CLAIMS

1. A cleaning device comprising:

a substrate rotation mechanism that holds a substrate and rotates the substrate around a center axis of the substrate as a rotation axis;

a first single-tube nozzle that discharges a first cleaning liquid toward a top surface of the substrate held by the substrate rotation mechanism; and

a second single-tube nozzle that discharges a second cleaning liquid toward the top surface of the substrate held by the substrate rotation mechanism separately from the first single-tube nozzle, wherein

the first single-tube nozzle discharges the first cleaning liquid such that the first cleaning liquid lands on a first position that is before a center of the substrate, and a first flow of the first cleaning liquid on the top surface of the substrate after landing passes through the center of the substrate,

the second single-tube nozzle discharges the second cleaning liquid in a forward direction of a rotation direction of the substrate such that the second cleaning liquid lands on a second position farther away from the center of the substrate than the first position that the first cleaning liquid lands on, and the first single-tube nozzle and the second single-tube nozzle are arranged such

that a portion is generated in which the first flow of the first cleaning liquid on the top surface of the substrate after landing and a second flow of the second cleaning liquid on the top surface of the substrate after landing are combined, and

from the perspective of a plan view of the substrate with a coordinate system having a supply direction of the first single-tube nozzle as one axis and a direction orthogonal to the supply direction of the first single-tube nozzle and passing through the center of the substrate as another axis, the second position that the second cleaning liquid discharged from the second single-tube nozzle lands on lies within a region on an upstream side by 90° in the rotation direction of the substrate with respect to an extension line from the center of the substrate in the supply direction of the first single-tube nozzle.

2. The cleaning device according to claim 1, wherein

a flow rate of the first cleaning liquid discharged from the first single-tube nozzle is larger than a flow rate of the second cleaning liquid discharged from the second single-tube nozzle.

3. The cleaning device according to claim 2, wherein

a diameter of the first single-tube nozzle is larger

than a diameter of the second single-tube nozzle.

4. The cleaning device according to any one of claims 1 to 3, wherein

discharge of the first cleaning liquid by the first single-tube nozzle and discharge of the second cleaning liquid by the second single-tube nozzle are capable of being performed simultaneously.

5. The cleaning device according to any one of claims 1 to 4, wherein

the first cleaning liquid and the second cleaning liquid are water or a chemical liquid.

6. The cleaning device according to any one of claims 1 to 5, wherein

a distance from the center of the substrate to the second position that the second cleaning liquid lands on is longer than 1/4 of a radius of the substrate.

7. The cleaning device according to claim 6, wherein

a distance from the center of the substrate to the second position that the second cleaning liquid lands on is longer than 1/3 of a radius of the substrate.

8. The cleaning device according to any one of claims 1 to 7, wherein

an angle between a liquid flow from being discharged from the first single-tube nozzle to landing on the top surface of the substrate and the top surface of the substrate is 15° to 75°.

9. The cleaning device according to any one of claims 1 to 8, wherein

an angle between a liquid flow from being discharged from the second single-tube nozzle to landing on the top surface of the substrate and the top surface of the substrate is 15° to 75°.

10. The cleaning device according to any one of claims 1 to 9, wherein

the number of second single-tube nozzles is two or more.

11. A cleaning method comprising:

a step of rotating a substrate around a center axis of the substrate as a rotation axis;

a step of discharging a first cleaning liquid from a first single-tube nozzle toward a top surface of the substrate; and

a step of discharging a second cleaning liquid from a second single-tube nozzle toward the top surface of the substrate separately from the first single-tube nozzle, wherein

in the step of discharging the first cleaning liquid, the first single-tube nozzle discharges the first cleaning liquid such that the first cleaning liquid lands on a first position that is before a center of the substrate, and a first flow of the first cleaning liquid on the top surface of the substrate after landing passes through the center of the substrate,

in the step of discharging the second cleaning liquid, the second single-tube nozzle discharges the second cleaning liquid in a forward direction of a rotation direction of the substrate such that the second cleaning liquid lands on a second position farther away from the center of the substrate than the first position that the first cleaning liquid lands on, and a portion is generated in which the first flow of the first cleaning liquid on the top surface of the substrate after landing and a second flow of the second cleaning liquid on the top surface of the substrate after landing are combined, and

from the perspective of a plan view of the substrate with a coordinate system having a supply direction of the first single-tube nozzle as one axis and a direction

orthogonal to the supply direction of the first single-tube nozzle and passing through the center of the substrate as another axis, the second position that the second cleaning liquid discharged from the second single-tube nozzle lands on lies within a region on an upstream side by 90° in the rotation direction of the substrate with respect to an extension line from the center of the substrate in the supply direction of the first single-tube nozzle.