Feb. 14, 1956 J. E. VANCE 2,734,218

SUCTION CLEANERS

Filed Dec. 12, 1950 3 Sheets-Sheet 1

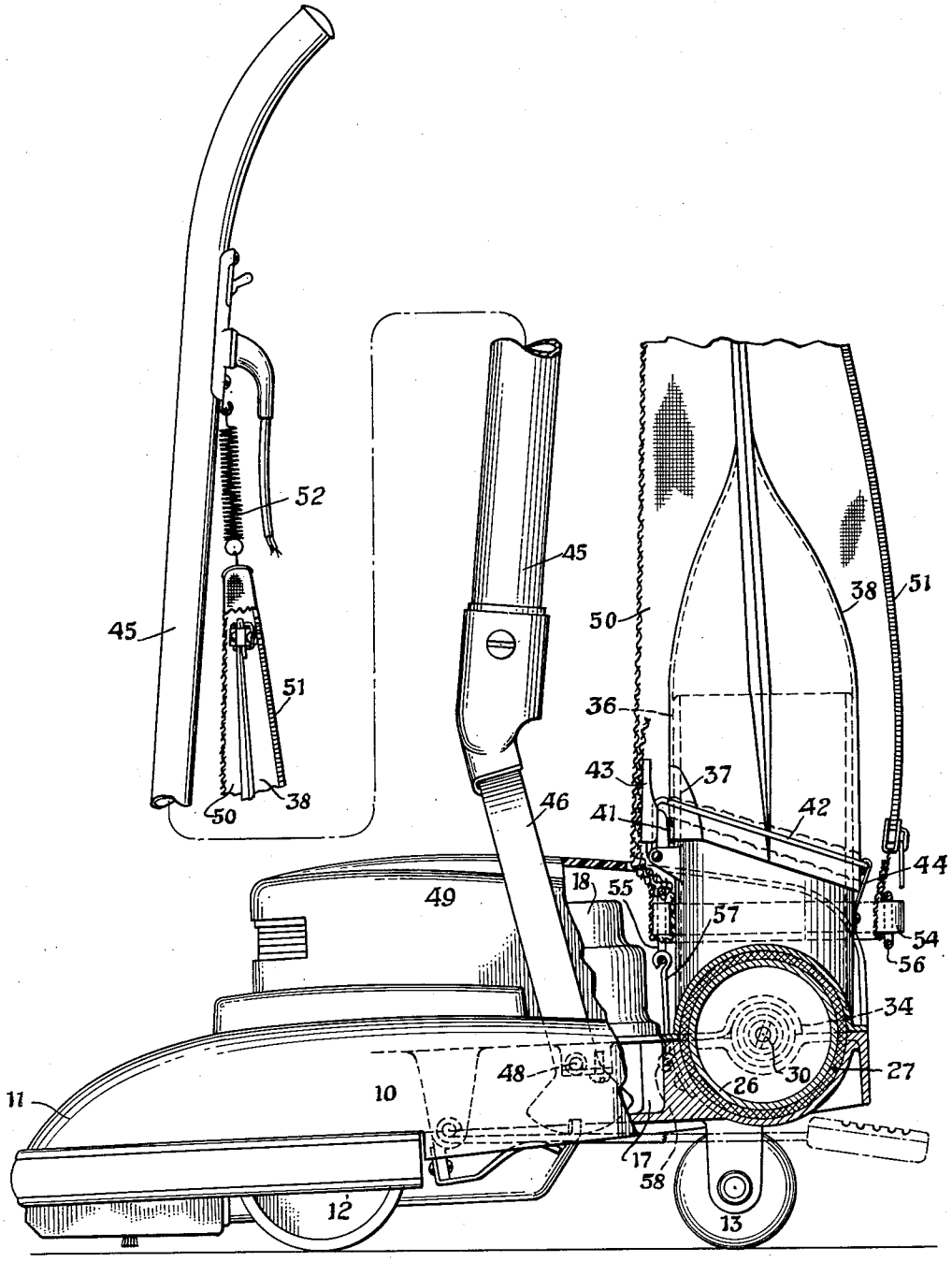


Fig. 1

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SUCTION CLEANERS

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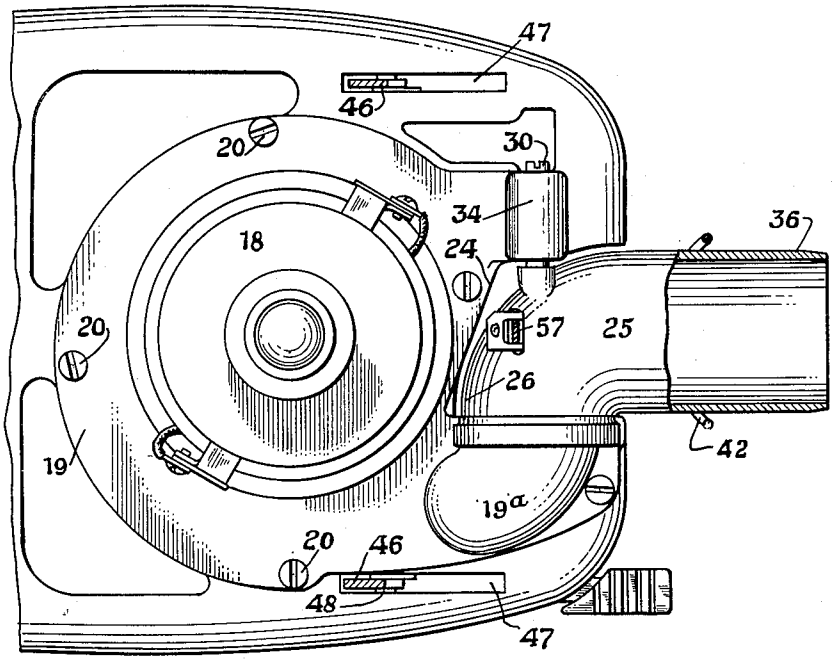


Fig. 5

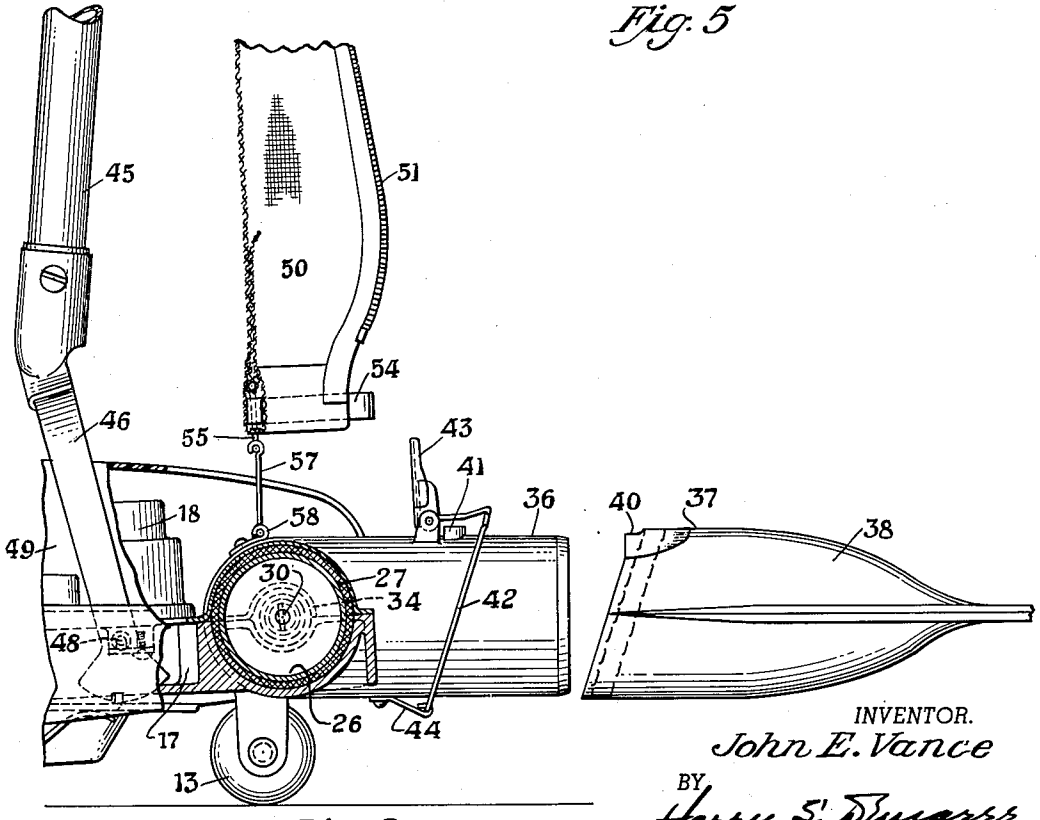


Fig. 2

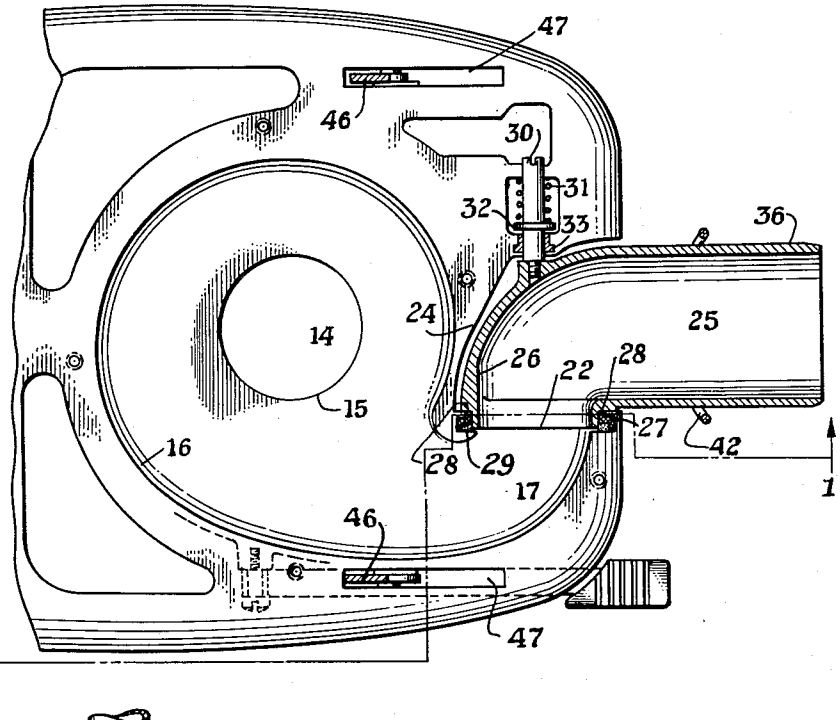
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SUCTION CLEANERS

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Fig. 4



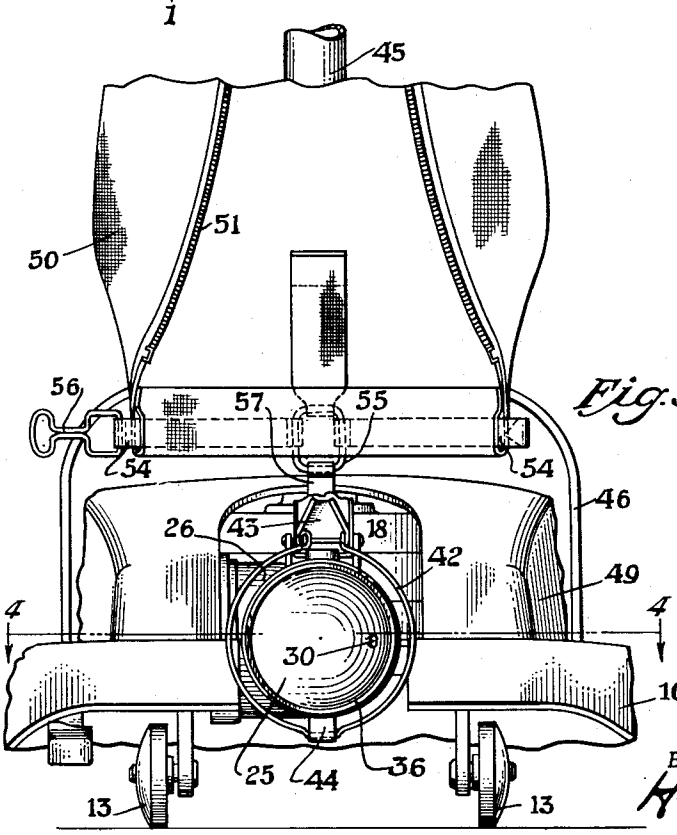


Fig. 3

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SUCTION CLEANERS

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Application December 12, 1950, Serial No. 200,443

16 Claims. (Cl. 15—351)

This invention relates to suction cleaners and more particularly to an improved mode of constructing and incorporating the filter assembly therein.

More specifically this invention provides a simplified filter assembly which is particularly advantageous when using inexpensive paper filters. In using this type of filter it is important to avoid flexure of the filter walls since this quickly weakens the paper and results in premature failure of the filter, as well as the release of a great volume of dirt and foreign matter about the room. If repeated flexure can be avoided, a comparatively weak walled bag of inexpensive construction is eminently satisfactory for collecting a single batch of dirt after which the filter is disposed of without emptying.

Previous attempts to construct a cleaner arranged to use paper filters protected from flexure of the walls during use have entailed certain shortcomings which are overcome most satisfactorily by the present invention. In general, previous constructions are objectionable as being too bulky, too complex, costly to manufacture and inconvenient for mechanically inept users.

Accordingly, it is an object of the present invention to provide a new and improved suction cleaner.

Another object is the provision of a new filter assembly and a novel construction for mounting the same on a suction cleaner.

Various other objects and advantages of the invention will become apparent from the following specification and drawings of an illustrative embodiment, in which:

Figure 1 is a side view of a suction cleaner incorporating the invention with parts in section along line 1—1 on Figure 4;

Figure 2 is a view similar to Figure 1 but showing the filter assembly in open position in readiness for the assembly of a new filter bag;

Figure 3 is a rear view of the cleaner in Figure 2 taken from the right hand side thereof;

Figure 4 is a top plan view of the cleaner body taken along line 4—4 on Figure 3; and

Figure 5 is a view similar to Figure 4, but showing the motor-fan unit in assembled position.

The main body casting 10 of the suction cleaner has a suction nozzle 11 extending across the forward end and is supported upon a pair of front carrier wheels 12 and a pair of rear wheels 13. A suction air passageway 14 extends from nozzle 11 to a point located centrally of the body where it opens upwardly through the circular fan inlet 15 into a volute-shaped fan chamber 16. This chamber discharges through an exhaust air passageway 17, the lower half of which is located in main body casting 10.

Superimposed upon the fan chamber is a unitary motor-fan assembly 18 having a vertically extending shaft. This shaft is not shown but will be understood to extend downwardly through fan eye 15 and to carry a belt pulley at its lower end supporting a rubber belt connected to the usual rotary agitator mounted within nozzle 11. The motor shaft also carries a radial blade fan positioned within the fan chamber. The motor-fan unit is supported

upon the main body by a fan chamber cover plate 19 integral with the motor-fan unit. Plate 19 is removably secured to the main body as by screws 20. Plate 19 includes an extension 19*a* which overlies and completes exhaust air passageway 17.

The outer ends of extension 19*a* and of passageway 17 terminate in a circular opening 22 located in a vertical plane parallel to but offset from the longitudinal center line of the cleaner, as clearly appears from Figures 4 and 5. Opening 22 is located in one side of a rearwardly opening notch 24 at the rear of the cleaner body. Notch 24 receives an L-shaped filter adapter conduit 25, the shorter leg 26 of which has a circular end formed to be journaled on a bronze bushing 27 seated within shouldered opening 22 of the cleaner body. Bearing 27 is a combined thrust and radial bearing, that is, its outer annular face bears against a shoulder 28 formed on leg 26 of the adapter, while its interior cylindrical surface cooperates with the end of adapter leg 26 to form a radial bearing therewith. Felt ring 29 serves as a dust seal and as an oil retainer for the bearing.

The side of adapter 25 opposite opening 22 carries a pivot pin 30 having an axis in alignment with the axis of opening 22. A compression spring 31 surrounding pin 30 has one end abutting a part of the main body and the other end abutting a flange 32 on the pivot pin so as to resiliently hold the adapter seated against bearing 27 in an air-tight manner. A bronze ring 33 forms the main bearing surface between the cleaner body and pivot pin 30. As will be readily understood from Figures 2 and 4, the housing for the pivot pin 30 is formed in part by the main cleaner body and in part by the bearing cap member 34 formed on cover plate 19, as shown in Figure 5.

The longer end 36 of the adapter forms a seating surface for the inlet neck 37 of a paper filter bag 38. Neck 37 has a periphery only slightly larger than tube 36 so as to be easily telescoped thereover, A locator notch 40 in the edge of the neck seats against a similarly shaped locator boss 41 on the top side of tube 36. The filter inlet is securely sealed to tube 36 by a self-expanding wire clamp 42 which can be readily collapsed against the filter neck by pivoting toggle clamp finger piece 43 downwardly against the tube from the position shown in Figure 2. The lower side of clamp 42 may be held in place by a spring clip 44 carried by tube 36 at a point below the end of the filter inlet.

The cleaner is provided with a propelling handle 45 having a bail 46 at its lower end. The lower ends of the bail extend through slots 47 in the cleaner body at either side of the motor-fan unit, and are pivotally secured to the underside of the cleaner body by pivot pins 48. It will thus be clear that handle bail 46 straddles hood 49 which cooperates with the main casting to enclose the motor-fan unit. Hood 49 has projections extending rearwardly at either side of the adapter to enclose the exhaust air passageway and the bearings for the filter adapter, while leaving the adapter tube free to pivot upwardly to the vertical position shown in Figure 1.

The handle is preferably provided with a control lever for locking the handle in a vertical position for convenient and efficient storage. This control may be of any well known type such as the foot operated lever having a detent engageable with a notch in a handle control sector carried by one side of the handle bail as shown in the drawings. This pedal is spring biased toward the sector so that the detent engages the notch as soon as the handle is elevated to the storage position.

Filter bag 38 is enclosed by an appearance bag 50 having an upperwardly opening hookless fastener 51 extending the full length of the rear central portion of the bag. The upper end of bag 50 is detachably connected to the cleaner handle by a tension spring 52, while the

lower end of the bag is secured to the adapter tube by a novel arrangement which will now be described.

As will be best understood by references to Figures 1 to 3, the lower end of appearance bag 50 is provided with a two-part clamping band 54 having one pair of its adjacent ends pivotally mounted on a ring 55. The other ends of band 54 are detachably connected together by toggle clamp 56 of the form illustrated. Bands 54 are preferably sewed into the lower end of the appearance bag. A link 57 pivotally connects the lower end of ring 55 to a strap 58 carried on the forward side of adapter leg 26. When the adapter is in the vertical position shown in Figure 1, strap 58 will be located on the forward side of the adapter directly opposite its axis and spring 52 connecting the top of the appearance bag to the handle will be under considerable tension. So long, however, as clamp 54 of the appearance bag is closed about the adapter, spring 52 is unable to pivot the adapter. If on the other hand, closure 51 and clamp 54 are open, spring 52 acts through the back side of the appearance bag and connecting links 55, 57 to pivot the adapter and the filter bag to the position shown in Figure 2. In this position, finger piece 43 of filter bag clamping ring 42 is readily accessible for opening so that the filler bag can be withdrawn from the adapter tube and carried to a point of disposal.

A new filter is then telescoped onto the adapter and clamp 42 is snapped closed to seal the filter in place on the adapter. The filter together with the adapter tube is then pivoted upwardly to the vertical position after which the closure bag is closed by pulling the hookless fastener 51 downwardly and clamping band 54 is closed about the adapter tube. This band, in cooperation with linkage 57 and spring 52, constrains the entire filter assembly to pivot in unison with the propelling handle thereby safeguarding the filter against flexure and premature failure during the use of the cleaner.

From the foregoing it will be appreciated that one of the important aspects of the invention is the fact that during the changing of the filter, the appearance bag remains attached to the handle which is locked in its upright storage position. Consequently, both of the closure members for the appearance bag are conveniently located for easy access by the operator. After these have been opened, the filter bag and adapter are automatically dislodged from the appearance bag and pivoted downwardly to a convenient position for the easy removal of the filter. This operation is of course accomplished by spring 52 and its connections to the rear side of the filter adapter. This arrangement makes it feasible to omit the usual dirt valve at the base of the filter bag since there is no tendency for the dirt to fall out of the bag while it is being withdrawn horizontally from the end of the adapter tube. The omission of the valve further reduces the cost of the disposable paper filter without sacrificing utility or efficiency.

Another self-apparent feature of the above described construction is the ease and dispatch with which the cleaner can be disassembled for servicing. Thus, by the simple expedient of removing motor hood 49 and screws 20, the motor-fan unit can be removed along with the cover plate for the fan chamber and the upper halves of the filter adapter bearings. This leaves the adapter free for removal by simply lifting it upward away from the cleaner body. Re-assembly of the parts is accomplished in the reverse order and is equally as expeditious.

It will also be observed that the bearings are located entirely outside of the dirty air stream, and that they are enclosed by housing members formed in part by the main body casting and in part by cover plate 19.

While I have shown but a single embodiment of my invention it is to be understood that this embodiment is to be taken as illustrative only and not in a limiting sense. I do not wish to be limited to the particular structure shown and described but to include all equivalent variations thereof except as limited by the scope of the claims.

I claim:

1. The combination with a suction cleaner having a wheel supported main body provided with an exhaust air conduit, a propelling handle pivoted to said cleaner, of a filter assembly for said cleaner comprising a filter adapter flexibly connected to the discharge end of said exhaust air conduit for movement about an axis substantially parallel to the handle pivot, clamping means on said adapter for detachably connecting the inlet of a filter bag thereto in an air-tight manner, an appearance bag for enclosing said filter bag, clamping means in the lower edge of said appearance bag having separable ends for normally holding the lower end of said bag closed about said filter adapter, means for flexibly attaching the lower end of said appearance bag to said adapter, and tension spring means connecting the upper end of said appearance bag to an upper portion of said propelling handle whereby said appearance bag and said filter adapter pivot with said handle so long as said clamping means on said appearance bag is closed about said filter adapter.

2. The combination defined in claim 1 characterized in that the means for flexibly attaching the lower end of said appearance bag to said adapter is arranged between the axes of said handle and of said adapter whereby the opening of said appearance bag clamping means permits said tension spring to pivot the filter receiving end of said adapter outwardly away from said appearance bag.

3. A suction cleaner having a main body, a suction nozzle thereon, a motor-fan unit in communication with said nozzle, an air discharge conduit for discharging the suction air stream, a filter adapter conduit, means providing a swivel connection between one end of said adapter and said discharge conduit, filter clamping means for detachably securing a filter bag to the other end of said adapter, a propelling handle pivotally supported on said cleaner adjacent said adapter, and means for causing said adapter to pivot in unison with said handle comprising means for enclosing a filter bag mounted on said adapter, means connecting the upper portion of said enclosing means to said handle, and means independent of said handle and carried by the lower end of said filter enclosing means for securing said last mentioned means to said cleaner and having means for releasably embracing the filter end of said adapter, said filter enclosing means having a normally closed opening extending longitudinally thereof to said embracing means whereby said filter adapter can be pivoted away from said filter enclosing means when said normally closed opening is opened and said embracing means are released.

4. A suction cleaner as defined in claim 3 wherein said handle overlies said adapter and said filter enclosing means and wherein said longitudinally extending opening therein is located on the side thereof remote from said handle whereby said adapter can be pivoted away from said filter enclosing means without interference from said handle.

5. A suction cleaner having a two-part body comprising, a main body casting having a suction nozzle at the forward end thereof, a fan chamber communicating with said nozzle and terminating in a rearwardly disposed discharge conduit, said casting including one portion only of said discharge conduit and said fan chamber being open at its top, a plate mounting a motor-driven suction unit adapted to be assembled on said casting with the suction unit disposed within the fan chamber, said plate closing the top of the fan chamber and including a complementary discharge conduit portion mating with the first discharge conduit portion to form a closed air discharge passage, the outlet end of the discharge conduit including a bearing for the reception of a pivotally mounted filter adapter communicating therewith.

6. A suction cleaner body having a fan chamber therein and an air discharge conduit portion leading from said chamber, a removable cover plate closing the fan chamber and including a complementary air discharge conduit

portion for assembly with the first said air discharge conduit portion to form a closed passage, a filter adapter having its inlet end in communication with the outer end of said air discharge conduit, and said air discharge conduit portions including means for swivelly receiving the inlet end of the filter adapter.

7. A propelling handle and filter assembly for a suction cleaner comprising, an elongated handle, a filter adapter conduit, means providing a pivotal support for the adjacent ends of said handle and said adapter so that each is pivotal with respect to the other, filter clamping means on the other end of said adapter for releasably securing the inlet of a filter thereto, an appearance bag for said filter having an open end and a longitudinal opening extending from said open end, means for connecting the other end of said bag to said handle, and clamping means in the open end of said bag for releasably embracing said bag about said adapter conduit, and means to secure said bag to the side of said adapter at a point between the open end of said bag and said pivotal support for said adapter whereby said adapter pivots with said handle when said bag clamp is closed and whereby said adapter is free to pivot independently of said handle when said bag clamp is open.

8. A suction cleaner having a propelling handle pivoted thereto, a flexible filter adapter having an inlet end connected to a discharge conduit terminating adjacent said handle pivot, means for clamping a filter to the other end of said adapter, means for causing said filter and said adapter to pivot in unison with said handle as well as independently of said handle and of said last mentioned means, said means including a filter appearance bag enclosing said filter and having its upper end connected to the upper portion of said handle, the opposite end of said bag being open and carrying a clamp for releasably embracing said bag about said adapter and flexible means connecting said bag clamp to said adapter adjacent the inlet end thereof.

9. A suction cleaner comprising a main body separable into two parts along a separation line extending transversely of said body, said body having a suction nozzle, a motor-driven suction unit having an inlet in communication with said nozzle and a discharge port in communication with an air discharge conduit, said suction unit being mounted on one of said body parts and being separable with said one part from the other body part, the assembly of said body parts forming a closed passage between the suction nozzle and the discharge conduit for the flow of air and including the suction unit therein, a filter adapter for said cleaner having an inlet end swivelly joined to said discharge conduit, a two-part bearing in the cleaner body for swivelly supporting the inlet end of the filter adapter, each body part including a bearing segment and said bearing segments embracing the inlet end of the filter adapter upon assembly of the body parts to seat the inlet end of the filter adapter in the air discharge conduit, a propelling handle pivotally supported on the cleaner body, and means interconnecting said handle and said filter adapter to pivot said adapter in unison with the handle.

10. A suction cleaner as defined in claim 9, wherein said means interconnecting said handle and said filter adapter includes an air pervious bag having its lower end secured to said adapter and its upper end secured to an upper portion of said handle.

11. A suction cleaner as defined in claim 10 wherein said air pervious bag comprises an enclosing appearance envelope for a paper filter bag, and means on the outer end of said adapter for releasably connecting the inlet of a paper filter bag thereto.

12. A suction cleaner as defined in claim 10 wherein said propelling handle is pivotable about an axis offset from the pivot axis of said swivel connection.

13. A suction cleaner as defined in claim 12 wherein said handle and swivel axes are parallel to one another and extend transversely of said cleaner at the rear end of said body, said swivel axis being located rearwardly of said handle pivot axis.

14. In a suction cleaner having a body with an air exhaust conduit and a propelling handle pivoted to said cleaner body, a filter assembly for said cleaner comprising a filter adapter connected to the discharge end of the exhaust conduit and swivally mounted with respect thereto, clamping means on said adapter for detachably connecting the inlet of a filter bag thereto in an air-tight manner, an appearance bag suspended from the handle for enclosing said filter bag, said appearance bag including segmental clamping means for embracing the filter adapter and securing the appearance bag in position enclosing the filter, means flexibly securing said appearance bag to said filter adapter, said segmental clamping means uniting the appearance bag with the filter adapter for swivel movement therewith, said filter adapter being movable independently of the appearance bag upon release of the segmental clamping means, said flexible securing means holding the appearance bag to the filter adapter and permitting said independent movement.

15. In a suction cleaner having a body with an air exhaust conduit and a propelling handle pivoted to said cleaner body, a filter assembly for said cleaner comprising a filter adapter connected to the discharge end of the exhaust conduit and swivelly mounted with respect thereto, clamping means on said adapter for detachably connecting the inlet of a filter bag thereto in an air-tight manner, an appearance bag suspended from the handle for enclosing said filter bag, including means for releasably embracing the filter adapter, means flexibly securing said appearance bag to said filter adapter, said embracing means uniting the appearance bag with the filter adapter for movement therewith on the filter adapter pivot, said filter adapter being movable independently of the appearance bag upon separation of the appearance bag therefrom, said flexible securing means holding the appearance bag to the filter adapter and permitting said independent movement.

16. A suction cleaner as recited in claim 15 including tension spring means connecting the upper end of the appearance bag to an upper portion of the propelling handle, and in which the means flexibly securing the appearance bag to the filter adapter is laterally spaced from the axis of the filter adapter toward said handle pivot, whereby release of the segmental clamping means embracing the filter adapter permits said tension spring to pivot the filter receiving end of said adapter outwardly away from said appearance bag.

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