W. LOCKE & E. B. DUNN.

SUCTION APPARATUS FOR PNEUMATIC CLEANING SYSTEMS.

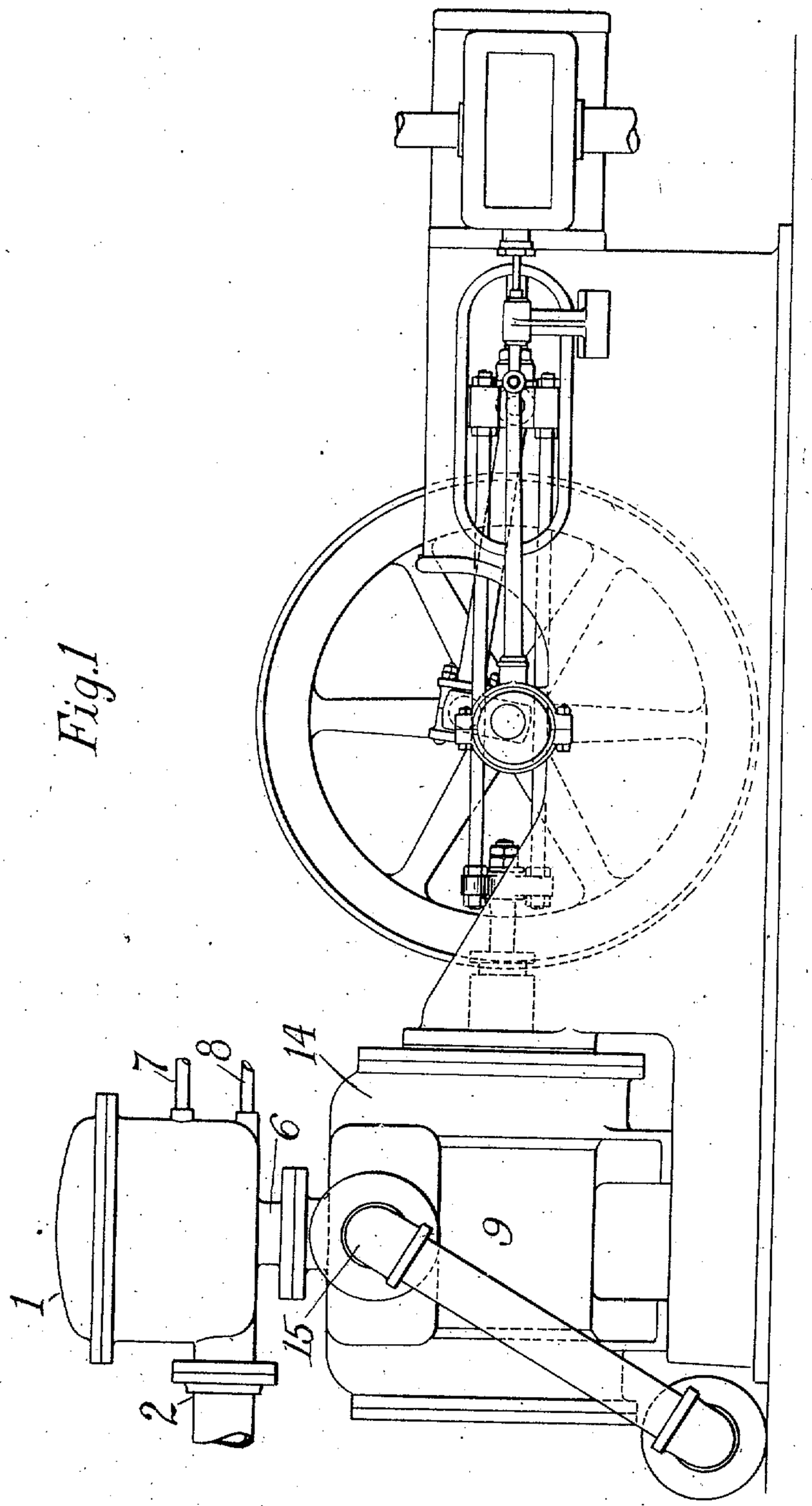
APPLICATION FILED SEPT. 28, 1907.

919,369.

Patented Apr. 27, 1909.

3 SHEETS—SHEET 1.

Fig.1



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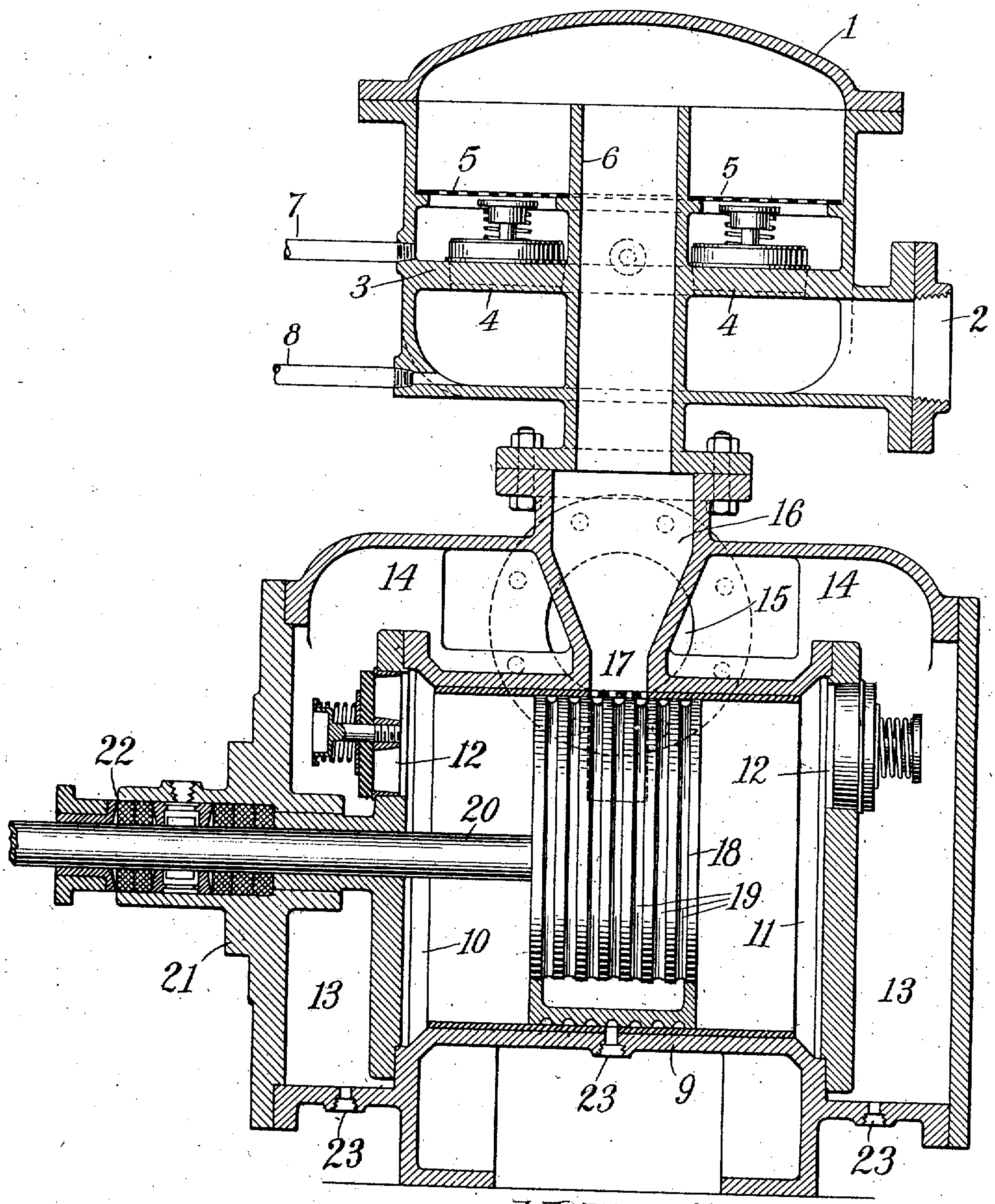
3 SHEETS—SHEET 2.

Fig. 2



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3 SHEETS—SHEET 3.

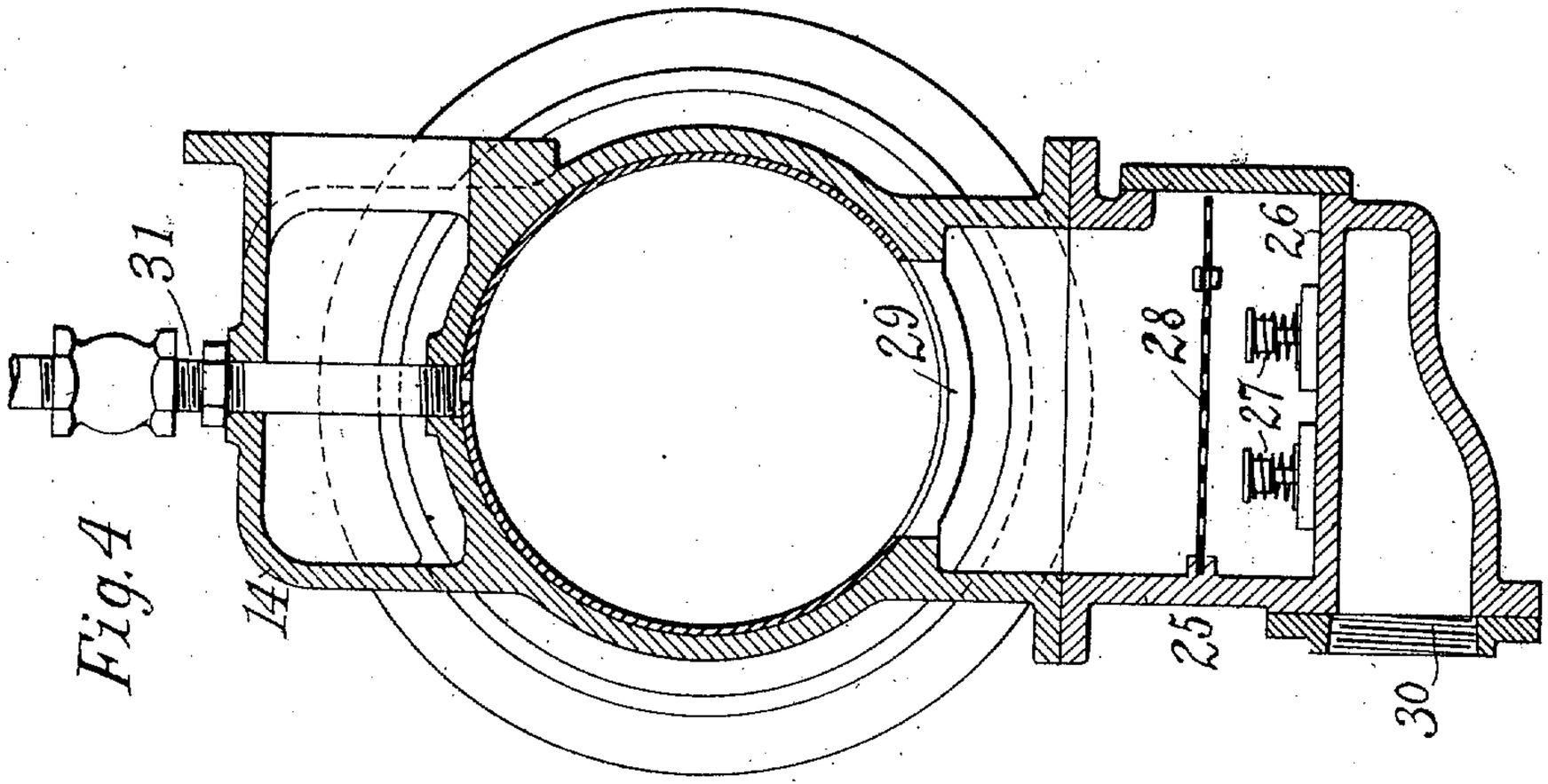

Fig. 4

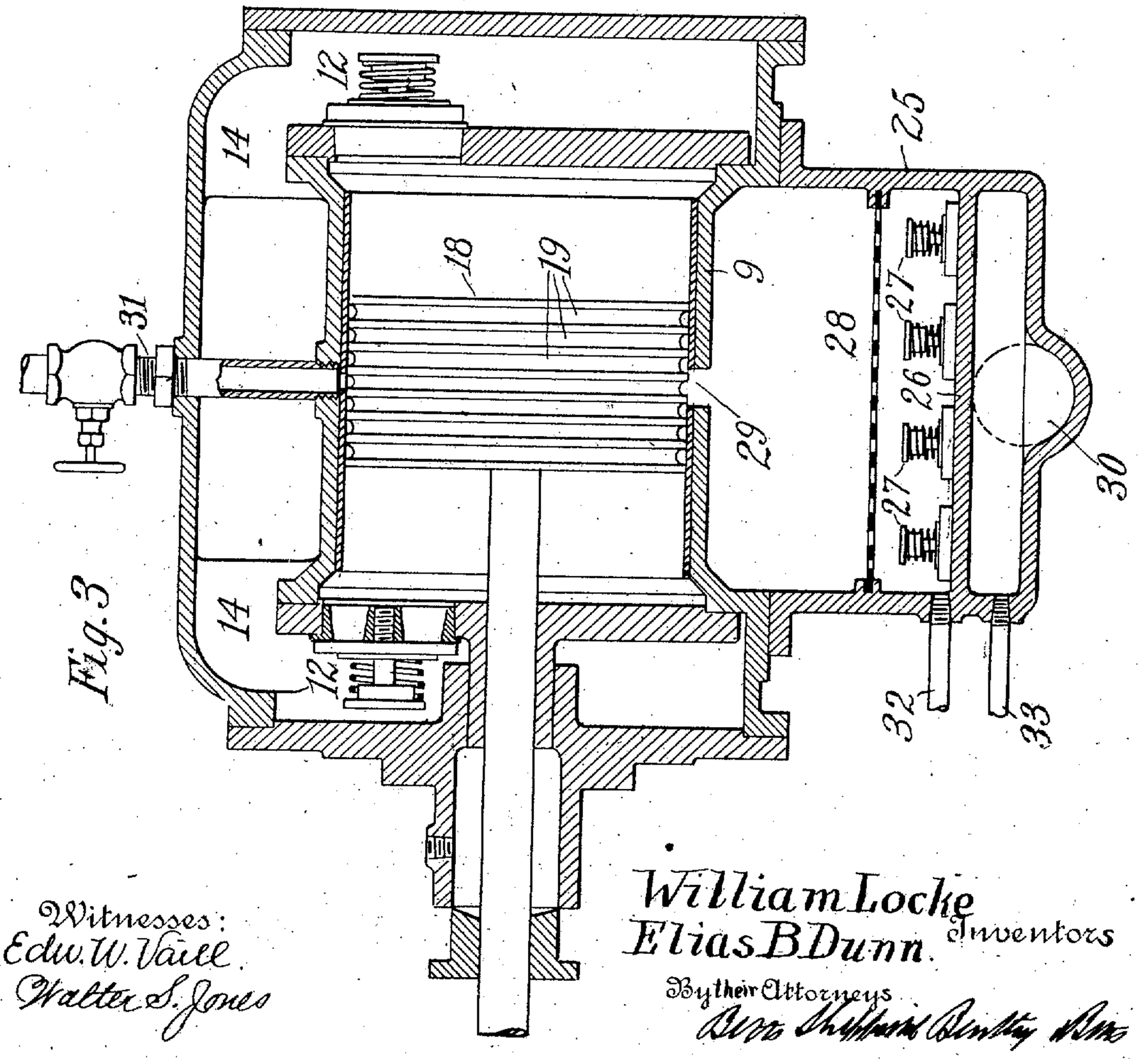

Fig. 3

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UNITED STATES PATENT OFFICE.

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SUCTION APPARATUS FOR PNEUMATIC CLEANING SYSTEMS.

No. 919,369. Specification of Letters Patent. Patented April 27, 1909.

Application filed September 28, 1907. Serial No. 395,037.

To all whom it may concern:

Be it known that we, WILLIAM LOCKE, a citizen of the United States, and a resident of Westfield, county of Union, State of New Jersey, and ELIAS B. DUNN, a citizen of the United States, and a resident of East Orange, county of Essex, State of New Jersey, have invented certain new and useful Improvements in Suction Apparatus for Pneumatic Cleaning Systems, of which the following is a full, clear, and complete disclosure.

Briefly stated, this invention relates to improvements in apparatus for producing pneumatic suction for removing dust and dirt through suitable suction cleaning and scrubbing implements and comprises a device of the nature of a pump, which is provided with such a construction that the parts thereof will not become worn or injured by the dirt and dust taken into the apparatus. The dust laden air or dust, water and air when taken directly into the suction apparatus avoids the necessity of using independent, costly and undesirable separating apparatus for extracting the dust and dirt from the air, and permits the use of water as a cleaning fluid. The special features of this form of the invention reside in a particular form of pump and in the arrangement of the saturating chamber and the pump chamber so that the parts are compact and therefore occupy little space, are simple in construction, not liable to become disarranged, and the valves and other similar parts are at all times easy of access for the purpose of adjustment and repair.

The construction referred to embodies a horizontal reciprocating plunger or piston located in a chamber connected with a saturating chamber so as to withdraw the air or a mixture of air and water from above the surface or body of liquid such as water, contained in the saturating chamber. The saturating chamber and the piston chamber are so arranged in relation to each other that there is no hindrance or impediment to the air or mixture passing from the saturating chamber to the piston chamber. The piston in the piston chamber is of such a character and is so constructed that water, dirt and air passing through the same will not injure the surface of the piston or the interior surfaces of the piston chamber. This apparatus is designed especially for use with systems of vacuum cleaning in which water is supplied to a suitable scrubbing implement and to which suitable conduits are connected through which the air and water may be drawn after the scrubbing operation and, when charged with the dirt removed from the surfaces being cleaned. The apparatus is also applicable to systems of vacuum cleaning, in which a suitable suction implement is passed over the surfaces being cleaned for removing the dust and dirt without the use of water.

The suction apparatus above briefly referred to produces a vacuum or partial vacuum which is transmitted through suitable conduits or pipes from a suction nozzle that is passed over the surface or surfaces being cleaned and so that the dust and air or dust, air and water which are caused to enter the nozzle by means of the suction are carried through the conduits to the suction device and saturating chamber where they become mixed with liquid therein and then are ejected directly into a sewer or other discharge conduit.

For a full, clear and exact description of the two forms of the invention, reference may be had to the following description, together with the accompanying drawing forming a part thereof, in which—

Figure 1 is a side elevation of the pump or suction device with its attached saturating chamber; Fig. 2 is a vertical sectional view thereof; Fig. 3 is a longitudinal sectional view of a modified form; and Fig. 4 is a transverse sectional view of the modified form of the device shown in Fig. 3.

Referring to the drawings, the numeral 1 indicates a cylindrical casing having an inlet port 2 in its lower portion. A transverse partition 3 extends across the central portion of the chamber formed by the casing 1 and is provided with suitable valves 4 which are adapted to permit an upward passage of the air or air and water, but which close when there is any tendency to a downward passage of the same. Above the valve 4, baffle-plates 5 are provided which cause the air passing through the chamber to be completely mixed with the water contained therein. A vertical conduit 6 extends through the central portion of the casing 1 to within a short distance of its top, said conduit being connected with the suction

apparatus at its lower end. The casing 1 is provided with a water inlet pipe 7 and a drain pipe 8, so that water may be supplied to the saturating chamber, and so that the contents of the chamber may be easily drawn off. The water flowing in through the conduit 7 fills the chamber formed by the casing 1 to a level corresponding to that of the upper end of the conduit 6, and the water then flows into the conduit 6 and then downward into the suction apparatus, together with the dirt and air that is mixed with the water. The suction apparatus comprises a cylindrical casing 9 provided with circular heads 10 and 11, which are provided with suitable valves 12 for permitting the escape of the mixture when under compression. Communicating with the interior of the cylinder 9 through the valves 12 are external chambers 13 that are connected at their upper ends by the transverse passage 14 which passage terminates in a large outlet port 15. The connecting passage 16 between the conduit 6 and the interior cylinder 9 opens into said cylinder at a point midway between its ends as indicated at 17. The piston 18 is slightly shorter in length than one-half the length of the piston chamber 9. The piston 18 within the cylinder 9 is slightly smaller in diameter than the internal diameter of the said cylinder, so that it fits loosely within the same and no packing is required, except that provided by the water passing through the conduit 6 and the passages 16 and 17. For this purpose the piston 18 is provided with a series of grooves 19 that are adapted to become filled or partly filled with water and thereby aid in forming a packing for the said piston. The piston rod 20 passes through the head 10 and through the outer casing 21 of one of the chambers 13 and is provided with a suitable stuffing box as indicated at 22. The piston 1 of course may be operated by any suitable power apparatus, such as an engine or an electric motor. The chambers 13 and the cylinder 9 are provided with outlets 23 that are closed by suitable plugs or stoppers so that said chambers may be drained when desired. When this form of our invention is in operation, a suction is produced within the conduit connected with the inlet port 2 and water dirt and air, or dirt and air, are drawn through the chamber 1 and through the baffle-plate 5 located therein, thereby becoming thoroughly mixed with the water in said chamber. The mixture then passes from the top of said chamber 1 into the conduit 6 and through the passages 16 and 17 into the cylinder 9. It should be noticed that the piston 18, when reciprocating within the cylinder 9, causes a vacuum to be produced on the rear side, as regards its direction of motion, which vacuum increases until the rear end of the piston passes the opening 17, at which point the vacuum then forcibly acts through the passages 6 and 16 in the manner above described. After the forward end of the piston 18 passes the opening 17 a pressure is produced in that portion of the cylinder in front of the piston, the mixture thereby being forced out through the adjacent valves 12 and into the corresponding chamber 13, from which it passes into the discharge conduit 15.

In the modification of the invention shown in Figs. 3 and 4 the construction of the piston, the piston chamber and its adjacent discharge passages is substantially the same as that above described. The saturating chamber, however, is located below the cylinder 9 and is formed by the casing 25 upon which the cylinder 9 is mounted. The casing 25 forms a saturating chamber which is provided at its central portion with a transverse partition 26 having valves 27, similar to the valves 4, and is also provided with a baffle-plate as indicated at 28. The opening 29 from the saturating chamber into the interior of the cylinder 9 is located in a position similar to that of the passage 17 referred to in the first modification. The casing 25 is also provided with an inlet opening 30 for permitting the inflow of air and dirt, or air, dirt and water, in a manner similar to that described in connection with the inlet port 2. The piston 18 in the piston chamber 9 is also provided with the grooves 19 as indicated. To insure the said grooves being at all times filled with water so as to provide the requisite packing for the piston, a conduit 31 passes through the chamber 14 and enters the cylinder 9 at its central portion as indicated. Water is allowed to flow through this conduit 31 and fills the grooves of the piston 18 at each reciprocation thereof. Casing 25 is also provided with suitable inlet and outlet pipes 32 and 33 respectively so that water may be continually added to the chamber formed by the casing 25 if desired and so that said chamber may be completely drained when necessary.

Having now particularly described this form of our said invention, what we claim and desire to protect by Letters Patent is:

1. In a pneumatic suction-cleaning apparatus, the combination of a horizontal piston chamber, a liquid saturating chamber attached to the side of said piston chamber and a passage forming direct communication between said piston chamber and the upper portion of said saturating chamber so as to withdraw the air and water from above the level of the liquid in said saturating chamber.

2. In a pneumatic suction-cleaning apparatus the combination of a horizontal piston chamber, a liquid saturating chamber attached to the side of said piston chamber, and a communicating passage entering said piston chamber intermediate its ends and

forming direct communication between the upper portion of said piston chamber and said saturating chamber, so as to withdraw the air and water from above the level of the liquid in said saturating chamber.

3. In a pneumatic suction-cleaning apparatus, the combination of a horizontal piston chamber, a saturating chamber attached to the side of said piston chamber extending from the upper portion of the former, a passage from said saturating chamber to said piston chamber and opening into the latter midway its ends, and outlet valves for discharging from said piston chamber.

4. In a pneumatic suction-cleaning apparatus, the combination of a horizontal chamber, a saturating chamber attached to the side of said piston chamber, a passage from said saturating chamber extending from the upper portion of the former to said piston chamber and opening into the latter midway its ends, outlet valves for discharging from said piston chamber, and suitable valves coöperating with said saturating chamber for preventing the backflow therefrom into the inlet conduit.

5. In a pneumatic suction-cleaning apparatus, the combination of a horizontal piston chamber, a saturating chamber mounted adjacent thereto, a passage between the upper portion of said saturating chamber and the central portion of said piston chamber, exterior casings inclosing the ends of said piston chamber and forming discharge passages from the piston chamber, and a discharge conduit connected with said passages.

6. In a pneumatic suction cleaning apparatus, the combination of a piston chamber, a saturating chamber mounted on one side of said piston chamber, a passage forming a direct communication between said suction chamber and said piston chamber, said passage extending upward to a point adjacent the top of said saturating chamber, an inlet conduit communicating with the lower portion of said saturating chamber, and suitable valves for controlling the flow through said saturating chamber and said piston chamber.

Dated, this 27th day of September, 1907.

WILLIAM LOCKE.
ELIAS B. DUNN.

Signed in the presence of—
WALTER S. JONES,
EDW. W. VAILL, JR.

Correction in Letters Patent No. 919,369.

It is hereby certified that in Letters Patent No. 919,369, granted April 27, 1909, upon the application of William Locke, of Westfield, and Elias B. Dunn, of East Orange, New Jersey, for an improvement in "Suction Apparatus for Pneumatic Cleaning Systems," an error appears in the printed specification, as follows: On page 3, line 16, after the word "horizontal" the word *piston* should be inserted; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 11th day of May, A. D., 1909.

[SEAL.]

E. B. MOORE,

Commissioner of Patents.