CLAIMS

1. A substrate processing apparatus comprising:

an electrostatic chuck having a substrate support surface and a ring support surface, the ring support surface including a first through-hole through which a lift pin is to be inserted into the ring support surface;

an edge ring supported by the ring support surface; and

a cylindrical member inserted into the first through-hole of the electrostatic chuck, the cylindrical member including a second through-hole,

wherein the cylindrical member includes:

a first shaft portion inserted into the first through-hole of the electrostatic chuck; and

a first head portion arranged on the ring support surface of the electrostatic chuck when the first shaft portion is inserted into the first through-hole of the electrostatic chuck, and

wherein the edge ring includes a first groove in which the first head portion is to be arranged, the first groove being provided on a lower surface of the edge ring, and

wherein the first head portion has a diameter larger than a diameter of the first shaft portion.

2. A substrate processing apparatus comprising:

an electrostatic chuck having a substrate support surface and a ring support surface, the ring support surface including a first through-hole through which a lift pin is to be inserted into the ring support surface;

an edge ring supported by the ring support surface; and

a cylindrical member inserted into the first through-hole of the electrostatic chuck, the cylindrical member including a second through-hole,

wherein the cylindrical member includes:

a first shaft portion inserted into the first through-hole of the electrostatic chuck; and

a first head portion arranged on the ring support surface of the

electrostatic chuck when the first shaft portion is inserted into the first through-hole of the electrostatic chuck, and

wherein the edge ring includes a first groove in which the first head portion is to be arranged, the first groove being provided on a lower surface of the edge ring, and

wherein the edge ring includes:

an under ring supported by the ring support surface; and

an inner ring disposed on the under ring, and

wherein the under ring includes:

a first counterbore as the first groove; and

a third through-hole communicating with the first counterbore, penetrating from a lower surface to an upper surface of the under ring, and communicating with the second through-hole of the cylindrical member such that the lift pin is insertable.

3. The substrate processing apparatus as claimed in claim 1 or 2, wherein the first groove is an oblong hole whose longitudinal axis extends in a radial direction of the electrostatic chuck.

4. The substrate processing apparatus as claimed in claim 2, wherein the first head portion has a diameter larger than a diameter of the first shaft portion.

5. The substrate processing apparatus as claimed in claim 1 or 2, wherein three of each of the first through-hole of the electrostatic chuck, the cylindrical member inserted into the first through-hole, and the first groove of the edge ring are provided in circumferential direction.

6. The substrate processing apparatus as claimed in claim 2, further comprising a guide pin including a second shaft portion and a second head portion having a diameter larger than a diameter of the second shaft portion,

wherein the under ring includes:

a second counterbore provided on the lower surface of the under ring, the second head portion being arranged in the second counterbore; and

a fourth through-hole communicating with the second counterbore and penetrating from the lower surface to the upper surface of the under ring, the second shaft portion being inserted through the fourth through-hole, and

wherein the inner ring includes a second groove provided on a lower surface of the inner ring, the second shaft portion protruding from the under ring being arranged in the second groove.

7. The substrate processing apparatus as claimed in claim 6, wherein the second groove is an oblong hole whose longitudinal axis extends in a radial direction of the electrostatic chuck.

8. The substrate processing apparatus as claimed in claim 6, wherein three of each of the guide pin, the second counterbore and the fourth through-hole of the under ring, and the second groove of the inner ring are provided in a circumferential direction.

9. The substrate processing apparatus as claimed in claim 2,

wherein the under ring includes a first convex portion, and

wherein the inner ring includes a third groove provided on a lower surface of the inner ring, the first convex portion of the under ring being arranged in the third groove.

10. The substrate processing apparatus as claimed in claim 9,

wherein the first convex portion has a spherical shape, and

wherein the third groove has an arc shape in a cross section viewed in a radial direction of the electrostatic chuck and is an oblong hole whose longitudinal axis extends in the radial direction of the electrostatic chuck.

11. The substrate processing apparatus as claimed in claim 9,

wherein the first convex portion has a spherical shape, and

wherein the third groove has an inverted V-shape in a cross section viewed in a radial direction of the electrostatic chuck and is an oblong hole whose longitudinal axis extends in the radial direction of the electrostatic chuck.

12. The substrate processing apparatus as claimed in claim 10 or 11, wherein the first convex portion is in contact with the third groove at one point.

13. The substrate processing apparatus as claimed in claim 10 or 11, wherein the first convex portion is in contact with the third groove at two points.

14. The substrate processing apparatus as claimed in claim 9, wherein three of each of the first convex portion and the third groove are provided in a circumferential direction.

15. The substrate processing apparatus as claimed in claim 9, further comprising a cover ring surrounding the edge ring,

wherein one of the under ring or the cover ring includes a second convex portion, and another one of the under ring or the cover ring includes a fourth groove, the second convex portion being arranged in the fourth groove.