

Oct. 29, 1940.

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2,219,567

VACUUM CLEANER

Filed July 16, 1938

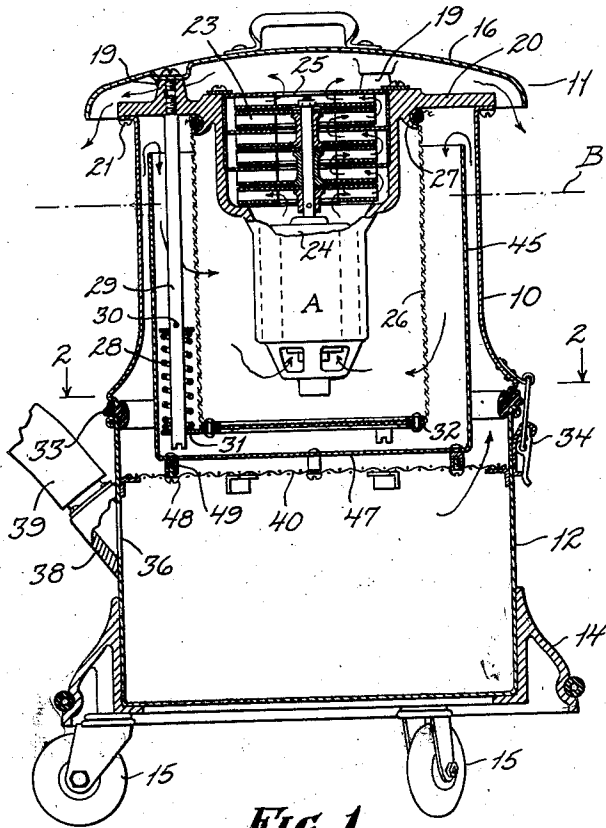


Fig. 1

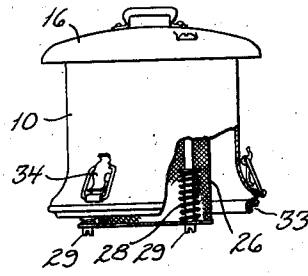


Fig. 3

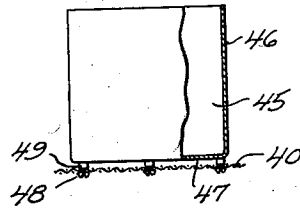


Fig. 4

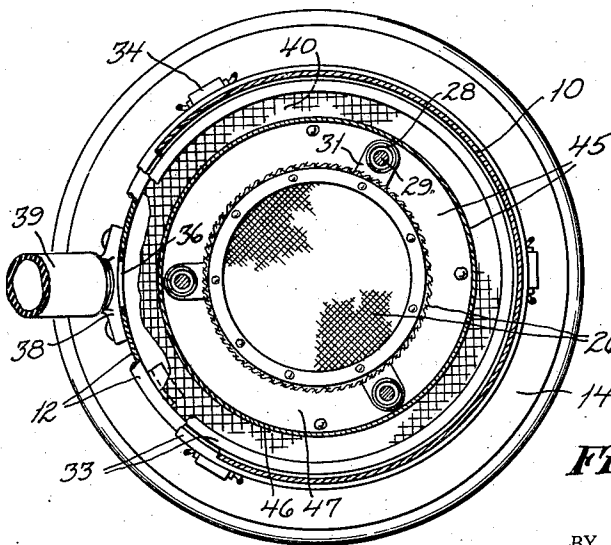


Fig. 2

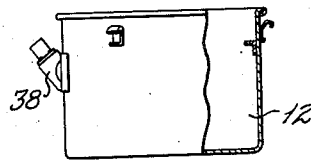


Fig. 5

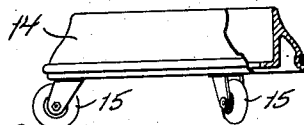


Fig. 6

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2,219,567

VACUUM CLEANER

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Application July 16, 1938, Serial No. 219,610

10 Claims. (Cl. 183—37)

This invention relates to a vacuum cleaner and especially to an electric vacuum cleaner for use in garages.

Vacuum cleaners are used extensively in garages and automotive service and car washing stations, to remove dirt from the interior of automotive vehicles. It is fast becoming a general practice to cleanse the upholstery of automobiles with a solution containing a cleaning agent. This solution is applied to the fabric of the vehicle by a brush or sponge and it has been found desirable to remove the cleaning solution with a vacuum cleaner. In this manner the solution may be quickly removed before the liquids enter the fibers of the fabric. Thus, when the cleaner is removed in this manner, the fabric, after such removal is substantially dry. Obviously, it is highly desirable that the vacuum cleaner used for this purpose may also be used to remove dirt and dust from the vehicle in the usual manner. The general object of the present invention is to provide an electric vacuum cleaner for the uses above set forth.

Another object of the present invention is to provide a cleaner of a comparatively small size, yet which will advantageously utilize a comparatively large filtering element, and to so arrange the element that it will be protected from the effects of cleaning liquids which are to be removed immediately following the cleaning operation.

It is likewise an object of the present invention to protect the filtering element in such a manner that the larger particles of dirt will not reach the main filtering element, and to so arrange the cleaner as to facilitate assembly or replacement of the filtering elements, as well as to facilitate the removal of the dust, debris and liquids.

Other objects of the present invention will become more apparent from the following description, reference being had to the accompanying drawing, in which I illustrate a preferred embodiment of my invention. The essential features of the invention will be summarized in the claims.

Referring now to the drawing, in which I illustrate a preferred form of my invention, Fig. 1 is a vertically extending, centrally located section through a preferred form of my invention; Fig. 2 is a horizontal section, as indicated by the lines 2—2 on Fig. 1; Fig. 3 is a view, on a smaller scale than Figs. 1 and 2, illustrating the filtering and power unit removed from the cleaner receptacle; Fig. 4 is a view of the dust collector receptacle removed from the cleaner; Fig. 5 is a view

of the liquid collecting receptacle; and Fig. 6 is a view of the cleaner base. Figs. 3 to 6, inclusive, are partially broken away to more clearly illustrate the construction of the various units which comprise the cleaner.

My improved cleaner comprises an open ended, comparatively light-weight sheet-metal cylinder 10, into which a power filtering unit A is suspended by a cover 11. The cylinder is removably mounted on a liquid and refuse collecting receptacle 12, which in turn is removably supported on a base 14. The base is provided with castors 15 to enable it to be removed from place to place.

The side walls of the base 14 extend upwardly around the receptacle 12, and as illustrated are more rigid than the walls of the receptacle, to provide a protecting skirt therefor. The base 14 also maintains the bottom of the receptacle spaced above the cleaner supporting surface, and forms a counterbalance for the motor and filter unit.

The cover, together with the power filtering unit supported thereby, is substantially the same as that shown and claimed in Patent No. 2,116,233, issued December 21, 1936, to Black and Decker Electric Company. Therefore, reference to such patent may be had for a complete description of this unit. Briefly, the power filtering unit comprises a sheet-metal cover 16, which is secured to upstanding lugs 19 of a closure member 20. The closure member is removably secured to the upper rim of the cylinder 10 by screws 21. The closure member 20 depends into the cylinder 10, and provides a housing for a multi-stage suction fan 23 and an electric motor 24, which is drivingly connected to operate the fan. The arrangement is such that the fan draws air from the motor and exhausts it through an opening 25 in the closure member from whence it escapes between the overhanging skirt of the cover and the periphery of the closure member, as indicated by the arrows in Fig. 1. This arrangement provides a chamber between the walls of the motor and fan housing, and the internal walls of the cylinder 10.

The filtering element comprises a bag-like member 26 of cloth, paper or similar flexible dust and dirt pervious material. This element is open at its upper end, which is tightly secured to a depending annular rib 27 of the closure member. As shown in Fig. 1, this filter bag encloses the fan and motor unit and is spaced apart from the walls thereof as well as from the walls of the container 10.

The filter bag is preferably resiliently maintained in an expanded position by springs 28 which encircle posts 29 carried by the closure member 20. These springs are interposed between pins 30, carried by the posts, and ears 31 formed on a reinforcing ring 32, which is secured to the bottom of the filter bag.

The cylinder 10 extends substantially to the bottom of the filter unit and rests on the receptacle 12 as shown in Fig. 1. Preferably, I insert a rubber packing ring 33 between the adjacent rims of the cylinder 10 and the receptacle 12. Any well known latch such as that indicated at 34 in Fig. 1, may be used to maintain the cylinder 10 in position on the receptacle 12.

Dirt and/or moisture laden air is drawn into the receptacle 12 through an opening 36 in the upper portion of the side wall of the receptacle 12. This opening is provided with a fitting 38, to which the usual cleaner hose arrangement is secured in any well known manner.

The greater part of the moisture, or water, as well as the larger particles of dirt are removed from the air, before such air reaches the cylinder 10 or the power filter unit A. Extending across the receptacle 12, above the inlet opening 36, and below the power filter unit A, is a coarse filter 40. As illustrated, this coarse filter 40 is in the form of a wire screen mesh or fabric having openings of approximately one-eighth inch. However, the filter 40 may be a perforated metal plate. The filter or screen 40 is shown as being supported by angle clips secured to the internal walls of the receptacle 12. I have found that the screen 40 removes, from the moisture and dirt laden air, the greater portion of the water and the larger particles of dirt, which fall to the bottom of the receptacle 12.

Obviously dust, small particles of dirt, and a certain amount of moisture passes through the screen upwardly toward the power filter unit A. While the dust and smaller particles of dirt may be permitted to reach the filter 26 of the unit A, obviously moisture should be prevented from contacting such filter, as were it to become saturated, the efficiency of the unit would be materially impaired; first because of the increased vacuum required to draw air through the filter, and second, because moisture would be detrimental to the motor 24 through which all of the air is drawn. I have found that this may be accomplished by shielding the filter unit so as to cause the air passing through the screen or coarse filter 40 to pass a considerable distance upwardly prior to its contact with the filter 26 of the unit A. I prefer to accomplish this by using a shield such as is shown at 45 in Figs. 1, 2 and 4.

The shield 45 is a cylindrical receptacle having a sheet-metal side wall 46 and is closed at the bottom by a wall 47. As shown in Fig. 1, this shield substantially encloses the filter unit A. The side wall of the shield is spaced both from the filter 26 and the wall of the cylinder 10, while the bottom of the shield is spaced both from the coarse filter or screen 40 and the filter 26. As illustrated, the shield 45 is supported by the coarse screen 40 being secured thereto by bolts 48. Suitable spacers 49 are interposed between the screen 40 and the bottom of the receptacle or shield 45 to maintain the spaced relation heretofore referred to.

I have found that when the cleaner is in operation with the usual suction unit, the air will not have sufficient velocity to carry the small particles of water or moisture above the level indi-

cated by the line B in Fig. 1. Thus, the moisture does not reach the filter 26 or the motor 24.

The shield 45 has a further advantage. I have found that when the cleaner is used as a simple vacuum cleaner, the dust is drawn upward through the coarse screen 40, between the walls of the shield 45 and the cylinder 10 into the shield 45. This shield thus serves as a receptacle for such dust and prevents it from falling into the water receptacle 12, thus facilitating cleaning of the unit.

From the foregoing description it will be seen that I have provided a simple cleaner which may be used to remove both dust and cleaning liquids from fabric such as the upholstering of automotive vehicles and for many other obvious uses. The cleaner is so arranged that the liquid is prevented from reaching the suction mechanism without materially increasing the suction resistance, and eliminating clogging of the dust separator, thus enabling the provision of a compact structure in which the dust filter together with the suction and power driving mechanism may be removed as a unit for cleaning or inspection.

I claim:

1. In a vacuum cleaner, the combination of a hollow casing, a pump and motor carried by one wall and depending into the receptacle, a bag of flexible pervious material surrounding the motor and removably secured to said wall; a shield supported by said receptacle extending upwardly between the outer wall of said bag and the inner wall of the receptacle to a point adjacent the top of the bag, whereby air entering the receptacle must travel upwardly between the receptacle and the shield to a point adjacent the top of the bag and then downwardly between and in contact with the walls of the pervious bag and the shield.

2. In a pneumatic cleaner, the combination of a hollow casing, having comparatively stiff walls, a filter cell enclosing a part of the space within said casing, a pump having its outlet in the top wall of such casing, a motor secured to the inlet side of the pump and depending within the casing, a driving connection between the motor and the pump; a shield comprising a receptacle open at its top and enclosing said filter cell, said shield being spaced from the walls of the casing and from said cell and being open at its top, a coarse filter extending across said casing beneath the shield and spaced from said shield and from the bottom wall of the receptacle, and wherein the casing is provided with an inlet opening spaced below said coarse filter and above the bottom of said receptacle.

3. In a vacuum cleaner, comprising an upright open ended cylindrical receptacle, a cover removably secured thereto, a suction-producing means carried by said cover and depending into the cylinder, a flexible bag-like dust-separator carried by said cover and disposed between the outer walls of the suction-producing means and the inner walls of the receptacle, a receptacle open at its top, means to secure said cylinder to said receptacle, a base adapted and arranged to removably support said receptacle and cylinder; a coarse filter extending transversely across said receptacle, a cylindrical shield spaced from and disposed between said cylinder and said dust-separator and open only at its top, means carried by said receptacle to removably support said filter and said shield, and wherein said receptacle has an inlet opening below said filter.

4. In a vacuum cleaner, the combination of a motor, a pump and a filter bag so arranged that

air is drawn through the filter bag, the motor and the pump in that order, and means to intercept the flow of air and adsorb suspended moisture therein before it reaches the bag and pump.

5 5. In a vacuum cleaner, a motor, a pump and a filter bag mounted in a common receptacle having an outlet for said pump adjacent its top and an inlet intermediate its top and bottom, a shield within said receptacle to intercept the flow of air and adsorb suspended moisture therein before it passes into contact with said filter bag.

10 6. In a vacuum cleaner, a vertically disposed receptacle, a suction-producing mechanism disposed within the receptacle in the upper region of the receptacle, an inlet leading into the lower region of the receptacle, a filtering bag surrounding the suction-producing mechanism and disposed in the upper region of said receptacle, a pervious moisture-baffling diaphragm disposed between the receptacle inlet and said filtering bag and serving to intercept liquid from the air before it is drawn upwardly to said filtering bag and an auxiliary dirt receptacle disposed within the first-named receptacle and surrounding the filtering bag and serving as a baffle means to cause air and liquid being drawn into the receptacle to pass upwardly to substantially the top of the receptacle before striking said filtering bag.

15 7. In a vacuum cleaner, a vertically disposed elongated receptacle comprising upper and lower detachable members, a suction-producing mechanism disposed within the upper receptacle member, an inlet leading into the lower receptacle member, a filtering bag surrounding the suction-producing mechanism and disposed in the upper receptacle member, a moisture-baffling diaphragm disposed in the lower receptacle member and serving to intercept heavy moisture and an auxiliary dirt receptacle disposed within the upper receptacle member and surrounding the filtering bag and serving as a baffle means to cause moisture laden air being drawn into the receptacle to pass upwardly to substantially the top of the receptacle before striking said filtering bag.

20 8. In a vacuum cleaner, an elongated receptacle, a suction-producing mechanism disposed within the receptacle adjacent one end thereof, an inlet in the receptacle and disposed remotely

from the suction mechanism, a filtering bag surrounding the suction-producing mechanism, a pervious moisture-baffling diaphragm disposed between the receptacle inlet and said filtering bag and serving to intercept liquid from the air before it is drawn upwardly to said filtering bag and an auxiliary dirt receptacle disposed within the first-named receptacle and surrounding the filtering bag and serving as a baffle means to cause moisture-laden air being drawn through the membrane to pass substantially to one end of the receptacle before striking said filtering bag.

25 9. A housing structure for a filter bag comprising a receptacle adapted to contain a filter bag in its upper portion and having an air receiving chamber in its lower position, an inlet leading into the air chamber of the receptacle, an auxiliary dirt receptacle mounted in the upper portion of the receptacle, open at its top and surrounding the filter bag and serving to cause air being drawn into the receptacle to pass upwardly to substantially the top of the receptacle before striking the filter bag, and a pervious moisture-baffling diaphragm disposed between the receptacle inlet and the filter bag and serving to intercept liquid from the air before the same is drawn upwardly to the filtering bag.

30 10. A housing structure for a cylindrical filter bag through which dust-laden air is drawn by suction means communicating with the interior of the bag, said housing comprising a receptacle having an inlet leading into its lower portion and spaced from the bottom of said receptacle, and having an upper portion adapted to receive the filter bag, an open topped container in the upper portion of said receptacle, the walls of said container being disposed between the exterior of the filter bag and the sides and bottom of the receptacle and being spaced from the top of the receptacle, a screen, secured to said container in spaced relation below the bottom wall thereof and extending across the receptacle so that all air must pass through said screen prior to the entrance of such air into the filter bag, said container and screen being removable as a unit from the receptacle.

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