

July 6, 1948.

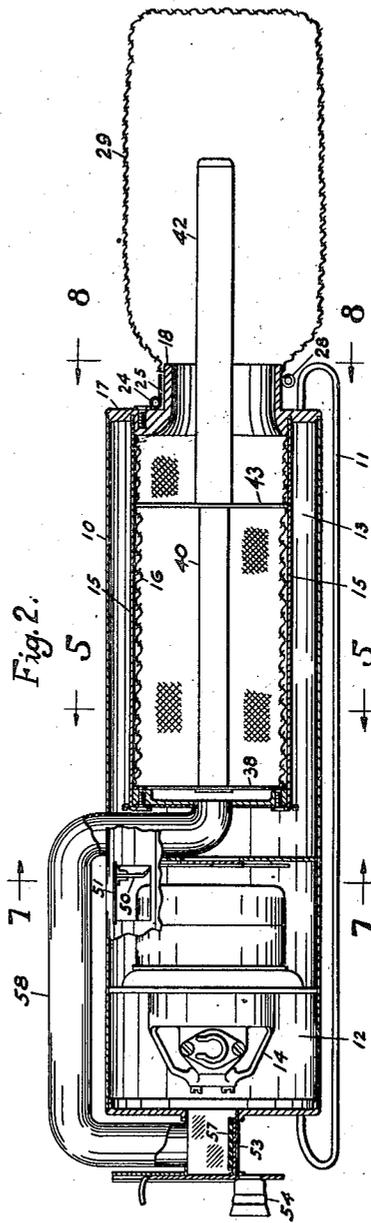
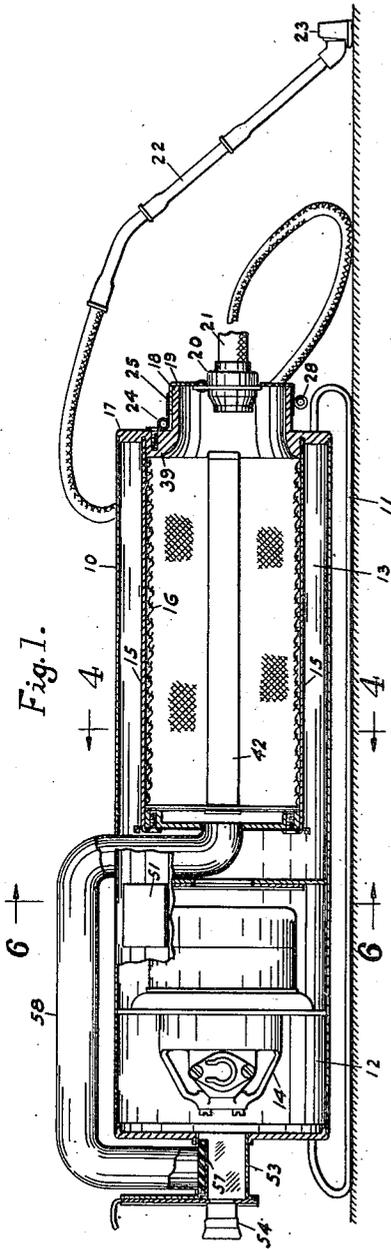
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2,444,809

REVERSE FLOW CLEANER

Filed Jan. 11, 1945

3 Sheets—Sheet 1



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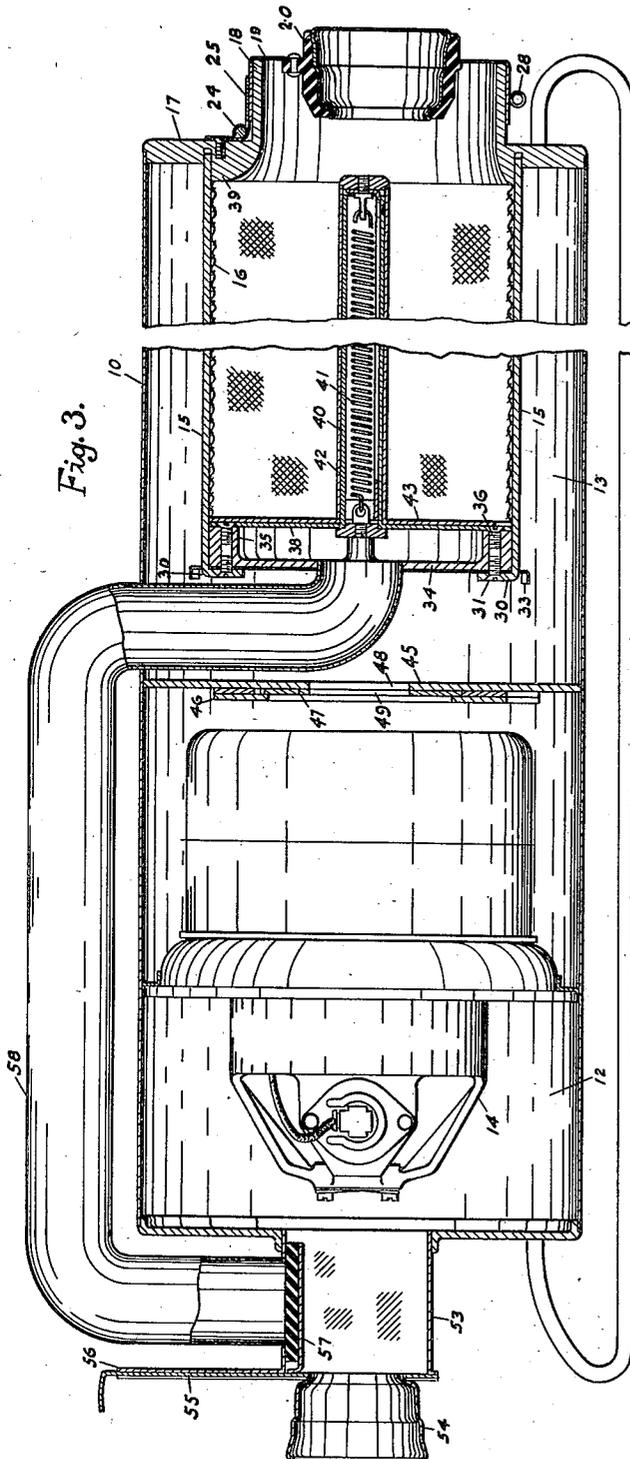
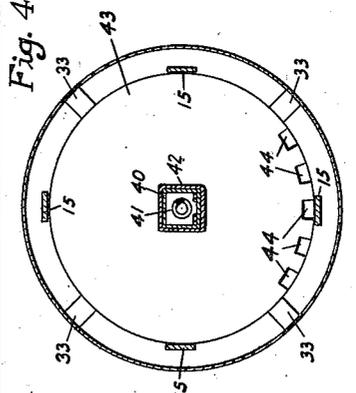
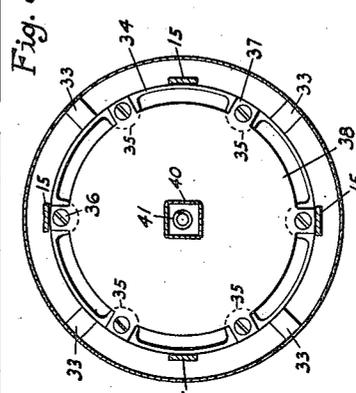


Fig. 3.

Fig. 5.

Fig. 4.



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Fig. 6.

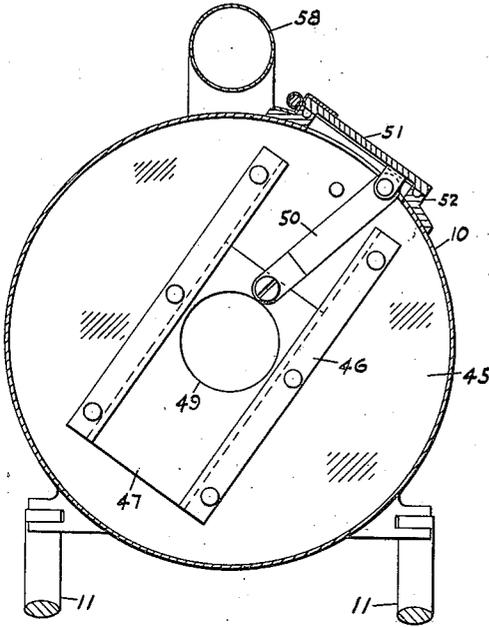


Fig. 7.

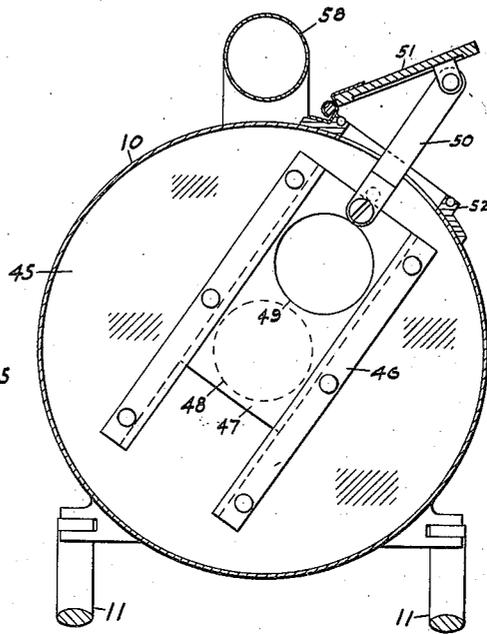
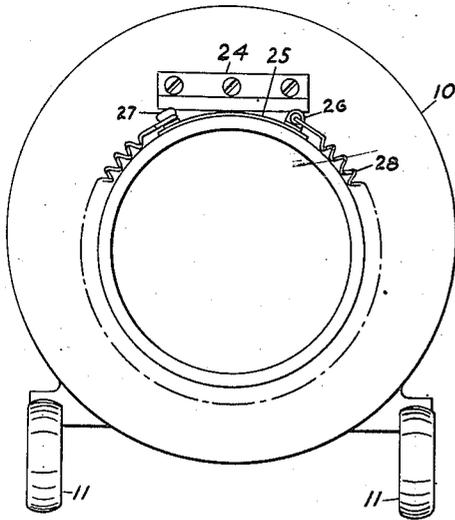


Fig. 8.



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REVERSE FLOW CLEANER

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12 Claims. (Cl. 183—37)

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This invention relates to suction cleaners and is particularly concerned with means for the removal of accumulated dust and dirt from the dust bag or chamber of the cleaner.

Various types of suction cleaners have long been a common element of household equipment. Most of such devices operate by the application of suction to the surface to be cleaned where-by the resulting flow of air will pick up and en- 5 train dust, dirt and like fine particles, the air being then directed through a separating means, usually a porous receptacle such as a bag which restrains and filters out such foreign matter, the air passing through the walls of the porous member. In all such devices considerable difficulty 10 and nuisance has been experienced in the subsequent removal of the accumulated dirt and dust from the bag or receptacle.

It is an object of the present invention to provide means for removing the accumulated dust and dirt from suction cleaners without requir- 20 ing either removal or manual handling of the porous receptacle which receives such foreign matter.

A further object of the invention is to provide means whereby the porous receptacle of a suction cleaner may be discharged of its accumulated dust and dirt and whereby the walls of the recep- 25 tacle are cleaned so as to insure maximum efficiency of the apparatus after discharging the foreign matter.

Another object of the invention is to provide a cleaner including pressure operated means oper- 30 able to move a piston through a dirt receiving compartment so as to eject accumulated dirt therefrom.

A further object of the invention is to provide means for reversing the air flow of a vacuum cleaner so as to cause a reverse air flow through a dirt receiving compartment of the cleaner whereby accumulated dust and dirt will be ejected therefrom.

Numerous other objects and features of the invention will be apparent from the foregoing specification taken in connection with the ac- 35 companying drawings.

In quite general terms the inventive concept may be defined as embracing the thought of reversing the flow of air in a suction cleaner in order to expel the accumulated dirt and foreign matter therefrom. More specifically the inven- 40 tion provides a valve system by which the air flow may be reversed and it also provides a pusher or piston which is preferably operated by such reversed air flow to move through the dust cham- 45

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ber and eject the dust and dirt therefrom. By way of illustration, the present invention is shown applied to a vacuum cleaner of the tank type, wherein the motor, fan and dust receptacle are mounted within a single housing which is nor- 5 mally stationary while a suction hose conducts air flow from a suction nozzle which is movable over the surfaces to be cleaned. The porous receptacle of the present embodiment of the in- 10 vention is shown as a fixed cylindrical member. Obviously various aspects of the invention may be directly applied or modified for application to other types of cleaners and numerous varia- 15 tions in the structure for the removal of dust and dirt from the incoming air may be resorted to.

In the drawings:

Fig. 1 is a side elevation showing the cleaner as used during a cleaning operation;

Fig. 2 is a similar view showing the position of the parts when the foreign matter is being discharged from the cleaner;

Fig. 3 is a more detailed view with the parts in the position shown in Fig. 1;

Fig. 4 is a sectional view taken on lines 4—4 of Fig. 1;

Fig. 5 is a sectional view taken on lines 5—5 of Fig. 2;

Fig. 6 is a sectional view taken on lines 6—6 of Fig. 1;

Fig. 7 is a vertical sectional view taken on lines 7—7 of Fig. 2, and

Fig. 8 is a sectional view taken on lines 8—8 of Fig. 2.

In the present disclosure, the housing is of generally cylindrical form constituted by a body 10 which is supported on runners 11 so as to be easily moved along the floor. The housing encloses a rear motor compartment 12 and a forward cleaning compartment 13. A motor fan unit 14 is mounted within the motor compart- 40 ment 12 while the forward cleaning compartment is provided with horizontally extending spider arms 15 within which is mounted a cylindrical porous receptacle 16 formed of a screen. The receptacle 16 is preferably made of fabric ma- 45 terial such as cloth. In the arrangement shown, it will be understood that when the motor fan unit 14 is energized air is caused to flow rear- 50 wardly through the motor compartment 12 toward the left in Figs. 1, 2, and 3.

The forward end of the body 10 is closed by an apertured and flanged front end closure 17. The central flange 18 thereof receives thereover a hose connection fitting 19 which frictionally 55

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engages the outer walls of the flange to be readily removed therefrom. The fitting 19 extends inwardly of the flange 18 and is provided with a hose receiving adapter indicated at 23. The adapter 20 is adapted to receive one end of a suction hose 21 as shown in Fig. 1. The hose 21 in turn is adapted to receive the conventional wand or handle 22, which in turn receives a nozzle or other suction tool as indicated at 23.

The front face of the front end closure 17 also carries a hinged retainer member 24, the pivoted element 25 of which is arcuately formed to conform in configuration to the curved outer surface of the flange 18 (see Fig. 8). When moved downwardly the element 25 contacts the side walls of the fitting 19 and assists in retaining the fitting 19 against accidental displacement. The element 25 also carries an eyelet 26 and a button 27. A coil spring 28 is secured to the eyelet 26 at one end, its opposite end being removably secured to the button 27. When dust or dirt is to be removed from the cleaner the fitting 19 is removed and a receiver such as a bag 29 as shown in Fig. 2 is fitted over the flange 18, the spring 28 being passed around the mouth of the bag and secured to the button 27 to secure the bag in place while the element 25 also engages the mouth of the bag to assist in such securement. The inner face of the front end member 17 receives the forward ends of the four symmetrically spaced spider arms 15. The opposite ends 30 of the arms 15 extend through, and are intumed and secured as by screws 31 to a circular plate 34. Between the spider arms 15 the plate 34 is provided with arms 33 for securement to the body 10 to thus provide free passage of air between the edge of the plate and the body. The screws 31 engage bosses 35 of the plate 34, while oppositely direct screws 36 secure ears 37 of a guide support 38 to the bosses 35, the bosses serving to space the support 38 from the plate 34. By this construction it will be seen that air entering a central aperture of the plate 34 can pass forwardly around the edges of the support 38 between the bosses 35 and the ears 37. The inner end of the receptacle 16 is secured between the plate 34 and the arms 15 while the forward end is secured between the arms 15 and an inwardly extending lip 39 of the front end enclosure 17.

The support 38 carries a forwardly extending hollow rectangular guide bar 40 within which is mounted a retracting coil spring 41. Over the guide bar 40 there is slidably mounted a companion hollow rectangular guided bar 42 to which at the forward end of the spring 41 is secured. The rear end of the guided bar 42 carries thereon a piston or pusher plate 43, the lower peripheral edges of which is cut away or serrated as at 44 to permit a limited passage of air therearound and in close proximity to the lower portion of the inner surface of the screen 16. The arrangement is such that when air is admitted forwardly through the central aperture of the plate 34 it will impinge upon the rear face of the plate 43, moving the plate forwardly within the screen 16 and against the tension of the spring 41.

Compartment 12 and 13 are divided by a baffle 45 on the rear face of which are mounted channeled guides 46 which support and guide a slide valve 47. The baffle 45 is provided with an aperture 48 with which an aperture 49 of the slide valve 47 registers when the valve is in its lower position and the device is used as a cleaner as in Fig. 6. For reciprocating the slide valve

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47, an operating link 50 is connected at one end with the slide valve 47 while its opposite upper end is connected with an externally mounted flap valve 51. The flap valve 51 is mounted over an intake aperture 52 of the body 10 and is adapted to be manually moved (see Figs. 6 and 7). When the flap valve 51 is open as in Fig. 7 air is admitted directly to the compartment 12 through the aperture 52 and suction is cut off from the compartment 13 by closure of the aperture 48 in the baffle 45. When the flap valve 51 is closed as in Fig. 6, the aperture 48 of the baffle and the aperture 49 of the slide valve are in registration and air is drawn through the compartment 13 passing through the motor fan unit to be discharged at the rear through an elbow 53 and a reciprocally mounted port 54. Port 54 is mounted on a slide 55 carried by guides 56. The slide 55 also carries with it a vertically movable closure 57 which in the raised position as shown in Figs. 1 and 3 engages in the lower end of a forwardly extending duct 58 to prevent the discharge of air therethrough during the cleaning operation. The forward end of the duct 58 leads to the central aperture of the plate 34.

In the operation of the device during cleaning it will be seen that with the motor fan unit 14 in operation and with port 54 moved upwardly for registration with the horizontal passage of the elbow 53, while apertures 48 and 49 are in registration, air is drawn rearwardly through the compartment 13 and with the hose applied to the adapter 20 of the fitting 19 as in Fig. 1, air will be drawn in through the nozzle 23, wand 22 and hose 21, passing outwardly through the screen 16, which retains the entrained dust and dirt, while the screened air passes rearwardly around the outer edge of plate 34 between the arms 33 to the aperture 48. For dust and dirt discharge, the valves 47 and 51 are shifted to the position shown in Fig. 7 and the slide 55 is lowered to the position shown in Fig. 2, whereby egress of air from the elbow 53 to the atmosphere is precluded and air under pressure is forced to flow into the duct 58 past closure 57, such air having been admitted past the open flap valve 51. The duct 58 leads over the housing, entering the body 10 forwardly of the baffle 45; the forward end of the duct 58 being mounted in the central aperture of the plate 34. With air pressure so applied through the central aperture of the plate 34 such air will impinge upon the pusher plate 43 moving it forwardly against the tension of spring 41, thus pushing accumulated dust and dirt forwardly through the flanged aperture of the front end closure 17, from which the fitting 19 has been removed and to which has been applied the bag 29.

In the forward movement of the plate 43 it will be noted that air under pressure escapes through the lower edge apertures 44, blowing dirt and dust forwardly along the screen surface and assisting in discharge of the dirt and dust through the flanged aperture of the front cover. It will also be noted that as the pusher plate 43 moves forwardly air under pressure will pass outwardly through the screen 16 in the rear of the pusher plate and such air will move forwardly in the chamber 13 and reenter the screen from the outside so as to cause a reversal of the normal flow during cleaning through the screen. Thus such reversal will not only aid in discharge of the foreign matter through the flange 18 but will also act to remove dust and dirt from the interstices of the screen.

From the foregoing it will be seen that the present invention provides a suction cleaner operable in the normal fashion to accomplish the usual suction cleaner function, but which may be readily adjusted to provide for a reverse flow of the air through the cleaning chamber and which further provides for the action of a mechanical pusher or piston having power operated means to cause it to move within the cleaning chamber to discharge accumulated dust and dirt therefrom.

It will be understood, of course, that the invention is not limited to the specific features of construction and operation here shown by way of example, and it will be appreciated that numerous changes and modifications of the structure set forth may be resorted to without departure from the spirit or scope of the invention as outlined in the appended claims.

What I claim is:

1. In a portable domestic suction cleaner the combination of means for producing an air flow, a compartment for removing dust and dirt entrained by air flowing under the influence of said means, means for reversing the flow of air through said compartment, and a pusher mounted within said compartment including an impervious element responsive to reversal of air flow to be moved by such reversal to cause said pusher to move in said compartment to eject accumulated dust and dirt therefrom.

2. In a portable domestic suction cleaner the combination of means for producing an air flow, a compartment through which air flows under the influence of said means, a porous member in said compartment for removing dust and dirt entrained by air flowing through the compartment, means for reversing the flow of air through said compartment, and a pusher mounted within said compartment including an impervious element responsive to reversal of air flow to be moved by such reversal to cause said pusher to move in said compartment to eject accumulated dust and dirt therefrom.

3. In a portable domestic suction cleaner the combination of means for producing an air flow, a compartment through which air flows under the influence of said means, a fixed substantially rigid porous member in said compartment for removing dust and dirt entrained by air flowing through the compartment, means for reversing the flow of air through said compartment, and a pusher mounted within said compartment including an impervious element responsive to reversal of air flow to be moved by such reversal to cause said pusher to move in said compartment to eject accumulated dust and dirt therefrom.

4. In a portable domestic suction cleaner having a dust receiving compartment and a porous walled dust separating receptacle therein, a piston within said receptacle, means for drawing dust laden air in through said compartment and receptacle whereby the walls of the receptacle will collect the dust of said air, means for reversing the flow of air through said compartment, and an impervious element engageable by the reversed air flow for moving said piston to eject dirt and dust from said receptacle.

5. In a portable domestic suction cleaner having a dust receiving compartment and a fixed normally rigid cylindrical porous walled dust separating receptacle therein, a piston within said receptacle, means for drawing dust laden air in through said compartment and receptacle where-

by the walls of the receptacle will collect the dust of said air, means for reversing the flow of air through said compartment, and an impervious element engageable by the reversed air flow for moving said piston to eject dirt and dust from said receptacle.

6. In a portable domestic suction cleaner having a dust receiving compartment and a porous walled dust separating receptacle therein, a piston within said receptacle, unidirectional impeller means for drawing dust laden air in through said compartment and receptacle whereby the walls of the receptacle will collect the dust of said air, means for reversing the flow of air through said compartment, and an impervious element engageable by the reversed air flow for moving said piston to eject dirt and dust from said receptacle.

7. In a portable domestic vacuum cleaner, an impervious casing, means for causing a flow of air through said casing, means for reversing the flow of air through said casing, a pervious chamber within said casing through which the flow of air may be directed, and an impervious piston within said chamber, said piston being constructed and arranged to be actuated by the flow of air in one direction to move in said chamber to eject accumulated dust and dirt therefrom.

8. In a portable domestic vacuum cleaner, an impervious casing, means for causing a flow of air through said casing, means for reversing the flow of air through said casing, a horizontal pervious dust and dirt collecting chamber within said casing through which the flow of air may be directed, and an impervious piston within said chamber, said piston being constructed and arranged to be actuated by the flow of air in one direction to move in said chamber to eject accumulated dust and dirt therefrom.

9. In a portable domestic vacuum cleaner, an impervious casing, means for causing a flow of air through said casing, means for reversing the flow of air through said casing, a horizontal pervious dust and dirt collecting chamber within said casing through which the flow of air may be directed, an impervious piston within said chamber, said piston being constructed and arranged to be actuated by the flow of air in one direction to move in said chamber to eject accumulated dust and dirt therefrom, and a spring means for returning said piston to its original position when flow of air in the actuating direction is terminated.

10. In a portable domestic vacuum cleaner, a horizontal substantially cylindrical casing, unidirectional means for producing a flow of air through said casing, a pervious dust collecting and receiving chamber in said casing, a normally retracted impervious piston within said chamber conforming to the size and shape of said chamber, and means for reversing the flow of air through said chamber, said piston being constructed and arranged to be actuated by the reverse air flow to move through said chamber to eject dust and dirt therefrom.

11. In a portable domestic vacuum cleaner, a horizontal substantially cylindrical casing, unidirectional means for producing a flow of air through said casing, a horizontal substantially cylindrical pervious rigid dust collecting and receiving chamber in said casing, a normally retracted impervious piston within said chamber conforming to the size and shape of said chamber, and valve means for reversing the flow of air through said chamber, said piston being con-

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structed and arranged to be actuated by the reverse air flow to move through said chamber to eject dust and dirt therefrom.

12. In a portable domestic vacuum cleaner, a horizontal substantially cylindrical casing, unidirectional means for producing a flow of air through said casing, a horizontal substantially cylindrical pervious rigid dust collecting and receiving chamber in said casing, a normally retracted impervious piston within said chamber conforming to the size and shape of said chamber, valve means for reversing the flow of air through said chamber, said piston being constructed and arranged to be actuated by the reverse air flow to move through said chamber to eject dust and dirt therefrom, means in said chamber to guide said piston, and means on said casing for attaching a dust and dirt receiving receptacle.

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