

No. 814,837.

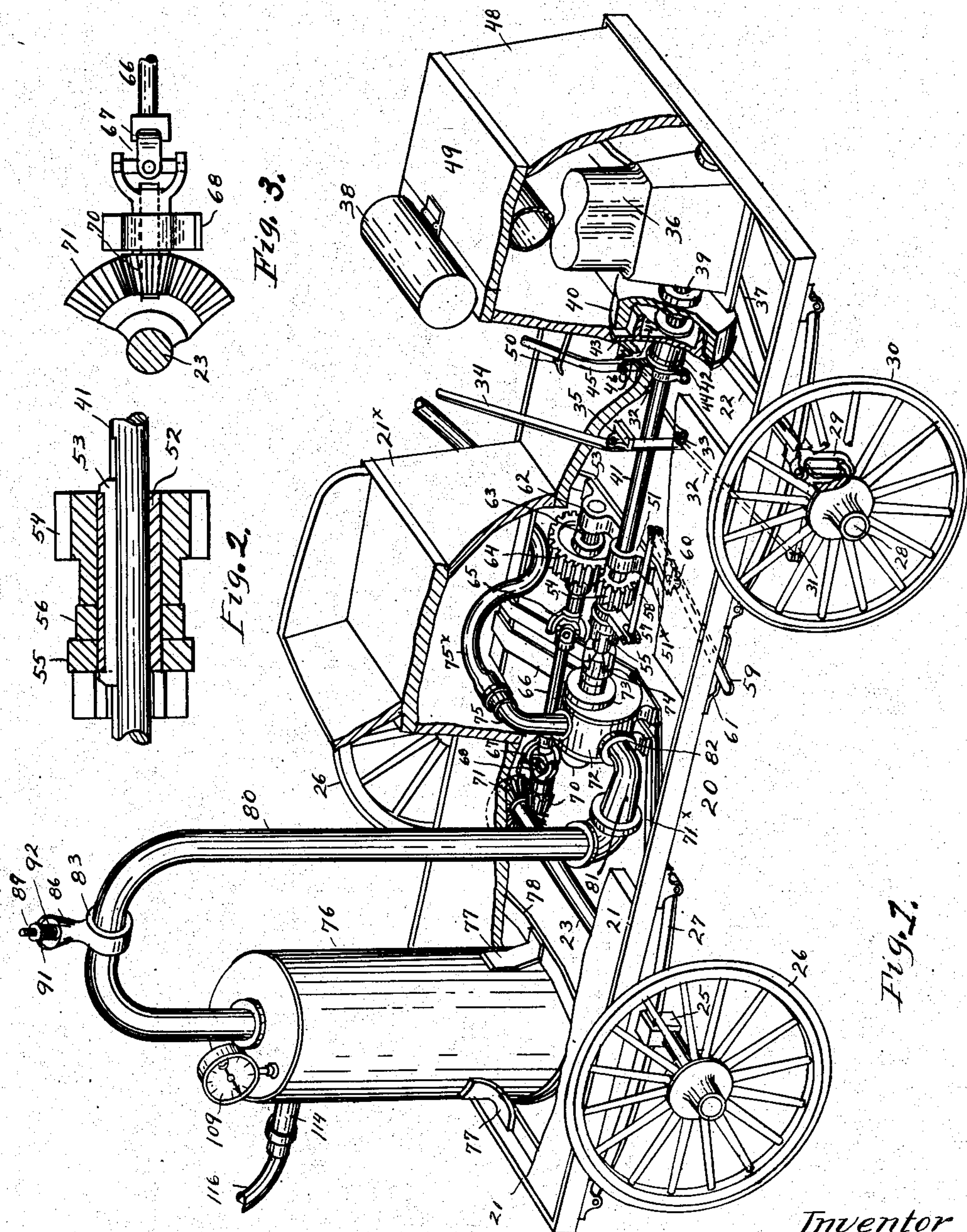
PATENTED MAR. 13, 1906.

E. H. FENTON.

PNEUMATIC DUST REMOVING AND COLLECTING APPARATUS.

APPLICATION FILED NOV. 8 1904.

2 SHEETS—SHEET 1.



Witnesses

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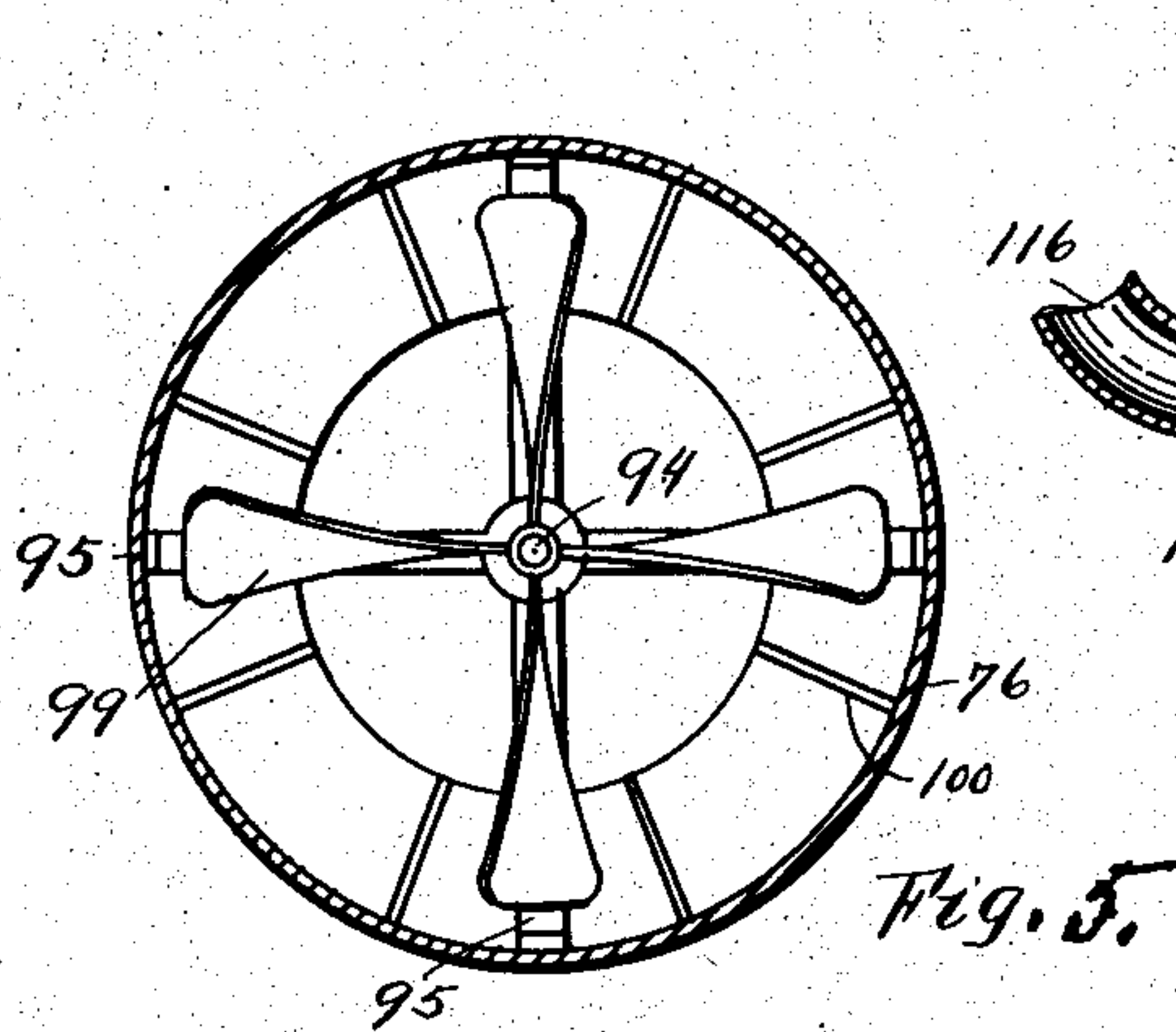


Fig. 5.

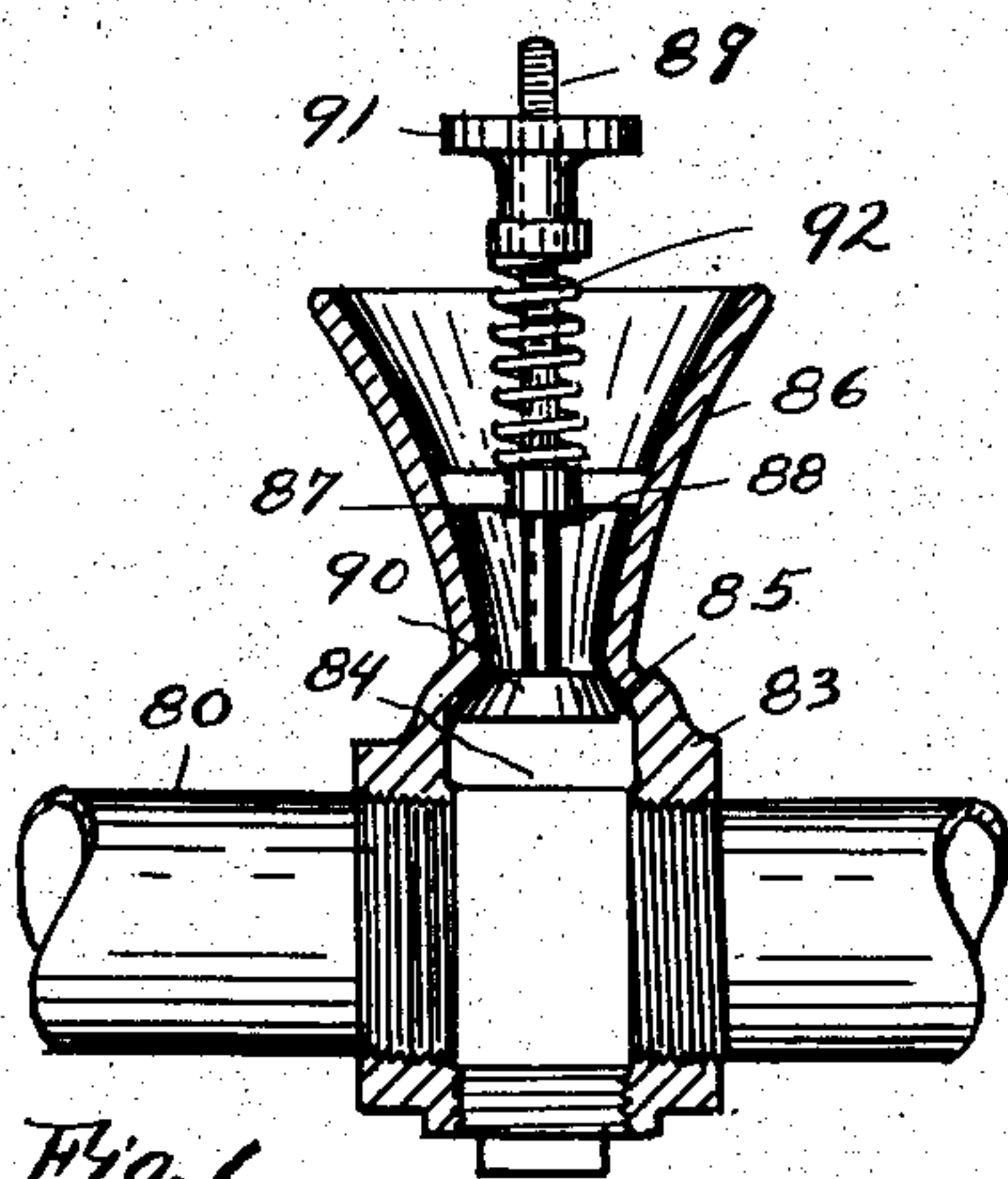


Fig. 6.

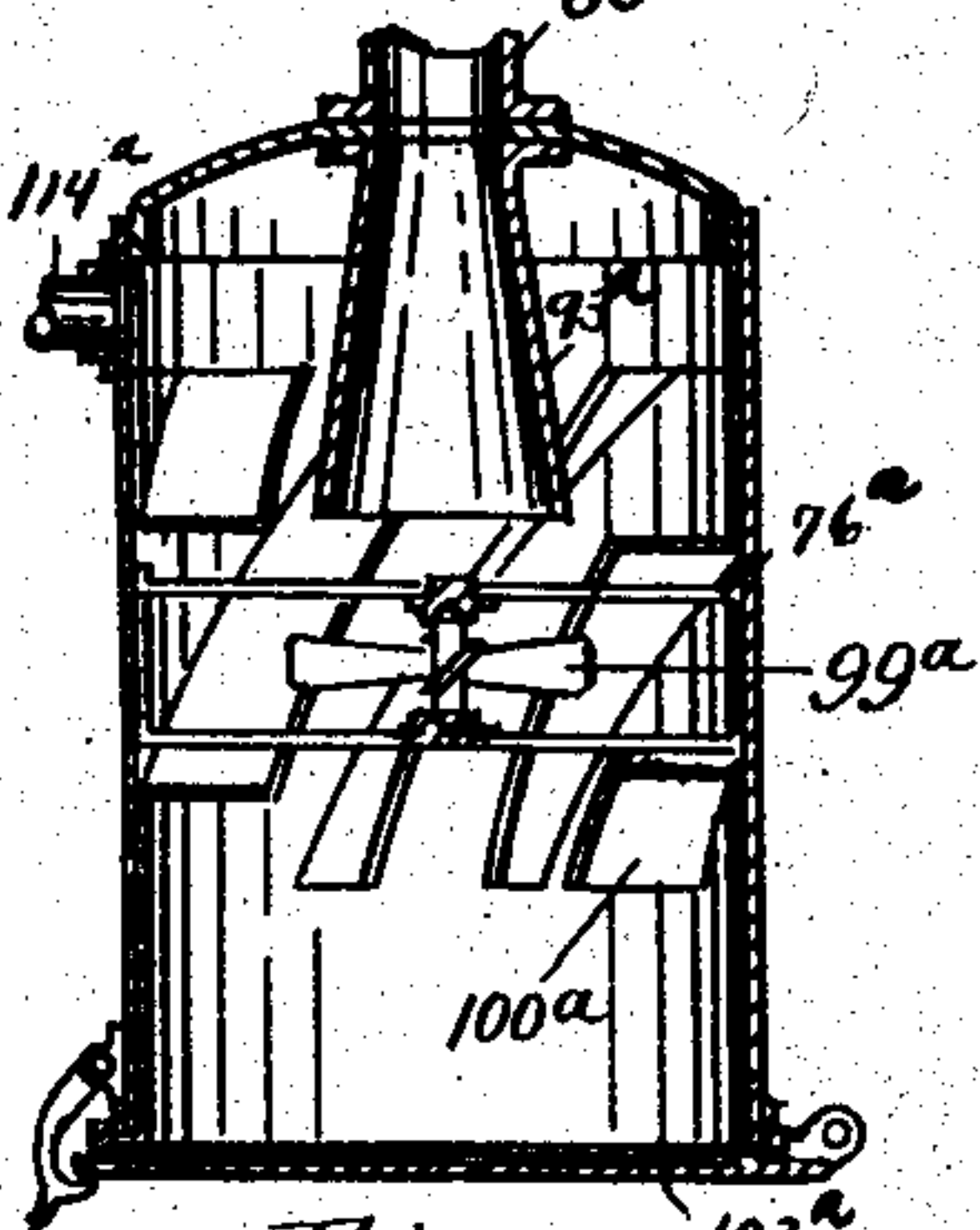


Fig. 8.

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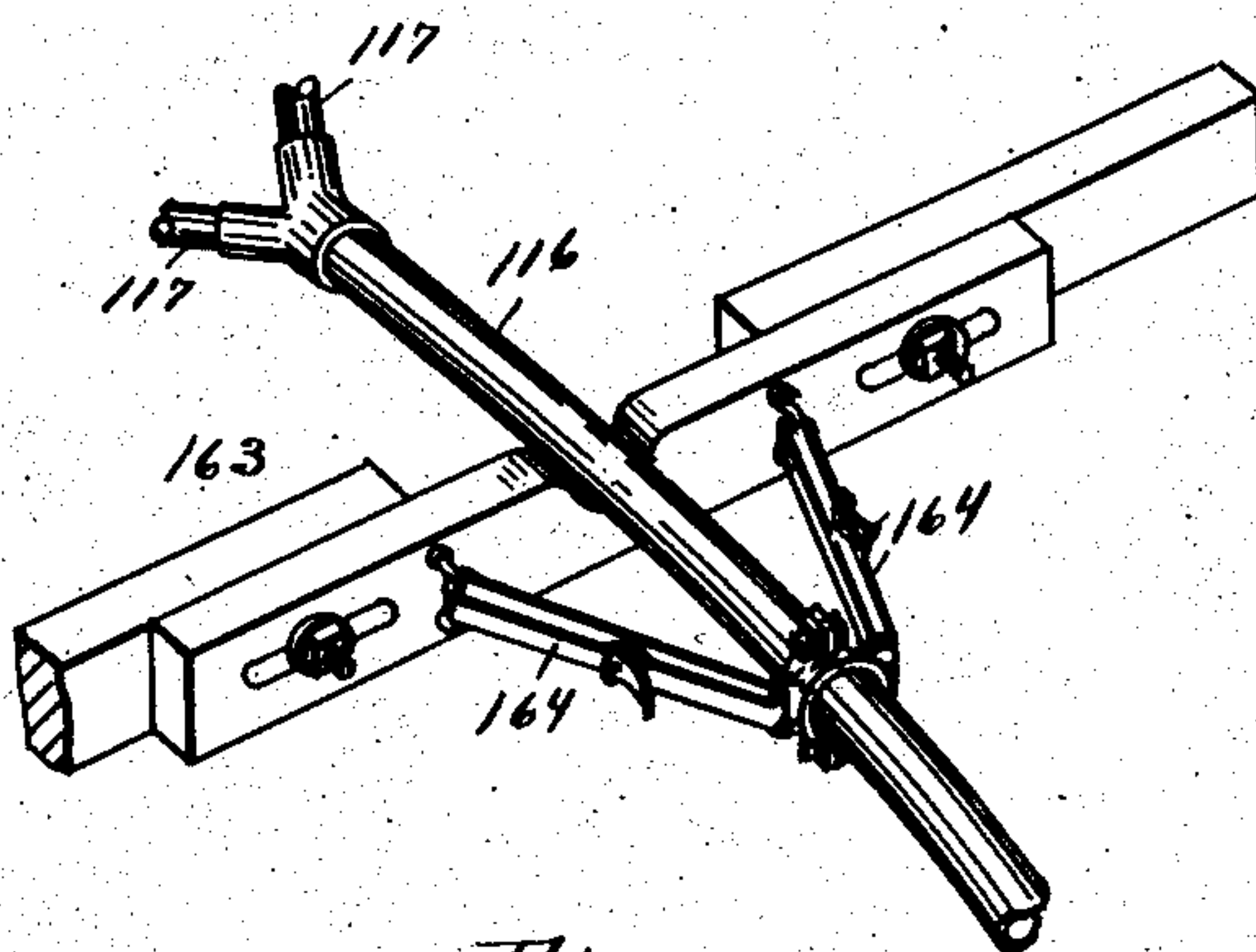


Fig. 7.

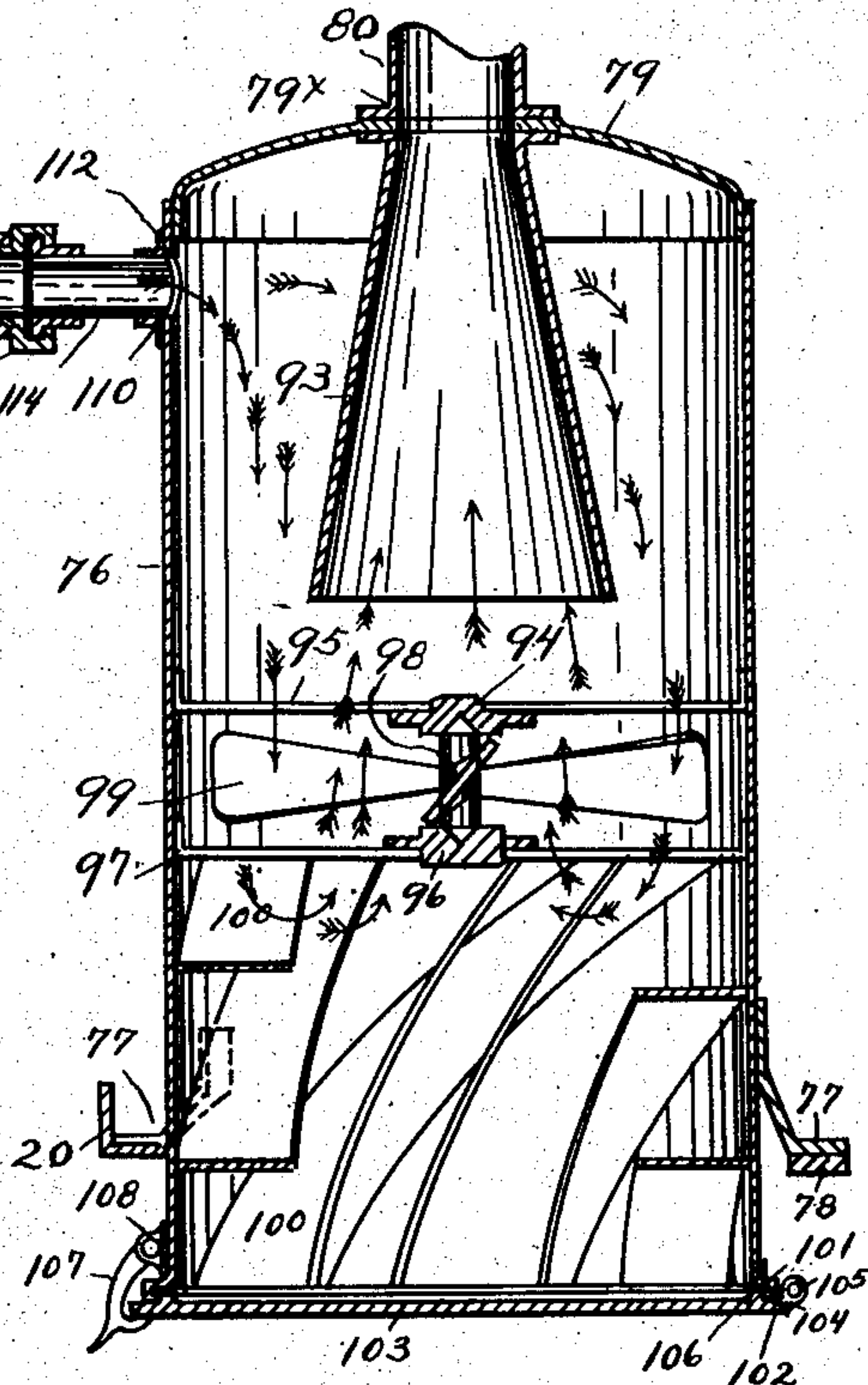


Fig. 4.

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PNEUMATIC DUST REMOVING AND COLLECTING APPARATUS.

No. 814,837.

Specification of Letters Patent.

Patented March 13, 1906.

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To all whom it may concern:

Be it known that I, EPHRAIM H. FENTON, a citizen of the United States of America, residing at Kansas City, in the county of Jackson and State of Missouri, have invented certain new and useful Improvements in Pneumatic Dust Removing and Collecting Apparatus; and I do hereby declare that the following is a full, clear, and exact description of the invention, such as will enable others to make and use the same, reference being had to the accompanying drawings, forming a part of this specification.

The objects of the invention are, first, an apparatus for removing dust pneumatically from floors and walls of buildings and floor or wall coverings, also from ordinarily inaccessible places wherein dust may collect, such as house furniture, so that the dust removal may be performed expeditiously; second, to separate the dust from the air within the dust receptacle or tank; third, to afford relief for the suction and blast fan during the operation of the dust-removing devices; fourth, to feed and impregnate the air with disinfectants pneumatically by the apparatus during its operation.

The invention consists in the novel construction and combination of parts, such as will be first fully described, and specifically pointed out in the claims.

In the drawings, Figure 1 is a view in perspective of the power-operated platform-vehicle, the platform being broken away, showing supported by the vehicle the dust-collecting and separating tank or receptacle, the dust-conducting pipe being broken away, the air suction and blast fan case and fan, and the air-suction pipe leading thereto from the tank, the relief-valve and cup on the suction-pipe, the discharge-pipe connected with the top of the fan-case, the engine and the power-transmitting devices from the engine to the fan-shaft and to the axle of the vehicle, and the means for disconnecting the power from the axle during the operation of the fan-shaft, the seat and the boxing for the motor being shown broken away. Fig. 2 is a detail view of a portion of the main power-transmitting shaft, showing the portion of the clutch, the pinion and the sleeve keyed to the shaft in section, also showing the collar extending around the sleeve connected with the shifting-arm. Fig. 3 is a detail view of the bevel-wheel on the rear axle, showing the pinion and its support and the universal joint

on the tumbler-shaft. Fig. 4 is a vertical sectional view of the dust collecting and separating tank. Fig. 5 is a horizontal sectional view of the tank, taken on the line *xx* of Fig. 4, showing the dust-distributing fan. Fig. 6 is a vertical sectional view of the relief-valve on the air-suction pipe and the receptacle or cup for the disinfectant. Fig. 7 is a detail broken view of the flexible dust-conducting pipe leading to the dust-separating tank, showing the branch nozzles, also showing the adjustable supporting-bars for the pipe. Fig. 8 is an alternate view of the dust-separating tank upon the vehicle, showing the dust-deflecting plates extended upwardly nearly to the top of the tank and the reduced size of the dust-separating fan.

Similar numerals of reference indicate corresponding parts in all the figures of the drawings.

Referring to the drawings, 20 represents a platform-vehicle, comprising a rectangular-shaped frame of the requisite length, the sides and ends of which frame are composed of angle-bars and within the sides of which frame is the platform 21. The frame is mounted at the forward end upon the fixed axle 22 and at the rear end upon the rotary shaft 23, forming the rear axle, which shaft is journaled in the journal-boxes 25, and upon the ends of the shaft are the traction-wheels 26. Connected rigidly with the journal-boxes 25 are the semi-elliptical springs 27, which are also connected at their outer ends with the under surface of the sides of the frame. The ends 28 of the forward axle are separated from the main portion of the axle, and these ends are connected with said main portion by a knuckle-joint 29. Upon these ends 28 of the axle is a traction-wheel 30, the other wheel upon the other side of the frame not being shown. Upon the front axle 22 are semi-elliptical springs connected with the sides of the frame in the same manner as springs 27. With the end portion 28 of the axle 22 on the inner side of the hub of the wheels 30 are connected rigidly the arms 31. With the outer ends of said arms is pivotally connected one end of the operating-rods 32, the inner ends of which rods are pivotally connected with a pivot or bolt 33 on the lower end of lever 34, the upper end of which lever extends upwardly through an opening in said platform and is pivotally connected with a small bracket 35 on the lower surface of the platform, and by means of which lever

the angle of direction of the front wheels is changed and the direction of movement of the vehicle.

At the forward end of the platform and located at a point equidistant from the sides of frame 20 is a gasoline-engine 36 of the ordinary type, the base of which engine is mounted upon the bars 37 beneath the platform 21 and which bars are bent upwardly at the ends and a portion of said bent ends extended horizontally and secured to the lower portion of the angle-bars forming the side of the frame 20.

38 indicates the supply-tank for gasoline, secured to the upper surface of the top of the box 48, inclosing the engine.

39 indicates the engine-shaft. Upon said shaft is fixed one part 40 of a friction-clutch wheel.

41 indicates the main power-transmitting shaft actuating the movement of the carriage and the suction and force apparatus, upon the inner end of which shaft is a sleeve 42, keyed so as to slide on said shaft, and upon said sleeve is the other part, 43, of the friction-clutch wheel, which engages with the part 40. Upon the inner end of the sleeve 42 is an externally-grooved collar 44.

45 indicates an operating-lever for the sleeve 42 and the portion 43 of the friction-clutch, which lever is pivoted to the bracket 46 on the upper surface of the platform 21, the lower end of which lever extends through an opening 47 in the platform and is forked at its lower end, and said forked ends engage with the groove in the collar 44.

The gasoline-motor and the friction-clutch wheels are preferably inclosed within a covering or box 48, which extends the width of the platform 21 and is provided with a hinged cover 49. Upon the rear side of the box 48 is a rearwardly-extended keeper 50 for the upper end of the lever 45, which permits of the operation of the lever.

The rear end of the main power-transmitting shaft 41 rotates within the journal-box 51, which is supported in position beneath the platform 21 by the transverse bar 51^x, which is located at a point about one-third the distance rearwardly from the forward end of the frame 20, the upwardly-bent ends being secured to the under or lower surface of the platform 21. Upon the end portion of shaft 41 in rear of the journal-box 51 is a sleeve 52, which is slidable on said end of the shaft and secured from rotary movement by the key or spline 53. (See Fig. 2.) Upon one end of the sleeve adjacent to the journal-box is a pinion 54, and upon the other end of the sleeve is a portion 55 of a positive clutch. Extending loosely around the sleeve 52 is a collar 56, with which collar is connected rigidly an arm 57, which is forked at its outer end and said forked end connected pivotally with an arm 58, extending parallel with the

shaft 41. With the forward end of the arm 58 is pivotally connected the inner end of an operating-lever 59, which lever is pivotally connected at 60 a short distance from its inner end with the lower surface of the platform 21, the outer end of the lever being supported on the guide-bar 61, secured to the lower surface of the side of frame 20.

Upon the upper surface of the transverse bar 51^x, supporting the journal-box 51, is a separate journal-box 62, in which is journaled the forward end of the power-transmitting shaft 63, upon which end of the shaft is a gear-wheel 64, with which the pinion 54 moves in and out of engagement. Upon the rear end of shaft 63 is a universal joint 65, with which is connected the forward end of the tumbler-shaft 66, upon the rear end of which shaft is a universal joint 67. Supported in the hanger 68, connected with the lower surface of the platform 20, is the bevel-pinion 70, the stud-shaft in which pinion is connected with the knuckle-joint 67 on the tumbler-shaft 66. Upon the shaft 23, forming the rear axle of the vehicle, is a bevel-gear 71, with which engages the pinion 70 on the shaft journaled in the hanger 68. (See Fig. 3.)

72 indicates a suction and force fan case, within which are air suction and forcing rotary fan blades of ordinary construction, which are mounted on a rotary shaft 73. The fan-case is mounted upon the parallel transverse supporting-bars 71^x, which are supported by the frame 20 beneath the level of the platform 21 in the same manner as the journal-boxes 51 and 62, the fan-shaft 73 being located in position in line with the main shaft 41. Upon the forward end of the fan-shaft is a portion 74 of a clutch, which engages with the other portion 55 of the clutch on shaft 41. The suction-fan case is inclosed by a boxing 21^x, which extends transversely to the frame 20, the front and rear ends being connected with the platform 21, the boxing serving the purposes of a seat in the propulsion of the vehicle.

76 indicates the dust receiving and separating tank on the rear end of the vehicle, which is cylindrical in form and of the requisite height. The tank is supported upon the frame 20 by the lugs 77, which lugs are connected with the sides of the tank a short distance upwardly from the bottom. The lugs on the rear side rest upon the lower portion of the angle-bar, forming the rear end of frame 20. The lugs on the forward side of the tank are connected with the transverse bar 78, supported by the sides of the frame 20 of the vehicle. With opening 79^x in the top 79 of the tank 76 is connected one end of a suction-pipe 80, which pipe extends a short distance in an upward direction and is bent in a curved line and extended downwardly to and within the outer end of a pipe-joint 81, the inner end of which pipe-joint 81 is bent

at right angles and extended inwardly within the induction-opening 82 in the side of the case 72. The upper curved portion of the pipe 80 is separated into two parts, each part being externally screw-threaded and connected with an internally-screw-threaded valved pipe-joint 83. In the upper portion of the valved joint is a valve-opening 84 and a valve-seat 85. (See Fig. 3.)

With the upper portion of the valved pipe-joint is connected the lower end of a cup or receptacle 86, which extends around the valve-seat and communicates with the valve-opening 84, the upper end of the receptacle being outwardly flaring or bell-shaped. Within the receptacle 86 is a transverse guide-bar 87, connected with its inner surfaces. Through the perforation 88 in said guide-bar extends a valve-rod 89, upon the lower end of which rod is a valve 90, which fits within the valve-seat 85. The upper end of the valve-rod is screw-threaded, and upon said end is a thumb-nut 91. Extending around the valve-rod is a spiral spring 92, one end of which bears against the thumb-nut 91 and the other end upon the upper side of the guide-bar 87, the tension of which spring may be increased or decreased by the nut 91.

With the upper portion of the fan-case is connected one end of a discharge-pipe 75, which extends upwardly a short distance, and with the upper end of such pipe is connected the inner end of a flexible pipe or hose 75^x.

Within the upper portion of the dust-separating tank 76 is a dust-deflecting pipe 93, which is cone-shaped, the upper end having a flange, which secures the pipe to the inner surface of the top of the tank and extends around the opening 79^x in said top. The lower flaring end of the pipe 93 extends downwardly a considerable distance and nearly to a point equidistant from the top and bottom of the tank. In line with the vertical axis of the tank 76 and beneath the lower end of the pipe 93 a short distance is a bearing 94, from which extend radially the bars 95 97, the outer ends of the bars being connected with the inner surface of the side of the tank 76. A short distance below the bearing 94 is a separate hub 96, which is supported by the radial bars 95 97, connected with the side of the tank. In the bearings 94 and 96 is pivoted the respective upper and lower ends of the fan-shaft 98, upon which shaft are the radial fan-blades 99, which rotate between the bars 95 and 97.

Beneath the radial bars 95 97 and within the lower portion of the tank are the series of dust-distributing plates or ribs 100. These plates are of a suitable width and the inner and outer edges are curved in the arc of a circle, the outer edges being secured rigidly to the inner surface of the tank 76 and their upper ends arranged in the direction of the axis of

the tank. The lower ends of the said plates are extended downwardly and spirally in the direction of the bottom of the tank in inclined planes and are arranged at short distances apart in the direction of the inner circumference of the tank. At the lower edge of the tank upon the outer surface is an annular outwardly-extending flange 101, upon the lower surface of which is a gasket 102, of rubber or other suitable material. 103 indicates the drop-bottom of the tank, which is slightly larger in circumference than the tank, and connected at one end is a lug 104, which is curved upwardly and pivotally connected with a lug 105 on the flange 101. On the upper surface of the bottom is a circular rib 106, which is directly beneath the gasket 102 and bears upwardly thereon. The other end of the drop-bottom 103 is retained in position by a hook 107, pivotally connected at its upper end to the lug 108 on the outer surface of the tank and its lower end engaging with the lower surface of the bottom 103. Upon the top of the tank is a vacuum-gage 109. In the side of the tank 76, a short distance downwardly from the top 79, is the opening 110 for the admission of the dust and air within the tank. Around the opening 110 on the outer surface of the tank is an annular flange 112, in which is fitted the inner end of a short pipe 114.

Upon the outer end of the pipe 114 is a hose-coupling 115 of the ordinary description, with which is connected one end of the flexible dust-conducting pipe or hose 116, which is of suitable length. Upon the outer end of said pipe are connected branch pipes or nozzles branches 117 117. With either of said branches may be connected a dust-collecting nozzle of the usual description, by means of which the dust is removed from the surfaces of floors, walls, &c.

In the preliminary movement of the vehicle to the desired locality for operation, and which is effected by the power of the motor on the vehicle, the portion 43 of the friction-clutch is moved by the lever 45 into engagement with the portion 40 on the driving-shaft 39 of the engine, and the power is transmitted through shaft 41 and the pinion 54, which is in engagement with gear 64, to the tumbler-shaft 66 and thence through the beveled pinion 70 and the gear 71 to the rear axle of the vehicle, the direction of movement of the vehicle being controlled by the lever 34.

In the operation of the apparatus for removing the dust from the wall or other surfaces the lever 59 on the vehicle is operated to move the portion 55 of the clutch on shaft 41 into engagement with the portion 74 on the fan-shaft of the air suction and forcing apparatus 72, which simultaneously moves the pinion 54 from engagement with the gear 64, and the suction being communicated to

the tank 76 a vacuum is formed in the tank, which also exhausts the air from the pipe 116 through the branches or nozzles 117, the entrance of the air external to the nozzles rushing in and carrying the dust dislodged, the entrance of the air being subject to a vacuum in the tank of a required degree, as indicated by the gage 109, the dust and air passing into the pipe 116 and thence to the tank 76, in which the fan-blades 99 are set in operation by the force of the incoming currents of air, the rapidity of rotation of the blades being controlled thereby, and the action of the fan-blades separates the body of the dust and forms eddies, into which the dust falls upon the inclined surfaces of the plates 100 and thence falls upon the bottom 103 of the tank, the air being drawn out of the tank through the cone-shaped pipe 93, passing the fan-blades 99, as indicated by the arrows in Fig. 4. When the tank 76 becomes laden with dust, the catch 107 is released, and the bottom falls downwardly, discharging the dust, after which the bottom, which is hermetically sealed by the gasket 106, is closed and secured as before. Should the action of the suction and force apparatus create a vacuum in the tank greater than is necessary, the relief-valve 85 in the exhaust-pipe 80, which is held by the spring 92 to a degree of resistance necessary to effect the best results, opens automatically and the action of the fan is not impeded. The dust in entering the tank 76 may be intercepted at the top of the tank, as seen in Fig. 8, in which the deflecting-plates 100^a extend from a point below the receiving-opening for the dust downwardly in inclined planes part way to the bottom of the tank. In this arrangement the fan-blades 99^a are obviously reduced in length and rotate within the reduced space concentric with the inner edges of the ribs or plates below and adjacent to the end of the cone. These deflecting-plates may be spiral and also perpendicular, as the conditions may require. When it is desired to disinfect the premises from which the dust has been removed, the cup 86 above the relief-valve in the exhaust-pipe 80 is filled with the disinfectant powder or liquid and discharged through the pipe 75, connected with the blast-opening on the fan-case 72, and through the flexible pipe 70^x directed to

the place, and the disinfectant is distributed under safety and with greater effectiveness. 55

Instead of mounting the apparatus upon a vehicle it may be installed as a permanent fixture in a building and such other modifications employed as are within the scope of the invention. 60

Having fully described my invention, what I now claim as new, and desire to secure by Letters Patent, is—

1. In a pneumatic, dust-collecting apparatus, the combination with a vacuum-tank and conductors for the dust leading to the tank, of inclined, dust-deflecting plates within said tank, an air-suction apparatus connected with the tank, and a rotary separating-fan within the tank, energized by the air entering and passing through the tank. 65 70

2. In a pneumatic, dust-collecting apparatus, the combination with a vacuum-tank for the dust, and with a conductor for the dust leading to the tank, of dust-deflecting plates within said tank, an air-suction apparatus connected with the tank, a rotary fan within the tank actuated by the air entering and passing through the tank, and means between the suction apparatus and the entrance to the tank self-acting to regulate the exhaust from the tank. 75 80

3. In a pneumatic dust-collecting apparatus, the combination with a vacuum-tank for the dust and with a conducting-pipe for the dust leading within the tank, of a suction-pipe leading within the tank and terminating in a downwardly-extended, outwardly-flaring end, an air-suction apparatus connected with the suction-pipe, and means in said pipe for regulating the exhaust in the tank, dust-deflecting devices within the tank, and a rotary fan intermediate the outwardly-flaring, downwardly-extended end of the suction-pipe and the dust-deflecting devices. 85 90 95

4. The combination with a vacuum-tank for collecting dust, &c., and with a conductor leading to the tank of a suction-pipe connected with the tank and a suction apparatus, a discharge-pipe leading from the suction apparatus, and a valved receptacle connected with the suction-pipe. 100

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