Oct. 25, 1955 J. L. DITZLER 2,721,622

ELECTROSTATIC PRECIPITATOR

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Fig. 1.

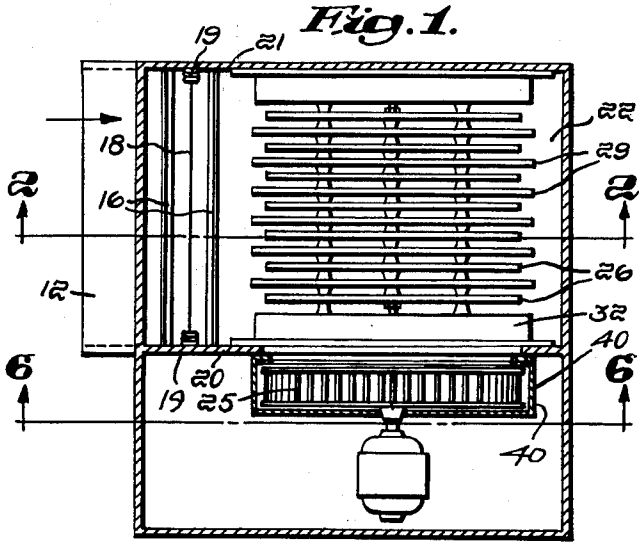
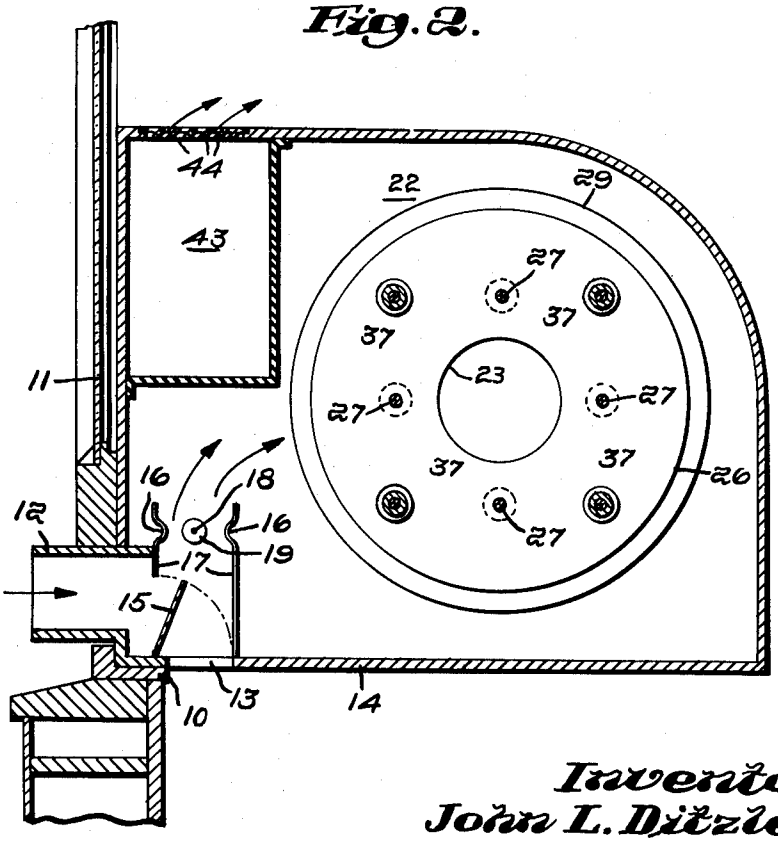


Fig. 2.



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Fig. 3.

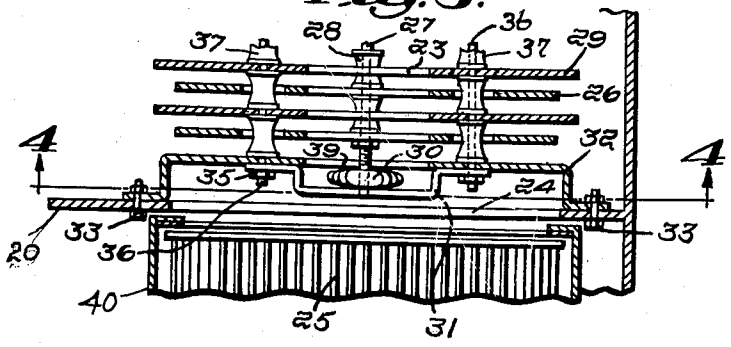
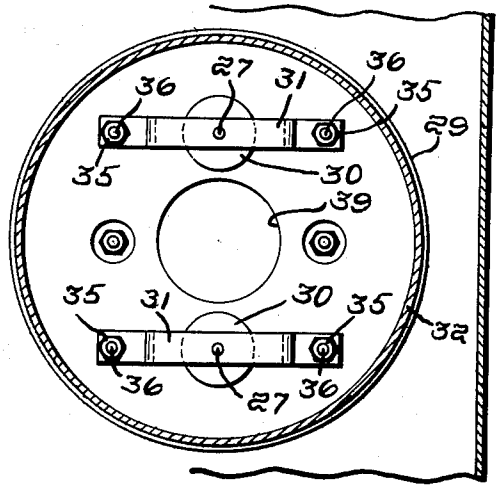


Fig. 4.



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Fig. 5.

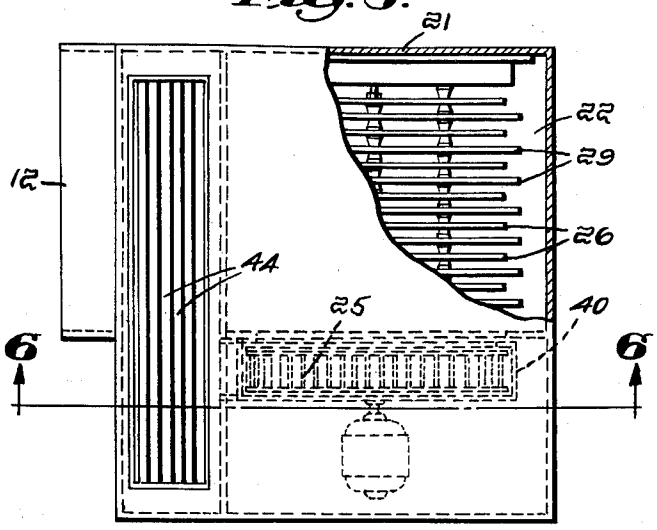
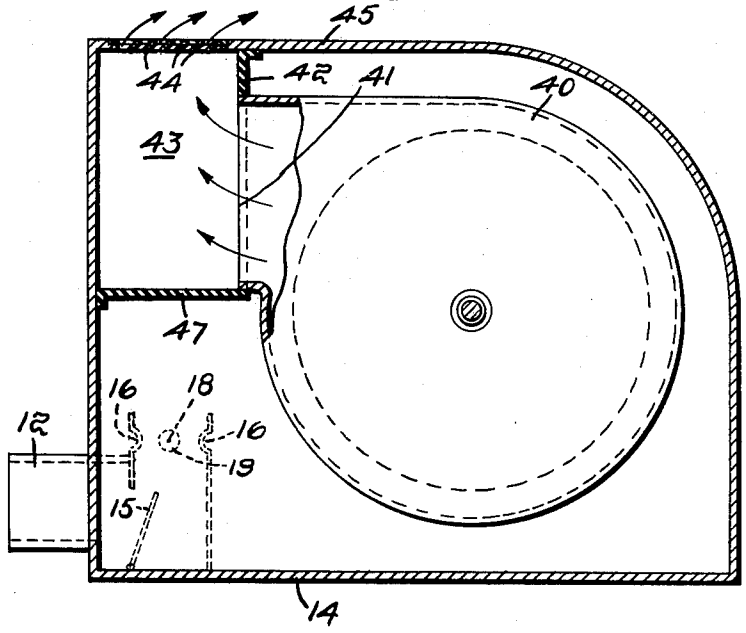


Fig. 6.



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ELECTROSTATIC PRECIPITATOR

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Application April 1, 1954, Serial No. 420,356

4 Claims. (Cl. 183—7)

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

In electrostatic precipitators of the room unit type used for cleaning air in homes, centrifugal fans are usually provided within the precipitator cabinets or casings for moving the air to be cleaned therethrough. This invention simplifies such a precipitator and increases its efficiency by rounding the collector plates and by providing them with central openings aligned with the axial inlet of a centrifugal fan having an involute housing aligned with the collector plates. A unit is provided which is particularly suited for mounting on a window sill and for drawing air to be cleaned through a window, the cabinet of the unit curving around the collector plates and the fan housing at the upper portion of the side opposite the window.

An object of this invention is to simplify the combination of a centrifugal fan with an electrostatic precipitator.

Another object of this invention is to provide a window mounted electrostatic precipitator.

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

Fig. 1 is a plan view, in section, looking downwardly upon an electrostatic precipitator embodying this invention;

Fig. 2 is a sectional view along the lines 2—2 of Fig. 1;

Fig. 3 is a plan view, in section of a portion of the fan wheel and the portion of the collector cell adjacent thereto;

Fig. 4 is a sectional view along the lines 4—4 of Fig. 3;

Fig. 5 is a plan view, with a portion of the upper wall removed, of the precipitator, and

Fig. 6 is a sectional view along the lines 6—6 of Fig. 5.

The precipitator is designed to be mounted on a window sill 10, the window 11 being raised sufficiently to permit the outdoor air duct 12 to extend between the sill and window. The recirculated air inlet 13 is provided in the lower wall 14 of the unit, just inwardly of the outdoor air duct. The damper 15 is pivoted to the wall 14 and controls the ratio of recirculated to outdoor air to be passed through the unit. It can also be adjusted to shut off either the outdoor air or the recirculated air.

The air to be cleaned, either outdoor air, recirculated air or a mixture of both, passes between the semi-cylindrical non-discharging ionizer electrodes 16 formed in the upper portions of the metal plates 17 which provide an inlet passage into the collector cell 22. The ionizer wire 18 extends midway between the electrodes 16, and is supported by the insulators 19 from the inner vertical wall 20 and the outer vertical wall 21 of the unit.

The collector cell 22 is supported from the walls 20 and 21, and is generally similar to the collector cell of the E. L. Richardson Patent No. 2,535,696 except that the collector plates are circular and have the central openings 23 therein in axial alignment with the opening 24 in the wall 20 which is aligned with the axial inlet of the centrifugal fan wheel 25.

The charge plates 26 of the collector cell 22 are supported on the tie rods 27 and are spaced apart by the spacers 28, the rods and spacers passing through clearance openings in the ground plates 29 of the cell and in the end walls 32 of the cell. The tie rods 27 are threaded at their ends into the insulators 30 which are secured to the brackets 31 which, in turn, are bolted to the end walls 32 of the cell. The cell end walls 32 are bolted to the walls 20 and 21 of the unit by the bolts 33. The brackets 31 are bolted to the cell end walls 32 by the nuts 35 on the threaded ends of the tie rods 36 which support the ground plates 29 from the end walls. The plates 29 are spaced apart by the spacers 37 which, with the tie rods 36, extend through clearance openings in the charge plates 26. The cell end wall 32 adjacent the fan wheel 25 has the central opening 39 therein in alignment with the axial inlet of the fan wheel.

The fan has a scroll shaped casing 40 therearound, and which has an outlet 41 in the vertical inner wall 42 of the unit, and which connects with an outlet passage 43 over which extends the upper wall 45 of the unit, the louvres 44 being provided in the wall 45 over the passage 43 for discharging the clean air from the unit. The louvres 44 are curved away from the window for guiding the clean air in a direction away from the window. The outlet passage 43 has a lower wall 47 which separates it from the air entering the collector cell. The walls 42 and 47 of the outlet passage 43 are of sound insulating or absorbing material.

As is conventional, a D. C. voltage of about 12 kv. would be applied to the ionizer electrodes, and a D. C. voltage of about 6 kv. would be applied to the collector plates.

In operation, the fan would operate to draw air through the passage between the plates 17 and through the ionizer where the entrained dust particles would be given electrostatic charges. The air with the charged dust particles would then pass between the collector plates 26 and 29, and the dust particles would precipitate on the oppositely charged plates. The clean air would pass through the central openings in the plates of the cell and through the opening 24 in the wall 20 into the fan wheel 25, and would be discharged from the fan wheel through the fan casing 40 into the outlet passage 43 and from the latter, through the passages between the curved louvres 44 into the room.

It will be noted that the inner upper portion of the upper wall 45 of the unit is rounded where it passes around the inner portions of the round collector plates and the rounded fan casing, thereby conserving space and providing a pleasing appearance.

By aligning the collector plates with the central openings therein, with the axial inlet of the centrifugal fan wheel, the usual inlet and outlet flow reversal passages are eliminated, resulting in a reduction in the space required by the unit, and in a reduction of the noise produced by the air flow.

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 and described, 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. A window mounted electrostatic precipitator comprising a casing having an outdoor air duct extending outwardly from its outer side and adapted to be placed between a partially opened window and the sill of the window, means forming an ionizer passage within said cas-

ing adjacent the inner end of said duct, the lower side of said casing having a recirculated air inlet connecting with said ionizer passage, ionizer electrodes in said ionizer passage, a collector cell comprising spaced apart collector plates in said casing between said ionizer passage and the inner side of said casing, said casing having an inner wall adjacent one end of said cell, a centrifugal fan in said casing on the opposite side of said wall from said cell, said fan having an axial inlet opening, said plates and wall having openings aligned with said axial opening, means forming an air outlet in the upper side of said casing, and means connecting the outlet of said fan to said outlet.

2. A window mounted precipitator as claimed in claim 1 in which the plates have portions adjacent the inner side of the casing which are curved in circular arcs, and in which the upper and inner sides of the casing are curved around said curved portions of the plates.

3. A window mounted precipitator as claimed in claim 2 in which the duct extends outwardly from the lower

portion of the casing, in which the means connecting the outlet of the fan to the air outlet is a passage located over the ionizer passage, and in which the air outlet is over the passage connecting the outlet of the fan to the air outlet.

4. A window mounted precipitator as claimed in claim 1 in which the duct extends outwardly from the lower portion of the casing, in which the means connecting the outlet of the fan to the air outlet is a passage located over the ionizer passage, and in which the air outlet is over the passage connecting the outlet of the fan to the air outlet.

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