

CLAIMS

1. A polishing head comprising: an annular rigid ring; an elastic film bonded to the rigid ring; and a mid-plate joined to the rigid ring so as to be movable upward and downward, the mid-plate defining a first sealed space together with the rigid ring and the elastic film,

the polishing head being configured to hold a back surface of a workpiece on a lower surface of the elastic film and to polish a front surface of the workpiece by bringing the front surface into sliding contact with a polishing pad attached to a turn table,

the polishing head further comprising an incompressible fluid enclosed in the first sealed space and a mid-plate positioning means for adjusting a vertical position of the mid-plate, wherein

the mid-plate positioning means can adjust a shape of the lower surface of the elastic film by adjusting the vertical position of the mid-plate.

2. The polishing head according to claim 1, further comprising a second sealed space defined by the mid-plate, a polishing head body disposed above the mid-plate, and an upper portion of the rigid ring contacting a lower end of the polishing head body, wherein the mid-plate positioning means adjusts the vertical position of the mid-plate by controlling pressure in the second sealed space.

3. The polishing head according to claim 1 or claim 2, further comprising a stopper for limiting an upper limit position and a lower limit position of the upward and

downward movement of the mid-plate.

4. The polishing head according to any one of claims 1 to 3, wherein the elastic film is composed of a material having a tensile strength of 10 MPa or more.

5. The polishing head according to any one of claims 1 to 4, further comprising an annular template for holding an edge portion of the workpiece, the template being disposed concentrically with the rigid ring in a peripheral portion of the lower surface of the elastic film.

6. The polishing head according to claim 5, wherein the annular template has a thickness adjusted within $\pm 1\%$ with respect to a finishing thickness of the workpiece.

7. The polishing head according to any one of claims 1 to 4, further comprising a resin ring for holding the edge portion of the workpiece, the resin ring being disposed concentrically with and outside the rigid ring.

8. The polishing head according to any one of claims 5 to 7, wherein when the mid-plate is moved to the lower limit position, the shape of the lower surface of the elastic film is adjusted to be a downward convex shape such that the front surface of the workpiece is located below a lower surface of the template or the resin ring.

9. The polishing head according to claim 8, wherein when the mid-plate is moved to the lower limit position, the front surface of the workpiece is located below the lower surface of the template or the resin ring by a

distance ranging from 50 μm to 55% of the finishing thickness of the workpiece.

10. A polishing apparatus for use in polishing of a front surface of a workpiece, comprising:

a polishing pad attached to a turn table; a polishing-agent-supply mechanism for supplying a polishing agent onto the polishing pad; and the polishing head for holding the workpiece according to any one of claims 1 to 9.

Claim

1. A polishing head comprising:
 - an annular rigid ring; an elastic film bonded to the rigid ring;
 - a mid-plate joined to the rigid ring so as to be movable upward and downward, the mid-plate defining a first sealed space together with the rigid ring and the elastic film;
 - an incompressible fluid enclosed in the first sealed space;
 - a mid-plate positioning means for adjusting a vertical position of the mid-plate;
 - a second sealed space defined by the mid-plate, a polishing head body disposed above the mid-plate, and an upper portion of the rigid ring contacting a lower end of the polishing head body; and
 - a stopper for limiting an upper limit position and a lower limit position of the upward and downward movement of the mid-plate; wherein
 - the polishing head is configured to hold a back surface of a workpiece on a lower surface of the elastic film and to polish a front surface of the workpiece by bringing the front surface into sliding contact with a polishing pad attached to a turn table, wherein
 - the mid-plate positioning means can adjust a shape of the lower surface of the elastic film by adjusting the vertical position of the mid-plate and the mid-plate positioning means adjusts the vertical position of the mid-plate by controlling pressure in the second sealed space.

2. The polishing head according to claim 1, wherein the elastic film is composed of a material having a tensile strength of 10 MPa or more.
3. The polishing head according to claim 1 or claim 2, further comprising an annular template for holding an edge portion of the workpiece, the template being disposed concentrically with the rigid ring in a peripheral portion of the lower surface of the elastic film.
4. The polishing head according to claim 3, wherein the annular template has a thickness adjusted within $\pm 1\%$ with respect to a finishing thickness of the workpiece.
5. The polishing head according to claim 1 or claim 2, further comprising a resin ring for holding the edge portion of the workpiece, the resin ring being disposed concentrically with and outside the rigid ring.
6. The polishing head according to claim 3 or claim 4, wherein when the mid-plate is moved to the lower limit position, the shape of the lower surface of the elastic film is adjusted to be a downward convex shape such that the front surface of the workpiece is located below a lower surface of the template.
7. The polishing head according to claim 5, wherein when the mid-plate is moved to the lower limit position, the shape of the lower surface of the elastic film is adjusted to be a downward convex shape such that the front surface of the workpiece is located below a lower surface of the resin ring.

8. The polishing head according to claim 6, wherein when the mid-plate is moved to the lower limit position, the front surface of the workpiece is located below the lower surface of the template by a distance ranging from 50 μm to 55% of the finishing thickness of the workpiece.

9. The polishing head according to claim 7, wherein when the mid-plate is moved to the lower limit position, the front surface of the workpiece is located below the lower surface of the resin ring by a distance ranging from 50 μm to 55% of the finishing thickness of the workpiece.

10. A polishing apparatus for use in polishing of a front surface of a workpiece, comprising:

a polishing pad attached to a turn table; a polishing-agent-supply mechanism for supplying a polishing agent onto the polishing pad; and the polishing head for holding the workpiece according to any one of claims 1 to 9.