Specifically, in this substrate holder, a projecting portion of a retaining ring disposed on the second holding member is engaged with a clamper disposed on an outer surface of the first holding member to fix the second holding member to the first holding member.

[0006] The substrate holder described in PTL 1 externally includes the clamp mechanism. In view of this, when the substrate holder is removed from plating solution after ending the plating, there is a problem that the plating solution is likely to attach to the clamp mechanism. As a result, when the substrate holder is removed from the plating solution, an amount of the plating solution taken out from a plating bath becomes large, and the large amount of the plating solution is lost. Cleaning the substrate holder to which the large amount of plating solution attached causes poor cleaning efficiency.

[0007] Embodiments of the present invention seek to reduce an amount of plating solution attached to a substrate holder.

SOLUTION TO PROBLEM

[0008] According to one aspect of the present invention, there is provided a substrate holder for holding a substrate. The substrate holder includes a first holding member, a second holding member, a sealing member, a pin, a ring, and a moving mechanism. The second holding member is configured such that the substrate is sandwiched between the first holding member and the second holding member. The sealing member forms a sealed space inside the substrate holder. The pin is fixed to the second holding member. The ring is disposed on the first holding member. The ring engages with the pin. The moving mechanism circumferentially moves the ring. The pin and the ring are engaged with one another to fix the first holding member and the second holding member to one another. The pin and the ring are disposed inside the sealed space. The first holding member has an outer contact portion electrically connected to an external power supply. The ring is electrically connected to the outer contact portion. The second holding member has contacts configured to supply current to the substrate. The pin is electrically connected to the contacts. The contacts are electrically connected to the outer contact portion by the pin. The current can flow from the outer contact portion of the first holding member to the contacts in contact with the substrate when the pin engages with the ring. The contacts are configured to

be unable to electrically connected to the outer contact portion when the pin does not engage with the ring.

[0009] According to another aspect of the present invention, a plating apparatus is provided. This plating apparatus includes the substrate holder as described, the substrate held to the substrate holder, and a plating bath that houses the substrate and an anode.

BRIEF DESCRIPTION OF DRAWINGS

WHAT IS CLAIMED IS:

1. A substrate holder for holding a substrate, comprising:

a first holding member;

a second holding member configured such that the substrate is sandwiched between the first holding member and the second holding member;

a sealing member that forms a sealed space inside the substrate holder;

a pin fixed to the second holding member;

a ring disposed on the first holding member, the ring engaging with the pin; and

a moving mechanism that circumferentially moves the ring, wherein

the pin and the ring are engaged with one another to fix the first holding member and the second holding member to one another,

the pin and the ring are disposed inside the sealed space,

the first holding member has an outer contact portion electrically connected to an external power supply,

the ring is electrically connected to the outer contact portion,

the second holding member has contacts configured to supply current to the substrate,

the pin is electrically connected to the contacts,

the contacts are electrically connected to the outer contact portion by the pin,

the current can flow from the outer contact portion of the first holding member to the contacts in contact with the substrate when the pin engages with the ring, and

the contacts are configured to be unable to electrically connected to the outer contact portion when the pin does not engage with the ring.

2. The substrate holder according to claim 1, wherein

the moving mechanism includes a link mechanism.

3. The substrate holder according to claim 2, wherein

the link mechanism includes:

a rod member having one end positioned outside the substrate holder and another end positioned inside the substrate holder to be axially movable; and

an intermediate member having one end directly or indirectly coupled to the rod member, the intermediate member having another end directly coupled to the ring.

4. The substrate holder according to claim 3, comprising:

a rod inner passage into which the rod member is inserted; and

a first packing that seals between a wall surface defining the rod inner passage and an outer peripheral surface of the rod member.

5. The substrate holder according to any one of claims 1 - 4, wherein

the moving mechanism includes a plurality of teeth, and the plurality of teeth are formed in the ring along a circumferential direction, and

the substrate holder includes an inner passage from outside the substrate holder to the plurality of teeth.

6. The substrate holder according to claim 5, comprising

a tool including a tooth that engages with the plurality of teeth, wherein

when the tool is inserted into the inner passage, the tooth on the tool engages with the plurality of teeth.

7. The substrate holder according to any one of claims 1 - 6, wherein

the pin includes a lock large-diameter portion, and

the ring has a first part and a second part, the lock large-diameter portion of the pin is passable through the first part, and the second part is engageable with the lock large-diameter portion of the pin.

8. The substrate holder according to claim 7, wherein

while the lock large-diameter portion of the pin is caused to pass through the first part and the sealing member is brought into pressure contact with the first holding member, the moving mechanism circumferentially moves the ring to engage the lock large-diameter portion with the second part of the ring.

9. The substrate holder according to claim 7 or 8, wherein

the pin includes a small-diameter portion and a semi-lock large-diameter portion, the small-diameter portion has a diameter smaller than the lock large-diameter portion, and the semi-lock large-diameter portion has a diameter larger than the small-diameter portion,

the small-diameter portion is positioned between the lock large-diameter portion and the semi-lock large-diameter portion, and

while the semi-lock large-diameter portion of the pin is caused to pass through the first part and the sealing member is separated from the first holding member, the moving mechanism circumferentially moves the ring such that the semi-lock large-diameter portion is engaged with the second part of the ring.

10. The substrate holder according to claim 7, wherein

the pin includes a small-diameter portion and a semi-lock large-diameter portion, the small-diameter portion has a diameter smaller than the lock large-diameter portion, and the semi-lock large-diameter portion has a diameter larger than the lock large-diameter portion,

the ring includes a third part engageable with the semi-lock large-diameter portion of the pin,

the first part and the third part are continuously formed, and

the second part and the third part are continuously formed.

11. The substrate holder according to claim 10, wherein

while the lock large-diameter portion and the semi-lock large-diameter portion of the pin are caused to pass through the first part and the sealing member is brought into pressure contact with the first holding member, the moving mechanism circumferentially moves the ring to engage the lock large-diameter portion with the second part of the ring.

12. The substrate holder according to claim 10 or 11, wherein

while the semi-lock large-diameter portion of the pin is caused to pass through the first part and the sealing member is separated from the first holding member, the moving mechanism circumferentially moves the ring such that the semi-lock large-diameter portion is engaged with the third part of the ring.

13. The substrate holder according to any one of claims 1 - 12, wherein

the sealing member includes a first seal portion and a second seal portion, the first seal portion contacts the substrate, and the second seal portion contacts the first holding member, and

the pin is located between the first seal portion and the second seal portion.

14. The substrate holder according to any one of claims 1 - 13, wherein

the first holding member includes:

a fixing plate;

a substrate mounting table on which the substrate is mountable; and

a thickness absorbing mechanism that biases the substrate

mounting table from the fixing plate toward the second holding member to absorb a change in thickness of the substrate.

15. The substrate holder according to claim 14, comprising:

a suction pad that absorbs a back surface of the substrate placed on the substrate mounting table;

a second packing that seals between the fixing plate and the substrate mounting table; and

a vacuum line formed on the fixing plate, the vacuum line communicating with the suction pad via an inside of the second packing.

16. A plating apparatus comprising:

the substrate holder according to any one of claims 1 - 15; and

a plating bath that houses the substrate held to the substrate holder and an anode.