WHAT IS CLAIMED IS:

1. A manufacturing apparatus of a semiconductor device, comprising:

a stage, having a mounting surface on which a substrate is mounted;

a bonding head, having a holding surface sucking and holding a chip, movable relative to the stage in a plane direction and a normal direction of the stage;

a copying mechanism, having a first spherical surface and a second spherical surface provided swingably with respect to the first spherical surface, mounted on the stage or the bonding head, wherein the copying mechanism causes a facing surface connected to the second spherical surface to swing with respect to a reference surface facing the facing surface, and is switchable between a free state in which swinging of the facing surface is enabled and a locked state in which swinging of the facing surface is restricted,

in a case where the holding surface being the facing surface, the mounting surface being the reference surface, and

in a case where the mounting surface being the facing surface, the holding surface being the reference surface; and

a controller, executing adjustment processing once or more times and adjusting the facing surface to be parallel to the reference surface, wherein in the adjustment processing, the facing surface is caused to directly or indirectly abut against the reference surface after the copying mechanism is set to the locked state, then the copying mechanism is switched to the free state and the facing surface is directly or indirectly pressed against the reference surface, and then the copying mechanism is switched to the locked state, wherein

the controller repeats the adjustment processing until a pressing position being an axial position of the bonding head when the facing surface is pressed against the reference surface in the adjustment processing reaches a specified reference value.

2. The manufacturing apparatus of a semiconductor device according to claim 1, wherein

the controller stores an axial position of the bonding head when the facing surface is pressed against the reference surface as a pressing position;

the controller repeats the adjustment processing until a change amount between the pressing position obtained by a previous pressing and the pressing position obtained by a current pressing reaches a specified reference value.

3. The manufacturing apparatus of a semiconductor device according to any one of claims 1 or 2, wherein

the copying mechanism is mounted on the stage;

the controller presses the holding surface being the reference surface against an intersection of the mounting surface being the facing surface and a normal of the mounting surface passing through a swing center of the copying mechanism in the adjustment processing.

4. The manufacturing apparatus of a semiconductor device according to any one of claims 1 to 3, wherein

the controller also executes initial processing prior to the adjustment processing;

the controller causes the facing surface to directly or indirectly abut against the reference surface after setting the copying mechanism to the free state, then directly or indirectly presses the facing surface against the reference surface, and then switches the copying mechanism to the locked state in the initial processing.

5. A method of manufacturing a semiconductor device, the method comprising: bonding a chip sucked and held by a holding surface of a bonding head having a copying mechanism to a substrate mounted on a stage, wherein

the stage or the bonding head is equipped with the copying mechanism, the copying mechanism having a first spherical surface and a second spherical surface provided swingably with respect to the first spherical surface, the copying mechanism causing a facing surface to

swing with respect to a reference surface facing the facing surface, wherein the copying mechanism is switchable between a free state in which swinging of the facing surface is enabled and a locked state in which swinging of the facing surface is restricted,

in a case where the holding surface being the facing surface, the mounting surface being the reference surface, and

in a case where the mounting surface being the facing surface, the holding surface being the reference surface;

an adjustment step is performed once or more times to: adjust the facing surface to be parallel to the reference surface, wherein in the adjustment step, the facing surface is caused to directly or indirectly abut against the reference surface after the copying mechanism is set to the locked state, then the copying mechanism is switched to the free state and the facing surface is directly or indirectly pressed against the reference surface, and then the copying mechanism is switched to the locked state; and

the adjustment step is repeated until a pressing position being an axial position of the bonding head when the facing surface is pressed against the reference surface in the adjustment step reaches a specified reference value.