Fig. 17 is a perspective view of an example of swirl-flow forming body 1B to which annular plate 118 is detachably attached.

Fig. 18 is another perspective view from a different angle of swirl-flow forming body 1B to which annular plate 118 is detachably attached.

Fig. 19 is a perspective view of an example of swirl-flow forming body 1 to which annular plate 120 is detachably attached.

Fig. 20 is a side view of an example of swirl-flow forming body 1 to which cylindrical body 121 is attached.

Description of Reference Numerals

[0011]

1, 1A, 1B… swirl-flow forming body, 101, 101A, 101B, 101C, 101D… main body, 102… through-hole, 103… first end face, 104… second end face, 105… inner periphery, 106… jetting port, 107… outer periphery, 108… supply port, 109… fluid passage, 110… flange part, 111… cover, 112… spacer, 113… flange part, 114… flange part, 115… flange part, 116… annular plate, 117… annular plate, 118… annular plate, 119… groove part, 120… annular plate, 121… cylindrical body, 1101… first end face, 1102… second end face, 1131… protruding part, 1132… U-shaped groove, 1141… V-shaped groove, 1151… first end face, 1152… second end face, 1153… through-hole, 1171… annular plate main body, 1172… holding member, 1173… claw part, 1181… annular plate main body, 1182… holding member, 1183… claw part, 1201… annular plate main body, 1202… holding member, 1203… claw part

Modes for Implementing the Invention

[0012]

1. Embodiment

A swirl-flow forming body 1 according to an embodiment of the present invention will now be described. Swirl-flow forming body 1 is a device in which Bernoulli's principle is utilized for applying suction to a member such as a semiconductor wafer or a food, so that the member can be held and conveyed. Fig. 1 is a perspective view of an example of an upper surface of swirl-flow forming body 1. Fig. 2 is a perspective view of an example of a lower surface of swirl-flow forming body 1. Fig. 3 is a cross-sectional view of swirl-flow forming body 1 along line I-I shown in Fig. 1. Fig. 4 is an enlarged view of part A shown in Fig. 3.

[0013]

Swirl-flow forming body 1 shown in these figures includes: main body 101, which is a cylindrical body that is circular in cross-section and includes through-hole 102 formed at the center of the cylindrical body; flat first end face 103, which is formed on the lower surface of main body 101 such that first end face 103 is in opposing relation to a target object; flat second end face 104, which is formed on the upper surface of main body 101; two jetting ports 106, which are formed on inner periphery ~~106~~ 105 of main body 101 that faces through-hole 102; two supply ports 108, which are formed on outer periphery 107 of main body 101; two straight fluid passages 109, which connect jetting port 106 and supply port108; annular flange part 110, which is formed to project substantially vertically from inner periphery 105 and to face a target object; cover 111, which is substantially disk-shaped; and four spacers 112, which serve as members for holding cover 111, such that cover 111 is held in opposing relation and

Claims

1. A swirl-flow forming body, comprising:

a main body;

an end face that is formed at the main body and faces a target object to which suction is applied;

a hole that opens on the end face;

a jetting port that is formed on an inner periphery of the main body, the inner periphery facing the hole;

a fluid passage that allows fluid to be discharged into the hole via the jetting port so as to form a swirl flow that generates negative pressure; and

a flange portion that is formed so as to protrude from the inner periphery, the flange portion allowing passage of fluid to which suction is applied by the negative pressure while preventing the fluid discharged via the jetting port from flowing out of the hole towards the target object, wherein the inner periphery is formed so as to guide the fluid discharged via the jetting port, in a direction away from the target object, to be discharged from the hole.

2. The swirl-flow forming body according to claim 1, wherein the flange portion comprises a protruding part that is formed at an end of the flange portion so as to protrude in a direction away from the target object.

3. The swirl-flow forming body according to claim 2, wherein
the flange portion comprises a first end face that faces the target object, a second end face opposite to the first end surface, and a through-hole that opens on the first end face and the second end face.

4. The swirl-flow forming body according to claim 1, wherein
the flange portion comprises a first end face that faces the target object, a second end face opposite to the first end surface, and a through-hole that opens on the first end face and the second end face.

~~2~~5. A swirl-flow forming body, comprising:

a main body;

an end face that is formed at the main body and faces a target object to which suction is applied;

a hole that opens on the end face;

a jetting port that is formed on an inner periphery of the main body, the inner periphery facing the hole;

a fluid passage that allows fluid to be discharged into the hole via the jetting port so as to form a swirl flow that generates negative pressure; and

a flange portion that is formed so as to protrude from the inner periphery, the flange portion allowing passage of fluid to which suction is applied by the negative pressure while preventing the fluid discharged via the jetting port from flowing out of

the hole towards the target object, wherein the fluid passage is formed so as to allow the fluid discharged via the jetting port to flow in a direction away from the target object to be discharged from the hole.

~~3. The swirl-flow forming body according to Claim 1 or 2, wherein the flange portion comprises a protruding part that is formed at an end of the flange portion so as to protrude in a direction away from the target object.~~

~~4. The swirl-flow forming body according to any one of Claims 1 to 3, wherein the flange portion comprises a first end face that faces the target object, a second end face opposite to the first end surface, and a through-hole that opens on the first end face and the second end face.~~

6. The swirl-flow forming body according to claim 5, wherein the flange portion comprises a protruding part that is formed at an end of the flange portion so as to protrude in a direction away from the target object.

7. The swirl-flow forming body according to claim 6, wherein the flange portion comprises a first end face that faces the target object, a second end face opposite to the first end surface, and a through-hole that opens on the first end face and the second end face.

8. The swirl-flow forming body according to claim 5, wherein the flange portion comprises a first end face that faces the target object, a second end face opposite to the first end surface, and a through-hole that opens on the first end face and the second end face.