Sept. 5, 1950 E. L. RICHARDSON 2,521,605

ELECTROSTATIC PRECIPITATOR

Filed Sept. 28, 1946

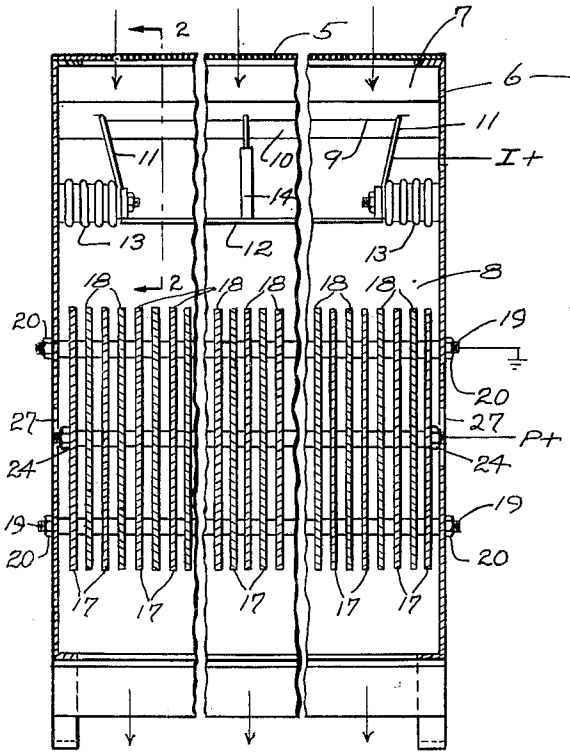


FIG. 1

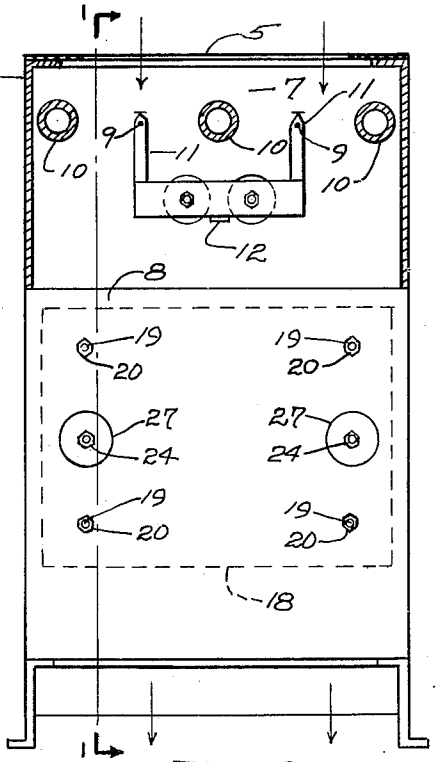


FIG. 2

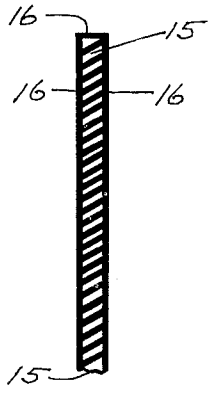


FIG. 3

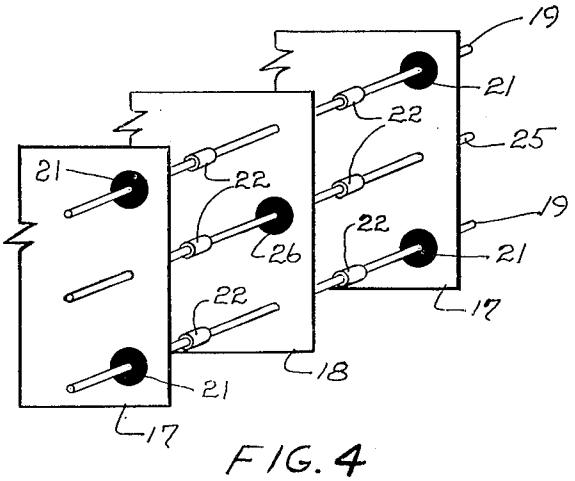


FIG. 4

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ELECTROSTATIC PRECIPITATOR

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8 Claims. (Cl. 183—7)

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This invention relates to electrostatic precipitators for removing dust and other foreign particles from gases such as air.

The conventional electrostatic precipitator for removing dust from air, includes an ionizing chamber in which the dust particles are given a charge, and includes in a collection chamber downstream of the ionizing chamber, a plurality of grounded metal plates and insulated metal plates, the grounded plates serving as collector electrodes to which the charged dust particles are attracted. The insulated plates are charged to a high voltage, and it has been necessary not only to support them from large insulators which extend into the air stream, but it has been necessary to use large numbers of spacer insulators between the plates for supporting them in alignment and for insulating them electrically.

This invention provides electrode plates comprising electric insulating material having layers of electric conductive material on their faces, the plates being supported upon metal rods and spaced apart by metal spacers, the conductive material being omitted from the plates it is desired to insulate from the rods and spacers. Advantages of this construction are that external supporting insulators are not necessary; the metal spacers are much less expensive than the insulating spacers; the metal spacers are cylindrical and do not trap the liquid used to flush the plates for cleaning, as the insulating spacers which have raised surfaces, do, and the electric connections between the electrodes can be provided by the supporting rods and the metal spacers.

Objects of the invention are to improve the efficiency of, and to reduce the cost of, electrostatic precipitators.

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

Fig. 1 is a side elevation in cross-section, of an electrostatic precipitator embodying this invention, with the section taken along the lines 1—1 of Fig. 2;

Fig. 2 is an end elevation partially in section, the section being taken along the lines 2—2 of Fig. 1;

Fig. 3 is an enlarged view in section, of a portion of one of the collector plates of the precipitator, and

Fig. 4 is an exploded view illustrating the relations of portions of three of the collector plates to their supporting rods and spacers, and illustrating the absence of conducting surfaces on the plates where insulation from the spacers and rods is desired.

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In the embodiment of the invention illustrated by the drawing, air to be treated is drawn in through the grille 5 in the top of the precipitator cabinet 6, and passes downwardly through the ionizing chamber 7, and then through the precipitating chamber 8, the bottom of which may be connected to a conventional blower.

The ionizing chamber 7 is similar to that disclosed in the G. W. Penney Patent No. 2,181,767, and contains the ionizing wires 9 disposed between the tubular electrodes 10, and which are connected to the positive terminal I+ of the high voltage, direct current supply source which is not illustrated. The electrodes 10 are grounded to the cabinet 6. The ionizing wires 9 are suspended between the rigid end supports 11 carried by the skeleton framework 12 which is supported by the insulators 13. The wires 9 are supported at an intermediate point by the support 14 also carried by the framework 12.

The electrodes in the precipitating chamber 8 are, as illustrated by Fig. 3, formed as plates 15 of electric insulating material such as fibre glass or Micarta which is a synthetic plastic having suitable electric insulation characteristics, coated or plated with a metallic, electric conductive coating 16.

The grounded precipitating electrodes 18 and the insulated electrodes 17 are supported on the rods 19 from the walls of the cabinet 6, the ends of the rods being threaded with the nuts 20 thereon drawn up against the cabinet walls. Where the rods 19 pass through the electrodes 17, the metallic coating thereon is removed as at 21 on Fig. 4. The cylindrical metal spacers 22 extend around the rods 19 and space the electrodes 17 from the electrodes 18, and space the outer electrodes 17 from the adjacent cabinet walls as illustrated by Fig. 1.

The rods 25 extend through the electrodes 17 and 18, and where they extend through the grounded electrodes 18, the metallic coating thereon is removed as at 26 on Fig. 4. The rods 25 also have the spacers 22 therearound for spacing the electrodes 17 and 18 apart and for maintaining same parallel. The ends of the rods 25 are threaded and have the nuts 24 thereon which are drawn up against the outer electrodes 17 as illustrated by Fig. 1.

Where the rods 19 pass through the grounded electrodes 18, they and the spacers 22 therearound, contact the metallic coatings on the electrodes 18 and electrically interconnect same, the rods 19 being connected to the minus terminal of the said high voltage, direct current supply source, and to ground.

Where the rods **25** pass through the insulated electrodes **17**, they and the spacers **22** thereabout, contact the metallic coatings on the electrodes **17** and electrically interconnect same. The cabinet walls have the circular openings **27** therein in axial alignment with the rods **25** whereby the outer ends of the rods **25** are insulated from the cabinet walls. The rods **25** are connected to the positive terminal P+ of the said high voltage supply source.

In operation, the air entering the top of the cabinet **6** as shown by the arrows indicating air flow, of Figs. 1 and 2, is first ionized in the ionizing chamber **7** so as to charge the foreign particles entrained in the air. The air then passes into the precipitating chamber **8** where the charged particles are attracted to the oppositely charged precipitating plates **18**, after which the purified air is drawn from the bottom of the cabinet.

Since the rods **19** support all of the electrodes **17** and **18** from the cabinet walls the need for large supporting electrodes extending into the air stream, is eliminated and the electrodes are more securely held in alignment.

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 arrangement of apparatus illustrated, as modification thereof may be suggested by those skilled in the art, without departure from the essence of the invention.

What is claimed is:

1. An electrostatic precipitator comprising a plurality of electrodes formed as plates of electric insulating material with layers of electric conductive material on the surface thereof, and metal supporting rods extending through perforations in said electrodes, alternate of said electrodes having the said conductive material omitted around the perforations therein said rods contacting only the insulating material of said alternate electrodes.

2. An electrostatic precipitator comprising a plurality of electrodes formed as plates of electric insulating material with layers of electric conductive material on the surface thereof, metal supporting rods extending through said electrodes, and metal spacers between said electrodes and around said rods, alternate of said electrodes having the said conductive material omitted where the spacers and rods contact same.

3. An electrostatic precipitator having a cabinet, a plurality of electrodes formed as plates of electric insulating material with layers of electric conductive material on the surface thereof, and means including metal rods extending through perforations in said electrodes for supporting said electrodes from the walls of said cabinet, alternate of said electrodes having the said conductive material omitted around the perforations therein, said rods contacting only the insulating material of said alternate electrodes.

4. An electrostatic precipitator having a cabinet with metal side walls, a plurality of electrodes formed as plates of electric insulating material with layers of electric conductive material on the surface thereof, metal supporting rods extending through said electrodes, metal spacers around said rods and between said electrodes, alternate of said electrodes having the said conductive material omitted where the spacers and rods contact the same, and means for attaching said rods to said walls.

5. An electrostatic precipitator comprising a plurality of electrodes formed as plates of electric insulating material with layers of electric conductive material on the surface thereof, metal supporting rods extending through perforations in said electrodes, alternate of said electrodes having the said conductive material omitted around the perforations therein, and other metal supporting rods extending through perforations in said electrodes, the others of said electrodes having the said conductive material omitted around the perforations therein through which said other rods extend, said rods contacting only the insulating material of said electrodes.

6. An electrostatic precipitator comprising a plurality of electrodes formed as plates of electric insulating material with layers of electric conductive material on the surface thereof, metal supporting rods extending through said electrodes, metal spacers around said rods and between said electrodes, alternate of said electrodes having the said conductive material omitted where the spacers and rods contact same, other metal supporting rods extending through said electrodes, and metal spacers around said other rods and between said electrodes, the others of said electrodes having the said conductive material omitted where said other rods and the spacers thereon contact same.

7. An electrostatic precipitator according to claim 5 in which the electrodes are contained within a cabinet having metal side walls, and the first mentioned rods are attached to the said side walls.

8. An electrostatic precipitator according to claim 6 in which the electrodes are contained within a cabinet having metal side walls, and the first mentioned rods are attached to said side walls.

EARL L. RICHARDSON.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,195,431	Shively et al.	Apr. 2, 1940

FOREIGN PATENTS

Number	Country	Date
551,358	Great Britain	Feb. 18, 1943
675,300	France	Oct. 29, 1929