What is claimed is:

1. A polishing head system for polishing a workpiece having a film, to be processed, by relatively moving the workpiece and a polishing surface in the presence of a polishing liquid while pressing the workpiece against the polishing surface, comprising:

a polishing head including an actuator configured to apply a pressing force to the workpiece, a retainer member arranged outside the actuator, and first piezoelectric elements coupled to the retainer member; and

a drive-voltage application device configured to apply voltages independently to the first piezoelectric elements;

wherein the polishing head further includes coupling members coupled to the first piezoelectric elements, respectively,

end surfaces of the coupling members are coupled to the retainer member, and

the polishing head further includes a first holding member configured to limit a range of movement of the coupling members in a direction perpendicular to a direction of pressing the retainer member.

2. The polishing head system according to claim 1, wherein the retainer member comprises retainer members coupled to the first piezoelectric elements, respectively.

3. The polishing head system according to claim 1 or 2, further comprising a retainer-member moving device configured to move an entirety of the first piezoelectric elements and the retainer member toward the polishing surface.

4. The polishing head system according to claim 3, wherein the retainer-member moving device includes an elastic bag forming a first pressure chamber therein and a first gas supply line communicating with the first pressure chamber.

5. The polishing head system according to claim 1, wherein the polishing head further includes pressing-force measuring devices configured to measure pressing forces generated by the first piezoelectric elements.

6. The polishing head system according to claim 5, wherein the pressing-force measuring devices are arranged between the first piezoelectric elements and the coupling members, respectively.

7. The polishing head system according to any one of claims 1 to 6, wherein the polishing head further includes a voltage distributor electrically coupled to the drive-voltage application device and the first piezoelectric elements, the voltage distributor being configured to distribute the voltage applied from the drive-voltage application device to the first piezoelectric elements.

8. The polishing head system according to any one of claims 1 to 7, wherein the actuator comprises a fluid-pressure type actuator, the fluid-pressure type actuator including an elastic membrane configured to form second pressure chambers and arranged to contact the back surface of the workpiece, and second gas supply lines communicating with the second pressure chambers, respectively.

9. The polishing head system according to any one of claims 1 to 7, wherein the actuator comprises second piezoelectric elements which are arranged so as to apply pressing forces to multiple regions of the workpiece.

10. The polishing head system according to claim 9, wherein the polishing head further includes pressing members coupled to the second piezoelectric elements, respectively.

11. The polishing head system according to claim 10, wherein the polishing head

further includes a second holding member configured to limit a range of movement of the pressing members in a direction perpendicular to a direction of pressing of the workpiece.

12. The polishing head system according to any one of claims 9 to 11, wherein the second piezoelectric elements are electrically coupled to a voltage distributor which is configured to distribute the voltage applied from the drive-voltage application device to the second piezoelectric elements.

13. A polishing apparatus for polishing a workpiece, comprising:

a polishing table for holding a polishing pad;

a polishing-liquid supply nozzle configured to supply a polishing liquid onto the polishing pad;

the polishing head system according to any one of claims 1 to 12; and

an operation controller configured to control operations of the polishing table, the polishing-liquid supply nozzle, and the polishing head system.

14. The polishing apparatus according to claim 13, further comprising a film-thickness sensor configured to measure a thickness of a film, to be processed, of the workpiece, the film-thickness sensor being arranged in the polishing table.

15. The polishing apparatus according to claim 14, wherein the operation controller is configured to produce a film-thickness profile of the workpiece from measured values of the film thickness acquired by the film-thickness sensor, and to determine voltage instruction values for the drive-voltage application device based on the film-thickness profile.

16. The polishing apparatus according to claim 14, wherein the operation controller is configured to determine voltage instruction values for the drive-voltage application device based on a difference between the film-thickness profile and a target film-thickness profile.

17. The polishing apparatus according to any one of claims 13 to 16, further comprising a loading and unloading device configured to allow the polishing head to hold the workpiece thereon.

18. The polishing apparatus according to any one of claims 13 to 17, further comprising an orientation detector configured to detect an orientation of the workpiece in its circumferential direction.

19. A processing system for processing a workpiece, comprising:

the polishing apparatus according to any one of claims 13 to 18 for polishing the workpiece;

a cleaning device configured to clean the polished workpiece;

a drying device configured to dry the cleaned workpiece; and

a transporting device configured to transport the workpiece between the polishing apparatus, the cleaning device, and the drying device.