W. S. SUTTON.

VACUUM CLEANER.

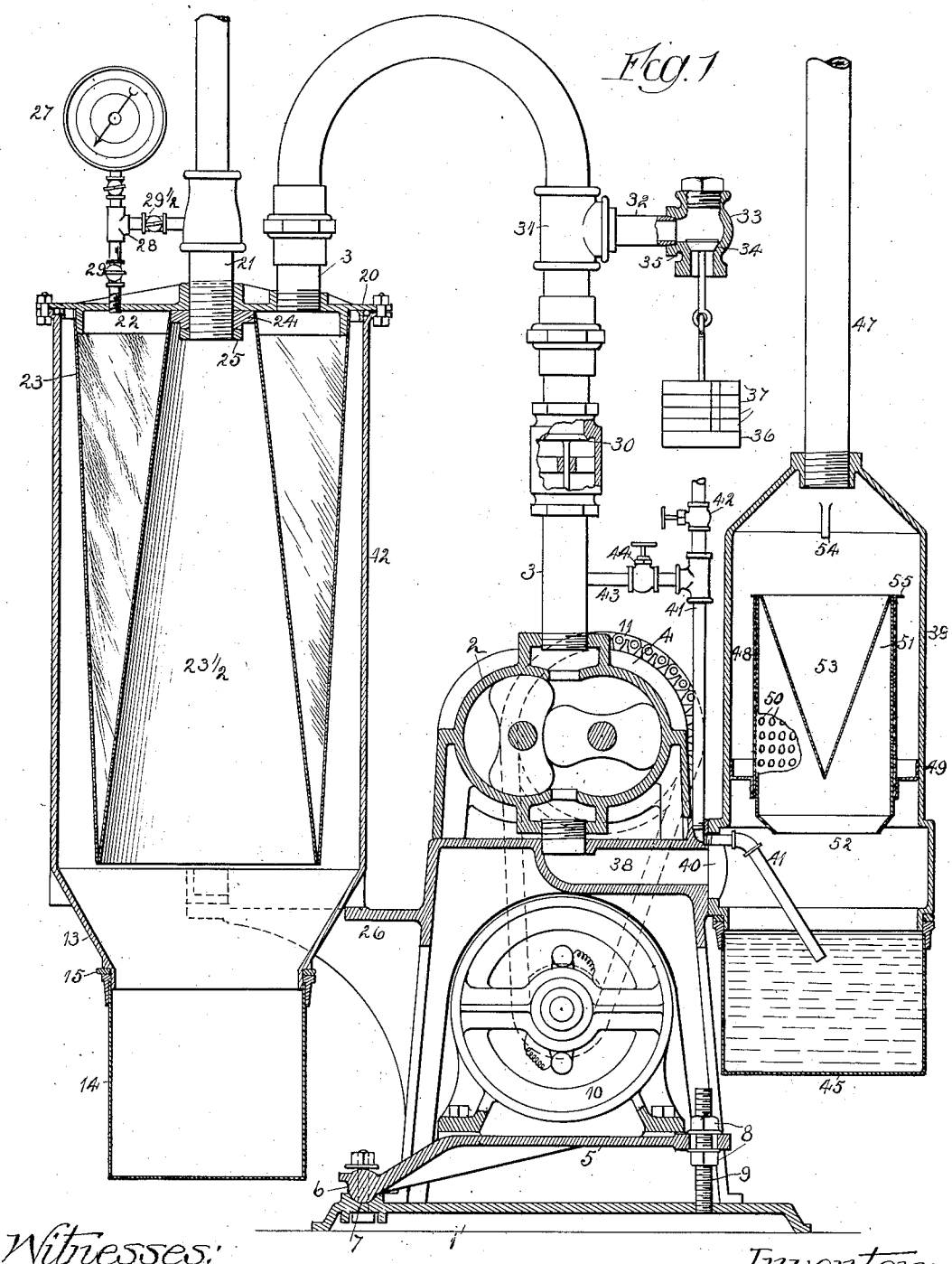
APPLICATION FILED SEPT. 27, 1909.

1,109,639.

Patented Sept. 1, 1914.

2 SHEETS—SHEET 1.

Fig. 1



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2 SHEETS-SHEET 2.

Fig. 2.

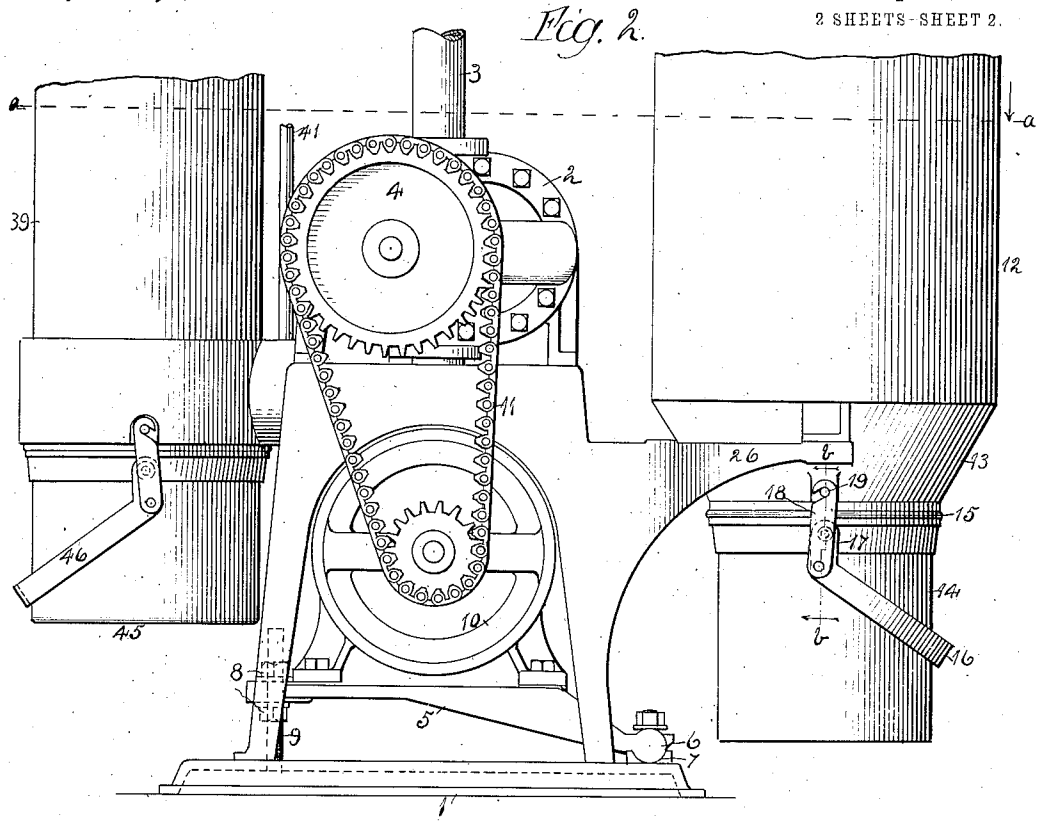

Fig. 3

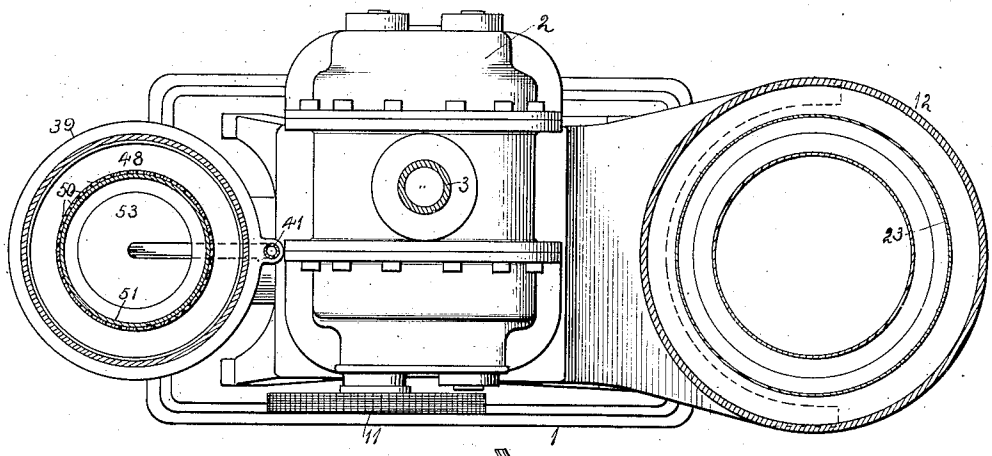

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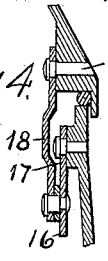
Fig. 4.



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UNITED STATES PATENT OFFICE.

WILLIAM S. SUTTON, OF ROCKFORD, ILLINOIS, ASSIGNOR TO AMERICAN RADIATOR COMPANY, OF CHICAGO ILLINOIS, A CORPORATION OF NEW JERSEY.

VACUUM-CLEANER.

1,109,639. Specification of Letters Patent. Patented Sept. 1, 1914.

Application filed September 27, 1909. Serial No. 519,841.

To all whom it may concern:

Be it known that I, WILLIAM S. SUTTON, a citizen of the United States, residing at Rockford, in the county of Winnebago and State of Illinois, have invented certain new and useful Improvements in Vacuum-Cleaners, of which the following is a specification.

The object of this invention is to construct a vacuum cleaner, in which the dust collector, exhaust fan and muffler are closely arranged, and in the details of construction of the various parts.

In the accompanying drawings, Figure 1 is a vertical section through the operative parts. Fig. 2 is a side elevation of the lower portion of the cleaner. Fig. 3 is a horizontal section through the dust collector and muffler on dotted line *a a* Fig. 2. Fig. 4 is a section on dotted line *b b* Fig. 2.

My improved vacuum cleaner comprises three sections or members, the suction fan, the dust collector, and the muffler, all of which are supported in this instance upon a single base. The base 1 supports an exhaust fan 2 with which a suction pipe 3 has a connection. A sprocket wheel 4 has a connection with the fan by which the fan is rotated. A shelf 5 has one end fitted with a curved surface 6 located in a cavity 7 formed in the base. The other end of this shelf is supported by the nuts 8, held in connection with the screw 9 connected to the base. A motor 10 is supported by the shelf 5, and a belt 11 connects the motor with the suction fan. The dust collector comprises the drum 12 having a hopper-shaped lower end 13. A removable receptacle 14 is held against the lower end 13 of the drum 12, and a packing ring 15 is located between the upper end of the receptacle and the lower end of the drum.

The means for holding the receptacle in connection with the drum 12 is essentially a toggle joint mechanism and comprises a bail 16 having its ends 17 pivoted to the receptacle. To the bail near each end thereof is pivoted a link 18 having its free end in hook form. The hooked ends of these links engage studs 19 extending from the lower portion 13 of the drum 12. When the receptacle 14 is held in connection with the drum, the bail will appear as shown at Fig. 2. By raising the bail the receptacle will drop from immediate connection with the drum, permitting the link to be removed from the studs 19, and as the bail is pivotally connected to the receptacle, the receptacle may be carried by the bail. A head 20 is secured to the upper end of the drum 12, and has a central screw-threaded opening within which is secured a pipe 21. From the underface of the head 20 depends a flange 22 to which is secured one end of a fabric tube 23, the other end of this tube is secured to a metallic tube 23½ connected to the collar 24 and held in connection with the pipe 21 by the lock nut 25. The pipe 3 communicating with the exhaust fan has its other end connected with the head 20, and communicates with the space between the fabric tube 23 and the tube 23½.

The drum 12 is supported by a bracket 26 extending from the base 1. A vacuum gage 27 is located in a pipe 28 having one end communicating with the pipe 21, and its other end connected with the head 20 and communicating with the interior of the drum 12 but inside the space included between the fabric tube 23 and the metallic tube 23½. Cocks 29 and 29½ are located in the pipe 28, one each side of the gage 27. A check valve 30 is located in the pipe 3 and is of the vertical type and closes in its upward movement. From a T 31 in the pipe 3 extends a pipe 32, to the free end of which is connected a relief valve 33 having its lower branch formed with a valve seat 34 upon which is seated a valve 35, from which is suspended a weight support 36 upon which may be placed weights 37. The base 1 is formed with an air passage-way 38 leading from the lower portion of the exhaust fan.

A muffler is supported by a connection with the base 1, and comprises an outer casing 39 provided with a side opening 40 communicating with the passage-way 38. A pipe 41 extends through the side opening 40 in the outer casing of the muffler and has its end extending downwardly. This pipe 41 is provided with a valve 42 for closing

its upper portion. A pipe 43 connects with the pipe 41 also with the pipe 3 and a valve 44 is placed in this pipe. A receptacle 45 is held against the lower end of the outer casing of the muffler by a bail 46 of the same construction as the bail 16 employed to hold the dust receptacle in position. A pipe 47 has a screw-thread connection with the upper end of the outer casing of the muffler. Within the outer casing 39 is located a tube 48 having both ends open, and connected to the outer casing by the flange 49. The lower portion of this tube 48 is provided with openings or perforations 50 arranged in series in the lengthwise direction of the tube. Within the tube 48 is located a vertically movable plunger 51 which is tubular and has its upper end closed. The lower end 52 of this plunger is turned inward. To the upper closed end of the plunger is secured an inverted cone 53. This plunger is capable of a vertical movement within the tube 48, and its upward movement is limited by coming in contact with the stops 54 projecting inward from the top of the outer casing of the muffler, and its lower movement will be limited by the flange 55 thereof resting on the upper end of the tube 48.

In use the suction fan is rapidly revolved which will create suction in the pipe 3, and in its connection with the dust collector, suction will be created through the fabric tube 23 and through the pipe 21 to which the cleaning tools are connected. The air taken in by the fan will be forced out through the passage-way 38 into the outer casing 39 of the muffler and into the plunger 51 thereby raising it until some of the openings 50 are exposed through which the air will escape into the space between the tube 48 and outer casing and escape by way of the pipe 47. As the air pressure varies so will the plunger 51 move vertically and uncover more or less number of the openings. If the air pressure from the fan 2 was constant, the plunger would be unnecessary, as the proper number of openings could be provided.

In order to secure quiet running a certain clearance between the working parts of the fan is required. In order to fill this space while running, the exhaustion of air from pipe 41 by virtue of its connection with vacuum pipe 3 will cause the liquid to rise and flow through pipe 41, valve 44, pipe 43 and into fan through vacuum pipe 3, and after passing through fan, the liquid passes through outlet into passage 38 and opening 40 into receiver 45 securing continuous circulation. The check valve 30 located in vacuum pipe 3 is normally open so that no resistance is offered to the passage of air, when the flow of air is discontinued the vacuum in the large drum 12 will close the valve 30 and prevent the liquid from receptacle 45 being drawn over into the drum 12. Should oil or water be carried by the air into the plunger 51 it will strike against the cone 53 and innerface of the plunger and run down and drop into the receptacle. The air, carrying dust drawn from the surfaces being cleaned will enter the dust collector by way of the pipe 21 and pass into the conical air tight tube 23½ which on account of its increased area in the direction of the flow of air will tend to expand it and cause the dust to separate and fall into the receptacle 14 provided for the purpose which can be removed when full. As greater or less suction is required to do different grades of cleaning, I have provided the relief valve with weights 37 which can be applied as required to vary the suction through the dust collector, as the valve 35 will open when the suction has reached the predetermined pressure corresponding with weights applied. This enables very delicate fabrics to be cleaned likewise the heaviest carpets or draperies.

In order to ascertain the condition of the fabric tube, that is, the quantity of dust adhering to it and which might in time interfere with the passage of air through it, the cocks 29 and 29½ are provided. If cock 29 is open with cock 29½ closed and the gage registers a certain figure, then if cock 29½ is opened and the pressure falls to a lower figure, the extent of the drop will indicate the condition of the fabric tube, that is, the quantity of dust adhering to it. When it is necessary to place water in the water receptacle, it can be accomplished by opening the valve 42, which communicates with a source of supply.

I claim as my invention.

1. In a vacuum cleaning machine, a dust collector comprising a casing, an inner tube impervious to air located therein, a tube pervious to air also located in the casing and surrounding the impervious tube, said tubes being spaced apart at one end and secured to one end of the casing and having their other ends secured together in spaced relation to the other end of the casing, means for introducing dust-laden air into the end of the impervious tube that is connected to the end of the casing, and means for withdrawing air from the corresponding end of the outer tube exteriorly of the inner tube.

2. In a vacuum cleaning machine, a dust collector comprising a vertical casing having an upper head and a lower dust receptacle, a flared tube impervious to air arranged within the receptacle and secured at its upper end to the upper head, a tapered tube pervious to air surrounding the impervious tube and connected at its upper end to the upper head, said tubes being engaged at their lower ends, a pipe for introducing dust-laden air into the end of the impervious

tube that is connected to the upper head of the casing and communicating with the inner tube, and means for withdrawing air from the casing connected to the upper head in the space between the impervious and pervious tubes.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

WILLIAM S. SUTTON.

Witnesses:
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E. D. E. N. BEHEL.