CLAIMS

1. A method of automatically balancing ionized air stream created in bipolar corona discharge, the method comprising:

providing an air moving device with at least one ion emitter and at least one reference electrode connected to a micro-pulsed alternating current (AC) power source, and a control system with at least one ion balance monitor and a corona discharge adjustment control;

generating variable polarity groups of short duration ionizing micro-pulses; and

balancing an ionized air stream at least in part by varying, with the corona discharge adjustment control, a repetition rate of the ionizing micro-pulses generated by said power source:

wherein said micro-pulses are predominantly asymmetric in amplitude and in duration of both polarity voltages and have a magnitude of at least one polarity of the ionizing micro-pulses exceeding a corona threshold.

2. A method of claim 1, wherein a duration of at least one polarity of said micro-pulses is at least approximately 100 times shorter than a time interval between micro pulses.

3. A method of claim 1, wherein said micro-pulses are arranged in following one another in groups/pulse trains and wherein a positive pulse train comprises between approximately 2 and 16 positive ionizing pulses; and

a negative pulse train comprises between approximately 2 and 16 positive ionizing pulses, with a time interval between the positive and negative pulse trains that is equal to approximately 2 times the period of consecutive pulses.

4. A method of claim 3, wherein to balance an ionized air stream, said corona discharge adjustment control varying a number of pulses in said positive and/or negative pulse trains generated by said micro-pulsed AC power source.

5. A method of claim 3, wherein to balance an ionized air stream, said corona discharge adjustment control varies an amplitude of ionizing pulses in said positive and/or negative pulse trains generated by said micro-pulsed AC power source.

6. A method of claim 1, wherein said ion balance monitor provides separation ions convection currents from pulsed AC currents by arranging closed loop current path between said micro-pulsed AC power source, said ion emitter and reference electrode.

7. A method of claim 1, comprising: performing an ion balance monitoring during time periods between said micro-pulses.

8. A method of claim 6, comprising: performing an ion balance monitoring by integrating differential signals of said positive and negative convection currents.

9. An apparatus for an automatically balanced ionizing blower, comprising:

an air moving device and at least one ion emitter and reference electrode both connected to a high voltage source configured to generate variable polarity groups of short duration ionizing micro-pulses, wherein said micro-pulses are predominantly asymmetric in amplitude and duration of both polarity voltages and have a magnitude of at least one polarity ionizing pulses exceed the corona threshold;

an ion balance monitor; and

a control system configured to balance an ionized air stream by varying a repetition rate of the ionizing micro-pulses in said generated by said high voltage source;

wherein a transformer of said high voltage source, said ion emitter and reference electrode arranged in a closed loop for AC current circuit and said loop is connected to ground by a high value viewing resistor.

10. An apparatus of claim 9, wherein an ion balance monitor includes a high impedance voltage sensor connected to an ion balance control system and installed downstream to the ion emitter at an outlet of said air moving device.

11. An apparatus of claim 10, wherein an ion balance control system is configured to sample output signals from said viewing resistor and/or voltage sensor in a time interval between the ionizing micro-pulses.

12. An apparatus of claim 9, wherein said high voltage source generates an output comprising a duration of at least one polarity of said micro-pulses of at least approximately 100 times shorter than a time interval between micro pulses.

13. An apparatus of claim 9, wherein said micro-pulses are arranged in following one another groups/pulse trains and wherein polarity positive pulse train comprises between approximately 2 and 16 positive ionizing pulses; and

a negative pulse train comprises between approximately 2 and 16 negative ionizing pulses, with a time interval between the positive and negative pulse trains that is equal to approximately 2 times the period of consecutive pulses.

14. An apparatus of claim 13, wherein the control system is configured to balance the ionized air stream further by, varying a number of pulses in said positive and/or negative pulse trains generated by said high voltage source.

15. An apparatus of claim 13, wherein the control system is configured to balance the ionized air stream further by varying an amplitude of ionizing pulses in said positive and/or negative pulse trains generated by said high voltage source.

16. An apparatus of claim 9, wherein said ion balance monitor provides separation ions convection currents from pulsed AC currents by arranging closed loop current path between said high voltage source, said ion emitter and reference electrode.

17. An apparatus of claim 9, wherein said ion balance monitor performs an ion balance monitoring during time periods between micro-pulses.