United States Patent [19]

Kim et al.

[11] **3,929,436**

[45] **Dec. 30, 1975**

[54] **ROTARY ELECTROSTATIC PRECIPITATOR**

[75] Inventors: **Kenneth Kim,** Tokyo; **Shigemutsu Suzuki,** Urawa, both of Japan

[73] Assignee: **Lotte Co., Ltd.,** Tokyo, Japan

[22] Filed: **Sept. 13, 1973**

[21] Appl. No.: **396,821**

[30] **Foreign Application Priority Data**

July 4, 1973 Japan 48-75417

[52] **U.S. Cl.** **55/121**; 55/138; 55/146; 55/145; 55/149; 55/151; 55/154

[51] **Int. Cl.²** **B03C 3/10**

[58] **Field of Search** 55/13, 14, 108, 109, 113, 55/114, 118–120, 121, 138, 128, 145, 146, 149, 151, 154

[56] **References Cited**

UNITED STATES PATENTS

1,394,771	10/1921	Kennard	55/114
2,631,687	3/1953	Dohrer	55/108
2,663,380	12/1953	Savitz	55/128
3,714,762	2/1973	Fillies et al.	55/120

FOREIGN PATENTS OR APPLICATIONS

32,128	4/1927	France	55/14

Primary Examiner—Bernard Nozick

[57] **ABSTRACT**

A rotary type electrostatic precipitator which comprises within a dust precipitation zone a discharge zone, a dust collecting zone being provided which cooperates with said discharge zone and a dust removing zone disposed within said dust precipitating zone. The discharge zone includes a plurality of discharge units which are radially disposed within the dust precipitating zone whereas the dust collecting zone includes a plurality of disc electrodes rotatably mounted on a common rotary shaft. The dust removing zone includes a plurality of closed chambers formed within the dust collecting zone but independent therefrom.

10 Claims, 15 Drawing Figures

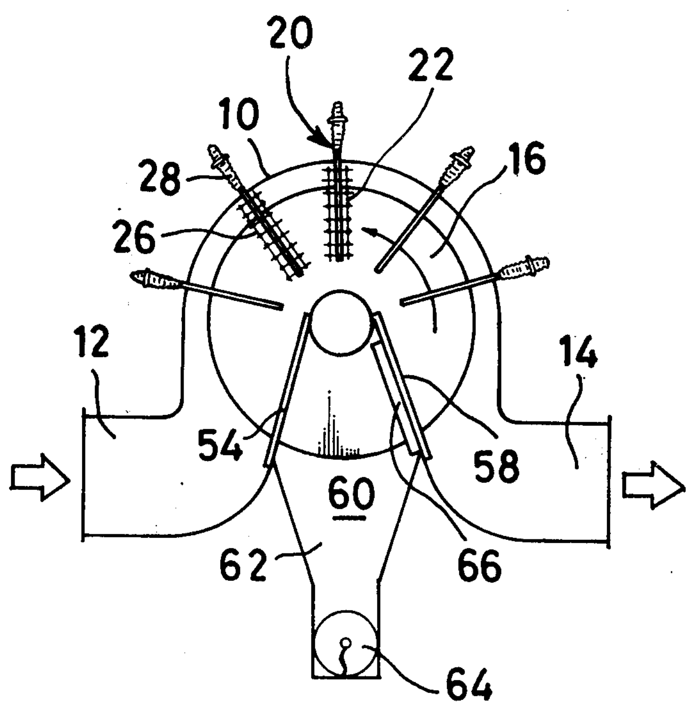


FIG.1

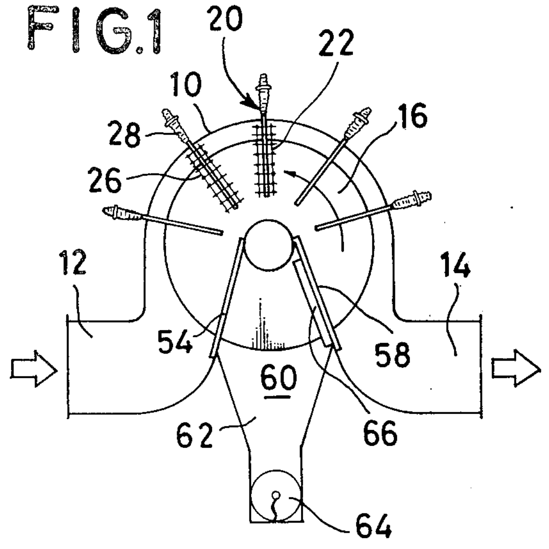


FIG.4

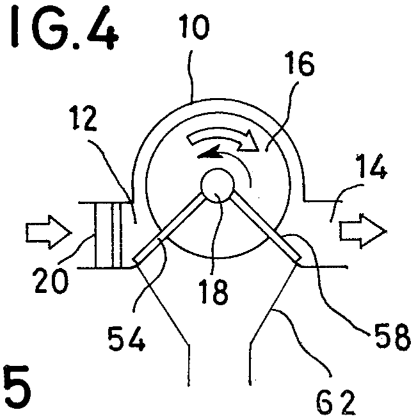


FIG.2

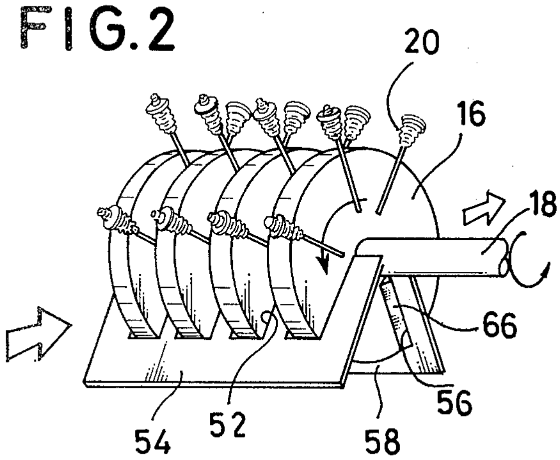


FIG.5

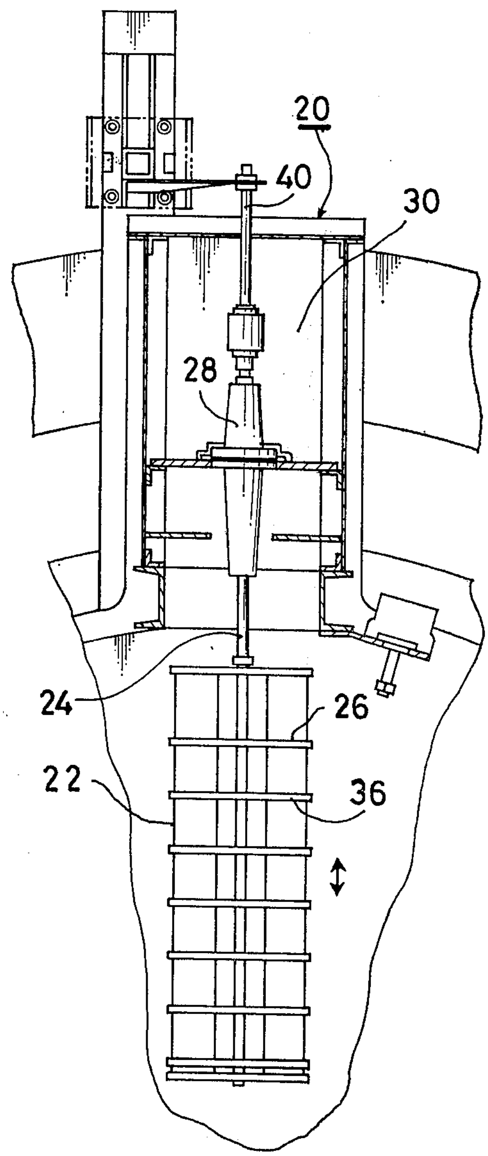
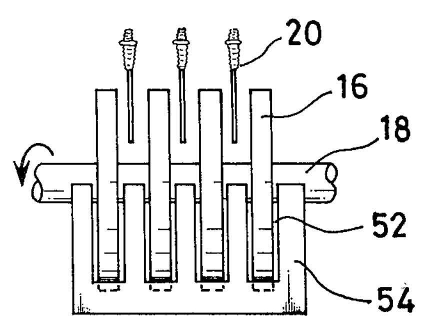


FIG.3



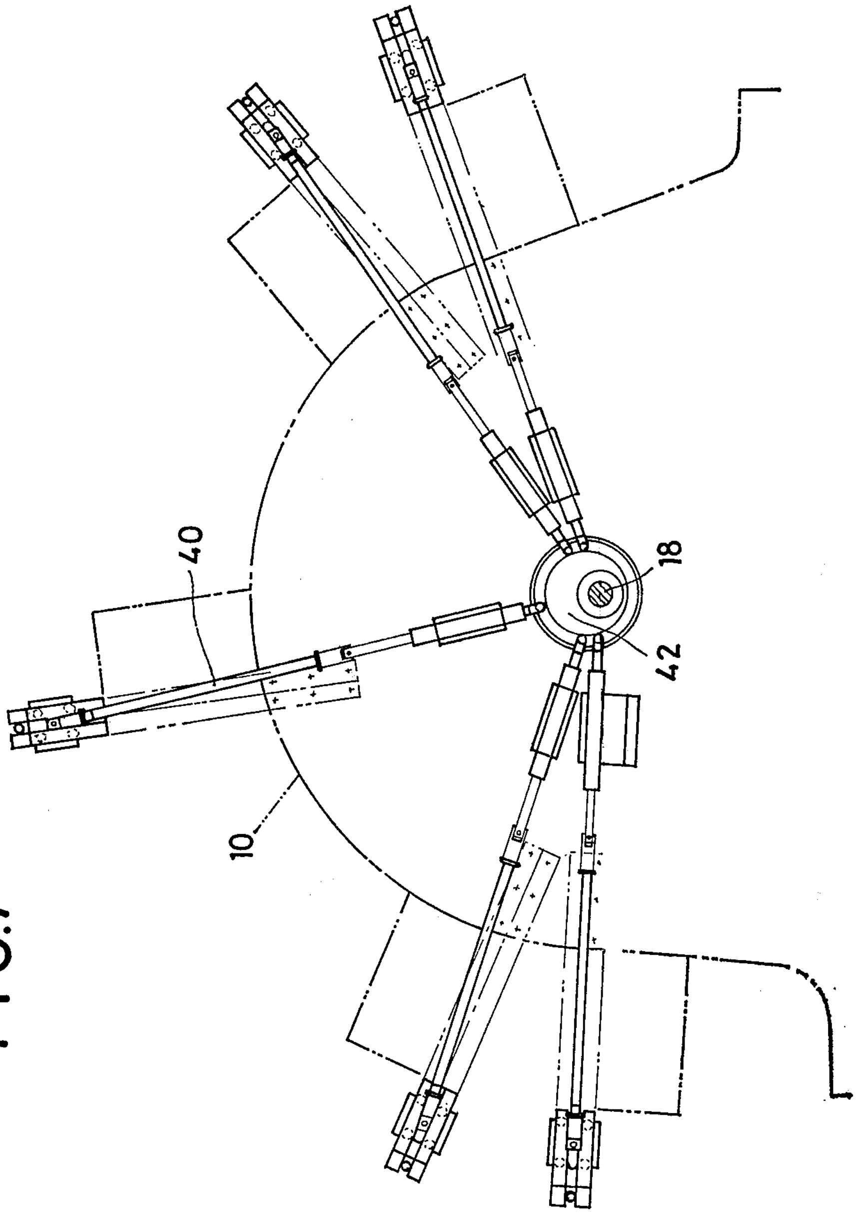


FIG.7

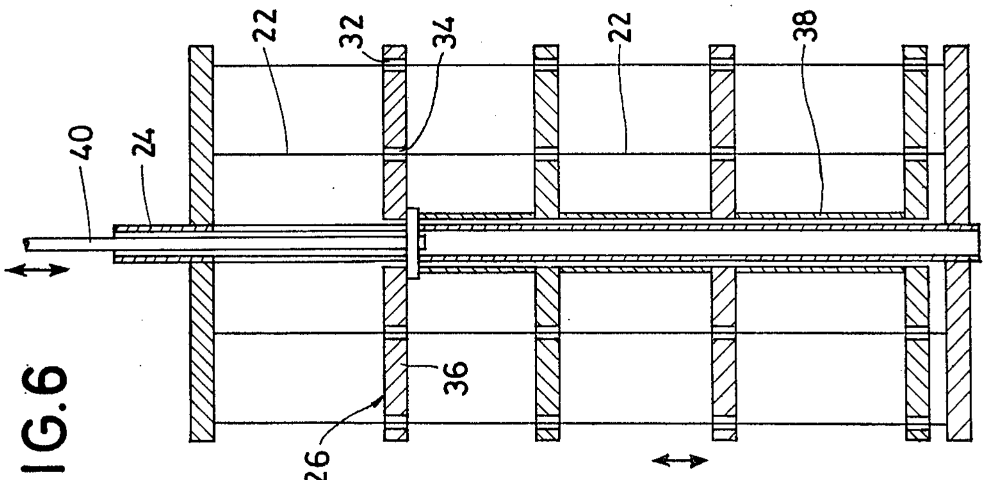


FIG.6

FIG. 8

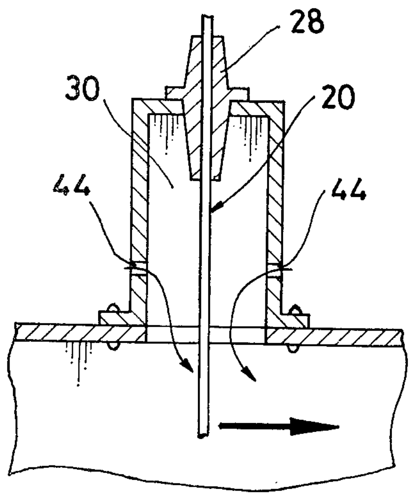


FIG. 10

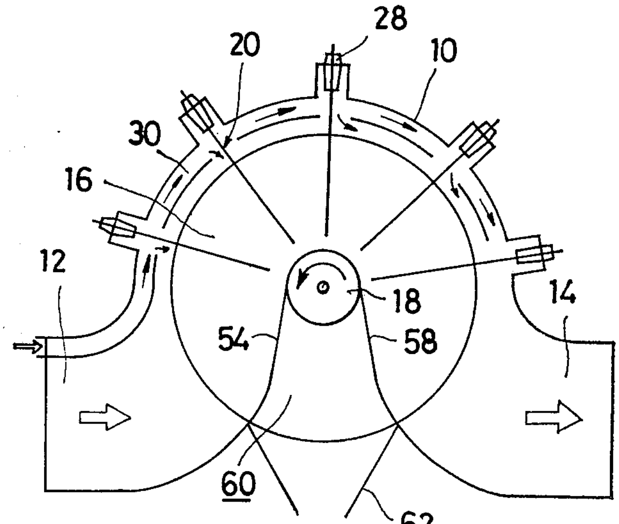


FIG. 9

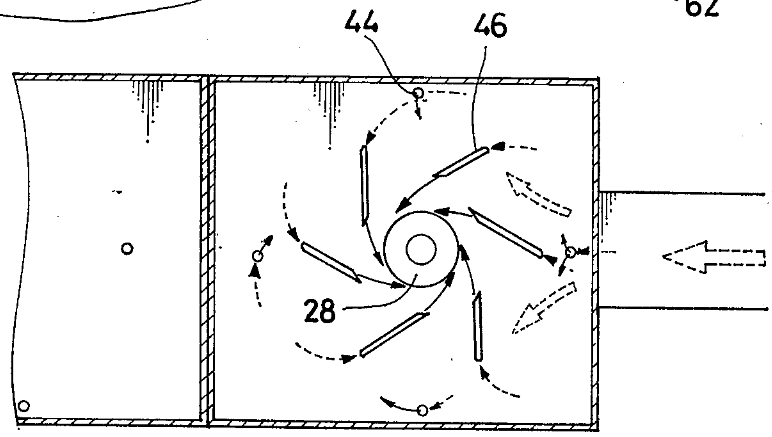


FIG. 11

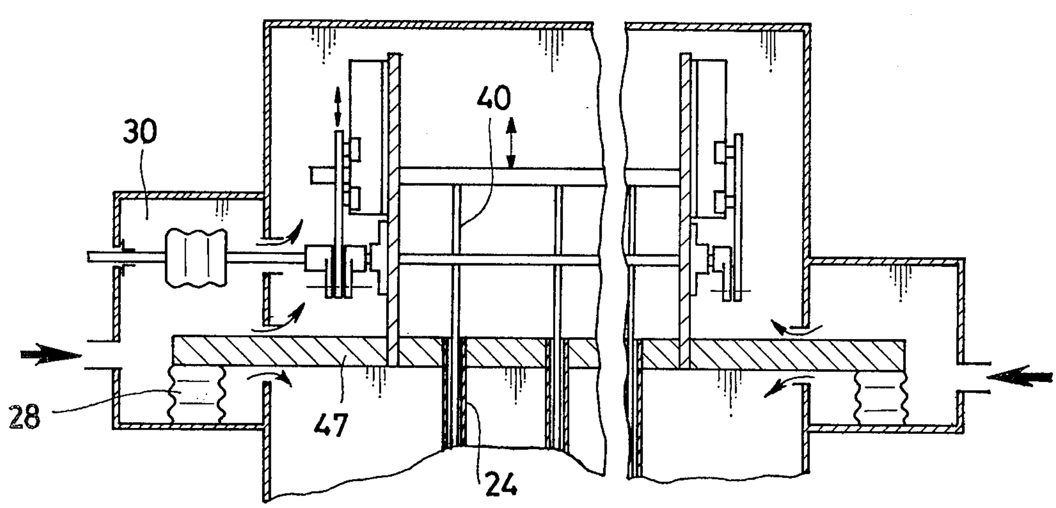


FIG. 12

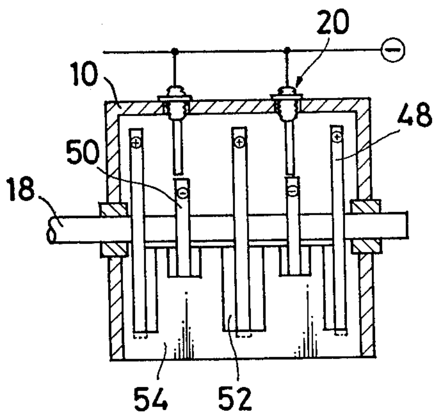


FIG.13

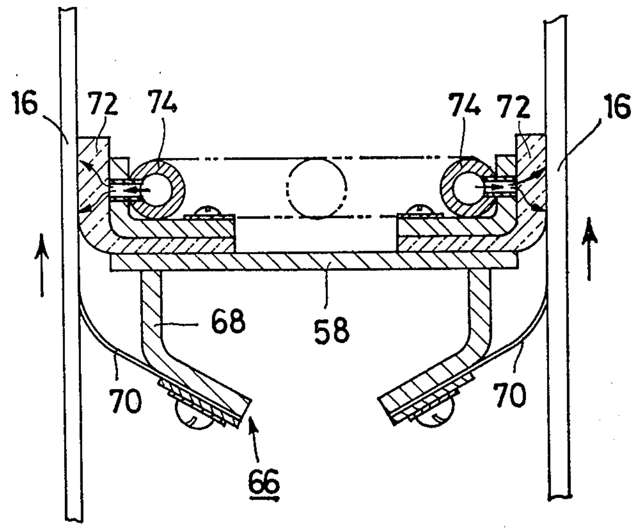


FIG.14

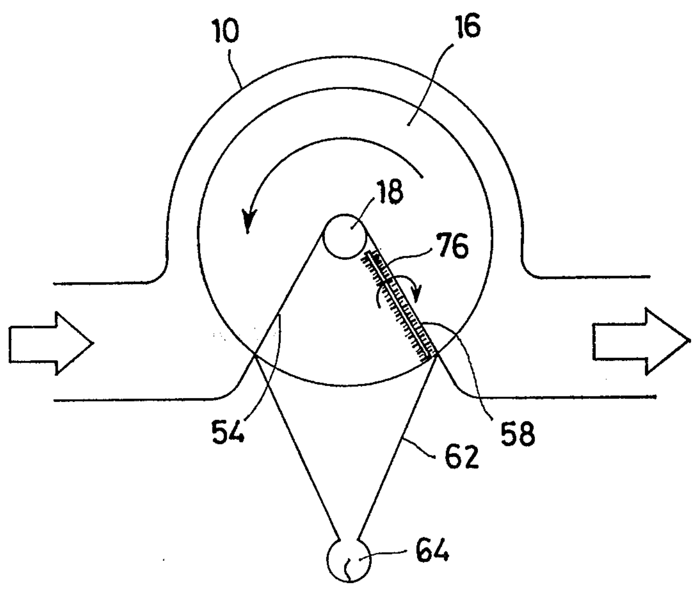
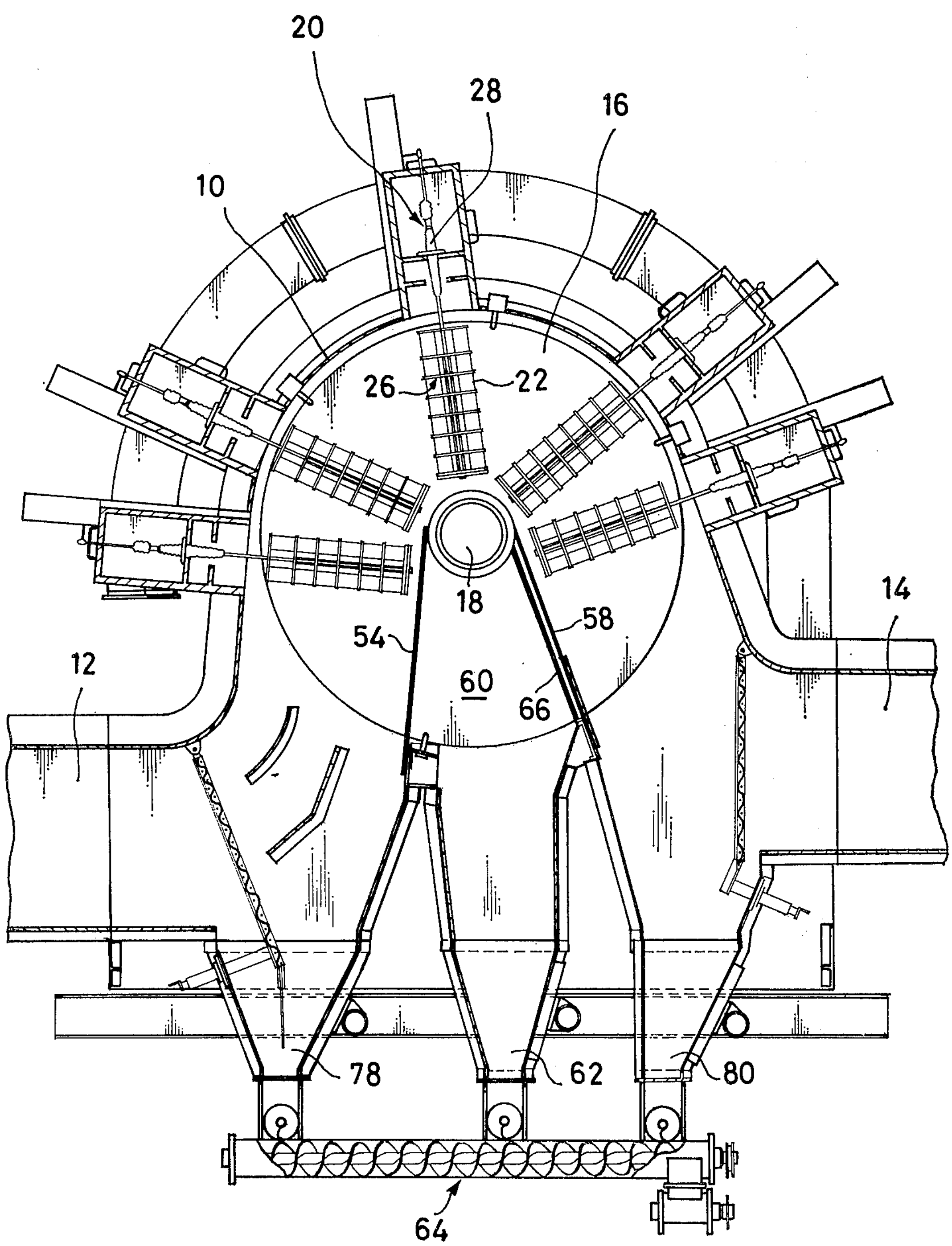


FIG.15



ROTARY ELECTROSTATIC PRECIPITATOR

BACKGROUND OF THE INVENTION

This invention relates to an apparatus for continuously precipitating dust included in a fluid and, more particularly, to a rotary type electrostatic precipitator which collects ionized or electrified dust on the surface of the rotary disc electrode and scrapes the collected dust for removal.

In the conventional electrostatic precipitator, different techniques for removal of dust precipitated on the electrode have been used such as hammering the dust collecting electrode to shake off the dust with oscillation or washing the electrode with liquid.

However, the hammering method usually applies considerable mechanical impacts to an entire portion of the precipitator and particularly to the dust precipitating electrode affecting detrimentally not only to the electrode per se but also to the other parts of the precipitator with reentrainment of the precipitated dust while gradually reducing the precipitation capacity because of building-up of dust during operation of the precipitator with difficulty in maintaining a constant precipitation efficiency. Further, the liquid washing system for removal of the precipitated dust requires a substantial amount of washing liquid and is followed by many difficulties and inconveniences in the treatment of the used liquid.

In order to improve the aforesaid disadvantages and inconveniencies, there has been provided a precipitator which includes a number of rotary disc electrodes with scrapers for continuous removal of the deposited dust. However, the conventional precipitator of this type entails so called "reentrainment" of the removed dust and therefore is not practically useful. To prevent this undesired reentrainment of the removed dust there has been made one approach in which the rotary disc electrode is partially immersed in the liquid to provide on its surface a liquid layer for depositing the collected dust thereon. However, this approach is still confronted with difficulty in removal of the collected dust with reduction of the precipitation efficiency of the rotary disc electrode.

As a result of many intensive researches and studies to improve the foregoing disadvantages and difficulties, the inventors have succeeded in providing a novel useful rotary type electrostatic precipitator having a number of rotary disc electrodes for dust precipitation with a number of discharge units for ionization in which the dust removing zone is provided independent from the dust precipitating or collecting zone so that the dust removing operation takes place within the independent dust collecting zone without however following any reentrainment of the removed dust and the contaminated fluid passing through the precipitator always contacts with the fresh dust precipitating electrode as hereinafter fully described.

It is, therefore, a general object of the invention to provide a rotary electrostatic precipitator in which the ionized dust is precipitated on the rotating electrode and thus the collected dust is removed within the closed dust removing chamber without following any reentrainment of the removed dust.

The rotary electrostatic precipitator according to the invention essentially comprises a discharge zone, a dust precipitating zone cooperative to said discharge zone and a dust removing zone disposed within said dust precipitating zone but independent therefrom. The discharge zone includes a plurality of discharge units which are disposed within the dust precipitating zone both radially or in effective parallel relation and longitudinally along the axis of the precipitator. Electrostatic precipitators of this type arae so-called Cottrell precipitator. The present invention is particularly useful when adapted to Cottrell type precipitators as will be fully described hereinafter.

The discharge zone may be positioned outside the dust precipitating zone if desired so that the discharge zone functions as an ionizing means including a positive electrode and a negative electrode. Electrostatic precipitators of this type are the so-called "two stage precipitators."

The individual discharge means may comprises one or more discharge wires or discharge electrodes, means for removing the dust deposited on the discharge wire and means for supporting the discharge wire. The dust removing means is usually comprised of a slider means providing a number of longitudinally spaced arms having one or more dust removing scrapers and associated at its top portion with suitable means such as a winding means for upward and downward movements or engagement at its lower end with a cam mounted on the rotary shaft, for effecting equivalent upward and downward movements.

Means for supporting the discharge wire generally comprises a porcelain insulator encompassing an upper end of the discharge wire and a frame member for suspending the porcelain insulator. The frame member is provided with one or more openings for introduction of a fluid therethrough which fluid by its flow action prevents the surface of the porcelain insulator from collecting dust. The fluid is preferably a hot fluid. Alternatively, the opening provided in the frame member may be communicated with nozzled pipes which are extended adjacent the periphery of the porcelain insulator to blow the fluid and preferably the hot fluid onto its surface.

About the circumference of the disc electrode, support frames for the discharge means may be interconnected with each other to form a single support frame. Moreover, along the axis of the disc electrodes the discharge means are connected to a common connector and are suspended from the housing of the precipitator by means of porcelain insulators.

The dust precipitating electrode comprises a substantially circular disc and two or more disc electrodes of this type are journaled on a common rotary shaft for simultaneous rotation. Individual disc electrode at its at least one side face is preferably coated with a thin layer of semiconductor having a resistance value preferably in the range of from 10^5–10^{11}Ωcm. Disc electrodes are generally of the same diameters but may have different diameters in alternate relations in which case one disc electrode may be a positive electrode and the other electrode a negative electrode or vice versa so that deposition of the dust on the discharge means is diminished.

The most important and advantageous feature of the present invention is to provide the dust removing zone independent from the dust precipitating or collecting zone so that any reentrainment of the deposited dust, which usually occurs when the dust is removed from a dust collecting electrode, may adequately be prevented. To achieve this purpose, the dust collecting zone at a confined area is provided with a closed dust removing chamber which is defined by two substantially comb shaped plates having slits which are inclined with respect to the plates' upper ends which are in alignment with the rotary shaft of the precipitator to thereby form a substantially triangular chamber within the dust collecting zone. Between each slit of the comb shaped plates individual of the disc electrodes is partially interposed.

At the entry of the precipitator, the clearance to be formed between the outer surface of the disc electrode and the slit may be controlled as desired according to the dust precipitating purpose. For example, two comb shaped plates of substantially the same size may be superimposed in a slidable relation. On the other hand, at the outlet of the precipitator the slit has substantially the same size as the thickness of the disc electrode. Thus, the dust removing chamber according to the invention is provided substantially independent from the dust collecting zone. The dust removing chamber at its bottom is connected to a main receiver of the removed dust which is further associated with a conveyor system, for example, an ordinary screw conveyor.

Within the dust removing chamber, there are provided a pair of scraper means at the closed outlet of the chamber in engagement with a part of the disc electrode for removal of the dust deposited on the opposite surfaces of the disc electrode. Individual scraper means generally comprises a support arm and a scraping blade flexibly supported by said support arm. The scraping blade is preferably made of steel plate, aluminum plate, synthetic plate and the like and one end of the plate is somewhat bent along the turning direction of the disc electrode to prevent the surface of the disc electrode from suffering any damage which may be caused by the scraping blade. In lieu of the scraping blade, a rotary brush may selectively be used. Further, the scraper means is partially attached with a moisture absorptive material and at least a part of said material is in contact with the disc electrode to supply water which forms a water membrane on the surface of the disc electrode on rotation of the disc electrode.

As hereinbefore described, the electrostatic precipitator according to the present invention is characterized in providing the dust removing chamber independent from the dust precipitating zone so that the dust deposited on the disc electrode is completely removed within the dust removing chamber without however entailing any reentrainment of the dust as hereafter fully described.

When the dust laden gas enters through the confined entry into the precipitator, the fine dust is condensed due to an abrupt change of pressure, settle out. To collect such dust, a first dust receiver is provided in juxtaposition with the main or second dust receiver and also a third dust receiver is provided in abutment with the second dust receiver to receive the dust which is removed from the discharge electrode. The first, second and third receivers are all connected at their bottoms to a common dust conveying system.

Other objects and advantages of the invention will be apparent from the following disclosure taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF DRAWINGS

FIG. **1** is a fragmental side view of the electrostatic precipitator according to the invention;

FIG. **2** is a perspective view of FIG. **1**;

FIG. **3** is a front elevation of FIG. **2**;

FIG. **4** is a frangmental side view of the precipitator according to the invention but arranged as a two-stage electrostatic precipitator;

FIG. **5** is a fragmentally enlarged front elevation of the discharge unit;

FIG. **6** is a fragmentally enlarged front elevation in partially sectioned of the scraper means for the discharge unit;

FIG. **7** is a pictorial view of the scraper means associated with the cam mechanism;

FIG. **8** is a lateral view in sectioned of one embodiment of the dustproof porcelain insulator for the discharge unit;

FIG. **9** is a plan view of the dustproof porcelain insulator of another embodiment;

FIG. **10** is a side view of the support chamber for the discharge unit formed as a common chamber along the circumference of the disc electrode;

FIG. **11** is a pictorial view of an embodiment in which a support wire for the discharge electrode is united as a common wire along an axis of the disc electrode;

FIG. **12** is a lateral view in partially sectioned of the dust precipitating electrodes of different diameters;

FIG. **13** is a fragmentally enlarged top view in partially sectioned of one embodiment of the scraper means according to the invention;

FIG. **14** is a side view of the scraper means of another embodiment; and

FIG. **15** is a complete unit in partially sectioned of the electrostatic precipitator according to the invention.

PREFERRED EMBODIMENT OF THE INVENTION

In FIGS. **1** to **3**, the reference numeral **10** represents a housing of the electrostatic precipitator according to the invention which is provided at its one side with a fluid inlet **12** and a fluid outlet **14** at its opposite side.

As best shown in FIGS. **2** and **3**, a number of dust collecting disc electrodes **16** are mounted on a common rotary shaft **18** at a predetermined space and between the disc electrodes are arranged a plurality of discharge units **20** radially disposed relative to the rotary shaft **18.** In the precipitator of the present invention, a number of the discharge electrodes are radially disposed in circumferential spaced relation from the inlet to the outlet end of precipitator so that it should be noted that the dust laden fluid may pass through a number of ionizing sections arranged and extended from the inlet to the outlet of the precipitator. Therefore, if some of the dust is not caught at the entry or the middle section of the precipitator it is further subjected to an ionization or electrification at the remaining ionizing sections and thus ionized or electrified will be precipitated on the disc electrode. This results in increased efficiency of the present precipitator.

The electrostatic precipitator shown in FIGS. **1** to **3** is generally of the type known as a Cottrell precipitator. It will be seen that the discharge unit **20,** i.e. the ionization section of the precipitator is located in a position different from that shown in FIG. **4** where the discharge unit **20** is located within inlet **12** of the precipitator.

In FIG. **5,** the discharge unit **20** includes a discharge wire **22,** a support tube **24** for bearing the discharge wire, a dust remover **26** slidably mounted on said support tube, a porcelain insulator **28** for protecting a top portion of the support tube and a chamber **30** housing the porcelain insulator **28.** A plurality of the discharge units **20** thus constructed have their axes in radially disposed relation to the axis of the shaft **18** and are arranged as groups in partial circumferential array between the dust collecting disc electrodes thereby to provide a number of ionizing sections between dust collecting zone.

When the dust laden gas passes through a number of ionizing sections provided along circumference of the dust collecting disc electrodes, virtually all of the negatively dust particles will be collected by the disc electrodes. There may however be a small number of dust particles which are positively charged and such particles will deposit on the negatively poled discharge unit. Dust deposit on the discharge unit lowers the discharge capacitance of the discharge electrodes or may result in an undesired short circuit with the dust collecting electrode. It is, therefore, desired to provide a device for periodically removing the dust deposited on the discharge unit. For this purpose, the dust remover **26** as shown in FIG. **6** has been developed which comprises a number of arms **36** perforated at their ends and middle portions with apertures **32** and **34** and are horizontally arranged, predeterminedly spaced from one another along a longitudinal direction of a support frame **38.** To one end of the support frame **38** is connected one end of a slidable member **40** whereas an opposite end of the slidable member is connected to reversible winding apparatus (not shown) so that the slidable members may be moved upwardly and downwardly to remove the dust deposited on the discharge electrode.

In the dust remover for the discharge electrode as shown in FIG. **7,** an upper end of the slidable member **40,** instead of being suspended from a winding apparatus, is connected to a cam **42** mounted on a rotary shaft **18** so that the slidable member **40** during cam rotation, occasioned by rotation of the rotary shaft, is reciprocatingly moved to impart corresponding movement to arms **36** to enable removal of the dust deposited on the discharge unit.

The porcelain insulator **28** must also be protected against deposition of the dust. For this purpose, in an embodiment shown in FIG. **8,** the frame for supporting the procelain insulator is partially provided with openings **44** through which a fluid is constrained to flow for precluding dust from depositing on the surface of the porcelain insulator. Alternatively, as shown in FIG. **9** the openings **44** are communicated with nozzled pipes **46** the open ends of which are directed toward the surface of the porcelain insulator to blow a pressurized fluid onto the surface of the porcelain insulator for preventing dust collection on the surface of the porcelain insulator.

In the embodiments hereinbefore described, the chamber **30** is formed as an independent chamber. However, this chamber **30** may be formed as a single elongated chamber extending around the outer circumference of the disc electrode **16** as shown in FIG. **10** to prevent the porcelain insulator from collecting the dust.

In FIG. **11,** about the circumference of the disc electrodes supports frames for the discharge means are provided which are interconnected with each other to form a single support rod **47.** From this common support rod **47** individual discharge electrodes are suspended, between disc electrodes **16,** with only two porcelain insulators mounted at opposite ends of the support rod **47** thereby to reduce the porcelain insulators otherwise required.

In another embodiment as shown in FIG. **12,** disc electrodes are used having different diameters in alternate relation, the electrode **48** of larger diameter, serving as a positive electrode and the electrode **50,** of smaller diameter as a negative electrode. The discharge unit **20** is positioned above the electrode **50** of smaller diameter and between the electrodes **48, 48** of larger diameter. The ionized dust is mostly precipitated on the positive electrodes **48** and the negative electrodes **50,** so that little if any dust remains for depositing on the discharge electrode. It will be, therefore, appreciated that a special dust remover will not be required for the discharge unit in this embodiment.

Now returning again to FIGS. **1** and **2,** a plate **54** having a number of slits **52** is positioned in confronting relation to the fluid inlet end of the precipitator with a little inclination so that the top edge of the plate is aligned with the rotary shaft **18** and between respective slits **52** the electrode is partially inserted as shown in FIGS. **1, 2** and **4.** Similarly, a closing plate **58** having a number of slits **56** arranged in confront confronting relation to the fluid outlet end of the precipitator and between the slits **56** is partially inserted the disc electrode **16** is partially inserted. By this structure, a closed dust collecting chamber **60** is formed within the dust precipitating zone and the dust collecting chamber **60** at its bottom is connected to a receiver **62** which at its lower end is further connected to a conveyor **64.**

The clearance provided between the slit **52** and the surface of the disc electrode **16** is important. If the clearance formed is too large the dust laden gas will undesirably flow into the dust collecting chamber **60.** On the other hand, if the clearance is too small the edge of the slit will scrape off the dust deposited on the disc electrode and will cause reentrainment of the precipitated dust. Advantageously the clearance between the edge of the slit and the surface of the dust collecting electrode should be conveniently and automatically be adjustable. Such adjustment is possible for example, by providing two plates having a number of slits, which plate may be slidably superimposed to selectively adjust the clearance.

The closing plate **58** at its inside is provided with a scraper **66** for removal of the dust deposited on the surface of the dust collecting electrode. In FIG. **13,** the scraper **66** includes a support arm **68** and a scraping blade **70** which is secured to an outer side of the support arm **66** through an appropriate fastner. The scraping blade **70** is preferably formed of a flexible material for example a thin steel, an aluminum plate or a synthetic plate and the blade is preferably curved along the rotational direction of the rotary electrode **16** to prevent the electrode **16** from suffering any damage. Further, in accordance with the purpose of the dust precipitator the support arm **68** is provided with a moisture absorptive material **72** a part of which is arranged in contact with the dust collecting electrode **16** and through a liquid supply pipe **74** a suitable liquid is supplied to form a liquid film on the surface of the dust collecting electrode **16** thereby to enable the precipitator to function as a wet type electrostatic precipitator.

In an example as shown in FIG. **14,** the scraper is a brush **76** which is preferably rotated in a direction opposite to the rotational direction of the dust collecting electrode as shown in FIG. **14.**

FIG. **15** shows a complete unit of the electrostatic precipitator according to the invention. In this complete unit a receiver **78** is provided in justaposition with the main receiver **62** to receive settled dust before entering into the precipitator while a receiver **80** is also provided at the opposite side of the main receiver **62** to collect a mass of the dust produced during the dust removing operation of the discharge electrode **22** of the discharge unit **20** and receivers **62, 78** and **80** are connected at their bottoms to a common conveyor **64.**

In operation of the electrostatic precipitator according to the present invention, the dust collecting electrodes counterclockwise as viewed in the drawing by an appropriate driving system (not shown). In other words, the disc electrodes are rotated countercurrent the direction of fluid flow. When the dust laden gas flows into the precipitator a mass of dust in the gas flow drops into the first receiver and the gas containing residual dust flows pass the dust precipitating electrodes toward the outlet of the precipitator. As hereinbefore described, the dust laden fluid passes a number of discharge units, i.e. ionizing sections and the ionized dust is essentially deposited onto the surface of the dust collecting electrodes. The dust precipitated on either sides of the disc electrode then enters into the dust removing chamber **60** through the slits i.e. **52** (see FIG. **2**) provided in the chamber plate **54** and is continuously scraped off by means of scrapers such as scraper blades **70** provided at the inner chamber facing side of the closing chamber plate **58.** A small amount of the dust deposited onto the discharge electrode **22** is removed by the dust removers **26** (see FIGS. **5** and **6**) and deposited essentially onto the collecting electrodes from which the dust is removed by blades **70.** Any dust remaining drops into the third receiver.

The electrostatic precipitator in accordance with the present invention brings the following effects and advantages:

1. On account of a number of discharge units arranged along the circumference of the dust collecting zone, an ionization or electrification of the dust has been remarkably emhanced.
2. Passage of the dust laden fluid along the circumference of the dust collecting zone through a number of ionizing sections increases the effect of the dust precipitator zone.
3. Continuous scraping operation of the dust deposited on the dust collecting electrode enhances the dust precipitation efficiency and increases the gas velocity through the precipitator greatly, permitting use of more compact equipment.
4. Since the dust precipitated on the dust collecting electrode is removed in the closed dust removing chamber, no reentrainment of the collected dust into the gas stream occur.
5. In the layer of deposited dust of high resistive materials, particles are polarized due to the high potential drop across it. The potential drop across the layer is proportional to the corona current and to the thickness of the layer itself. Since there are no dust layers on the discs of the present rotary precipitators, the potential drop across them is nearly zero. Therefore, polarization effect, which frequently occurs with materials of high specific resistivity do not occur. This means the dust of high specific resistivity such as silicon oxides can be collected with high efficiency.
6. The dust containing viscous materials such as, tar, oil mist and paint are easily removed from the collecting electrods by means of scrapers, brushes, or other suitable devices that could not be used with Cottrell type precipitators.
7. A mean ion current density of 2 to 10 ma/m^2 has been achieved with the rotary precipitators of this application. 0.2 to 0.3 ma/m^2 is the usual value for the conventional precipitators. Since the efficiency of an electrostatic precipitator depends on the mean ion current density, the overall dust collection efficiency is significantly improved. The particles of low specific resistivity such as carbon blacks are one of the main problems that Cottrell precipitators face because of the reentrainment of aggregated particles in to the gas stream. When dust of high conductivity such as carbon black and metal powders pass through corona fields, they are charged by the ion current and collected onto the discs as other particles do. However, the conductive ones lose their charge immediately after they arrive at the surface of the discs, are recharged in opposite polarity and reverse their motion, i.e. they move toward the ionizers. While travelling against the ion currents, they are again charged whereby the process is repeated. Since this movement is at right angles to gas flow direction, the resulting paths of the particles will be in the forms of zig-zag lines and will finally leave the electrostatic precipitator without being collected. This phenomenon is known as Jumping. Since the time required for a particle to be charged in a current field is approximately proportional to the inverse of current density, a particle will be charged immediately, in a high current field, as they travel against the current. Consequently they jump much less distance than they would in a low current field. The present invention succeeded to achieve the current density of 2 to 10 ma/m^2 which compares to 0.2 to 0.3 ma/m^2 in the conventional Cottrell type electrostatic precipitators. In such a high current density, a traversing particle is charged immediately and will move toward the discs, so that in a practical sense the jumping effect has been eliminated.

The above examples have been provided only for illustration of the present invention and are not limitative. Various change and modification of design therefore may be made within the scope of the appended claims. For example, a plurality of the precipitators according to the invention may be arranged in series or in the parallel relation.

We claim:

1. A rotary electrostatic precipitator comprising a housing provided with an inlet for receiving a dust laden gas stream under pressure and an outlet from which said gas stream issues substantially free of dust, an annular rotary dust collector means comprising a rotatable shaft having a plurality of disc electrodes mounted thereon within said housing and positioned in the path of the gas stream between said inlet and said outlet, said dust collector means rotating about a predetermined axis, a plurality of radially extending discharge means supported within said housing in spaced relation to said collector means and being adapted for connection together with the dust collector means to a source of electircal current for ionizing dust particles passing therebetween for collection by said dust collector means, first and second axially extending means at said inlet and said outlet ends of the precipitator, respectively, said first and second means being positioned with respect to said inlet and outlet ends and the discs of said annular dust collector means to direct said gaseous stream from said inlet through a first zone, through which said dust collector means rotates in proximate spaced relation to said discharge means, to said outlet, said first and second means also defining a dust removal zone which is liquid-free and isolated from said first dust collecting zone, said dust collecting means during rotation thereof rotating through said first dusting collecting zone and simultaneously through said dust removal zone, means on said second means in engagement with said dust collector means for removing dust from that part only of the dust collector means which passes through the dust removal zone, and conveyor means below the dust removal zone and in communication therewith for the conveying to waste dust from the dust removal zone, said dust from the dust removal zone freely falling onto the conveyor means.

2. A rotary electrostatic precipitator as claimed in claim **1**, wherein the discharge means comprises groups of a plurality of radially extending, circumferentially spaced discharge units, each group having discharge units which are in axial alignment with discharge units of other groups, at least one group of discharge units being associated with a disc electrode of said dust collector means.

3. A rotary electrostatic precipitator as claimed in claim **1**, wherein said plurality of disc electrodes are fixedly mounted on a rotatable shaft in axially spaced apart relation and said discharge means comprise groups of a plurality of radially extending, circumferentially spaced discharge units, all but one of the groups of said discharge means being disposed in the spaces between the disc electrodes, said one of the groups being positioned to one side of an end disc electrode.

4. A rotary electrostatic precipitator as claimed in claim **1**, wherein said disc electrodes are journaled on a common shaft rotatable about said predetermined axis.

5. A rotary electrostatic precipitator as claimed in claim **1**, wherein each disc electrode has applied on at least one of its faces a layer of a semi-conductor material.

6. A rotary electrostatic precipitator as claimed in claim **5**, wherein the resistatance of the semi-conductor material is in the range of about 10^5 to 10^{11} ohms centimeter.

7. A rotary electrostatic precipitator as claimed in claim **1**, wherein the dust removing means is formed as a chamber which communicates with said dust conveyor means.

8. A rotary electrostatic precipitator as claimed in claim **7**, wherein the dust removing chamber is defined by said first and second means in form of first and second inclined plates, respectively, said first plate preventing flow of the gaseous stream into the chamber and said second plate being provided with scraper means for scraping dust particles from the dust collector means as it rotates past the scraper means.

9. A rotary electrostatic precipitator as claimed in claim **8**, wherein the dust scraper means comprises a support arm affixed to the second means and a scraper blade flexibly supported by said support arm.

10. A rotary electrostatic precipitator comprising a housing providing with an inlet for receiving a dust laden gas stream under pressure and an outlet from which said gas stream issues substantially free of dust, an annular rotary dust collector means adapted for rotation about a predetermined axis and comprising a plurality of axially spaced apart disc electrodes within said housing and positioned in the path of the gas stream between said inlet and outlet, a plurality of radially extending electrical discharge means supported in spaced relation to said collector means and being adapted for connection together with the dust collector means to a source of electrical current for ionizing dust particles passing therebetween for collection by said dust collector means, first and second axially extending means at said inlet and said outlet ends of the precipitator, respectively, and positioned with respect to said inlet and outlet ends and said annular dust collector means to direct said gas stream from said inlet through a first zone, through which said dust collector means rotates in proximate spaced relation to said discharge means, toward said outlet, said first and second means defining a dust removal zone which is isolated from said first dust collecting zone, said first and second means comprising comb-shaped plates, each said disc electrodes being in part received within the spaces in said comb-shaped plates, said first and second plates being inclined relative to the axis of rotation of said dust collector means, the latter being carried for rotation by a rotary shaft, the free ends of the tooth-like projections of the comb-shaped plates being in alignment with the rotary shaft, said inclined side plates and rotary shaft forming a substantially triangular chamber which is isolated from said dust collecting zone, said dust collector means during rotation thereof rotating through said first dust collecting zone and simultaneously through said dust removal zone defined by said chamber, means on said second means in engagement with said dust collector means for removing dust from that part only of the dust collector means which passes through said chamber, and conveyor means below the dust removal zone and in communication therewith for conveying to waste dust from the dust removal zone.

* * * * *