refrigerant inflow opening to flow into the casing from the opening part, wherein the casing is formed into a cylindrical shape and includes: a cylindrical casing that has an opening at least at one end part thereof; and a lid part on which the refrigerant inflow opening is formed and that closes the opening of the cylindrical casing, and the opening part is disposed so as to face a bottom part of the casing of claim 1.

[0014a]

In one aspect, the present disclosure refers to a cooling device, comprising: a plurality of evaporators that is formed for each of a plurality of heating elements, and evaporates liquid-phase refrigerant retained internally by the heat of the heating element, and allows gas-phase refrigerant to flow out; a condenser that condenses the gas-phase refrigerant from the plurality of evaporators to flow out as liquid-phase refrigerant; a refrigerant relay device that is connected to the plurality of evaporators and the condenser, and retains the gas-phase refrigerant from the plurality of evaporators and allows the gas-phase refrigerant to flow out to the condenser, and retains liquid refrigerant from the condenser and allows the liquid refrigerant to flow out to the plurality of evaporators; a first vapor tube for the gas-phase refrigerant connecting the refrigerant relay device and the condenser; a first liquid tube for the liquid-phase refrigerant connecting the refrigerant relay device and the condenser; a plurality of second vapor tubes for the gas-phase refrigerant connecting the refrigerant relay device and the plurality of evaporators; and a plurality of second liquid tubes for the liquid-phase refrigerant connecting the refrigerant relay device and the plurality of evaporators; characterized in that the refrigerant relay device comprises a casing that retains the liquid-phase refrigerant and the gas-phase refrigerant, wherein the casing comprises: a first vapor tube connecting part to which the first vapor tube is connected; a first liquid tube connecting part to which the first liquid

tube is connected; a plurality of second vapor tube connecting parts to which the plurality of second vapor tubes are connected; a plurality of second liquid tube connecting parts to which the plurality of second liquid tubes are connected; a refrigerant inflow opening that is formed on the first liquid tube connecting part, and allows the liquid-phase refrigerant to flow into the casing therethrough; a refrigerant outflow opening that is formed on the first vapor tube connecting part, and allows the gas-phase refrigerant to flow out of the casing therethrough; and a refrigerant inflow piping one end part of which is connected to the refrigerant inflow opening, at the other end part of which an opening part is formed, and that allows the liquid-phase refrigerant flowing into the refrigerant inflow opening to flow into the casing from the opening part, wherein the plurality of second vapor tube connecting parts and the plurality of second liquid tube connecting parts are formed at intervals so as to correspond to respective positions of the plurality of evaporators.

[Advantageous Effects of Invention]

[0015]

A cooling device or the like according to the present invention enables heat from a heating element to be cooled efficiently.

[Brief Description of Drawings]

[0016]

[Fig. 1] Fig. 1 is a cross-sectional view illustrating a configuration of a refrigerant relay device in an example embodiment of the present invention;

[Fig. 2] Fig. 2 is an exploded cross-sectional view illustrating the configuration of the refrigerant relay device in the example embodiment of the present invention in an exploded manner;

[Fig. 3] Fig. 3 is a diagram illustrating an outline of a configuration of a cooling device in the example embodiment of the present invention;

[Fig. 4] Fig. 4 is an external perspective view illustrating the configuration of the cooling device in the example embodiment of the present invention;

[Fig. 5] Fig. 5 is an external perspective view illustrating the configuration of the refrigerant relay device in the example embodiment of the present invention;

[Fig. 6] Fig. 6 is a cross-sectional view illustrating the configuration of the refrigerant relay device in the example embodiment of the present invention;

[Fig. 7] Fig. 7 is a cross-sectional view illustrating another configuration of the refrigerant relay device in the example embodiment of the present invention; and

CLAIMS

[Claim 1]

A cooling device, comprising:

a plurality of evaporators that is formed for each of a plurality of heating elements, and evaporates liquid-phase refrigerant retained internally by the heat of the heating element, and allows gas-phase refrigerant to flow out;

a condenser that condenses the gas-phase refrigerant from the plurality of evaporators to flow out as liquid-phase refrigerant;

a refrigerant relay device that is connected to the plurality of evaporators and the condenser, and retains the gas-phase refrigerant from the plurality of evaporators and allows the gas-phase refrigerant to flow out to the condenser, and retains liquid refrigerant from the condenser and allows the liquid refrigerant to flow out to the plurality of evaporators;

a first vapor tube for the gas-phase refrigerant connecting the refrigerant relay device and the condenser;

a first liquid tube for the liquid-phase refrigerant connecting the refrigerant relay device and the condenser;

a plurality of second vapor tubes for the gas-phase refrigerant connecting the refrigerant relay device and the plurality of evaporators; and

a plurality of second liquid tubes for the liquid-phase refrigerant connecting the refrigerant relay device and the plurality of evaporators;

characterized in that

the refrigerant relay device comprises

a casing that retains the liquid-phase refrigerant and the gas-phase refrigerant, wherein

the casing comprises:

a first vapor tube connecting part to which the first vapor tube is connected;

a first liquid tube connecting part to which the first liquid tube is connected;

a plurality of second vapor tube connecting parts to which the plurality of second vapor tubes are connected;

a plurality of second liquid tube connecting parts to which the plurality of second liquid tubes are connected;

a refrigerant inflow opening that is formed on the first liquid tube connecting part, and allows the liquid-phase refrigerant to flow into the casing therethrough;

a refrigerant outflow opening that is formed on the first vapor tube connecting part, and allows the gas-phase refrigerant to flow out of the casing therethrough; and

a refrigerant inflow piping one end part of which is connected to the refrigerant inflow opening, at the other end part of which an opening part is formed, and that allows the liquid-phase refrigerant flowing into the refrigerant inflow opening to flow into the casing from the opening part, wherein

the plurality of second vapor tube connecting parts and the plurality of second liquid tube connecting parts are formed at intervals so as to correspond to respective positions of the plurality of evaporators.

[Claim 2]

The cooling device The refrigerant relay device according to claim 1, wherein

the casing includes:

a cylindrical casing that is formed into a cylindrical shape and has an opening at least at one end part thereof; and

a lid part on which the refrigerant inflow opening is formed and that closes the opening of the cylindrical casing, wherein

the opening part is disposed so as to face a bottom part of the casing, and

the other end part of the refrigerant inflow piping is formed so as to extend toward the bottom part of the casing.

[Claim 3]

The cooling device according to claim 1 or 2, wherein the other end part of the refrigerant inflow piping is formed so as to extend in a lower vertical direction.

[Claim 4]

The cooling device according to any one of claims 1 to 3, wherein the one end part of the refrigerant inflow piping is attached to the refrigerant inflow opening of the lid part.

[Claim 5]

The cooling device according to claim 4, wherein an extending direction of each connecting part between one of the second vapor tubes and the cylindrical casing is set so as not to pass through a central part in a cross section of the cylindrical casing when the cylindrical casing is cross-sectioned along a perpendicular direction to an extending direction of the cylindrical casing.

[Claim 6]

The cooling device according to claim 5, wherein each connecting part between one of the second vapor tubes and the cylindrical casing is disposed at a higher position in the vertical direction than the central part

in the cross section of the cylindrical casing.

[Claim 7]

The cooling device according to claim 5 or 6, wherein the cylindrical casing is formed into a circular cylindrical shape, and an extending direction of each connecting part between one of the second vapor tubes and the cylindrical casing is set along a tangent line to an outer perimeter circle of the cylindrical casing.

[Claim 8]

The cooling device according to any one of claims 5 to 7, wherein an extending direction of each connecting part between one of the second vapor tubes and the cylindrical casing is further set in a direction toward a side on which the refrigerant outflow opening is formed.