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(54) **SUPPORTING STRUCTURE, APPARATUS FOR SUPPORTING SUBSTRATE AND FACILITY FOR PROCESSING SUBSTRATE**

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B08B 3/02 (2006.01)
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CPC ***B08B 11/02*** (2013.01); ***B08B 3/02*** (2013.01); ***B08B 3/08*** (2013.01)

(58) **Field of Classification Search**
CPC H01L 21/6833; H01L 21/6831
See application file for complete search history.

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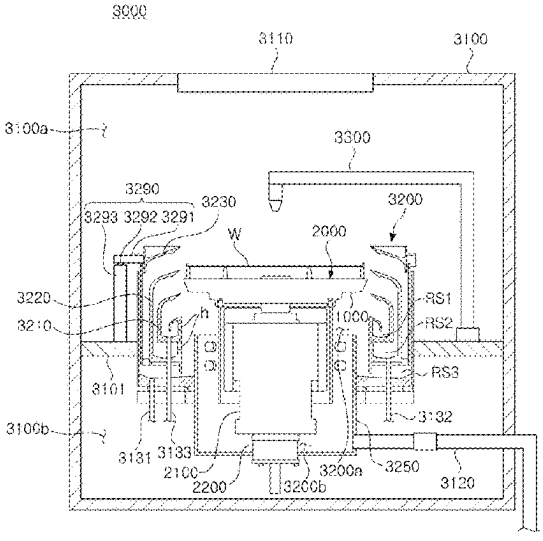
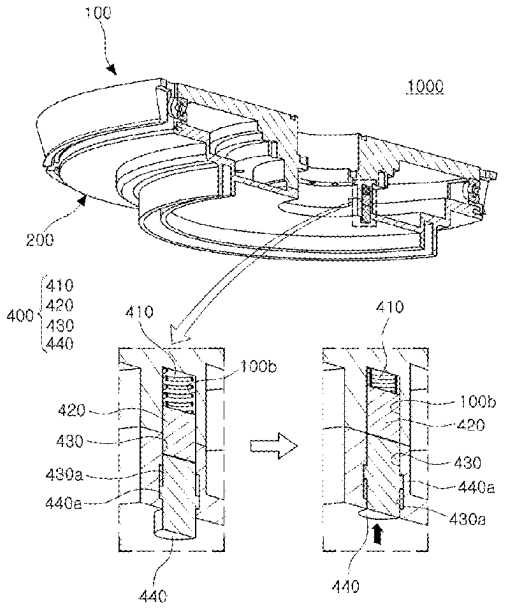
(57) **ABSTRACT**

A support structure, includes: a support plate supporting a substrate; a lower cover covering a lower portion of the support plate; and a catching unit comprising a concave-convex structure having portions corresponding to each other so that the support plate and the lower cover are rotated and assembled with each other.

19 Claims, 9 Drawing Sheets





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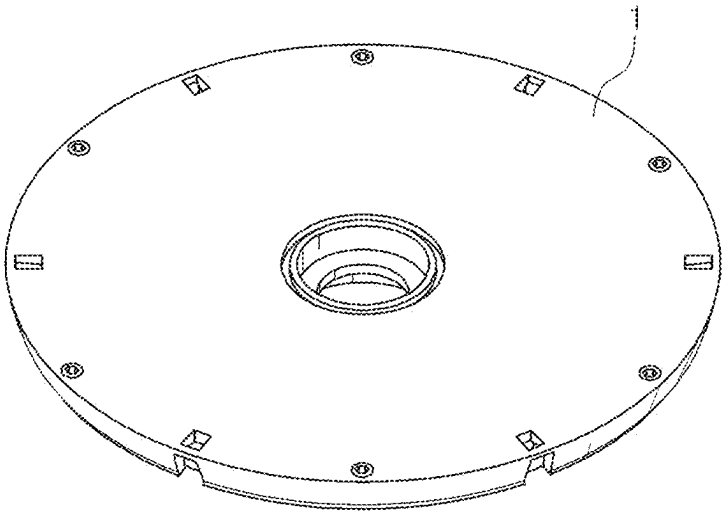
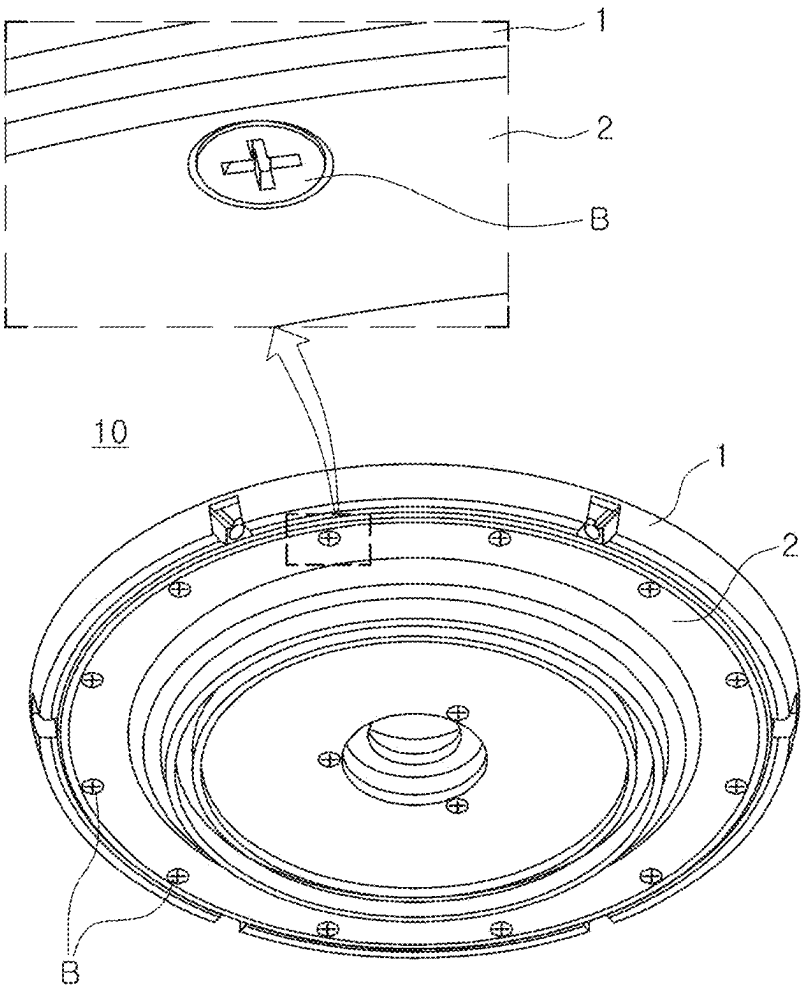
[FIG. 1]



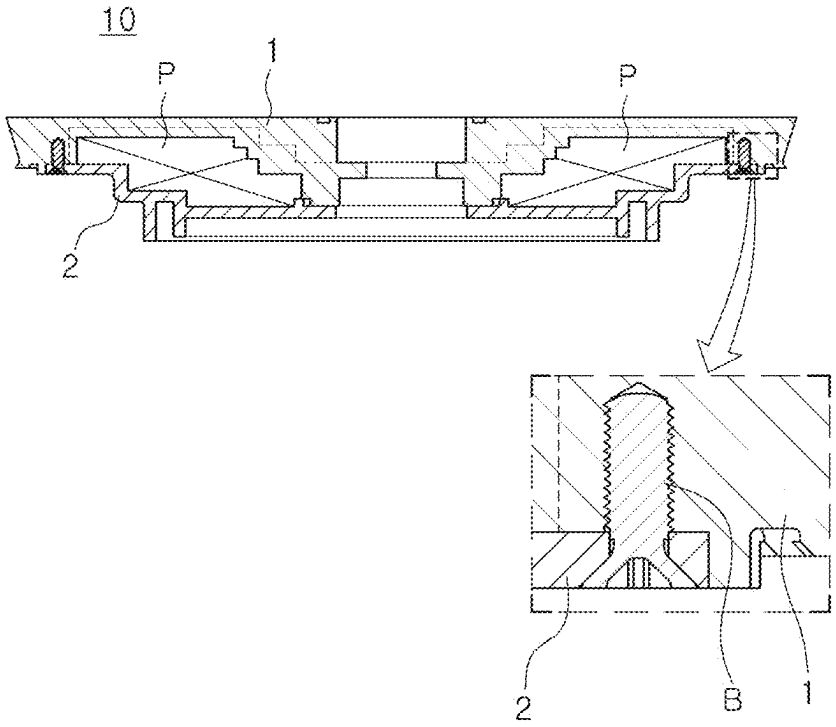
RELATED ART

[FIG. 2]



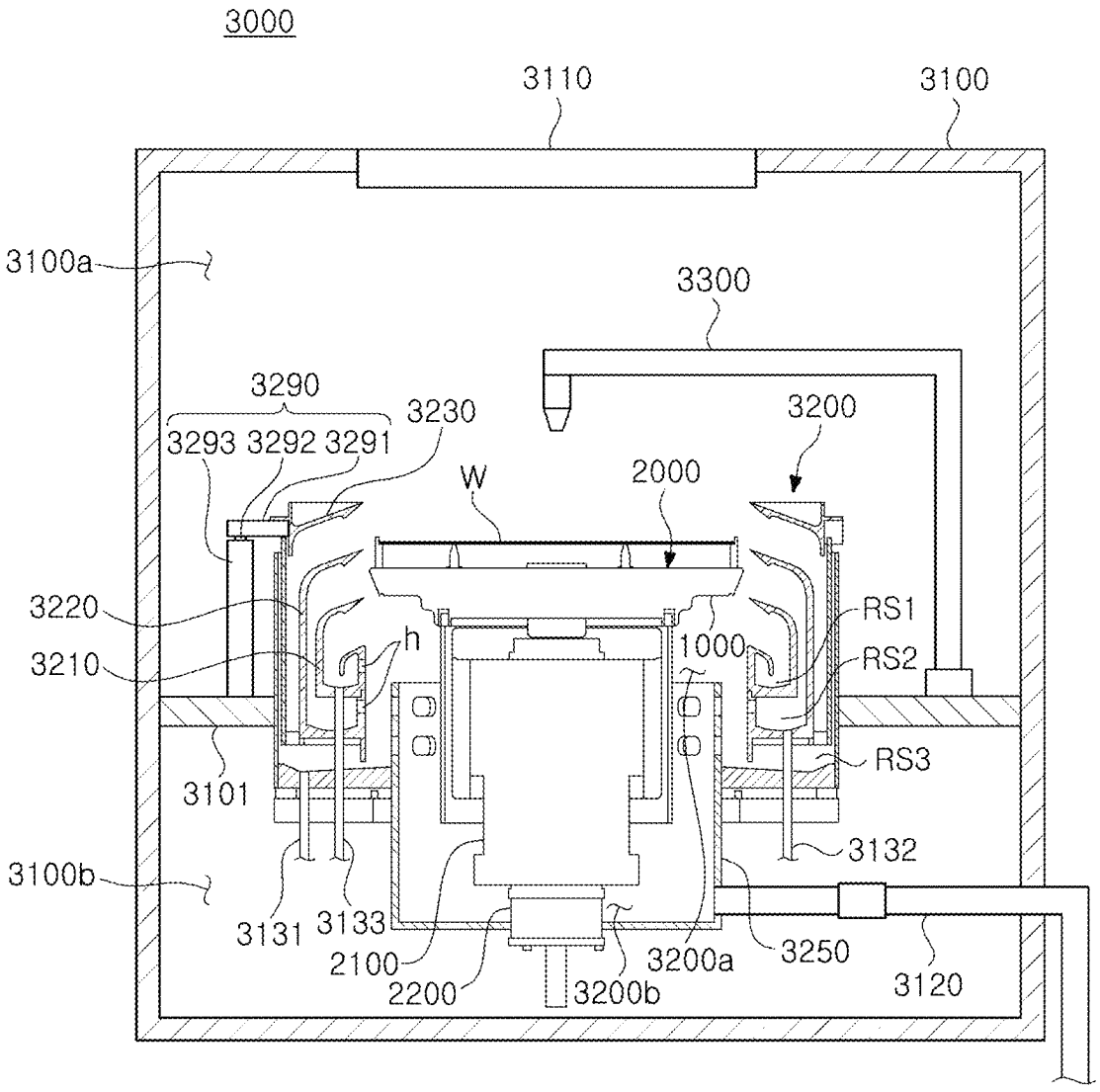
RELATED ART

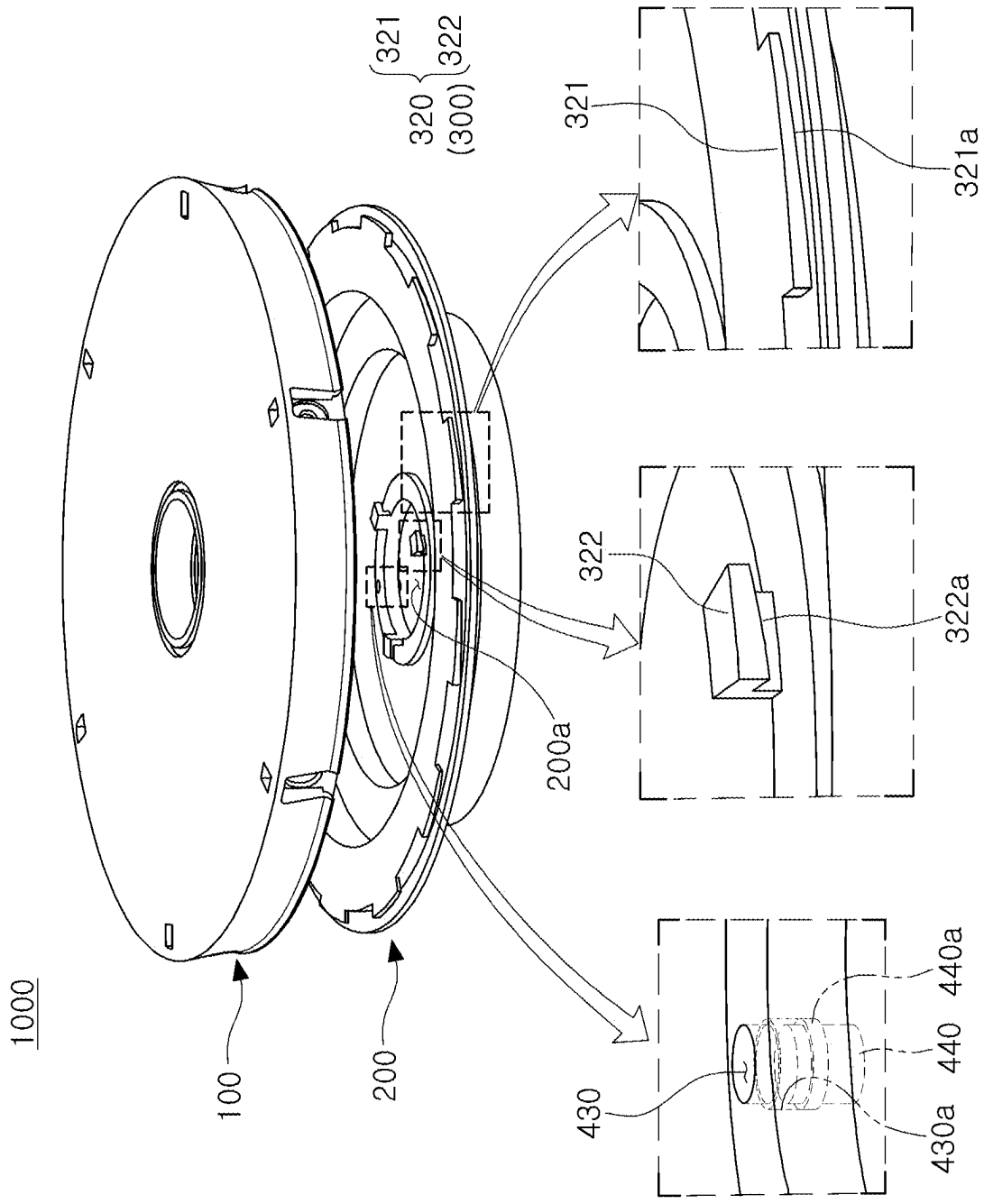
[FIG. 3]



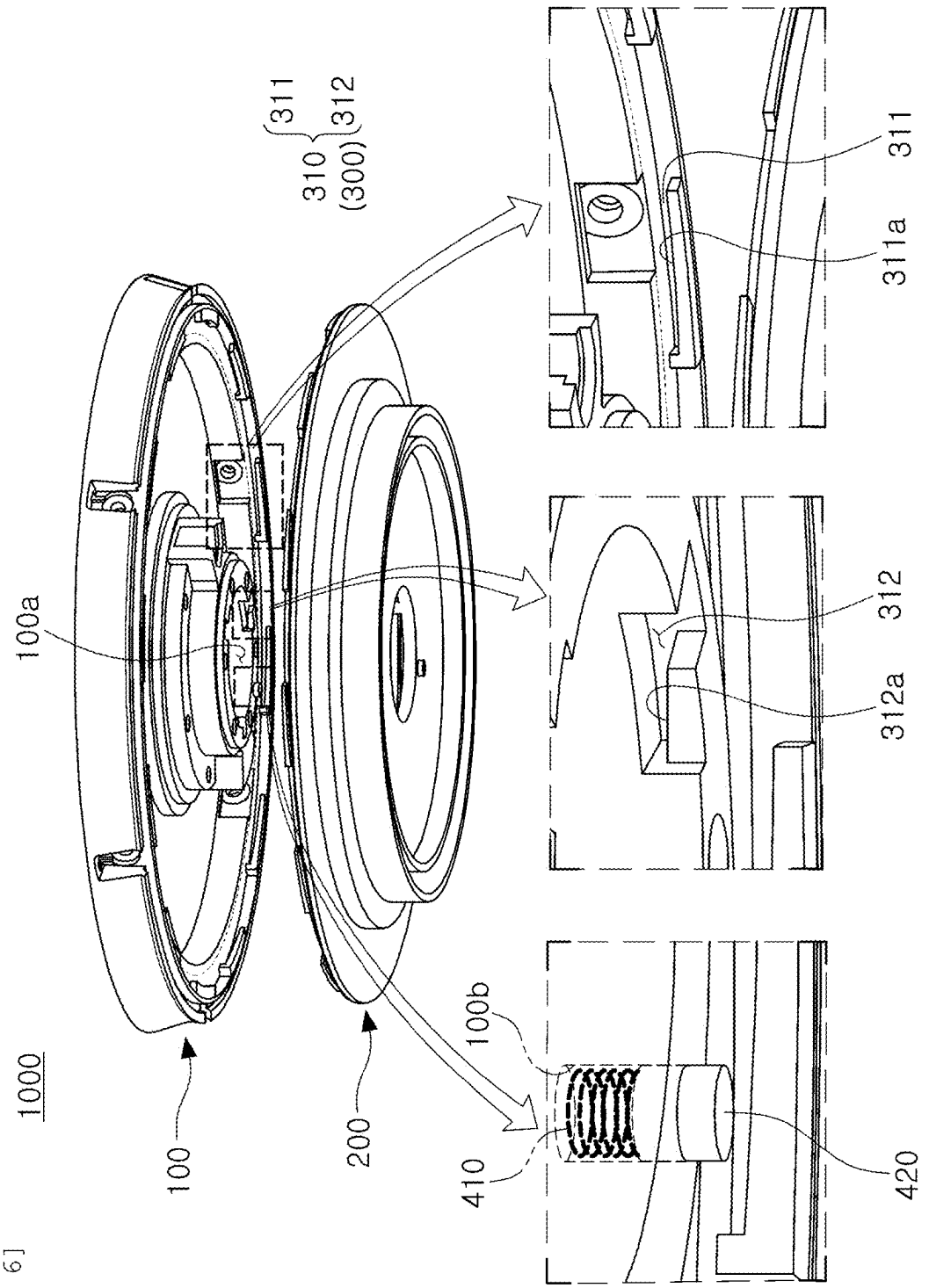
RELATED ART

[FIG. 4]


3000
3110
3100
3100a
3300
3290
3293 3292 3291
3230
3200
W
2000
3220
3210
h
1000
RS1
RS2
RS3
3101
3132
3100b
3131
3133
2100
2200
3200b
3200a
3250
3120

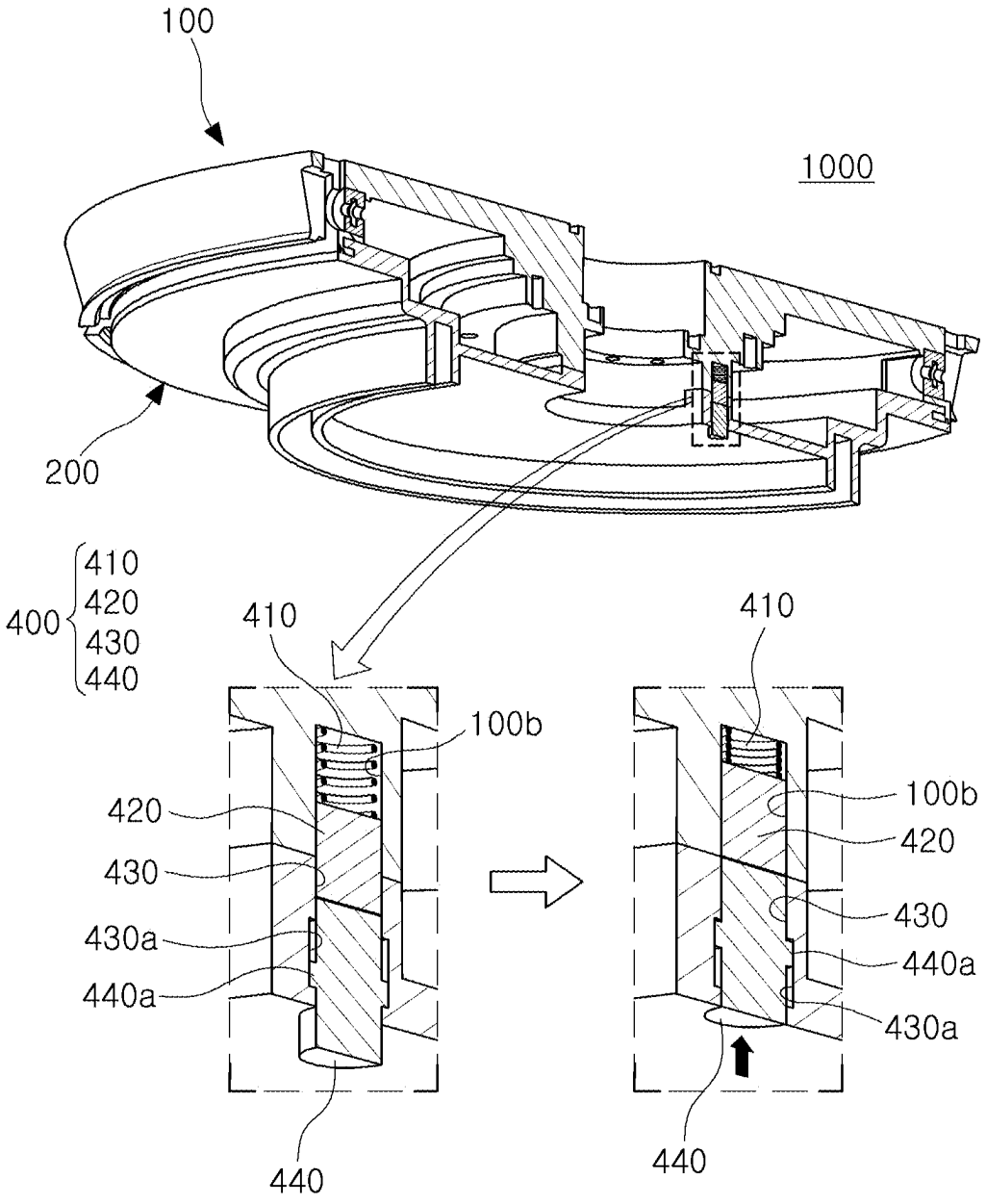

1000
100
200
200a
320
(300)
321
322
321
321a
322
322a
430
440a
440
430a

[FIG. 5]

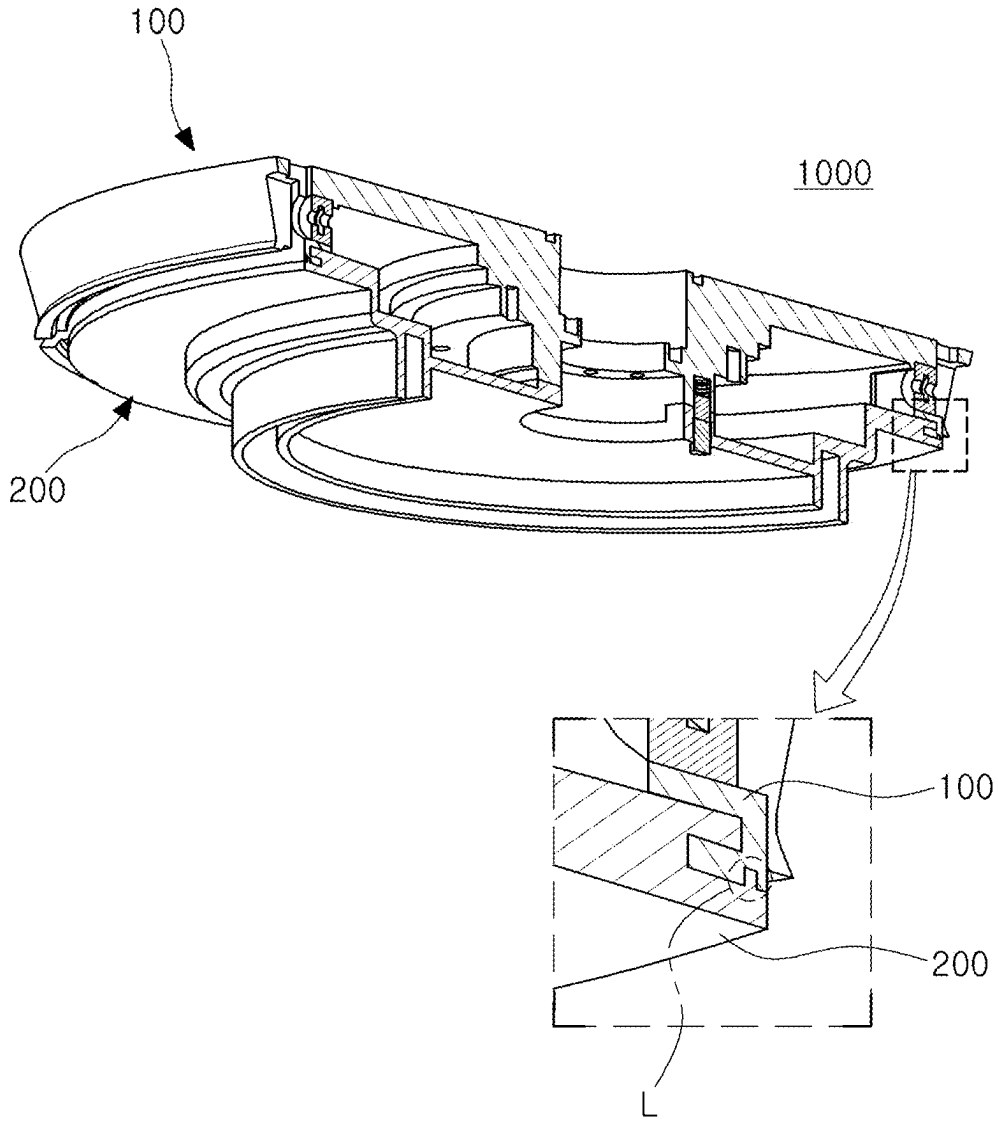

1000
100
200
100a
310
(300)
311
312
311
311a
312
312a
100b
410
420

[FIG. 6]

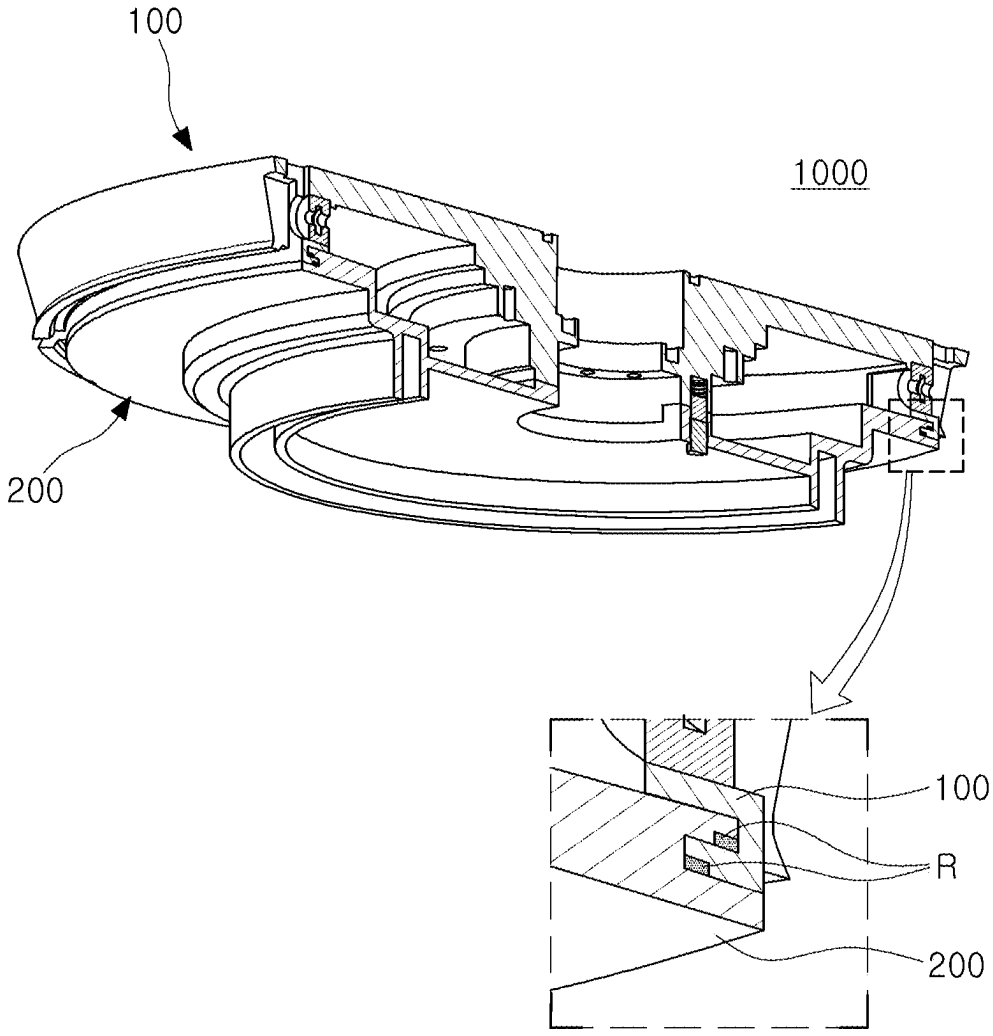
[FIG. 7]


100
1000
200
400
410
420
430
440
410
100b
420
430
430a
440a
440
410
100b
420
430
440a
430a
440

[FIG. 8]



[FIG. 9]



SUPPORTING STRUCTURE, APPARATUS FOR SUPPORTING SUBSTRATE AND FACILITY FOR PROCESSING SUBSTRATE

CROSS-REFERENCE TO RELATED APPLICATION(S)

This application claims the benefit under 35 USC 119(a) of Korean Patent Application No. 10-2022-0049708 filed on Apr. 21, 2022 in the Korean Intellectual Property Office, the entire disclosure of which is incorporated herein by reference for all purposes.

BACKGROUND

The present disclosure relates to a support structure supporting a substrate, an apparatus for supporting a substrate and a facility for processing a substrate including the same.

In a clean facility in which an etching process is performed using water cleaning and a chemical solution, as illustrated in FIGS. **1** to **3**, a chuck **10** forms a structure in which an upper plate **1** and a lower cover **2** are fastened to each other, a chuck pin actuating structure P for holding a wafer is installed thereinside, and the lower cover **2** protects the chuck pin actuating structure P from a chemical solution.

The lower cover **2** is fastened to the upper plate **1** with bolts (counterhead bolts) (B), and during an etching process, a portion of the chemical solution seeps into the bolts (B) and threads are corroded, weakening the fastening force to cause loosening of the bolts.

In addition, whenever a high-temperature chemical solution is used, repeated thermal deformation due to a temperature difference between upper and lower portions thereof causes frequent bolt loosening.

Furthermore, bolts that are completely loosened often block a chemical solution drain portion, and the used chemical solution may overflow and contaminate an entire processing bowl.

In order to prevent this, bolt loosening has been reduced by applying various improvements such as bolt coating, helicoil, and the like, but it still occurs and a fundamental solution is required.

(Patent Document 1) Republic of Korea Patent Publication No. 10-2015-0068917

SUMMARY

The present disclosure has been devised to solve the above problems, and an aspect of the present disclosure is to provide a support structure assembled without using bolts, an apparatus for supporting a substrate, and a facility for processing a substrate including the same.

In order to achieve the above-described object, according to an aspect of the present disclosure, a support structure includes: a support plate supporting a substrate; a lower cover covering a lower portion of the support plate; and a catching unit comprising a concave-convex structure having portions corresponding to each other so that the support plate and the lower cover are rotated and assembled with each other.

Here, the catching unit may include a catching groove portion formed on one of the support plate and the lower cover; and a catching protrusion portion formed on the other one of the support plate and the lower cover and rotated and caught in the catching groove portion.

In this case, the catching groove portion may include an outer catching groove formed on an inner surface of an outer edge, bent downwardly from the support plate, and the catching protrusion portion may include an outer catching protrusion formed on an outer edge of the lower cover.

In addition, in a direction, rotated so that the outer catching protrusion is caught in the outer catching groove, the outer locking groove may have an upwardly inclined groove lower surface, and the outer catching protrusion may have an upwardly inclined protrusion lower surface.

Furthermore, the plurality of outer catching grooves may be disposed along an outer edge of the support plate, and a plurality of outer catching protrusions may be disposed along an outer edge of the lower cover.

The support plate has a plate hole formed in a center thereof, the lower cover has a cover hole corresponding to the plate hole formed in a center thereof, and the catching groove portion may include an inner catching groove formed on an inner edge of the support plate as an edge of the plate hole, and the catching protrusion portion may include an inner catching protrusion formed on an inner edge of the cover as an edge of the cover hole.

In addition, in a direction, rotated the inner catching protrusion is caught in the inner catching groove, the inner locking groove may have an upwardly inclined groove lower surface, and the inner catching protrusion may have an upwardly inclined protrusion lower surface.

Furthermore, the plurality of inner catching grooves may be disposed along an inner edge of the support plate, and the plurality of inner catching protrusions may be disposed along an inner edge of the lower cover.

Meanwhile, in the present disclosure, a locking unit configured to lock the support plate and the lower cover in an assembled state, may be further included, wherein the locking unit may include: an elastic member embedded in a lower groove of the support plate; a locking bar disposed in the lower groove, connected to the elastic member, and elastically supported so as to protrude downwardly from the lower groove; and a locking hole portion formed in the lower cover so that the locking bar may be inserted thereinto.

The locking unit may further include a unlocking button disposed to be lifted inside the locking hole portion, wherein the locking hole portion may have a side groove formed therein, the unlocking button has a side protrusion, and the side protrusion may be lifted from the side groove, and when supported on a lower portion of the side groove, may have a structure in which the unlocking button protrudes downwardly from the locking hole portion.

A portion of the support plate and the lower cover in contact with each other may be formed in a labyrinth structure.

The labyrinth structure may be formed at a contact portion between an outer edge of the support plate and an outer edge of the lower cover.

As another embodiment, the outer edge of the support plate and the outer edge of the lower cover of the present disclosure may be installed with a silicon pad ring, respectively, in a contact portion therebetween.

According to another aspect of the present disclosure, an apparatus for supporting a substrate may be provided, the apparatus for supporting a substrate includes: a support structure supporting a substrate; a support shaft disposed below the support structure and supporting the support structure; and a driving member connected to a lower end of the support shaft and rotating the support shaft, wherein the support structure includes: a support plate supporting the substrate; a lower cover covering a lower portion of the

support plate; and a catching unit comprising a concave-convex structure having portions corresponding to each other so that the support plate and the lower cover are rotated and attached to each other, wherein the catching unit includes: a catching groove portion formed on one of the support plate and the lower cover; and a catching protrusion portion formed on the other one of the support plate and the lower cover and rotated and caught in the catching protrusion portion.

According to another aspect of the present disclosure, a facility for processing a substrate may be provided, the facility for processing a substrate includes: a process chamber; a processing container installed in the process chamber and having a processing space for processing a substrate; a nozzle unit discharging a chemical solution to the substrate; and an apparatus for supporting a substrate supporting the substrate in the processing space, wherein the apparatus for supporting a substrate includes: a support structure supporting the substrate; a support shaft disposed below the support structure and supporting the support structure; and a driving member connected to a lower end of the support shaft and rotating the rotating shaft, wherein the support structure includes: a support plate supporting the substrate; a lower cover covering a lower portion of the support plate; and a catching unit comprising a concave-convex structure having portions corresponding to each other so that the support plate and the lower cover are rotated and assembled with each other, wherein the catching unit includes: a catching groove portion formed on one of the support plate and the lower cover; and a catching protrusion portion formed on the other one of the support plate and the lower cover and rotated and caught in the catching groove portion.

BRIEF DESCRIPTION OF DRAWINGS

The above and other aspects, features, and advantages of the present disclosure will be more clearly understood from the following detailed description, taken in conjunction with the accompanying drawings, in which:

FIGS. **1** and **2** are perspective views illustrating a support structure according to the prior art.

FIG. **3** is a longitudinal cross-sectional view illustrating the support structure of FIG. **2**.

FIG. **4** is a view illustrating a facility for processing a substrate according to an embodiment of the present disclosure.

FIGS. **5** and **6** are views illustrating an internal structure of a support structure according to an embodiment of the present disclosure.

FIG. **7** is a view illustrating a locking and unlocking process of the locking unit in the support structure of FIGS. **5** and **6**.

FIG. **8** is a vertical cross-sectional view illustrating a labyrinth structure of the support structure of FIGS. **5** and **6**.

FIG. **9** is a vertical cross-sectional view illustrating a support structure in which a silicon pad ring is installed according to another embodiment of the present disclosure.

DETAILED DESCRIPTION

Hereinafter, preferred embodiments of the present disclosure will be described in detail so that those skilled in the art can easily practice the present disclosure with reference to the accompanying drawings. However, in describing a preferred embodiment of the present disclosure in detail, if it is determined that a detailed description of a related known function or configuration may unnecessarily obscure the subject matter of the present disclosure, the detailed description will be omitted. In addition, the same reference numerals are used throughout the drawings for parts having similar functions and actions. In addition, in the present specification, terms such as 'upper', 'upper portion', 'upper surface', 'lower', 'lower portion', 'lower surface', 'side surface', and the like are based on the drawings, and in practice, it may be different depending on a direction in which the components are placed.

In addition, throughout the specification, when a part is said to be 'connected' to another part, this is not only when it is 'directly connected', but also when it is 'indirectly connected' with other components therebetween. In addition, 'including' a certain component means that other components may be further included without excluding other components unless otherwise stated.

FIG. **4** is a view illustrating a facility for processing a substrate according to an embodiment of the present disclosure.

Referring to FIG. **4**, a facility for processing a substrate **3000** of the present disclosure includes a process chamber **3100** performing a process on a substrate W using a chemical solution. In the process chamber **3100**, a process is performed on the substrate W while maintaining the substrate W horizontally. The process may be a process of etching a nitride film formed on the substrate W. In this case, the chemical solution may include phosphoric acid. Furthermore, the process chamber **3100** may be used in a process of removing foreign substances and film quality remaining on a surface of the substrate W using various chemical solutions.

Specifically, the process chamber **3100** provides a sealed internal space, and a fan filter unit **3110** is installed thereabove. The fan filter unit **3110** generates vertical airflow inside the process chamber **3100**. In the fan filter unit **3110**, a filter and an air supply fan are modularized as a single unit, and clean air is filtered and supplied to the process chamber **3100**. After the clean air passes through the fan filter unit **3110**, the air is supplied to the process chamber **3100** to form a vertical airflow. The vertical airflow provides a uniform airflow above the substrate W, and discharge and remove pollutants (fumes) generated in a process in which a surface of the substrate W is processed by a processing fluid and remove the same together with air through discharge lines **3131**, **3132**, and **3133** through suction ducts **3210**, **3220**, and **3230** of a processing container **3200**, to maintain a high level of cleanliness inside the processing container.

The process chamber **3100** includes a process region **3100***a* and a maintenance region **3100***b*, partitioned by a horizontal partition wall **3101**. A driving member **3293** of a lifting unit **3290** and a driving member **3390** of a nozzle unit **3300** are installed on the horizontal partition wall **3101**. In addition, the maintenance region **3100***b* is a space in which the discharge lines **3131**, **3132**, and **3133** connected to the processing container **3200** and an exhaust member **3120** are located, and it is preferable that the maintenance region **3100***b* is isolated from the process region **3100***a* in which the substrate S is processed.

The facility for processing a substrate **3000** of the present disclosure may include a processing container **3200**, an apparatus for supporting a substrate **2000**, and a nozzle unit **3300** in a process chamber **3100**. The processing container **3200** is installed inside the process chamber **3100**, has a cylindrical shape with an open upper portion, and provides a processing space for processing the substrate W. The open upper surface of the processing container **3200** serves as a path for carrying-out and carrying-in the substrate W. Here,

an apparatus for supporting a substrate **2000** is positioned in the processing space. In this case, the apparatus for supporting a substrate **2000** supports the substrate W and rotates the substrate W during the process.

In addition, the processing container **3200** provides an upper space **3200***a* in which the support structure **1000** of the apparatus for supporting a substrate **2000** is located and a lower space **3200***b* connected to an exhaust duct **3250** to perform forced exhaust therebelow. The exhaust duct **3250** is connected to an exhaust member **3120** extending outwardly of the process chamber **3100**. In the upper space **3200***a* of the processing container **3200**, annular suction ducts **3210**, **3220**, and **3230** are disposed in multiple stages to introduce and suckchemical liquid and gas scattered on the rotating substrate W. The first, second and third suction ducts **3210**, **3220** and **3230** have exhaust ports h communicating with one common annular space (corresponding to the lower space of the processing container).

Here, the first, second, and third suction ducts **3210**, **3220**, and **3230** provide first to third recovery spaces RS1, RS2, and RS3, into which air currents containing chemicals and fumes scattered from the substrate W flow. The first recovery space RS1 is formed by being partitioned by the first suction duct **3210**, and the second recovery space RS2 is formed as a separation space between the first suction duct **3210** and the second suction duct **3220**, and the third recovery space RS3 is formed as a separation space between the second suction duct **3220** and the third suction duct **3230**.

In addition thereto, the processing container **3200** is coupled with a lifting unit **3290** for changing a vertical position of the processing container **3200**. The lifting unit **3290** linearly moves the processing container **3200** in a vertical direction. As the processing container **3200** moves vertically, a relative height of the processing container **3200** with respect to the support structure **1000** is changed. This lifting unit **3290** has a bracket **3291**, a moving shaft **3292**, and a driving member **3293**. The bracket **3291** is fixedly installed on an outer wall of the processing container **3200**, and a moving shaft **3292** moved vertically by a driving member **3293** is fixedly coupled to the bracket **3291**. When the substrate W is loaded into or unloaded from the support structure **1000**, the processing container **3200** descends so that the support structure **1000** protrudes upwardly of the processing container **3200**.

In addition, during the process, the height of the processing container **3200** is adjusted so that the chemical solution may flow into the predetermined suction ducts **3210**, **3220**, and **3230** according to the type of the chemical solution supplied to the substrate W. Accordingly, a relative vertical position between the processing container **3200** and the substrate W is changed. Accordingly, the processing container **3200** may have different types of chemical liquid and pollutant gas recovered for each recovery space RS1, RS2, and RS3.

Meanwhile, the nozzle unit **3300** discharges a chemical solution onto the substrate W supported by the apparatus for supporting a substrate **2000**. In this case, the chemical solution may include an etching solution to etch a film formed on the substrate W.

The apparatus for supporting a substrate **2000** includes a support structure, a support shaft, and a driving member. In this case, the support structure **1000** has a circular upper surface, supports the substrate W, and may be rotated by a driving member **2200** during the process. In addition, the support shaft **2100** is disposed below the support structure **1000** to support the support structure **1000**. In addition, the driving member **2200** is connected to a lower end of the support shaft **2100** and rotates the support shaft **2100**. In this case, the driving member **2200** is provided as a motor, or the like, and as the support shaft **2100** rotates by the driving member **2200**, the support structure **1000** and the substrate W rotate.

FIGS. **5** and **6** are views illustrating an internal structure of a support structure according to an embodiment of the present disclosure.

Referring to FIGS. **5** and **6**, a support structure **1000** of the present disclosure is also referred to as an electrostatic chuck as a component for supporting a substrate. The support structure **1000** is configured to firmly and stably support the substrate.

Specifically, the support structure **1000** according to an embodiment of the present disclosure includes a support plate **100**, a lower cover **200**, and a catching unit **300**.

The support plate **100** is a member supporting a substrate, and may be formed of a dielectric material. An electrode (not shown) generating electrostatic force by receiving power may be installed inside the support plate **100**. When current is applied to the electrode, electrostatic force is generated between the electrode and the substrate, and the movement of the substrate may be restricted by adsorbing the substrate with the electrostatic force. A structure for holding a substrate may be installed below the support plate **100**. As an example, a chuck pin operating structure (P in FIG. **3**) for aligning the substrate may be installed.

In addition, the lower cover **200** is a member covering the lower portion of the support plate **100**, and serves to protect the lower structure of the support plate **100**, as described above, from the chemical solution.

The support plate **100** and the lower cover **200** are not limited by the present disclosure as long as they take a shape that firmly and stably supports the substrate in their specific shape structure.

Meanwhile, the locking unit **300** is comprising a concave-convex structure having portions corresponding to each other so that the support plate **100** and the lower cover **200** are rotated and assembled with each other.

Specifically, the catching unit **300** includes a catching groove portion **310** and a catching protrusion portion **320**.

The catching groove portion **310** may be formed on one of the support plate **100** and the lower cover **200**.

In addition, the catching protrusion portion **320** is formed on the other one of the support plate **100** and the lower cover **200**, and has a structure, rotated and caught in the catching groove portion **310**.

Specifically, the catching groove portion **310** includes an outer catching groove **311**, and the catching protrusion portion **320** includes an outer catching protrusion **321**. Here, the outer catching groove **311** may be formed on an inner surface of an outer edge bent downwardly from the support plate **100**, and the outer catching protrusion **321** may be formed on an outer edge of the lower cover **200**.

The support plate **100** may have a plate hole **100***a* formed in a center thereof, and the lower cover **200** may have a cover hole **200***a* corresponding to the plate hole **100***a* formed in a center thereof.

In this case, the catching groove portion **310** may further include an inner catching groove **312** and the catching protrusion portion **320** may further include an inner catching protrusion **322**. Here, the inner catching groove **312** may be formed on an inner edge of the support plate **100** as an edge of the plate hole **100***a*, and the inner catching protrusion **322** may be formed on an inner edge of the cover.

As described above, in the present disclosure, a catching unit **300** is configured so that the support plate **100** and the

lower cover **200** are rotated and assembled, and the present disclosure has a bolt-free fastening structure, without a bolt, so that it is possible to prevent assembly disassembly due to the bolt fastening structure, such as loosening of bolts caused by weakening of fastening force due to corrosion (by chemical solution) and loosening of bolts due to thermal deformation.

Furthermore, in a direction in which the catching protrusion portion **320** rotates to be caught by the catching protrusion portion **310**, each of the outer catching protrusion **311** and the inner catching groove **312** have upwardly inclined groove lower surfaces **311***a* and **312***a*, and each of the outer catching protrusion **321** and the inner catching protrusion **322** have upwardly inclined protrusion lower surfaces **321***a* and **322***a*.

Accordingly, in a process of rotating the catching protrusion portion **320** of the lower cover **200** to be caught in the catching groove portion **310** of the support plate **100**, as the upwardly inclined protrusion lower surface **321***a* of the outer catching protrusion **321** is in contact with the upwardly inclined groove lower surface **311***a* of the outer catching groove **311**, a contact surface gradually increases and eventually an entire surface comes into contact, and as the upwardly inclined protrusion lower surface **322***a* of the inner catching protrusion **322** is in contact with the upwardly inclined groove lower surface **311***a* of the inner catching groove **321**, a contact surface gradually increases and eventually an entire surface comes into contact.

In this case, due to a structure of the upwardly inclined protrusion lower surface **321***a* of the outer catching protrusion **321** and the upwardly inclined groove lower surface **311***a* of the outer catching groove **311**, a front end portion of the outer catching protrusion **321**, introduced into the outer catching groove **311** is formed to have a narrow thickness at an upper side thereof, an entrance of the outer catching groove **311** into which the outer catching protrusion **321** is introduced is formed to be large, so that the outer catching protrusion **321** is smoothly and easily introduced into the outer catching groove **311**, and as it rotates, it is gradually force fitted thereinto. Similarly thereto, due to the structure of the upwardly inclined protrusion lower surface **322***a* of the inner catching protrusion **322** and the upwardly inclined groove lower surface **312***a* of the inner catching groove **312**, a front end portion of the inner catching protrusion **322**, introduced into the inner catching groove **312** is formed to have a narrow thickness at an upper side thereof, an entrance of the inner catching groove **312** into which the inner catching protrusion **322** is introduced is formed to be large, so that the inner catching protrusion **322** is smoothly and easily introduced into the inner catching groove **312**, and as it rotates, it is gradually force fitted thereinto.

The plurality of outer catching grooves **311** configured as described above may be disposed along the outer edge of the support plate **100**, and the plurality of outer catching protrusions **321** may be disposed along the outer edge of the lower cover **200**, thereby increasing fixing force thereof when assembling the support plate **100** and the lower cover **200**. In addition, the plurality of inner locking grooves **312** may be disposed along the inner edge of the support plate **100**, and the plurality of inner catching protrusions **322** may be disposed along the inner edge of the lower cover **200**, thereby further improving the fixing force thereof when assembling the support plate **100** and the lower cover **200**.

FIG. **7** is a view illustrating a locking and unlocking process of the locking unit in the support structure of FIGS. **5** and **6**.

Referring to FIGS. **5** to **7**, a support structure **1000** according to the present disclosure may further include a locking unit **400**. The locking unit **400** is configured to be locked when the support plate **100** and the lower cover **200** are assembled.

Specifically, the locking unit **400** includes an elastic member **410**, a locking bar **420**, and a locking hole portion **430**.

The elastic member **410** is embedded in a lower groove **100***b* of the support plate **100**. That is, the elastic member **410** may be disposed inside the lower groove **100***b* formed in a lower portion of the support plate **100**, and an upper end thereof may be connected to an inner upper surface of the lower groove **100***b* to be fixed in position.

In addition, the locking bar **420** is disposed in the lower groove **100***b* and has an upper end connected to the elastic member **410**. In this case, the locking bar **420** is elastically supported downwardly by the elastic member **410**, and maintains a state of protruding downwardly from the lower groove **100***b* when there is no external force.

The locking hole portion **430** is formed in an upper portion of the lower cover **200**, and takes a structure in which a lower portion of the locking bar **420** may be inserted. That is, when the locking bar **420** connected to the support plate **100** by the elastic member **410** and the locking hole portion **430** of the lower cover **200** are disposed to correspond to each other in a vertical direction, the locking bar **420** is lowered by the elastic force of the elastic member **410** so that the lower portion of the locking bar **420** is inserted into the locking hole portion **430**. As described above, when the lower portion of the locking bar **420** is inserted into the locking hole portion **430**, the support plate **100** and the lower cover **200** form a state in which rotation with respect to each other is blocked. Conversely, when the locking bar **420** is pushed up by an external force, the lower portion of the locking bar **420** protrudes from the locking hole **430** upwardly. As described above, when the lower portion of the locking bar **420** protrudes from the locking hole portion **430**, the support plate **100** and the lower cover **200** form a mutually rotatable state.

Furthermore, the locking unit **400** may further include a unlocking button **440**.

The lock release button **440** is disposed to be lifted inside the locking hole portion **430**.

Specifically, the locking hole portion **430** has a side groove **430***a* formed therein, and the lock release button **440** has a side protrusion **440***a* formed on a side portion thereof. In this case, a vertical length of the side groove **430***a* is formed to be longer than a vertical length of the side protrusion **440***a*, so that the side protrusion **440***a* is lifted in the side groove **430***a*. In addition, the lock release button **440** forms a state in which the lock release button **440** protrudes downwardly of the locking hole portion **430** when the side protrusion **440***a* is supported by the lower portion of the side groove **430***a*.

When the unlocking button **440** is raised from the lower side thereof by an external force, the upper locking bar **420** may be pushed up, so that the locking bar **420** protrudes from the locking hole portion **430** upwardly.

A locking and unlocking process of the support plate **100** and the lower cover **200** according to the above configuration will be described as follows.

In a process of rotating the support plate **100** and the lower cover **200** in close contact with each other to catch and fix the same through a locking unit **300**, when the support plate **100** and the lower cover **200** are in close contact with each other, an upper surface of the lower cover **200** pushes

the locking bar **420** up, and when the lower cover **200** is rotated and the locking hole portion **430** of the lower cover **200** is located directly below the locking bar **420**, as illustrated in a lower left drawing of FIG. **7**, the lower portion of the locking bar **420** is inserted into the locking hole portion **430** (in a state in which an elastic member **410** is expanded), so that the support plate **100** and the lower cover **200** are locked in a state of being caught and fixed.

Conversely, as illustrated in a lower right drawing of FIG. **7**, when an user pushes the lock release button **440** upwardly to push the locking bar **420** up, a lower portion of the locking bar **420** protrudes from the locking hole portion **430**, so that unlocking is performed, and in this unlocked state, when the lower cover **200** is rotated in a direction the reverse of the direction for locking, locking and fixing of the support plate **100** and the lower cover **200** is released.

As described above, according to the present disclosure, the locking unit **400** may be configured, so that the support plate **100** and the lower cover **200** may be locked and unlocked smoothly and easily.

FIG. **8** is a vertical cross-sectional view illustrating a labyrinth structure of the support structure of FIGS. **5** and **6**.

Referring to FIG. **8**, a support plate **100** and a lower cover **200** of the support structure **1000** may have a portion, in contact with each other, formed in a labyrinth structure L. Specifically, the labyrinth structure L may be formed in a contact portion of the outer edge of the support plate **100** and the outer edge of the lower cover **200**, thereby safely protecting a structure disposed inside the support structure **1000**. The labyrinth structure L is a structure in which the contact portion of the support plate **100** and the lower cover **200** is bent multiple times, and as airtightness is excellent, an internal component between the support plate **100** and the lower cover **200** may be protected by minimizing permeation of the chemical solution from the outside to the outside.

FIG. **9** is a vertical cross-sectional view illustrating a support structure in which a silicon pad ring is installed according to another embodiment of the present disclosure.

Referring to FIG. **9**, in a support structure **1000** of the present disclosure, an outer edge of a support plate **100** and an outer edge of a lower cover **200** may be respectively have a silicon pad ring R installed at a contact portion with each other. The silicon pad ring R may perform a sealing action on the contact portion between the outer edge of the support plate **100** and the outer edge of the lower cover **200**. Furthermore, the silicon pad ring R is installed to be wound along the outer edge of the support plate **100**, so that the silicon pad ring R presses the support plate **100** and the lower cover **200** at a certain amount of force to maintain an initial state thereof when the support plate **100** and the lower cover **200** are thermally deformed during a high-temperature substrate treatment process and then restored to an initial state thereof.

As set forth above, according to the present disclosure, as a catching unit is configured so that a support plate and a lower cover are rotated with each other and assembled, a bolt-free fastening structure in which a bolt is not used is adopted, thereby preventing assembly disassembly such as loosening of the bolts, or the like.

While exemplary embodiments have been shown and described above, it will be apparent to those skilled in the art that modifications and variations could be made without departing from the scope of the present invention as defined by the appended claims.

DESCRIPTION OF REFERENCE NUMERALS

3000: FACILITY FOR PROCESSING SUBSTRATE
3100: PROCESS CHAMBER
3100A: PROCESS REGION
3100B: MAINTENANCE REGION
3101: HORIZONTAL PARTITION WALL
3110: FAN FILTER UNIT
3120: EXHAUST MEMBER
3131~3133: DISCHARGE LINE
3200: PROCESSING CONTAINER
3200A: UPPER SPACE
3200B: LOWER SPACE
3210: FIRST SUCTION DUCT
3220: SECOND SUCTION DUCT
3230: THIRD SUCTION DUCT
3250: EXHAUST DUCT
3290: LIFTING UNIT
3291: BRACKET
3292: MOVING SHAFT
3293: DRIVING MEMBER
3300: NOZZLE UNIT
2000: APPARATUS FOR PROCESSING SUBSTRATE
2100: SUPPORT SHAFT
2200: DRIVING MEMBER
1000: SUPPORT STRUCTURE
100: SUPPORT PLATE
100A: PLATE HOLE
100B: LOWER GROOVE
200: LOWER COVER
200A: COVER HOLE
300: CATCHING UNIT
310: CATCHING GROOVE PORTION
311: OUTER CATCHING GROOVE
311A: GROOVE LOWER SURFACE (OF OUTER CATCHING GROOVE)
312: INNER CATCHING GROOVE
312A: GROOVE LOWER SURFACE (OF INNER CATCHING GROOVE)
320: CATCHING PROTRUSION PORTION
321: OUTER CATCHING GROOVE
321A: PROTRUSION LOWER SURFACE (OF OUTER CATCHING GROOVE)
322: INNER CATCHING GROOVE
322A: PROTRUSION LOWER SURFACE
400: LOCKING UNIT
410: ELASTIC MEMBER
420: LOCKING BAR
430: LOCKING HOLE PORTION
430A: SIDE GROOVE
440: UNLOCKING BUTTON
440A: SIDE PROTRUSION
W: SUBSTRATE
H: EXHAUST PORT
L: LABYRINTH STRUCTURE
R: SILICON PAD RING

What is claimed is:

1. A support structure, comprising:
a support plate supporting a substrate;
a lower cover covering a lower portion of the support plate;
a catching unit comprising a concave-convex structure having portions corresponding to each other so that the support plate and the lower cover are rotated and assembled with each other;
a locking unit configured to be locked in a state in which support plate and the lower cover are assembled,
wherein the locking unit includes:
an elastic member embedded in a lower groove of the support plate;

a locking bar disposed in the lower groove, and connected to the elastic member and be elastically supported so as to protrude downwardly from the lower groove; and

a locking hole portion formed in the lower cover to insert the locking bar.

2. The support structure of claim **1**, wherein the catching unit comprises

a catching groove portion formed on one of the support plate and the lower cover; and

a catching protrusion portion formed on the other one of the support plate and the lower cover and rotated and caught in the catching groove portion.

3. The support structure of claim **2**, wherein the catching groove portion comprises an outer catching groove formed on an inner surface of an outer edge, bent downwardly from the support plate, and the catching protrusion portion comprises an outer catching protrusion formed on an outer edge of the lower cover.

4. The support structure of claim **3**, wherein, in a direction, rotated so that the outer catching protrusion is caught in the outer catching groove, the outer catching groove has an upwardly inclined groove lower surface formed therein, and the outer catching groove protrusion has an upwardly inclined protrusion lower surface formed therein.

5. The support structure of claim **3**, wherein the plurality of outer catching grooves are disposed along the outer edge of the support plate, and the plurality of outer catching protrusions are disposed along the outer edge of the lower cover.

6. The support structure of claim **2**, wherein the support plate has a plate hole formed in a center thereof, and the lower cover has a cover hole corresponding to the plate hole in a center thereof, and

the catching groove portion comprises an inner catching groove formed on an inner edge of the support plate, as an edge of the plate hole, and the catching protrusion portion comprises an inner catching protrusion formed on an inner edge of the cover as an edge of the cover hole.

7. The support structure of claim **6**, wherein, in a direction, rotated so that the inner catching protrusion is caught in the inner catching groove, the inner catching groove has an upwardly inclined groove lower surface, and the inner catching groove has an upwardly inclined protrusion lower surface.

8. The support structure of claim **6**, wherein the plurality of inner catching grooves are disposed along the inner edge of the support plate, and the plurality of inner catching protrusions are disposed along the inner edge of the lower cover.

9. The support structure of claim **1**, wherein the locking unit further comprises an unlocking botton disposed to be lifted inside the locking hole portion,

wherein the locking hole has a side groove formed therein, and the unlocking button has a side protrusion formed therein, and

the side protrusion may be lifted in the side groove, and when supported by a lower portion of the side groove, the unlocking botton protrudes downwardly of the locking hole portion.

10. The support structure of claim **1**, wherein the support plate and the lower cover has a portion in contact with each other, formed in a labyrinth structure.

11. The support structure of claim **10**, wherein the labyrinth structure is formed in a contact portion between an outer edge of the support plate and an outer edge of the lower cover.

12. The support structure of claim **1**, wherein the outer edge of the support plate and the outer edge of the lower cover are installed with a silicon pad ring in a contact portion therebetween, respectively.

13. An apparatus for supporting a substrate, comprising:

a support structure supporting a substrate;

a support shaft disposed below the support structure and supporting the support structure; and

a driving member connected to a lower end of the support shaft and rotating the support shaft,

wherein the support structure, includes

a support plate supporting the substrate;

a lower cover covering a lower portion of the support plate; and

a catching unit comprising a concave-convex structure having portions corresponding to each other so that the support plate and the lower cover are rotated and assembled with each other,

wherein the catching unit, includes

a catching groove portion formed on one of the support plate and the lower cover; and

a catching protrusion portion formed on the other one of the support plate and the lower cover and rotated and caught in the catching groove portion.

14. The apparatus for supporting a substrate of claim **13**, wherein the catching groove portion comprises an outer catching groove formed on an inner surface of an outer edge, bent downwardly from the support plate, and the catching protrusion portion comprises an outer catching protrusion formed on an outer edge of the lower cover.

15. The apparatus for supporting a substrate of claim **13**, wherein, in a direction, rotated so that the outer catching protrusion is caught in the outer locking groove, the outer catching groove has an upwardly inclined groove lower surface formed therein, and the outer catching protrusion has an upwardly inclined protrusion lower surface formed therein.

16. The apparatus for supporting a substrate of claim **13**, wherein the support plate has a plate hole formed in a center thereof, and the lower cover has a cover hole corresponding to the plate hole formed in a center thereof,

wherein the catching groove portion comprises an inner catching groove formed on an inner edge of the support plate as an edge of the plate hole, and the catching protrusion portion comprises an inner catching protrusion formed on an inner edge of the cover as an edge of the cover hole.

17. The apparatus for supporting a substrate of claim **16**, wherein, in a direction, rotated so that the inner catching protrusion is caught in the inner catching groove, the inner catching groove has an upwardly inclined groove lower surface, and the inner catching protrusion has an upwardly inclined protrusion lower surface.

18. A facility for processing a substrate, comprising:

a process chamber;

a processing container installed in the process chamber and having a processing space for processing a substrate;

a nozzle unit discharging a chemical solution to the substrate; and

an apparatus for supporting a substrate supporting the substrate in the processing space,

wherein the apparatus for supporting a substrate includes,

a support structure supporting the substrate;

a support shaft disposed below the support structure and supporting the support structure; and

a driving member connected to a lower end of the support shaft and rotating the support shaft,

wherein the support structure, includes

a support plate supporting the substrate;

a lower cover covering a lower portion of the support plate; and

a catching unit comprising a concave-convex structure having portions corresponding to each other so that the support plate and the lower cover are rotated and assembled with each other,

wherein the catching unit includes

a catching groove portion formed on one of the support plate and the lower cover; and

a catching protrusion formed on the other one of the support plate and the lower cover and rotated and caught in the locking groove.

19. The facility for processing a substrate of claim **18**, wherein the catching groove portion comprises an outer catching groove formed on an inner surface of an outer edge, bent downwardly from the support plate, and the catching protrusion portion comprises an outer catching protrusion formed on an outer edge of the lower cover,

wherein, in a direction, rotated so that the outer catching protrusion is caught in the outer catching groove, the outer catching groove has an upwardly inclined groove lower surface formed therein and the outer catching protrusion has an upwardly inclined protrusion lower surface,

the support plate has a plate hole formed in a center thereof, and the lower cover has a cover hole corresponding to the plate hole formed in a center thereof,

the catching groove portion includes an inner catching groove formed on an inner edge of the support plate as an edge of the plate hole, and the catching protrusion portion includes an inner catching protrusion formed on an inner edge of the cover as an edge of the cover hole,

wherein, in a direction, rotated so that the inner catching protrusion is caught in the inner catching groove, the inner catching groove has an upwardly inclined groove lower surface, and the inner catching protrusion has an upwardly inclined protrusion lower surface.

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