

What is claimed is:

1. A heating device, comprising a base plate, at least three supporting columns and a heating assembly, wherein the at least three supporting columns are arranged vertically on the base plate and are distributed at intervals along a circumferential direction of the base plate, and top ends of the at least three supporting columns form a bearing surface for supporting a to-be-heated member; and

the heating assembly comprises a heating light tube and a thermal radiation shielding assembly, wherein:

the heating light tube is disposed above the base plate and below the bearing surface and is configured to radiate heat towards the bearing surface, and a projection of an effective heating area formed by uniform distribution of the heating light tube on the base plate covers a projection of the bearing surface on the base plate, and

the thermal radiation shielding assembly is configured to shield heat radiated by the heating light tube towards surroundings and a bottom of the heating light tube; and

the heating light tube comprises a heating section, and a heating wire for generating heat is disposed in the heating section, and an area where the heating wire is located is the effective heating area; and

the thermal radiation shielding assembly comprises:

a first shielding member comprising a first horizontal part and a first vertical part, wherein the first horizontal part is located below the heating light tube and covers the effective heating area; the first vertical part is connected to the first horizontal part and surrounds the heating section of the heating light tube, and a top end of the first vertical part is higher than the heating light tube.

2. The heating device according to claim 1, wherein the heating light tube comprises two non-heating sections located at two ends of the heating section, wherein:

wires respectively connected to two ends of the heating wire are disposed in each non-heating section and serve as an anode and a cathode of the heating light tube.

3. The heating device according to claim 2, wherein a shape and size of the effective heating area are obtained by configuring a shape of the heating light tube and a length of the heating wire.

4. The heating device according to claim 1, wherein a shape of the effective heating area corresponds to a shape of the bearing surface.

5. The heating device according to any one of claims 2-4, wherein a number of the heating light tubes is plural;

a plurality of heating light tubes are straight tubes, and are arranged in parallel to each other at equal intervals; or,

each heating light tube comprises an arc-shaped portion and straight-line portions connected to two ends of the arc-shaped portion, wherein the arc-shaped portions of the heating light tubes are concentric, have different radii, and are arranged at equal intervals; and the straight-line portions of the heating light tubes are arranged in parallel to each other at equal intervals.

6. The heating device according to claim 1, wherein the heating light tubes are divided into a plurality of heating groups based on different areas of the bearing surface, heating light tubes in a same heating group are electrically connected with each other,

and heating light tubes in different heating groups are shielded from each other.

7. The heating device according to claim 6, wherein the heating device further comprises a heating control system, and the heating control system comprises a temperature detector, a temperature controller, an adjustment controller and a plurality of power controllers, wherein:

the temperature detector is configured to detect a real-time temperature at any position of the to-be-heated member in an execution stage of a heating process and send the real-time temperature to the temperature controller;

the temperature controller is configured to generate a control signal based on the real-time temperature sent from the temperature detector and a preset target temperature and send the control signal to the adjustment controller;

the adjustment controller is configured to respectively obtain a plurality of control sub-signals corresponding to the heating groups based on the control signal and a heating weighting function and send the plurality of control sub-signals to the plurality of power controllers in a one-to-one correspondence; and

a number of the power controllers corresponds to a number of the heating groups, and each power controller is configured to adjust heating power of the heating light tubes in a corresponding heating group based on the plurality of control sub-signals.

8. The heating device according to claim 7, wherein the heating weighting function is established in a preset stage by a method of trial and error based on a temperature distribution condition of the to-be-heated member.

9. The heating device according to claim 7 or 8, wherein the heating weighting

function is:

when $T_{meas} < T_p - T$, $U_n = U$;

when $T_{meas} \geq T_p - T$, $U_n = fn(U) = knU + b$;

wherein n is an integer larger than 0 and smaller than or equal to N , and N is the number of the heating groups;

T_{meas} is the real-time temperature detected by the temperature detector;

U_n represents a control sub-signal corresponding to an n^{th} heating group;

U represents the control signal;

$fn(U)$ represents a preset correspondence rule corresponding to the n^{th} heating group;

T_p is the preset target temperature;

T is a preset threshold temperature;

kn is a weighting coefficient corresponding to the n^{th} heating group; and

b is a constant.

10. The heating device according to claim 8, wherein in the preset stage, in a process of establishing the heating weighting function, temperature detection points are configured in areas of the bearing surface where the heating groups are located in a one-to-one correspondence; and

in a detection process, the real-time temperatures of the temperature detection points are detected; when a real-time temperature detected at any one of the temperature detection points is close to the preset target temperature, the temperature distribution condition of the to-be-heated member is obtained based on the real-time temperatures of the temperature detection points detected at a current moment, and the heating weighting function is established based on the temperature distribution

condition, thereby allowing a temperature difference between different areas of the to-be-heated member to satisfy a requirement of a process on temperature uniformity.

11. The heating device according to claim 7, wherein one of the at least three supporting columns is used as a thermocouple of the temperature detector.

12. The heating device according to any one of claims 2-4, wherein the number of the heating light tubes is one, and the one heating light tube is a planar spiral tube with equal intervals.

13. The heating device according to claim 2, wherein the thermal radiation shielding assembly comprises:

a second shielding member comprising a second horizontal part and a second vertical part, wherein the second vertical part surrounds the bearing surface and a top end of the second vertical part is higher than the bearing surface, the second horizontal part surrounds an outer side of the second vertical part, and a plane where the second horizontal part is located is high than the first vertical part and the heating light tube.

14. The heating device according to claim 13, wherein a number of the first shielding members is plural, and the first vertical parts of a plurality of first shielding members are arranged at intervals along a direction parallel to the bearing surface; and the first horizontal parts of the plurality of first shielding members are arranged at intervals along a direction perpendicular to the bearing surface.

15. The heating device according to claim 13, wherein surfaces of the first

horizontal part, the first vertical part, the second horizontal part and the second vertical part that faces towards the heating light tube are respectively polished or plated to improve light reflectivity.

16. The heating device according to claim 13, wherein surfaces of the first horizontal part, the first vertical part, the second horizontal part and the second vertical part that face towards the heating light tube include a planar surface or a curved surface.

17. The heating device according to claim 13, wherein materials of the first shielding member and the second shielding member comprise molybdenum, stainless steel or quartz.

18. The heating device according to claim 1, wherein the heating device further comprises:

two electrodes disposed on the base plate at a position close to a central position of the base plate; wherein upper and lower ends of each electrode are located above and below the base plate, respectively; and

two electric connectors located between the thermal radiation shielding assembly and the base plate, wherein one ends of the electric connectors are respectively connected to the electrodes, and the other ends of the electric connectors are electrically connected to the heating light tube.

19. The heating device according to claim 18, wherein the heating device further comprises:

a first electric shielding member surroundingly disposed on the base plate, and having a first closed space to shield electric fields generated at connecting portion between the electric connectors and the light heating tube; and

a second electric shielding member covering connecting portions between the electrodes and the electric connectors to form a second closed space to respectively shield electric fields generated at the connecting portions between the electrodes and the electric connectors.

20. The heating device according to claim 1, wherein the heating light tube is a short-wave infrared light tube.

21. The heating device according to claim 1, wherein a cooling channel is disposed in the based plate to cool the base plate by introducing cooling water into the cooling channel.

22. A heating chamber, comprising a heating device and a driving device for driving the heating device to move up and down, wherein the heating device is the heating device according to any one of claims 1-21.

23. The heating chamber according to claim 22, wherein the driving device comprises a first lifting shaft and a first driving mechanism, wherein:

the first lifting shaft is configured vertically, an upper end of the first lifting shaft is connected to the base plate, and a lower end of the first lifting shaft extends vertically to an outside of the heating chamber; and

the first driving mechanism is disposed at a bottom of the heating chamber and

connected to the first lifting shaft, and is configured to drive the base plate to move up or down through the first lifting shaft.

24. The heating chamber according to claim 23, wherein the driving device further comprises at least three movable supporting columns, a connector, a second lifting shaft and a second driving mechanism, wherein:

the at least three movable supporting columns are configured vertically on the connector and are distributed along a circumferential direction of the base plate at intervals, and top ends of the at least three movable supporting columns are configured to support the to-be-heated member;

the second lifting shaft is configured vertically, an upper end of the second lifting shaft is connected to the connector, and a lower end of the second lifting shaft extends vertically to the outside of the heating chamber; and

the second driving mechanism is configured at the bottom of the heating chamber and connected to the second lifting shaft, and is configured to drive the movable supporting columns to move up or down through the second lifting shaft.