second evaporator **282**.

[0099] In response to operation of the second fan **280** operates, airflow may enter the second cooling space **283** from the second storage compartment **23** and pass through the second evaporator **282**. The airflow may be cooled as it passes through the second evaporator **282**.

[0100] The airflow passing through the second evaporator **282** may flow from the second cooling

space **283** to the second fan receiving groove **281**, and then may flow into the second fan **280**. The cooling airflow flowing into the second fan **280** may be discharged into the second storage compartment **23**.

[0101] In an example, the refrigerator **1** may include the duct **100** configured to guide the airflow introduced into the fan **110** to the storage compartment **21**. The fan **110** and the evaporator **120** may be installed in the duct **100**, and the duct **100** may further include a guide passage **156** that guides air drawn into the fan **110** to the storage compartment **20**.

[0102] The duct **100** may be installed in the inner cases **13***a* and **13***b* so as to be in contact with one surface of the inner cases **13***a* and **13***b* forming the storage compartment **20**. The duct **100** will be described later.

[0103] The open front of the storage compartment **20** may be opened and closed by the door **30**. The storage compartment **20** may be provided with a shelf **25** on which food may be placed.

[0104] An upper door **31** may be configured to open or close the first storage compartment **21**. The upper door **31** may be coupled to the cabinet **10** so as to be rotatable in a left-to-right direction (+-Y direction). A rear surface of the upper door **31** may be provided with an upper door guard for food storage. A hinge cover may be provided on a portion of the cabinet **10** to which the upper door **31** is coupled. The upper door **31** may be referred to as the first door **31**.

[0105] A lower door **33** may be configured to open or close the lower storage compartment **23**. The lower door **33** may be referred to as the second door **33**. The lower door **33** may be coupled to the cabinet **10** so as to be rotatable in the left-to-right direction. A rear surface of the lower door **33** may be provided with a lower door guard for food storage.

[0106] FIG. **3** is a view showing a portion of the inner case, the fan, wires, and the duct separately in a refrigerator according to an embodiment. FIG. **4** is an exploded view showing FIG. **3**. FIG. **5** is a view of FIG. **4** from a different angle.

[0107] For ease of description, the refrigerator **1** according to various embodiments will be described below with reference to the first inner case **13***a*, which is a portion of the inner cases **13***a* and **13***b* forming the first storage compartment **21**, and the duct **100** installed in the first storage compartment **21**. This is by way of an example only, and it is also possible for the duct **100** described below to be installed in the second inner case **13***b* forming the second storage compartment **23**.

[0108] Referring to FIGS. **3** to **5**, the refrigerator **1** may include the duct **100** configured to guide airflow generated by the fan **110** into the first storage compartment **21**.

[0109] The duct **100** may be installed in the first inner case **13***a*. The duct **100** may be arranged to partition the first storage compartment **21** and the first cooling space **132**.

[0110] The duct **100** may be arranged to partition the first storage compartment **21** and the first fan receiving groove **131**.

[0111] The duct **100** may include a duct cover **160** arranged to be in direct contact with one surface **13***a*′ of the first inner case, a duct plate **140** arranged in a front side of the duct cover **160** and coupleable to the duct cover **160**, and a duct insulation **150** arranged between the duct cover **160** and the duct plate **140**.

[0112] The duct cover **160** may include a cover body **161** forming an exterior. The cover body **161** may be installed on the first inner case **13***a* such that one surface of a rear side thereof is in contact with the front surface of the first inner case **13***a*. The shape of the cover body **161** may be formed to correspond to the shape of the one surface **13***a*′ of the first inner case.

[0113] The duct cover **160** may include a second guide housing **162** forming a portion **156***a* of the guide passage **156**. The second guide housing **162** may be formed to extend in a vertical direction on the right side of the cover body **161**. Accordingly, the guide passage **156** may also be formed to extend in the vertical direction (+-Z direction) on the right side of the cover body **161**.

[0114] In an example, the first fan **110** may be positioned and operated in the center of the upper side (+Z side) of the duct cover **160**. The second guide housing **162** may include a guide passage

inlet **163** disposed on the right (+Y side) upper side (+Z direction), at one end of the duct cover **160**, and formed to be open toward the first fan **110**, and a guide passage outlet **165** disposed on the right (+Y side) lower side (−Z direction), the other end of the duct cover **160**, and formed to be open toward the front (+X direction).

[0115] The guide passage **156** may be extended to communicate with the guide passage inlet **163** and the guide passage outlet **165** described above.

[0116] The first fan receiving groove **131** in which the first fan **110** is received may communicate with the guide passage inlet **163**. Accordingly, a portion of the airflow discharged through the first fan **110** may be introduced into the guide passage inlet **163**.

[0117] The airflow flowing through the guide passage inlet **163** may then pass through the guide passage **156** and be discharged forwardly through the guide passage outlet **165**. As will be described later, the airflow discharged through the guide passage outlet **165** may be introduced into the container inlet hole **274** (described later) formed in the storage container **27** to cool the storage space **272** of the storage container **27**. The duct cover **160** may include a cover inlet hole **166** that is open downwardly on a lower side of the cover body **161**.

[0118] In a case where the duct **100** is installed in the first inner case **13***a*, when the first fan **110** operates, air from the first storage compartment **21** may be introduced to a rear surface of the duct cover **160** through the cover inlet hole **166** and pass through the first evaporator **120**.

[0119] The air cooled by passing through the first evaporator **120** may be drawn into the first fan **110** and discharged back into the first storage compartment **21** to cool the first storage compartment **21**.

[0120] The duct **100** may include a damper **170** configured to open or close the guide passage **156**. In an example, the damper **170** may be positioned on a front side of the cover body **161**.

[0121] The damper **170** may be installed between the guide passage inlet **163** and the guide passage outlet **165**. In other words, the damper **170** may be disposed on the guide passage **156**.

[0122] In response to opening of the guide passage **156** opened by the damper **170**, a portion of the airflow discharged from the first fan **110** may be introduced into the guide passage inlet **163** and may be discharged through the guide passage **156** to the guide passage outlet **165**.

[0123] The duct cover **160** may include a power supply **180** configured to supply power to the damper **170**. The power supply **180** may be arranged at the rear side of the cover body **161**. In other words, the damper **170** may be arranged at the front side of the cover body **161**, and the power supply **180** that supplies power to the damper **170** may be arranged at the rear side of the cover body **161**.

[0124] In an example, a wire L connecting the damper **170** and the power supply **180** may be arranged to pass through a slit **167** formed to penetrate the cover body **161** of the duct cover **160** to connect the damper **170** and the power supply **180**.

[0125] The duct plate **140** may be coupled to the duct cover **160** to cover the front side of the cover body **161**. The duct plate **140** may include a plate body **141** forming an exterior, a first plate exhaust hole **142** formed at the center of the upper side of the plate body **141** to communicate with the first fan receiving groove **131** and the first storage compartment **21**, and a second plate exhaust hole **145** open toward the front and communicating with the guide passage outlet **165** of the duct cover **160**.

[0126] The second plate exhaust hole **145** may be formed as a space surrounded by a connecting member **144** connected to the container inlet hole **274** of the storage container **27**.

[0127] In an example, the duct plate **140** may have an approximately rectangular shape, but is not limited thereto.

[0128] Based on the duct plate **140** being coupled to the duct cover **160**, the plate body **141** may partition the first fan receiving groove **131** and the guide passage **156** from the first storage compartment **21**.

[0129] The duct plate **140** may include a plate inlet hole **143** formed at the lower center. The plate

inlet hole **143** may communicate the first storage compartment **21** with the cover inlet hole **166**. Accordingly, the first storage compartment **21** may communicate with the first cooling space **132** and the first fan receiving groove **131** through the plate inlet hole **143** and the cover inlet hole **166**.
[0130] The first plate exhaust hole **142** may communicate with the first fan receiving groove **131**. Accordingly, in response to the operation of the first fan **110**, the air from the first storage compartment **21** may be introduced into the plate inlet hole **143**, pass through the cover inlet hole **166**, be cooled in the first evaporator **120**, and then be discharged forwardly by the first fan **110**, pass through the first plate exhaust hole **142**, and be discharged to the first storage compartment **21**.
[0131] The second plate exhaust hole **145** may communicate with the guide passage outlet **165** of the duct cover **160**. Accordingly, in response to the operation of the first fan **110**, air from the first storage compartment **21** may be introduced into the plate inlet hole **143**, pass through the cover inlet hole **166**, be cooled in the first evaporator **120**, and then be introduced into the guide passage outlet **156** by the first fan **110**. The air passing through the guide passage outlet **156** and being discharged forwardly through the guide passage outlet **165** may be discharged into the storage space **272** of the storage container **27** through the second plate exhaust hole **145**.
[0132] The duct insulation **150** may include an insulation body **151** forming an exterior appearance. In an example, the insulation body **151** may include an insulation material.
[0133] The duct insulation **150** may be disposed between the duct plate **140** and the duct cover **160**, and thus the duct insulation **150** may partition and insulate the first cooling space **132** from the first storage compartment **21**. As a result, the temperature of the cooled air passing through the first evaporator **120** may be prevented from being raised by the temperature of the first storage compartment **21**.
[0134] The duct insulation **150** may include a first insulation exhaust hole **152** formed in the upper center of the insulation body **151**.
[0135] The first insulation exhaust hole **152** may communicate the first fan receiving groove **131** with the first plate exhaust hole **142**. Consequently, the first fan receiving groove **131** may communicate with the first storage compartment **21** through the first insulation exhaust hole **152** and the first plate exhaust hole **142**, so that the airflow generated from the first fan **110** may flow into the first storage compartment **21**.
[0136] The duct insulation **150** may include a first guide housing **153** forming the remaining portion of the guide passage **156**.
[0137] In an example, the first guide housing **153** may be formed on the lower right side of the insulation body **151**. Stated differently, the first guide housing **153** may be formed to be positioned corresponding to the position of the second guide housing **162** when the duct insulation **150** is in contact with the duct cover **160**.
[0138] A second insulation exhaust hole **155** may be formed on the lower right side of the duct insulation **150**. The second insulation exhaust hole **155** may communicate with the guide passage outlet **165** and the second plate exhaust hole **145** described above. In addition, the container inlet hole **274** of the storage container **27** may be formed on the rear side of the container body **273** to penetrate the container body **273**.
[0139] Finally, the first fan receiving groove **131** may be in communication with the storage space **272** of the storage container **27** through the guide passage **156**, the guide passage outlet **165**, the second insulation exhaust hole **155**, and the second plate exhaust hole **145**, so that the airflow generated by the first fan **110** may flow into the storage space **272** of the storage container **27**.
[0140] FIG. **6** is an enlarged view showing a portion of a contact portion of the duct in the refrigerator according to an embodiment. FIG. **7** is a view of FIG. **6** from another angle. FIG. **8** is a cross-sectional view of FIG. **6** taken along the a-a′ line.
[0141] Referring to FIGS. **6** to **8**, the duct **100** may include a contact portion **200** arranged to contact one surface **13***a*′ of the first inner case when installed in the first inner case **13***a*. The contact portion **200** may be formed on the rear surface of the duct cover **160**.

[0142] More specifically, the contact portion **200** may have a contact surface that protrudes rearwardly from an edge of the first cooling space **132** and contacts one surface of the inner cases **13***a* and **13***b*.
[0143] The first cooling space **132** may be cooled by the air passing through the first evaporator **120** to have a temperature lower than the surroundings, and it is necessary to prevent the cooled air from escaping. Accordingly, when the duct cover **160** is arranged to be in close contact with the inner cases **13***a* and **13***b* by the contact surface, the first cooling space **132** may be partitioned from a space other than the first cooling space **132**, thereby minimizing the escape of the cooled air.
[0144] As described above, the damper **170** may be connected to the power supply **180** to receive power. In this case, the power supply **180** may be disposed on the opposite side of the damper **170** with respect to the contact surface, so that the wire L connecting the power supply **180** and the damper **170** may be arranged to pass through the contact portion **200**.
[0145] In the drawings, the wire L is shown as passing through the contact portion **200** in the left-to-right direction (+-Y direction), but this is by way of example only. In an example, the wire L may extend in a variety of directions, including forward (+X direction), backward (−X direction), left-to-right (+-Y direction), and up-and-down (+-Z direction), to connect a plurality of configurations that are required to be electrically connected to each other, and may be arranged to curve, bend, fold, or twist to transmit electrical signals and power, and the like.
[0146] Hereinafter, a structure for allowing the wire L to pass through the contact portion **200** will be described.
[0147] The contact portion **200** may include a passageway **230** formed to be recessed in the contact surface for the wire L to be disposed, and protrusions **240** and **250** protruding from an inner side of the passageway to support and hold the wire L so as to prevent the wire L passing through the passageway **230** from being deviated from the passageway **230**.
[0148] The passageway **230** may be formed to be recessed from contact surfaces **211** and **221** facing rearward toward the front (+X direction). The passageway **230** may be formed in a portion of the contact surfaces **211** and **221**.
[0149] In an example, the passageway **230** may be formed to extend in the left-right direction (+-Y direction). In an example, the diameter of the passageway **230** may be greater than or equal to the diameter **1** of the wire L.
[0150] In an example, the contact surfaces **211** and **221** may be arranged to extend in the up-and-down direction (+-Z direction), and the passageway **230** may be formed to be recessed in the contact surfaces **211** and **221** so as to extend in the left-right direction (+-Y direction). As a result, the contact surfaces **211** and **221** may be separated by the passageway **230** into the upper contact surface **211** and the lower contact surface **221**.
[0151] The upper contact surface **221** may be referred to as the first contact surface **211**, and the lower contact surface **221** may be referred to as the second contact surface **221**. In addition, a portion of the contact portion **200** on which the first contact surface **211** is positioned may be referred to as a first contact area **210**, and another portion of the contact portion **200** on which the second contact surface **221** is positioned may be referred to as a second contact area **220**.
[0152] The protrusions **240** and **250** may protrude from inner surfaces **210***a* and **220***a*, respectively, and may press against the wire L passing through the passageway **230**.
[0153] For ease of description, the two protrusions **240** and **250** will be showed and described herein.
[0154] In an example, the protrusions **240** and **250** may include the first protrusion **250** protruding in a first direction from the inner surface **210***a* of the passageway **230**, and the second protrusion **240** protruding in a second direction different from the first direction from the inner surface **220***a* of the passageway **230**.
[0155] The inner surface **210***a* of the passageway **230** may be referred to as the first inner surface **210***a*, and the inner surface **220***a* of the passageway **230** may be referred to as the second inner

surface **220***a*.
[0156] In an example, the first direction may be downward (−Z direction), and the second direction may be upward (+Z direction).
[0157] As previously described, the fact that the protrusions are formed in two and the protrusion directions are downward and upward, respectively, is only one of various embodiments. In an example, it may also be possible that the protrusions are formed in three and protrude sequentially upward, downward, and upward, that neighboring protrusions protrude in the same direction so that the wire L is caught, and that three or more protrusions protrude from one surface of the passageway **230**.
[0158] Furthermore, the direction in which the protrusions protrude may include all directions in addition to the downward (−Z direction) or upward (+Z direction) described above, such as the front-to-back direction (+-X direction) and the left-to-right direction (+-Y direction), and it should be understood that the protrusions may also protrude in various directions other than the directions described above as needed.
[0159] The first protrusion **250** and the second protrusion **240** may be formed to press against a first portion L**1** and a second portion L**2** of the wire L, respectively (see FIG. **9**). Accordingly, the wire L passing through the passageway **230** may be more reliably seated within the passageway **230**, and the wire L may be prevented from deviating from the passageway **230**.
[0160] The lengths d**4** and d**5** by which the first protrusion **250** and the second protrusion **240** protrude may be such that each protruding end **251***a* does not contact the inner surface **220***a* of the passageway **230**.
[0161] The passageway **230** may include a first passageway **231** formed by an end **250***a* of the first protrusion and the second inner surface **220***a*, which are spaced apart from each other. In an example, the passageway **230** may include a first through-hole **261** open toward the damper **170** for allowing the wire L extending from the damper **170** to be inserted into the first passageway **231**. In an example, the first through-hole **261** may be formed to be open on a lateral side of the contact portion **200**.
[0162] While the shape of the end **250***a* of the first protrusion is shown in the drawings as having approximately the shape of a plane, but this is by way of example only, and the end **250***a* of the first protrusion may be formed in a variety of ways, such as including approximately the shape of a vertex or the like. This may also be applied to an end **240***a* of the second protrusion, which will be described later.
[0163] In an example, the wire L connected to the damper **170** and extending from the damper **170** may pass through the first through hole **261** and be inserted into the first passageway **231**.
[0164] The passageway **230** may include a second passageway **232** formed by the end **240***a* of the second protrusion and the first inner surface **210***a*, which are spaced apart from each other, and a communicating portion **233** disposed between the first passageway **231** and the second passageway **232** to communicate the first passageway **231** with the second passageway **232**.
[0165] In an example, the wire L inserted into the first passageway **231** may pass through the communicating portion **233** and be inserted into the second passageway **232**.
[0166] In an example, the communicating portion **233** may be a space formed by a side surface **250***b* of the first protrusion and a side surface **240***b* of the second protrusion facing the side surface **250***b* of the first protrusion, which are spaced apart from each other.
[0167] The second passageway **232** may include a second through-hole **262** formed on the lateral side of the contact portion **200** and open toward the power supply **180**. The wire L inserted into the second passageway **232** may pass through the second through-hole **262** and be connected to the power supply **180**. Accordingly, the wire L may pass through the contact portion **200** and connect the damper **170** and the power supply **180**.
[0168] In an example, the power supply **180** may include a power terminal **183** electrically connected to the wire L extending from components requiring power supply, a power case **181**

accommodating the power terminal **183**, and a power communication hole **182** formed on one side of the power case **181** to connect the wire L to the power terminal **183**. In an example, the wire L extending from the damper **170** and passing through the contact portion **200** may be connected to the power terminal **183** to supply power to the damper **170**.

[0169] In an example, the passageway **230** may include an opening **234** open toward the rear (−Z direction). The opening **234** may be a portion of the passageway **230** formed on the same line as the contact surface. The opening **234** may be formed between the first contact area **210** and the second contact area **220**. The opening **234** may be formed between the first contact surface **211** and the second contact surface **221** to allow spacing between the first contact surface **211** and the second contact surface **221**.

[0170] In an example, the wire L may be inserted into the passageway **230** through the opening **234**. The wire L inserted into the opening **234** may be arranged such that one side of the wire L passes through the first through-hole **261**, the other side passes through the second through-hole **262**, and a portion between the one side and the other side of the wire L is located on the passageway **230**. Accordingly, a user may more easily insert the wire L into the passageway **230**.

[0171] In an example, the contact portion **200** may include a lead portion **251** extending downward (−Z direction) from the first protrusion **250** so as to cover a portion of the opening **234**. The lead portion **251** may be arranged to be located on the same line as the rear surface of the first protrusion **250**.

[0172] In an example, the thickness of the lead portion **251** in the front-to-back direction may be formed thinner than the thickness of the first protrusion **250** in the front-to-back direction. A portion of the opening **234** covered by the lead portion **251** may be a portion in communication with the first passageway **231**. Accordingly, the lead portion **251** may prevent the wire L arranged in the passageway **230** from deviating from the opening **234**.

[0173] The lead portion **251** may extend such that one end **251***a* of the lead portion does not contact the inner surface of the passageway **230**. Stated differently, the length d**6**-d**4**-d**1** along which the lead portion **251** extends may be shorter than a distance d**2** between the one end **250***a* of the first protrusion and the second inner surface **220***a*. In other words, the lead portion **251** may be formed such that the one end **251***a* of the lead portion is spaced apart from the second inner surface **220***a*.

[0174] The distance d**1** between the one end **251***a* of the lead portion and the second inner surface **220***a* may be greater than the diameter **1** of the wire L. Accordingly, the wire L may be inserted into the passageway **230** through a portion of the opening **234** that is not covered by the lead portion **251**. In an example, the one end **251***a* of the lead portion may be the one end **251***a* of the lead portion facing downward.

[0175] For ease of description, although the lead portion **251** is described above as extending from the first protrusion **250**, but it is also possible that the lead portion **251** may extend from the second protrusion **240** to cover a portion of the opening **234** that is connected to the second passageway **232**.

[0176] The refrigerator **1** may include a sealing member **190** arranged between the inner cases **13***a* and **13***b* and the contact surfaces **211** and **221**. In an example, the sealing member **190** may include an elastic material.

[0177] Based on the duct **100** being installed in the first inner case **13***a*, the sealing member **190** may be disposed between the first inner case **13***a* and the contact surfaces **211** and **221** to improve the contactability between the duct **100** and the first inner case **13***a*. As a result, cold air in the first cooling space **132** may be prevented from escaping through the contact surfaces.

[0178] In an example, the sealing member **190** may include an insulating material. Accordingly, the first cooling space **132** may be prevented from being heated by heat conducted from spaces different from the first cooling space **132**.

[0179] In an example, the sealing member **190** may be attached to the contact surface to cover the

opening **234**. Since the sealing member **190** is disposed to cover the opening **234**, the wire L arranged in the passageway **230** may be prevented from deviating from the passageway **230** through the opening **234**. The sealing member **190** may connect the first contact surface **211** and the second contact surface **221**. The sealing member **190** may connect the first contact area **210** and the second contact area **220**.

[0180] FIG. **9** is a cross-sectional view of FIG. **6** taken along the b-b′ line. FIG. **10** is a cross-sectional view of FIG. **6** taken along the c-c′ line.

[0181] Referring to FIGS. **9** and **10**, the passageway **230** may be formed to be recessed from the contact surfaces **211** and **221** toward the front (+X direction). Accordingly, the communicating portion **233** connecting the first passageway **231** and the second passageway **232** may be formed in a direction extending from the rear to the front.

[0182] The diameter d**7** of one end of the communicating portion **233** adjacent to the contact surface may be formed to be larger than the diameter **1** of the wire L. In other words, the diameter d**7** of the one end of the communicating portion **233** forming a portion of the opening **234** may be formed to be larger than the diameter **1** of the wire L. In other words, the diameter d**7** of the rear end of the communicating portion **233** may be formed to be larger than the diameter **1** of the wire L. Accordingly, the wire L inserted through the opening **234** may pass smoothly through the rear side of the communicating portion **233** and be disposed in the communicating portion **233**.

[0183] The diameter d**8** of the other end of the communicating portion **233** may be formed to correspond to the diameter **1** of the wire L. In other words, the diameter d**8** of the front end of the communicating portion **233** may be formed to correspond to the diameter **1** of the wire L. Accordingly, in response to the wire L disposed in the communicating portion **233** moving to the front (+X direction) of the communicating portion **233**, the wire L may be more stably positioned in the communicating portion **233**.

[0184] In an example, the diameter d**8** of the other end of the communicating portion **233** may be formed smaller than the diameter **1** of the wire L. In other words, the diameter d**8** of the front end of the communicating portion **233** may be formed smaller than the diameter **1** of the wire L. Accordingly, in response to the wire L disposed in the communicating portion **233** moving to the front end of the communicating portion **233**, the wire L may be more stably positioned in the communicating portion **233**.

[0185] Finally, the diameter of the communicating portion **233** may have a cross-section that decreases as it goes forward from the contact surface. Accordingly, the wire L having various diameters may be more stably accommodated.

[0186] In an example, the sum of the protruding length d**4** of the first protrusion **250** and the protruding length d**5** of the second protrusion **240** may be longer than the diameter d**6** of the passageway **230**. In other words, the first protrusion **250** and the second protrusion **240** may protrude such that their respective ends do not contact each other. In other words, the first protrusion **250** and the second protrusion **240** may protrude staggered positions from each other. In other words, the position in the left-to-right direction (+-Y direction) at which the first protrusion **250** protrudes may be different from the position in the left-to-right direction (+-Y direction) at which the second protrusion **240** protrudes.

[0187] In an example, the position of the end **250***a* of the first protrusion **250** in the vertical direction (+-Z direction) may be lower than the position of the end **240***a* of the second protrusion **240** in the vertical direction (+-Z direction). Accordingly, in a case where the wire extends through the first passageway **231** and the communicating portion **233** to the second passageway **232**, the wire L may be bent to pass through the end **250***a* of the first protrusion **250** and the end **240***a* of the second protrusion **240**, which have different heights, and may contact the end **250***a* of the first protrusion **250** and the end **240***a* of the second protrusion **240**, respectively.

[0188] As described above, since the diameter **1** of the wire L is arranged to be larger than the diameter d**8** of the other end of the communicating portion **233**, the wire L may be inserted and

secured to the other end of the communicating portion **233** to be seated in the inside of the passageway **230**. Furthermore, as described above, when the wire L is in contact with the end **250***a* of the first protrusion **250** and the end **240***a* of the second protrusion **240**, respectively, the wire L may be more stably seated in the inside of the passageway **230** by the frictional force generated by the contact between the wire L and the protrusions **240** and **250**.

[0189] Accordingly, the position of the first passageway **231** formed by the first protrusion **250** in the up-and-down direction (+-Z direction) and the position of the second passageway **232** formed by the second protrusion **240** in the up-and-down direction (+-Z direction) may be different from each other. Consequently, the wire L passing through the passageway **230** may be arranged to be bent while passing through the first passageway **231** and the second passageway **232**.

[0190] The wire L arranged in the passageway **230** may be curved by the first portion L**1** being pressed by the first protrusion **250** and the second portion L**2** being pressed by the second protrusion **240**. As described above, the first portion L**1** and the second portion L**2** may be portions of different wires L. Accordingly, the wire L may be pressed and supported by the first protrusion **250** and the second protrusion **240** to be stably disposed in the passageway **230**.

[0191] The refrigerator **1** according to an embodiment includes the inner cases **13***a* and **13***b* forming the storage compartment **20**, the evaporator **120** configured to generate cold air, and the duct **100** provided at a rear side of the storage compartment **20** to supply cold air generated by the evaporator **120** to the storage compartment **20**. The duct **100** may include the cooling space formed to be recessed in a rear side of the duct **100** to allow installation of the evaporator **120**, and the contact portion **200** having the contact surfaces **211** and **221** protruding rearwardly from an edge of the cooling space and in contact with one surface of the inner cases **13***a* and **13***b*. The contact portion **200** may include the passageway **230** formed to be recessed in the contact surface to allow an electric wire to be arranged, the first inner surface **210***a* forming the passageway **230**, the second inner surface **220***a* forming the passageway **230** and facing the first inner surface, the first protrusion **250** protruding in a first direction from the first inner surface **210***a* toward the second inner surface **220***a*, and the second protrusion **240** protruding in a second direction from the second inner surface **220***a* toward the first inner surface **210***a*, wherein the end **240***a* of the second protrusion is closer to the first inner surface **210***a* than the end **250***a* of the first protrusion.

[0192] The first protrusion **250** and the second protrusion **240** may be spaced apart from each other.

[0193] The passageway **230** may include the first passageway **231** formed by the end **250***a* of the first protrusion and the second inner surface **220***a*, which are spaced apart from each other, the second passageway **232** formed by the end **240***a* of the second protrusion and the first inner surface **210***a*, which are spaced apart from each other, and the communicating portion **233** formed by the side surface **250***b* of the first protrusion **250** and the side surface **240***b* of the second protrusion **240**, which are spaced apart from each other, and communicating the first passageway **231** with the second passageway **232**.

[0194] The passageway **230** may be formed to be recessed forwardly from the contact surface, and the diameter of the communicating portion **233** may decrease as it goes forward from the contact surface.

[0195] The diameter of one end of the communicating portion **233** adjacent to the contact surface may be formed to be larger than the diameter **1** of the wire L, and the diameter of the other end of the communicating portion **233** may be formed to be smaller than the diameter **1** of the wire L.

[0196] The sum d**4**+d**5** of the protruding length d**4** of the first protrusion **250** and the protruding length d**5** of the second protrusion **240** may be longer than the diameter d**6** of the passageway **230**.

[0197] The passageway **230** may include the opening **234** that is open toward the rear to allow insertion of the wire L, and the contact portion **200** may further include the lead portion **251** that extends downwardly from the first protrusion **250** to cover a portion of the opening **234**.

[0198] The one end **251***a* of the lead portion facing downward may extend to be spaced apart from the inner surface of the passageway **230**.

[0199] The distance d**1** between the one end **251***a* of the lead portion and the inner surface of the passageway **230** may be larger than the diameter **1** of the wire L.
[0200] The wire L may include the first portion L**1** in contact with the first protrusion **250** and the second portion L**2** different from the first portion L**1**, wherein the second portion L**2** is in contact with the second protrusion **240**.
[0201] The duct **100** may further include the guide passage **156** configured to guide the cold air to the storage compartment **20**, and the damper **170** configured to open or close the guide passage **156**, and one end of the wire L may be connectable to the damper **170**.
[0202] The refrigerator **1** may further include the power supply **180** arranged on the opposite side of the damper **170** with respect to the contact surface and connectable to the other end of the wire L.
[0203] The refrigerator **1** may further include the sealing member **190** arranged between the inner cases **13***a* and **13***b* and coming the duct **100** in close contact with the inner cases **13***a* and **13***b*.
[0204] The sealing member **190** may be attached to the contact surface to cover the opening **234**.
[0205] The sealing member **190** may include an insulating material.
[0206] The refrigerator **1** according to an embodiment may include the inner cases **13***a* and **13***b* forming the storage compartment **20**, the evaporator **120** configured to generate cold air, the fan **110** configured to cause the cold air to flow into the storage compartment **20**, the duct **100** including a guide passage **156** configured to guide the cold air into the storage compartment **20** and the contact portion **200** disposed on a rear side of the storage compartment **20** and in contact with the inner cases **13***a* and **13***b*, the damper **170** configured to open or close the guide passage **156**, the power supply **180** disposed on the opposite side of the damper **170** with respect to the contact portion **200** and configured to supply power to the damper **170**, and the electric wire L arranged to pass the contact portion **200** and connecting the damper **170** and the power supply **180**. The contact portion **200** may include a contact surface in contact with one surface of the inner cases **13***a* and **13***b*, the passageway **230** formed to be recessed in the contact surface to allow installation of the electric wire, the first inner surface **210***a* forming the passageway **230**, the second inner surface **220***a* forming the passageway **230** and facing the first inner surface, the first protrusion **250** protruding in a first direction from the first inner surface **210***a* toward the second inner surface **220***a*, and the second protrusion **240** protruding in a second direction from the second inner surface **220***a* toward the first inner surface **210***a*, wherein the end **240***a* of the second protrusion **240** is closer to the first inner surface **210***a* than the end **250***a* of the first protrusion.
[0207] The first protrusion **250** and the second protrusion **240** may be spaced apart from each other in a third direction.
[0208] The passageway **230** may include the first passageway **231** formed by the end **250***a* of the first protrusion and the second inner surface **220***a*, which are spaced apart from each other, the second passageway **232** formed by the end **240***a* of the second protrusion and the first inner surface **210***a*, which are spaced apart from each other, and the communicating portion **233** formed by the side surface **250***b* of the first protrusion **250** and the side surface **240***b* of the second protrusion **240**, which are spaced apart from each other, and communicating the first passageway **231** with the second passageway **232**.
[0209] The passageway **230** may include the opening **234** that is open toward the rear side to allow insertion of the wire L, and the contact portion **200** may further include the lead portion **251** that extends downwardly from the first protrusion **250** to cover a portion of the opening **234**.
[0210] The refrigerator **1** according to an embodiment includes the inner cases **13***a* and **13***b* forming the storage compartment **20**, the duct **100** including the contact portion **200** in contact with the inner cases **13***a* and **13***b* and installable in the inner cases **13***a* and **13***b*, and the electric wire L arranged to pass the contact portion **200**. The contact portion **200** may include the contact surface in contact with one surface of the inner cases **13***a* and **13***b*, the passageway **230** in which the wire L is arranged, wherein the passageway **230** is formed to be recessed from the contact surface and

separates the contact surface into the first contact surface **211** and the second contact surface **221** distinct from the first contact surface **211**, the first protrusion **250** forming a portion of the passageway **230** and protruding in a first direction from the first inner surface **210***a* adjacent to the first contact surface **211** toward the second inner surface **220***a* forming another portion of the passageway **230** and adjacent to the second contact surface **221**, and the second protrusion **250** protruding in a second direction from the second inner surface **220***a* toward the first inner surface **210***a* and arranged to be spaced apart from the first protrusion **250**.

[0211] According to the idea of the present disclosure, the passageway in which the electric wire is arranged may be formed to be recessed in the contact surface, and thus a separate structure for securing or supporting the wire is not required, thereby simplifying the manufacturing process of the refrigerator.

[0212] According to the idea of the present disclosure, the electric wire may be held on the protrusions, and thus the wire is pressed and elastically supported, thereby preventing the wire from being deviating from the passageway.

[0213] The effects to be obtained from the present disclosure are not limited to those mentioned above, and other effects not mentioned will be clearly understood by those skilled in the art to which the present disclosure belongs from the description below.

[0214] While the present disclosure has been particularly described with reference to exemplary embodiments, it should be understood by those of skilled in the art that various changes in form and details may be made without departing from the spirit and scope of the present disclosure.

Claims

1. A refrigerator comprising: an inner case including a storage compartment; an evaporator configured to generate cold air; and a duct at rear side of the storage compartment and configured to supply the cold air generated by the evaporator to the storage compartment, the duct including: a cooling space recessed in a rear side of the duct, and in which the evaporator is installed, and a contact portion protruding rearwardly from an edge of the cooling space so that a contact surface of the contact portion contacts a surface of the inner case, and forming a passageway recessed from the contact surface in which an electric wire is arrangeable, the contact portion including: a first inner surface forming the passageway, a second inner surface forming the passageway and facing the first inner surface, a first protrusion protruding from the first inner surface toward the second inner surface, and a second protrusion protruding from the second inner surface toward the first inner surface, wherein an end of the second protrusion is closer to the first inner surface than an end of the first protrusion.

2. The refrigerator of claim 1, wherein the first protrusion and the second protrusion are spaced apart from each other.

3. The refrigerator of claim 2, wherein the passageway includes: a first passageway between the end of the first protrusion and the second inner surface, a second passageway between the end of the second protrusion and the first inner surface, and a communicating portion formed by a side surface of the first protrusion and a side surface of the second protrusion spaced apart from each other, and communicating the first passageway with the second passageway.

4. The refrigerator of claim 3, wherein the passageway is recessed from the contact surface in a forward direction of the refrigerator, and a diameter of the communicating portion decreases in the forward direction.

5. The refrigerator of claim 4, wherein a diameter of a first end of the communicating portion at the contact surface is larger than a diameter of the electric wire, and a diameter of a second end of the communicating portion is smaller than the diameter of the electric wire.

6. The refrigerator of claim 3, wherein a sum of a protruding length of the first protrusion and a protruding length of the second protrusion is longer than a diameter of the passageway.

7. The refrigerator of claim 2, wherein the passageway includes an opening that is open toward a rearward direction of the refrigerator to allow insertion of the electric wire, and the contact portion includes a lead portion that extends downwardly from the first protrusion to cover a portion of the opening.
8. The refrigerator of claim 7, wherein an end of the lead portion facing downward is spaced apart from the second inner surface.
9. The refrigerator of claim 7, wherein a distance between the end of the lead portion and the second inner surface is greater than a diameter of the electric wire.
10. The refrigerator of claim 2, wherein when arranged in the passageway, the electric wire includes: a first portion in contact with the first protrusion, and a second portion different from the first portion and in contact with the second protrusion.
11. The refrigerator of claim 1, wherein the duct includes: a guide passage configured to guide the cold air to the storage compartment, and a damper configured to open or close the guide passage, and a first end of the electric wire is connectable to the damper when the electric wire is arranged in the passageway.
12. The refrigerator of claim 11, further comprising: a power supply arranged on a side of the contact surface opposite to the damper, and connectable to a second end of the electric wire.
13. The refrigerator of claim 7, further comprising: a sealing member arranged between the inner case and the contact portion.
14. The refrigerator of claim 13, wherein the sealing member is attached to the contact surface to cover the opening.
15. The refrigerator of claim 13, wherein the sealing member includes an insulating material.