

removal device 200 causes compressed air to flow into a chamber 29 together with gaseous carbon dioxide and dry ice particles, mixes the gaseous carbon dioxide, the dry ice particles, and the compressed air in the chamber 29, and performs removal of fine foreign matter 50 and foreign matter 51 of a substrate 13 by ejecting the mixed fluid of compressed air, gaseous carbon dioxide, and dry ice particles from a slit 23. Since the foreign matter removal device 200 of the present embodiment can increase a flow rate of the fluid ejected from the slit 23 more than that in the foreign matter removal device 100 described above, even in a case of a large amount of adhesion of the foreign matter 51 larger than the fine foreign matter 50, it is possible to effectively perform removal of the fine foreign matter 50 and the foreign matter 51. Also, the particle diameter of the dry ice particles ejected from the slit 23 can be adjusted by adjusting a temperature of the air caused to be flowed in from the air inlet 25c.

[0036]

In the embodiment illustrated in Fig. 7, although it has been described that the air inlet 25c is provided to cause compressed air to flow into the sleeve 30, the air inlet 25c may be disposed at any position as long as the position allows compressed air to flow into the chamber 29 so that the gaseous carbon dioxide, the dry ice particles, and the compressed air are mixed, and may be disposed, for example, at a lid 22.

[0037]

Next, a foreign matter removal device 300 according to another embodiment of the present invention will be described with reference to Fig. 8. Portions the same as those in the foreign matter removal device 100 described above with reference to Figs. 1 to 6 are denoted by the same reference signs, and the description thereof will be omitted.

[0038]

As illustrated in Fig. 8, in a foreign matter removal device 300 of the present

[CLAIMS]

[Claim 1]

A foreign matter removal device comprising:

5 a nozzle in which a pressurized flow of liquid carbon dioxide is caused to be expanded and cooled during the expansion to form solid carbon dioxide particles in the flow;

a chamber connected to the nozzle and into which the solid carbon dioxide particles flow;

10 an ejection port connected to the chamber and configured to eject the solid carbon dioxide particles toward a surface of a flat plate-like member, and

a suction port disposed adjacent to the ejection port, wherein

15 a particle diameter of individual of the carbon dioxide particles ejected from the ejection port is adjusted by changing a distance between the nozzle and the chamber, whereby varying the flight distance of the solid carbon dioxide from the outlet of the nozzle to the chamber.

[Claim 2]

20 The foreign matter removal device according to claim 1, comprising a heater attached to an outer surface of the chamber and configured to adjust a particle diameter of individual of the carbon dioxide particles ejected from the ejection port by changing a heating amount of the heater.

[Claim 3]

The foreign matter removal device according to claim 1 or 2, wherein the ejection port is a slit communicating with the chamber and configured to eject the carbon dioxide particles in a band shape toward the surface of the flat plate-like member.

25 [Claim 4]

The foreign matter removal device according to claim 1 or 2, wherein the ejection port is a plurality of holes communicating with the chamber and disposed in a straight line.

[Claim 5]

The foreign matter removal device according to any one of claims 1 to 4, wherein the ejection port injects the carbon dioxide particles to be inclined in a direction of the suction port.

5 [Claim 6]

The foreign matter removal device according to any one of claims 1 to 5, further comprising:

an air inlet which causes compressed air to flow into the chamber, wherein the chamber mixes the carbon dioxide particles and the compressed air.