

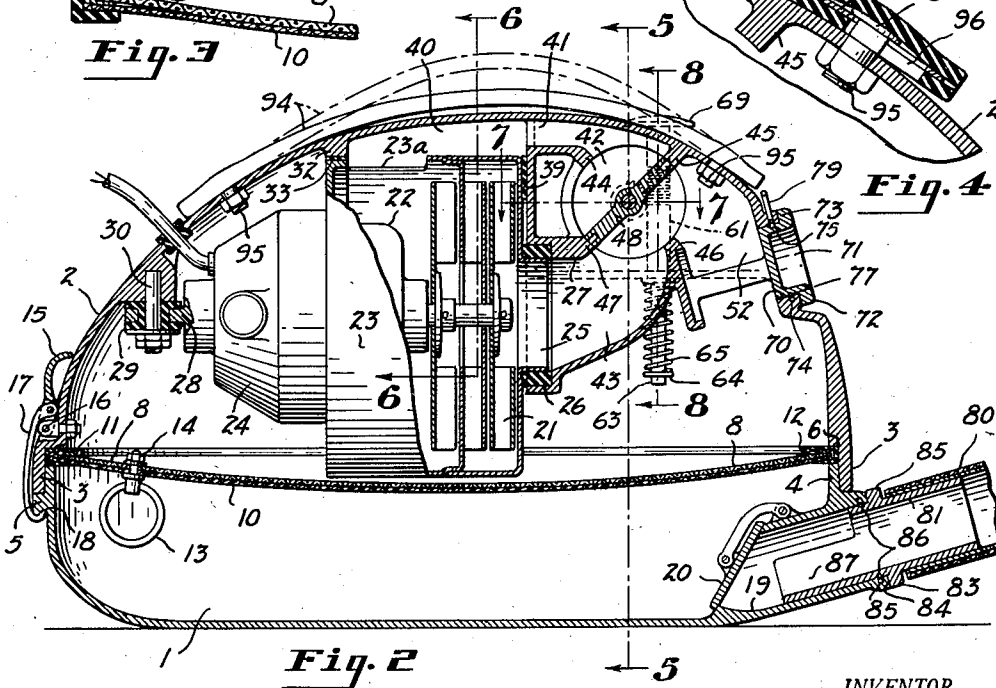
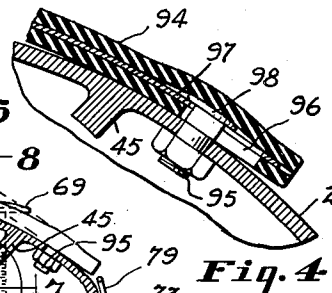
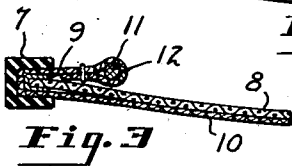
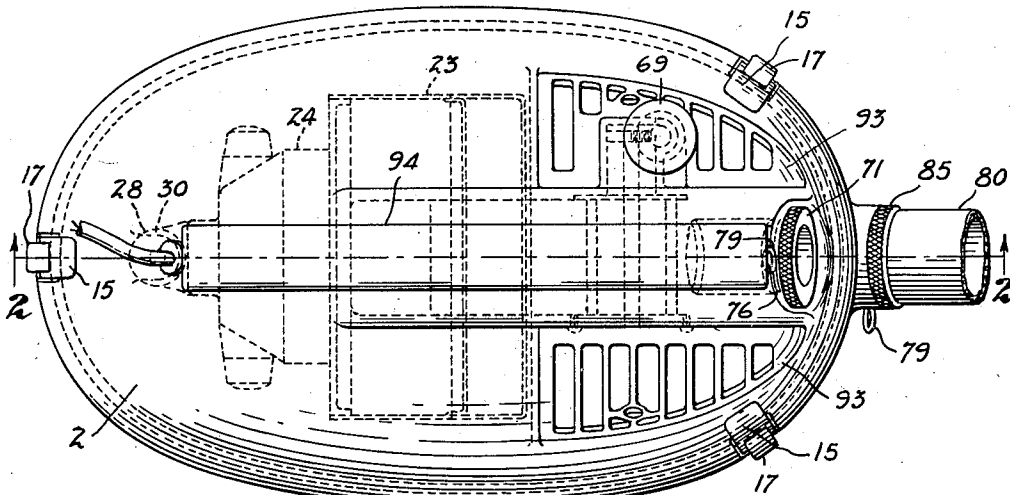
March 14, 1950

J. B. KIRBY
VACUUM-CLEANER

2,500,832

Filed Jan. 29, 1945

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

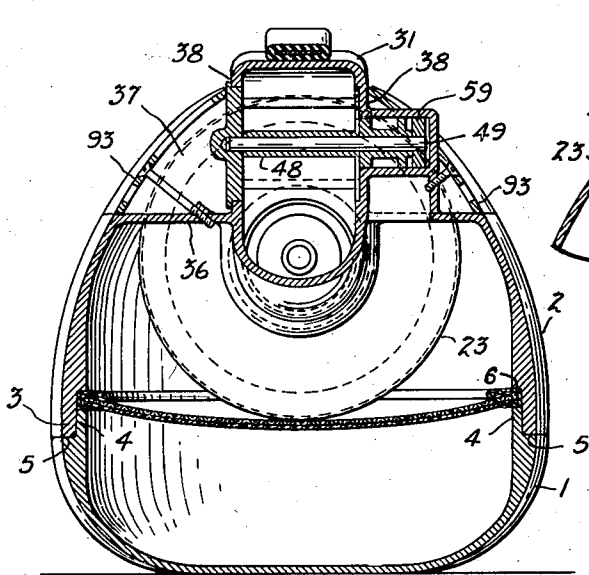


Fig. 5

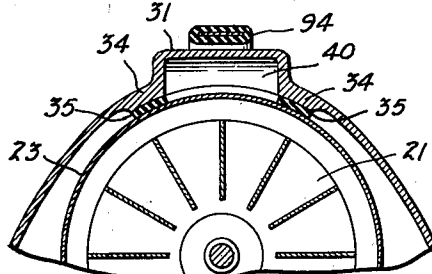


Fig. 6

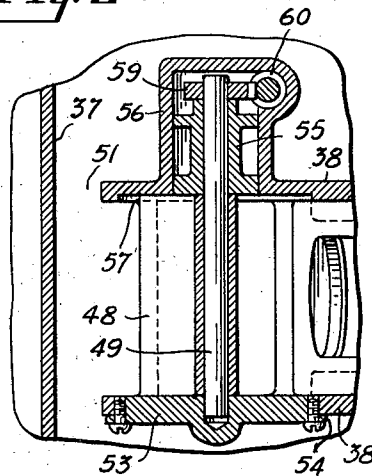


Fig. 7

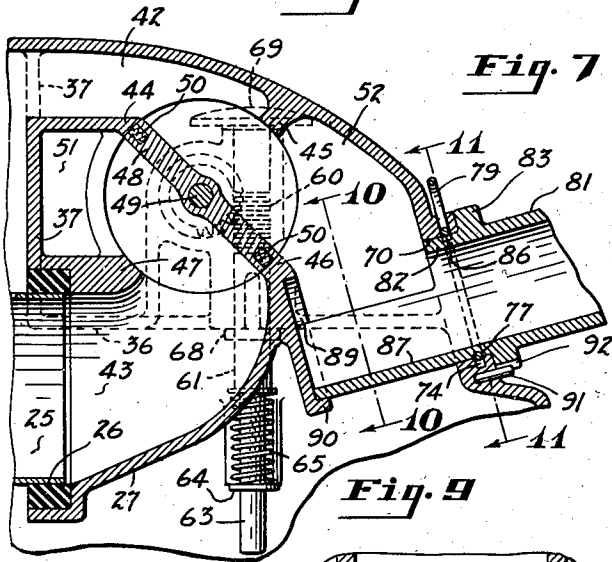


Fig. 9

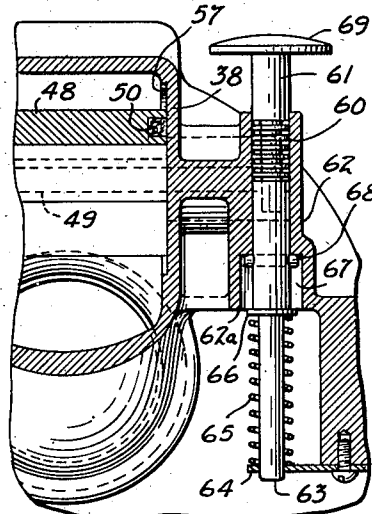


Fig. 8 INVENTOR.
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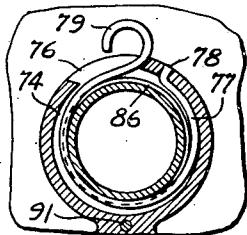


Fig. 11

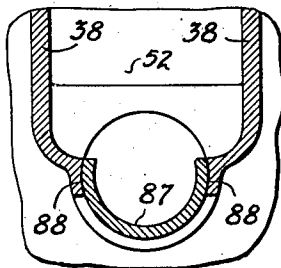


Fig. 10

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VACUUM CLEANER

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1 Claim. (Cl. 183—57)

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This invention relates to vacuum cleaners of the type in which the air is drawn by suction through a dust collecting chamber and filter that are interposed between the suction nozzle and fan.

The invention has for an object to provide a vacuum cleaner with a suction creating and dust collecting unit including a filter and a dust collecting chamber and having means under the control of the operator for momentarily reversing the flow of air through the filter from time to time during operation of the cleaner to keep the filter clean and maintain efficient operation.

It is common practice in the art to provide vacuum cleaners with pressure attachments adapted to be connected to the fan casing outlet to receive air under pressure from the fan. In vacuum cleaners of the type above referred to, such air pressure attachments are inefficient because of the fact that the filter chokes the flow of air to the fan and decreases the volume of air delivered to the attachment.

An important object of the present invention is to provide a pressure attachment for vacuum cleaners of the character referred to, so associated with means controlling the fan inlet and outlet that air may be drawn directly from the atmosphere into the fan and discharged through the fan casing outlet to the pressure attachment.

An additional object is to provide a simple and compact air flow creating and dust collecting unit having an easily removable dirt receptacle so associated with the filter and air flow creating means as to provide a convenient and sanitary means for disposal of the dirt.

With the above and other objects in view, the invention may be said to comprise the vacuum cleaner as illustrated in the accompanying drawings, hereinafter described and particularly set forth in the appended claims, together with such variations and modifications thereof as will be apparent to one skilled in the art to which the invention pertains.

Reference should be had to the accompanying drawings forming a part of this specification, in which

Fig. 1 is a top plan view of a vacuum cleaner embodying the invention;

Fig. 2 is a longitudinal, vertical section through the cleaner, taken on the line indicated at 2—2 in Fig. 1;

Fig. 3 is a fragmentary section through a margin of the filter;

Fig. 4 is a fragmentary section through an end of the strap handle;

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Fig. 5 is a section taken on the line indicated at 5—5 in Fig. 2;

Fig. 6 is a section taken on the line indicated at 6—6 in Fig. 2;

Fig. 7 is a section taken on the line indicated at 7—7 in Fig. 2;

Fig. 8 is a section taken on the line indicated at 8—8 in Fig. 2;

Fig. 9 is a fragmentary vertical section on an enlarged scale through the valve casing and pressure hose connection;

Fig. 10 is a section taken on the line indicated at 10—10 in Fig. 9, and

Fig. 11 is a section taken on the line indicated at 11—11 in Fig. 9.

Referring to the accompanying drawings, the cleaner housing is composed of a hollow bottom section 1 of oval form the bottom of which is rounded at the sides and ends to provide a narrow elongated flat center portion which is adapted to slide on a floor surface and a cover section 2 that is also hollow, being arched in both longitudinal and transverse section. The cover section 2 has a marginal edge portion 3 that conforms to and is adapted to receive a top edge 4 of the oval bottom section 1. The bottom edge of the cover section 2 rests upon an external shoulder 5 on the bottom section 1 and is provided with an internal shoulder 6 that is spaced far enough above the top edge 4 of the bottom section to provide a channel to receive the margin of a suitable filter.

As herein shown, the margin of the filter is covered by an elastic rubber band 7 of channel section that is stretched around the edge of the filter. The filter comprises a relatively stiff wire screen 8 that may have a sheet metal binder 9 around its margin and a cloth filter 10 that underlies the screen 8 and has its marginal edge portions folded over the edge of the screen 8. The cloth filter has a looped edge 11 which receives a draw string 12 by means of which the cloth filter may be drawn tightly against the bottom of the screen 8. The filter has a close fit within the bottom portion of the cover section 2 and is normally lifted off the bottom section with the cover section. To facilitate the removal of the filter from the cover section, a ring 13 may be attached to one end of the filter by means of a bolt 14. The filter may be readily detached from the cover section by simply grasping the ring 13 and pulling the filter from the cover section.

Suitable fasteners are provided for detachably securing the cover section to the bottom section 1. As herein shown the fastener comprises

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a lever 15 that is mounted on a horizontal pivot 16 suitably secured to the cover section 2 adjacent the shoulder 6 and a hook 17 that is pivoted to the lever 15 outwardly of the pivot 16, the hook 17 being adapted to engage a recessed shoulder 18 on the bottom section 1. When the lever 15 is swung inwardly against the exterior of the cover 2 as shown in Fig. 2, the hook 17 is drawn tightly against the shoulder 18 and the cover is clamped tightly against the top edge 4 of the bottom section. The rubber channel 7 is clamped between the shoulder 6 and the top edge 4 of the bottom section forming an air seal.

The filter 10 divides the housing into upper and lower chambers, the lower chamber being a dust collecting chamber and the upper chamber being a vacuum chamber. The bottom section 1 is provided with a suction inlet 19 that is normally closed by a flap valve 20 which is pivoted to swing inwardly to open the inlet upon a flow of air into the bottom section.

Suction is created by means of a fan 21 that is mounted upon the shaft of a motor 22 and enclosed within a casing 23 which has a rearwardly extending portion 24 of reduced diameter which encloses the motor 22. The fan casing 23 has a central inlet at its forward end and is provided with a forwardly projecting cylindrical flange 25 surrounding the inlet. The flange 25 extends into a rubber ring 26 that is mounted in a valve casing 27 that is formed integrally with the forward portion of the cover 2.

At the rear end of the extension 24, an attaching flange 28 is provided in which is mounted a rubber cushioning collar 29 which receives a supporting bolt 30 that is fastened to the cover 2. The fan casing 23 is mounted centrally of the cover 2, which is provided with a longitudinal channel 31 that overlies the casing 23 centrally thereof. At the rear end of the channel 31 the cover is provided with an internal arcuate rib 32 that conforms to the casing 23 and a rubber sealing strip 33 is provided between the rib 32 and the casing 23.

Along opposite sides of the channel 31 the cover 2 is provided with longitudinal internal ribs 34 which closely overlie the casing 23 and engage rubber sealing strips 35 which are clamped between the ribs 34 and the casing 23 to seal the opposite sides of the channel 31. The forward end portion of the cover is recessed on opposite sides of the channel 31, the recesses having flat bottoms 36, a vertical rear wall 37 and vertical side walls 38 which form continuations of the sides of the channel 31 and opposite sides of the valve casing 27.

The fan casing 23 has an outlet 23a to the space between the flanges 34 adjacent the rear end of the channel 31, and a sealing strip 39 of rubber is mounted between the valve casing 27 and the upper portion of the fan casing 23 to prevent leakage of air between the front end of the fan casing and the valve casing 27, so that a passage 40 is formed between the cover 2 and the casing 23 from the outlet 23a forwardly to a passage 41 in the valve casing 27. The passage 41 leads to a valve chamber 42 and the inlet to the fan casing is also connected to the valve chamber 42 by a passage 43.

The valve chamber 42 has four equiangularly spaced bearing portions 44, 45, 46 and 47 which are adapted to have sealing engagement with a valve vane 48 that is mounted upon a central shaft 49. The vane 48 carries packing strips 50

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in its edges which have sealing engagement with the bearing members 44, 45, 46 and 47. The passage 41 opens into the top of the valve chamber 42 between the bearing members 44 and 45. The passage 43 to the fan inlet opens to the valve chamber 42 at the bottom thereof between the bearing members 46 and 47. A transverse passage 51 opening through the walls 38 of the valve casing to the atmosphere, opens to the valve chamber between the bearing members 44 and 47. A fourth passage 52 extends along the forward portion of the cover 2 and opens at its upper end into the valve chamber 42 between the bearing members 45 and 46 and at its lower end into the vacuum chamber.

As best shown in Fig. 7, the valve chamber is closed at one end by a plate 53 which is of circular form to fit a circular opening in the wall 38, the plate 53 being detachably secured to the wall 38 and having a peripheral flange 54 which bears against the outer face of the wall 38. The shaft 49 extends centrally through the vane 48 and has a bearing at one end in the plate 53. The shaft 49 is journaled at its opposite end in a bearing member 55 that is mounted in a cylindrical pocket that is formed integrally with and projects outwardly from one of the walls 38. The inner face of the wall 38 in which the pocket 56 is formed is provided with recesses 57 to receive the vane 48.

In the position of the valve shown in Fig. 2 the inlet of the fan is connected through the passages 43 and 52 with the vacuum chamber, and the fan outlet is connected through the passages 40, 41 and 51 to the atmosphere. In the other position of the valve shown in Fig. 9 the fan inlet is connected through the passages 51 and 43 with the atmosphere and the fan outlet is connected through the passages 40, 41 and 52 to the vacuum chamber. By momentarily shifting the valve 48, pressure may be reversed on the filter to dislodge lint and dust therefrom. During the reversal of pressure, the inlet 19 is closed by means of the valve 20 which is held against its seat by the internal pressure. Since the reverse flow of air through the filter occurs only while pressure is being increased within the bottom compartment, it is desirable that means be provided by which the vane 48 may be quickly shifted manually and by which the vane is instantaneously and automatically returned to its normal position when released.

As shown in Figs. 7 and 9, the shaft 49 has a pinion 59 attached thereto within the pocket 56, and this pinion is engaged by circular rack teeth 60 formed on a vertical rod 61 that is slidably and rotatably mounted in a guide 62 formed integrally with the cover 2. The rod 61 has a reduced lower end 63 which is slidable in an aperture in a horizontal plate 64 attached to the cover and is normally held in its uppermost position by means of a coil spring 65 that is mounted between the plate 64 and washer 66 at the upper end of the reduced portion 63. When the rod 61 is depressed to its full extent, the shaft 49 is turned to shift the vane 48 to the position shown in Fig. 9, and upon release of the rod 61 the vane 48 is instantly returned to its normal position by the spring 65. During operation of the cleaner the rod 61 may be depressed to reverse the pressure on the filter, and immediately released to reestablish normal operating conditions. In this way the filter may be cleaned at intervals to increase its efficiency.

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For a purpose which will be hereinafter explained, it is sometimes desirable to hold the valve in the position shown in Fig. 9. As shown in Fig. 8, the lower portion of the guide 62 may be provided with diametrically opposite keyways 68 to receive a key 69 that passes diametrically through the rod 61. When the rod 61 is in its lowermost position the key 68 is below the lower end of the keyway 67 and by turning the rod 61 the key 68 may be engaged with a seat 62a at the lower end of the guide 62 to hold the rod in its depressed position and retain the valve in the position shown in Fig. 9. The circular ribs 60 permit the rod to be turned while in engagement with the pinion 59 so that the valve may be quickly and easily locked in its flow reversing position when desired. The rod 61 is provided with a flat head 69 at its upper end which can be readily engaged by a hand or foot to push the rod downwardly or which may be easily grasped to turn the rod to locking position. Upward movement of the rod 61 is limited by the engagement of the washer 66 against the seat 62a and the downward movement by engagement of the head 69 with the upper end of the guide 62, the extreme positions being shown in Figs. 8 and 9.

The cover 2 has an opening 70 into the passage 52 and this opening is adapted to be closed by means of a plug 71 that has a flange 72 that engages with a flat bearing surface 73 around the opening. The opening 70 has an internal groove 74 and the plug 71 has an external groove 75 that registers with the groove 74 when the plug is in place in the opening. An arcuate slot 76 opens into the groove 75 as shown in Fig. 11 and a wire locking ring 77 is mounted in the groove 75, the wire 77 having one end 78 anchored to the cover 2 and its opposite end extending through the slot 76 and provided with a bent finger piece 79. The ring 79 is formed of spring wire and is biased toward a contracted position in which it lies partially within the groove 75 of the plug, to lock the same in place. By pushing on the end 79 of the ring, the ring may be expanded to free the plug, which may then be readily removed from the opening.

A hose 80 is attached to a tubular coupling member 81 that is adapted to be engaged either in the inlet 19 as shown in Fig. 2, or in the opening 70 as shown in Fig. 9. The coupling member 80 has an inner cylindrical portion 82 that fits either in the opening 19 or the opening 70 and is also provided with an external flange 83 that engages with a flat bearing surface 84 around the opening 19 or with the bearing surface 73 around the opening 70.

The inlet opening 19 has an internal groove 85 corresponding to the groove 74 in the opening 70, and the coupling member 81 has an external groove 86 that is adapted to register with the groove 85 in the opening 19, or with the groove 74 in the opening 70.

When the coupling member 81 is mounted in the opening 70 and the vane 48 positioned as shown in Fig. 9 air is drawn into the fan through the passages 51 and 43, and is discharged from the fan through passages 40, 42 and 52 to the hose 80. Since the air is drawn directly from the atmosphere instead of through the filter, the full force of the fan is exerted in driving the air under pressure through the hose 80.

While the extension 87 is desirable, it is not essential that the passages 52 be cut off from the suction chamber since the hose 80 when con-

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nected to the opening 70 forms the sole outlet for the air under pressure discharged through the passage 52. In order to avoid using the housing as a pressure chamber, the coupling member 81 may be provided with a semi-cylindrical section 87 at its inner end that engages with arcuate bearings 88 on opposite sides of the passage 52 as best shown in Fig. 10, and with a circular recess 89 in the inner wall of the passage 52, the inner wall of the passage having an arcuate flange 90 which engages with the under side of the extension 87, as shown in Fig. 9.

The inlet 19 as shown in Fig. 2, is of elongated, tubular form so that the extension 87 of the coupling member 81 is housed between the retaining ring and the valve 20. When it is desired to use the hose 80 as a pressure attachment, the plug 71 is detached from the opening 70 and the hose 80 is connected to the opening 70 as shown in Fig. 9. The valve 48 is then set in the position shown in Fig. 9 and the fan operated to deliver air under pressure to the hose 80. The plug 71 may be fastened in the inlet opening 19 while the hose 80 is being used as a pressure attachment since both the plug 71 and the coupling 81 are adapted to be secured in either opening.

To properly position the coupling member 81 in the opening 70 a pin 91 mounted in the cover 2 engages in a slot 92 formed in the periphery of the bearing shoulder 83 to insure proper alignment of the extension 87 with the bearing members 88.

The recesses on opposite sides of the valve casing at the forward portion of the cover member may be closed by means of suitable grill plates 93 that allow free entry of air to the air inlet 51, the grill plates being secured in place by any suitable means.

A suitable strap handle 94 may be provided for carrying the vacuum cleaner. The strap 94 may be secured to the cover in any suitable way. As herein shown, the ends of the strap are attached to the cover by means of bolts 95, which are slidable in slots 96 in the strap, as shown in Fig. 4. The strap 94 may be formed of a metal strip 97 covered with rubber, in which case the slot 96 extends through the strip 97 and the rubber on the under side thereof, the bolt having a head 98 engaging the outer side of the strip 97.

During operation of the cleaner the filter may be kept open by momentarily depressing the rod 61 at intervals to reverse the flow of air through the filter, and the cover section can be quickly and easily removed to permit emptying of the dirt receptacle.

The filter may be cleaned by reversing the air flow through it, before the dirt receptacle is detached for emptying so that dropping of dirt from the filter after its separation from the dirt receptacle is avoided.

It is to be understood that variations and modifications of the specific device herein shown and described for purposes of illustration, may be made without departing from the spirit of the invention.

What I claim is:

In a vacuum cleaner a fluid tight receptacle having a top wall, an upper suction compartment and a lower dust collecting compartment, said dust collecting compartment having an inlet for dust laden air, a fan and valve unit carried by the top wall and positioned in said suction compartment, said unit comprising a fan casing having an inlet and an outlet and a valve chamber and having passages connecting said inlet and

outlet to the valve chamber and connecting the valve chamber with the suction compartment and with the atmosphere through said top wall, a valve in said chamber which in its normal position connects the fan casing inlet to the suction compartment and the fan casing outlet to the atmosphere and which is movable from its normal position to a position connecting the fan casing inlet to the atmosphere and the fan casing outlet to the suction compartment, a manually operable plunger extending through the top wall of the chamber and connected to the valve to actuate the same, and a spring acting upon said plunger to return the valve to its normal position upon release of the plunger.

JAMES B. KIRBY.

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