SCOPE OF THE CLAIMS

1. A manufacturing method of a silicon single crystal comprising:

a melting step of producing a silicon melt containing a main-dopant in a pulling furnace; and

a crystal pulling step of pulling a silicon single crystal from the silicon melt while feeding Ar gas into the pulling furnace; wherein

the crystal pulling step includes at least one additional doping step of charging a sub-dopant to the silicon melt,

the additional doping step regulates a flow velocity of the Ar gas passing through a gap between a lower end of a heat-shield body installed above the silicon melt so as to surround the silicon single crystal pulled from the silicon melt and a liquid surface of the silicon melt to 0.75 m/s to 1.1 m/s, and

the flow velocity of the Ar gas during the crystal pulling step before a start of the additional doping step and after a completion of the additional doping step is set to a value lower than the flow velocity of the Ar gas during the additional doping step.

2. The manufacturing method of a silicon single crystal according to Claim 1, wherein

a width of the gap is controlled to 50 mm to 90 mm in the crystal pulling step.

3. The manufacturing method of a silicon single crystal according to Claim 1 or 2, wherein

the additional doping step regulates the flow velocity of the Ar gas by controlling at least one of the flow rate of the Ar gas to be fed into the pulling furnace and an internal pressure of the pulling furnace.

4. The manufacturing method of a silicon single crystal according to Claim 1 or 2, wherein

the additional doping step controls an internal pressure of the pulling furnace to 10 Torr to 30 Torr.

5. The manufacturing method of a silicon single crystal according to Claim 1 or 2, wherein

the crystal pulling step returns the flow velocity of the Ar gas after the completion of the additional doping step to the flow velocity of the Ar gas before the start of the additional doping step.

6. The manufacturing method of a silicon single crystal according to any one of Claims 1 to 5, wherein

the flow velocity of the Ar gas during the crystal pulling step before the start of the additional doping step and after the completion of the additional doping step is set to 0.3 to 0.5 m/s.