Claims

[Claim 1]

An evaporator comprising:

a housing forming an outer shell;

a first heat transfer pipe group accommodated in the housing, immersed in a liquid-phase refrigerant stored in a storage portion provided in a lower portion of the housing, and having a plurality of first heat transfer pipes in which a medium to be cooled circulates;

a second heat transfer pipe group accommodated in the housing, provided above a liquid surface of the liquid-phase refrigerant stored in the lower portion of the housing, and having a plurality of second heat transfer pipes in which a medium to be cooled circulates and which extend in a predetermined direction; and

a refrigerant supply pipe accommodated in the housing, extending in the predetermined direction, allowing a gas-liquid two-phase-state refrigerant to circulate inside in the predetermined direction, and supplying the refrigerant from above to the second heat transfer pipe group, wherein

~~wherein~~ the refrigerant supply pipe has a closing portion closing at least a lower end portion of an end surface in the predetermined direction and an opening portion formed in the end portion in the predetermined direction and above the closing portion, ~~and connecting an inner space of the refrigerant supply pipe and an outer space of the refrigerant supply pipe~~ and

the opening portion connects an inner space of the refrigerant supply pipe in which the gas-liquid two-phase-state refrigerant is allowed to circulate and an outer space of the refrigerant supply pipe.

[Claim 2]

The evaporator according to Claim 1, wherein the opening portion is formed in an upper portion of the refrigerant supply pipe.

[Claim 3]

The evaporator according to Claim 1 or 2, wherein the refrigerant supply pipe is provided with a first shielding plate portion disposed closer to a central portion side in the predetermined direction than the opening portion and extending downward from an upper portion of an inner peripheral surface of the refrigerant supply pipe.

[Claim 4]

The evaporator according to any one of Claims 1 to 3, wherein a tube body is inserted in the opening portion.

[Claim 5]

The evaporator according to any one of Claims 1 to 4, wherein

a refrigerant outlet discharging an evaporated refrigerant outward is provided on the housing,

a length of the second heat transfer pipe group in the predetermined direction is longer than a length of the refrigerant supply pipe in the predetermined direction, and

a second shielding plate portion is provided above the refrigerant supply pipe and between the opening portion and the refrigerant outlet.

[Claim 6]

The evaporator according to any one of Claims 1 to 5, wherein

the opening portions are formed in both end portions of the refrigerant supply pipe in the predetermined direction, and

an opening area of the opening portion formed in one end portion in the predetermined direction is different from an opening area of the opening portion formed in the other end portion in the predetermined direction.

[Claim 7]

An evaporator comprising:

a housing forming an outer shell;

a first heat transfer pipe group accommodated in the housing, immersed in a liquid-phase refrigerant stored in a storage portion provided in a lower portion of the housing, and having a plurality of first heat transfer pipes in which a medium to be cooled circulates;

a second heat transfer pipe group accommodated in the housing, provided above a liquid surface of the liquid-phase refrigerant stored in the lower portion of the housing, and having a plurality of second heat transfer pipes in which a medium to be cooled circulates and which extend in a predetermined direction; and

a refrigerant supply pipe accommodated in the housing, extending in the predetermined direction, allowing a gas-liquid two-phase-state refrigerant to circulate inside, and supplying the refrigerant from above to the second heat transfer pipe group, wherein

the refrigerant supply pipe has a closing portion closing at least a lower end portion of an end surface in the predetermined direction and an opening portion formed

in the end portion in the predetermined direction and above the closing portion, and connecting an inner space of the refrigerant supply pipe and an outer space of the refrigerant supply pipe,

a refrigerant outlet discharging an evaporated refrigerant outward is provided on the housing,

a length of the second heat transfer pipe group in the predetermined direction is longer than a length of the refrigerant supply pipe in the predetermined direction, and

a second shielding plate portion is provided above the refrigerant supply pipe and between the opening portion and the refrigerant outlet.

[Claim 8]

An evaporator comprising:

a housing forming an outer shell;

a first heat transfer pipe group accommodated in the housing, immersed in a liquid-phase refrigerant stored in a storage portion provided in a lower portion of the housing, and having a plurality of first heat transfer pipes in which a medium to be cooled circulates;

a second heat transfer pipe group accommodated in the housing, provided above a liquid surface of the liquid-phase refrigerant stored in the lower portion of the housing, and having a plurality of second heat transfer pipes in which a medium to be cooled circulates and which extend in a predetermined direction; and

a refrigerant supply pipe accommodated in the housing, extending in the predetermined direction, allowing a gas-liquid two-phase-state refrigerant to circulate

inside, and supplying the refrigerant from above to the second heat transfer pipe group, wherein

the refrigerant supply pipe has a closing portion closing at least a lower end portion of an end surface in the predetermined direction and an opening portion formed in the end portion in the predetermined direction and above the closing portion, and connecting an inner space of the refrigerant supply pipe and an outer space of the refrigerant supply pipe,

the opening portions are formed in both end portions of the refrigerant supply pipe in the predetermined direction, and

an opening area of the opening portion formed in one end portion in the predetermined direction is different from an opening area of the opening portion formed in the other end portion in the predetermined direction.