rotor mounted on the inner cylinder. The magnetic bearing is a radial magnetic bearing including a magnetic bearing stator mounted on the outer cylinder, and a magnetic bearing rotor mounted on the inner cylinder. The magnetic bearing is configured to magnetically levitate the inner cylinder with an attractive force between the magnetic bearing stator and the magnetic bearing rotor.

[0005a] There is also disclosed a substrate cleaning device including the substrate rotation device as described above.

[0005b] Another embodiment provides a control method for a substrate rotation device. The substrate rotation device includes an outer cylinder, an inner cylinder positioned inside the outer cylinder, a motor for rotating the inner cylinder, a magnetic bearing for magnetically levitating the inner cylinder, and a substrate holder disposed on the inner pip. The motor is a radial motor including a motor stator mounted on the outer cylinder, and a motor rotor mounted on the inner cylinder. The magnetic bearing is a radial magnetic bearing including a magnetic bearing stator mounted on the outer cylinder, and a magnetic bearing rotor mounted on the inner cylinder. The method includes magnetically levitating the inner cylinder with an attractive force between the magnetic bearing stator and the magnetic bearing rotor.

BRIEF DESCRIPTION OF DRAWINGS

[0006] Fig. 1 is a top view schematically illustrating a substrate processing device;

Fig. 2 is a front view schematically illustrating a substrate cleaning device and a view where an inner cylinder is positioned at a cleaning position;

Fig. 3 is a front view schematically illustrating the substrate cleaning device and a view where the inner cylinder is positioned at a conveyance position;

Fig. 4 is a front view schematically illustrating a substrate rotation device including a motor rotor having a length identical to that of a motor stator and a substrate cleaning device including this substrate rotation device and a view where the inner cylinder is positioned at the cleaning position;

Fig. 5 is a front view schematically illustrating the substrate rotation device including the motor rotor having the length identical to that of the motor stator and the substrate cleaning device including this substrate rotation device and a view where the inner cylinder is positioned at the conveyance position;

Fig. 6 is a front view schematically illustrating a substrate rotation device, where a height at which a magnetic bearing stator is positioned is identical to a height at which the motor stator is positioned and a height at which a magnetic bearing rotor is positioned is identical to a height at which the motor rotor is positioned, and a substrate cleaning device including this substrate rotation device; and

Fig. 7 is a cross-sectional view of the substrate rotation device in Fig. 6.

DESCRIPTION OF EMBODIMENTS

[0007] The following describes a substrate rotation device and a device including this substrate rotation device according to an embodiment by referring to the drawings. In the