The whole unit is of overall dimensions having approximate diameter 3 to 7 inches and approximate length of 7 to 10 inches and fits in a space near the muffler.

The material of construction for outer and inner cylinders may be a thermally conductive material such as prefereably SS or MS, which can withstand high voltage and high temperature. The material of construction for the wipers may be an insulating elastomeric material that is capable of withstanding high temperature, such as Silicon rubber. The supporting structure assembly is characterized by a rigid but insulating material, such as a metal construction coated with rubber layer.

Second embodiment: Coaxial Vertical Double Cylindrical CCM

The second embodiment is presently described with reference to Figure 5.

Carbon particulate matter laden exhaust gases C_{in} enter the CCM through an exhaust inlet pipe 11, which leads into an enclosing chamber 12, provided with an exhaust outlet pipe 13 to discharge the cleaned exhaust gases C_{out}. The enclosing chamber 12 is vertically positioned and is shaped substantially as a hollow cylinder and is referred hereinafter as a first cylinder 14. The exhaust inlet pipe 11 is preferably positioned in the bottom portion of the first cylinder 14, and the exhaust outlet pipe 13 is positioned at the top portion of the first cylinder 14.

The second cylinder 15 is disposed coaxially within the first cylinder 14. Both the first cylinder 14 and the second cylinder 15 are electrically conducting in nature and are charged with opposing polarities. Plurality of carbon brushes 16 (not shown in the figures) are in communication with the first cylinder 14 and the second cylinder 15 for supply of electric current.

In a preferred embodiment of the invention, the first cylinder 14 is negatively charged on its internal surface and the second cylinder 15 is positively charged on its external surface.

The second cylinder 15 is mounted on a supporting structure assembly 10 which rotates within the first cylinder 14. A stationary vertical support member 17 is non-removably attached to the first cylinder 14 and holds the supporting structure assembly 10 at one end. The supporting structure assembly 10 comprises of three parallel pipe members designated as an outer member 18, a central member 19 and an inner member 20. The central member 19 is disposed axially and non-removably within the second cylinder 15 and thereby provides support to the second cylinder 15. The central member 19 is also coupled to a motor 30 mounted on the exterior of the first cylinder 14. A wiper strip, designated as first wiper 21, made of a thermo elastomeric polymer material is non-removably affixed to a longitudinal edge of the outer

In alternate embodiments, resilient members such as springs may be provided between the wipers.

In another alternate embodiment, once the weight of the agglomerated carbon particles in the removable tray of the collection section reaches a predetermined level, an alarm in the form of a visual, audio, or message alert is triggered and the driver of the vehicle is sensitized. Optionally, a message can be sent by telecommunication means to a central server.

Third embodiment: Coaxial Horizontal Parallel Rotary Discs CCM

The second embodiment is presently described with reference to Figure 6.

Carbon particulate matter laden exhaust gases C_{in} enter the CCM through an exhaust inlet manifold, which diverges into a plurality of distribution pipes (not shown in figure) arranged in a symmetric fashion for uniform distribution of inlet gases and to dissipate the pressure drop.

The distribution pipes are housed in a stationary, horizontally positioned enclosing chamber 12, which encloses within it, a duality of rotary metallic discs or plates 33, of opposing polarities, mounted parallely and coaxially on a rotating supporting structure 10.

The entry of C_{in} into the enclosing chamber 12 is parallel to the discs 33. The rotating supporting structure is driven by means such as a pulley and is coupled to a motor 30 mounted on the exterior of the enclosing chamber 12. The pair of rotary discs are preferably circular in shape and parallel to each other with an approximate distance of 1 to 3 inches. Both the discs, designated as a first disc 34 and a second disc 35, are electrically conducting in nature and are charged with opposing polarities. Plurality of carbon brushes 16 (not shown in the figure) are in communication with first disc 34 and second disc 35 for supply of electric current. The first disc 34 and the second disc 35 are centrally mounted on the rotating, supporting structure assembly 10.

A wiper strip, designated as a first wiper 21, and a wiper strip designated as a second wiper 22, are made of a thermo elastomeric polymer material and are non-removably affixed at a predetermined position of the enclosing chamber. The first and second wiper, 21 and 22, are positioned in close contact with the first and second discs, 34 and 35, respectively to scrape off the deposited agglomerated layer of carbon particles.

What is claimed is:

1. A device for air pollution control, wherein carbon particulate matter present in exhaust gases generated by the combustion of hydrocarbons, is agglomerated, collected and separated and prevented from being directly emitted into the atmosphere, during the combustion, characterized by controlled steps of charging and cleaning at predetermined duration and frequency, comprises:
    a) an exhaust inlet pipe 11, leading into an enclosed chamber 12, shaped as a first hollow cylinder 14, said first hollow cylinder 14, provided with an exhaust outlet pipe 13, a front lid 31, a back lid 32,
    wherein said first hollow cylinder 14 is characterized by an electrically conducting nature;
    b) a second cylinder 15, disposed coaxially within the first hollow cylinder 14, to form an annular space of predetermined distance,
    wherein said cylinder 15 is characterized by an electrically conducting nature;
    c) a plurality of carbon brushes 16 in communication with the first cylinder 14 and the second cylinder 15,
    d) a high voltage power source 29, connected to the plurality of carbon brushes 16, capable of applying prescribed high voltage between said first cylinder 14 and said second cylinder 15 and charging said first cylinder and said second cylinder with opposing polarities so as to create a corona discharge,
    e) a supporting structure assembly 16, rotatably disposed within the first cylinder 14, wherein said supporting structure assembly 16, further comprising of three parallel pipe members designated as an outer member 18, a central member 19 and an inner member 20, such that the central member 19 is disposed axially and non-removably within the second cylinder 15,
    f) a power source (motor 30) mounted on the exterior of the first cylinder and coupled to the central member 19 for driving the rotational movement of the supporting structure assembly 16,
    g) a stationary vertical support member 17 non-removably attached to the first cylinder 14 and connected to the supporting structure assembly 16 at one end,
    h) a first wiper 21, non-removably affixed to a longitudinal edge of the outer member 18, in contact with the external surface of second cylinder,

i) a second wiper 22, non-removably affixed to a longitudinal edge of the inner member 20, in contact with the internal surface of cylinder,
wherein the first wiper 21 and the second wiper 22 are characterized by a thermo elastomeric polymer material,

j) a separation chamber 23, connected to the first cylinder 14 through the exhaust outlet pipe 13, wherein the separation chamber 23 further comprises a cyclone section 24, a collection section 25 and an outlet pipe 27;
said collection section 25 further comprising of a removable tray 26 positioned at the lower portion, and coupled to the cyclone section 24 and said outlet pipe 27 connected to the upper portion of the cyclone section 24 for discharge of clean exhaust gases C_c;

k) an electronic control unit comprising of a microcontroller system electrically linked to the motor 30 and the power source 29 for control of the charging and cleaning cycle at predetermined duration and predetermined frequency;

wherein the enclosing chamber 12 is horizontally positioned and parallel to the inflow of the exhaust gas, the first cylinder 14 and the second cylinder 15 are stationary and the first wiper 21 and the second wiper 22 rotate.

2. A device for air pollution control, wherein carbon particulate matter present in exhaust gases generated by the combustion of hydrocarbons, is agglomerated, collected and separated and prevented from being directly emitted into the atmosphere, during the combustion, characterized by controlled steps of charging and cleaning at predetermined duration and frequency, comprises:

a) an exhaust inlet pipe 11, leading into an enclosed chamber 12, shaped as a first hollow cylinder 14, said first hollow cylinder 14, provided with an exhaust outlet pipe 13, a front lid 31, a back lid 32,
wherein said first hollow cylinder 14 is characterized by an electrically conducting nature;

b) a second cylinder 15, disposed coaxially within the first hollow cylinder 14, to form an annular space of predetermined distance,
wherein said cylinder 15 is characterized by an electrically conducting nature;

c) a plurality of carbon brushes 16 in communication with the first cylinder 14 and the second cylinder 15,

d) a high voltage power source 29, connected to the plurality of carbon brushes 16, capable of applying prescribed high voltage between said first cylinder 14 and said second cylinder 15 and charging said first cylinder 14 and said second cylinder 15 with opposing polarities so as to create a corona discharge,

e) a supporting structure assembly 16, rotatably disposed within the first cylinder 14, wherein said supporting structure assembly 16, further comprising of three parallel pipe members designated as an outer member 18, a central member 19 and an inner member 20, such that the central member 19 is disposed axially and non-removably within the second cylinder 15,

f) a power source (motor 30) mounted on the exterior of the first cylinder and coupled to the central member 19 for driving the rotational movement of the supporting structure assembly 16,

g) a stationary vertical support member 17 non-removably attached to the first cylinder 14 and connected to the supporting structure assembly 16 at one end,

h) a first wiper 21, non-removably affixed to a longitudinal edge of the outer member 18, in contact with the external surface of second cylinder,

i) a second wiper 22, non-removably affixed to a longitudinal edge of the inner member 20, in contact with the internal surface of cylinder,

wherein the first wiper 21 and the second wiper 22 are characterized by a thermo elastomeric polymer material,

j) a separation chamber 23, integrally coupled to the lower portion of the first cylinder 14, wherein the separation chamber 23 further comprises a cyclone section 24, a collection section 25 and an outlet pipe 27;

said collection section 25 further comprising of a removable tray 26 positioned at the lower portion, and coupled to the cyclone section 24 and said outlet pipe 27 connected to the upper portion of the cyclone section 24 for discharge of clean exhaust gases C_c;

k) an electronic control unit comprising of a microcontroller system electrically linked to the motor 30 and the power source 29 for control of the charging and cleaning cycle at predetermined duration and predetermined frequency;

wherein the enclosing chamber 12 is vertically positioned and perpendicular to the inflow of the exhaust gas, the first cylinder 14 and the second cylinder 15 are stationary and the first wiper 21 and the second wiper 22 rotate.

3. A device for air pollution control provided by the present invention, wherein carbon particulate matter present in exhaust gases generated by the combustion of hydrocarbons, is agglomerated, collected and separated and prevented from being directly emitted into the atmosphere, during the combustion, characterized by controlled steps of charging and cleaning at predetermined duration and frequency, comprises:

a) a stationary, horizontally positioned enclosing chamber 12, which encloses within it, a duality of rotary metallic discs 33 comprising of a first disc and a second disc, of opposing polarities, mounted parallely and coaxially on a rotating supporting structure 10,

wherein said duality of rotary metallic discs 33 are characterized by an electrically conducting nature and said duality of rotary metallic discs 33 are positioned to form an annular space of predetermined distance,

b) a plurality of carbon brushes 16 in communication with the first disc and the second disc,

c) a high voltage power source 29, connected to the plurality of carbon brushes 16, capable of applying prescribed high voltage between said first disc and said second disc and charging said first disc and said second disc with opposing polarities so as to create a corona discharge,

d) a supporting structure assembly 16, rotatably disposed within the enclosing chamber 12, further comprising of a rotatable shaft onto which said duality of rotary discs 33 are fixedly mounted for rotation in a plane perpendicular to said shaft,

e) a power source (motor 30) mounted on the exterior of the enclosing chamber 12 for driving the rotational movement of the supporting structure assembly 16,

f) a stationary vertical support member 17 non-removably attached to the supporting structure assembly 16 at one end,

g) a first wiper 21, non-removably affixed to the supporting structure assembly 16, in contact with a surface of a first disc,

h) a second wiper 22, non-removably affixed to the supporting structure assembly 16, in contact with a surface of a second disc,

wherein the first wiper 21 and the second wiper 22 are characterized by a thermo elastomeric polymer material,

i) a separation chamber 23, connected to the enclosing chamber 12 through the exhaust outlet pipe 13, wherein the separation chamber 23 further comprises a cyclone section 24, a collection section 25 and an outlet pipe 26;

said collection section 25 further comprising of a removable tray 26 positioned at the lower portion, and coupled to the cyclone section 24 and said outlet pipe 26 connected to the upper portion of the cyclone section 24 for discharge of clean exhaust gases C_c;

j) an electronic control unit comprising of a microcontroller system electrically linked to the motor 30 and the power source 29 for control of the charging and cleaning cycle at predetermined duration and predetermined frequency;

wherein the enclosing chamber 12 is stationary and horizontally positioned and the first disc and the second disc rotate in a plane perpendicular to the inflow of the exhaust gas and the first wiper 21 and the second wiper 22 are stationary.

4. A device for air pollution control provided by the present invention, wherein carbon particulate matter present in exhaust gases generated by the combustion of hydrocarbons, is agglomerated, collected and separated and prevented from being directly emitted into the atmosphere, during the combustion, characterized by controlled steps of charging and cleaning at predetermined duration and frequency, comprises:

a) a stationary, vertically positioned enclosing chamber 12, which encloses within it, a duality of rotary metallic discs 33 comprising of a first disc and a second disc, of opposing polarities, mounted parallely and coaxially on a rotating supporting structure 10,

wherein said duality of rotary metallic discs 33 are characterized by an electrically conducting nature and said duality of rotary metallic discs 33 are positioned to form an annular space of predetermined distance,

b) a plurality of carbon brushes 16 in communication with the first disc and the second disc,

c) a high voltage power source 29, connected to the plurality of carbon brushes 16, capable of applying prescribed high voltage between said first disc and said second disc and charging said first disc and said second disc with opposing polarities so as to create a corona discharge,

d) a supporting structure assembly 16, rotatably disposed within the enclosing chamber 12, further comprising of a rotatable shaft onto which said duality of rotary discs 33 are fixedly mounted for rotation in a plane perpendicular to said shaft,

e) a power source (motor 30) mounted on the exterior of the enclosing chamber 12 for driving the rotational movement of the supporting structure assembly 16,

f) a stationary horizontal support member 17 non-removably attached to the supporting structure assembly 16 at one end,

g) a first wiper 21, non-removably affixed to the supporting structure assembly 16, in contact with a surface of a first disc,

h) a second wiper 22, non-removably affixed to the supporting structure assembly 16, in contact with a surface of a second disc,

wherein the first wiper 21 and the second wiper 22 are characterized by a thermo elastomeric polymer material,

i) a separation chamber 23, integrally coupled to the lower portion of the first cylinder 14, wherein the separation chamber 23 further comprises a cyclone section 24, a collection section 25 and an outlet pipe 27;

said collection section 25 further comprising of a removable tray 26 positioned at the lower portion, and coupled to the cyclone section 24 and said outlet pipe 26 connected to the upper portion of the cyclone section 24 for discharge of clean exhaust gases C_c;

j) an electronic control unit comprising of a microcontroller system electrically linked to the motor 30 and the power source 29 for control of the charging and cleaning cycle at predetermined duration and predetermined frequency;

wherein the enclosing chamber 12 is stationary and vertically positioned and the first disc and the second disc rotate in a plane parallel to the inflow of the exhaust gas and the first wiper 21 and the second wiper 22 are stationary.

5. A device for air pollution control provided by the present invention, wherein carbon particulate matter present in exhaust gases generated in a open source pollution, is agglomerated, collected and separated and prevented from being directly emitted into the atmosphere, characterized by controlled steps of charging and cleaning at predetermined duration and frequency, comprises:

a) a vertical tower 36 provided with an inlet mesh 38, an induced draft fan 37, a first hollow cylinder 14,

wherein said first hollow cylinder 14 is characterized by an electrically conducting nature and is housed in the central position of the vertical tower 36;

b) a second cylinder 15, disposed coaxially within the first hollow cylinder 14, to form an annular space of predetermined distance,
wherein said cylinder 15 is characterized by an electrically conducting nature;

c) a plurality of carbon brushes 16 in communication with the first cylinder 14 and the second cylinder 15,

d) a high voltage power source 29, connected to the plurality of carbon brushes 16, capable of applying prescribed high voltage between said first cylinder 14 and said second cylinder 15 and charging said first cylinder 14 and said second cylinder 15 with opposing polarities so as to create a corona discharge,

e) a supporting structure assembly 16, rotatably disposed within the first cylinder 14, wherein said supporting structure assembly 16, further comprising of three parallel pipe members designated as an outer member 18, a central member 19 and an inner member 20, such that the central member 19 is disposed axially and non-removably within the second cylinder 15,

f) a power source (motor 30) coupled to the central member 19 for driving the rotational movement of the supporting structure assembly 16,

g) a stationary vertical support member 17 non-removably attached to the first cylinder 14 and connected to the supporting structure assembly 16 at one end,

h) a first wiper 21, non-removably affixed to a longitudinal edge of the outer member 18, in contact with the external surface of second cylinder,

i) a second wiper 22, non-removably affixed to a longitudinal edge of the inner member 20, in contact with the internal surface of cylinder,
wherein the first wiper 21 and the second wiper 22 are characterized by a thermo elastomeric polymer material,

j) a separation chamber 23, integrally coupled to the lower portion of the first cylinder 14, wherein the separation chamber 23 further comprises a cyclone section 24, a collection section 25 and an outlet pipe 27;
said collection section 25 further comprising of a removable tray 26 positioned at the lower portion, and coupled to the cyclone section 24 and said outlet pipe 27 connected to the upper portion of the cyclone section 24 for discharge of clean exhaust gases C_c;

k) an electronic control unit comprising of a microcontroller system electrically linked to the motor 30 and the power source 29 for control of the charging and cleaning cycle at predetermined duration and predetermined frequency;

wherein the sucking tower 36 is vertically positioned and perpendicular to the inflow of the exhaust gas, the first cylinder 14 and the second cylinder 15 are stationary and the first wiper 21 and the second wiper 22 rotate.

6. A device as claimed in any of the claims 1 to 5, wherein a notification by way of an audio alert, a visual alert, a Short Messaging Service (SMS) alert, or a combination of an audio, visual and a Short Messaging Service (SMS) alert is generated and transmitted to a user or a communication device, when the weight of the agglomerated carbon particles in the collection section reaches a predetermined level.

7. A device as claimed in claim 6 wherein the communication device comprises at least one of a mobile phone, a personal computer, a smart phone, a cellular phone, a personal digital assistant (PDA), a GPS device, a smartbook, a netbook, a notebook, an ultra-mobile personal computer and a wearable computing device.

8. A device as claimed in claim 5 wherein the power source for rotating the wiper blades is achieved by a renewable energy source such as solar or wind energy.