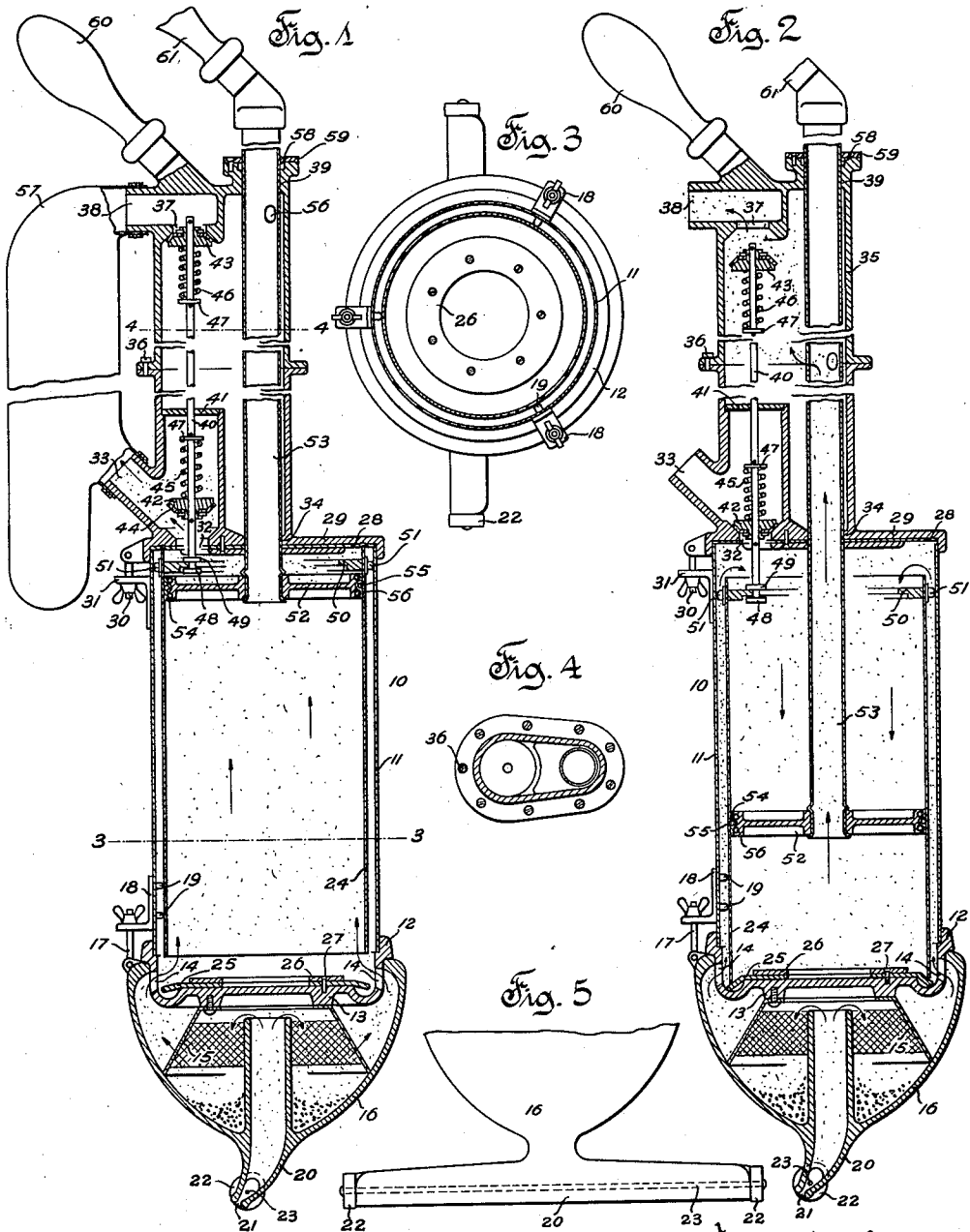


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VACUUM PRODUCING APPARATUS.
APPLICATION FILED DEC. 31, 1910.

1,013,200.

Patented Jan. 2, 1912.



Witnesses

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VACUUM-PRODUCING APPARATUS.

1,013,200.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, JOSEPH F. MENNINGEN, a citizen of the United States, residing at West Allis, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Vacuum-Producing Apparatus, of which the following is a full, clear, and exact specification.

My present invention relates to vacuum producing apparatus and more particularly to vacuum producing apparatus for cleaning carpets, covers, furniture, and the like.

Most of the apparatus for cleaning or abstracting dust and dirt from carpets and furniture now on the market is bulky, heavy, and expensive. Such apparatus has to be operated by a man if it is manually operated, or has to be provided with an electric, hydraulic, or other motor which is expensive both in first cost and in maintenance.

It is the object of my invention to provide vacuum producing apparatus which is simple, novel, and inexpensive.

More particularly the object of my invention is to provide a simple, novel, and inexpensive vacuum cleaner which is light but durable in construction, and which can be operated easily by anyone.

The various novel features of my invention will be described in the following specification and particularly set forth in the appended claims.

The invention is illustrated in the accompanying drawings in which—

Figure 1 is a vertical sectional view of a vacuum cleaner which is included in my invention with the plunger in one extreme position and the other parts in their corresponding positions; Fig. 2 is a vertical sectional view of the same with the plunger in an intermediate position; Fig. 3 is a horizontal sectional view taken in the plane of the line 3—3 of Fig. 1. Fig. 4 is a horizontal sectional view taken in the plane of the line 4—4 of Fig. 1; and, Fig. 5 is a fragmentary elevation of the lower part of the vacuum cleaner showing the broad side of the nozzle.

While I am describing my invention in connection with my novel vacuum cleaner I do not intend to limit myself to vacuum cleaners, for the invention includes vacuum producing apparatus for various purposes.

All of the metal parts of the vacuum

cleaner 10 are preferably made of aluminum. The main body portion of the vacuum cleaner includes an outer housing or shell 11, the bottom of which fits and sets into a casting 12 having an annular lug 13 and openings 14. Secured to the annular lug 13 is a conical screen 15 for preventing the passage of relatively large bodies which are drawn into the cleaner. The screen 15 is located within a bowl-shaped member 16 which is supported by the outer shell 11 by pivotally mounted screws 17 engaging slotted brackets 18 fastened to the shell 11 by plugs 19. The casting 12 is pressed and retained between the shell 11 and bowl-shaped member 16 without its being otherwise fastened in any manner to said parts. This bowl-shaped member 16 is provided with a nozzle 20 having a long, narrow opening 21 extending practically the full width of the nozzle. The relative width of the nozzle is shown clearly in Fig. 5. The nozzles may be of any size or shape, depending upon the nature of the work to be done. Rollers 22, providing for the movement of the vacuum cleaner over the article to be cleaned, are supported by a rod 23 passing through the nozzle 20.

Movably mounted within the outer shell 11 is a light, hollow, open-ended cylinder 24 which is adapted to move axially of said shell. In its lower position, as shown in Fig. 2, the cylinder 24 engages a rubber or leather washer 25 which is interposed between a collar 26 and the casting 12 and secured to the latter by screws 27. In its upper position, as shown in Fig. 1, the cylinder 24 engages a rubber or leather washer 28 which is secured between a casting 29 and the shell 11. This casting 29 fits over the top of the shell 11 and is retained in position by pivotally mounted screws 30 engaging slotted brackets 31 secured to said shell. The casting 29 is provided with a valve opening 32, an air and dust outlet 33, and a centrally located bore 34. Another casting 35 secured to the casting 29 by bolts or screws 36 is provided with a valve opening 37, air and dust outlet 38, and a bore 39. Slidably mounted on a slidable valve stem 40, located within the castings 29, 35, and shell 11, and guided by a member 41, are two valves 42 and 43. These valves are provided with washers 44 and backed up by springs 45 and 46 respectively, which are prevented from shifting on the valve stem 40 by collars 47. The

lower end of the valve stem 40 is provided with two collars 48 and 49 between which is retained an annular flange 50 secured to the hollow cylinder 24 by screws 51. No matter how much the cylinder 24 may turn the flange 50 will be retained between collars 48 and 49. The hollow cylinder in its upward and downward axial movement is guided by the plugs 19 and by the screws 51 engaging the inside surface of the outer shell 11.

For creating a vacuum a plunger 52 having a hollow plunger rod 53 is provided. The plunger has a rubber or leather washer 54 which is held in place by a spring 55 and held against the inside surface of the cylinder 24 by springs 56. The hollow plunger rod 53 communicates with the space within the cylinder 24 between the casting 12 and plunger 52, and has openings 56 for permitting the flow of air and dust therethrough and out through the valve opening 37 into a removable bag 57 fastened over the air and dust outlet portions of the castings 29 and 35. This bag may be made of any material, preferably cloth, which permits the passage of air but retains dust of dust laden air passing through said bag. Surrounding the hollow plunger rod and within a grooved portion of the casting 35 is a packing ring 58 held in position by a cap 59.

The vacuum cleaner is provided with two handles, one 60 secured to the casting 35 for rolling and steadying the cleaner and another 61 secured to the plunger rod 53 for actuating the plunger 52.

The construction of the vacuum cleaner having been described, its operation will now be considered.

Assuming that the plunger is in its lowest position engaging the lower end of the hollow cylinder 24, the cylinder will be held down against the washer 25. When the plunger 52 is first raised by means of the plunger rod 53 and handle 61, the cylinder 24 will also raise a definite amount due to the friction between the plunger 52 and the inside surface of the cylinder 24 caused by the snug fit between said plunger and cylinder. This cylinder will continue to rise until its upper end engages the washer 28 of casting 29. Due to the connection between the flange 50 and the valve stem collars 48 and 49, the valve stem 40 will be raised, opening the valve 42. As the plunger 52 is drawn up still farther a vacuum is created within the lower part of the movable cylinder 24 and air carrying dust and dirt from carpets and the like will be drawn through the nozzle 20, screen 15, openings 14 in the casting 12 into the cylinder 24. This is possible as the cylinder 24 at this time is raised from the casting 12, as shown in Fig. 1. This suction continues on the up stroke of the plunger until the plunger reaches its upper limit. When the plunger is lowered the cyl-

inder 24 is immediately forced down until its lower end engages the washer 25 of casting 12. The dust laden air now within the cylinder is thereby prevented from getting out of the cylinder the way it came in. At the same time the flange 50 draws down the valve stem 40, closing valve 42 and opening valve 43. Upon the continued downward movement of the plunger the dust laden air is forced up through the hollow plunger rod 53, out through the openings 56 in said plunger rod, through valve opening 37, air outlet 38, and into the bag 57. The dust and dirt will be retained in the bag 57 as the air passes out of the bag 57 free of its dust and dirt. Also, as the plunger is forced downwardly, a vacuum is formed within the movable cylinder 24 above the plunger, and air carrying dust and dirt as before is drawn up through the nozzle 20, screen 15, openings 14 in casting 12, passing upwardly in the annular passageway between the outer shell 11 and movable cylinder 24 and down into the cylinder on top of the plunger 52. The valve 42 at this time being closed, no dust can pass through the valve opening 32. But when the plunger is started on its up stroke as above considered the cylinder 24 rises, lifting the valve stem 40 and opening valve 42 and closing valve 43. As the plunger is continued on its up stroke the dust laden air will be forced from the upper part of the cylinder 24, through valve opening 32, air outlet 33 into the bag 57 where the dust will be removed from the air as the air passes through said bag. It is therefore seen that this vacuum cleaner is compound or double acting, being capable of drawing in dust laden air and forcing it out through the dust bag on both the up and down strokes of the plunger. The bag can be removed readily and the dust removed. If comparatively large particles of dirt or other pieces be drawn up through the nozzle 20 they will be retained in the bowl-shaped member 16 by the screen 15. This bowl-shaped member can be readily removed by loosening the screw 17 and the dirt removed.

This vacuum cleaner can be operated by anyone by simply grasping the handle 61 and moving the plunger up and down and steadying the cleaner by holding the other handle 60. The plunger could be actuated in other ways to move the cylinder 24 up and down and to create vacuum on both sides of the plunger. There may also be many modifications in the precise arrangement herein shown and described, and I aim in my claims to cover all such modifications which do not involve a departure from the spirit and scope of my invention.

What I claim as new is:

1. In vacuum-producing apparatus, the combination of a shell, a cylinder movable

in said shell, a member connected to said cylinder, a plurality of valves mounted on said member, and a plunger adapted to be actuated in said cylinder for producing a vacuum in said cylinder.

2. In vacuum-producing apparatus, the combination of a shell, a cylinder movable in said shell, a member movable with said cylinder, a valve mounted on said member, and a plunger adapted to be actuated in said cylinder for producing a vacuum in said cylinder, said cylinder being movable with said plunger at definite stages.

3. In vacuum-producing apparatus, the combination of an outer shell, a cylinder movable in said shell with an air-passage-way between said cylinder and shell, a member reciprocated by said cylinder, a valve mounted on said member, and a plunger adapted to be actuated in said cylinder for producing a vacuum in said cylinder, said cylinder being movable with said plunger at a definite stage and also movable relatively to said plunger.

4. In vacuum-producing apparatus, the combination of a shell, a cylinder movable in said shell, a stem movable with said cylinder, spring-pressed valves mounted on said stem, and a plunger slidably mounted in said cylinder to produce a vacuum in said cylinder.

5. In vacuum-producing apparatus, the combination of a cylinder movable in a plurality of directions, a member rigidly secured to said cylinder, a valve slidably mounted on said member and adapted to be opened when said cylinder is moved in one direction and closed when moved in another direction, and a plunger slidably mounted in said cylinder to produce a vacuum in said cylinder.

6. In vacuum-producing apparatus, the combination of a cylinder movable in a plurality of directions, a member rigidly secured to said cylinder, a plurality of spring-pressed valves mounted on said member and adapted to be actuated by said cylinder, one of said valves being closed and another opened when said cylinder is moved in one direction, and said first valve opened and said second valve closed when said cylinder is moved in another direction, and a plun-

ger slidably mounted in said cylinder to produce a vacuum in said cylinder.

7. In vacuum-producing apparatus, the combination of a shell, a cylinder movable within said shell, a stem rigidly secured to said cylinder, spring-pressed valves slidably mounted on said stem, and a plunger adapted to be actuated in said cylinder to produce a vacuum alternately on opposite sides of said plunger in said cylinder.

8. In a vacuum cleaner, the combination of a movable cylinder, a member moved by and with said cylinder, a valve mounted on said member, and a plunger having a movement with and a movement relatively to said cylinder, said valve being adapted to be opened when said cylinder moves with said plunger, and a vacuum produced when said plunger moves relatively to said cylinder.

9. In a vacuum cleaner, the combination of a shell, a cylinder movable within said shell, means including a stem associated with said cylinder and having a valve controlled by the movement of said cylinder, and a plunger having a movement with and a movement relatively to said cylinder, said valve being adapted to be closed when said cylinder moves with said plunger, and a vacuum produced when said plunger moves relatively to said cylinder, the movement of the cylinder with the plunger being dependent upon the friction between said cylinder and plunger.

10. In a vacuum cleaner, the combination of a shell, a cylinder movable within said shell, a stem movable with said cylinder, a valve mounted on said stem remote from said cylinder and adapted to be alternately opened and closed by the movement of said stem and cylinder, and a plunger adapted to operate in said cylinder to produce a vacuum on one side of said plunger in said cylinder and to force the air on the other side of said plunger out through said valve.

In testimony whereof I affix my signature in the presence of two witnesses.

Milwaukee, Wis., Dec. 29, 1910.

JOSEPH F. MENNINGEN.

Witnesses:

H. C. CASE,
ROB. E. STOLL.