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Schmitz

[11] **3,763,635**

[45] **Oct. 9, 1973**

[54] **VACUUM CLEANER CONSTRUCTION**

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[73] Assignee: **Whirlpool Corporation**, Benton Harbor, Mich.

[22] Filed: **Sept. 30, 1971**

[21] Appl. No.: **185,134**

[52] **U.S. Cl.** ..... **55/374**, 15/327 R, 15/351, 55/472, DIG. 3, 165/181, 417/423 A

[51] **Int. Cl.** **B01d 46/02**

[58] **Field of Search** ..... 55/361-379, 467-473, 55/356, 357, DIG. 3; 15/352, 351, 327 R; 310/62, 63, 89; 417/323, 423 A; 165/181

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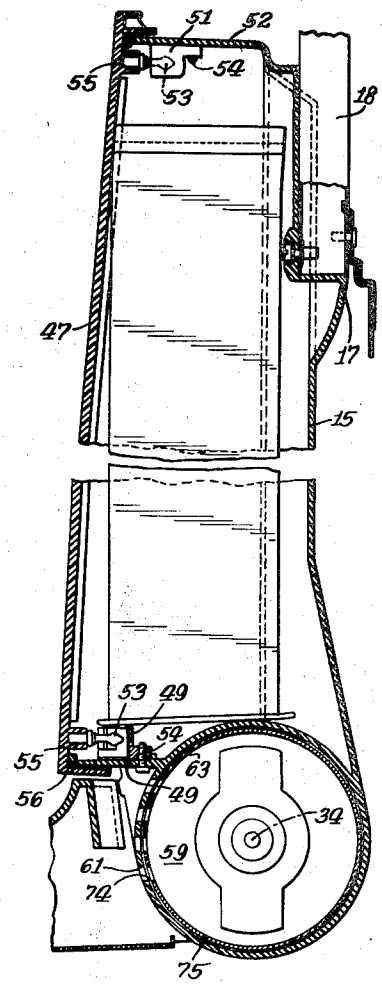
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Primary Examiner—Bernard Nozick
Attorney—James S. Nettleton et al.

[57] **ABSTRACT**

An upright vacuum cleaner construction having a one-piece housing defining means for housing the motor-driven fan and the dust-collecting bag. The housing is adapted to be pivotally carried on a base assembly defining a nozzle so as to dispose a handle secured to the housing suitably for manipulation of the vacuum cleaner by the user. The housing may be formed of molded plastic and may be provided with a flameproof enclosure surrounding the motor and electrical wiring in the lower portion thereof for preventing injury to the relatively flammable plastic housing portions. The lower portion of the housing may be cylindrical and the motor-driven fan means may be disposed coaxially thereof for pivoting coaxially on the base assembly. The fan means may be arranged to direct air from the bag space over the electrical wiring and motor so as to cool the motor and discharge the air to exteriorly of the housing away from the bag enclosing portion.

10 Claims, 5 Drawing Figures



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SHEET 1 OF 2

Fig. 1.

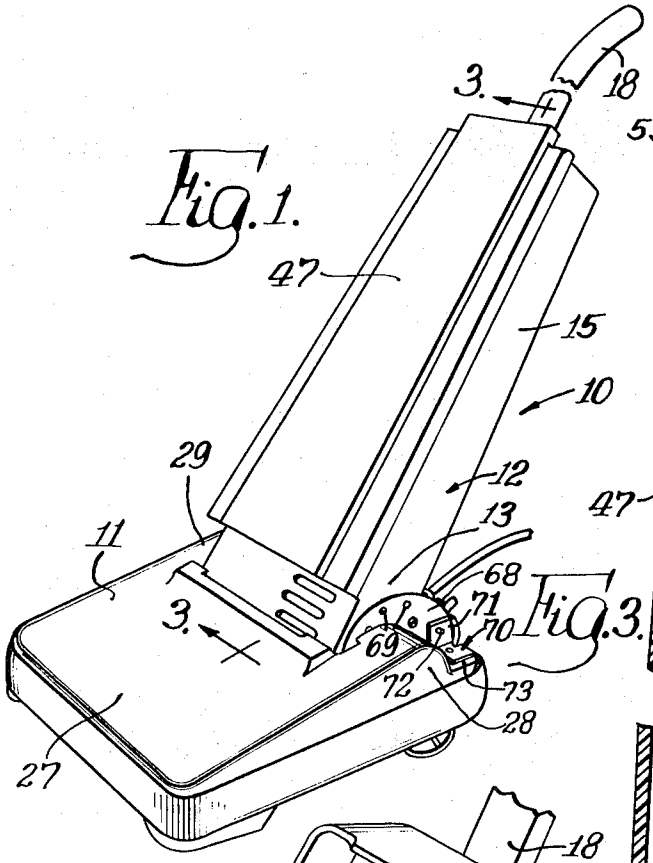


Fig. 2.

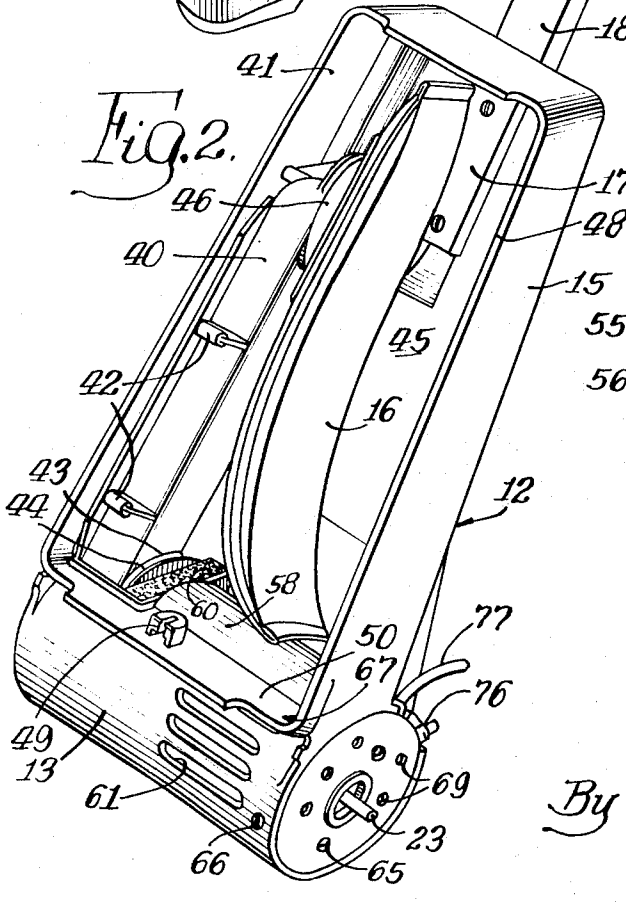
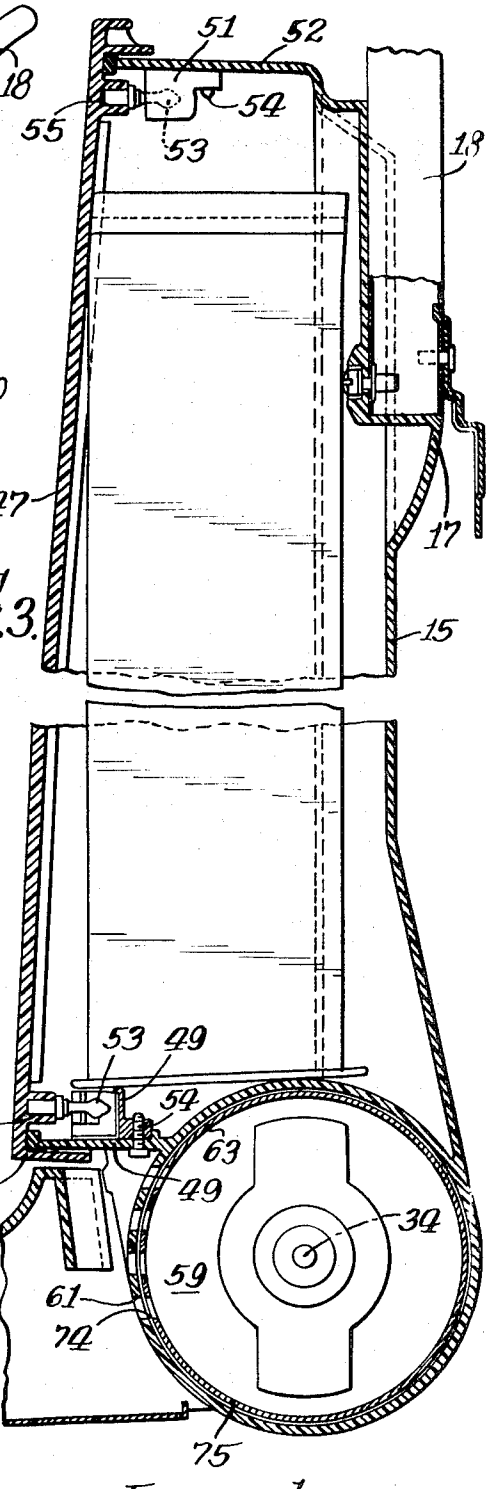


Fig. 3.



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Fig. 4.

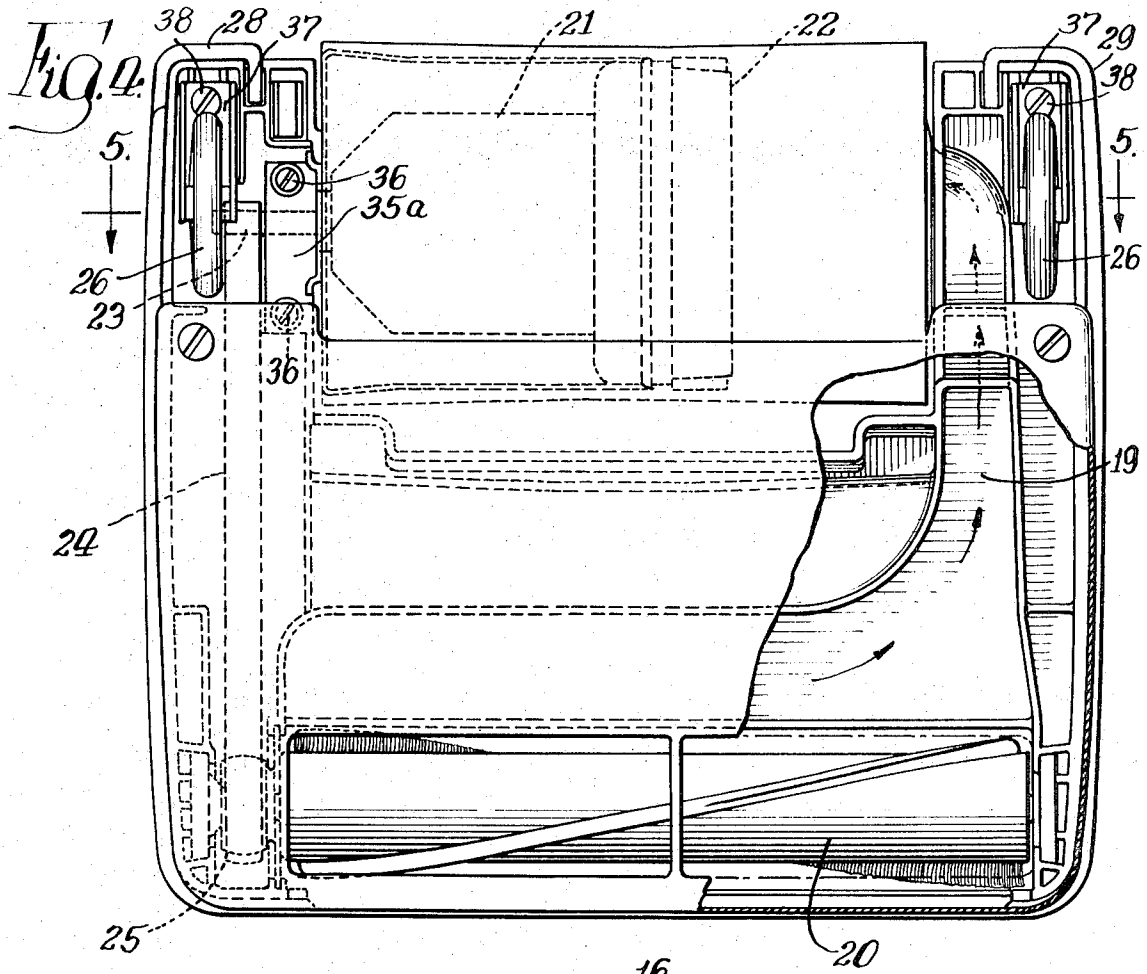
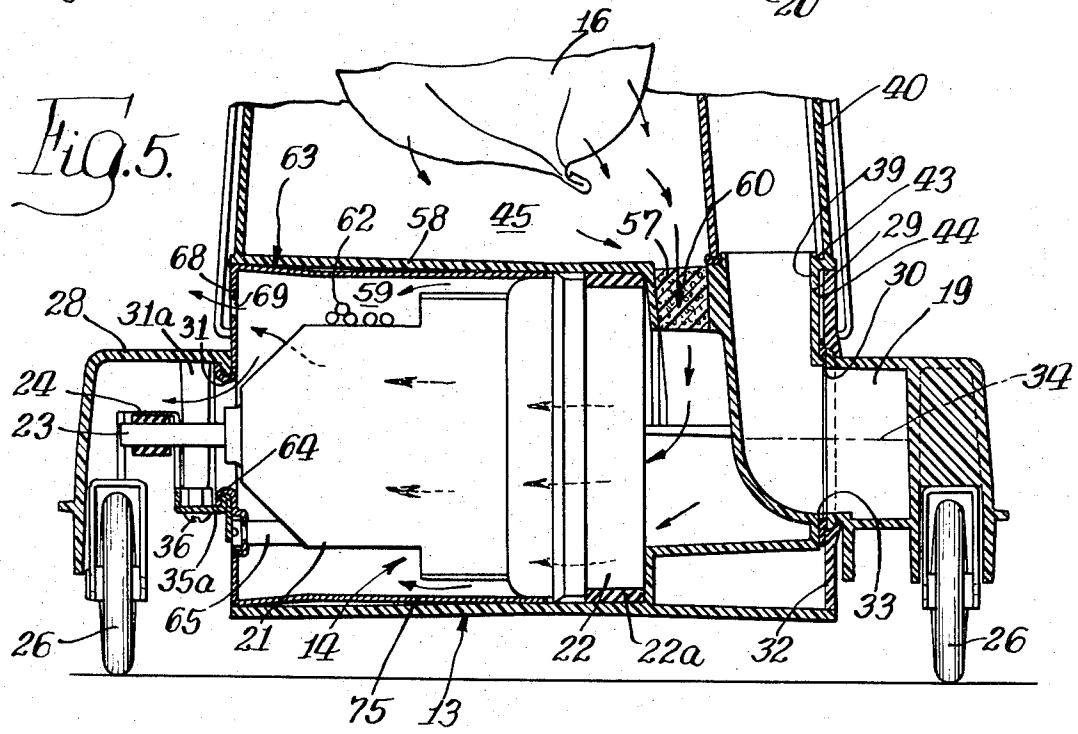

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Fig. 5.


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VACUUM CLEANER CONSTRUCTION

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to vacuum cleaner constructions and in particular to upright vacuum cleaners.

2. Description of the Prior Art

In the conventional upright vacuum cleaners, a motor-driven fan is mounted on a base assembly defining a nozzle for drawing air through the nozzle and delivering it into a dust-collecting bag carried in a housing overlying the fan means. The housing enclosing the dust-collecting bag may be pivotally connected to the base assembly and normally supports a handle for manipulation of the vacuum cleaner by the user. Examples of such vacuum cleaner constructions are shown in the U.S. letters Pat. Of Erwin E. Nordeen No. 3,199,138 issued Aug. 10, 1965 for a Cleaner and U.S. Pat. No. 3,344,460 for a Vacuum Cleaner issued Oct. 3, 1967, each of which patents is owned by the assignee hereof. It is desirable in such vacuum cleaner constructions to form the housing portions of plastic for improved lightweight, aesthetic effect, and serviceability. A problem arises, however, in forming the portion of the housing structure enclosing the fan motor and wiring in that conventional molded plastics are relatively flammable and it is desirable to provide means for effectively precluding flaming of such plastic housing portions.

SUMMARY OF THE INVENTION

The present invention comprehends an improved upright vacuum cleaner structure having a novel one-piece housing for enclosing the motor-driven fan means and the dust-collecting bag thereof which may be formed of molded plastic providing lightweight, desirable aesthetic effect, and improved service-ability.

The invention comprehends providing such a one-piece housing having a cylindrical lower portion and means for housing the motor-driven fan means coaxially therein for pivotal mounting on the subjacent nozzle base assembly. The motor-driven fan means housing portion may be arranged to conduct air past the motor to exteriorly of the housing away from the flammable plastic portions thereof. A nonflammable enclosure may be provided around the fan motor and electrical wiring within the lower housing portion so as to prevent flaming of the housing portions in the event of the production of excess heat at the motor, such as due to a malfunction of the electrical structure.

The bag housing portion may be provided with a removable cover extending substantially from the fan means portion to the distal end thereof for facilitated access to the bag-holding space.

Thus, more specifically, the invention comprehends the provision in an upright vacuum cleaner having a motor-driven fan means and a dust-collecting bag of structure comprising a one-piece housing defining a first, lower space, and a second, upper space, means for mounting the motor-driven fan means within the first space, and means for mounting the dust-collecting bag within the second space, the housing defining inlet means for conducting air to the dust-collecting bag in the second space, transfer duct means for conducting air from the second space externally of the dust-collecting bag to the first space, and outlet means for conducting air from the first space to the ambient atmosphere.

The structure may comprise a cylindrical housing, means for mounting the motor-driven fan means in the housing, a bag housing extending upwardly from the cylindrical housing, nozzle means, and means for mounting the cylindrical housing and bag housing to the nozzle means for concurrent pivotal rotation about the longitudinal axis of the cylindrical housing.

Still further, the structure may define a housing having a first portion for housing the motor-driven fan means and a second portion for housing the dust-collecting bag, the second portion of the housing being formed of a flammable plastic material for housing the dust-collecting bag, and a flameproof enclosure in the housing first portion for enclosing the motor-driven fan means to preclude flaming of the second housing portion by flames which may be caused by heat generated by the motor of the motor-driven fan means in the first housing portion, and means for pivotally mounting the first housing portion on the base assembly.

BRIEF DESCRIPTION OF THE DRAWING

Other features and advantages of the invention will be apparent from the following description taken in connection with the accompanying drawing wherein:

FIG. 1 is a perspective view of an upright vacuum cleaner having structure embodying the invention;

FIG. 2 is a fragmentary perspective view thereof with the cover of the dust-collecting bag space removed;

FIG. 3 is a fragmentary enlarged vertical section taken substantially along the line 3—3 of FIG. 1;

FIG. 4 is an enlarged bottom plan view with portions broken away to facilitate illustration of the invention; and

FIG. 5 is a fragmentary vertical section taken substantially along the line 5—5 of FIG. 4.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In the exemplary embodiment of the invention as disclosed in the drawing, an upright vacuum cleaner generally designated **10** is shown to comprise a base assembly **11** pivotally carrying a housing **12** having a lower portion **13** housing a motor-driven fan means generally designated **14** (FIG. 5) and an upper portion **15** for enclosing a dust-collecting bag **16**. Upper housing portion **15** is provided with a connector **17** for removably attaching a handle **18** to the housing to extend upwardly therefrom, as shown in FIG. **1**, for manipulating the vacuum cleaner in the normal floor cleaning operation.

The base assembly defines an air inlet nozzle **19** (FIG. 4) adapted to conduct air from the subjacent floor surface upwardly through the lower portion **13** of housing **12** into the dust-collecting bag **16** in upper housing portion **15**. A conventional beater-brush device **20** may be provided at the front of nozzle **19** for agitating the dust on the carpet pile for facilitating suction thereof into the dust-collecting bag. The motor-driven fan means includes an electric motor **21** which, in addition to driving the fan **22**, is provided with an output shaft **23** driving a belt **24** trained over a driven hub **25** connected to the beater-brush **20** for rotating the beater-brush during the operation of the vacuum cleaner. The base assembly is further provided with a pair of wheels **26** for facilitated rolling of the vacuum cleaner along the floor surface.

The base assembly is effectively defined by a molded plastic member comprising a generally flat horizontally

extending front portion 27 and a pair of rearwardly extending projection portions 28 and 29. Projection 29 is provided with a relatively large diameter circular opening 30 (FIG. 5) and projection 28 is provided with a corresponding large downwardly opening slot 31 (FIG. 5).

Housing portion 13 is provided with an end wall 32 having a flange 33 slidably fitted on the edge portion of projection 29 defining the opening 30. The motor-driven fan assembly is mounted in housing portion 13 coaxially with the axis 34 of the housing portion 13. A boss 35 may be formed on the projection 28 as shown in FIG. 5. Screws 36 fasten a retainer 35a to the boss 35 thereby to support a flange 64 of enclosure 63 as will appear. Wheels 26 may be secured to the projections 28 and 29 by suitable brackets 37 retained in association with the projections by suitable screws 38.

As shown in FIG. 5, housing portion 13 includes a transfer duct portion 39 leading to a duct 40 secured to the side wall 41 of the upper housing portion 15 by suitable screw means generally designated 42 (FIG. 2). The lower end 43 of the duct may be arcuate and sealingly fits against a corresponding arcuate portion 44 formed integrally on lower housing portion 13 to provide a suction passage extending upwardly through the space 45 within upper housing portion 15. At its upper end, duct 40 is provided with a connector 46 adapted for facilitated releasable connection of the dust-collecting bag 16 thereto. As best seen in FIG. 2, upper housing portion 15 defines a forwardly open space 45 extending fully upwardly from the housing lower portion 15 for facilitated access to the space 45 in installing and removing the dust-collecting bag in the normal maintenance operation of the vacuum cleaner. A cover 47 is retained on the forward edge 48 of housing portion 15 for closing space 45. A clip 49 may be provided on a projection wall portion 50 of the lower housing portion 13 and a clip 51 may be provided on the top wall 52 of the upper housing portion 15 for cooperating with rearwardly projecting latch elements 53 on cover 47 in retaining the cover against accidental dislodgement from the upper housing portion. Clips 49 and 51 may be secured to the respective wall portions of the housing by suitable means, such as screws 54. Latch elements 53 may comprise metal elements carried on bosses 55 formed integrally with the cover 47, as shown in FIG. 3. The cover may include a rearwardly turned flange 56 to overlie the edge 48 of the housing portion 15.

As best seen in FIG. 5, air is drawn through bag 16 and from space 45 through an interconnecting passage 57 defined by the dividing wall portion 58 between upper housing space 45 and the space 59 within lower housing portion 13. A suitable filter 60, which illustratively may be formed of foam plastic, may be provided in passage 57 for effectively precluding transfer of foreign matter from space 45 to the motor-driven fan means 14 in space 59. The motor-driven fan means 14 is mounted coaxially within the cylindrical lower housing portion 13, as shown in FIG. 5, and air is drawn by fan 22 from passage 57 and delivered to around motor 21 in thermal transfer association therewith for cooling the motor. A gasket 22a is interposed between fan 22 and housing 13. The air is discharged through a plurality of discharge openings 61 in the front upper portion of the lower housing 13, as shown in FIG. 2, and through openings 69 in the end wall 68 as will appear. The electrical wiring 62 to motor 21 may also be disposed in space 59 adjacent the motor so that cooling air is delivered past the electrical wiring to the openings 61 and 69.

Portions 13 and 15 of housing 12 are integrally formed so that the housing defines a one-piece housing. The housing may be formed of a molded plastic so as to define a low cost housing structure. To prevent flaming of relatively flammable plastic material of which the housing may be formed, a flameproof enclosure 63 is provided surrounding the motor and wiring space 59, as shown in FIG. 5. Illustratively, enclosure 63 may be formed of metal or other suitable high temperature resistant material to effectively prevent damage to the plastic parts of the housing structure as may result from the generation of flames or high temperatures in the space 59. Further as discussed above, the air movement through space 59 is such as to discharge away from the plastic housing portions thereby further minimizing danger from such conditions in space 59.

Enclosure 63 further includes a turned flange 64, supported by retainer 35a, which is slidably mounted on the edge portion of projection 28 defining opening 31 to pivotally support the lefthand end of the housing portion 13 on projection 28, as shown in FIG. 5. As the flange opening 31 has a diameter larger than that of shaft 23, as shown in FIG. 5, a portion of the discharge air may exit therethrough as indicated at 31a. Motor 21 may be fixedly secured to enclosure 63 such as by screw mounting means 65.

The enclosure may be retained in the cylindrical plastic housing portion 13 by suitable means such as screws 66 and 67. The end wall 68 of the enclosure 63 may be provided with a plurality of recessed openings defining air passages 69, which extend axially of the motor 21 and shaft 23, as shown in FIGS. 1, 2 and 5. A spring latch 70 is mounted on projection 28 (FIG. 1) to have a first portion 71 thereof carrying a latching button 72 biased against the end wall 68 so as to cause button 72 to be received selectively in the different recessed openings 69 thereby to releasably retain the upright portion of the vacuum cleaner selectively at different desired angles. The openings 69 also serve as vent openings for passage of air from space 59 for cooling the motor 21. Spring latch 70 may include a second portion 73 which is manually depressible to urge portion 71 away from wall 68 for repositioning the button 72 when desired.

As shown in FIG. 3, the enclosure 63 is provided with openings 74 which correspond to openings 61 of housing portion 13 to cooperatively define therewith discharge passages for discharging air from space 59. As further shown in FIGS. 3 and 5, the enclosure 63 defines a tubular wall 75 extending concentrically of axis 34 within cylindrical housing portion 13 substantially fully therearound to protect the entire circumferential area of the housing portion 13 surrounding the motor and wiring space 59.

Thus, enclosure 63 functions as a portion of the pivot for the upright portion of the vacuum cleaner, as a mount for the motor-driven fan means, as means cooperatively defining with the housing portion 13 discharge air passages from space 59, and as means for cooperatively controlling the angular disposition of the upright portion of the vacuum cleaner, while defining discharge air passages through the end wall of the motor.

An electrical control switch 76 for on-off control of the motor 21 may be provided on housing portion 13 rearwardly of upright portion 15 adjacent the entrance of the electrical power supply cord 77 to the housing portion 13, as shown in FIG. 2.

Thus, housing 12 effectively housing the motor-driven fan assembly and the dust-collecting bag as a one-piece housing structure. The motor enclosure 63 cooperates with the housing portion 13 to define the means for pivoting the upright portion of the vacuum cleaner defined by the housing about the longitudinal axis of the motor-driven fan means. The motor enclosure 63 further effectively prevents flaming of the housing which may be economically formed of lightweight molded plastic. The elements of the vacuum cleaner are readily assembled by virtue of the simplified housing construction further minimizing the cost of the vacuum cleaner construction while yet providing the improved pivotal connection of the upright portion to the base assembly portion 27 as discussed above.

The foregoing disclosure of specific embodiments is illustrative of the broad inventive concepts comprehended by the invention.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. In an upright vacuum cleaner having a motor-driven fan means and a dust-collecting bag, structure comprising: a one-piece housing defining a first, lower space housing portion, and a second, upper space housing portion; means for mounting the motor-driven fan means within said first space housing portion, the portion of the housing defining said first space comprising a horizontal generally cylindrical wall means coaxially enclosing the motor-driven fan means, and having an open end and radial air-exhaust openings; flameproof tubular wall means defining a flameproof barrier covering the inner surface of said cylindrical wall means and having openings aligned with said air-exhaust openings thereof, and defining means for further exhausting air from said first space in a direction parallel to the axis of said cylindrical wall means through said open end thereof; and means mounting the dust-collecting bag within said second space housing portion, said housing further defining inlet means connected with the dust collecting bag for conducting air to the dust-collecting bag in said second space housing portion, and transfer duct means flow connecting said housing portions for conducting air from said second space housing portion externally of the dust-collecting bag to said first space housing portion through said fan means with said air-exhaust openings conducting air from said first space housing portion to the ambient atmosphere.

2. The vacuum cleaner structure of claim 1 wherein said housing comprises a molded plastic element.

3. The vacuum cleaner structure of claim 1 wherein electrical wiring connections are disposed in said first space housing portion adjacent the motor-driven fan means.

4. The vacuum cleaner structure of claim 1 wherein said flameproof wall means defines an end wall extending across said open end of such cylindrical wall means and having a plurality of axial passages defining the means for further exhausting air from said fan means axially outwardly from said first space housing portion.

5. The vacuum cleaner structure of claim 1 wherein said housing defines a distal end and includes a removable wall extending substantially from said cylindrical wall means to said distal end.

6. The vacuum cleaner structure of claim 1 wherein said flameproof wall means is formed of metal.

7. The vacuum cleaner structure of claim 1 wherein said flameproof wall means is removably secured to said housing.

8. The vacuum cleaner structure of claim 1 wherein said fan means is arranged to draw air from said second housing space and discharge it through said first space to externally of said housing.

9. The vacuum cleaner structure of claim 1 wherein said fan means is arranged to draw air from said second space housing portion and discharge it through said first space housing portion in thermal transfer association within said motor-driven fan means for cooling the motor to externally of said first space housing portion.

10. The vacuum cleaner structure of claim 1 wherein said flameproof wall means defines means for pivotally mounting the housing.

* * * * *