CLAIMS

[Claim 1]

A heat insulating box body having a rear wall and lateral walls and including a storage compartment with an opening at a front side, the heat insulating box body comprising:

convex portions formed on the rear wall at corner portions between the lateral walls and the rear wall and projecting toward the front side of the storage compartment;

a first vacuum heat insulating material arranged between an internal box corresponding to an inner surface of the rear wall and an external box corresponding to an outer surface of the rear wall in a manner of being overlapped with the convex portions in a width direction;

a first intermediate member charged, sealed, or applied between the first vacuum heat insulating material and the internal box forming the convex portions to bond, attach, or fix the first vacuum heat insulating material and the internal box to each other; and

a second intermediate member bonding the first vacuum heat insulating material with the external box,

wherein the rear wall includes a concave portion formed on the rear wall in a manner of being recessed to a rear side with respect to the convex portions;

wherein the first vacuum heat insulating material is a flat plate shape larger than a width of the concave portion to be integrally bonded, attached, or fixed to the internal box and the external box in the convex portions,

wherein the concave portion is a direct bonding portion to which the vacuum heat insulating material is directly adhered through an adhesive agent to the internal box, and

wherein the convex portions are reinforcing member interposing portions in which the first intermediate member that is a reinforcing member improving strength of the box

body is interposed between the vacuum heat insulating material and the internal box.

[Claim 2]

A heat insulating box body having a rear wall and lateral walls formed by an internal box and an external box and including a storage compartment with an opening at a front side, the heat insulating box body comprising:

convex portions formed on the rear wall at corner portions between the lateral walls and the rear wall and projecting toward the front side of the storage compartment;

a concave portion formed in a manner of being recessed to a rear side with respect to the convex portions;

a protruding portion provided in the concave portion and formed separately from the internal box forming an inner surface of the rear wall, the protruding portion protruding toward the front side and fixing or holding a cover member covering at least part of the rear wall;

a first vacuum heat insulating material arranged between an internal box corresponding to an inner surface of the rear wall and an external box corresponding to an outer surface of the rear wall in a manner of being partially overlapped with the convex portions in a width direction, the first vacuum heat insulating material being a flat plate shape and being larger in width than the concave portion;

a first intermediate member charged, sealed, or applied to the convex portions to bond, attach, or fix the first vacuum heat insulating material and the internal box to each other; and

a second intermediate member bonding the first vacuum heat insulating material with the external box,

wherein the first vacuum heat insulating material is bonded, attached, or fixed to

the internal box and the external box in the convex portions.

[Claim 3]

A heat insulating box body of claim 2,

wherein the cover member is fixed or held onto the protruding portion by a fitting structure or a hooking structure.

[Claim 4]

The heat insulating box body of any one of claims 1 to 3, further comprising

injection ports provided on the rear wall and charging or injecting the first intermediate member,

wherein the convex portions are a substantially triangular shape having an oblique side in a horizontal cross section and the injection ports are provided in the range of the oblique side.

[Claim 5]

The heat insulating box body of claim 4,

wherein the oblique side is substantially linear, curved, or arched shape.

[Claim 6]

The heat insulating box body of any one of claims 1 to 5,

wherein the first intermediate member is charged, sealed, or applied to between the internal box forming the concave portion and the first vacuum heat insulating material, and

wherein a thickness of the first intermediate member after foaming is less than 10 mm.

[Claim 7]

The heat insulating box body of any one of claims 2 to 6,

wherein the protruding portion is provided at at least two locations in the width direction.

[Claim 8]

The heat insulating box body of claim 1 or 2, further comprising

injection ports provided at positions near the widthwise end portions of the external box forming the rear wall or at positions near four corners of the external box forming the rear wall and charging or injecting the first intermediate member,

wherein the injection ports are provided in the range of the convex portions and arranged such that the first vacuum heat insulating material does not interfere with the injection ports.

[Claim 9]

The heat insulating box body of any one of claims 1 to 8,

wherein a second vacuum heat insulating material is provided between the internal box corresponding to an inner surface of the lateral wall and the external box corresponding to an outer surface of the lateral wall, and

wherein the second vacuum heat insulating material is a flat plate shape and is arranged to be overlapped with the convex portions.

[Claim 10]

The heat insulating box body of any one of claims 1 to 9,

wherein the first intermediate member is a foam heat insulating material and the

foam heat insulating material is charged, sealed, or applied between the first vacuum heat insulating material and the convex portions, and

wherein the second intermediate member is an adhesive agent different from the foam heat insulating material.

[Claim 11]

The heat insulating box body of claim 10,

wherein the foam heat insulating material is a rigid urethane foam and a density after foaming is more than 60 kg/m^3.

[Claim 12]

The heat insulating box body of claim 1 or 2,

wherein the first intermediate member is applied or charged to a part of a range of the concave portion.

[Claim 13]

The heat insulating box body of claim 1 or 2,

injection ports provided at positions near the widthwise end portions of the external box forming the rear wall or at positions near four corners of the external box forming the rear wall and charging or injecting the first intermediate member,

wherein the first vacuum heat insulating material has cutout portions at the corner portions thereof, and the cutout portions are arranged at positions corresponding to the injection ports.

[Claim 14]

A refrigerator, comprising:

the heat insulating box body of any one of claims 1 to 13; and

a cooler generating cooling air for cooling the storage compartment,

wherein the concave portion is formed in a vertical direction of the rear wall of the storage compartment, and is used as a cooling air passage through which the cooling air generated by the cooler is supplied into the storage compartment.

[Claim 15]

A refrigerator having a storage compartment with an opening at a front side, including at least lateral walls and rear wall, the refrigerator comprising:

convex portions formed at corner portions between the lateral walls and the rear wall, the convex portions projecting the internal box forming the rear wall toward the front side;

a concave portion formed on the rear wall in a manner of being recessed to a rear side with respect to the convex portions;

a cover member covering at least part of the rear wall;

a protruding portion provided in the concave portion, the protruding portion protruding toward the front side and fixing or holding the cover member;

a first vacuum heat insulating material arranged between an internal box corresponding to an inner surface of the rear wall and an external box corresponding to an outer surface of the rear wall to be partially overlapped with the convex portions in a width direction, the first vacuum heat insulating material being a flat plate shape and being larger in width than the concave portion;

a first intermediate member charged, sealed, or applied between the first vacuum

heat insulating material and the internal box forming the convex portions, to bond, attach, or fix the first vacuum heat insulating material and the internal box to each other, and

a second intermediate member bonding the first vacuum heat insulating material with the external box,

wherein the first vacuum heat insulating material is integrally bonded, attached, or fixed with the internal box and the external box in the convex portions, and

wherein the protruding portion is formed separately from the internal box and provided in the concave portion.

[Claim 16]

The refrigerator of claim 15, further comprising a cover member for covering the concave portion,

wherein the cover member comprises:

an air passage cover portion for forming at least a part of the cooling air passage or covering at least the part of the cooling air passage; and

a mount portion for mounting to the rear wall.

[Claim 17]

The refrigerator of claim 15, further comprising a refrigeration cycle,

wherein a pipe forming the refrigeration cycle is arranged in the convex portion.

[Claim 18]

The refrigerator of any one of claims 15 to 17,

wherein control lead wires are arranged in the convex portion.

[Claim 19]

The refrigerator of any one of claims 15 to 18, further comprising

a cooler generating cooling air for cooling the storage compartment,

wherein the concave portion is formed in a vertical direction of the rear wall, and is used as a cooling air passage through which the cooling air generated by the cooler is supplied into the storage compartment.

[Claim 20]

The refrigerator of claim 19,

wherein the cover member comprises:

an air passage cover portion for forming at least a part of the cooling air passage or covering at least the part of the cooling air passage; and

a mount portion for mounting to the rear wall.

[Claim 21]

The refrigerator of any one of claims 15 to 20,

wherein the cover member is fixed or held onto the protruding portion by a hooking structure or a fitting structure.

[Claim 22]

The refrigerator of any one of claims 15 to 21, further comprising:

a pull-out case housed in the storage compartment and pulled out through rail members arranged respectively on the lateral walls of the storage compartment;

a vacuum heat insulating material arranged between the internal box and the external box corresponding to each of the lateral walls facing the rail members; and

a foam heat insulating material charged between the internal box and the vacuum heat insulating material at a position facing each of the rail members,

wherein a thickness of the foam heat insulating material is less than 10 mm at the position facing the each of the rail members, and

wherein a density of the foam heat insulating material charged between the internal box and the vacuum heat insulating material at a position facing each of the rail members is more than 60 kg/m^3.

[Claim 23]

The refrigerator of claim 22,

wherein a reinforcing member for fixing the rail member is provided between the vacuum heat insulating material and the internal box.

[Claim 24]

The heat insulating box body of claim 1 or 2,

wherein the length of the first vacuum heat insulating materials overlapped with the convex portion is 30 mm or more.

[Claim 25]

The heat insulating box body of claim 1 or 2, further comprising second vacuum heat insulating materials on the lateral wall side,

wherein the length of the second vacuum heat insulating materials overlapped with the convex portion is 30 mm or more.

[Claim 26]

The refrigerator of claim 15,

wherein the first intermediate member is applied or charged in a part of a range of the concave portion.

[Claim 27]

The refrigerator of claim 14 or 19,

wherein the storage compartment is a refrigerator compartment or a vegetable compartment, and

the cooler is provided on the rear of the storage compartment or the vegetable compartment.