Claims

[Claim 1]

An evaporator comprising:

a housing provided with a refrigerant outlet discharging an evaporated refrigerant to an outside and forming an outer shell;

a liquid film-type heat transfer pipe group accommodated in the housing and having a plurality of liquid film heat transfer pipes in which a medium to be cooled circulates;

a refrigerant supply unit accommodated in the housing and supplying a liquid-phase refrigerant from above to the liquid film-type heat transfer pipe group;

a side plate portion covering the liquid film-type heat transfer pipe group from a side, and spaced apart from the refrigerant supply unit; and

an upper plate portion disposed above the refrigerant supply unit, and covering the liquid film-type heat transfer pipe group from above,

wherein a gap through which the refrigerant evaporated in the liquid film-type heat transfer pipe group passes is

formed between the side plate portion and the upper plate portion.

[Claim 2]

The evaporator according to Claim 1, further comprising a flooded-type heat transfer pipe group accommodated in the housing, immersed in a liquid-phase refrigerant stored in a lower portion of the housing, and having a plurality of flooding heat transfer pipes in which a medium to be cooled circulates,

wherein the liquid film-type heat transfer pipe group is provided above a liquid surface of the liquid-phase refrigerant stored in the lower portion of the housing.

[Claim 3]

The evaporator according to Claim 1 or 2, wherein the refrigerant outlet is provided above a lower end of the side plate portion.

[Claim 4]

The evaporator according to any one of Claims 1 to 3, wherein

the refrigerant supply unit is provided above the liquid film-type heat transfer pipe group, and

the side plate portion covers an upper portion of the liquid film-type heat transfer pipe group from a side.

[Claim 5]

An evaporator comprising:

a housing having a refrigerant outlet discharging an evaporated refrigerant to an outside and forming an outer shell;

a flooded-type 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 flooding heat transfer pipes in which a medium to be cooled circulates;

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

a refrigerant supply unit accommodated in the housing and supplying the liquid-phase refrigerant from above to the liquid film-type heat transfer pipe group;

a lower plate portion provided between the liquid film-type heat transfer pipe group and the liquid surface; and

a refrigerant discharge pipe guiding the refrigerant on an upper surface of the lower plate portion to the storage portion, wherein the refrigerant discharge pipe extends from the upper surface of the lower plate portion into the liquid-phase refrigerant stored in the storage portion.

[Claim 6]

The evaporator according to Claim 5,

wherein an upper end of the refrigerant discharge pipe is connected to the lower plate portion, and a lower end disposed below the flooded-type heat transfer pipe group, and the lower plate portion is provided below the liquid film-type heat transfer pipe group.

[Claim 7]

The evaporator according to Claim 5 or 6, wherein the lower plate portion has a hole penetrating the lower plate portion from an upper surface to a lower surface.

[Claim 8]

An evaporator according to Claim 5, further comprising:

a pressure loss increasing portion disposed only on a side of a lower end portion of the liquid film-type heat transfer pipe group and increasing a pressure loss in a region where the lower end portion of the liquid film-type heat transfer pipe group is disposed, wherein

the pressure loss increasing portion has a pair of lower end side plate portions disposed to sandwich the liquid film-type heat transfer pipe group and covering the liquid film-type heat transfer pipe group from a side, and

the lower end side plate portions are disposed along the liquid film-type heat transfer pipe group such that a distance by which an upper end portion and a lower end portion thereof are spaced apart from the liquid film-type heat transfer pipe group becomes the same distance.

[Claim 9]

The evaporator according to Claim 5, further comprising:

a rectification portion disposed to sandwich a lower portion which is below a central portion in an up-down direction of the liquid film-type heat transfer pipe group and guiding a refrigerant evaporated in the flooded-type heat transfer pipe group to the refrigerant outlet, wherein

the rectification portion is disposed such that a lower end thereof is above a lower end of the liquid film-type heat transfer pipe group.

[Claim 10]

The evaporator according to Claim 9, wherein the rectification portion has a pair of lower side plate portions covering the liquid film-type heat transfer pipe group from both sides.

[Claim 11]

The evaporator according to any one of Claims 1 to 10, wherein

the housing extends in a predetermined direction,

a plurality of cross plate portions disposed to intersect the predetermined direction are provided on the side of the liquid film-type heat transfer pipe group, and

the predetermined direction is a longitudinal direction of the housing.