

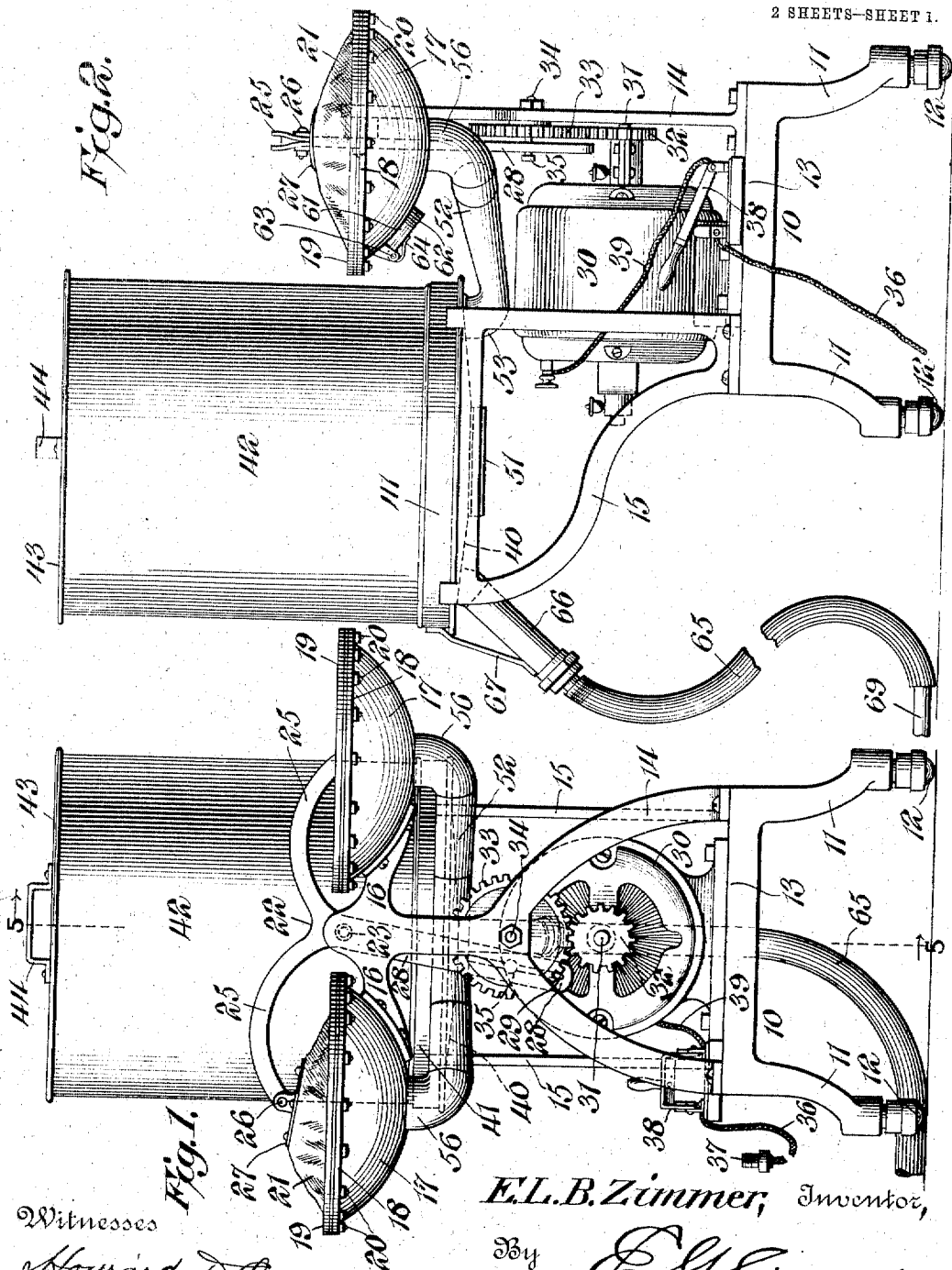
E. L. B. ZIMMER.  
PNEUMATIC CLEANING APPARATUS.

APPLICATION FILED JUNE 17, 1908. RENEWED JAN. 26, 1911.

985,965.

Patented Mar. 7, 1911.

2 SHEETS-SHEET 1.



Witnesses

Howard D. Orr.

B. G. Lott.

E. L. B. Zimmer, Inventor,

By

C. G. Siggers.

Attorney

E. L. B. ZIMMER.  
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Fig. 4.

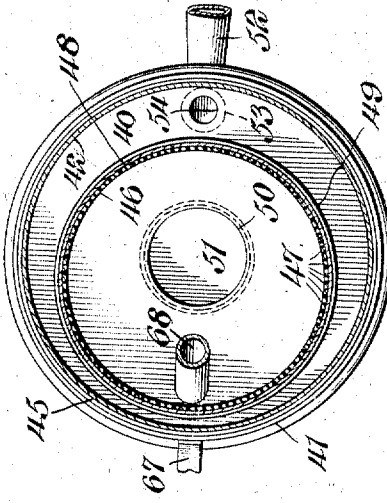


Fig. 5.

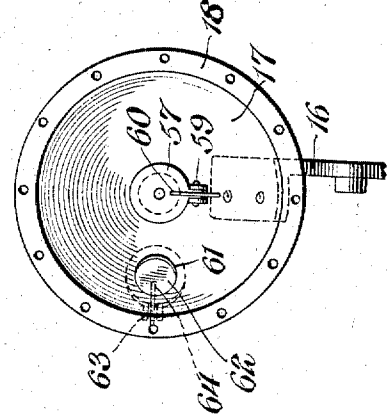
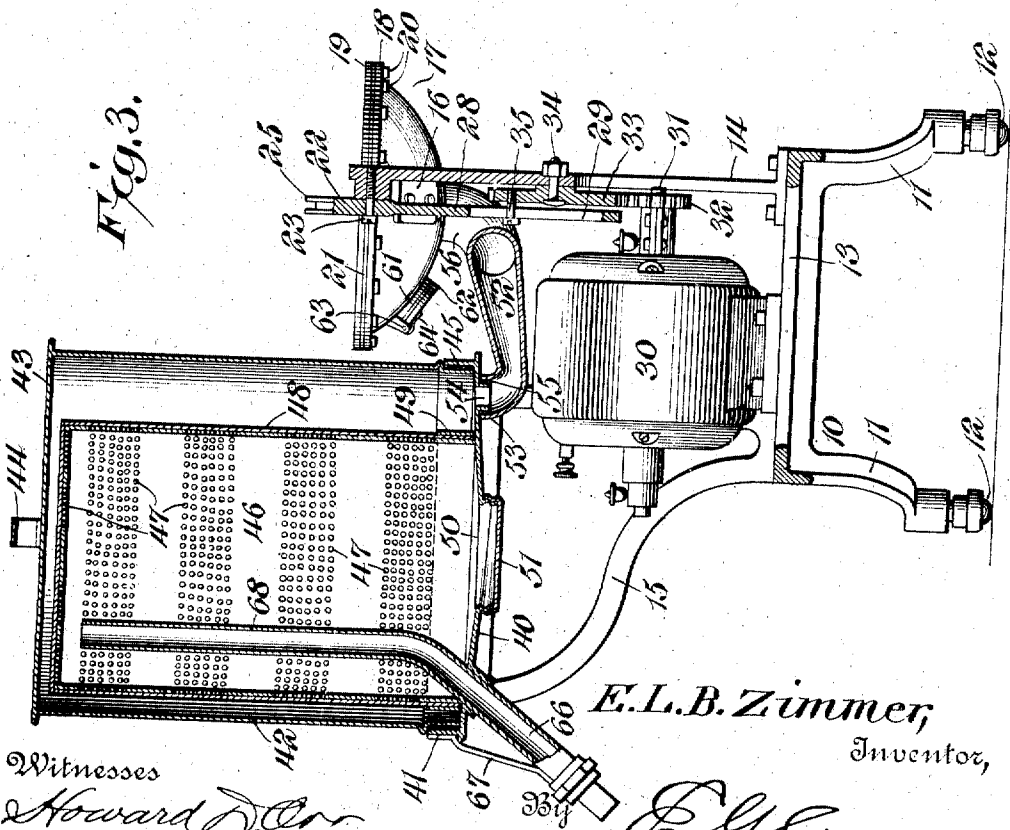


Fig. 3.



E. L. B. Zimmer,  
Inventor,  
C. L. Singer,  
Attorney

Witnesses  
Howard D. Co.  
B. L. Int.

# UNITED STATES PATENT OFFICE.

ERNEST L. B. ZIMMER, OF MINNEAPOLIS, MINNESOTA, ASSIGNOR TO ZIMMER VACUUM  
RENOVATOR CO., OF MINNEAPOLIS, MINNESOTA.

## PNEUMATIC CLEANING APPARATUS.

985,965.

Specification of Letters Patent.

Patented Mar. 7, 1911.

Application filed June 17, 1908, Serial No. 439,652. Renewed January 26, 1911. Serial No. 604,876.

### *To all whom it may concern:*

Be it known that I, ERNEST L. B. ZIMMER, a citizen of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented a new and useful Pneumatic Cleaning Apparatus, of which the following is a specification.

The present invention relates to means for cleaning carpets, rugs, draperies, furnishings and the like, and the primary object is to provide a novel and simple machine that is entirely practicable for household or other purposes, can be easily moved from room to room or place to place, and occupies but very little space, while having a very powerful suction, and consequently a thoroughly effective cleansing action.

A further and important object is to provide dust and dirt collecting means that can be readily removed and dismembered for the purpose of emptying it and cleaning it, said means effectively separating the dust from the air passed through the apparatus.

The preferred embodiment of the invention is illustrated in the accompanying drawings, but it will be evident from an inspection of the claims hereto appended that the invention is by no means limited to the exact structure disclosed.

In the drawings:—Figure 1 is a rear elevation of the machine. Fig. 2 is a side elevation of the same. Fig. 3 is a vertical sectional view on the line 5—5 of Fig. 1. Fig. 4 is a horizontal sectional view through the structure. Fig. 5 is a plan view of one of the pump bodies.

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

In the embodiment illustrated, a supporting frame, designated as a whole by the reference numeral 10, is employed, that is provided with legs 11 mounted on ball casters 12. This frame includes a platform 13 carrying a rear up-standing bracket 14 and a pair of front up-standing brackets 15 that are suitably secured to the platform. The bracket 14 has at its upper end oppositely outstanding arms 16, to which are fastened horizontally disposed chambered pump bodies 17, the upper sides of these bodies being concaved to form the chambers. Said

bodies have outstanding peripheral flanges 18, to which are clamped by means of rings 19 and bolts 20, the margins of flexible diaphragms 21 formed of leather or other suitable material. A walking beam 22, fulcrumed between its ends, as shown at 23 upon the bracket 14, has oppositely extending curved arms 25 pivoted as shown at 26 to clamping washers 27 secured on opposite sides of the central portions of the diaphragms 21. This walking beam has a depending swinging arm 28, which as shown more particularly in Fig. 3, is provided with a longitudinally disposed slot 29.

A motor 30, preferably an electric motor, is suitably mounted on the platform 13, and the shaft 31 thereof carries a pinion 32 in mesh with a driven pinion 33 journaled, as shown at 34 on the bracket 14. A crank pin 35, fastened to the driven pinion 33, operates in the longitudinal slot 29 of the depending arm 28, and thus when the motor is in operation, it will be evident that the walking beam 22 will be moved in opposite directions. This will alternately raise and lower the diaphragms 21 of the pump. The current to drive the motor is taken from any suitable source, and in the present embodiment, a cord 36 of considerable length is employed that has at its free end a plug 37 adapted to be inserted in an ordinary lamp socket. This cord 36 is connected to a controlling switch 38 mounted on the platform 13 and from the switch, extends a cord 39 that is properly connected to the motor.

The means for separating the dust and dirt collected, from the air is as follows: A bottom wall 40, preferably slightly conical in form, rests loosely upon the upper arms of the brackets 15, and has an up-standing annular flange 41 on its outer margin. A cylindrical outer casing 42 that is impermeable, and has a top 43 provided with a handle 44, has an open bottom normally closed by said bottom wall 40, the lower margin of the cylindrical wall of the casing fitting within the up-standing flange 41 and being packed by a suitable gasket 45. The outer casing has an annular bead adjacent its bottom with which the upper edge of the ring gasket 45 engages, so that in placing the casing on the bottom wall 40, the

gasket can be engaged within the annular flange 41 without the gasket slipping upwardly on the casing. Within the outer casing and disposed eccentrically thereto, is an inner cylindrical casing 46, which is mounted on the bottom, and has portions of its side and top walls perforated, as shown at 47. This inner casing is spaced on all sides from the outer casing, and is preferably covered by a wall 48 of fabric, the same being substantially in the form of a bag that fits snugly over the outer face and top of the inner casing, and is detachably held in place by a removable metal band 49 engaging its lower margin and surrounding the casing. The bottom 40 has an opening 50 communicating with the interior of the inner casing, said opening being normally closed by a detachable screw cap 51.

An air conduit 52, located over the motor 30, has an upstanding inlet end 53 that receives a depending nipple 54 carried by the bottom 40, the nipple being detachable from the conduit, and being packed by a suitable rubber or other gasket 55. It will be noted by reference to Figs. 3 and 4 that the conduit 52 is thus in communication with the nipple 54, which is located at the point where the outer and inner casings are most widely separated. The conduit 52 is divided into branches 56, which lead to the bottoms of the pump bodies 17, and operating over the discharge ends of said branches, are inwardly opening valves 57 that are located in the chambers of said bodies. These valves are preferably provided with packing disks, and are hinged as shown at 59, suitable springs 60 bearing against the same to urge them to their closed positions. The pump bodies are also provided with discharge orifices 61 controlled by outwardly opening valves 62 hinged as illustrated at 63 and normally held in closed position by springs 64.

For the purpose of directing the dust and dirt into the separating means, a flexible conduit 65 of some length is employed, which is connected to a downwardly extending spout 66 projecting from the bottom 40, and preferably strengthened by a brace 67. This spout 66 is in fact the lower end of an upstanding pipe 68 arranged within the inner casing 46 and extending to a point within a short distance of the top of the same, as illustrated in Fig. 3. To the free end of the flexible conduit is a fixed and rigid nozzle tube 69, a portion of which is shown in Fig. 2.

The operation of the structure is substantially as follows. If the plug 37 is inserted in a socket and the switch 38 is closed, it will be evident that the motor 30 will be placed in operation. As a consequence, the gear wheel 33 will be revolved, thereby

swinging the arm 28 in opposite directions, and causing the walking beam to oscillate. This, as already explained, will alternately raise and lower the pump diaphragms and cause the same to operate at a comparatively high speed. As each diaphragm rises, the air will rush through the conduit 52 into the pump body, and on the depression of each diaphragm, the valve 57 will close while the discharge valve 62 will open and the air will pass from the pump. As one of the diaphragms is always rising when the other is being depressed, a constant suction will thus take place through the conduit 52, and as a result a partial vacuum will at all times be maintained in the outer casing 42, which is already explained, is imperforate. Consequently the only way in which air can enter the outer casing to relieve the vacuum is through a dust-collecting nozzle and pipes 65 and 66, while this air must pass not only through the perforate inner casing 46, but through the fabric strainer wall surrounding the same. The dust and dirt, however, or other material thus drawn into said inner casing cannot pass through the same, and will therefore be deposited in said inner casing from whence it can be removed by detaching the closure 51.

There are many advantages for this structure. In the first place, it occupies but very little space, and can be moved about by anyone, making it peculiarly useful as a household implement, though it can be employed on a more extensive commercial scale. The structure is all open, so that access can be gained to any part and at the same time, it is strong and durable. In addition to this, the separating means is an important feature. It will be noted that the outer casing can be readily detached from the bottom at any time by raising it, and consequently the fabric wall or strip can be removed for the purpose of washing or otherwise cleansing the same. The dirt collected can be easily removed from the inner casing, and if desired, the entire separating chamber can be removed from the mechanism. Furthermore in this structure, inasmuch as the pipe 68 extends nearly to the top of the inner casing, there is no danger of the structure becoming clogged until said casing is practically full.

From the foregoing, it is thought that the construction, operation and many advantages of the herein described invention will be apparent to those skilled in the art, without further description, and it will be understood that various changes in the size, shape, proportion, and minor details of construction, may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

Having thus fully described my inven-

tion, what I claim as new, and desire to secure by Letters Patent, is:

1. In a machine of the class described, the combination of inner and outer casings arranged eccentrically with a chamber between them, a conduit connected with the widest part of the chamber, a conduit communicating with the inner casing at a point eccentric thereto and adjacent the narrowest portion of the said chamber, said inner casing forming a screen.

2. In a machine of the class described, the combination of inner and outer cylindrical casings arranged eccentrically, a conduit connected with the bottom of the outer casing at a point to communicate with the widest part of the chamber between the casings, a conduit extending upwardly through the inner casing at a point eccentric thereto and terminating at the top of said casing and nearest the narrowest part of the said chamber, the walls of said inner casing forming a screen.

3. In a machine of the class described, the combination of an inner casing forming a screen and having a head at its bottom end which extends beyond the periphery of the casing and is provided with an opening, a closure for the opening, a fabric covering extending around the sides of the casing and over the top thereof, means for removably holding the covering in place, a removable casing held in fixed relation to the said inner casing by the marginal portion of the said head, said covering being disposed between the two casings, and separate conduits both attached to the head and communicating respectively with the chamber inclosed by the inner casing and the chamber formed between the two casings.

4. In a machine of the character set forth, the combination with an outer imperforate casing, of an inner perforate casing located therein and disposed eccentrically thereto, a material directing conduit, and air exhausting means including a conduit, one conduit communicating with the interior of the inner casing at the point where the inner casing is nearest the outer casing, the other conduit communicating with the interior of the outer casing at the point where the inner casing is farthest removed therefrom.

5. In a machine of the character set forth, the combination with a bottom having an upstanding annular flange, of an imperforate outer cylindrical casing detachably engaged with the flange, an inner perforate casing mounted on the bottom and inclosed by the outer casing, said bottom having an opening communicating with the interior of the inner casing, a detachable closure for the opening, a material directing conduit extending through the bottom and having its discharge end located in the upper por-

tion of the inner casing, said inner casing being disposed eccentrically to the outer casing, and air exhaust means including a conduit connected to the bottom and communicating with the interior of the outer casing at the point where said outer and inner casings are farthest removed from each other.

6. In a machine of the character set forth, the combination with a movable supporting frame, of an air pump mounted thereon, a separating chamber composed of eccentrically-arranged inner and outer casings and detachably supported on the frame and having a detachable head, an air exhaust conduit connected to the pump and having a detachable engagement with the said head, said chamber being detachable from the head while the conduit remains attached to the latter, and a material directing conduit communicating with the chamber and extending through and carried by the head.

7. In a machine of the character set forth, the combination with a movable supporting frame including brackets, of an air pump mounted on the frame, a bottom plate having an upstanding annular flange, an imperforate outer cylindrical casing detachably engaged with the flange and fitting against the bottom plate, an inner perforate casing mounted on the bottom plate and inclosed by the outer casing, a material-directing conduit extending through the bottom plate and having its discharge end located in the upper portion of the inner casing, and an air exhaust conduit connected to the pump and having its inlet end detachably engaged with said bottom plate and opening between the outer casing and the inner perforate casing.

8. In a machine of the character set forth, the combination with a movable supporting frame, a bottom plate having an upstanding annular flange, of an imperforate outer cylindrical casing detachably engaged with the flange, an inner perforate casing mounted eccentrically to the outer casing, there being a cleaning opening in the bottom plate communicating with the inner casing, a removable closure for the said opening, a material-directing conduit extending through the bottom plate and having its discharge end located in the upper portion of the inner casing, and an air exhaust conduit having its inlet end detachably engaged with the bottom plate and communicating with the interior of the outer casing between the outer casing and the inner.

9. In a machine of the class described, the combination of a head having a circular flange, a casing secured to the head by the said flange, means for forming an air-tight joint between the flange and point of engagement with the casing, an inner casing

fixed on the said head and disposed eccentrically to the same, said head having an emptying opening, a closure for the said opening, a pipe leading through the head  
5 and into the inner casing, and a conduit communicating with the outer casing and attached to the said head.

In testimony, that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

ERNEST L. B. ZIMMER.

Witnesses:

C. S. WENN,

E. B. CAMERON.