CLAIMS

Claim 1: A heat exchange device comprising:

a low-temperature pipe through which low-temperature refrigerant is passed and which is bent at least at one place; and

two high-temperature pipes through which high-temperature refrigerant is passed and of which at least middle parts are fastened to the low-temperature pipe in contact therewith, wherein

the two high-temperature pipes are arranged side by side in a direction crossing a direction in which the low-temperature pipe is bent and in symmetry about the low-temperature pipe.

Claim 2: The heat exchange device according to claim 1, wherein

at least the parts of the two high-temperature pipes fastened to the low-temperature pipe in contact therewith are arranged in a direction perpendicular to the direction in which the low-temperature pipe is bent.

Claim 3: The heat exchange device according to claim 1 or 2, wherein

the two high-temperature pipes are pipes that differ from each other in at least one of inner diameter and length.

Claim 4: The heat exchange device according to any one of claims 1 to 3, wherein

the low-temperature pipe is a suction pipe arranged between an evaporator and a compressor,

the two high-temperature pipes are capillary pipes arranged between a condenser and the evaporator,

the two capillary pipes are pipes formed parallel to each other in a refrigerant circuit, both end parts of the two capillary pipes being separated from the suction pipe, and

at least end parts of the two capillary pipes closer to the evaporator are annealed.

Claim 5: The heat exchange device according to claim 4, wherein

the end parts of the two capillary pipes closer to the evaporator are bundled together

with a fastening member.

Claim 6: The heat exchange device according to claim 5, wherein the fastening member is a filler metal ring.

Claim 7: An evaporator to which the heat exchange device according to any one of claims 4 to 6 is connected, the evaporator comprising an inlet pipe having in an end part thereof an opening in which the two capillary pipes are together inserted, wherein

the inlet pipe has a capillary pipe holding portion in a tip end part of which the two capillary pipes are inserted to be fastened thereto by brazing,

the capillary pipe holding portion has

an oval-cylindrical inner circumferential portion that can hold the two capillary pipes in contact with each other in a state where axes thereof lie side by side, and

an outer circumferential portion of which a projected face in an axial direction has an oval shape extending in a same direction as the inner circumferential portion, the projected face having a smaller projected area than a remaining part of the inlet pipe.

Claim 8: The evaporator according to claim 7, wherein

the capillary pipe holding portion has such a length that tip end parts of the two capillary pipes can penetrate the capillary pipe holding portion.

Claim 9: The evaporator according to claim 7 or 8, wherein

the inlet pipe is formed of a metal different from a metal of which an heat exchange portion of the evaporator is formed, and

joint faces of the inlet pipe and of a pipe of the heat exchange portion are brought together and joined together such that inner surfaces thereof are flush.

Claim 10: The evaporator according to any one of claims 7 to 9, wherein

an inner circumference of the capillary pipe holding portion is such that, when the evaporator is installed inside a refrigeration storage unit, the two capillary pipes lie side by side in a depth direction of the refrigeration storage unit.

Claim 11: The evaporator according to any one of claims 7 to 10, wherein in the opening of the inlet pipe, a taper is formed so as to be increasingly wide open outward toward a tip end.

Claim 12: The evaporator according to claim 11, wherein when the evaporator is installed at an installation site, the taper has a greater length in a lower inclined surface than elsewhere.

Claim 13: A refrigeration storage unit comprising the heat exchange device according to any one of claims 1 to 6.

Claim 14: A refrigeration storage unit comprising the evaporator according to any one of claims 7 to 12.

CLAIMS

[Claim 1]

A heat exchange device comprising:

a suction pipe that connects between an evaporator and a compressor and that is bent at least at one place, the suction pipe having a low-temperature refrigerant passing therethrough; and

two capillary pipes that connect between a condenser and the evaporator, and that are arranged in a direction crossing a bending direction of the suction pipe and in symmetry about the low-temperature pipe, the capillary pipes being, at least at a surface of a middle part thereof, fastened to the suction pipe in contact therewith by blazing, the capillary pipes having a high-temperature refrigerant passing therethrough,

wherein

a pipe portion of an inlet pipe of the evaporator is shaped such that the two capillary pipes can be, in a state arranged side by side in a horizontal direction, inserted thereinto and fastened thereto by blazing, and

at an opening at a tip end of the pipe portion of the inlet pipe of the evaporator, a taper is formed such that, when gaps between a contact part between the two capillary pipes and the pipe portion are formed one at top and one at bottom, the taper is increasingly wide open outward toward the tip end and a length of a slope is greater at bottom than elsewhere.

[Claim 2]

The heat exchange device according to claim 2, wherein

the two capillary pipes are arranged, at least in the part thereof fastened in contact, in a direction perpendicular to the bending direction of the suction pipe.

[Claim 3]

The heat exchange device according to claim 1 or 2, wherein

the two capillary pipes are pipes that differ in at least one of inner diameter and length.

[Claim 4]

The heat exchange device according to any one of claims 1 to 3, wherein

the two capillary pipes are, at both end parts thereof, separated from the suction pipe, and

the two capillary pipes are, at least in an end part thereof inserted into and fastened to the inlet pipe of the evaporator, annealed.

[Claim 5]

The heat exchange device according to any one of claims 1 to 4, wherein

the two capillary pipes are, in an end part thereof inserted into and fastened to the evaporator, bundled together with a fastening member.

[Claim 6]

The heat exchange device according to claim 5, wherein

the fastening member is a filler metal ring.

[Claim 7]

A heat exchange device comprising:

a suction pipe that connects between an evaporator and a compressor and that is bent at least at one place, the suction pipe having a low-temperature refrigerant passing therethrough; and

two capillary pipes that connect between a condenser and the evaporator, and that are arranged in a direction crossing a bending direction of the suction pipe and in symmetry about the low-temperature pipe, the capillary pipes being, at least at a surface of a middle part thereof, fastened to the suction pipe in contact therewith by blazing, the capillary pipes having a high-temperature refrigerant passing therethrough,

wherein

a pipe portion of an inlet pipe of the evaporator is shaped such that the two capillary pipes can be, in a state arranged side by side in a horizontal direction, inserted thereinto and fastened thereto by blazing,

the two capillary pipes are, at least in an end part thereof inserted into and fastened to the inlet pipe of the evaporator, annealed, and

the two capillary pipes are, in an end part thereof inserted into and fastened to the evaporator, bundled together with a filler metal ring.

[Claim 8]

A refrigeration storage unit comprising the heat exchange device according to any one of claims 1 to 7.