SUCTION CLEANER STRUCTURE

Fig. 1.

Fig. 2.

Fig. 3.

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Suction Cleaner Structure

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6 Claims. (Cl. 183—37)

This application is a division of our application Serial No. 398,574, filed December 16, 1953, now Patent No. 2,794,513, granted June 4, 1957 for Suction Cleaner Structure.

This invention relates to suction cleaners, and it is an object of the invention to provide an improved suction cleaner which is simple to operate, and to provide a construction having a compact arrangement of parts.

Further objects and advantages of the invention will become apparent as the following description proceeds, and the features of novelty which characterize the invention will be pointed out with particularity in the claims annexed to and forming a part of this specification.

For a better understanding of the invention, reference may be had to the following description taken in connection with the accompanying drawings in which:

Fig. 1 is a perspective view of a suction cleaner embodying the invention;

Fig. 2 is a vertical sectional view of the suction cleaner shown in Fig. 1 to illustrate details; and

Fig. 3 is a top plan view of the suction cleaner shown in Figs. 1 and 2.

Referring to Figs. 1, 2 and 3, the suction cleaner which we have shown embodying the invention comprises an elongated casing 10 which is generally oval-shaped in horizontal section and includes an open top shell 11 and a removable cover 12. The shell 11 comprises a bottom 14 and an upstanding side wall 15, elongated runners 16 being stamped from the bottom to facilitate movement of the cleaner on a supporting surface.

The open top shell 11 is provided with a cross wall or partition 17 to divide the shell into adjacent spaces 18 and 19. The top edge of the partition 17 and upper edge portions of the shell 11 define an access opening into the space 18 at which region is supported the top marginal edge of a perforated receptacle 20. The space 19, within which a motor fan unit 21 is mounted in any well known manner, is defined by the partition 17 and also by a top wall portion 22 of the shell 11, such top wall having an opening 22 therein.

In accordance with the invention, the cover 12 is formed to provide a part of the air flow passage between the inlet 23 and outlet 24 and a dust separating member or filter element 25 is carried at the underside thereof. As seen in Fig. 2, the cover 12 includes a conduit section 26 into which air is drawn into the inlet 23 thereof which is located at the upper part of the casing 10 at the wider end thereof. The conduit section 26 is bent downwardly for directing air into the receptacle 20.

The cover 12 comprises an outer wall 27 and an inner limited or well 28 spaced therefrom to provide an elongated passage 29. The part of the inner wall 28 above the space 18 includes a horizontally extending section 30 having an opening 31, the wall section 30 serving as a partition between the passage 29 and the filter element 25 which is secured in any suitable manner to a downwardly extending collar or flange 32 of annular form at the underside of the cover 12. The dust separating member 25, which is generally flexible in character, is formed with circular folds which are concentric with respect to one another, and the points of the folds may be arranged to pass over wires (not shown) which not only define the shape of the circular folds but also serve to reinforce the dust separating member.

A valve plate or disk 33 is fixed to the central region of the dust separating member immediately beneath the opening 31 in the inner wall section 30 of the cover 12. A suitable torsion spring 34 is provided at the underside of the cover 12 which resiliently biases the valve plate 33 to the position shown in Fig. 2. Under certain operating conditions which will be described presently, the valve plate 33 moves toward the opening 31 in the cover 12.

A suction hose (not shown) is adapted to be removably secured in any suitable manner to the inner wall section of the suction cleaner. Suitable cleaning appliances may be connected to a wand which in turn is connected to the outer free end of the suction hose and through which air is drawn through the conduit section 26 by the motor fan unit 21.

During operation of the suction cleaner, dust-laden air is drawn through the conduit section 26 into a dust collecting bag 35 retained in the apertured receptacle 20. The bag 35 may be of the throw-away type and formed of paper or other suitable material impermeable to dust.

Air from which dust and dirt have been separated by the filter element 25 flows through the opening 31 in the inner wall section 30 into the elongated passage 29 formed in the cover 12. Air flows from the passage 29 through the opening 22' into the space 19 in which the motor fan unit 21 is located. Air enters the suction inlet 36 of the unit 21 and is discharged therefrom through the outlet 24 at the rear end of the casing 10.

Since dust and dirt are trapped at the underside of the filter element 25, there is a tendency for the latter to become clogged during operation of the cleaner. When the filter element 25 becomes clogged with dirt to such an extent that the flow of air therethrough becomes restricted, the suction effect developed by the motor fan unit 21 tends to impart upward movement to the filter element against the biasing action of the torsion spring 34. With such upward movement of the filter element 25, the valve plate 33 moves toward the seat formed by the opening 31, such movement of the valve plate 33 being effective to dislodge dust and dirt from the filter element. It will be seen in Fig. 2 that the opening 31 is formed so that the long arm of the torsion spring 34, which is fixed to the valve plate 33, can move into a part of the opening.

After dust and dirt are dislodged from the filter element 25, the rate at which air flows therethrough increases and the filter element tends to move downwardly, such downward movement being aided by the torsion spring 34. Due to movement imparted to the filter element in the manner just described, the filter element will vibrate up and down during operation of the cleaner and cause dust and dirt to be dislodged therefrom and collect in the bag 35. There is always some flow of air through the opening 31 even when the valve plate 33 moves toward its seat at the opening 31, so that the valve plate 33 never completely closes the opening 31 and can move downwardly with the aid of torsion spring 34 after dust and dirt are dislodged from the filter element.

The cover 12 is removably secured to the shell 11 in any suitable manner (not shown). To facilitate handling of the cover 12, the latter is formed with a raised section 36 which extends lengthwise of the cleaner and at oppos-
ing sides of which are formed horizontally extending deck portions 37. The opposing sides of the raised section 36 may be notched or recessed at 38 to provide a suitable hand grip at 39 for the cover 12. The shell 11 at the top part of the rear end thereof is provided with a suitable electrical switch having an operating member 50 projecting through an opening in the cover 12.

The electrical switch (not shown) is carried at the rear end of the shell 11 in any suitable manner and includes a conventional contact socket or receptacle adapted to receive a connecting plug 51 connected by an electrical cord 52 to a source of electrical supply. Hence, the cover 12 in Figs. 1, 2 and 3 forms a protective hood for the electrical switch provided to control the supply of electrical energy to the motor of the motor fan unit 21. When the cover 12 is removed to insert a clean dust bag 35 in the apertured receptacle 20, it is convenient to make use of the suction effect developed by the motor fan unit 21 to open the bag and fit the latter snugly within the receptacle.

In accordance with our invention, the suction effect developed by the motor fan unit 21 is employed in position a clean dust bag 35 in the receptacle 20 by closing the passage 29 and providing a direct path of air flow from space 18 into space 19 through an opening 40 in the partition 17 therebetween. As shown in Fig. 2, a valve plate 41 hinged at 42 is provided to close the opening 22 when the cover 12 is removed from the shell 11. When the cover 12 is removed, the valve plate 41 is moved to its closed position by a resilient leaf spring 43. The cover 12 is provided with a pin 44 at the underside thereof which is adapted to bear and act against the valve plate 41 when the cover 12 is positioned on the shell, the pin in such case being effective to move the valve plate 41 to its open position against the biasing action of the leaf spring 43.

During operation of the cleaner, the opening 40 in partition 17 is normally closed by a disk 45 which is carried at the lower end of a lever 46 pivoted intermediate its ends at 47 to the partition. A suitable torsion spring 48 is provided at 47 to urge the disk 45 to its open position. When the cover 12 is positioned on the shell 11, the extreme upper end of the lever 46 is held at the top part of an inclined edge of a projection 49 at the underside of the cover, as shown in Fig. 2. In this position the lever 46 effectively holds the disk 45 in its closed position at the opening 40 against the biasing action of the torsion spring 48.

Upon removing cover 12 from the shell 11, the torsion spring 48 becomes effective to move disk 45 to its open position. At the same time, valve plate 41 is moved to its closed position by the leaf spring 43. With passage 29 closed by the valve plate 41 at the spaces 18 and in communication with one another through the opening 40, the full suction effect developed by the motor fan unit 21 can be effectively employed to draw a clean dust bag 35 against the inner surfaces of the apertured receptacle 20. After a clean dust bag is properly placed in position in this manner, the cover 12 can be secured in position, the pin 44 at the underside thereof being effective to open valve plate 41 against the action of leaf spring 43. When the cover 12 is placed in position on the shell 11, the extreme upper end of lever 46 initially will engage the bottom part of the inclined edge of the projection 49 at the underside of the cover, the lever 46 being in such an inclined position from the vertical due to the biasing action of the torsion spring 48.

As the cover 12 is being lowered into position, the extreme upper end of the lever 46 rides upwardly on the inclined edge of the projection 49, the link during such contact with the projection shifting counter-clockwise about its pivot at 47 and being effective to maintain disk 45 in its closed position when the cover 12 is in the position shown in Fig. 2. Hence, after the cover 12 is mounted in position on the shell 11, the opening 40 in partition 17 is closed by the disk 45 and the valve plate 41 is moved to its open position by the pin 44, so that the circulation of air will again be effected upwardly through the filter element 25 and passage 29 into the space 19. Such circulated air is effected by the motor fan unit 21 from which air is discharged at the outlet 24 at the rear of the cleaner.

Although a single embodiment of the invention has been shown and described, we do not wish to be limited to the particular form set forth, and we intend in the following claims to cover all modifications which do not depart from the spirit and scope of the invention.

What is claimed is:
1. In a suction cleaner having a casing provided with an inlet and an outlet and a dust collector therein for collecting dust removed from air circulated through by a motor-fan unit, said casing including an open top shell having a bottom and upstanding side wall and a removable cover for closing the opening, said shell having a partition forming a unitary part thereof to provide several spaces therein, an apertured receptacle being disposed at one side of said partition and said motor fan unit being disposed at the opposite side thereof, said dust collector comprising a dust bag adapted to be held within said apertured receptacle, said partition having an opening providing communication between said motor fan unit and the space in which said apertured receptacle is disposed when said cover is removed from its closed position on said shell, and means operable when said cover is in its closed position on said shell to close the opening in said partition.
2. Apparatus as set forth in claim 1 including means providing a passage for normal flowing air from said dust collector to said motor fan unit, valve means operable between open and closed positions to permit or shut off flow of air from said passage into said space in which said motor fan unit is disposed, and means for moving said valve means to its closed position when said cover is removed from said shell and to its open position when said cover is positioned on said shell.
3. In a suction cleaner having a casing provided with an inlet and an outlet and dust separating means therein for removing dust from air circulated therethrough by a motor-fan unit, said casing including an open bottom section and a top section serving as a cover for said bottom section, an apertured receptacle, a dust bag associated with said dust separating means which is adapted to be held in said receptacle, structure embodied in said casing for normally flowing air from said inlet to said outlet in a path of flow which includes said dust separating means and then said motor-fan unit, and means for modifying the normal path of flow of air in said casing responsive to removal of said cover from said bottom section, said last-mentioned means including structure to flow air in a path of flow which by-passes said dust separating means and subjects said apertured receptacle to the suction effect produced by said motor-fan unit.
4. In a suction cleaner having a casing provided with an inlet and outlet and dust separating means therethrough by a suction producing unit, said casing having an access opening and a removable cover for closing the opening, said casing having partition means forming a unitary part thereof to provide several spaces therein, an apertured receptacle which is disposed in a first space and within which the dust bag is adapted to be held, said suction producing unit being disposed in a second space, the first and second spaces being separated from one another by said partition means, said partition means having an opening providing communication between the first and second spaces when said cover is moved from its closed position on said casing, and means operable when said cover is in its closed position on said casing to close the opening in said partition means.
5. Apparatus as set forth in claim 4 including means providing a passage for normally flowing air from the dust bag to the second space in a path of flow which bypasses the opening in said partition means, control means for controlling flow of air in said passage to the second space, and means for rendering said control means operable to close said passage when said cover is moved from its closed position on said casing and for rendering said control means operable to open said passage when said cover is in its closed position on said casing.

6. In a suction cleaner having a casing provided with an inlet and an outlet and dust separating means for removing dust from air circulated therethrough by a suction producing unit, said casing having an access opening and a cover for closing the opening, an apertured receptacle, a dust bag associated with said dust separating means which is adapted to be held in said receptacle, structure embodied in said casing for normally flowing air from the inlet to the outlet in a path of flow which includes said dust bag and said suction producing unit, and means for modifying the normal path of flow of air in said casing responsive to movement of said cover from its closed position on said casing, said last-mentioned means including structure to flow air in a path of flow which bypasses said dust separating means and subjects said apertured receptacle to the suction effect produced by said suction producing unit.

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