cooling device using the phase change cycle of evaporation and condensation of the refrigerant that receives heat from an electronic device using a multipart heat-receiving section, such that heat can be discharged from an electronic device.

SUMMARY

[0004]

The refrigerant vapor obtained by vaporizing the refrigerant in the heat receiving section is a gas-liquid mixture two-phase flow in which liquid and gas are mixed. In the cooling device of PCT International Publication No. WO 2016/159056, a tank is provided above the multistage heat receiving section so that the liquid of the gas-liquid mixed two-phase flow does not hinder the flow of the gas, and the refrigerant vapor in the vapor pipe is separated into refrigerant gas and refrigerant liquid.

[0005]

However, when the refrigerant liquid accumulates in the tank, the refrigerant liquid may overflow into the vapor pipe. When the refrigerant liquid overflows into the vapor pipe, it hinders the flow of the refrigerant vapor and the heat transport efficiency drops. Therefore, in the cooling device of PCT International Publication No. WO 2016/159056, it is necessary to increase the tank capacity so that the refrigerant liquid does not overflow.

[0006]

Embodiments of the present invention provide a gas-liquid separation device, a rear door, a cooling device, and a gas-liquid separating method in which a tank capacity may be reduced.

[0007]

A gas-liquid separation device of a first aspect includes a tank

having a refrigerant vapor inflow section into which a refrigerant vapor flowing out from a heat receiving section, which recovers exhaust heat from a cooling object, via a vapor pipe is introduced, and a refrigerant gas outflow section from which the refrigerant gas of the refrigerant vapor is discharged, the tank being capable of storing refrigerant liquid of the refrigerant vapor on a lower surface; and a regulating valve which floats on the refrigerant liquid stored in the tank and closes a space between the vapor pipe and the tank.

[0008]

A gas-liquid separating method of a second aspect includes a step of providing a regulating valve capable of floating on a refrigerant liquid inside a tank which has a refrigerant vapor inflow section into which a refrigerant vapor flowing out from a heat receiving section, which recovers exhaust heat from a cooling object, via a vapor pipe is introduced, and a refrigerant gas outflow section from which the refrigerant gas of the refrigerant vapor is discharged, the tank being capable of storing the refrigerant liquid of the refrigerant vapor on a lower surface; a step of storing the refrigerant liquid on the lower surface in the tank to make the regulating valve float; and a step of closing a space between the vapor pipe and the tank.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009]

FIG. 1 is a schematic view of a cooling device according to an embodiment of the present invention.

FIG. 2 is a cross-sectional view of a main part of a gas-liquid separation device according to the embodiment of the present invention.

FIG. 3 is a cross-sectional view of a main part showing a minimum

What is claimed is:

1. A gas-liquid separation device comprising:

a tank having a refrigerant vapor inflow section into which a refrigerant vapor flowing out from a heat receiving section, which recovers exhaust heat from a cooling object, via a vapor pipe is introduced, and a refrigerant gas outflow section from which the refrigerant gas of the refrigerant vapor is discharged, the tank being capable of storing refrigerant liquid of the refrigerant vapor on a lower surface; and

a regulating valve which floats on the refrigerant liquid stored in the tank and closes a space between the vapor pipe and the tank.

2. The gas-liquid separation device according to claim 1, wherein the regulating valve has a ring shape.

3. The gas-liquid separation device according to claim 1 or 2, wherein the regulating valve is inserted into a protruding section of the vapor pipe which protrudes into the tank.

4. The gas-liquid separation device according to claim 3, wherein the regulating valve has a seal section which seals the refrigerant liquid between the regulating valve and the protruding section.

5. A rear door comprising:

the gas-liquid separation device according to any one of claims 1 to 4;

the vapor pipe; and

the heat receiving section.

6. A cooling device comprising:

the rear door according to claim 5;

a heat exchanger configured to condense the refrigerant gas by heat exchange;

a first pipe configured to connect the gas-liquid separation device and the heat exchanger; and

a second pipe configured to connect the heat exchanger and the gas-liquid separation device.

7. A method for separating a gas from a liquid, the method comprising:

providing a regulating valve capable of floating on a refrigerant liquid inside a tank which has a refrigerant vapor inflow section into which a refrigerant vapor flowing out from a heat receiving section, which recovers exhaust heat from a cooling object, via a vapor pipe is introduced, and a refrigerant gas outflow section from which the refrigerant gas of the refrigerant vapor is discharged, the tank being capable of storing the refrigerant liquid of the refrigerant vapor on a lower surface;

storing the refrigerant liquid on the lower surface in the tank to make the regulating valve float; and

closing a space between the vapor pipe and the tank.