Claims

1. An electrostatic precipitator comprising:

an ionization unit configured to generate ions; and

a dust collection unit configured to electrically collect dust to which the ions are attached,

wherein the ionization unit includes an ionizer that generates the ions having the same polarity as an applied predetermined voltage by applying the voltage to an electrode needle to cause corona discharge,

wherein the dust collection unit includes:

a high-voltage electrode disposed at a rear stage of the ionization unit, having a plurality of gaps for passing the dust to which the ions are attached, and applied with a predetermined voltage; and

a dust collection board disposed at a rear stage of the high-voltage electrode and applied with a voltage or a ground voltage having polarity opposite to polarity of the voltage applied to the high-voltage electrode to electrically adsorb the dust to which the ions are attached,

wherein the polarity of the voltage applied to the electrode needle of the ionization unit and the polarity of the voltage applied to the high-voltage electrode are set to the same polarity, and

wherein the high-voltage electrode of the dust collection unit is formed by a plurality of linear

conductors arranged in parallel at a predetermined interval and each covered with an insulator,

wherein the dust collection board of the dust collection unit is formed by a base material such as a semi-conductor or an insulator and a carbon material covering the base material, and

wherein an ionizer having an electrode needle of the same polarity as the electrode needle of the ionization unit is additionally provided above and outside the dust collection unit.

2. An electrostatic precipitator according to Claim 1,

wherein a structure of the base material of the dust collection board is a large surface area structure such as a corrugated honeycomb structure, a sponge structure, or a fiber structure.

3. An electrostatic precipitator according to Claim 1 or 2,

wherein an interval between the plurality of linear conductors forming the high-voltage electrode is set within a range of 40 mm to 80 mm,

wherein a distance between the high-voltage electrode formed by the plurality of linear conductors and the dust collection board is set within a range of 45 mm to 100 mm, and

wherein a distance from the electrode needle of the

ionization unit to the high-voltage electrode is set to 0 mm or more.

4. An electrostatic precipitator according to Claim 1 or 2, wherein the ionizer is a direct current ionizer that generates ions by applying a direct current voltage of 3 kV or more, and
wherein the voltage applied to the dust collection board is a direct current voltage or a ground voltage having polarity opposite to that of the high-voltage electrode.

5. An electrostatic precipitator according to Claim 3, wherein the ionizer is a direct current ionizer that generates ions by applying a direct current voltage of 3 kV or more, and
wherein the voltage applied to the dust collection board is a direct current voltage or a ground voltage having polarity opposite to that of the high-voltage electrode.

6. An electrostatic precipitator according to Claim 1 or 2, wherein the ionization unit is disposed at a front stage inside an insulating cover of which front and rear sides are opened, and the dust collection unit is assembled from a middle stage to a rear stage inside the cover, and
wherein a front cover member made of an insulating resin and having a plurality of openings is provided between the

ionization unit and the high-voltage electrode of the dust collection unit and at a position away from the electrode needle of the ionization unit.

7. An electrostatic precipitator according to Claim 3, wherein the ionization unit is disposed at a front stage inside an insulating cover of which front and rear sides are opened, and the dust collection unit is assembled from a middle stage to a rear stage inside the cover, and wherein a front cover member made of an insulating resin and having a plurality of openings is provided between the ionization unit and the high-voltage electrode of the dust collection unit and at a position away from the electrode needle of the ionization unit.

8. An electrostatic precipitator according to Claim 4, wherein the ionization unit is disposed at a front stage inside an insulating cover of which front and rear sides are opened, and the dust collection unit is assembled from a middle stage to a rear stage inside the cover, and wherein a front cover member made of an insulating resin and having a plurality of openings is provided between the ionization unit and the high-voltage electrode of the dust collection unit and at a position away from the electrode needle of the ionization unit.

9. An electrostatic precipitator according to Claim 2, wherein the dust collection unit has any one of structures in which a plurality of the dust collection boards are stackedly provided in a front-rear direction, in which the dust collection board is bendedly provided in the front-rear direction, and in which a thicker dust collection board is provided, at the rear stage of the high-voltage electrode.