

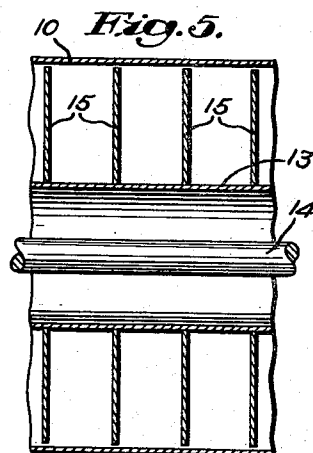
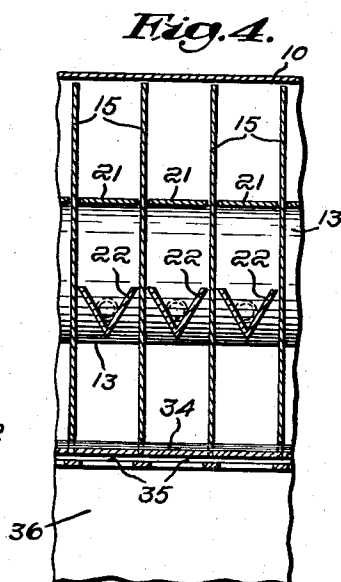
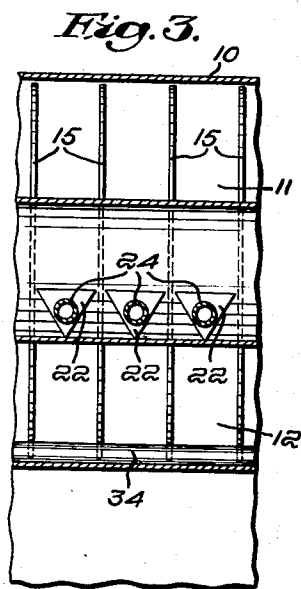
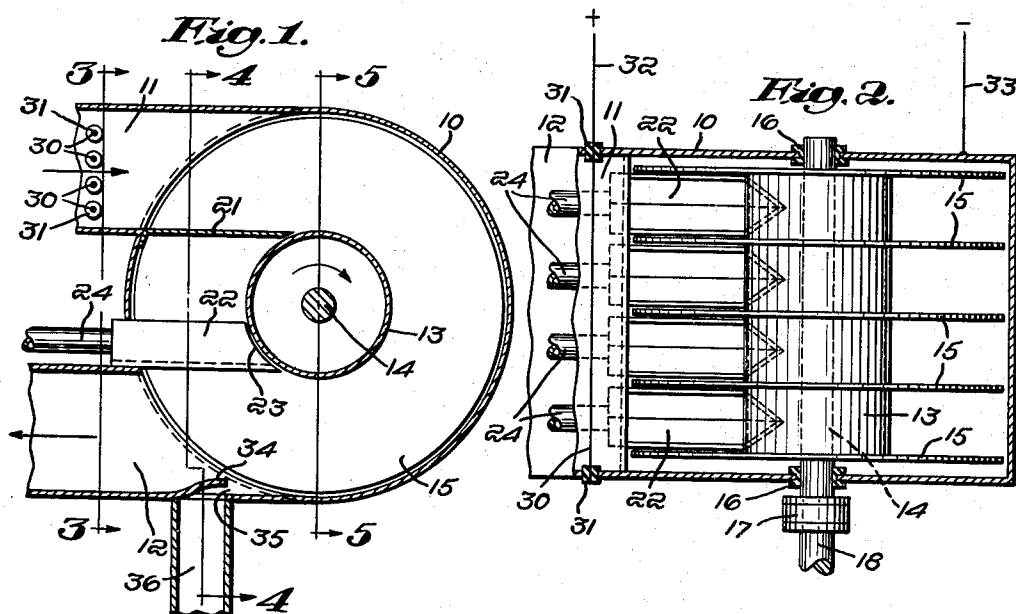
Nov. 2, 1943.

R. L. LINCOLN

2,333,431

ELECTROSTATIC PRECIPITATORS

Filed Oct. 30, 1941



Inventor:
 Roland L. Lincoln,
 by Robert J. Palmer
 Attorney

UNITED STATES PATENT OFFICE

2,333,431

ELECTROSTATIC PRECIPITATOR

Roland L. Lincoln, Dedham, Mass., assignor to
B. F. Sturtevant Company, Boston, Mass.

Application October 30, 1941, Serial No. 417,129

6 Claims. (Cl. 183—7)

This invention relates to electrostatic precipitators for removing small foreign particles such as dust or cinders from gases and for disposing of same.

Prior electrostatic precipitators have utilized charged wires, rods, or plates upon which the dust collected through electrostatic attraction. Such precipitators have the disadvantages that it is difficult to dislodge the particles deposited upon the plates, for collection and disposal. In some prior electrostatic precipitators, the positive electrodes are vibrated periodically as by hammer like blows for dislodging the dust particles. In others it is necessary to shut down the apparatus and to wash the dust off the electrodes.

This invention provides a continuously operating electrostatic precipitator in which the dust is continuously removed as it is deposited, by suction applied to one of the electrode surfaces. In one embodiment of the invention, a cylindrical, metal casing having a tangential gas inlet and a tangential gas outlet, contains a plurality of vertically disposed, spaced, circular, metallic plate electrodes, which are centrally disposed in the casing and are revolved therein in the direction of the movement of the gas therethrough. A plurality of positively charged wires extend across the inlet and serve to charge the dust particles passing therethrough. The circular electrodes are at ground, or negative potential with the result that the positive dust particles are attracted thereto and collect upon the surfaces of the circular plates. Suction nozzles extending the distance between adjacent plates are placed between pairs of the plates and suction applied to the nozzles removes the dust particles from the plates as they are deposited.

An object of the invention is to improve the efficiency of electrostatic precipitators.

Another object of the invention is to provide an improved method of removing dust particles from electrodes in electrostatic precipitators.

Another object of the invention is to provide rotating electrodes in an electrostatic precipitator and to apply suction to the surfaces of the rotating electrodes for removing the dust particles precipitated thereon.

The invention will now be described with reference to the drawing, of which:

Fig. 1 is a side elevation partially in section, of a dust collector embodying this invention;

Fig. 2 is a plan view partially in section, looking downwardly upon the collector of Fig. 1;

Fig. 3 is a sectional view along the lines 3—3 of Fig. 1;

Fig. 4 is a sectional view along the lines 4—4 of Fig. 1, and

Fig. 5 is a sectional view along the lines 5—5 of Fig. 1.

The cylindrical metallic casing 10 has the tangential gas inlet 11 and the oppositely directed tangential gas outlet 12, in parallel alignment therewith.

Disposed in the casing 10 is the drum 13 supported in the rotary shaft 14 by the outermost of the spaced circular, metallic, electrode plates 15, the inner plates 15 being supported on the drum.

The plurality of spaced wires 30 extend across the inlet 11 and are supported from the sides thereof by the electric insulators 31. These wires are interconnected at their ends and are connected by the conductor 32 to the positive terminal of a high voltage direct current electric source.

The shaft 14 is supported from the end walls of the casing through which it extends, by the bearings 16. One end of the shaft 14 is connected through the coupling 17 to the shaft 18 for rotation by a suitable motor.

The metal casing of the unit is connected by the conductor 33 to the negative terminal of the high voltage electric source and through this connection, and the metallic contacts of the bearings, etc., the plates 15 are placed at negative or ground potential.

The sheet members 21 (Figs. 1 and 4) are connected to the casing 10 and extend between the plates 15 adjacent the drum 13, and form upper walls above the suction nozzles 22.

The V-shaped suction nozzles 22 extend through the casing 10, between the plates 15, to points adjacent the drum 13, and have their inner surfaces 23 adjacent the drum, curved complementary to the cylindrical surface of the drum. The upper surfaces of the nozzles 22 extend substantially completely crosswise the spaces between adjacent plates 15.

The lower walls of the outlet 12 are turned upwardly at 34 to form the tangential skimming passage 35 at the downstream sides of the plates 15, which passage connects with the downwardly extending dust disposal passage 36.

In operation, the plates 15 are rotated in the direction of the dust laden gas introduced through the tangential inlet 11. The dust particles passing the wires 30 are charged positively and then are attracted to and adhere to the surfaces of the negatively charged plates.

Some of the dust is thrown off by centrifugal

force from the plates 15 and enters the tangential skimming passage 35. Dust which may not have adhered to the plates 15 is thrown out by centrifugal force against the curved walls of the unit and enters the passage 35.

Suction through the tubes 24 is applied from a suitable source, to the nozzles 22. The walls 21 and the close spacing of the nozzle surfaces to the surfaces of the plates 15, form substantially enclosed spaces enabling suction from the nozzles to be concentrated upon the surfaces of the plates, this suction removing the dust particles from the plates. The dust is conveyed through the tubes 24 for disposal. The clean gas passes through the outlet 12.

By providing the lower walls of the nozzles as the legs of V's, the dust particles are drawn by the suction into converging channels, thus facilitating their passage into the tubes 24. The suction nozzles are seen to be located where they do not interfere with the gas flow through the collector. The collection is accomplished with an extremely low draft loss.

The plates are exposed to suction from the nozzles, at the same points, during each revolution thereof, the precipitation being continuous, the suction being continuously applied and the collection being continuous. No hammer blows for dislodging the dust particles are necessary nor is any washing down required.

While one embodiment of the invention has been described for the purpose of illustration, it should be understood that the invention is not limited to the exact apparatus and arrangements of apparatus illustrated, as modifications thereof may be suggested by those skilled in the art without departure from the essence of the invention.

What is claimed is:

1. A dust collector comprising a casing having a gas inlet and a gas outlet and having circular walls, a rotary shaft extending substantially horizontally through said casing, a cylindrical drum mounted on said shaft, a plurality of spaced circular plates extending substantially perpendicular from said drum into the path of the gas flowing between said inlet and outlet, means for charging the dust entering said casing, and said plates, electrically opposite whereby the dust will be attracted by said plates, and means including a suction nozzle extending between adjacent said plates and having a curved surface complementary to the surface of said drum, closely adjacent said drum, for removing the dust precipitated upon the plates.

2. A dust collector comprising a casing having a gas inlet and a gas outlet and having circular walls, a rotary shaft extending substantially horizontally through said casing, a cylindrical drum mounted on said shaft, a plurality of spaced circular plates extending substantially perpendicular from said drum into the path of the gas flowing between said inlet and outlet, means for charging the dust entering said casing, and said plates, electrically opposite whereby the dust will be attracted by said plates, a plurality of suction nozzles extending substantially completely crosswise the space between adjacent plates and having curved surfaces complementary to the surface of said drum, closely adjacent said drum, for removing the precipitated dust from said plates, and a plurality of walls extending between said plates, from the said circular walls to closely adjacent said drum, and spaced from said nozzles, for forming with said nozzles, suction application spaces through which said plates revolve,

3. A dust collector comprising a casing having a gas inlet and a gas outlet and having circular walls, a rotary shaft extending substantially horizontally through said casing, a cylindrical drum mounted on said shaft, a plurality of spaced circular plates extending substantially perpendicular from said drum into the path of the gas flowing between said inlet and outlet, means for charging the dust entering said casing, and said plates, electrically opposite whereby the dust will be attracted by said plates, a plurality of suction nozzles extending substantially horizontally substantially completely crosswise the space between adjacent plates and having curved surfaces complementary to the surface of said drum, closely adjacent said drum, for removing the precipitated dust from said plates, and a plurality of walls extending between said plates, from the said circular walls to closely adjacent said drum, and spaced from said nozzles, for forming with said nozzles, suction application spaces through which said plates revolve, said nozzles being formed substantially as open V's and said walls extending between said plates extending substantially parallel to said nozzles and above same.

4. A dust collector comprising a casing having curved walls and having a tangential gas inlet passage extending into one side thereof and an oppositely directed tangential gas outlet passage extending from said side, substantially parallel to said inlet passage, a rotary shaft extending substantially horizontally centrally through said casing, a cylindrical drum mounted on said shaft, a plurality of spaced circular plates extending substantially perpendicular to said drum into the path of the gas flowing between said inlet and outlet, means for charging the dust entering said casing, and said plates, electrically opposite whereby the dust will be attracted by said plates, and a plurality of suction nozzles extending at said side between said inlet and outlet, substantially completely crosswise the space between the plates and having curved surfaces complementary to the surface of said drum, closely adjacent said drum, for removing the dust from said plates.

5. A dust collector comprising a casing having curved walls and having a tangential gas inlet passage extending into one side thereof and an oppositely directed tangential gas outlet passage extending from said side, substantially parallel to said inlet passage, a rotary shaft extending substantially horizontally centrally through said casing, a cylindrical drum mounted on said shaft, a plurality of spaced circular plates extending substantially perpendicular to said drum into the path of the gas flowing between said inlet and outlet, means for charging the dust entering said casing, and said plates, electrically opposite whereby the dust will be attracted by said plates, a plurality of suction nozzles extending at said side between said inlet and outlet, substantially completely crosswise the space between the plates and having curved surfaces complementary to the surface of said drum, closely adjacent said drum, for removing the dust from said plates, and a plurality of walls extending between said plates, from said circular walls to closely adjacent said drum, and spaced from said nozzles between same and said inlet, for forming with said nozzles, suction application spaces through which said plates revolve.

6. A dust collector comprising a casing having curved walls and having a tangential gas inlet passage extending into one side thereof and an

oppositely directed tangential gas outlet passage extending from said side, substantially parallel to said inlet passage, a rotary shaft extending substantially horizontally centrally through said casing, a cylindrical drum mounted on said shaft, 5 a plurality of spaced circular plates extending substantially perpendicular to said drum into the path of the gas flowing between said inlet and outlet, means for charging the dust entering said casing, and said plates, electrically opposite 10 whereby the dust will be attracted by said plates, a plurality of suction nozzles extending substantially horizontally at said side between said inlet and outlet, substantially completely cross-wise

the space between the plates and having curved surfaces complementary to the surface of said drum, closely adjacent said drum, for removing the dust from said plates, and a plurality of walls extending between said plates, from said circular walls to closely adjacent said drum, and spaced from said nozzles between same and said inlet, for forming with said nozzles, suction application spaces through which said plates revolve, said nozzles being formed substantially as open V's and said walls extending between said plates extending substantially parallel to said nozzles and above same.

ROLAND L. LINCOLN.