What is claimed is:

1. A substrate cleaning device comprising:

a cleaning member configured to clean a substrate by contacting the substrate;

a member rotation unit configured to rotate the cleaning member;

a member drive unit configured to press the cleaning member against the substrate;

a load measurement unit configured to measure a pressing load of the cleaning member; and

a control unit configured to control a pressing amount of the cleaning member by the member drive unit, on the basis of a measurement value of the load measurement unit, so that the pressing load of the cleaning member becomes a setting load, wherein

the control unit repeats an operation of comparing the measurement value of the load measurement unit with the setting load, changing the pressing amount of the cleaning member by a first movement amount so that a difference value decreases, when the difference value is larger than a first threshold value and equal to or smaller than a second threshold value, and changing the pressing amount of the cleaning member by a second movement amount larger than the first movement amount so that the difference value decreases, when the difference value is larger than the second threshold value, until the difference value becomes

equal to or smaller than the first threshold value.

~~2. A substrate cleaning device comprising:~~

~~a cleaning member configured to clean a substrate by contacting the substrate;~~

~~a member rotation unit configured to rotate the cleaning member;~~

~~a member drive unit configured to press the cleaning member against the substrate;~~

~~a load measurement unit configured to measure a pressing load of the cleaning member; and~~

~~a control unit configured to control a pressing amount of the cleaning member by the member drive unit, on the basis of a measurement value of the load measurement unit, so that the pressing load of the cleaning member becomes a setting load, wherein~~

~~the control unit previously stores a correspondence relation between the pressing load and the pressing amount of the cleaning member for M pressing loads as master data,~~

~~the control unit acquires the correspondence relation between the pressing load and the pressing amount of the cleaning member for N pressing loads among the M pressing loads as measurement data, on the basis of the measurement value of the load measurement unit,~~

~~the control unit corrects each of pressing amounts corresponding to the M pressing loads in the master data, on the basis of the measurement data, so that the~~

~~correspondence relation between the pressing load and the pressing amount for the N pressing loads in the master data approaches the correspondence relation between the pressing load and the pressing amount for the N pressing loads in the measurement data, and generates data for movement amount calculation showing the correspondence relation between the pressing load and the pressing amount for the M pressing loads, and~~

~~the control unit calculates the pressing amount of the cleaning member corresponding to the setting load, on the basis of the correspondence relation between the pressing load and the pressing amount in the data for movement amount calculation.~~

2~~3~~. The substrate cleaning device according to claim 1 ~~or 2~~, wherein

the cleaning member is any one member of a~~the~~ group consisting of a roll cleaning member, a pencil cleaning member, and a buff cleaning/polishing member.

3~~4~~. The substrate cleaning device according to ~~any one of~~ claim~~s~~ 1 or~~to~~ 2~~3~~, wherein

the member drive unit is an electric actuator.

~~5. A substrate cleaning device comprising:~~

~~a first cleaning member configured to clean a first surface of a substrate by contacting the first surface of~~

~~the substrate;~~

~~a first member rotation unit configured to rotate the first cleaning member;~~

~~a first member drive unit configured to press the first cleaning member against the first surface of the substrate;~~

~~a first load measurement unit configured to measure a pressing load of the first cleaning member;~~

~~a second cleaning member configured to clean a second surface of the substrate by contacting the second surface of the substrate;~~

~~a second member rotation unit configured to rotate the second cleaning member;~~

~~a second member drive unit configured to press the second cleaning member against the second surface of the substrate;~~

~~a second load measurement unit configured to measure a pressing load of the second cleaning member; and~~

~~a control unit configured to control a pressing amount of the first cleaning member by the first member drive unit and a pressing amount of the second cleaning member by the second member drive unit, on the basis of a measurement value of the first load measurement unit and a measurement value of the second load measurement unit, so that the pressing load of the first cleaning member becomes a first setting load and the pressing load of the second cleaning member becomes a second setting load, wherein~~

~~the control unit is configured to execute~~

~~a first step of controlling the first member drive unit and the second member drive unit so that the first cleaning member moves at a first movement speed from a first initial position separated from the first surface of the substrate by a first distance to a first proximity position separated from the first surface by a third distance and the second cleaning member moves at a second movement speed from a second initial position separated from the second surface of the substrate by a second distance shorter than the first distance to a second proximity position separated from the second surface by the third distance and~~

~~a second step of controlling the first member drive unit and the second member drive unit so that the first cleaning member and the second cleaning member simultaneously start moving at a third movement speed lower than the first movement speed and simultaneously contact the first surface and the second surface of the substrate, respectively, and~~

~~the control unit is configured to determine the second movement speed of the second cleaning member by the second member drive unit, on the basis of the first movement speed of the first cleaning member by the first member drive unit, so that the first cleaning member disposed at the first initial position and the second cleaning member disposed at the second initial position~~

~~simultaneously start the moving and the second cleaning member reaches the second proximity position at timing identical to timing when the first cleaning member reaches the first proximity position, before the first step.~~

~~6. The substrate cleaning device according to claim 5, wherein~~

~~each of the first cleaning member and the second cleaning member is a roll cleaning member.~~

~~7. The substrate cleaning device according to claim 5 or 6, wherein~~

~~each of the first member drive unit and the second member drive unit is an electric actuator.~~

4~~8~~. A substrate processing apparatus comprising the substrate cleaning device according to any one of claims 1 to ~~7~~3.

5~~9~~. A substrate cleaning method comprising:

a step of causing a member drive unit to press a cleaning member against a substrate;

a step of causing a load measurement unit to measure a pressing load of the cleaning member; and

a step of causing a control unit to control a pressing amount of the cleaning member by the member drive unit, on the basis of a measurement value of the load

measurement unit, so that the pressing load of the cleaning member becomes a setting load, wherein

in the step of controlling the pressing amount, the control unit repeats an operation of comparing the measurement value of the load measurement unit with the setting load, changing the pressing amount of the cleaning member by a first movement amount so that a difference value decreases, when the difference value is larger than a first threshold value and equal to or smaller than a second threshold value, and changing the pressing amount of the cleaning member by a second movement amount larger than the first movement amount so that the difference value decreases, when the difference value is larger than the second threshold value, until the difference value becomes equal to or smaller than the first threshold value.

~~10. A substrate cleaning method comprising:~~

~~a step of causing a control unit to calculate a pressing amount of a cleaning member corresponding to a setting load;~~

~~a step of causing a member drive unit to press the cleaning member against a substrate by the calculated pressing amount;~~

~~a step of causing a load measurement unit to measure a pressing load of the cleaning member; and~~

~~a step of causing a control unit to control the pressing amount of the cleaning member by the member drive~~

~~unit, on the basis of a measurement value of the load measurement unit, so that the pressing load of the cleaning member becomes the setting load, wherein~~

~~the control unit previously stores a correspondence relation between the pressing load and the pressing amount of the cleaning member for M pressing loads as master data, and~~

~~in the step of calculating the pressing amount, the control unit acquires the correspondence relation between the pressing load and the pressing amount of the cleaning member for N pressing loads among the M pressing loads as measurement data, on the basis of the measurement value of the load measurement unit,~~

~~the control unit corrects each of pressing amounts corresponding to the M pressing loads in the master data, on the basis of the measurement data, so that the correspondence relation between the pressing load and the pressing amount for the N pressing loads in the master data approaches the correspondence relation between the pressing load and the pressing amount for the N pressing loads in the measurement data, and generates data for movement amount calculation showing the correspondence relation between the pressing load and the pressing amount for the M pressing loads, and~~

~~the control unit calculates the pressing amount of the cleaning member corresponding to the setting load, on the basis of the correspondence relation between the~~

~~pressing load and the pressing amount in the data for movement amount calculation.~~

6~~11~~. The substrate cleaning method according to claim 5~~9 or 10~~, wherein

the cleaning member is any one member of a~~the~~ group consisting of a roll cleaning member, a pencil cleaning member, and a buff cleaning/polishing member.

7~~12~~. The substrate cleaning method according to~~ any one of~~ claim~~s~~ 5~~9~~ or~~to~~ 6~~11~~, wherein

the member drive unit is an electric actuator.

~~13. A substrate cleaning method comprising:~~

~~a step of causing a first member drive unit to contact a first cleaning member with a first surface of a substrate and causing a second member drive unit to contact a second cleaning member with a second surface of the substrate;~~

~~a step of causing the first member drive unit to press the first cleaning member against the first surface of the substrate and causing the second member drive unit to press the second cleaning member against the second surface of the substrate;~~

~~a step of causing a first load measurement unit to measure a pressing load of the first cleaning member and causing a second load measurement unit to measure a~~

~~pressing load of the second cleaning member; and~~

~~a step of causing a control unit to control each of a pressing amount of the first cleaning member by the first member drive unit and a pressing amount of the second cleaning member by the second member drive unit, on the basis of a measurement value of the first load measurement unit and a measurement value of the second load measurement unit, so that the pressing load of the first cleaning member becomes a first setting load and the pressing load of the second cleaning member becomes a second setting load,~~ ~~wherein~~

~~the step of contacting the first cleaning member and the second cleaning member with the substrate includes~~

~~a first step of causing the control unit to control the first member drive unit and the second member drive unit so that the first cleaning member moves at a first movement speed from a first initial position separated from the first surface of the substrate by a first distance to a first proximity position separated from the first surface by a third distance and the second cleaning member moves at a second movement speed from a second initial position separated from the second surface of the substrate by a second distance shorter than the first distance to a second proximity position separated from the second surface by the third distance and~~

~~a second step of causing the control unit to control the first member drive unit and the second member drive~~

~~unit so that the first cleaning member and the second cleaning member simultaneously start moving at a third movement speed lower than the first movement speed and simultaneously contact the first surface and the second surface of the substrate, respectively, and~~

~~the control unit determines the second movement speed of the second cleaning member, on the basis of the first movement speed of the first cleaning member, so that the first cleaning member disposed at the first initial position and the second cleaning member disposed at the second initial position simultaneously start the moving and the second cleaning member reaches the second proximity position at timing identical to timing when the first cleaning member reaches the first proximity position, before the first step.~~

~~14. The substrate cleaning method according to claim 13, wherein~~

~~each of the first cleaning member and the second cleaning member is a roll cleaning member.~~

~~15. The substrate cleaning method according to claim 13 or 14, wherein~~

~~each of the first member drive unit and the second member drive unit is an electric actuator.~~