[Title of Document] Claims

[Claim 1]

An electrostatic precipitation apparatus for room ventilation, having a two-stage charging type electrostatic precipitator comprising an ionization section for charging floating particles in the air, a particle collection section for collecting charged floating particles with a coulomb force, and a power supply for supplying electric power to said ionization section and said particle collection section,

said apparatus comprising:

a constant-current control unit interposed between said power supply and said ionization section for supplying said ionization section with a constant current which does not cause a predefined voltage to be exceeded;

a sensing unit interposed between said power supply and said particle collection section for sensing an applied voltage value and current value at all times when said particle collection section is applied with a predetermined voltage;

a voltage step control unit for receiving the applied voltage value and current value from said sensing unit for issuing a command to increase or decrease the predetermined voltage so as to prevent said particle collection section from anomalously discharging in response to an anomalous discharge caused by a sudden fluctuation of the applied voltage value and current value and a continued fluctuation of the applied voltage value and current value within a certain range; and

a voltage changing unit for changing the predetermined voltage in response to a command from said voltage step control unit to control a current and a voltage sent from said power supply to said particle collection section,

said apparatus characterized in that:

said ionization section is applied with a constant current through said constant-current control unit;

said particle collection section is applied with the predetermined voltage through said voltage step control unit;

upon occurrence of an anomalous discharge, said voltage step control unit once stops supplying power to said particle collection section;

said voltage changing unit subsequently changes the predetermined voltage to a level at which an anomalous discharge does not occur, said changed predetermined voltage applied to said particle collection section to continue a particle collecting action; and

when said applied voltage value and current value continue to fluctuate within a certain range for a predefined time, a determination is made that a cause of the

anomalous discharge has been eliminated, allowing said voltage step control unit to issue a command to said voltage changing unit to increase the predetermined voltage, said increased predetermined voltage being applied to said particle collection section to continue a particle collecting action.

[Claim 2]

An electrostatic precipitation apparatus for room ventilation according to claim 1, wherein:

said voltage step control unit operates in a cleaning mode, said cleaning mode including, upon occurrence of an anomalous discharge due to the predetermined voltage applied to said particle collection section, once shutting off the power supply to said particle collection section with a command from said voltage step control unit, causing said voltage changing unit to apply a voltage higher than the predetermined voltage to said particle collection section to clean said particle collection section.

[Claim 3]

An electrostatic precipitation apparatus for room ventilation according to claim 1 or 2, wherein said voltage step control unit outputs a PWM (pulse width modulation) signal having a predetermined value from a CPU (central processing unit) to an amplifier circuit, such that said particle collection section is applied with the predetermined voltage commensurate with the PWM signal from said voltage changing unit.

[Claim 4]

An electrostatic precipitation apparatus for room ventilation according to claim 1 or 2, wherein:

said voltage changing unit includes n resistors (R1<R2 ... <Rn-1<Rn) arranged in parallel between said particle collection section and said power supply,

when said sensing unit senses an anomalous discharge while a resistor R1 is connected between said particle collection section and said power supply, said voltage step control unit issues a command to said voltage changing unit to once shut off said particle collection section from said power supply and subsequently switch the resistor R1 to a resistor R2 having a larger resistance value between said particle collection section and said power supply, said particle collection section being applied with the predetermined voltage, and

said voltage step control unit subsequently switches (n-2) arranged resistors to resistors R3 - Rn having larger resistance values to change in steps the predetermined

voltage, and applies the changed predetermined voltage to said particle collection section.

[Claim 5]

An electrostatic precipitation apparatus for room ventilation according to claim 1 or 2, wherein:

said voltage changing unit includes n resistors (R1 <R2 ... <Rn-1 <Rn) arranged in parallel between said particle collection section and said power supply,

when the applied voltage value or current value fluctuate within a certain range for a predefined time while one of the n resistors except for R1 (<R2 ... <Rn-1 <Rn) is connected between said particle collection section and said power supply, said voltage step control unit issues a command to said voltage changing unit to once shut off said particle collection section from said power supply, and subsequently switches the one resistor to another resistor R1 - Rn-l having a sequentially smaller resistance value between said particle collection section and said power supply to increase said predetermined voltage in steps, said particle collection section being applied with the predetermined voltage, and applies the increased predetermined voltage to said particle collection section.

[Claim 6]

A ventilation system characterized by utilizing an electrostatic precipitation apparatus for room ventilation according to any of claims 1 - 5.