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PATENTED FEB. 26, 1907.

A. LOTZ.

APPARATUS FOR CLEANING DUST LADEN AIR.

APPLICATION FILED MAR. 24, 1906.

2 SHEETS—SHEET 1.

Fig. 1

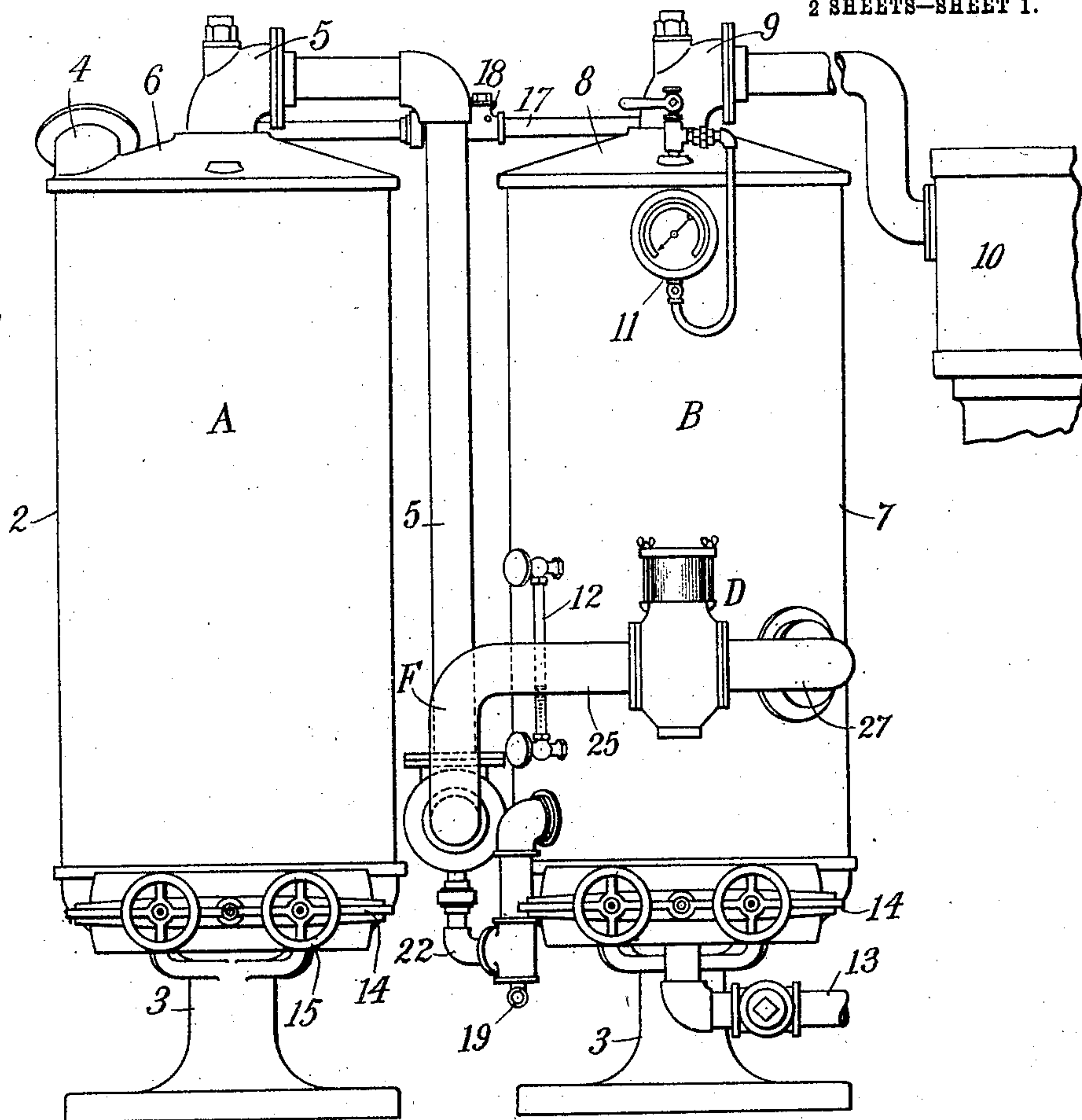
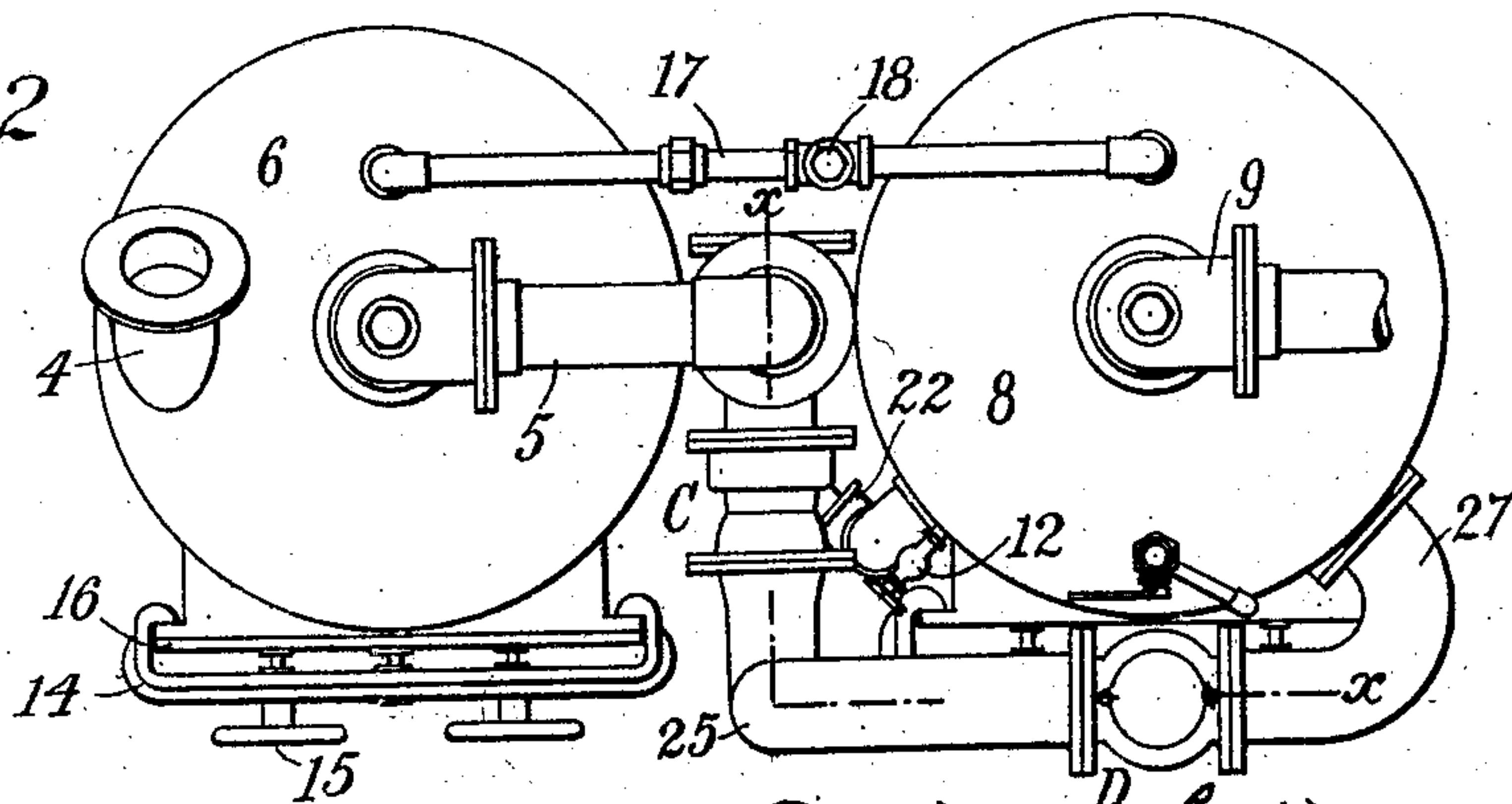


Fig. 2



Witnesses
Rapphaël Ketter
Frederick Freckinger.

Augustus Lotz Inventor
 By *his* Attorney *J. M. W. W.*

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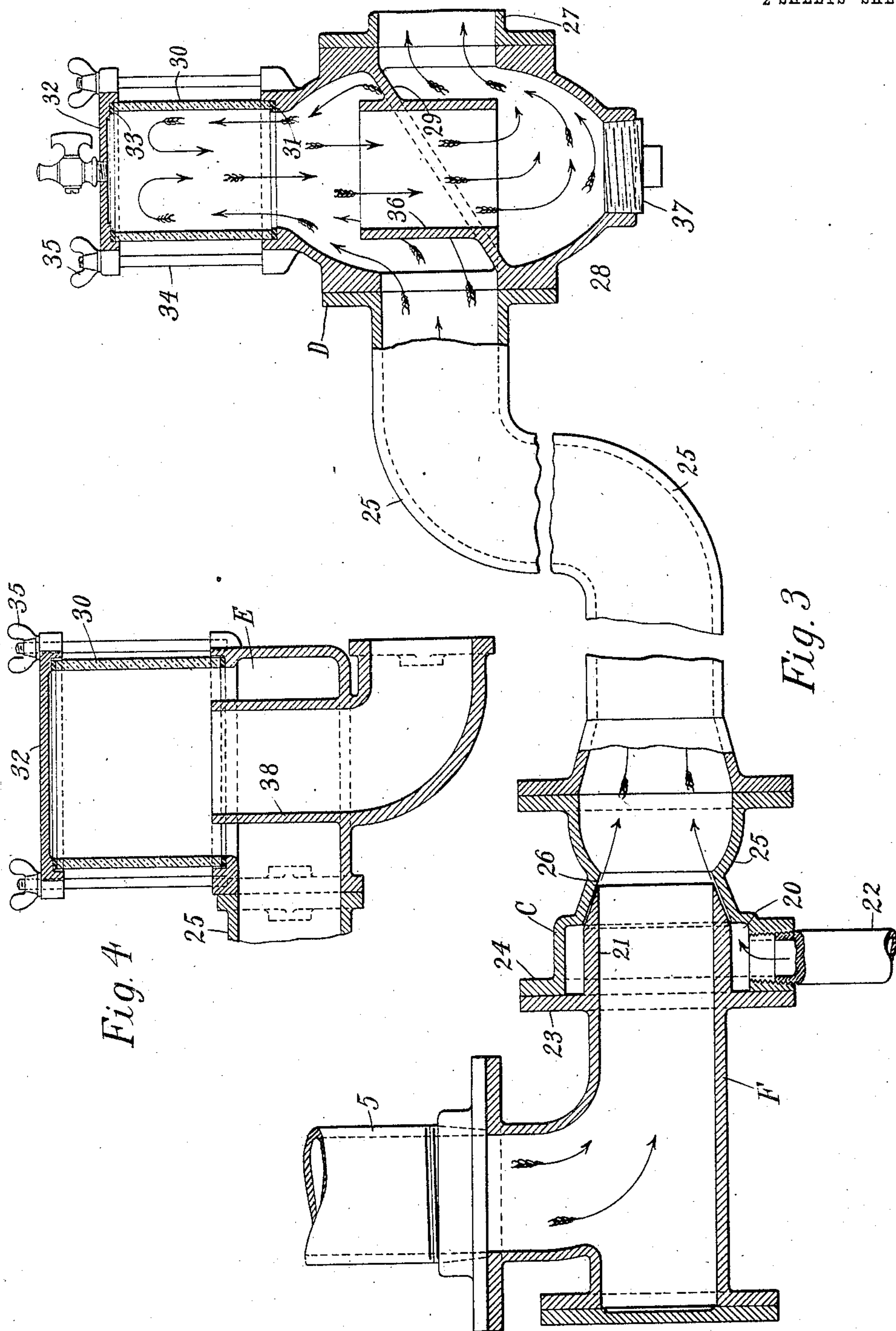
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By his Attorney J. D. Morris

UNITED STATES PATENT OFFICE.

AUGUSTUS LOTZ, OF SAN FRANCISCO, CALIFORNIA, ASSIGNOR TO SANITARY DEVICES MANUFACTURING COMPANY, A CORPORATION OF CALIFORNIA.

APPARATUS FOR CLEANING DUST-LADEN AIR.

No. 845,364.

Specification of Letters Patent.

Patented Feb. 26, 1907.

Application filed March 24, 1906. Serial No. 307,836.

To all whom it may concern:

Be it known that I, AUGUSTUS LOTZ, a citizen of the United States, and a resident of the city and county of San Francisco, State of California, have invented new and useful Improvements in Apparatus for Cleaning Dust-Laden Air, of which the following is a specification.

My invention relates to improvements in apparatus for the cleaning of dust-laden air, and is particularly applicable to the cleansing of the air discharged from pneumatic carpet-cleansing apparatus, its object being to provide more efficient means for the freeing of the air from the particles of solid matter held in suspension so as to discharge only thoroughly-purified air to the atmosphere and protect the pump through which the air must pass before it is discharged into the atmosphere from undue wear.

In the accompanying drawings, forming part of this specification, Figure 1 is a front elevation of my improved apparatus, showing a dry separator in which the greater portion of the solid matter is deposited by gravity, a wet separator through which the air is passed from the dry separator, the devices intermediate of the two separators for washing the air, and the vacuum-pump to and through which the air passes from the system. Fig. 2 is a plan view of the same. Fig. 3 is a detail sectional view of the air-washing devices intermediate of the two separators, taken on line *xx* of the Fig. 2; and Fig. 4 is a modification of part of Fig. 3.

In the drawings, A represents the dry separator, which consists of a hollow vertical cylinder 2, resting upon a suitable standard 3.

4 is an intake-pipe entering the top of the cylinder at such an angle as to impart a spiral motion to the incoming air, and 5 is an outlet-pipe leading from the center of the conically-shaped head or top 6.

B is the wet separator-tank or expansion-chamber, consisting of a similar hollow cylinder 7, from the conical head 8 of which the outlet-pipe 9 conveys the air to the vacuum-pump 10.

11 is a vacuum-gage to indicate the air-pressure, and 12 is a water-gage to show the height of the water in the separator.

13 is an outlet-pipe for draining the fouled contents of the separator into the sewer.

14 is a clamp operated by the screws 15 to hold in place the door 16, which closes an opening into the bottom of the separator.

17 is a pipe connecting the tops of the two separators, having a check-valve 18 for equalizing pressure therein.

19 is a pipe connection to the separator B for introducing water into the same, for the purposes hereinafter described.

The air is conveyed from the wet to the dry separator through the conduit F, made up of the pipe 5, the washing devices C and D, and their connected pipes 21, 25, and 27. The device C is an ejector by means of which water is atomized by the current of air passing therethrough. 20 is an annular chamber surrounding the pipe-nozzle 21, being supplied with water from the separator B by means of the pipe 22. It is desirable to admit the water from the annular chamber into the conduit equally on all sides of the pipe and to be able to adjust its flow. The preferable means for accomplishing this result is shown in the drawings. The nozzle 21 is connected to the pipe-section 25 by a flange-coupling, the parts being of such dimensions that when assembled and adjusted for the minimum flow the members 23 and 24 of the coupling abut directly against each other, as shown in the drawings. This leaves a narrow annular passage between the conical tip of the nozzle and the conical seat 26 of the adjacent pipe-section. Should it be found desirable to increase the inflow of water to the conduit, this may readily be done by disconnecting the coupling and inserting washers or gaskets between the members, thus increasing the width of the annular passage.

D is a mixing-chamber for commingling the air and entrained watery vapor to secure the thorough wetting of every particle of suspended dust, so that when discharged through the pipe 27 into the separator B the water is allowed to condense and carry with it the solid matter as it falls into the bottom of the separator. The mixing device D comprises a casing forming a chamber 28, extending above and below the connected pipe-sections 25 and 27. Extending diagonally through the chamber and interposed between the pipe-sections is the diaphragm 29. Upon or forming a part of the chamber 28 is a glass dome or cylinder 30, designed for exhibiting to the

eye the mingled currents of vapor and air to disclose the working of the apparatus. Preferably this glass portion is a simple cylinder seated upon the top of the chamber 28 with a suitable interposed gasket 31, forming an air-tight joint, and with a cap 32 seated upon its top with an interposed gasket 33, the screw-threaded rods 34 and nuts 35 serving to detachably hold the parts together.

Through the diaphragm or deflecting-plate 29 extends a short vertical pipe 36, preferably of substantially the dimensions of the pipes 25 and 27, and which serves to connect the same to form a continuous passage. 37 is a removable plug in the bottom of the chamber 28 to give access to the same for the purpose of cleaning.

The various parts of the conduit F are united together by means of flanged unions in the ordinary way.

Fig. 4 shows a modified form of mixing-chamber E. The pipe 25 is connected with and opens into the bottom of this chamber, which has a superposed glass top or dome 30, the same as the mixing-chamber D. Centrally and vertically arranged in the chamber is a pipe-section 38, the top or inlet end of which projects above the level of the pipe 25 and extends downward, having a right-angled bend with means for connecting to the pipe 27.

The operation of the apparatus, while readily apparent from the drawings and the foregoing description, may be specifically set forth as follows: The tank or separator B having been supplied with water to a height less than that of the outlet of the pipe 27 and the vacuum-pump 10 being set in action, air is drawn from the cleaning-tools (not shown) through the pipe connection 4 into the separator A. Herein the air is rotated spirally and the heavier portions of the suspended solid matter precipitated by gravity. Thence the partially-cleaned air passes out through the pipe 5 and the described cleaning devices. The air in rushing through the nozzle 19 serves as in an ejector to draw in the water from the chamber 18 and by its force finely atomizes it and entrains the vapor, carrying it more or less commingled therewith into the mixing-chamber E. Therein the currents are deflected by the plate or diaphragm 29 and forced to circulate in the upper part of the chamber and the glass dome 30, thence descending through the pipe-section 36 into the lower portion of the chamber, and thence outward through the pipe 27 into the separator B. The air is carried through the conduit at a speed of two or three miles a minute, and the frictional contact of the mingled air and watery vapor currents with the inclosing and deflecting walls between the nozzle 19 and the separator B suffices to so thoroughly agitate and commingle the two fluids that practically every particle of sus-

pended dust is thoroughly moistened and precipitated by gravity with the water as it is condensed from the air in the expansion-chamber or separator B and pours into the bottom of the separator, the cleansed air passing out from the separator B into and through the vacuum-pump 10.

In the modified construction of Fig. 4 the air having entrained and atomized the water is carried into the chamber E and forced to circulate in the top thereof and descend through the vertical pipe 38, the two fluids being agitated and commingled in substantially the same manner and with the same efficiency as in the mixing-chamber D.

I claim—

1. The combination with a narrow pipe, of means for forcing air therethrough at high velocity, means for admitting water to said pipe, a nozzle adjacent said water-inlet adapted under the action of the air-current to entrain and atomize the water, and means in the conduit beyond the nozzle for commingling the atomized water and air, separating the solid matter from the air and entraining it in the water and discharging the purified air freed from the water and solid matter.

2. The combination with a narrow conduit having a lateral water-inlet, of means for forcing air through such conduit at high velocity, a mixing-chamber comprising tortuous passages arranged in said conduit beyond said water-inlet, and means whereby the air-current entrains the inflowing water and violently commingles it with the air in their passage through said chamber.

3. The combination with a narrow conduit having a lateral water-inlet, of means for forcing air therethrough at high velocity, a mixing-chamber beyond said water-inlet, tortuous passages connecting said mixing-chamber with said conduit, and means whereby the air-current entrains the inflowing water and violently commingles it with the air in their travel through said tortuous passages and chamber.

4. In apparatus for cleaning dust-laden air, in combination with a vacuum-pump, a narrow sectional conduit for confining and conveying the air to said pump, and an annular chamber surrounding the adjacent ends of the conduit-sections and connected with a source of water-supply, the adjacent ends of the conduit-sections being provided the one with a conical seat and the other with a conical tip fitted thereto and slightly spaced therefrom to afford a communicating passage between the same from the annular chamber to the conduit.

5. In apparatus for cleaning dust-laden air in combination, a vacuum-pump, a conduit for connecting the same with the cleaning instrument, means for precipitating the entrained solid matter by gravity, a water-

inlet to said conduit intermediate said gravity separating means and said vacuum-pump, an atomizing-nozzle adjacent said water-inlet and adapted under the action of the
 5 air-current to draw water therefrom into said conduit in fine spray, and means intermediate of said atomizing device and said pump for condensing and separating the entrained water with its load of solid matter
 10 from the air-current.

6. In apparatus for cleaning dust-laden air, in combination, a dry gravity-separator, an expansion-chamber or wet separator, an interconnecting narrow conduit, a tortuous
 15 section in said conduit, means for introducing a water-spray into said conduit intermediate of the dry separator and tortuous section, and means for impelling the air through said conduit at high velocity.

20 7. In apparatus for cleaning dust-laden air, in combination with a vacuum-pump, an air-conveying system intermediate said pump and the source of air-supply comprising a gravity-separator, a wet separator or expansion-chamber, an intermediate narrow, sec-

tional conduit, and an annular chamber surrounding the adjacent ends of its pipe-sections and connected with the source of water-supply, the end of one of said pipe-sections having a conical seat and the end of the
 30 adjacent section having a conical tip fitted thereto.

8. In an apparatus of the class described, a dry or gravity separator, a wet separator or expansion-chamber, a connected vacuum-
 35 pump, a narrow sectional conduit intermediate of said separators, a water-chamber around the adjacent ends of the pipe-sections of said conduit connected to the source of water-supply, said pipe-sections constituting an ejector, and a tortuous section of
 40 said conduit intermediate of said water-chamber and wet separator.

In testimony whereof I have hereunto set my hand this 21st day of February, 1906.

AUGUSTUS LOTZ.

Witnesses:

H. L. HAND,
 MATTHEW BRADY.