

# **ELECTROPLATING FIXTURE, ELECTROPLATING APPARATUS, AND ELECTROPLATING FIXTURE DETECTION METHOD**

## **FIELD OF THE INVENTION**

The present application relates to the technical field of semiconductor technology, and in particular, to an electroplating fixture, an electroplating apparatus, and an electroplating fixture detection method.

## **BACKGROUND**

Wafer electroplating processes currently include two types: vertical rack plating and horizontal jet-type cup plating. Wherein, rack plating involves vertically immersing a wafer into an electroplating solution, and electroplating of multiple wafers can be carried out in one electroplating tank at the same time. Cup plating involves covering a wafer in a cup-shaped electroplating tank, and the electroplating process is carried out in a one-to-one cup-to-wafer arrangement. In contrast to rack plating, the single-wafer process of cup plating is more controllable, and the single-wafer process of cup plating is an important development direction of high-quality electroplating processes. In the advanced cup plating process, it is usually necessary to reliably seal the edge of the wafer with a sealing ring, so that the electroplating solution does not contact the edge of the wafer and the back surface of the to-be-electroplated surface of the wafer.

However, with the progress of electroplating operations, a rubber sealing ring will age and local damage will gradually occur, especially small damages of the rubber sealing ring are difficult to detect with the naked eye, resulting in electroplating failure.

## **SUMMARY**

Embodiments of the present application provide an electroplating fixture, an electroplating apparatus, and an electroplating fixture detection method, capable of detecting damage to a sealing member at least to a certain extent.

In a first aspect, the present application provides an electroplating fixture, comprising: a clamping cylinder, an annular boss being arranged on the inner wall of

the clamping cylinder, and the annular boss being used for supporting a wafer; a sealing ring, wrapping the annular boss, and extending from the annular boss to the cylinder wall of the clamping cylinder; wherein a gas channel is arranged in the cylinder wall of the clamping cylinder, a gas channel opening of the gas channel is arranged at the position where the clamping cylinder is wrapped by the sealing ring, and whether the sealing ring is damaged is detected by evacuating gas through the gas channel.

Specifically, a clamping cylinder open groove is arranged at the position where the clamping cylinder is wrapped by the sealing ring, and the clamping cylinder open groove is in communication with the gas channel through the gas channel opening.

Specifically, the clamping cylinder open groove is arranged around the clamping cylinder for a whole circle.

Specifically, a plurality of the gas channels are provided, and the plurality of the gas channels are in communication with the clamping cylinder open groove at different positions.

Specifically, a plurality of the clamping cylinder open grooves and the plurality of the gas channels are provided, each clamping cylinder open groove is in communication with at least one gas channel, and the plurality of the clamping cylinder open grooves are arranged at intervals.

Specifically, the sealing ring extends from the annular boss to the inner wall of the clamping cylinder, and the electroplating fixture further comprises a fixture inner ring, and the fixture inner ring is arranged on the inner side of the clamping cylinder and covers a first edge of the sealing ring located on the inner wall of the clamping cylinder.

Specifically, an internal step structure is arranged on the inner wall of the clamping cylinder, the first edge is located at the internal step structure, and the fixture inner ring covers the first edge at the internal step structure.

Specifically, the sealing ring extends from the annular boss to the outer wall of the clamping cylinder, and the electroplating fixture further comprises a fixture shield, and the fixture shield is arranged on the outer side of the clamping cylinder and covers

a second edge of the sealing ring located on the outer wall of the clamping cylinder.

Specifically, an external step structure is arranged on the outer wall of the clamping cylinder, the second edge of the sealing ring is located at the external step structure, and the fixture shield covers the second edge at the external step structure.

Specifically, the electroplating fixture further comprises a rotating circular plate provided with a gas pumping device, the rotating circular plate is connected to the clamping cylinder through a fixture connecting member, and the gas channel is also arranged in the rotating circular plate and the fixture connecting member.

In a second aspect, the present application provides an electroplating apparatus, comprising: an electroplating tank; and the electroplating fixture according to any one of the above items, wherein the electroplating fixture is used for making the to-be-electroplated surface of the wafer face the electroplating tank.

In a third aspect, the present application provides an electroplating fixture detection method, applied to the electroplating fixture according to any one of the above items, comprising: evacuating gas through the gas channel arranged in the electroplating fixture and detecting the gas pumping flow rate; recording the change in gas flow rate at the gas channel opening covered by the sealing ring according to the gas pumping flow rate; and determining whether the sealing ring is damaged according to the change in gas flow rate.

In a fourth aspect, the present application provides an electroplating fixture detection method, applied to the electroplating fixture according to any one of the above items, comprising: evacuating gas through the gas channel arranged in the electroplating fixture and detecting the gas pumping pressure; recording the gas pressure change at the gas channel opening covered by the sealing ring according to the gas pumping pressure; and determining whether the sealing ring is damaged according to the gas pressure change.

For the electroplating fixture of the present application, since the gas channel opening is arranged at the position where the clamping cylinder is wrapped by the sealing ring, whether the sealing ring is damaged can be detected through gas pumping

detection of the gas channel.

Other characteristics and advantages of the present application will become apparent from the following detailed description, or can be partially learned through the practice of the present application.

It should be understood that the above general description and the following detailed description are only exemplary and explanatory, and cannot limit the present application.

## BRIEF DESCRIPTION OF THE DRAWINGS

The features and performance of the present application are further described by the following embodiments and the accompanying drawings of the embodiments.

The accompanying drawings herein are incorporated into the specification and form a part of the specification, illustrate the embodiments conforming to the present application, and explain the principle of the present application together with the specification. Obviously, the accompanying drawings in the following description are only some embodiments of the present application, and those of ordinary skill in the art can obtain other accompanying drawings according to these accompanying drawings without making creative efforts. In the accompanying drawings:

FIG. 1 is a schematic structural view of an electroplating fixture according to an embodiment of the present application;

FIG. 2 is a schematic structural view of a clamping cylinder and a fixture connecting member according to an embodiment of the present application;

FIG. 3 is a partial schematic structural view of a clamping cylinder and a fixture connecting member according to an embodiment of the present application;

FIG. 4 is a partial schematic structural view of a clamping cylinder and a fixture connecting member according to an embodiment of the present application;

FIG. 5 is a schematic structural view of a clamping cylinder and a fixture

connecting member according to an embodiment of the present application;

FIG. 6 is a schematic structural view of an electroplating fixture according to an embodiment of the present application;

FIG. 7 is a schematic structural view of an electroplating apparatus according to an embodiment of the present application;

FIG. 8 is a schematic flow chart of an electroplating fixture detection method according to an embodiment of the present application;

FIG. 9 is a schematic flow chart of an electroplating fixture detection method according to an embodiment of the present application.

## PREFERRED EMBODIMENTS OF THE INVENTION

Embodiments will now be described more fully with reference to the accompanying drawings. However, the embodiments can be implemented in various forms, and should not be construed as being limited to the examples set forth herein; on the contrary, these embodiments are provided so that the present application will be more comprehensive and complete, and the conception of the embodiments will be fully conveyed to those skilled in the art.

In addition, the described features, structures, or characteristics may be combined in any suitable manner in one or more embodiments. In the following description, numerous specific details are provided to give a full understanding of the embodiments of the present application. However, those skilled in the art will realize that the technical solutions of the present application can be practiced without one or more of the specific details, or other methods, components, devices, steps, and the like can be adopted. In other cases, well-known methods, devices, implementations, or operations are not shown or described in detail to avoid obscuring various aspects of the present application.

According to FIGS. 1 to 4, the present embodiment provides an electroplating fixture 1, which can detect whether a sealing ring 15 in the electroplating fixture 1 is damaged.

As shown in FIG. 1, the electroplating fixture 1 comprises a clamping cylinder 11, a power assembly 12 for driving the clamping cylinder 11 to rotate, a rotating circular plate 13, and a fixture connecting member 14. Wherein, the clamping cylinder 11 is in a cylindrical shape and has two ends in the axial direction, and an annular boss 111 is convexly arranged on the inner wall of the lower end of the clamping cylinder 11 as shown in FIG. 1. A wafer 2 is arranged in the clamping cylinder 11, and the edge of the to-be-electroplated surface of the wafer 2 is supported by the annular boss 111. The power assembly 12 includes a rotary driving member, the power assembly 12 is arranged at the center of the rotating circular plate 13, the rotating circular plate 13 is connected to the other end of the clamping cylinder 11 through the fixture connecting member 14, and the power assembly 12 drives the clamping cylinder 11 to rotate through the rotating circular plate 13 and the fixture connecting member 14, so that the wafer 2 rotates during electroplating, and uniform electroplating of the wafer 2 can be realized. Specifically, one or more fixture connecting members 14 may be provided, and when a plurality of fixture connecting members 14 are provided, the plurality of fixture connecting members 14 are uniformly distributed along the circumference of the rotating circular plate 13, so that the rotating circular plate 13 and the clamping cylinder 11 are stably connected. For example, as shown in FIG. 2, the fixture connecting members 14 can be at least two connecting rods uniformly distributed along the circumference of the rotating circular plate 13, or two connecting rods form a group, and two groups of connecting rods are symmetrically arranged on two sides of the rotating circular plate 13. Each group of connecting rods can also form a connecting frame, the connecting frame has a larger connection area with the rotating circular plate 13, and the connecting frame has a larger connection area with the clamping cylinder 11, which can increase the connection strength. In this embodiment, the fixture connecting members 14 can also be connecting plates, connecting blocks, or other structures.

With reference again to FIG. 1, the clamping cylinder 11 is a cylindrical cylinder, the inner diameter of the lower end of the clamping cylinder 11 is equal to the diameter of the wafer 2, and the diameter of the hole formed on the inner wall of the annular boss 111 is slightly smaller than the diameter of the wafer 2, so that the clamping cylinder 11 contacts the edge of the wafer to position the wafer 2, and the annular boss 111 supports the edge of the to-be-electroplated surface of the wafer, so that the

electroplating fixture 1 clamps the wafer 2 stably. The diameter of the end of the clamping cylinder 11 far away from the annular boss 111 is larger than the diameter of the wafer 2, so as to facilitate placing the wafer 2 into the clamping cylinder 11. At least a section of the inner wall of the clamping cylinder can be inclined, which can play a guiding role for the wafer 2. The annular boss 111 can be integrally arranged with the clamping cylinder 11. In other implementation modes of the embodiment of the present application, the annular boss 111 can be connected to the clamping cylinder 11 by welding, bonding, or other means.

According to FIG. 3, the electroplating fixture 1 further comprises a sealing ring 15, and the sealing ring 15 wraps the annular boss 111, so that the annular boss 111 can contact the wafer 2 through the sealing ring 15. The electroplating fixture 1 further comprises a fixture inner ring 16 arranged on the inner side of the clamping cylinder and a fixture shield 17 arranged on the outer side of the clamping cylinder. The sealing ring 15 extends from the annular boss 111 to the inner wall and the outer wall of the clamping cylinder, a first edge 151 of the sealing ring on the inner wall of the clamping cylinder is pressed tightly by the fixture inner ring 16, and a second edge 152 of the sealing ring on the outer wall of the clamping cylinder is pressed tightly by the fixture shield 17, so that the position of the sealing ring 15 is fixed. Since the sealing ring 15 extends to the inner wall of the clamping cylinder, the inner wall of the clamping cylinder contacts the edge of the wafer through the sealing ring 15, so that the sealing effect of the wafer edge is better. Further, an internal step structure is arranged on the inner wall of the clamping cylinder, the first edge 151 of the sealing ring on the inner wall of the clamping cylinder extends to the internal step structure, and the first edge 151 of the sealing ring is pressed tightly by the fixture inner ring 16 at the internal step structure, so that the sealing ring 15 is better fixed. Similarly, an external step structure can be arranged on the outer wall of the clamping cylinder, and the second edge 152 of the sealing ring on the outer wall of the clamping cylinder is pressed tightly by the fixture shield 17 at the external step structure, so that the sealing ring 15 is better fixed.

As shown in FIG. 4, further, a plurality of annular retaining grooves 112 are arranged on the external step structure, the sealing ring 15 is made of an elastic material such as rubber, and the sealing ring 15 is compressed into the annular retaining grooves 112 when being pressed tightly, so that the second edge 152 of the sealing ring is in a

wavy shape, therefore the sealing ring 15 is better fixed. The annular retaining grooves 112 can also be arranged at the internal step structure, the fixture inner ring 16, and/or the fixture shield 17, and the number of the annular retaining grooves 112 can also be one.

A gas channel 113 is arranged in the cylinder wall of the clamping cylinder 11, and a gas channel opening 114 of the gas channel 113 is arranged at the position where the clamping cylinder 11 is wrapped by the sealing ring 15. The gas channel 113 is also in communication with a gas pumping device (not shown), so that when the gas pumping device is used for evacuating gas through the gas channel 113, whether the sealing ring 15 at the position of the gas channel opening 114 is damaged can be determined according to the change in gas flow rate or gas pressure in the gas channel 113. The sealing ring 15 is arranged to be attached to the clamping cylinder 11, but the sealing ring 15 is made of elastic material, and the elasticity of the sealing ring 15 may become poor due to aging and other reasons, so that a micron-level gap is formed between the sealing ring 15 and the clamping cylinder 11. Therefore, evacuating gas through the gas channel 113 can not only determine whether the sealing ring 15 at the position of the gas channel opening 114 is damaged, but also detect whether the whole sealing ring 15 is damaged through the gap. The gas channel 113 also extends from the inner wall of the clamping cylinder 11 to the fixture connecting member 14 and the rotating circular plate 13 until being connected to the gas pumping device in the power assembly 12. One or more gas channels 113 may be provided in the clamping cylinder 11, correspondingly, one or more gas channels 113 may be provided in the fixture connecting member 14, and one or more gas channels 113 may be provided in the rotating circular plate 13. In a specific implementation mode, according to FIG. 2, if the fixture connecting member 14 is a connecting rod, the gas channel 113 can be arranged in the connecting rod. In other implementation modes of the embodiment of the present application, the gas pumping device is arranged outside the electroplating fixture 1.

In other implementation modes of the embodiment of the present application, the gas channel 113 extends to the interior of the annular boss 111, and then the gas channel opening 114 is arranged at the position where the annular boss 111 is wrapped by the sealing ring 15. In other implementation modes of the embodiment of the present

application, a plurality of gas channel openings 114 are provided, and the plurality of gas channel openings 114 are distributed on two sides of the supporting surface of the annular boss 111. When the annular boss 111 supports the wafer 2, the wafer 2 presses the sealing ring 15 to be closely attached to the supporting surface under the action of gravity, and the gas channel openings 114 distributed on two sides of the supporting surface can respectively detect the sealing ring 15 on two sides of the supporting surface, thereby better determining whether the sealing ring 15 is damaged. The plurality of gas channel openings 114 can also be arranged around the clamping cylinder 11 or the annular boss 111 for a whole circle, thereby enabling detection of damage to the sealing ring 15 from a plurality of directions.

Specifically, when the sealing ring 15 is not damaged, the gas flow rate is lower than when the sealing ring 15 is damaged, for example, the gas flow rate may be less than 3 standard cubic centimeters per minute (sccm), and gradually decreases until the flow rate approaches 0 with the gas pumping of the gas channel 113; when the sealing ring 15 is damaged, the damage will make gas continuously enter the gas channel 113, and the gas flow rate is higher than when the sealing ring 15 is not damaged, with no obvious change in the gas flow rate during gas evacuation of the gas channel 113, for example, the gas flow rate may be maintained at 5 sccm. In other implementation modes of the embodiment of the present application, when the sealing ring 15 is not damaged, the gas pressure is higher than when the sealing ring 15 is damaged, and the gas pressure gradually increases until gas pumping cannot be performed with the gas pumping of the gas channel 113; when the sealing ring 15 is damaged, the damage will make gas continuously enter the gas channel 113, the gas pressure is lower than when the sealing ring 15 is not damaged, with no obvious change in the gas flow rate during gas evacuation of the gas channel 113.

In another implementation mode of the embodiment of the present application, as shown in FIG. 5, the clamping cylinder 11 is provided with a clamping cylinder open groove 115 having an opening facing the sealing ring 15 at the position where the clamping cylinder 11 is wrapped by the sealing ring 15, the clamping cylinder open groove 115 is in communication with the gas channel 113 through the gas channel opening 114, that is, the gas channel opening 114 is arranged in the clamping cylinder open groove 115, and the gas channel 113 pumps gas through the opening of the

clamping cylinder open groove 115, which can increase the detection range of the sealing ring 15. Meanwhile, when a part of the opening is blocked by the sealing ring 15 or impurities, gas can still circulate inside the clamping cylinder open groove 115 because the clamping cylinder open groove 115 has a certain depth, thereby achieving a better detection effect.

Further, as shown in FIG. 5, the clamping cylinder open groove 115 is an annular groove arranged around the clamping cylinder 11 for a whole circle, so that the sealing ring 15 can be detected from more directions. When a plurality of gas channels 113 are provided, each gas channel 113 is in communication with the annular groove at different positions.

In an implementation mode of the embodiment of the present application, as shown in FIG. 6, when a plurality of gas channels 113 are provided, a plurality of clamping cylinder open grooves 115 are also provided, each clamping cylinder open groove 115 is in communication with at least one gas channel 113, each gas channel 113 is respectively in communication with the gas pumping device, and the gas pumping device can respectively control the on-off of each gas channel 113 to detect the sealing ring 15 through each clamping cylinder open groove 115, respectively. The plurality of clamping cylinder open grooves 115 are arranged at intervals to reduce the influence on the strength of the clamping cylinder 11, and the plurality of clamping cylinder open grooves 115 are arranged in the circumferential direction of the clamping cylinder 11. In other implementation modes of the embodiment of the present application, the plurality of clamping cylinder open grooves 115 can be arranged in the axial direction of the clamping cylinder 11.

In other implementation modes of the embodiment of the present application, a slot at the boss opening facing the sealing ring 15 is provided at the position where the annular boss 111 is wrapped by the sealing ring 15. The slot at the boss opening has a structure similar to the structure of the clamping cylinder open groove 115, and the specific structure can be set with reference to the clamping cylinder open groove 115, which will not be repeated here.

With reference again to FIG. 1, the electroplating fixture 1 further comprises a wafer pressing block 18, the wafer pressing block 18 is arranged in the clamping

cylinder 11 and used for applying pressure to the back surface of the wafer 2 away from the to-be-electroplated surface, so that the edge of the wafer is closely attached to the annular boss 111, and a better sealing effect is achieved. The size of the end face of the wafer pressing block 18 for pressing the wafer 2 is the same as the size of the wafer 2, so that the wafer 2 is stressed uniformly everywhere, and the electroplating flatness is improved. A protrusion is arranged on the edge of the end of the wafer pressing block 18 away from the wafer 2 in a direction away from the wafer 2, the protrusion extends to the end of the clamping cylinder 11 far away from the annular boss 111 and is provided with a bending structure towards the end face of the clamping cylinder 11 far away from the annular boss 111, and the bending structure is clamped on the end face of the clamping cylinder 11 far away from the annular boss 111 to realize the limit of the wafer pressing block 18. The distance between the end face of the wafer pressing block 18 for pressing the wafer 2 and the annular boss 111 is equal to the thickness of one wafer 2, that is, the difference between the distance from the clamping surface of the bending structure of the wafer pressing block 18 to the end face of the wafer pressing block 18 for pressing the wafer 2 and the height of the clamping cylinder 11 is equal to the thickness of one wafer 2, so as to prevent the wafer pressing block 18 from excessively extruding the wafer 2 and causing damage to the wafer 2.

According to FIG. 7, the present embodiment further provides an electroplating apparatus, comprising the electroplating fixture 1 as described above.

As shown in FIG. 7, the electroplating apparatus further comprises an electroplating tank 3 filled with an electroplating solution, when the electroplating fixture 1 clamps the edge of the wafer 2, the to-be-electroplated surface of the wafer faces the electroplating tank 3, so that when the electroplating fixture 1 clamps the wafer 2 to move into the electroplating tank 3, the to-be-electroplated surface of the wafer is immersed in the electroplating tank 3 for cup plating.

According to FIG. 8, the present embodiment further provides an electroplating fixture detection method, which is executed by the above electroplating fixture 1 or electroplating apparatus.

The electroplating fixture detection method at least comprises steps S110 to S130,

which are specifically described as follows:

S110: Evacuate gas through the gas channel 113 arranged in the electroplating fixture 1 and detect the gas pumping flow rate.

S120: Record the change in gas flow rate at the gas channel opening 114 covered by the sealing ring 15 according to the gas pumping flow rate.

The change in gas pumping flow rate denotes the change in gas flow rate at the gas channel opening 114 covered by the sealing ring 15.

S130: Determine whether the sealing ring 15 is damaged according to the change in gas flow rate.

When the sealing ring 15 is not damaged, the gas flow rate is lower than when the sealing ring 15 is damaged, for example, the gas flow rate may be less than 3 sccm, and gradually decreases until the flow rate approaches 0 with the gas pumping of the gas channel 113; when the sealing ring 15 is damaged, the damage will make gas continuously enter the gas channel 113, the gas flow rate is higher than when the sealing ring 15 is not damaged, with no obvious change in the gas flow rate during gas evacuation of the gas channel 113, for example, the gas flow rate may be maintained at 5 sccm.

Step S110 can be executed before the electroplating fixture 1 clamps the wafer 2, or during the process in which the electroplating fixture 1 clamps the wafer 2.

In this electroplating fixture detection method, the change in gas flow rate at the gas channel opening 114 covered by the sealing ring 15 is obtained by evacuating gas through the gas channel 113 to determine whether gas continuously enters, so that whether the sealing ring 15 is damaged can be determined.

According to FIG. 9, the present embodiment further provides an electroplating fixture detection method, which is executed by the above electroplating fixture 1 or electroplating apparatus.

The electroplating fixture detection method at least comprises steps S210 to S230,

which are specifically described as follows:

S210: Evacuate gas through the gas channel 113 arranged in the electroplating fixture 1 and detect the gas pumping pressure.

S220: Record the gas pressure change at the gas channel opening 114 covered by the sealing ring 15 according to the gas pumping pressure.

The change of the gas pumping pressure is recorded according to the detected gas pumping pressure, and the change of the gas pumping pressure denotes the gas pressure change at the gas channel opening 114 covered by the sealing ring 15.

S130: Determine whether the sealing ring 15 is damaged according to the gas pressure change.

When the sealing ring 15 is not damaged, the gas pressure is higher than when the sealing ring 15 is damaged, and the gas pressure gradually increases until gas pumping cannot be performed with the gas pumping of the gas channel 113; when the sealing ring 15 is damaged, the damage will make gas continuously enter the gas channel 113, the gas pressure is lower than when the sealing ring 15 is not damaged, with no obvious change in the gas flow rate during gas evacuation of the gas channel 113.

Step S210 can be executed before the electroplating fixture 1 clamps the wafer 2, or during the process in which the electroplating fixture 1 clamps the wafer 2.

In this electroplating fixture detection method, the gas pressure change at the gas channel opening 114 covered by the sealing ring 15 is obtained by evacuating gas through the gas channel 113 to determine whether gas continuously enters, so that whether the sealing ring 15 is damaged can be determined.

Those skilled in the art will easily think of other embodiments of the present application after considering the specification and practicing the embodiments disclosed herein. The present application is intended to cover any variations, uses, or adaptive changes of the present application, and these variations, uses, or adaptive changes follow the general principle of the present application and include the common general knowledge or conventional technical means in the technical field not disclosed

by the present application.

It should be understood that the present application is not limited to the exact structure described above and shown in the accompanying drawings, and various modifications and changes can be made without departing from the scope of the present application. The scope of the present application is only limited by the appended claims.

What is claimed is:

1. An electroplating fixture, comprising:

a clamping cylinder, an annular boss being arranged on the inner wall of the clamping cylinder, and the annular boss being used for supporting a wafer;

a sealing ring, wrapping the annular boss, and extending from the annular boss to the cylinder wall of the clamping cylinder;

wherein a gas channel is arranged in the cylinder wall of the clamping cylinder, a gas channel opening of the gas channel is arranged at the position where the clamping cylinder is wrapped by the sealing ring, and whether the sealing ring is damaged is detected by evacuating gas through the gas channel.

2. The electroplating fixture according to claim 1, wherein a clamping cylinder open groove is arranged at the position where the clamping cylinder is wrapped by the sealing ring, and the clamping cylinder open groove is in communication with the gas channel through the gas channel opening.

3. The electroplating fixture according to claim 2, wherein the clamping cylinder open groove is arranged around the clamping cylinder for a whole circle.

4. The electroplating fixture according to claim 3, wherein a plurality of the gas channels are provided, and the plurality of the gas channels are in communication with the clamping cylinder open groove at different positions.

5. The electroplating fixture according to claim 2, wherein a plurality of the clamping cylinder open grooves are provided, a plurality of the gas channels are provided, each clamping cylinder open groove is in communication with at least one gas channel, and the plurality of the clamping cylinder open grooves are arranged at intervals.

6. The electroplating fixture according to claim 1, wherein the sealing ring extends from the annular boss to the inner wall of the clamping cylinder, and the electroplating fixture further comprises a fixture inner ring, and the fixture inner ring is arranged on

the inner side of the clamping cylinder and covers a first edge of the sealing ring located on the inner wall of the clamping cylinder.

7. The electroplating fixture according to claim 6, wherein an internal step structure is arranged on the inner wall of the clamping cylinder, the first edge is located at the internal step structure, and the fixture inner ring covers the first edge at the internal step structure.

8. The electroplating fixture according to claim 1, wherein the sealing ring extends from the annular boss to the outer wall of the clamping cylinder, and the electroplating fixture further comprises a fixture shield, and the fixture shield is arranged on the outer side of the clamping cylinder and covers a second edge of the sealing ring located on the outer wall of the clamping cylinder.

9. The electroplating fixture according to claim 8, wherein an external step structure is arranged on the outer wall of the clamping cylinder, the second edge of the sealing ring is located at the external step structure, and the fixture shield covers the second edge at the external step structure.

10. The electroplating fixture according to claim 1, wherein the electroplating fixture further comprises a rotating circular plate provided with a gas pumping device, the rotating circular plate is connected to the clamping cylinder through a fixture connecting member, and the gas channel is also arranged in the rotating circular plate and the fixture connecting member.

11. An electroplating apparatus, comprising:

an electroplating tank;

the electroplating fixture according to any one of claims 1 to 10, used for making the to-be-electroplated surface of the wafer face the electroplating tank.

12. An electroplating fixture detection method, applied to the electroplating fixture according to any one of claims 1 to 10, comprising:

evacuating gas through the gas channel arranged in the electroplating fixture and

detecting the gas pumping flow rate;

recording the change in gas flow rate at the gas channel opening covered by the sealing ring according to the gas pumping flow rate;

determining whether the sealing ring is damaged according to the change in gas flow rate.

13. An electroplating fixture detection method, applied to the electroplating fixture according to any one of claims 1 to 10, comprising:

evacuating gas through the gas channel arranged in the electroplating fixture and detecting the gas pumping pressure;

recording the gas pressure change at the gas channel opening covered by the sealing ring according to the gas pumping pressure;

determining whether the sealing ring is damaged according to the gas pressure change.