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A. C. FIELDS

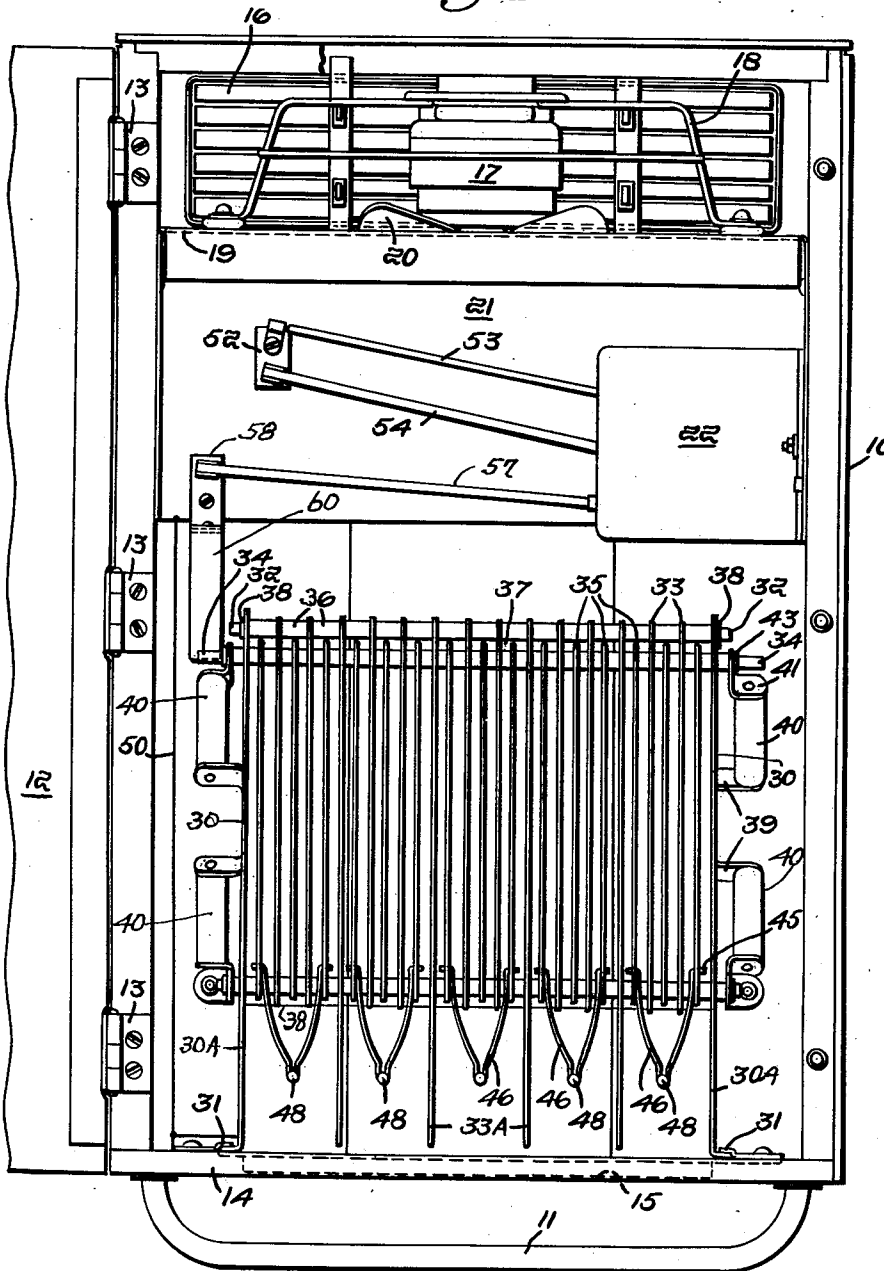
2,796,948

ELECTROSTATIC PRECIPITATORS

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Fig. 1.



Inventor:
Arnold C. Fields,
by Robert J. Palmer
Attorney

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Fig. 2.

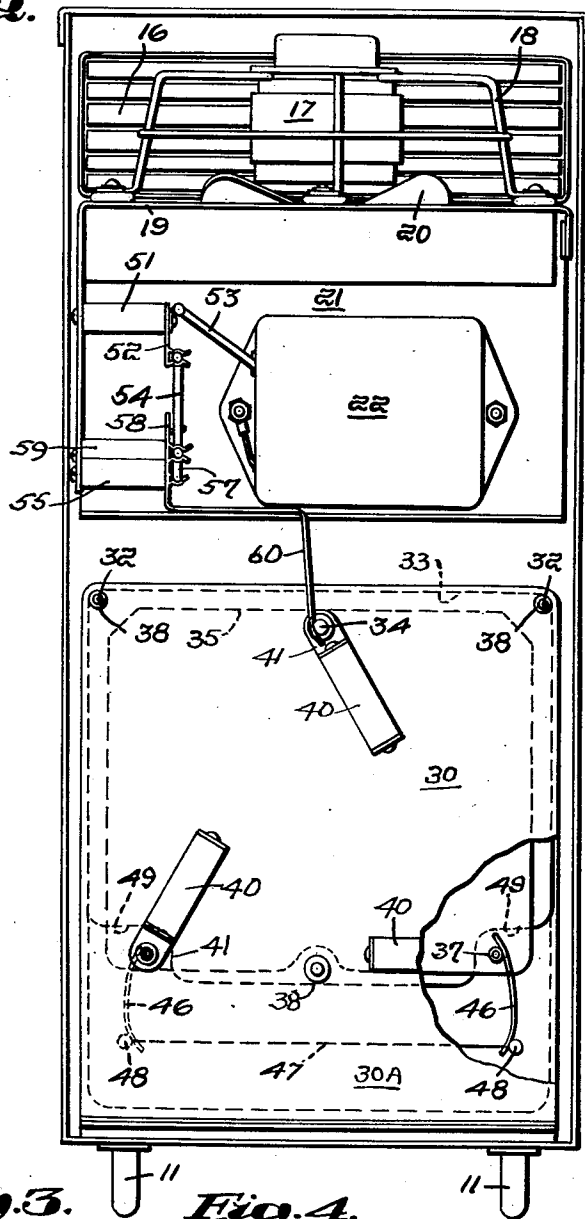


Fig. 3.

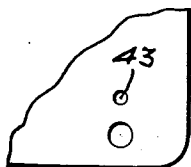
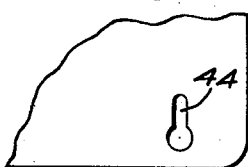


Fig. 4.



Inventor:
Arnold C. Fields,
by Robert J. Palmer
Attorney

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ELECTROSTATIC PRECIPITATORS

Arnold C. Fields, Medfield, Mass., assignor to Westinghouse Electric Corporation, East Pittsburgh, Pa., a corporation of Pennsylvania

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2 Claims. (Cl. 183—7)

This invention relates to electrostatic precipitators for removing dust from air.

Objects of this invention are to simplify the construction of, and to reduce the cost of electrostatic precipitators used for cleaning air in rooms.

Precipitators embodying this invention are of the general type disclosed by the G. W. Penney Patent No. 2,129,783 in that ionizer wires extend across the stream of air to be cleaned, midway between grounded non-discharging ionizer electrodes, and in that downstream collector plates are provided, alternate of the plates being charged, and the others of the plates being grounded.

A feature of this invention is that the side plates of a precipitator have outwardly turned bracket-like portions to which tubular insulators are attached and which support tie rods on which charged collector plates are supported.

Another feature of this invention is that the usual insulators for supporting the ionizer wires are not used, the wires being supported at their ends by spring arms from charged collector plates, spacers between charged plates acting as supports for the spring arms.

This invention will now be described with reference to the annexed drawings, of which:

Fig. 1 is a back view with access door open, of an electrostatic precipitator embodying this invention, only a portion of the access door being shown;

Fig. 2 is a side view with the adjacent side removed, of the precipitator;

Fig. 3 is an enlarged view of one corner of a charged plate showing a small circular opening in which one end of an ionizer wire supporting arm is held, and

Fig. 4 is a view similar to Fig. 3 except that a slot is shown for holding one end of an ionizer wire supporting arm.

The precipitator illustrated by the drawings is of the room unit type, and has a decorative casing or cabinet 10 supported above the floor of a room by a pair of tubes 11. The casing has an access door 12 hinged at 13 to the back side of the casing. The casing has four vertical side walls with clean air outlet grilles 16 in their upper portions, the access door 12 forming the back side wall.

An electric motor 17 is supported by the arms 18 from the top of an inverted metal pan 19 which is secured to the inner surface of the top of the casing. The motor has fan blades 20 attached to its rotary shaft, which blades rotate within a circular opening in the top of the pan. The front side of the pan 19 extends lower than its other sides and forms a ground plate 21 to which is attached a step-up transformer 22, the casing of which is grounded to the plate 21, and which has one side of its secondary winding which is not shown, grounded to the plate which forms the negative terminal of the power pack.

The precipitator has two side plates 30 which extend generally vertically but which have outwardly turned lower ends which are adapted to be slidably fitted in the slide members 31 of metal which are attached to the

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bottom of the casing 10. Tie rods 32 which support grounded collector plates 33, and tie rods 34 which support charged plates 35, extend through the side walls 30, the grounded and charged plates being alternately arranged. The tie rods 32 have spacers 36 therearound which contact the grounded plates, the charged plates being spaced inwardly of the spacers 36. The tie rods 34 have spacers 37 therearound which contact the charged plates, the grounded plates having clearance openings for clearing the spacers 37, such clearance openings is some of the grounded plates being cut-outs in their corners as will be described later. The ends of the tie rods 32 have friction fasteners 38 therearound which contact the outer surfaces of the side plates 30 and hold the latter firmly against the outer spacers 36.

The side plates 30 have integral brackets 39 punched outwardly therefrom so as to extend perpendicular thereto. Cylindrical insulators 40 have their inner ends attached to the brackets 39 and have their outer ends 20 attached to the inner portions of brackets 41, the outer portions of which extend around the ends of tie rods 34 and are secured thereto by friction fasteners 43.

The tie rods 32 are three in number and are so spaced that they extend through the apices of an equilateral triangle. The tie rods 34 are also three in number, and are so spaced that they extend through the apices of another equilateral triangle, the apex of one of the triangles being substantially at the midpoint of one of the sides of the other triangle. This provides equal support in all directions in planes parallel to the side plates.

The punching of the brackets 39 directly from the side plates provides economy of labor and material. The brackets support the insulators firmly and outside the air stream to be cleaned. The diameters of the insulators 35 are so small that the space they occupy between the side plates and the adjacent casing walls is small.

The air to be cleaned is drawn by the fan blades from underneath the unit through an opening 15 in its lower side. The lower ends of the side and collector plates are, therefore, their upstream ends.

The side walls 30 have lower portions 30A which extend upstream of the upstream portions of the charged collector plates 35 and form end non-discharging ionizer electrodes. Every third grounded collector plate 33 has a lower portion 33A which extends upstream of the upstream ends of the charged collector plates and the other grounded collector plates, and which forms an inner non-discharging ionizer electrode.

The charged plates 33 adjacent the side walls 30, and every second charged plate therebetween have small openings 43 (Figs. 2 and 3) or slots 44 (Fig. 4) in which outwardly turned ends 45 of V-shaped ionizer wire supporting arms 46 of spring metal are held. The legs of the supports 46 are bent inwardly at their apices to fit closely around opposite sides of ionizer wires 47, the ends of the wires having the enlarged beads 48 thereon which prevent the wire ends from passing through the apices of the supports 46.

The supports 46 have to be sprung inwardly as shown by Fig. 2 to receive the ionizer wires, and in being so sprung contact spacers 37 on the upstream tie rods 34, which spacers serve as supports and fulcrums for the wire supports 46. The wires are supported under spring tension by the supports 46 midway between adjacent non-discharging ionizer electrodes.

The grounded collector plates 33 which are adjacent those charged plates to which the inner ends of the wire supports 46 are attached, have cut-outs 49 in their upstream corners for clearing the wire supports 46 and for clearing the spacers 37 on the upstream tie rods 34.

A conductor 50 is connected to the ground plate 21 to which the transformer 22 is grounded, and to the slide

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members 31 in which the outwardly turned lower ends of the side plates 30 are held, and serves to ground the side plates and the grounded collector plates.

An insulator 51 supports a contact strap 52 from the ground plate 21. A high voltage conductor 53 from the transformer 22 is connected to the strap 52. A selenium rectifier 54 is connected at one end to the strap 52 and at its other end to a similar strap (not shown) behind the transformer 22, and which is supported by an insulator 55 from the plate 21. One end of a second selenium rectifier 57 is connected to the other end of the rectifier 54 at the contact strap behind the transformer 22, and its other end is connected to a contact strap 58 which is supported by an insulator 59 from the ground plate 21.

A contact strap 60 of spring metal is connected at one end to the contact strap 58, and its other end contacts one of the tie rods 34 for the charged collector plates 35 when the collector cell is in operating position within the casing 10. When the collector cell is removed from the casing the contact with the contact strap 60 is broken.

The rectifiers 54 and 57 are in series with the high voltage conductor 53, and serve to rectify the high voltage alternating current from the transformer 22, the rectified current being supplied to the charged plates 35 and to the ionizer wires 47. The cell capacitance serves as filter capacitance.

In operation, the air passing through the spaces between the ionizer wires and the non-discharging ionizer electrodes would be ionized, with positive ions adhering to the dust particles and charging them positively. The charged dust would then deposit upon the grounded collector plates.

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While one embodiment of the invention has been described for the purpose of illustration, the invention is not limited to the exact apparatus illustrated since modifications 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 spaced-apart parallel metal collector plates, tie rods extending through said plates, spacers around said rods in contact with alternate of said plates, the others of said plates having clearance openings around said spacers, a pair of oppositely disposed substantially V-shaped ionizer wire supports of spring metal having the ends of their legs opposite their apices in openings in a pair of said alternate plates, an ionizer wire having its ends held in said apices of said supports, said supports being bowed inwardly over pairs of said spacers by being pulled inwardly by said wire.

2. An electrostatic precipitator as claimed in claim 1 in which a pair of said other plates have portions on opposite sides of said wire and forming non-discharging ionizer electrodes.

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