

Jan. 27, 1970

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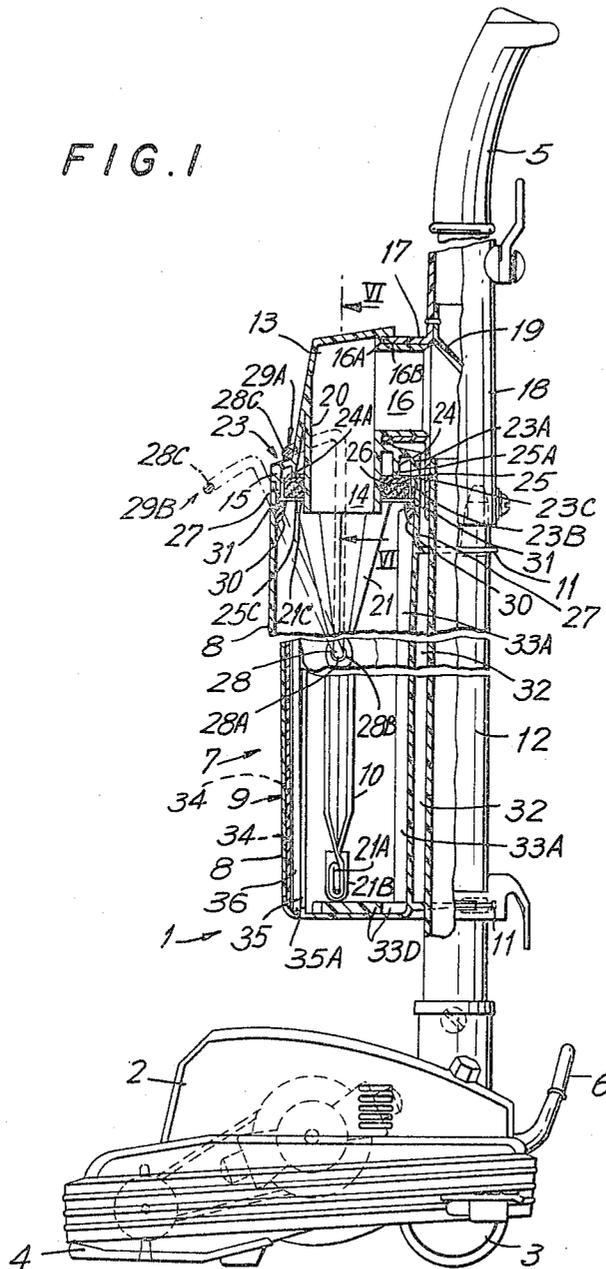
3,491,519

VACUUM CLEANER

Filed Oct. 25, 1967

7 Sheets-Sheet 1

FIG. 1



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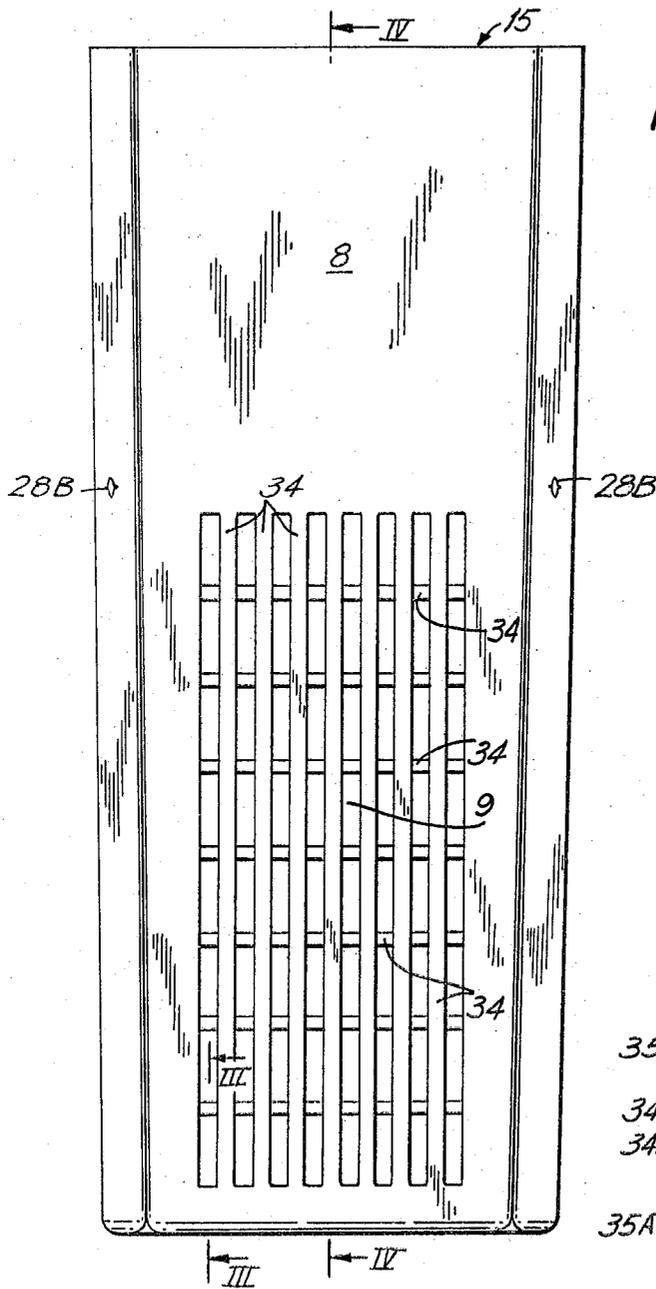


FIG. 2

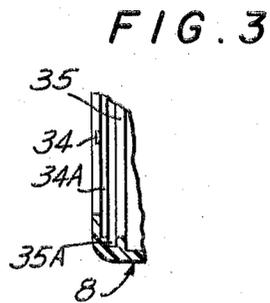


FIG. 3

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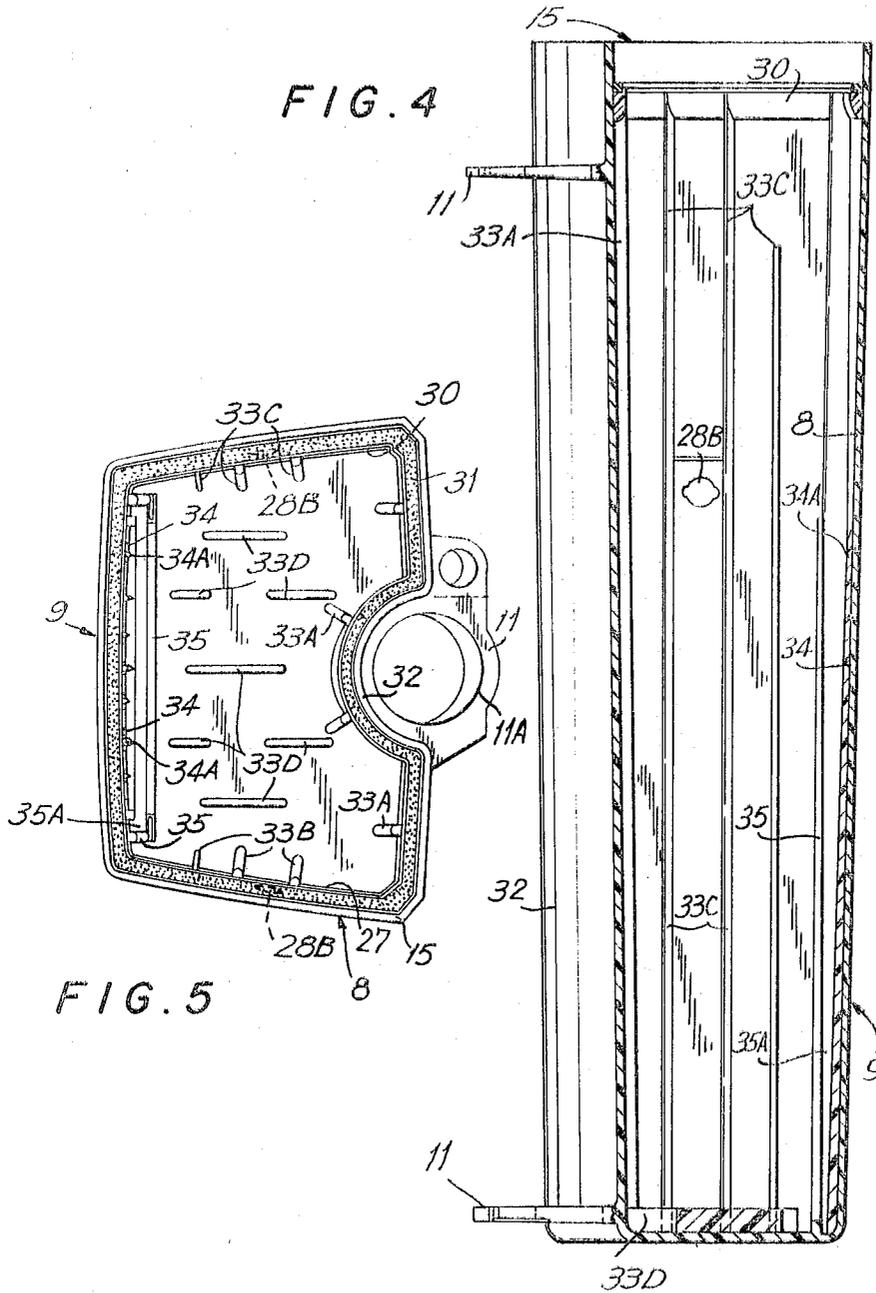
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VACUUM CLEANER

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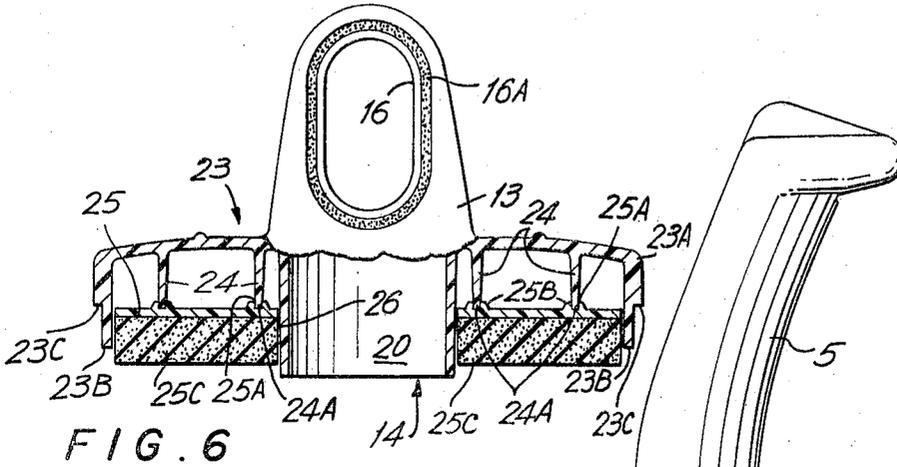


FIG. 6

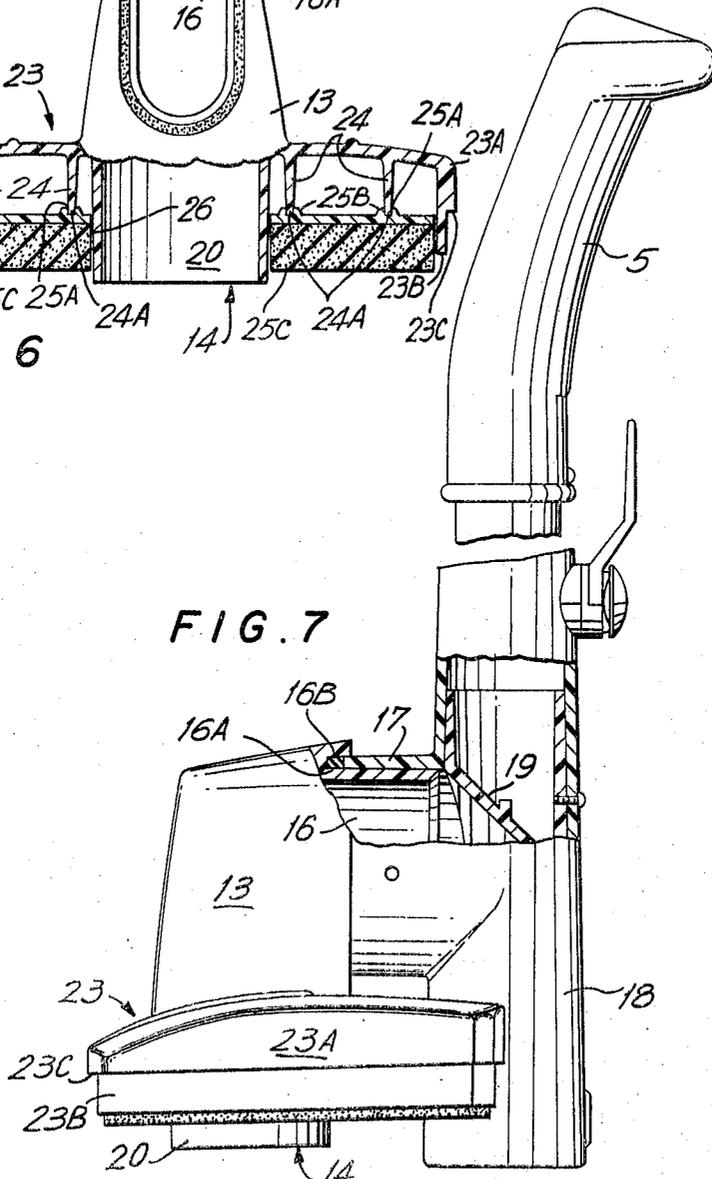


FIG. 7

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FIG. 8

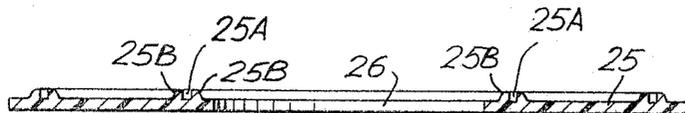
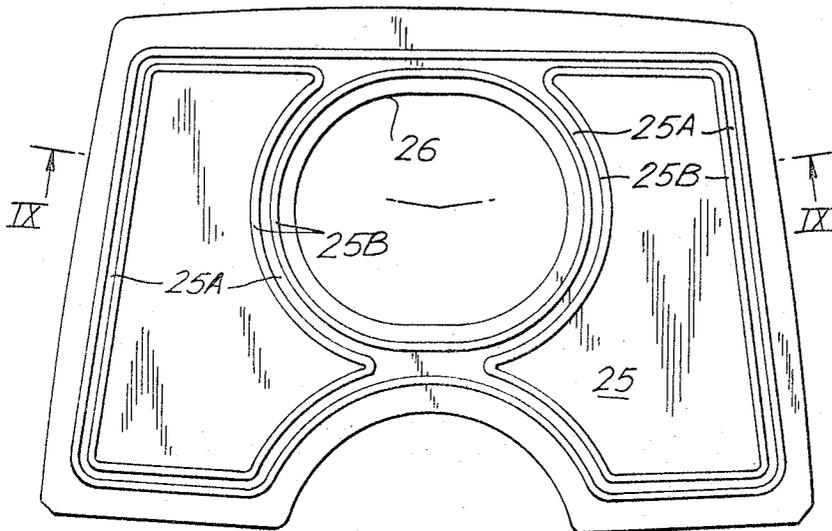


FIG. 9

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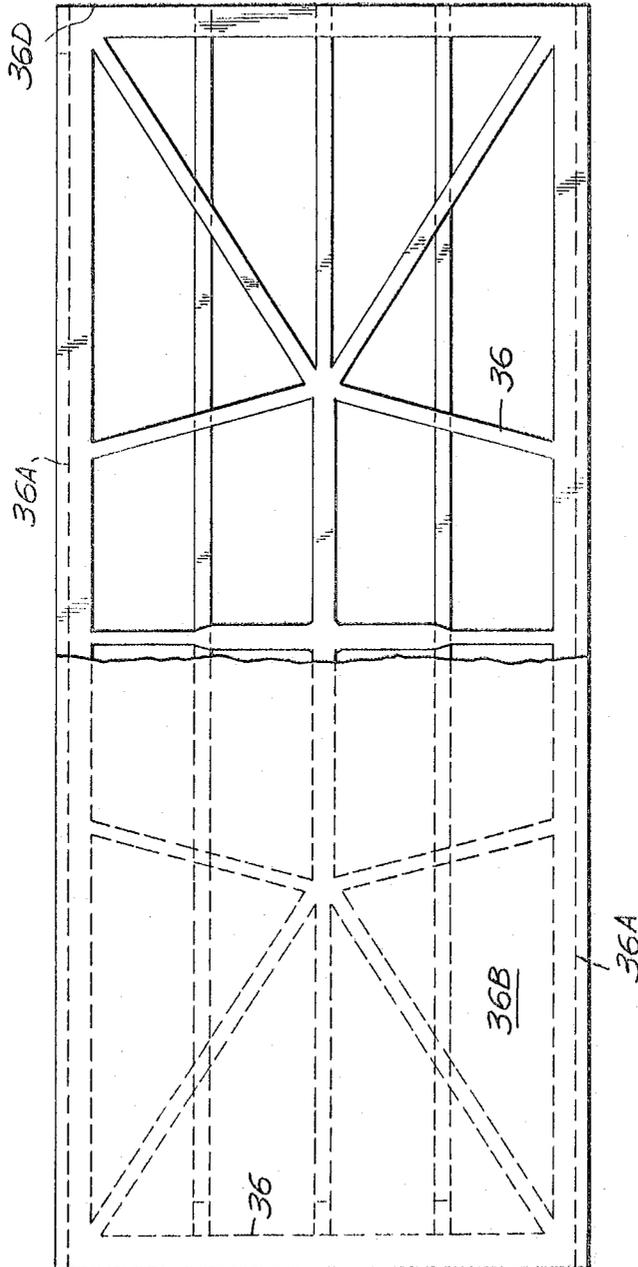
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FIG. 10



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FIG. 11

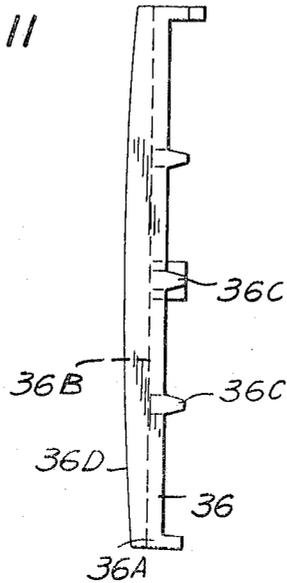
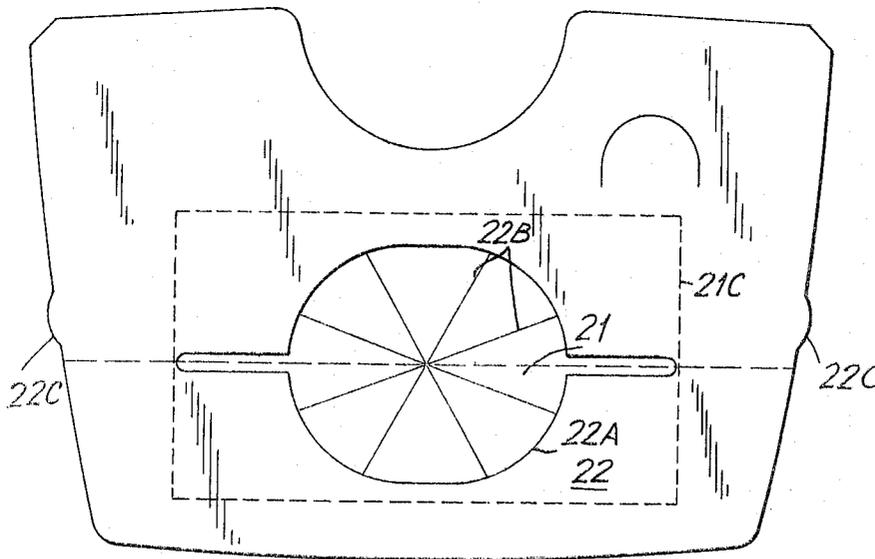


FIG. 12



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VACUUM CLEANER

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14,735/66

Int. Cl. B01d 46/02

U.S. Cl. 55—357

5 Claims

ABSTRACT OF THE DISCLOSURE

A vacuum cleaner having a casing and a pivotally connected upright handle for manipulating the casing over a surface to be cleaned, the casing having a motor-driven brush at the vicinity of an air inlet and a motor-fan unit for drawing air through the casing from the inlet to an outlet connected to a tube forming a major part of the handle and from the upper end of which dust-laden air discharged from the motor-fan unit flows to a dust collector. The dust collector comprises a rigid container which is carried by the handle and within which is positioned a disposable dust bag into which dust-laden air is introduced. The rigid container is provided with an apertured grille from which air is discharged from the vacuum cleaner, such grille having a sheet of air permeable material to remove fine dust particles from the air. The inner disposable dust bag is provided with a flexible cover formed with an air inlet and is sealed to prevent air and dust escaping from the dust collector. The rigid container and a rigid open-ended conduit in communication therewith for introducing dust-laden air into the inner disposable dust bag are movable with respect to one another in a first direction for inserting and removing the rigid open-ended conduit into and from the dust collector and also are movable in a second direction perpendicular to the first direction to facilitate removal of the inner disposable dust bag from the rigid container and insertion of a fresh dust bag into the container.

BRIEF SUMMARY OF THE INVENTION

My invention relates to a vacuum cleaner of the type having a casing movable over a surface to be cleaned and an elongated and upstanding handle pivotally connected to the casing. In a vacuum cleaner of this type the casing contains a motor-fan unit which draws in air and dust through an inlet opening at the bottom of the casing and discharges the air and dust from the casing to a dust bag.

This type of cleaner has long been known and it has been the usual practice to suspend an expansible dust bag from the handle. This arrangement has the disadvantage that disposal of dust from the dust bag is an inconvenient and inefficient operation. Many attempts have been made to avoid this disadvantage.

In one known arrangement the handle forms a passage for the air and dust which flows from the passage into the upper end of a suspended dust bag in the form of a removable inner bag disposed in an outer flexible bag. This arrangement also has the disadvantage that the removal of the inner dust bag is rather inconvenient. In another known arrangement the dust bag is in the form of a removable inner bag disposed in a rigid outer container which forms part of the handle. This also has the disadvantage that removal of the inner bag is rather inconvenient.

It is an object of my invention to avoid the disadvantages of these known vacuum cleaners, and, according to my invention, I provide an improved vacuum cleaner of

this kind having a casing movable over a surface to be cleaned and an elongated upstanding handle pivotally connected to the casing in which the dust collector comprises an outer rigid container having an air discharge opening and an inner disposable dust bag, the rigid container being carried by the handle. Preferably, air and dust flow to the dust collector through a tube which has an end portion remote from the casing, the end portion being rigid and open-ended, and the rigid container has an inlet opening through which the end portion penetrates into the container and the disposable dust bag therein.

In order that the disposable dust bag, which may be formed of paper, for example, can be quickly and easily replaced in a hygienic manner, the rigid container and the rigid open-ended end portion of the tube are relatively movable in two directions, preferably a first direction in which they are moved together or apart, and a second direction in which, once apart, the inlet opening of the container can be moved clear of the rigid end portion of the tube, whereby the inner disposable bag can then be lifted from the rigid container and a fresh disposable dust bag can be inserted into the container.

The dust collector may have two filters, the disposable dust bag constituting a primary filter and a sheet of air permeable material constituting a secondary filter which extends entirely over the air discharge opening of the rigid container.

To insure good air flow and efficient filtering action, the interior of the rigid container may be formed with internal ribs for spacing the disposable dust bag from the walls of the container. Further, the secondary air filter may include a frame which has ribs for spacing the disposable dust bag from the secondary filter. The air discharge opening may be in the form of a grille, and the grille preferably is formed with internal ribs for spacing the secondary filter from the grille.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING

In the drawing, FIG. 1 is a side elevational view, partly broken away and in section, of a vacuum cleaner embodying the invention, certain details being omitted to illustrate the invention more clearly;

FIG. 2 is a front elevational view of the rigid outer container of the dust collector shown in FIG. 1;

FIG. 3 is a fragmentary sectional view taken at line III—III of FIG. 2;

FIG. 4 is a sectional view taken at line IV—IV of FIG. 2;

FIG. 5 is a top plan view, partly broken away and in section, of the rigid outer container of the dust collector shown in FIG. 1;

FIG. 6 is a fragmentary sectional view taken at line VI—VI of FIG. 1;

FIG. 7 is an enlarged fragmentary side elevational view, partly in section, to illustrate details in FIG. 1 more clearly;

FIG. 8 is a top plan view of a part shown in FIG. 1;

FIG. 9 is a horizontal sectional view taken at line IX—IX of FIG. 8;

FIG. 10 is a front elevational view, partly broken away and in section, of details shown in FIG. 1;

FIG. 11 is a top plan view, partly in section, illustrating the detail shown in FIG. 10; and

FIG. 12 is an enlarged top plan view of the flexible cover of the inner disposable dust bag of the dust collector shown in FIG. 1.

DETAILED DESCRIPTION

Referring to the drawing, a vacuum cleaner indicated generally by reference numeral 1 includes a casing or

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part 2 having a pair of wheels 3, only one of which is shown, and a slide 4. Within the casing 2 are disposed an electric motor-fan unit and a rotatable brush (not shown) which is driven by the motor and disposed at an air inlet at the bottom of the casing 2. An elongated handle 5 extends vertically upward from the casing or part 2 and its lower end is pivotally connected in known manner to the casing 2. An electric supply cable is indicated at 6.

A dust collector, generally indicated at 7, comprises an outer rigid container 8 having an air discharge opening 9 and an inner disposable bag 10 which may be formed of paper, for example. The rigid container 8 is carried on the handle by brackets 11.

The handle 5 is hollow and includes a major straight portion 12 which forms a part of conduit means through which air and dust discharged from the motor-fan unit flow to the dust collector 7. An end portion 13 of a tube remote from the casing 2 is formed of rigid material, such as, for example, a thermosetting plastic, and is open-ended, as seen at 14.

The outer rigid container 8 is open at the top to provide an air inlet opening 15.

The end portion 13 comprises an elbow or bent member having two rigid hollow arms, one arm 16 of which is oval in cross-section (FIG. 6) and telescopically fits into a projecting collar 17 of a tubular handle part 18 fitting over the upper end of the straight tube portion 12, as seen in FIG. 1. The handle part 18 is provided with an internal baffle 19 which is inclined to deflect air and dust into the arm 16 and functions to close the upper part of the handle. As seen in FIGS. 1 and 6, the arm 16 has a groove 16A in which a sealing ring 16B is disposed and in which the end of the collar 17 fits.

The other arm 20 of the bent member 13 also is oval in cross-section and is at a right angle to the arm 16. The arm 20 is of such length that its open end 14 penetrates through the air inlet opening 15 into the rigid container 8 and into the disposable bag 10. Hence, air flows through the hollow handle 12 in one direction toward the outer end thereof and then flows in a second opposite direction in the hollow arm 20 of the elbow 13, the outer end of the hollow arm 20 being laterally removed from the hollow straight portion 12 of the handle 5.

The disposable bag 10 may comprise a pleated tube 21 of air pervious paper, the open lower end 21A of which is folded over and clamped by a clip 21B, as shown in FIG. 1. The top closed end 21C of the bag is fixed to the underside of a cardboard top or flexible cover 22. The open end 14 of the arm 20 penetrates into the disposable bag through an oval hole 22A in the cardboard top (FIG. 12) and through slits 22B cut in the top of the pleated paper tube 21. Small projections 22C at each of a pair of opposite edges engage the inner surfaces of the upper ends 27 of the walls of the rigid container 8 in such manner that the cardboard top 22 exerts a slight pressure against the walls to retain the top accurately in position when it is inserted in the container 8 and before the container is drawn upward into sealing contact with a closure or cover 23 by moving a bail 28 to its operative position 29A in FIG. 1.

It will be seen that the bent member or elbow 13 is fixed to the handle and that the rigid container 8 is carried on the handle by the brackets 11. As shown in FIGS. 4 and 5, each of the brackets 11 has a circular opening 11A, the openings having a common axis which coincides with the axis of the handle tube 12, the major portion of the handle tube passing freely through the pair of openings 11A. In this way the rigid container 8 can be moved in a first direction parallel to the axis of the handle tube 12, that is, up and down on the handle tube relative to the end portion or bent member 13. It will also be seen that when the rigid container 8 is moved downward and clear of the open end 14 of the arm 20, the container can also be swung in a second direction in a plane at a right angle to the axis of the handle and the first direc-

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tion. In other words, the container 8 can be swung laterally on the handle and angularly moved about the handle, so that the air inlet opening 15 of the rigid container will be angularly offset and clear of the open end 14 of the arm 20, and the inner disposable dust bag 10 then can be lifted upward out of the outer rigid container 8 for inspection and, if necessary, replaced by a fresh dust bag inserted into the container.

Referring to FIGS. 1 and 6 to 9, the bent member 13 having the elbow or two arms 16 and 20 may be molded in one piece with a closure or cover 23 for the rigid container 8 forming a unitary part thereof, the cover 23 having an aperture through which a part of the hollow arm 20 extends. The closure or cover includes a skirt 23A formed with a depending lip 23B and a shoulder 23C. The closure 23 also includes depending ribs 24 to the lower free ends 24A of which a sealing plate 25 is anchored (FIGS. 8 and 9). The ends 24A fit into grooves 25A defined by molded ribs 25B. The shape of the ribs 24 and grooves 25A is such that sealing pressure is applied to the plate around its periphery and around its central hole 26 through which the arm 20 passes. A body 25C of resilient sealing material is fixed to the underside of the plate 25.

As seen in FIG. 1, the depending lip 23B telescopically fits within the upper ends 27 of the walls defining the inlet opening 15 of the rigid container 8, the shoulder 23C resting at the top edge of the container. The container 8 is firmly held in this position by the U-shaped bail 28, the ends 28A of which are held in openings 28B in the rigid container 8. The top part or cross member 28C of the bail exerts downward force on the top surface of the closure or cover 23, as indicated by arrow 29A in FIG. 1. The free or release position of the bail is indicated by arrow 29B. In its operative position 29A, the bail 28 draws the rigid container 8 upward into tight engagement with the closure or cover 23. In such operative position the container 8 is held at the arm 20 of the elbow 13 with the container bearing against the cover 23 which, as explained above, forms a unitary part of the arm 20. With the bail 28 in its release position 29B, the rigid container 8 can be lowered clear of the closure or cover 23.

At the inlet opening 15 of the rigid container 8 a ledge 30 extends about the inner surfaces of the walls of the container (FIG. 1), the ledge being spaced from the depending lip 23B so that the cardboard top or flexible cover 22 and a sealing ring 31 will be clamped between the ledge and the lip. In this position the top surface of the cardboard top 22 will be firmly pressed against the body 25C of resilient sealing material. With this arrangement double sealing is obtained. First, air and dust cannot escape from the interior of the disposable bag 10 through the oval hole 22A. Second, air cannot escape from the interior of the rigid container 8 past the outer periphery of the cardboard top or flexible cover 22.

As seen in FIGS. 4 and 5, the outer rigid container 8 is formed with an elongated recess 32 of concave cross-section in which part of the handle tube is disposed (see also FIG. 1). The elongated recess 32 defines a concave-shaped wall portion of the container 8 which extends lengthwise thereof. The brackets 11 comprise collars which, as seen in FIG. 5, are fixed to the container. The convex exterior surfaces of the collars snugly fit in the concave-shaped wall portion 32, as shown in FIG. 4, the concave-shaped wall portion 32 embracing the straight section 12 of the handle 5. The collars 11 are axially movable lengthwise of the handle 5 and also are angularly turnable thereon and function to enable the container to be moved axially of the handle and also be angularly turned about the axis of the handle with respect to the outer end 14 of the arm 20 of the elbow. In this way the disposable dust bag in the container 8 can be inspected or replaced when the holding means or U-shaped bail 28 is rendered ineffective and the container

8 and outer end 14 of the arm 20 are separated by axial movement of the container 8.

In FIG. 5 the ledge 30 has been omitted in order to illustrate more clearly internal spacing ribs 33A, 33B and 33C which are molded in the back and side walls, respectively, of the rigid container 8. The bottom of the container 8 has molded spacing ribs 33D. All of these internal spacing ribs function to prevent the outer surface of the disposable bag 10 contacting and touching the inner surfaces of the rigid container 8, so that air can readily pass from the interior of the disposable dust bag to the interior of the container 8 and flow therefrom through the air discharge opening 9. (Ribs 33C are omitted from FIG. 1, for clarity.)

The air discharge opening 9 is in the form of a grille having bars 34. Spacing ribs 34A are formed at the inner faces of the vertical bars.

A locating rib 35 is formed within the rigid container 8 about the grille (FIGS. 1, 3, 4 and 5) except at the top edge of the grille. At the bottom and side edges of the grille the rib 35 defines a recess 35A which is U-shaped in section and receives a frame 36 (FIGS. 1, 10 and 11) of a secondary filter which functions as a fine air filter and also acts as an air diffuser. The frame 35 preferably is formed of polyethylene and integrally bonded to edge zones 36A of a sheet 36B of air permeable filter material, such as a cellulose-plastic, for example. The frame 35 includes spacing ribs 36C for spacing the disposable bag 10 from the secondary filter 36B. The upper end of the frame is formed with a projecting lip 36D which in its operative position abuts the inner wall surface of the rigid container 8 above the air discharge opening 9.

I claim:

1. A vacuum cleaner comprising
 - (a) a part having an air inlet, said part in normal use being movable over a surface to be cleaned,
 - (b) an elongated hollow handle extending vertically upward from said part in normal use thereof,
 - (c) means connecting the lower end of said handle to said part,
 - (d) conduit means comprising said handle for conducting dust-laden air from said part toward the outer end of said handle in a first direction,
 - (e) an elbow having first and second rigid hollow arms in communication with one another,
 - (f) means for mounting said elbow in a fixed position on said handle for said first arm to receive dust-laden air from said hollow handle,
 - (g) said second hollow arm, which is laterally removed from said handle and terminates in an outer end, functioning to conduct dust-laden air in a second direction opposite to the first direction,
 - (h) a dust collector comprising an outer rigid container having an opening for discharging air therefrom and an inner disposable dust bag, said outer container having an inlet opening,
 - (i) means for removably holding said container in an operative position at said second arm of said elbow for introducing dust-laden air from the outer end thereof into said disposable dust bag within said container,
 - (j) means for mounting said container on said handle for axial and angular turning movement thereon,
 - (k) said mounting means including structure functioning to enable said container to be moved axially of said handle, and
 - (l) said mounting means structure further functioning to enable said container to be turned about the

axis of said handle to a position angularly offset with respect to the outer end of said second arm of said elbow for inspecting or replacing said disposable dust bag in said container when said holding means is rendered ineffective and said container and outer end of said second arm of said elbow are separated by movement of said container axially of said handle.

2. A vacuum cleaner as set forth in claim 1 in which said container includes an open-ended vessel, a cover for closing said container, said cover having an aperture, and said cover forming a unitary part of said second arm of said elbow and through the aperture of which at least a portion of said second arm extends.

3. A vacuum cleaner as set forth in claim 1 in which said means for holding said container in an operative position at said second arm of said elbow includes structure which functions to draw said container axially of said handle and forcibly hold it against a unitary part of said second arm of said elbow.

4. A vacuum cleaner as set forth in claim 1 in which said container includes a wall having a concave-shaped portion extending lengthwise thereof, said concave-shaped wall portion of said container being disposed about and embracing said handle.

5. A vacuum cleaner as set forth in claim 4 in which said structure forming a part of said means for mounting said container on said handle for axial and angular turning movement thereon comprises at least a pair of spaced brackets which are fixed to said container and include collars through which said handle extends, said collars being axially movable and angularly turnable on said handle, and said collars having convex exterior surfaces which snugly fit in the concave-shaped wall portion of said container.

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U.S. Cl. X.R.

15—327, 350; 55—358, 367, 372, 373, 378, 473; 229—62.5; 230—117; 285—7; 306—1