CLAIMS

WHAT IS CLAIMED IS:

1. A heating device configured to carry and heat a to-be-processed workpiece in a semiconductor processing apparatus, wherein the heating device comprises a base, a heating assembly, and a cooling mechanism, wherein:

the heating assembly is provided with a ventilation structure, the ventilation structure being configured to blow gas to an edge of the to-be-processed workpiece; and

the base is arranged on a side of the heating assembly away from a heating surface of the heating assembly, and a mounting space is formed between the base and the heating assembly, the cooling mechanism being arranged in the mounting space, located at a position corresponding to an edge area of the heating surface, and configured to cool the heating assembly.

2. The heating device according to claim 1, wherein the cooling mechanism includes an annular assembly, at least one of a cooling water channel configured to transfer a cooling liquid or a cooling gas channel configured to transfer a cooling gas being integrated in the annular assembly, an outlet of the cooling gas channel facing a surface of the heating assembly away from the heating surface and configured to blow the cooling gas to the surface.

3. The heating device according to claim 2, wherein the annular assembly is integrated with the cooling water channel configured to transfer the cooling liquid and the cooling gas channel configured to transfer the cooling gas, the annular assembly includes an annular body, a first annular cover, and a second annular cover, an annular groove is formed on a

first surface of the annular body facing the surface of the heating assembly away from the heating surface, and the first annular cover is sealed and connected to the annular body and forms the closed cooling water channel with the annular groove;

a plurality of gas blow holes are arranged in the annular body, an outlet of each of the gas blow holes is located on the first surface, an inlet of each of the gas blow holes is located on a second surface of the annular body away from the first surface, the second annular cover is sealedly connected to the annular body on a side where the second surface of the annular body is located, the second annular cover and the annular body form a closed annular gas channel, and the annular gas channel is connected to inlets of the gas blow holes.

4. The heating device according to claim 3, wherein the plurality of gas blow holes are distributed on inner and outer sides of the cooling water channel, and gas blow holes on a same side are distributed along a circumferential direction of the annular body at intervals.

5. The heating device according to claim 2, wherein a heating member is further integrated in the annular assembly, the heating member being configured to heat at least one of the cooling water channel or the cooling gas channel integrated in the annular assembly.

6. The heating device according to claim 5, wherein the heating member includes a heating tube embedded in the annular assembly, and the heating tube is wounded around an axis of the annular assembly in a spiral plane shape.

7. The heating device according to any one of claims 1 to 6, wherein the cooling mechanism is in contact with the surface of the heating assembly away from the heating surface; or the cooling mechanism is arranged at an interval from the surface of the heating assembly away from the heating surface, and a heat conductive member that is in contact with the cooling mechanism and the surface of the heating assembly away from the heating surface is arranged between the cooling mechanism and the surface of the heating assembly away from the heating surface.

8. The heating device according to claim 1, wherein the heating assembly includes a heating body, a gas channel plate arranged on the side of the heating body away from the heating surface, and a gas source channel configured to be connected to a gas source, wherein the ventilation structure includes a first gas channel and a second gas channel, an outlet of the first gas channel is located at the edge area of the heating surface of the heating body, an inlet of the first gas channel is located on the surface of the heating body away from the heating surface, and the first gas channel is configured to blow gas to the edge of the to-be-processed workpiece; and

the second gas channel is located between the gas channel plate and the heating body, the second gas channel is communicated with the inlet of the first gas channel, and the second gas channel is communicated with the gas source channel.

9. The heating device according to claim 8, wherein the second gas channel includes a first sub-channel and a second sub-channel, wherein the first sub-channel is communicated with the first gas channel and the second sub-channel, and the second sub-channel is communicated with the gas source channel;

wherein, a gas storage volume of the second sub-channel and a gas storage volume of the first gas channel are both smaller than a gas storage volume of the first sub-channel, and a flow rate of the second sub-channel is greater than a gas flow rate of the first gas channel.

10. The heating device according to claim 8 or 9, wherein the second gas channel is a groove formed on at least one of two opposite surfaces of the gas channel plate and the heating body.

11. The heating device according to claim 8, wherein a surface of the base facing the gas channel plate is provided with a mounting groove, the mounting groove and the gas channel plate form the mounting space, the cooling mechanism is arranged at a groove bottom of the mounting groove, and a high temperature-resistant member is arranged between the cooling mechanism and the groove bottom.

12. The heating device according to claim 11, wherein a support member is arranged in the mounting space, and the support member supports between the cooling mechanism and the groove bottom of the mounting groove.

13. The heating device according to claim 9, wherein the heating assembly further includes an edge ring surrounding the heating body, the first gas channel includes a third sub-channel and a fourth sub-channel, wherein the third sub-channel is arranged in the heating body, and an outlet of the third sub-channel is located on the outer peripheral wall of the heating body, and an inlet of the third sub-channel is located on the surface of the heating body away from the heating surface and communicated with the first sub-channel; and

an inner peripheral wall of the edge ring is arranged at an interval from the outer peripheral wall of the heating body to form the fourth sub-channel, and the fourth sub-channel is communicated with the third sub-channel.

14. The heating device according to claim 13, wherein a cooling channel configured to transfer a cooling medium is arranged in the edge ring.

15. A semiconductor processing apparatus comprising a reaction chamber, wherein the reaction chamber is provided with the heating device according to any one of claims 1 to 14.