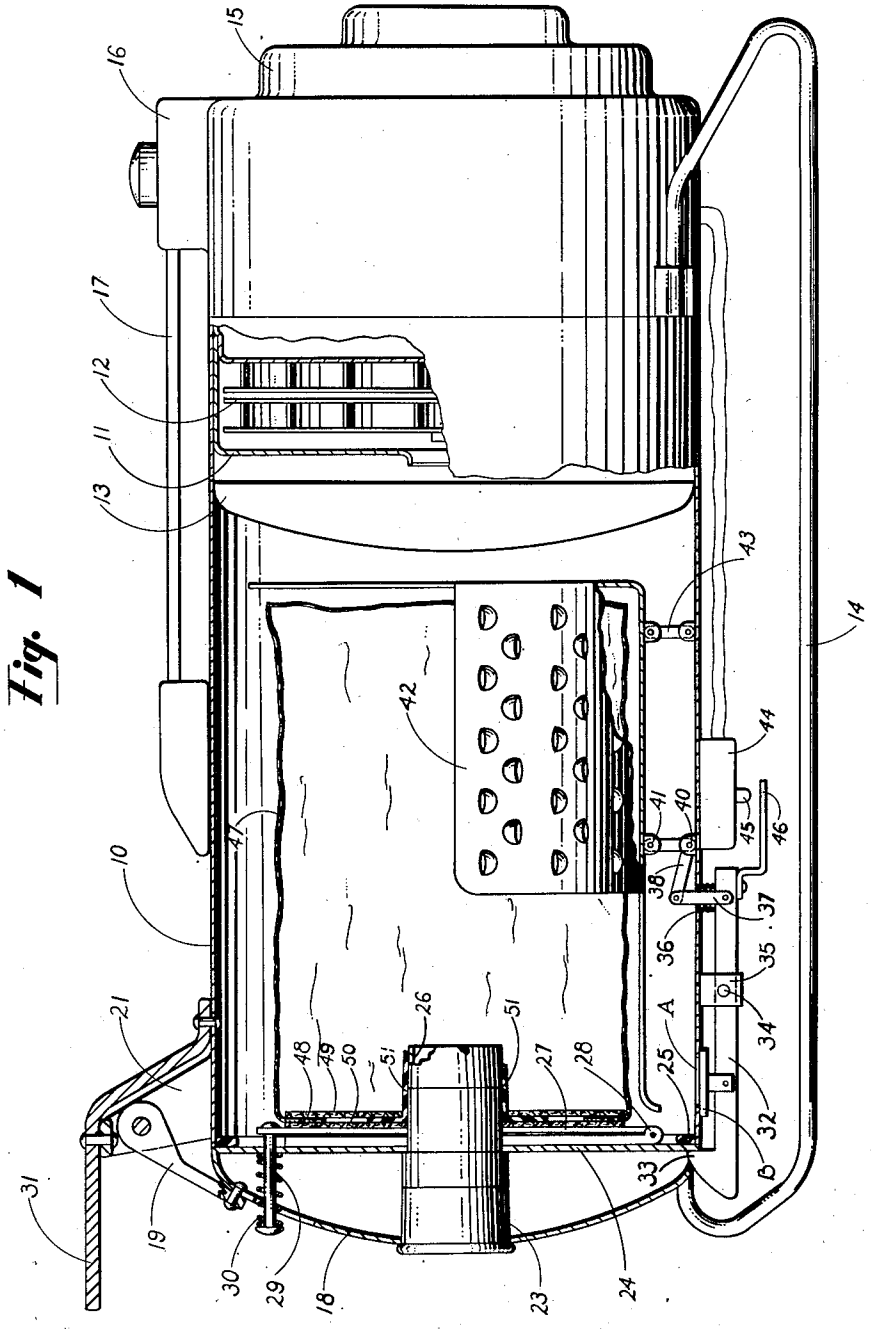
Aug. 14, 1951 E. ANDERSON 2,564,468

VACUUM CLEANER

Filed Feb. 15, 1946 3 Sheets-Sheet 1

Fig. 1



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EMIL ANDERSON

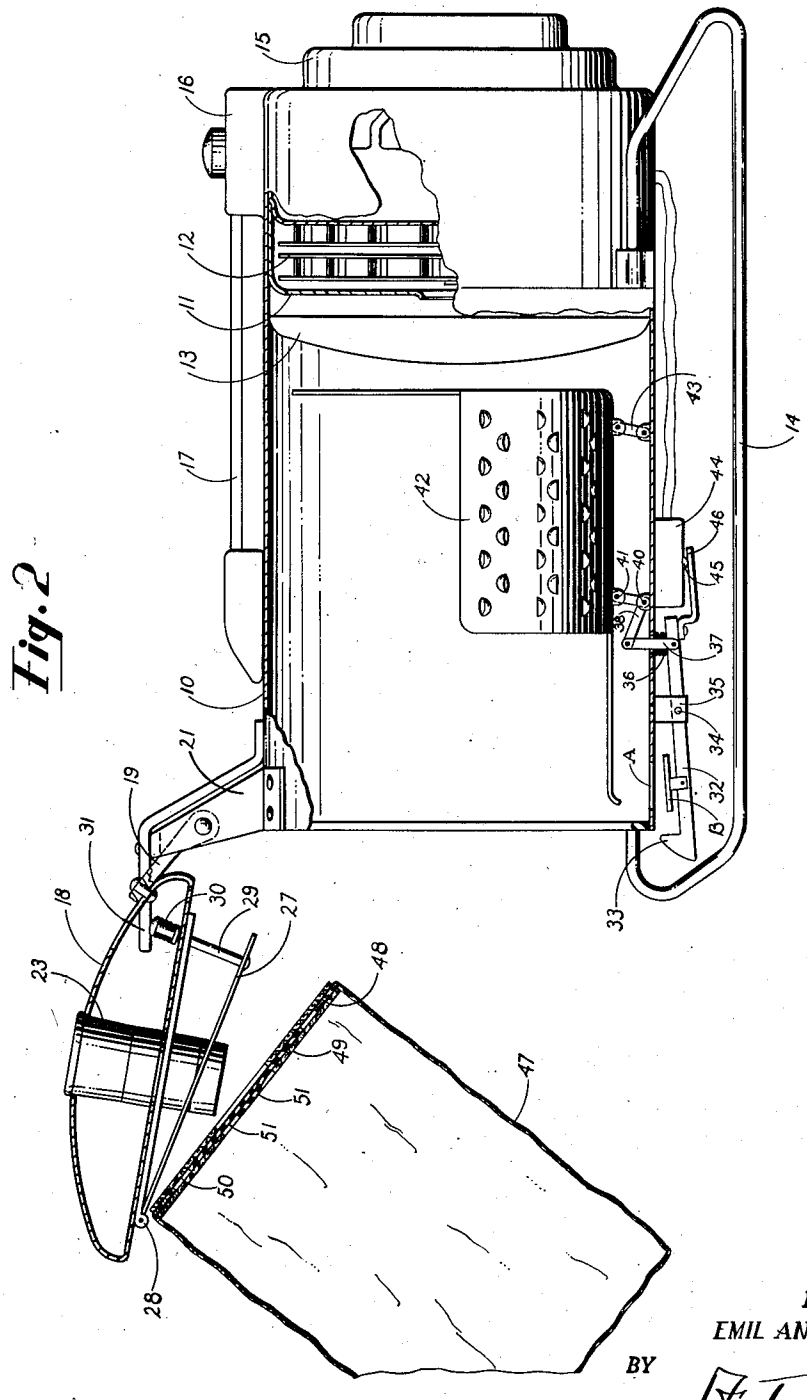
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VACUUM CLEANER

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Fig. 2



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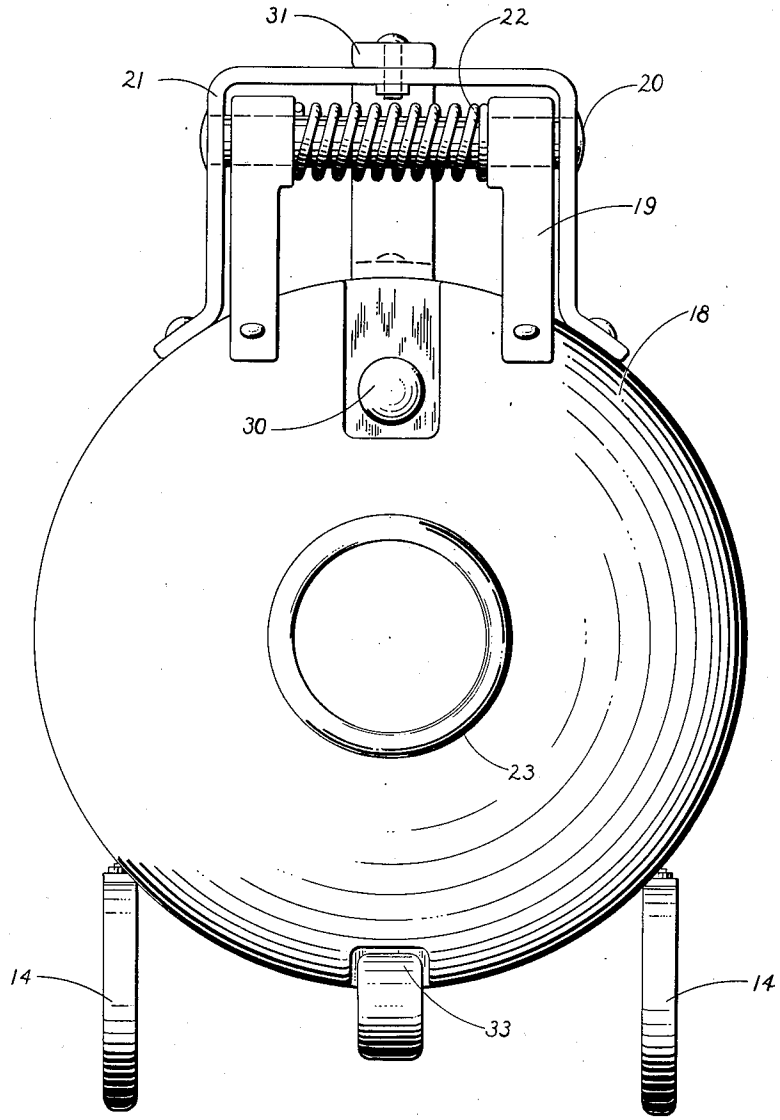
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VACUUM CLEANER

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Fig. 3



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2,564,468

UNITED STATES PATENT OFFICE

2,564,468

VACUUM CLEANER

Emil Anderson, Briarcliff Manor, N. Y., assignor to Electrolux Corporation, Old Greenwich, Conn., a corporation of Delaware

Application February 15, 1946, Serial No. 647,877

23 Claims. (Cl. 183—37)

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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. The present invention is also concerned with automatic control means responsive to certain operating characteristics of the device.

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 a dust collecting bag having an open mouth is removed and the dust shaken from the bag which is thereafter returned for further cleaning operations. In addition to the obvious objection to such procedure because of the required cover manipulation and exposure of the collected dirt, it is frequently impossible for the operator to determine when the bag should be emptied. The collection of dirt by the bag causes the pores and interstices of the fabric to become clogged, thus reducing the flow of air therethrough and consequently reducing the efficiency and effectiveness of the cleaner. However, such reduction in efficiency may not be apparent to the operator and thus, since the emptying of the bag is the least pleasant of the cleaning operations, it is frequently postponed beyond the time when efficiency would best be served by emptying.

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.

It is a further object of the invention to provide in a vacuum cleaner means responsive to accumulation of dust therein for actuating a dirt disposal means.

More specifically, it is an object of the present invention to provide for the opening of the cover and for the removal of the dust receptacle as an incident of such opening.

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Another more specific object of the invention is to provide for the opening of the front cover in response to a predetermined decrease in the efficiency of the apparatus.

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 may be safely handled after removal from the device without danger of scattering the contents or soiling the hands of the operator.

A still further and important object of the invention is to provide a vacuum cleaner which automatically in response to efficiency changes or at the discrimination of the operator will eject from the casing a sealed disposable dust receptacle.

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 embodiment of the present invention;

Fig. 2 is a view similar to Fig. 1 showing the device with the cover opened and the bag ejected; and

Fig. 3 is a front elevation of the device in the position shown in Fig. 1.

In general terms, the structure of the present embodiment of the invention may be defined as including a substantially cylindrical normally horizontal body within which is mounted a motor-fan unit for causing a flow of air from the front to the rear therethrough. A hinged cover is mounted on the front of the machine through which there is an intake opening adapted to receive a suction tube (not shown). When the device is in operation there is mounted within the cleaner and attached to the hinged cover a porous dust bag preferably of paper or like inexpensive and thus disposable. The bag is secured to the cover so as to be withdrawn from the cleaner when the cover is opened and means are provided for dislodging the bag from the cover after removal from the cleaner. The action of the latter means is so timed with respect to the movement of the cover that the bag will be "flipped" and thus forcibly ejected from the cleaner when the cover is opened. The cover is biased to a normally opened position and is retained in closed position by a latch member which is automatically displaced when the bag becomes loaded with accumulated dirt so that the opening of the cover and the ejection of the

bag is responsive to the efficiency of the machine. Manually operable trip means may also be provided for actuation of the latch and the motor-fan unit is preferably controlled through a switch operating in conjunction with the latch so as to preclude the possibility of opening the front cover while the motor is in operation.

Referring now to the drawings which depict the specific structural embodiment of one form of the invention, the usually cylindrical, horizontally disposed casing is indicated by numeral 10. Midway of the casing there is provided an apertured bulkhead 11 behind which, in the direction of air flow, is mounted the motor-fan unit 12 and in front of which there is disposed an air filter 13. The casing 10 is preferably supported upon sleighs 14 and the rear end is closed by a apertured end piece 15 through which clean air is discharged to the atmosphere. A manually operable control switch 16 is provided for controlling the motor when the front cover is closed, and a carrying handle 17 may be provided extending longitudinally over the top of the casing.

The front end of the casing is provided with a front cover 18 which is pivotally mounted by arms 19 upon a transverse pintle 20 which is supported above the casing 10 by a supporting bracket 21. A coil spring 22, shown in Fig. 3, is provided to bias the cover to its opened position as shown in Fig. 2. The cover is provided with a central air inlet tube 23 to which a suction tube (not shown) may be removably secured. The inner face of the cover 18 is provided with a sealing plate 24 which is adapted to bear against a sealing ring 25 to securely seal the casing when the cover is closed as shown in Fig. 1. The inlet tube 23 extends through the sealing plate 24, the inner end of this tube being designated by reference character 26. The sealing plate 24 also carries a stripper plate 27 which is hinged thereto as at 28 and has an aperture through which the inner end 26 of tube 23 extends with sufficient clearance to permit pivotal movement of the stripper plate. The top of the plate 27 is provided with a forwardly extending actuator 29 which by means of a spring 30 normally maintains the stripper plate 27 parallel and closely adjacent to the sealing plate 24. In conjunction with the bracket 21 there is provided a forwardly extending stripper cam 31 which, when the cover is opened as in Fig. 2, is engaged by the actuator 29 to pivot the stripper plate to remove the dust collecting bag from its attachment to the inlet tube 26 as will be hereinafter described.

The front cover is normally retained in its closed position, as shown in Fig. 1, by a latch member 32, the upwardly extending latching head 33 of which engages the front of the sealing plate 24. The latch is pivotally mounted under the casing on a pintle 34 supported by a bracket 35 and is normally retained in cover engaging position by a spring 36 which encircles an actuating link 37. The lower end of link 37 engages the rear end of the latch, while the upper end is engaged by the forward extending arm of a bellcrank 38, the central portion of which is pivoted internally of the casing as at 40. The upwardly extending arm of the bellcrank is pivoted as at 41 to a perforate bag receiving stirrup 42. The rear end of the stirrup is supported on a pivoted link 43 in such manner that the dust receiving bag, in response to excessive pressure drop therethrough, will rock the stirrup in a clockwise manner to impart counter-clockwise and cover releasing motion to the latch 32.

Since it would be difficult if not impossible to withdraw the bag while suction is being applied by the motor-fan unit 12, it is desirable to insure the cessation of motor operation when the cover is unlatched. In the present embodiment of the invention this is accomplished by means of a switch 44, the actuating button 45 of which is adapted to be engaged by a lever 46 attached to the latch 32. This arrangement is such that when the latch is operated by the stirrup 42, the member 46 engages the button 45 to open the switch 44, which is connected in the circuit to the motor. In normal operating position as shown in Fig. 1, the switch 44 is closed leaving the motor under control of the manual switch 16. In order to further facilitate ease in removal of the bag, a vent A is provided in the casing. The vent A is normally closed during cleaning operation by a closure B, mounted on the latch 32. When movement of the stirrup 42 actuates the latch, the closure B moves away from the vent A to break the suction applied to the bag so that, should the motor-fan unit fail to shut off or should its momentum act to continue suction after its power is cut off there will nevertheless be no difficulty in the opening of the front cover.

The dust collecting bag of the present form of the invention is identified by the numeral 47 and is of the type disclosed in the copending application of Leon P. Borkoski, Serial No. 641,992, filed January 18, 1946. The body of the bag is preferably made from inexpensive porous material such as paper, so that the bag may be disposed of whenever filled with dust without prohibitive expense. The front edges 48 of the body of the bag are secured between inner and outer end members 49 and 50, respectively, both of which are apertured to receive therethrough the inner end 26 of the air inlet tube of the front cover. A pair of normally overlapping rubber closure members 51 are stretched across the apertures of the end members, the arrangement being such that when the tube is inserted through the apertures the rubber closure members are separated and engage the tube to seal the bag thereto and to retain the bag thereon during cleaning operations. When the front cover is opened, the retention of the members 51 is effective to lift the bag out with the front cover until such time as the stripper member acts to push the bag mouth off of the tube and permit the final upward movement of the cover to fling the bag away from the cleaner.

In the operation of the device, it will be seen that with the cover open as shown in Fig. 2, the bag may be attached to the inner end 26 of inlet tube 23 by insertion of the tube between the elastic closure members 51. The cover is then closed and such movement inserts the bag within the casing, disposing its rear lower end within stirrup 42. When the switch 16 is thereafter actuated, the motor fan unit 12 produces suction which causes flow of air from left to right of the device as shown in Fig. 1 and normal cleaning operations may be carried on by the use of a suction tube and suitable tools, the tube being applied to the inlet tube 23. It will, of course, be understood that during such cleaning operation dust-laden air enters the bag 47 in which the dust is trapped, the clean air being discharged through the pores of the bag. As the pores of the bag become clogged by entrapped dust and dirt particles, the relative pressure between the inside and the outside of the bag increases and the bag is sucked rearwardly with increasing force. Such increase in the pressure differences

between the inside and outside of the bag is, of course, a measure of efficiency of the cleaning operation and thus as the efficiency diminishes the pressure on the stirrup increases until such time as the force of spring 36 is overcome and the stirrup pivots the bellcrank 38, thus actuating the latch 32 to cause the switch 44 to open the circuit to the motor-fan unit 12 and at the same time open vent A and also release the front cover 18 which by virtue of the spring 22 swings upwardly to the position shown in Fig. 2. The filled bag is withdrawn from the casing by the opening movement of the cover and at the end of such movement actuator 29 strikes arm 31 to cause the stripper plate to move away from the closure plate 24, thus forcing the bag from the tube 23, the bag being flipped outwardly away from the device.

Of course, it will be understood that with the bag in position and the cover closed, intermittent operations of the cleaner may be controlled by manual manipulation of the switch 16 and if desired, the latch 32 may be manually operated to eject the bag when automatic ejection is not relied on.

From the foregoing, it will be seen that the present invention provides a vacuum cleaner which will automatically operate to eject from the cleaner a filled and sealed container of accumulated dirt when the filling of the container has caused the efficiency of the device to drop to a predetermined standard. It will, of course, be understood that various adjustments may be made to vary the predetermined standard of efficiency at which the cover is released and in carrying out the invention numerous changes and modifications may be resorted to without departing from the spirit or scope of the invention as outlined in the appended claims.

What I claim is:

1. In a vacuum cleaner, a casing having an opening, a dust separating and receiving container receivable within said casing, a motor fan unit for producing a flow of air through said container, power storing means for moving said container outwardly through said opening, means restraining said power storing means from moving said container, and a control device for releasing said restraining means responsive to an increase in the pressure drop through said container.

2. In a vacuum cleaner, a casing having an opening, a cover for said opening, a dust separating and receiving container receivable within said casing, a motor fan unit for producing flow of air through said container, power storing means for opening said cover and for moving said container outwardly through said opening, means restraining said power storing means from opening said cover and from moving said container, and a control device for releasing said restraining means responsive to an increase in the pressure drop through said container.

3. In a vacuum cleaner, a casing having an opening, a flexible dust separating and receiving container receivable within said casing, a motor fan unit for producing a flow of air through said container, power storing means for moving said container outwardly through said opening, means restraining said power storing means from moving said container, a member movably mounted in said casing in contact with said flexible container and displaceable by distension of said container resulting from increase in pressure drop therethrough, and means operable by displacement of said member for releasing said restraining means.

4. In a vacuum cleaner, a casing having an opening, a cover for said opening, a dust separating and receiving container receivable within said casing, means for removably attaching said container to said cover, a motor fan unit for producing flow of air through said container, power storing means for opening said cover and moving the container attached thereto outwardly through said opening, means restraining said power storing means from opening said cover, and a control device for releasing said restraining means responsive to an increase in the pressure drop through said container.

5. In a vacuum cleaner, a casing having an opening, a cover for said opening, a dust separating and receiving container receivable within said casing, means for removably attaching said container to said cover, a motor fan unit for producing flow of air through said container, power storing means for opening said cover and moving the container attached thereto outwardly through said opening, means restraining said power storing means from opening said cover, a control device for releasing said restraining means responsive to an increase in the pressure drop through said container, and means operable by the opening of said cover for detaching said container from said cover.

6. In a vacuum cleaner, a casing having an opening, a cover for said opening, an inlet conduit extending through said cover and inwardly therefrom, a dust separating and receiving container receivable within said casing, said container having an inlet opening for attaching said inlet conduit, resilient means for releasably securing said container to said conduit, a motor fan unit for producing flow of air through said container, power storing means for opening said cover and moving the container attached thereto outwardly through said opening, means restraining said power storing means from opening said cover, a control device for releasing said restraining means responsive to an increase in the pressure drop through said container, a stripper member carried by said cover and movable to remove said container from said inlet conduit, and means actuated by substantially complete opening of said cover for moving said stripper member.

7. In a vacuum cleaner, a casing having an opening, a dust separating and receiving container receivable within said casing, a motor fan unit for producing a flow of air through said container, power storing means for moving said container outwardly through said opening, means restraining said power storing means from moving said container, valve means for reducing the flow of air through said container, and a control device for actuating said valve and for releasing said restraining means responsive to an increase in the pressure drop through said container.

8. In a vacuum cleaner, a casing having an opening, a motor fan unit for producing flow of air through said casing, a dust receiving container receivable within said casing, means for moving said container outwardly through said opening, and control means actuatable to effect operation of said means for moving, said control means being actuatable in response to an increase in pressure drop through said container.

9. In a vacuum cleaner, a casing having an opening, a dust receiving container insertable

into and removable from said casing through said opening, a motor fan unit for producing flow of air through said container, a cover for said opening, means operable to open said cover, and control means actuatable to effect operation of said means for opening, said control means being actuatable in response to an increase in pressure drop through said container.

10. In a vacuum cleaner, a casing having an opening, a cover for said opening, a dust separating and receiving container receivable within said casing, a motor fan unit for producing flow of air through said container, operating means for opening said cover and for moving said container outwardly through said opening, and control means for actuating said operating means, said control means being actuatable in response to an increase in pressure drop through said container.

11. In a vacuum cleaner, a casing having an opening, a dust receiving container insertable into and removable from said casing through said opening, a motor fan unit for producing flow of air through said container, a cover for said opening, power storing means for opening said cover, means restraining said power storing means from opening said cover, and control means for releasing said restraining means, said control means being actuatable in response to an increase in pressure drop through said container.

12. In a vacuum cleaner, a casing, means for producing flow of air through said casing, a dust separating member removably positioned within said casing, structure movable in one direction to move said member outwardly from said casing, power storing means for moving said structure in said one direction, said power storing means being operable by movement of said structure in another direction to store power, and control means operable for releasing the stored power to thereby move said structure, said control means being actuatable in response to an increase in pressure drop through said member.

13. In a vacuum cleaner, a casing having an opening, means for producing flow of air through said casing, a cover member for said opening, a dust separating member positioned within said casing and removable through said opening, structure mounted in conjunction with said cover and movable therewith in one direction to move said dust separating member outwardly through said opening, power storing means for moving said cover and structure in said one direction, said power storing means being operable by movement of said cover and structure in another direction to store power, and control means for releasing the stored power to thereby move said cover and structure, said control means being actuatable in response to an increase in pressure drop through said dust separating member.

14. In a vacuum cleaner, a casing having an opening, a cover for said opening, a motor fan unit for producing flow of air through said casing, a dust receiving container insertable into and removable from said casing through said opening, means for opening said cover, means restraining the last mentioned means from opening said cover, an electric switch for controlling the operation of said motor fan unit, and control means for opening said switch and releasing said restraining means, said control means being actuatable in response to an increase in pressure drop through said container.

15. In a vacuum cleaner, a casing having an opening, a motor fan unit for producing flow of air through said casing, a dust receiving container receivable within said casing, power storing means for moving said container outwardly through said opening, means restraining said power storing means from moving said container, an electric switch for controlling the operation of said motor fan unit, and a control device for opening said switch and releasing said restraining means responsive to an increase in pressure drop through said container.

16. In an air filtering machine of the type comprising a filter compartment including an opening and closing member adapted to be opened for the insertion and removal of a filter, a mechanism normally tending to open said member, releasable means for holding said member in its closed position against the action of said mechanism during normal operation of said machine, and means responsive to a predetermined filled condition of said filter for automatically releasing said releasable means to permit opening of said member when said filter becomes filled with filtered material to a predetermined degree.

17. In an air filtering machine of the type comprising a filter compartment including an opening and closing member adapted to be opened for the insertion and removal of a filter, a mechanism normally tending to bias said member to its open position, releasable latch means for holding said member in its closed position against the biasing force of said mechanism during normal operation of said machine, and means connected to said latch means and responsive to a predetermined filled condition of said filter for automatically releasing said latch means to permit opening of said member when said filter becomes filled with filtered material to a predetermined degree.

18. In a vacuum cleaner, a casing having an opening, a dust receiving container formed with an inlet aperture and insertable into and removable from said casing through said opening, a motor fan unit for producing flow of air through said container, an inlet conduit, means for movably supporting said conduit with respect to said casing so that the conduit is movable from a position in which it extends through said opening and communicates with said inlet aperture to a position in which it is removed from said opening sufficiently to permit insertion and removal of said container, means operable to move said conduit to the latter of said positions, and means responsive to an increase in pressure drop through said container to effect operation of the last-mentioned means.

19. In a vacuum cleaner, a casing having an opening, a dust receiving container formed with an inlet aperture and insertable into and removable from said casing through said opening, a motor fan unit for producing flow of air through said container, an inlet conduit, means for movably supporting said conduit with respect to said casing so that the conduit is movable from a position in which it extends through said opening and communicates with said inlet aperture to a position in which it is removed from said opening sufficiently to permit insertion and removal of said container, and means operable to move said conduit to the latter of said positions and for moving said container outwardly through said opening, and means responsive to an increase in pressure drop through said container to effect operation of the last-mentioned means.

20. In a vacuum cleaner, a casing having an

opening, a dust receiving container formed with an inlet aperture and insertable into and removable from said casing through said opening, a motor fan unit for producing flow of air through said container, an inlet conduit, means for movably supporting said conduit with respect to said casing so that the conduit is movable from a position in which it extends through said opening and communicates with said inlet aperture to a position in which it is removed from said opening sufficiently to permit insertion and removal of said container, a switch for controlling the operation of said motor fan unit, means operable to move said conduit to the latter of said positions, means operable to open said switch, and means responsive to an increase in pressure drop through said container for effecting operation of said conduit moving means and said switch opening means.

21. In a vacuum cleaner, a casing having an opening, means for producing flow of air through said casing, a member movably connected to said casing adjacent to said opening, a dust separating member positioned within said casing and removable through said opening, structure operatively associated with said movable member and releasably engageable with said dust separating member and actuated by opening movement of said movable member to move said dust separating member outwardly, and means for moving said movable member and said structure in response to an increase in pressure drop through said dust separating member.

22. In a vacuum cleaner, a casing having an opening, a motor fan unit for producing flow of air through said casing, a cover member for said opening, a dust bag member removably positioned in said casing, means movably attaching said cover member to said casing whereby said cover member is movable between open and closed position relative to said opening, means associated with said casing and said cover member operable to move said cover member to its open position, interconnecting means between said bag and cover member effective to move said bag outwardly by the movement of said cover member, said interconnecting means being releasable upon continued movement of said cover, and a control device associated with said casing and with the cover moving means to render said last-mentioned means operable to open said cover member.

23. In a vacuum cleaner, a casing having an opening, a dust receiving container receivable within said casing, a motor fan unit for producing flow of air through said container, spring means for moving said container outwardly, means for restraining said spring means from moving said container, and a control means for releasing said restraining means responsive to an increase in pressure drop through said container.

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