Dec. 19, 1950 G. É. LOFGREN 2,534,280

VACUUM CLEANER

Filed July 2, 1946 5 Sheets-Sheet 1

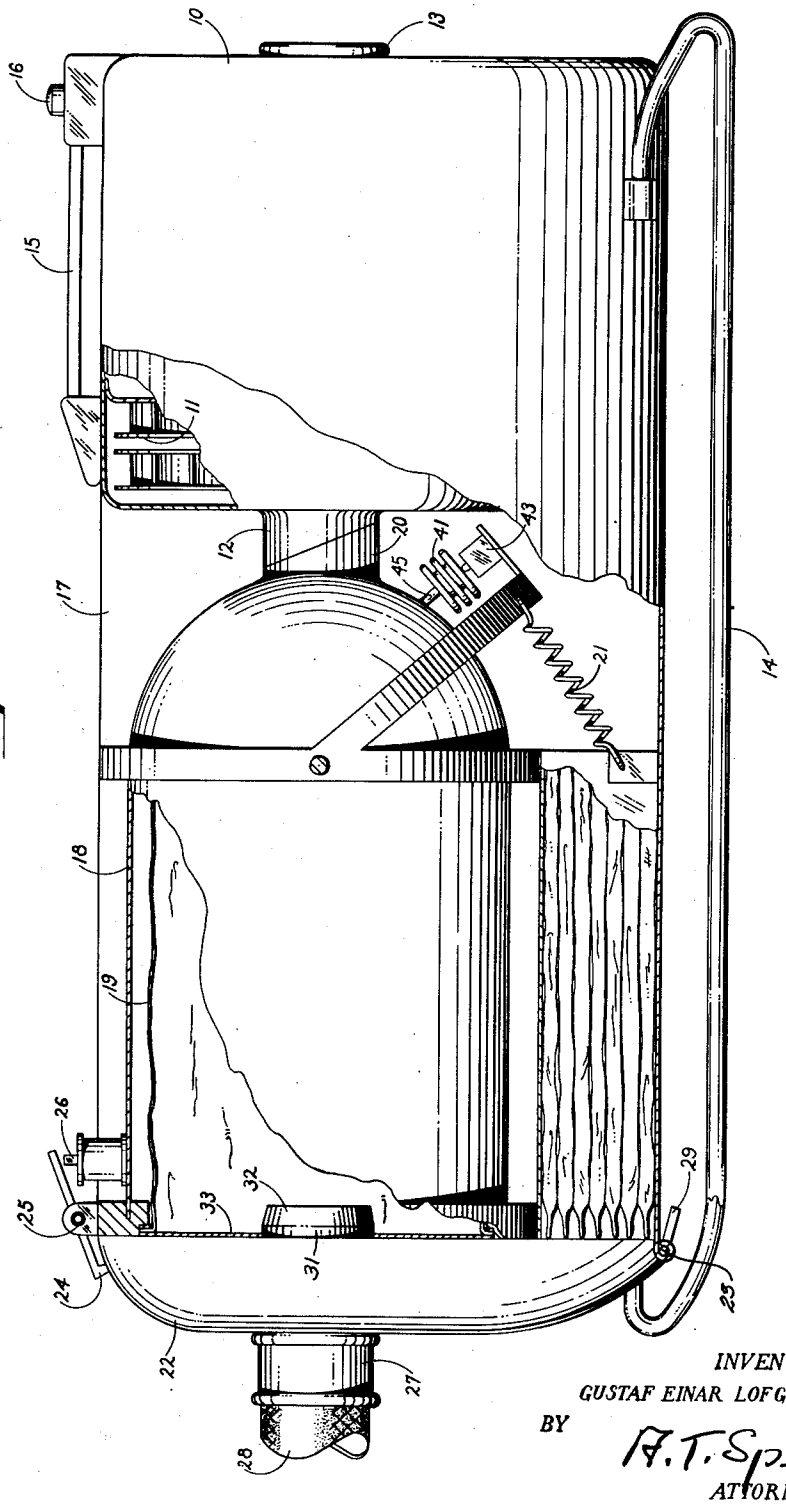


Fig. 1

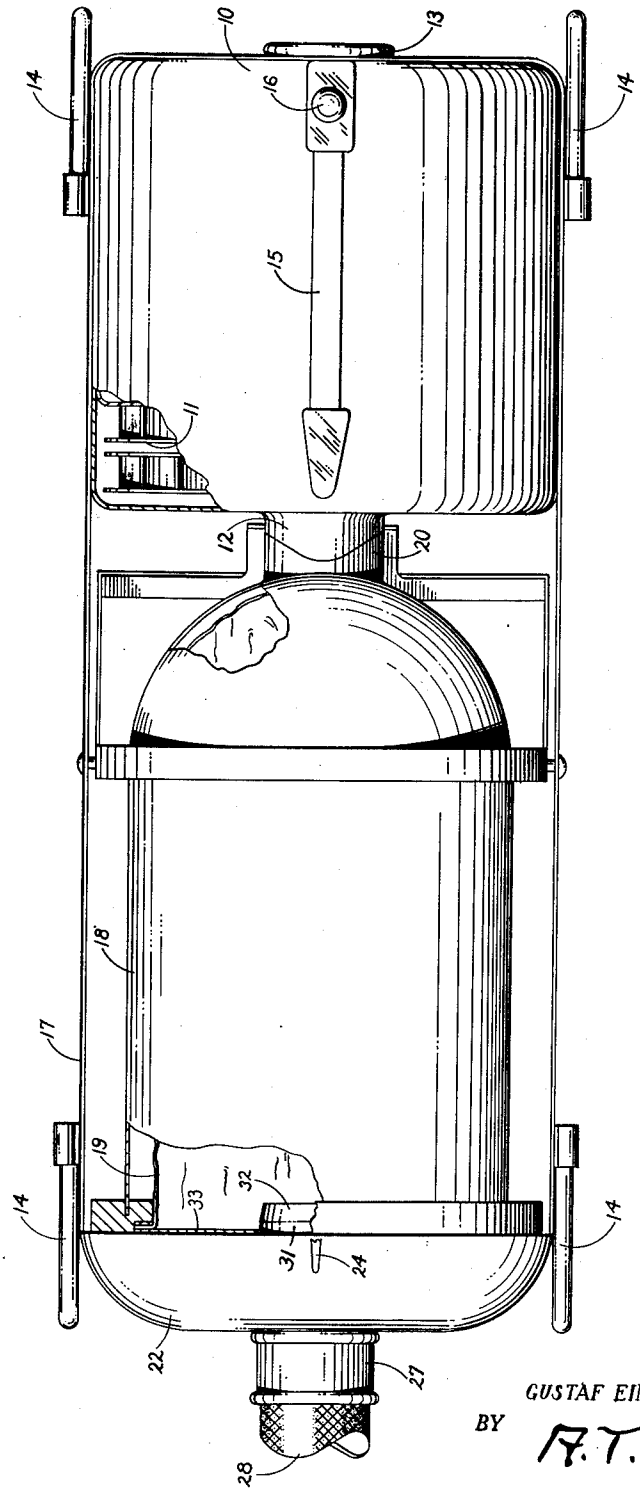
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VACUUM CLEANER

Filed July 2, 1946 5 Sheets-Sheet 2

Fig. 2



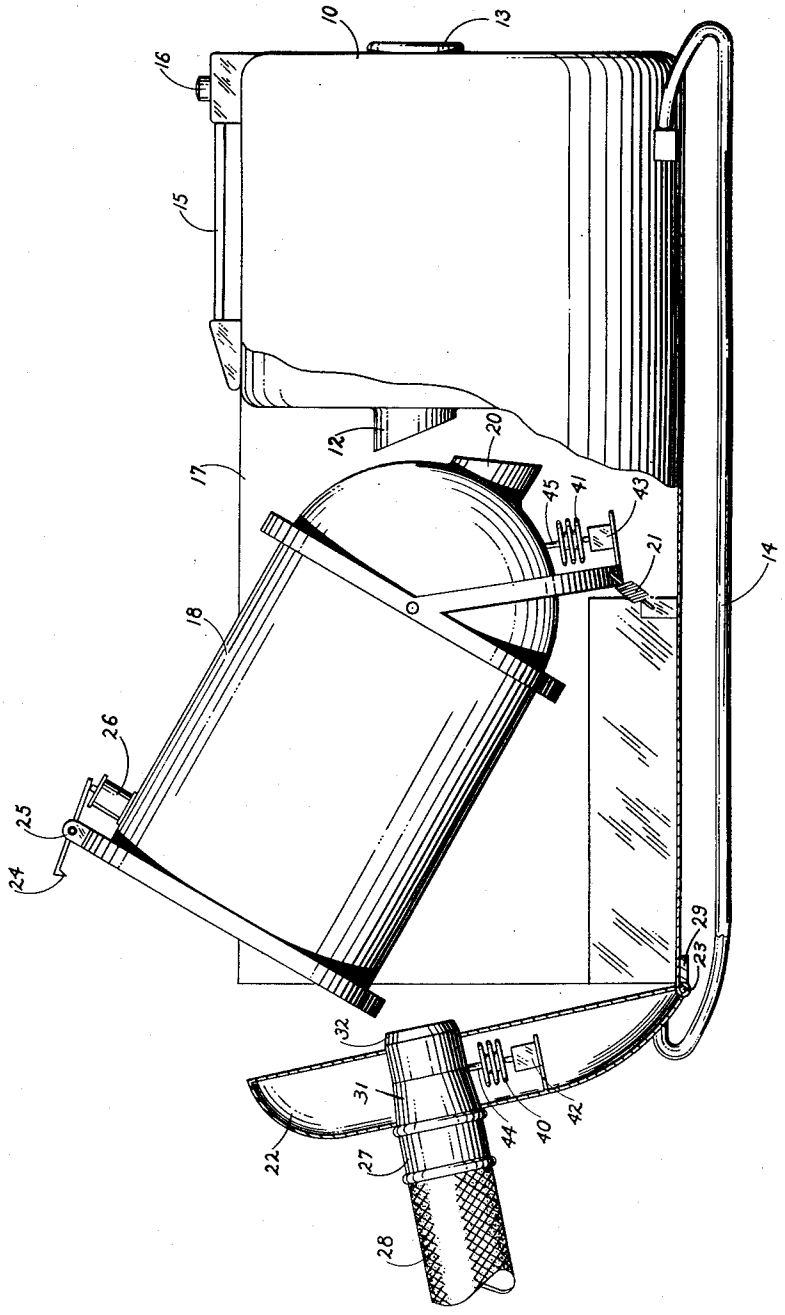
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Filed July 2, 1946 5 Sheets-Sheet 3

Fig. 3



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Fig. 4

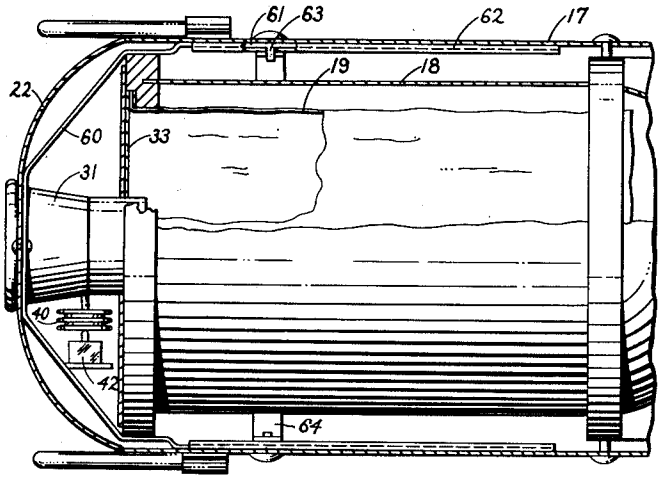
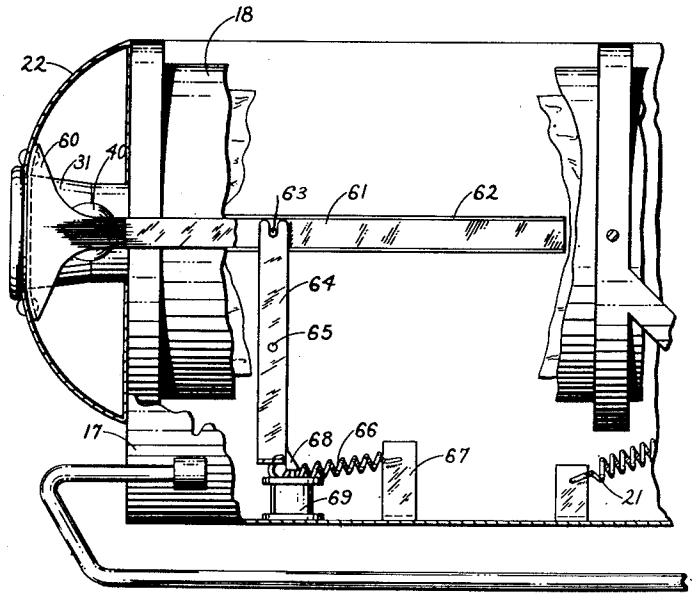


Fig. 5



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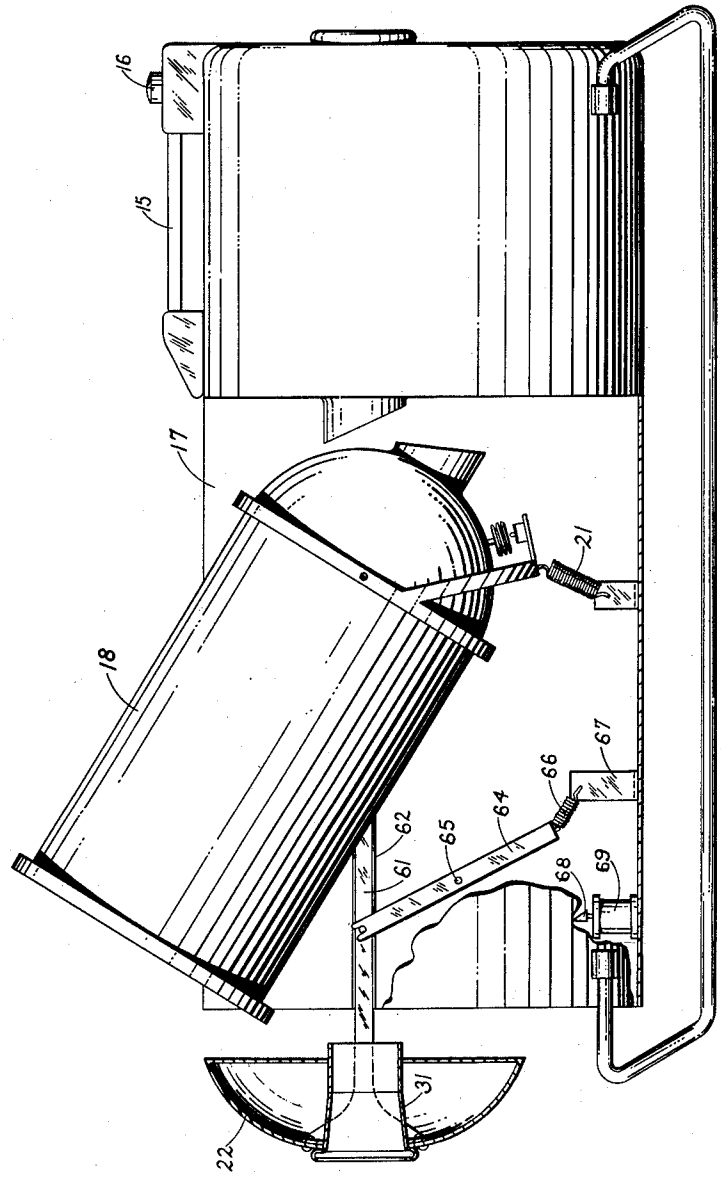
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VACUUM CLEANER

Filed July 2, 1946 5 Sheets-Sheet 5

Fig. 6



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UNITED STATES PATENT OFFICE

2,534,280

VACUUM CLEANER

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Application July 2, 1946, Serial No. 681,074

7 Claims. (Cl. 183—37)

1

This invention relates to vacuum cleaners and is particularly concerned with means for disposing of dust, dirt, and like foreign matter which has been accumulated during cleaning operations.

While certain aspects of the present inventive concept may be broadly applicable to a wide variety of types of vacuum cleaners, the invention is more particularly concerned with tank type vacuum cleaners in which a relatively stationary casing, housing a motor-fan unit and a removable dust collecting bag, is provided with an intake opening to which a suction hose is applied. Such devices are provided with suitable cleaning tools which may be selectively attached to the end of the hose and from such tools dust is drawn through the tube and deposited in the bag, the clean air being exhausted through the opposite end of the casing.

One of the outstanding problems presented by such cleaners is the removal and disposition of the dirt collected. Cleaners of this type now on the market provide for the removal of the front cover whereupon an open mouthed dust collecting bag is removed and the dust shaken from the bag which is thereafter returned for further cleaning operations.

It is one of the primary objects of the present invention to provide a new and improved means for disposing of the accumulated dirt of a vacuum cleaner.

Another object of the present invention is to provide a vacuum cleaner of the general type herein referred to in which the dirt disposal may be accomplished without manual manipulation of a front cover and/or without manipulation of the suction hose.

A further and important object of the invention is to provide for the accumulation of dust within the cleaner in a removable, disposable, and self-closing dust bag which is presented for ready removal and which may be safely handled after removal from the device without danger of scattering the contents or soiling the hands of the operator.

Other objects and features of the present invention will be apparent from the consideration of the following specification when taken in conjunction with the accompanying drawings in which:

Fig. 1 is a side elevation partly broken away of one form of the present invention with the device in cleaning position;

Fig. 2 is a similar top plan view of the device in the position shown in Fig. 1;

2

Fig. 3 is a view similar to Fig. 1 showing the device in position for disposal of the dust receptacle;

Fig. 4 is a fragmentary top plan view partly broken away of another modification of the invention;

Fig. 5 is a side elevation of the device shown in Fig. 4 with the cleaner in closed position; and

Fig. 6 is a view similar to Fig. 5 with the casing in raised position.

In general terms the structure of the present invention may be defined as including a relatively stationary body housing a motor-fan unit together with a casing tiltably mounted with respect to the body and provided with means for receiving a porous dust bag preferably of paper or like inexpensive and thus disposable material. The front of the casing is provided with a movable cover which detachably engages the casing and means are provided for coupling the casing with the motor-fan unit when the casing is in one position so as to provide for a flow of air through the cover and casing and motor-fan unit. When the dirt is to be disposed of, the cover is moved to release the casing and the casing is tilted to present the dust receptacle for convenient disposal. The present disclosure includes automatic means for tilting the casing, as by a spring power storing mechanism, which may be released in response to a variation in an operating characteristic of the device as, for instance, a decrease in the operating efficiency due to overcharging the bag with accumulated dirt.

In that form of the device shown in Figs. 1 to 3 the cover is pivotally mounted upon a base formed as an extension of the motor-fan unit, while in the form of the invention shown in Figs. 4 to 6 inclusive, the cover is mounted for rectilinear movement with respect to the tiltable casing.

Referring now to Figs. 1 to 3 of the drawings which depict a specific structural embodiment of one form of the invention, the numeral 10 indicates a body within which is mounted a motor-fan unit 11 adapted to draw air in through the body inlet 12, and discharge the same through the body outlet 13. Sleighs 14 support the structure in slightly spaced relations from the floor and a handle 15 is provided for carrying the device. Mounted at one end of the handle is a switch button 16 to provide manual control of the motor of the unit 11, the arrangement being such that the button may be conveniently actuated by the foot of the operator.

Forwardly of the body 10 a housing 17 extends, between the walls of which is pivotally mounted a chamber 18 which encloses a dust receptacle 19. The rear end of the chamber 18 is provided with an air outlet 20 of such configuration as to sealingly engage the inlet 12 when the casing is in horizontal position as shown in Fig. 1. The chamber 18 is biased to the tilted position shown in Fig. 3 by spring 21. The front of the chamber is normally closed by front cover 22 pivoted as at 23 to the lower portion of housing 17. A latch 24 pivoted as at 25 upon the chamber 18 is provided to perform the dual function of securing the cover 22 closed and securing the chamber 18 in its horizontal and operative position. Latch 24 is connected for operation by a solenoid 26, mounted upon the chamber 18, which engages the latch 24 so that upon energization of the solenoid, the latch will pivot clockwise to release the cover, permitting the spring 21 to tilt the casing to the position shown in Fig. 3, thus presenting the dust bag for ready removal from the chamber.

The front cover 22 is preferably provided with a hose receiving coupling 27, a hose 28 being removably secured therein and being adapted to receive suitable cleaning tools as commonly used in connection with tank type cleaners. The cover 22 is provided with a stop 29 to limit the tilting movement of the cover so as to restrain its movement to the minimum required for release of the chamber, thus minimizing movement of the hose 28 when the cover is opened. The cover is also provided with an inlet tube 31, the mouth 32 of which extends through a cover 33 of the dust receptacle 19 when the cover is closed and the device is in the operating position shown in Fig. 1.

The present structure is designed to use any one of various types of dust receptacles which are characterized by porous bodies usually having rigid covers, centrally apertured to receive the end 32 of the tube 31. These receptacles are preferably formed of paper, the central aperture of the cover being provided with a sealing device preferably arranged to seal against the end 32 and upon withdrawal of the tube, to close the bag to provide a sealed and disposable dust receptacle.

The control device of the present invention comprises a pair of Sylphon bellows 40 and 41 with which are associated micro switches 42 and 43. Tubes 44 and 45 communicate with the interior of the bellows 40 and 41, respectively. Externally the bellows are open to the atmosphere, the arrangement being such that variations in suction communicated to the Sylphons through the tubes will cause a responsive contraction or elongation thereof by which the micro switches will be actuated.

It will be understood that with a new or clean bag in the chamber 18 and with the housing closed as in Fig. 1 and the motor-fan unit operating, the suction inside of chamber 18 will be communicated with minimum resistance to the inside of the bag 19 since air may readily flow through the pores of the bag. Similarly since the hose itself is designed to provide minimum resistance of air flow, a comparative suction will be obtained within the nozzle. Such suction induces rapid inflow of air across the surface to be cleaned, thus entraining dust and dirt which is carried to the bag 19 and strained by the pores thereof, clean air being passed through to be discharged to the atmosphere.

The present invention is not concerned with the specific control arrangement by which the cover and chamber are released. Suffice it therefore to say that switches 42 and 43 are connected in series with the solenoid 26 and the arrangement is such that when suction on Sylphon 40 falls below a given point while suction on Sylphon 41 is maintained above a given point both of these switches are closed, and the control circuit will be actuated to energize the solenoid and release the cover.

As the cleaning continues, pores and interstices of the bag 19 become clogged and there is a continuously increasing pressure drop through the bag. This pressure drop is continuously reflected by the Sylphons 40 and 41. When the suction in the tube 31 falls, the Sylphon 40 will close the switch 42. If such increase in pressure takes place while the fan is operating and while suction is thus applied to the bag 19, the control circuit will be completed since under such circumstances the Sylphon 41 is retaining the micro switch 43 closed, thus energizing solenoid 26 and actuating the latch 24. The chamber will then be in the position shown in Fig. 3 with the bag 19 presented for disposal. After the bag is emptied or replaced by a clean bag, the chamber 18 is lowered to the horizontal position shown in Fig. 1 and the cover is closed, whereupon the latch 24 acts to retain the cover closed and the chamber in operative position. The device is then ready for another cycle of operation.

Referring now to Figs. 4 to 6 of the drawings, a modification is shown in which cover 22 is mounted for forward rectilinear movement away from the chamber 18, rather than being pivotally mounted as in Figs. 1 to 3. This arrangement is advantageous in that the cover movement may take place with a minimum displacement of the hose and further such movement provides for rectilinear movement of the tube 31 which facilitates the entrance and release of the tube mouth 32 with respect to the front 33 of the dust bag 19.

In this form of the invention, the cover 22 with its tube 31 and Sylphon 40 and switch 42 is carried by a pair of supporting arms 60 which preferably engage the cover adjacent to tube 31 and extend rearwardly as shown at 61, being mounted and guided in conforming guide tubes 62. Intermediate their ends the arms 60 are provided with projections 63 which are engaged by the bifurcated ends of a U-shaped actuating member 64 which is pivotally mounted upon the casing 17 as at 65. Member 64 is biased for counter-clockwise pivotal movement by a spring 66 secured to the casing 17 as at 67.

During cleaning operations, the member 64 is in substantially vertical position as shown in Figs. 4 and 5 and is retained in such position against the tension of spring 66 and with arms 60 in retracted position with cover 22 closed by a latch 68 associated with a solenoid 69. When the solenoid 69 is energized through actuation of a control circuit (not shown) under control of the Sylphons 40 and 41, latch 68 is retracted whereupon member 64 is rocked by spring 66 in counter-clockwise direction, thus moving forward the cover 22 and releasing the chamber 18 to be tilted by its spring 21 as shown in Fig. 6.

After disposal of the accumulated dirt, a clean bag is placed in chamber 18 which is then moved down to horizontal position against tension of spring 21 and the cover is moved inwardly to engage the chamber 18, thus securing it in posi-

tion. Such inward movement of the cover retracts arms 60, thus restoring member 64 to vertical position against the tension of spring 66 and past latch 68 which thereafter retains the member 64 until a further energization of solenoid when the bag is again ready for dirt disposal.

In carrying out the present invention, it will be understood that the concept is not limited to the specific structural embodiment thereof herein shown and that numerous changes and modifications 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 vacuum cleaner, a base portion, a motor fan unit supported in fixed position on said base portion, a dust receptacle compartment permanently and movably mounted on said base portion adjacent to said motor fan unit, the end of said compartment remote from said motor fan unit being open, a cover for said open end permanently and movably connected to said base portion, said compartment and said cover being movable relative to said base portion and to each other from a position in which said open end is closed by said cover to a position in which said cover is spaced from said open end sufficiently for the insertion and removal of a dust receptacle therethrough, and means providing for flow of air between said compartment and said motor fan unit.

2. In a vacuum cleaner, a base portion, a motor fan unit supported in fixed position on said base portion, a dust receptacle compartment permanently and movably mounted on said base portion adjacent to said motor fan unit, the end of said compartment remote from said motor fan unit being open, a cover for said open end permanently and movably connected to said base portion, said compartment and said cover being movable relative to said base portion and to each other from a position in which said open end is closed by said cover to a position in which said cover is spaced from said open end sufficiently for the insertion and removal of a dust receptacle therethrough, means for biasing said compartment and said cover towards the last mentioned position, releasable means for securing said compartment and said cover in the first mentioned position, and means providing for flow of air between said compartment and said motor fan unit.

3. In a vacuum cleaner, a base portion, a motor fan unit supported in fixed position on said base portion, a dust receptacle compartment permanently and movably mounted on said base portion adjacent to said motor fan unit, the end of said compartment remote from said motor fan unit being open, a cover for said open end permanently and movably connected to said base portion, said compartment and said cover being movable relative to said base portion and to each other from a position in which said open end is closed by said cover to a position in which said cover is spaced from said open end sufficiently for the insertion and removal of a dust receptacle therethrough, means for biasing said compartment and said cover towards the last mentioned position, releasable means for securing said compartment and said cover in the first mentioned position, said releasable means comprising latching mechanism acting directly between said cover and said compartment, and

means providing for flow of air between said compartment and said motor fan unit.

4. In a vacuum cleaner, a base portion, a motor fan unit supported in fixed position on said base portion, a dust receptacle compartment pivotally mounted about a horizontal axis on said base portion adjacent to said motor fan unit, the end of said compartment remote from said motor fan unit being open, a cover for said open end permanently and movably connected to said base portion, said compartment and said cover being movable relative to said base portion and to each other from a position in which said compartment is substantially horizontal and said open end is closed by said cover to a position in which said cover is spaced from said open end and the open end of said compartment is pivoted upwardly sufficiently for the insertion and removal of a dust receptacle therethrough, and means providing for flow of air between said compartment and said motor fan unit.

5. In a vacuum cleaner, a base portion, a motor fan unit supported in fixed position on said base portion, a dust receptacle compartment pivotally mounted about a horizontal axis on said base portion adjacent to said motor fan unit, the end of said compartment remote from said motor fan unit being open, a cover for said open end pivotally mounted about a horizontal axis on said base portion, said compartment and said cover being independently pivotal relative to said base portion from a position in which said compartment is substantially horizontal and said open end is closed by said cover to a position in which said cover is pivoted away from said compartment and the open end of said compartment is pivoted upwardly sufficiently for the insertion and removal of a dust receptacle therethrough, and means providing for flow of air between said compartment and said motor fan unit.

6. In a vacuum cleaner, a base portion, a motor fan unit supported in fixed position on said base portion, a dust receptacle compartment pivotally mounted about a horizontal axis on said base portion adjacent to said motor fan unit, the end of said compartment remote from said motor fan unit being open, a cover for said open end slidably mounted on said base portion for movement towards and away from said compartment, said compartment and said cover being movable relative to said base portion and to each other from a position in which said compartment is substantially horizontal and said open end is closed by said cover to a position in which said cover is slid away from said compartment and the open end of said compartment is pivoted upwardly sufficiently for the insertion and removal of a dust receptacle therethrough, and means providing for flow of air between said compartment and said motor fan unit.

7. In a vacuum cleaner, a base portion, a motor fan unit supported in fixed position on said base portion, a dust receptacle compartment pivotally mounted on said base portion adjacent to said motor fan unit, the end of said compartment remote from said motor fan unit being open, a cover for said open end permanently and movably connected to said base portion, said compartment and said cover being movable relative to said base portion and to each other from a position in which said compartment is substantially horizontal and said open end is closed by said cover to a position in which said cover is spaced from said open end and the open end of said compartment is pivoted upwardly sufficiently for the insertion

and removal of a dust receptacle therethrough, conduit members extending from the adjacent ends of said compartment and said motor fan unit, respectively, said conduit members having mating ends chamfered at any angle providing clearance between the conduit members when said compartment is pivoted from its horizontal position.

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