

Feb. 14, 1956

C. C. HURD
SUCTION CLEANER

2,734,595

Filed Sept. 28, 1953

4 Sheets-Sheet 1

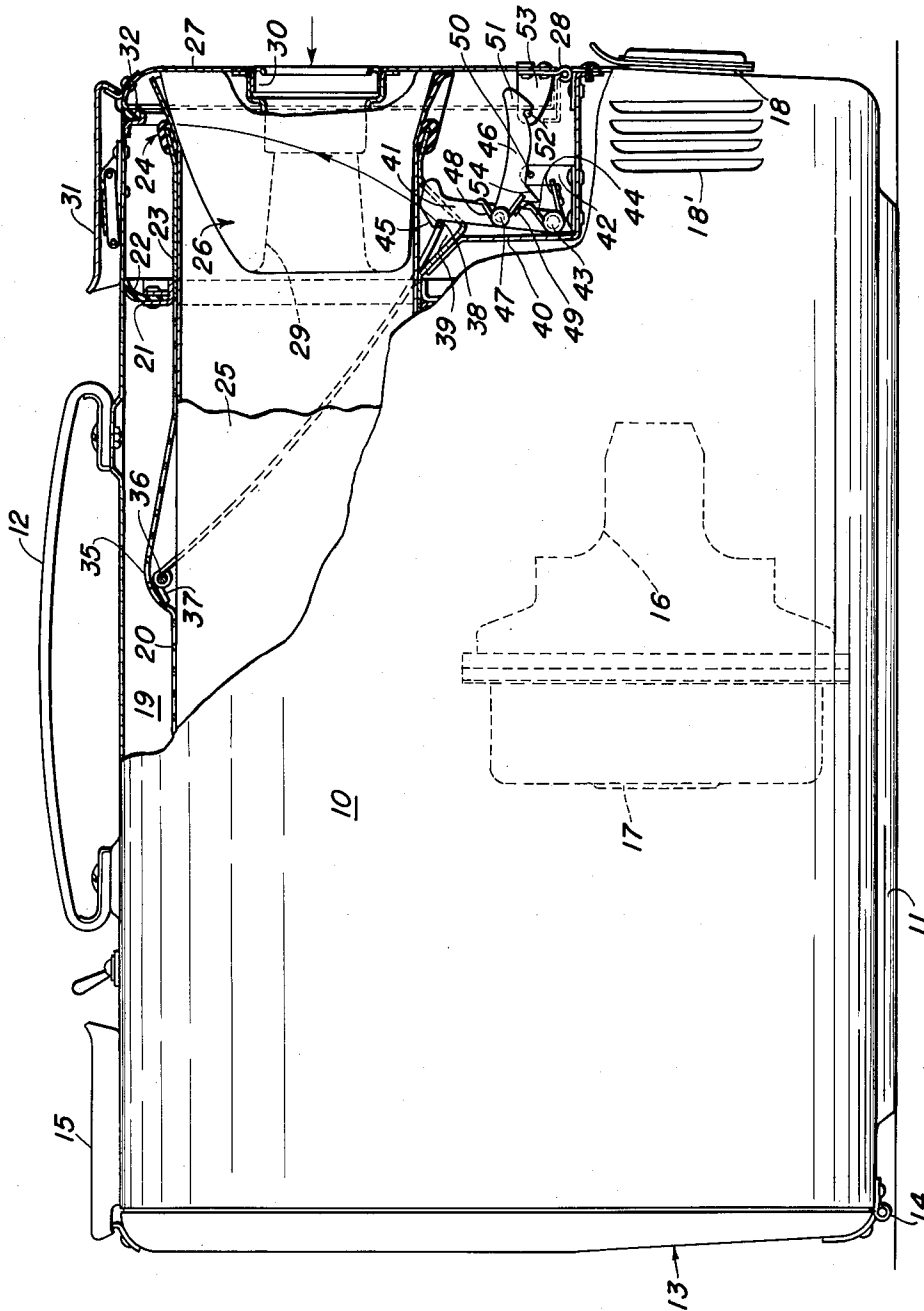


Fig. 1

INVENTOR.
Claud C. Hurd
BY
[Signature]
ATTORNEY.

Feb. 14, 1956

C. C. HURD
SUCTION CLEANER

2,734,595

Filed Sept. 28, 1953

4 Sheets-Sheet 3

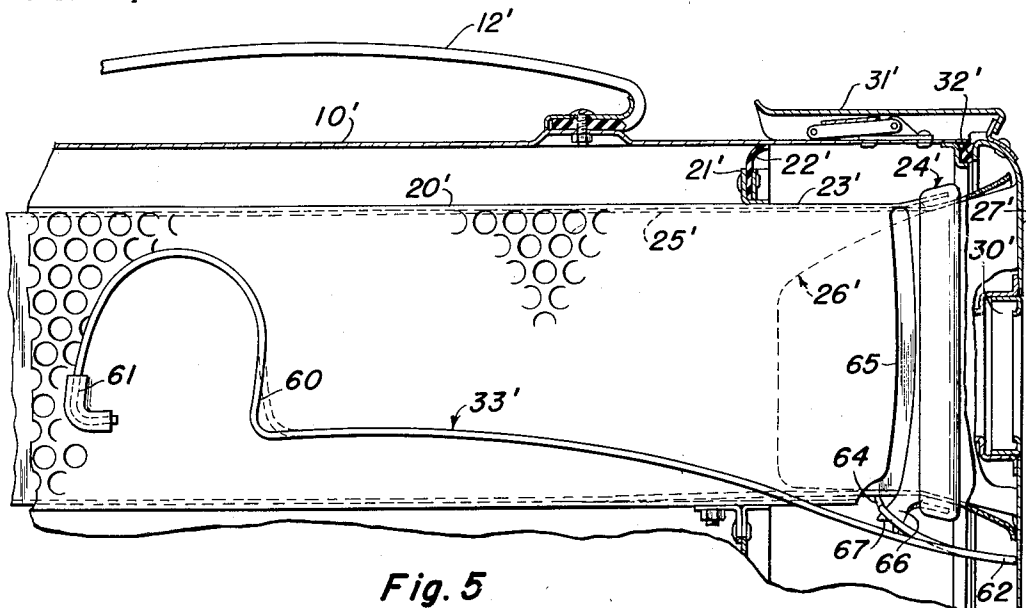


Fig. 5

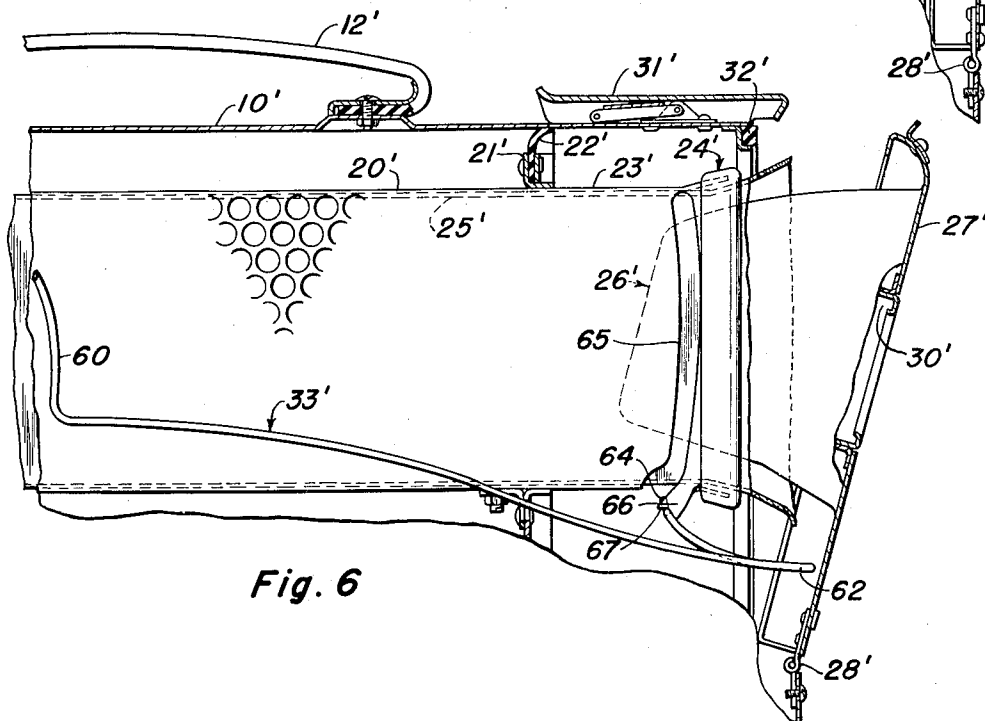


Fig. 6

INVENTOR.

Claud C. Hurd

BY

ATTORNEY.

Feb. 14, 1956

C. C. HURD
SUCTION CLEANER

2,734,595

Filed Sept. 28, 1953

4 Sheets-Sheet 4

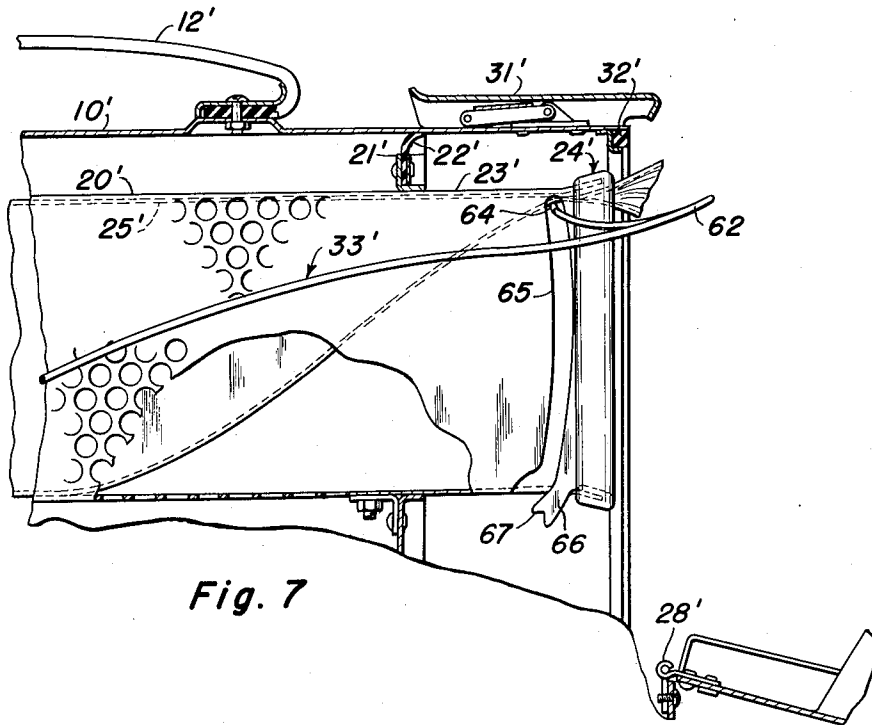


Fig. 7

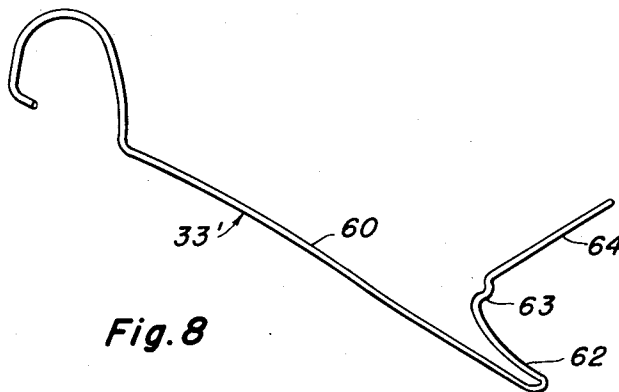


Fig. 8

INVENTOR.
Claud C. Hurd

BY

Ed. M. Day
ATTORNEY.

1

2,734,595

SUCTION CLEANER

Claud C. Hurd, North Canton, Ohio, assignor to The Hoover Company, North Canton, Ohio, a corporation of Ohio

Application September 28, 1953, Serial No. 382,714

12 Claims. (Cl. 183-51)

This invention relates to canister type suction cleaners and more particularly to the dirt filtering facilities therefor and a simple and novel means for closing the filter bag automatically as an incident to the opening of the closure cap for the filter chamber.

The invention has particular utility in connection with a suction cleaner designed to employ disposable paper filter bags having wide-mouthed inlets adapted to be clamped in place about the rim of the filter chamber by special clamps or, as herein illustrated, by the end cap itself. The use of such filter bags is now common but is attended by certain disadvantages overcome by the present invention. Chief among these is the unavoidable escape of dirt as the end cap is opened and the large-mouthed filter is manipulated to effect its removal from the cleaner casing. Also, the large mouth of the bag is difficult for the user to close without discharging a cloud of fine dust into the room to the great annoyance and discomfort of the user.

These and other disadvantages of known arrangements are circumvented in this invention by the use of simple and effective means for closing the mouth of the bag instantly upon the opening of the end cap or of the means clamping the filter in place in the cleaner. The filter closing means comprises a spring driven arm extending across the filter adjacent the mouth thereof. Upon the initial opening movement of the filter clamping means, this spring driven arm is released and quickly closes the opposite sides of the bag mouth together and holds them closed until the user is ready to withdraw the dirty filter. At this time the user relatches the arm in its retracted position to one side of the filter chamber where it does not interfere with the removal of the dirty filter or the installation of a new one.

Accordingly, it is a primary object of the invention to provide an improved suction cleaner having novel means for closing the inlet mouth of a filter bag prior to its removal from the cleaner.

Another object is the provision of automatic means for closing the inlet of a filter as a prerequisite to its removal from a suction cleaner and as an incident to the release of the means holding it assembled thereto.

A further object is the provision of a filter bag closing means which is rendered operative to close its inlet opening as the access closure for the filter chamber is moved away from its closed position.

Still another object is the provision of means for holding a filter bag closing means retracted to one side of the filter chamber while a dirty bag is being withdrawn and a new one installed and which inter-engages automatically with the cleaner end cap as the latter is closed.

Numerous additional objects and advantages of the invention will become apparent from the following detailed specification and accompanying drawings of illustrative embodiments of the invention and wherein:

Figure 1 is a side elevational view of a suction cleaner incorporating the invention with portions in section and

2

showing the position of parts following the installation of a new filter;

Figure 2 is a perspective view of the spring actuated filter closing member;

5 Figure 3 is a fragmentary view taken after the end cap has been opened sufficiently to release the bag closing means;

Figure 4 is another fragmentary view showing the bag mouth closed and the end cap fully open;

10 Figure 5 is a fragmentary view of a simplified embodiment showing the position of parts with a new filter in place in the cleaner;

Figure 6 is similar to Figure 5 but showing the filter closing means latched open with the end cap approaching closed position and about to release the closing means from its latched position;

Figure 7 shows the filter mouth closed and the end cap fully open; and

15 Figure 8 is a perspective view of the one-piece resilient filter closing means employed in the second embodiment.

Referring now to the drawings, it will be seen that the first embodiment is incorporated in a canister type suction cleaner here illustrated as having a generally rectangular casing 10 supported on a pair of runners or skids 11 and having a carrying handle 12 secured to its upper wall. A rear end cap 13, providing access to the rear end of the casing, has its lower corner connected to the casing by a hinge 14 while its upper rim is releasably locked closed by a conventional toggle clamp 15.

20 Suitably supported centrally of the lower portion of the casing is a multiple stage motor-fan unit 16 having an air inlet opening 17 in its rear end wall. As will become apparent hereinafter, the motor-fan unit handles only clean air and the air discharged from the fan is directed over the motor to cool it and is then confined by suitably disposed internal partitions for discharge from the cleaner casing through the outlet or blower hose coupling 18. In many instances users prefer that the air discharge through a number of outlet openings distributed over a wall portion of the cleaner while it is being used for cleaning by suction. In this event, hose coupling 18 may be closed by a valve or a cover member so that the air discharges through louvred outlets 18'.

25 The entire upper portion of the cleaner casing serves as a filter chamber housing a disposable type paper filter receptacle. Extending lengthwise of the filter chamber 19 and spaced inwardly from the side walls of the casing is a filter bag cage 20 of perforated sheet material, wire cloth, or the like. The forward end of this cage extends through and is supported by a vertical partition 21 having its lower end suitably supported in the lower portion of the casing. As shown, a flexible rubber gasket 22 carried on the rim of partition 21 forms an air-tight seal with the inner side of the casing. Portion 23 of filter cage 20 forwardly of partition 21 is imperforate and its foremost end is flared outwardly slightly and is embraced by a soft rubber gasket 24 against which the mouth of the filter bag is seated, as will be explained presently.

30 The disposable filter receptacle comprises a tubular paper bag 25 the bottom end of which is closed in any suitable manner. For example, the bottom may be closed merely by turning over the end of the tube and stitching or gluing it closed. In the alternative, the bottom may be formed in the same manner as conventional grocery sacks. With either form of closure, the opposite sides of the tube are preferably pleated and folded inwardly so that the filter can be folded flat for compact packaging. The forward or inlet end of the filter bag is entirely open and is of the same cross sectional area as the main body of the bag. Preferably, the cross sectional area of the inlet is equal to or slightly greater than the area of the open end of the filter cage at sealing

3

gasket 24. In consequence, the walls of the bag may be pressed firmly against the gasket to form an air-tight seal therewith.

One exceedingly simple and effective means of clamping the bag against the sealing gasket is here shown as comprising an off-set frusto-conical pilot member generally designated 26, having its larger or base end secured to the inner wall of the inlet end cap 27. The lower edge of this end cap is pivotally connected to the front wall of the cleaner casing by a hinge 28. It will be noted from Figure 1 that the axis of pilot 26 is offset below the axis of the filter bag inlet and that the lower wall of the pilot is more nearly normal to the end cap than is its rounded upper wall. The pilot is provided with a flaring air inlet passage 29 the inlet end of which is formed to provide the female coupling socket 30 for the usual flexible suction hose not here shown. The pilot is so shaped as to enter the flexible paper mouth of the filter readily and to expand it into air-tight sealing engagement with gasket 24 as the end cap is pivoted to its closed position in a manner readily apparent from Figures 1, 3 and 4. The cap is then latched in closed position by a toggle clamp 31 so that the rim of the end cap is sealed against a resilient gasket 32 carried in a channel on the rim of the cleaner casing.

The means for automatically closing the mouth of the filter bag as the end cap is opened will now be described. The bag closing member proper is generally designated 33 (see Figure 2) and comprises a resilient U-shaped wire member. The legs of this member lie closely adjacent the inner opposite sides of filter cage 20 and the coiled ends 34 are located in a recess 35 of the filter cage and are secured in place therein by rivets or pins 36 with the ends 37 bearing against the wall of the filter cage. It will of course be understood that coils 34 are under stress in all operating positions of bag closing member 33.

From the foregoing, it will be apparent that the bag closing member 33 is free to swing from its closed position shown in Figure 4 in which the bight portion 38 lies against the upper lip of the sealing gasket 24 to a second or open position shown in Figure 1 wherein bight portion 38 extends into a V-shaped trough 39 extending crosswise of the lower wall of filter cage 20. It is held in this latter position of greater stress by a unique latch mechanism which will now be described.

The latch mechanism for closure member 33 is housed in a small compartment 40 underlying the inlet end of the filter cage. The lower end of latch member 41 is pivotally supported on a bracket 42 by a pin 43 and is urged to pivot counterclockwise by a coil spring 44 mounted on pin 43. The upper end of latch 41 projects through a slot in trough 39 and carries a hook 45 operative to engage portion 38 of the spring closure member 33 at a point somewhat below the lower wall of filter bag 25 and to thereby latch the closure member open until the filter is to be removed.

The rear end of a second latch member 46 is pivotally supported on latch 41 by pin 47. A spring 48 similar to spring 44 is supported on pin 47 and has one leg engaging a tab 49 projecting from the lower edge of latch 46 and its other end bearing against latch 41. In consequence, the hooked forward end 51 of latch 46 is operative to over-ride and engage a detent pin 52 projecting from the side of a bracket 53 secured to end cap 27. A triangularly shaped tang 54 projects downwardly from latch 46 and cooperates with pin 50 to disengage latch 46 from detent pin 52 during the opening of the end cap 27.

Operation

Let it be assumed that the filter bag is in place in the cleaner and that it has become filled with dirt. The position of the parts will be as illustrated in Figure 1 wherein the closure spring 33 is latched in its depressed or open position beneath hook 45 of latch member 41.

4

Latch 46 will also be engaged over detent 52 carried by end cap 27.

To remove the filter bag, the operator releases toggle clamp 31 and pivots the end cap rearwardly to approximately the position shown in Figure 3. From this figure it will be perceived that the opening of the end cap has carried latch member 46 forwardly and, in so doing, has pivoted latch lever 41 clockwise out of engagement with the bight portion 38 of the filter closure spring, allowing the latter to snap upwardly pressing the lower wall of the filter bag against pilot 26. Also note from Figure 3 that tang 54 has started to ride upwardly along pin 50 to pivot latch member 46 counterclockwise and lift hook 51 out of engagement with detent 52. Further opening of the end cap will disengage hook 51 from the detent allowing springs 44 and 48 to return latch members 41 and 46 to the positions shown in Figure 1. At the same time, the withdrawal of pilot 26 from the filter bag allows the closure member 33 to snap the lower wall of the bag upwardly against the upper wall as shown in Figure 4, thereby preventing the escape of any dirt into the room.

The filter bag is held closed until the operator is ready to withdraw it from the filter cage. First it is necessary to relatch the closure member 33 in open position which is accomplished by depressing it with one hand as the other holds the bag closed. As the bight portion 38 is compressed into trough 39, it contacts the nose of hook 45 and shifts it forwardly into latching engagement therebeneath. The filter bag may now be freely withdrawn from the cleaner and carried to a point of disposal.

A new bag is then placed in position in the filter cage and the peripheral edges are flared generally outwardly. The end cap is then swung closed so that the small end of the pilot enters the filter mouth and gradually forces the walls outwardly into firm sealing relation with resilient gasket 24. As the end cap approaches its closed position, detent 52 rides under the nose of hook 51 on latch 46 and pivots it upwardly in opposition to spring 48 and without disturbing the position of latch 41. Thereafter, spring 48 lowers the latch into locking engagement with the detent in readiness for a repeat operation of the bag closure mechanism.

Second embodiment

A simplified embodiment of the invention is illustrated in Figures 5 to 8, many parts of which are identical or very similar to the corresponding parts of the first embodiment. Accordingly, these parts are designated by the same reference characters distinguished by a prime.

The second embodiment differs from the first primarily in the elimination of a number of parts. Thus, the entire bag closure mechanism consists of a single element comprising a specially formed resilient bag closure member 33'. This member has the general configuration best illustrated in Figure 8, wherein it is seen to be generally L-shaped and as having a U-shaped loop at the rear end of its longer leg which is firmly anchored to the outer side wall of the filter cage 20' as by an L-shaped tab 61 struck outwardly therefrom. It will of course be obvious that leg 60 may be mounted inside the side wall of the filter cage, if so desired.

The forward end of leg 60 is bent into a loop 62 one side of which is then bent to form a latch portion 63 while the remaining portion 64 extends crosswise of the filter cage to a point adjacent the opposite side wall. It will be noted that portion 64 extends through an arcuate shaped slot 65 formed in the side wall of cage 20'. A tab 66 projecting downwardly from the side wall of the cage is notched at 67 and disposed to engage latch portion 63 of the closure element when this element is pivoted downwardly therebeneath, as shown in Figure 6. It will be quite apparent that the resilient closure member 33' is so shaped as to have considerable flexibility both lengthwise of the cleaner casing as well

5

as in a vertical plane through the longer leg 60. And, as installed and anchored beneath tab 61, the entire member tends to occupy its closed position as illustrated in Figure 7.

Operation

Let it be assumed that a filter bag has been installed in the cleaner and that the end cap has been closed. The position of the parts under these circumstances will be that illustrated in Figure 5. Note in particular that the foremost end of loop 62 bears against the inner side of the end cap and that the latch portion 63 of the closure member has been pressed rearwardly out of latching engagement with notch 67. It should also be noted that the U-shaped loop at the rear end of leg 60 has been compressed to occupy the full line position rather than the dotted line position which it occupies when the end cap is open and portion 63 is seated in notch 67. Accordingly, as illustrated in Figure 5, arm 64 is pressing the lower wall of the filter bag firmly against the under side of pilot 26'.

If the toggle latch 31' is now opened to release the end cap preliminary to the removal of the filter and the end cap is swung outwardly toward its open position, the energy stored in the resilient bag closure member 33' will snap the lower wall of the filter closed against the upper wall of the filter and hold it captive against gasket 24', as clearly illustrated in Figure 7. Note that the loop 62 then projects well forwardly of the open end of the filter chamber where it is conveniently accessible to the operator. The operator then grasps the closed end of the filter bag in the right hand as she uses the left hand to engage loop 62 and depress it until latch portion 63 over-rides the nose of notch 67 and becomes engaged therein.

The dirt filled paper bag may now be withdrawn for disposal and a new bag inserted within the filter chamber. As soon as the operator has flared the mouth outwardly slightly with her hand, the end cap is pivoted toward closed position. Note from Figure 6 that the forward end of loop 62 now projects beyond the plane of the filter opening. Hence, the end cap strikes the end of the loop 62 just before it reaches its fully closed position and, in so doing, flexes the resilient U-shaped loop of the closure member toward the anchored end thereof, thereby disengaging portion 63 from notch 67. As this occurs, the member snaps upwardly a slight distance to bring arm 64 into engagement with the lower wall of the filter and to press it tightly against the lower wall of pilot 26'. Toggle clamp 31' is then closed to latch the end cap snugly closed, thereby completing the filter changing operation and restoring the cleaner to use.

While I have shown and described but two embodiments of my invention, it is to be understood that those embodiments are to be taken as illustrative only and not in a limiting sense. I do not wish to be limited to the particular structures shown and described but to include all equivalent variations except as limited by the scope of the claims.

I claim:

1. The combination with a suction cleaner of the type having a filter chamber for housing a large mouthed filter bag, said chamber having a large area inlet opening through which a filter bag can be inserted and withdrawn, annular filter seating means adjacent said inlet opening against which the mouth of a filter bag may be clamped in an air tight manner; of means for closing the mouth of a filter bag located in said filter chamber comprising, a filter bag closure arm extending crosswise of said filter chamber adjacent said inlet opening, resilient means supporting said arm on said cleaner for movement between an open bag position adjacent one side of said filter chamber and a bag closing position adjacent an opposite wall of said filter chamber, a removable closure for the inlet opening of said filter chamber, and means for hold-

6

ing said filter bag closure arm adjacent the open bag position until an operator removes the closure for said filter chamber from the inlet opening thereof and for thereafter allowing said arm to move to the bag closing position thereof.

2. The combination with a suction cleaner of the type having an open ended filter chamber for housing a removable filter bag, annular filter seating means supported within said filter chamber adjacent said open end, a closure member for the open end of said chamber constructed to engage the inlet rim end of a filter bag on the side thereof opposite said annular filter seating means and to form an air-tight seal between a filter bag and said closure member when the same is in place over the open end of said filter chamber, of means for closing the inlet end of a filter bag mounted within said filter chamber comprising, a spring pressed member having a portion extending crosswise of said chamber adjacent the open end thereof and spaced inwardly of the inlet end of a filter bag including means movably supporting the same for movement from an open bag position adjacent one side of said chamber to a bag closing position adjacent the opposite side thereof, and means for releasably holding said filter bag closing means in the open bag position thereof so long as said filter chamber closure member is closed and for releasing the same for movement to its bag closing position as said closure member is removed.

3. In combination, a suction cleaner having an open ended filter chamber for enclosing an open ended throw-away paper filter bag, a seating gasket positioned interiorly of said inlet opening through which a filter bag can be inserted and withdrawn and against which the inlet rim of a filter bag can be clamped in an air-tight manner, a closure member for the open end of said chamber having means on its inner side adapted to enter the inlet of a filter bag and clamp the same against said seating gasket, resilient means for closing the opposite sides of a filter bag together adjacent the inlet end thereof, said filter bag closing means being mounted within said filter chamber and being movable between an open bag stressed position adjacent one side of said chamber and a bag opening relatively less stressed position adjacent the opposite side thereof, and means for holding said filter closing means in said open bag position while a filter bag is being installed in or removed from said filter chamber.

4. The combination defined in claim 3 wherein said filter bag closing means includes an elongated resilient arm having one end secured to said cleaner at a point remote from the open end of said filter chamber and an arm projecting laterally from the other end thereof for movement in an arcuate path across said open end as said filter bag closure means moves between the open bag and bag closing positions thereof.

5. A suction cleaner filter chamber having a large area inlet opening to receive a tubular open ended throw-away paper filter bag, a seating ring adjacent said inlet opening against which the inlet rim of the filter bag is adapted to be clamped, a closure member for said inlet opening having a frusto-conical pilot secured to the inner wall thereof adapted to enter and expand the inlet end of a filter bag into air tight engagement with said seating ring when in closed position across said inlet opening, resiliently supported means carried interiorly of said filter chamber and including a filter bag closing portion extending transversely of the filter chamber adjacent said inlet opening for closing one inlet rim of a filter bag against the opposite rim thereof as the same swings across said inlet opening, means for holding said last mentioned means in a stressed position at one side of said filter chamber while a filter bag is being installed therein and said closure member is being closed across said inlet opening, and means operatively associated with said holding means and said closure member as the latter is closed for conditioning said resiliently supported means

7

to close the inlet end of a filter bag as said closure member is moved away from the closed position thereof.

6. In combination with a suction cleaner having an open ended filter chamber to house an open ended paper filter bag, means for clamping the inlet rim of an open ended filter bag in place in said cleaner including a removable closure member for said filter chamber opening, closing means operable to close the opposite sides of the inlet end of a filter bag together as said closure member is removed to prevent the escape of dirt from the filter bag, said closing means comprising a unitary resilient member having at least one leg extending along one interior side of said filter chamber and another leg at right angles thereto extending crosswise of said filter chamber adjacent the open end thereof, said closing member being sufficiently resilient that said last mentioned leg can swing in an arc from one side of said chamber to the other, means for retaining said bag closing means under a stressed condition on the opposite side of said chamber than it would occupy if not retained, and means for releasing said filter closing means for return to the opposite side of said chamber.

7. The combination defined in claim 6 in which said means for releasing said filter closing means includes a closure member for said filter chamber.

8. The combination defined in claim 6 in which said means for releasing said filter closing means includes a closure member for said filter chamber operable to engage said retaining means as said closure member is closed and to release said retaining means when said closure member is next opened.

9. The combination defined in claim 6 wherein said retaining means for said filter closing means projects into

8

the path of said closure member as the same approaches a closed position and disengages said retaining means as the closure member is moved into its fully closed position.

10. The combination defined in claim 9 wherein said closure member includes means secured to the inner wall thereof and projecting into the path of the filter closing means for holding the latter against closing after release and until said closure member is moved away from its closed position whereupon said filter closing means snaps closed and closes the inlet end of the filter bag.

11. The combination defined in claim 6 wherein said filter closing means comprises a resilient U-shaped member having the ends of its legs anchored to said filter chamber remotely from the open end thereof and having the bight portion thereof positioned to swing in an arc across said chamber adjacent its open end.

12. The combination defined in claim 6 wherein said filter closing means comprises a generally L-shaped resilient member having the end of one leg anchored to the interior of said filter chamber remotely from the open end thereof and its other leg swingable in an arc crosswise of and adjacent the open end of said chamber, said first mentioned leg being so shaped as to flex axially of said leg as well as in a direction transversely thereof.

References Cited in the file of this patent

UNITED STATES PATENTS

2,459,970	Smith	Jan. 25, 1949
2,547,805	Beede	Apr. 3, 1951
2,649,926	Cranmer	Aug. 25, 1953
2,664,965	Swann	Jan. 5, 1954