

United States Patent

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[54] ELECTRIC VACUUM CLEANER CONSTRUCTION

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[58] Field of Search 15/350, 412, 413, 333, 351

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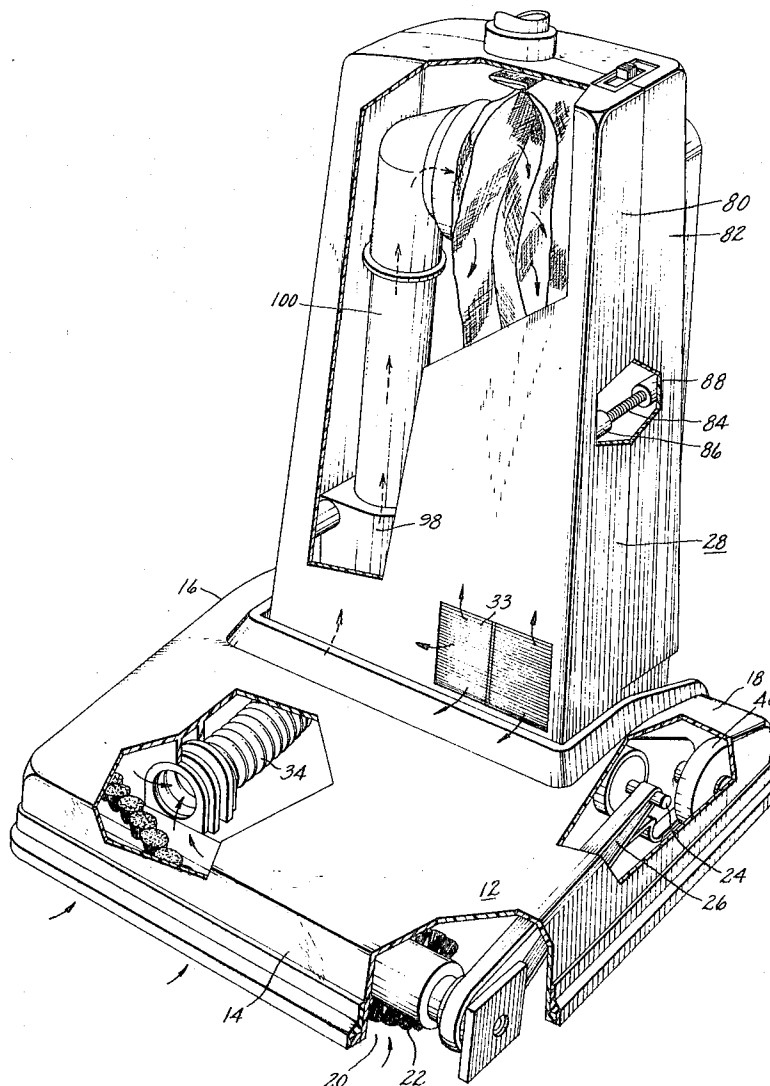
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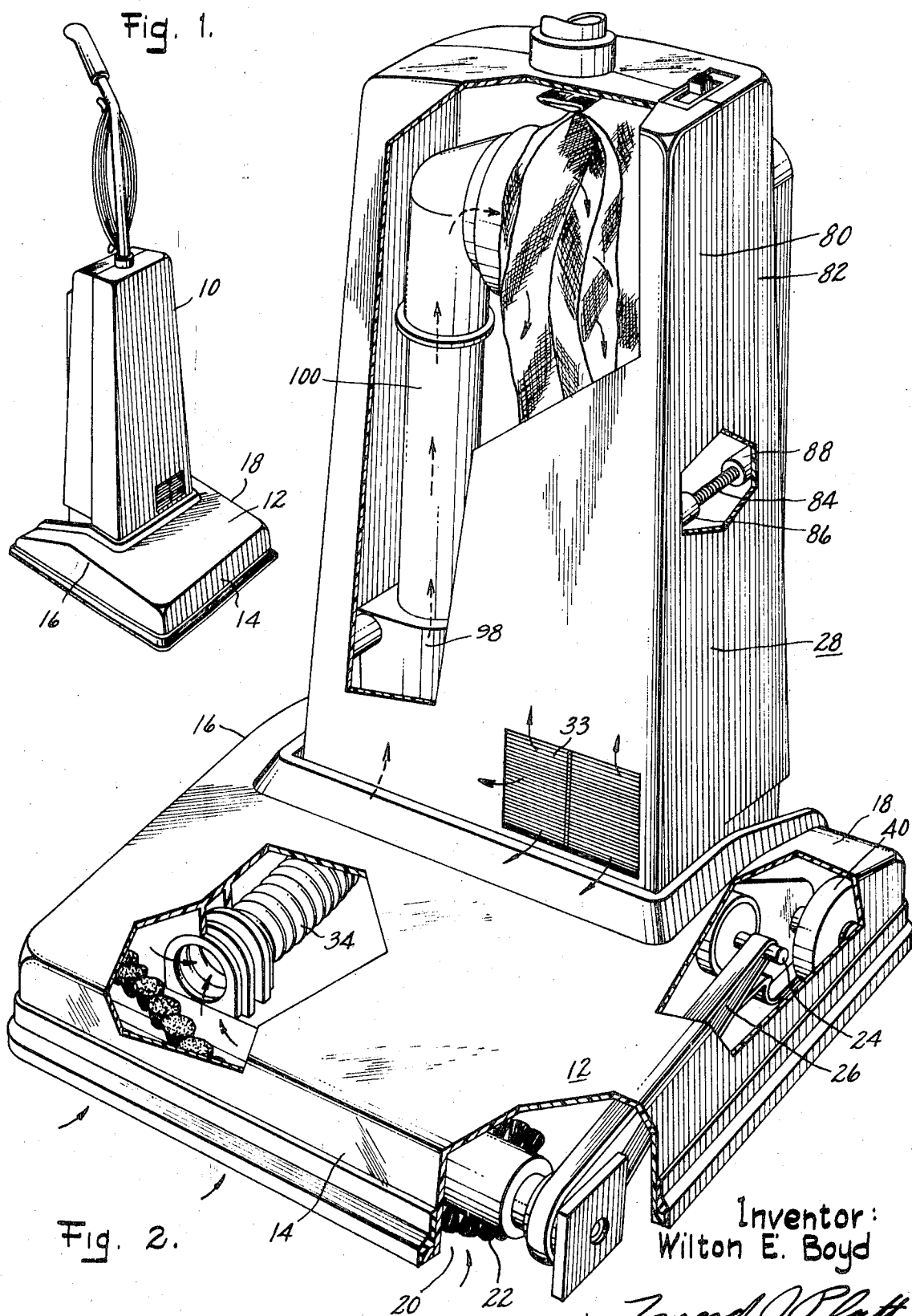
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ABSTRACT

An electric vacuum cleaner construction wherein an electric motor, a suction fan, and a filter bag are positioned within an upper housing and a unique arrangement is provided for pivoting the upper housing to a generally U-shaped vacuum cleaner base.

8 Claims, 6 Drawing Figures

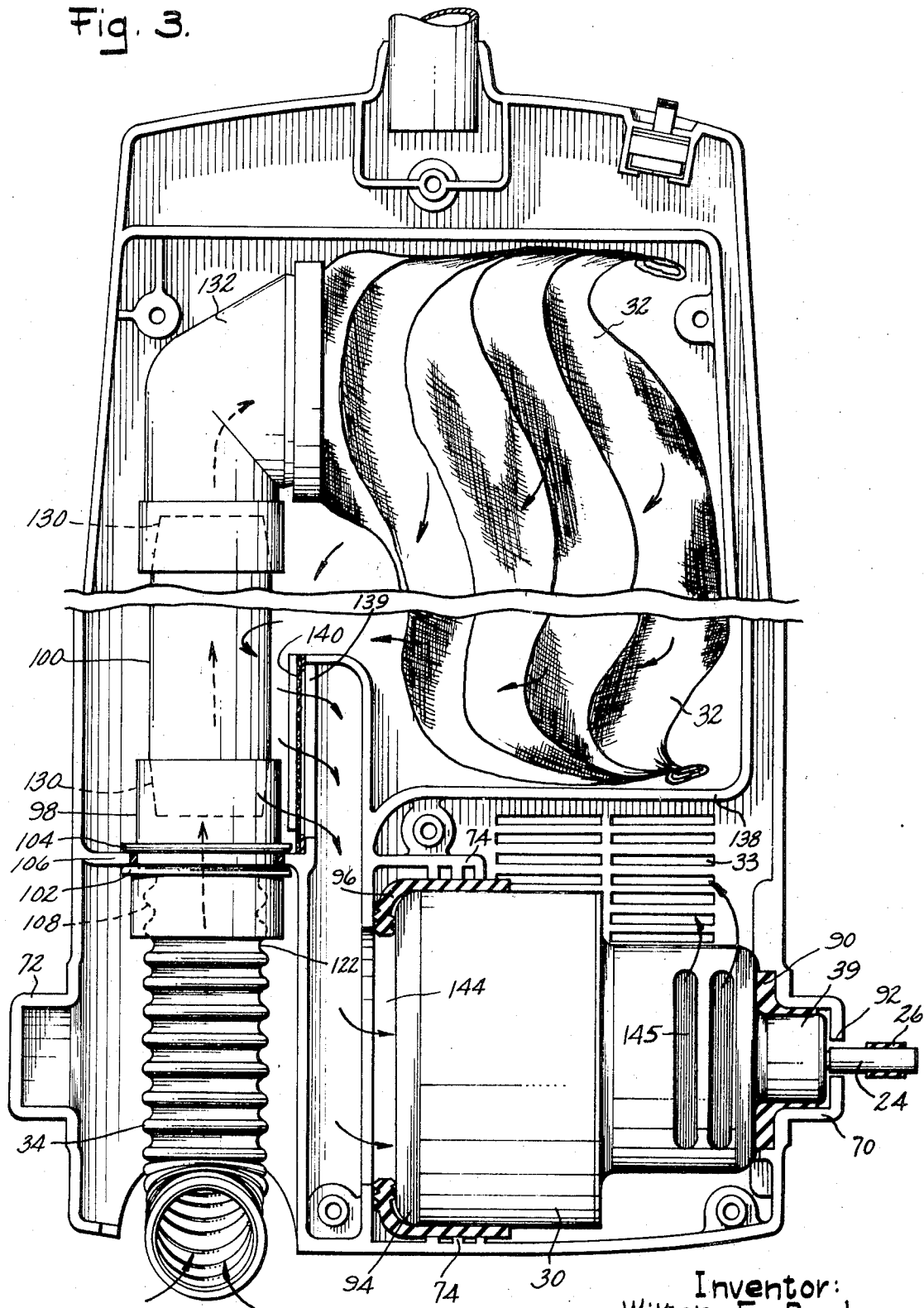




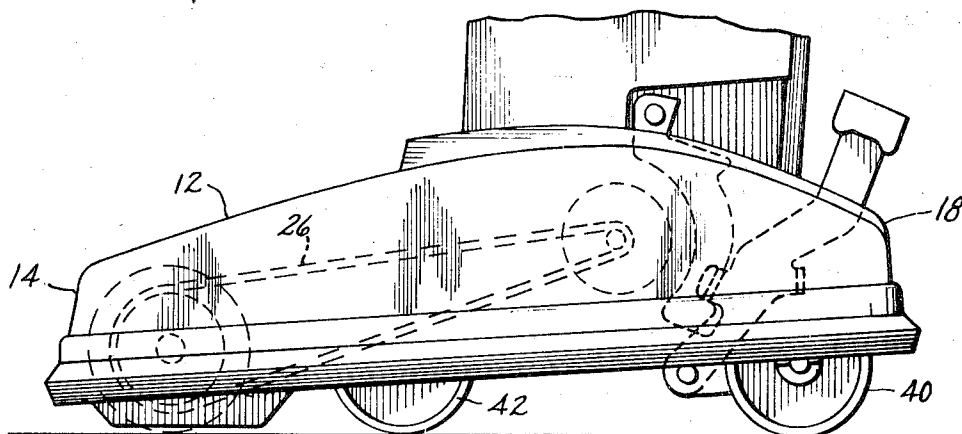
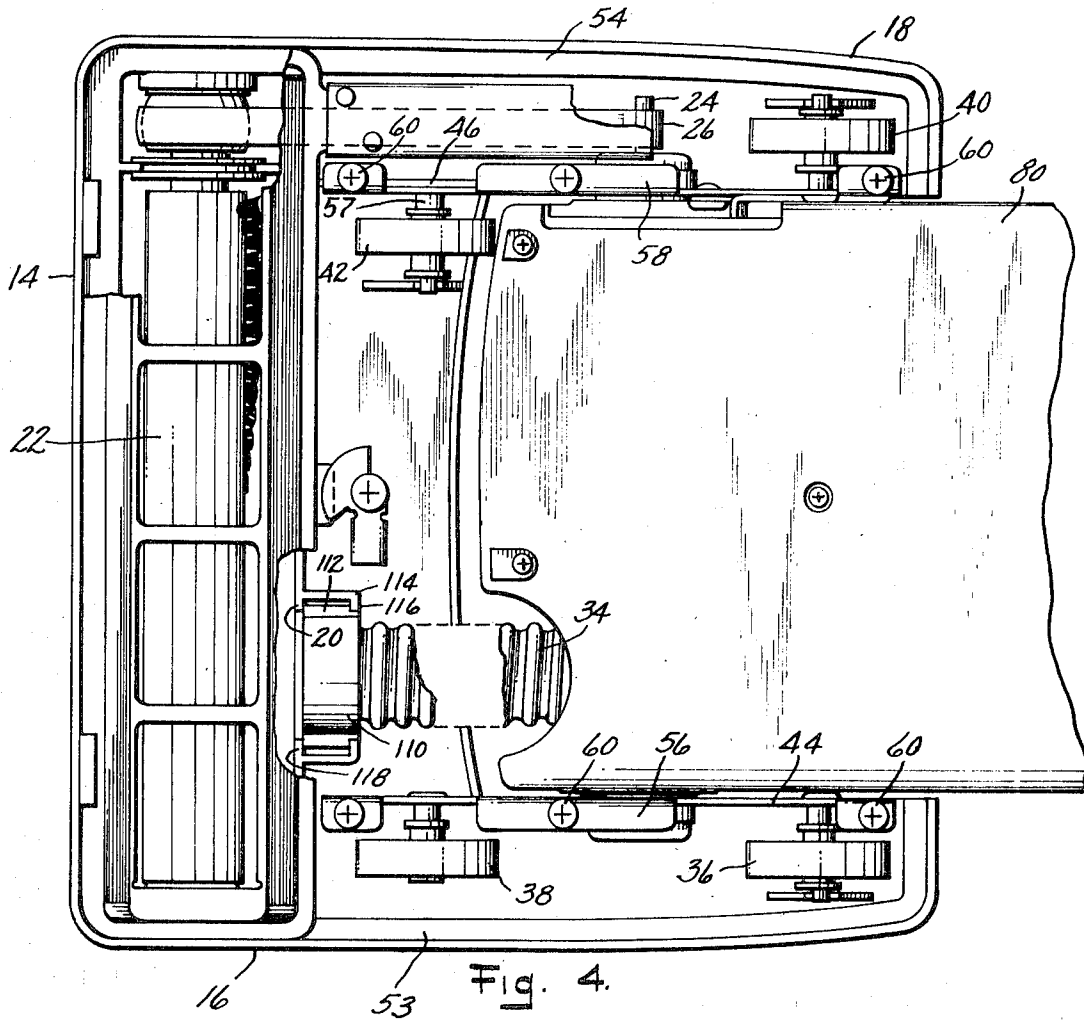
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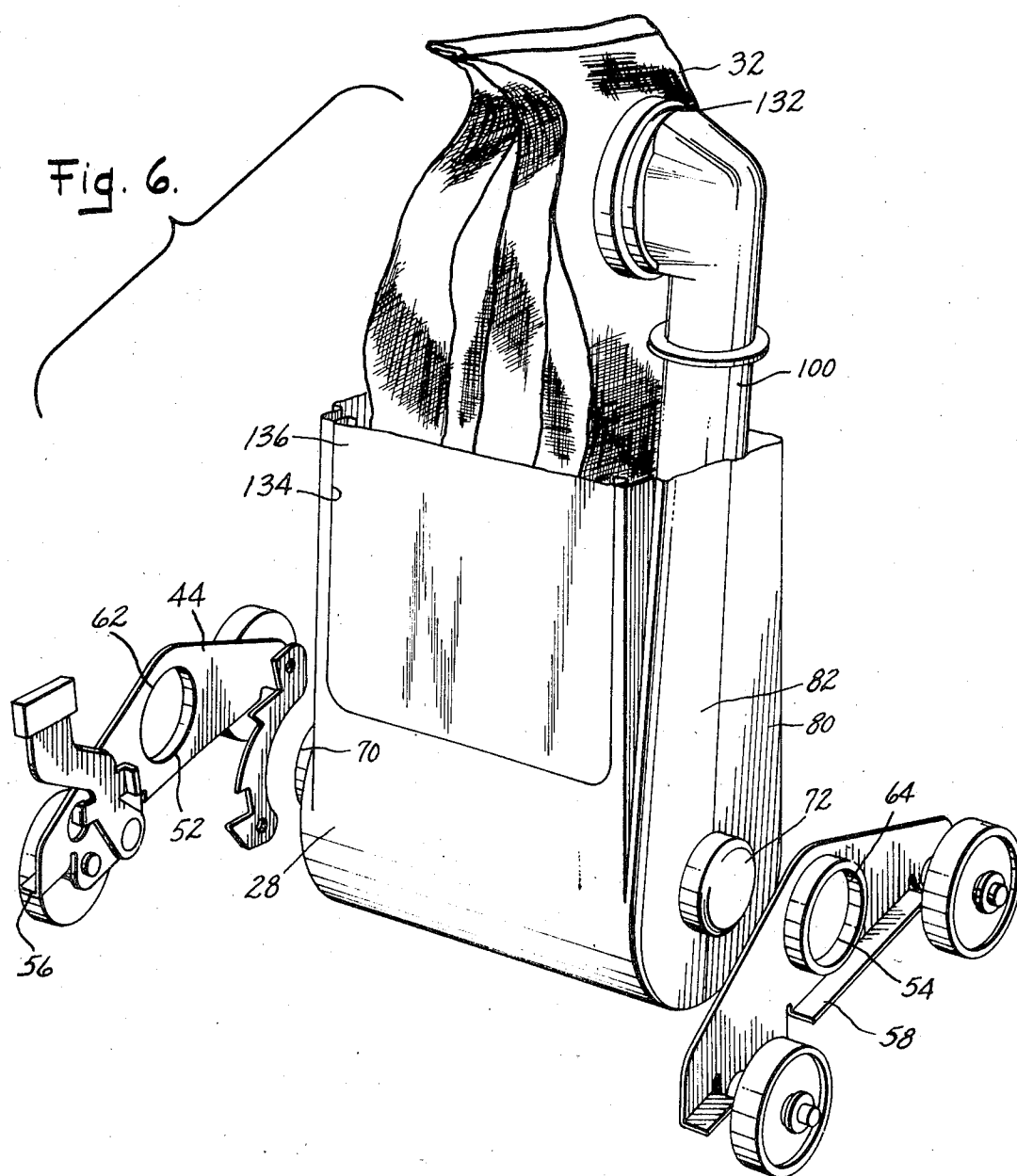
Fig. 3.



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ELECTRIC VACUUM CLEANER CONSTRUCTION

BACKGROUND OF THE INVENTION

This invention relates to an electric vacuum cleaner and more particularly to an improved lightweight, compact and easily manufactured construction for an electric vacuum cleaner.

Electric vacuum cleaners conventionally include electric motor and suction fan units, filter bags, suction nozzles, and rollable base units for supporting the vacuum cleaner on a floor to be cleaned. While these components have been constructed, subassembled and assembled in a number of different ways, it is especially desirable that they be sturdily constructed and securely assembled in a vacuum cleaner.

It is also desirable to provide an electric vacuum cleaner construction which may be manufactured at relatively low cost. It is most important, therefore, to reduce to a minimum the number of parts required, the number of manufacturing operations to be performed on each part, and the number of operations required to assemble the parts to each other.

Accordingly, it is a primary object of this invention to provide an improved low cost construction for an electric vacuum having a minimum number of parts which may be easily manufactured and assembled to each other.

It is also an object of this invention to provide a vacuum cleaner construction which includes a suction air hose and other parts that may be readily removed for cleaning.

SUMMARY OF THE INVENTION

In accordance with one of the aspects of this invention, a vacuum cleaner includes an upper housing having an electric motor and a suction fan positioned therein. A filter bag is also positioned within the upper housing above the electric motor and suction fan. A generally U-shaped vacuum cleaner base has a forward portion and two rearwardly extending leg portions, and conventionally, a suction air inlet nozzle is located within the forward portion of the base. Generally circular bearing openings are located in the inner walls of the base and the openings are oppositely arranged with respect to each other for pivotally mounting the upper housing on the base. Two oppositely arranged protruding bosses are integrally formed with the upper housing. One of the protruding bosses extends through one of the circular bearing openings, and the other protruding boss extends through the other circular bearing opening. With this unique arrangement, the upper housing is pivoted to the lower base without the use of separate bearing parts. The upper housing itself forms one portion of the bearing and the other portion is an integral part of the vacuum cleaner base.

BRIEF DESCRIPTION OF THE DRAWING

Other objects and attendant advantages of the invention will be apparent from the following description taken in connection with the accompanying drawing in which:

FIG. 1 is a perspective view of an electric vacuum cleaner construction embodying my improved arrangement for pivoting an upper housing to a generally U-shaped vacuum cleaner base;

FIG. 2 is a fragmentary perspective view of the lower portion of the vacuum cleaner shown in FIG. 1, some of the parts being broken away to show details of construction;

FIG. 3 is a fragmentary front cross-sectional view of the vacuum cleaner shown in FIG. 2 with the front half casing section removed looking at the back half of the upper housing of my improved vacuum cleaner construction;

FIG. 4 is a bottom cross-sectional view of the vacuum cleaner shown in FIG. 2, some of the parts being broken away to show details of construction;

FIG. 5 is a side elevational view of the vacuum cleaner base of my improved vacuum cleaner construction, and

FIG. 6 is an exploded rear perspective view of the principal components of my unique arrangement for pivoting the upper housing of the vacuum cleaner to the vacuum cleaner base.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings and especially to FIGS. 1 and 2, there is shown a vacuum cleaner generally designated by the reference numeral 10 embodying my improved low-cost construction. The vacuum cleaner includes a generally U-shaped base portion 12 having a forward portion 14 and two rearwardly extending leg portions 16 and 18. Conventionally, a section air inlet nozzle 20 is located within the forward portion of the base, and a rotary brush 22 is mounted in the suction nozzle 20 so as to be in contact with a floor surface when the cleaner base 12 is in the position illustrated in FIG. 1. The rotary brush 22 is connected in driven relationship to a motor shaft 24 by means of an endless belt 26.

The vacuum cleaner also includes an upper housing 28 having an electric motor and suction fan 30 and a filter bag 32 positioned therein. With this arrangement, air flows inwardly through nozzle 20 through a hose 34, through filter bag 32, through the motor fan unit 30, and to exhaust 33 from the upper housing as shown by the arrows in FIGS. 2 and 3.

As shown more particularly in FIG. 4, the base of the vacuum cleaner is supported for movement on a floor surface by wheels 36 and 38 located at one side of the vacuum cleaner, and wheels 40 and 42 located at the other side of the vacuum cleaner.

In accordance with my invention, the upper housing 28 and the base 12 are uniquely constructed so that the upper housing 28 may be pivoted to the base 12 without the use of a separate bearing construction. As illustrated, the wheels 36 and 38 are mounted on a generally flat plate 44 and the wheels 40 and 42 are mounted on a generally flat plate 46. Plate 44 forms an inner wall of one of the legs 16 of the generally U-shaped base while the plate 46 forms the inner wall of the other leg 18 of the base. With this construction, generally circular bearing openings 52 and 54, may be stamped in the wheel supporting plates 44 and 46, respectively, at the same time the plates are being stamped and formed for mounting the wheels 36, 38, 40, and 42.

As shown more particularly in FIG. 4, wheels 36 and 38 are positioned between inner wall 44 and an outer wall 53 of the base, wheel 40 is positioned between inner wall 46 and outer wall 54 of the base and wheel 42 is mounted on an axle 57 which extends inwardly from plate 46. The supporting plates 46 and 48 may be formed of sheet metal and stamped to the desired shape. During the stamping operation, suitable inwardly extending flanges 56 and 58 may be provided for receiving screws 60 for connecting the wheel supporting plates to the base of the vacuum cleaner. Significantly, during the stamping operation the generally circular bearings 52 and 54 are integrally formed with the supporting plates. As shown more particularly in FIG. 6, the bearings 52 and 54 include generally cylindrical walls 62 and 64, respectively, which extend outwardly from the supporting plates in the same direction as the flanges 56 and 58. Thus, the bearings may be readily formed at the same time that the flanges 56 and 58 are being formed. With this construction, it can be appreciated that the inner surface of the generally cylindrical walls 62 and 64 function as bearing surfaces for protruding bosses 70 and 72, respectively, which are integrally formed with my upper housing 28.

As shown more particularly in FIG. 2, the upper housing 28 of my improved low-cost vacuum cleaner construction comprises a pair of mating shell halves 80 and 82 which are secured together by a plurality of screws 84 which pass through lugs 86 and 88 which are integrally formed with halves 80 and 82, respectively. With reference to FIG. 6, it can be appreciated that in the preferred embodiment, one half of each of the protruding bosses 70 and 72 is integrally formed with the front half shell section 80, while the other half of each of the bosses 70 and 72 is integrally formed with the rear mating shell half 82.

The unique arrangement of the mating shell halves 80 and 82 of my invention not only provides the integrally formed pivot bosses 70 and 72, but also conveniently houses the elec-

tric motor and suction fan unit 30. As shown more particularly in FIG. 2, the right portion of the motor fan unit 30 includes a generally cylindrical casing part 39 which is complimentary to and fits within protruding bearing 70. A suitable gasket 90 may be inserted between the cylindrical wall 39 of the motor fan unit and the inner cylindrical surface of the protruding boss 70 for securely holding the cylindrical wall 39 of the motor fan unit between the mating half shells 80 and 82. As shown, an output shaft 24 of the electric motor and suction fan unit 30 extends outwardly from casing 39, and a generally circular aperture 92 is integrally formed in the mating shell halves for receiving the shaft 24. As previously described, the shaft 24 is provided for driving an endless belt 26 which drives the vacuum cleaner brush 22.

The electric motor suction fan unit 30 also includes an enlarged left cylindrical portion 94 and a suitable gasket 96 is also compressed between the inner walls of the mating shell halves and the wall 94 for securely holding the left portion 94 of the electric motor suction fan unit 30 between the mating shell halves.

The mating shell halves 80 and 82 also securely hold a hose connector 98 and a suction air pipe 100 which extends to filter bag 32. As shown more particularly in FIG. 3, the hose connector 98 may be molded of plastic or other suitable material and as illustrated it is a generally cylindrical tube. Two radially outwardly extending generally parallel circular flanges 102 and 104 are integrally formed with the connector 98 for securely holding the connector tube between the mating shell halves. As shown more particularly in FIG. 3, each of the mating shell halves is provided with a semicircular inwardly directed flange 106 which is approximately the same thickness as the distance between the generally parallel flanges 102 and 104 of the connector 98. By this arrangement, the semicircular flanges 106 on the mating shell halves are positioned between the hose connector flanges 102 and 104, and the hose connector 98 is securely held by the flanges when the mating shell halves are connected to each other by means of screws 84.

In accordance with my invention, a relatively short length of removable hose 34 is provided for connecting the suction air inlet nozzle 20 to the upper housing 28 and filter bag 32. As shown more particularly in FIG. 3, screw threads 108 may be readily formed on an inner cylindrical wall of the plastic coupling member 98 for receiving one end 122 of the short length of hose 34, and a readily formed slide connector 110 is provided for connecting the other end of the hose 34 to the air inlet nozzle 20. As illustrated more particularly in FIG. 4, the slide connector 110 is preferably formed of plastic or other suitable moldable material and is provided with a raised lip portion 112 for ready insertion within a receptacle 114 which is integrally formed in the base of the vacuum cleaner adjacent to nozzle 20. As illustrated, the receptacle includes two inwardly directed flanges 116 and 118 which are spaced from each other approximately the same distance as the thickness of lip 112 of the slide connector. With this construction, the relatively short length of hose 34 may be readily connected to the vacuum cleaner by simply threading the upper end 122 of the hose 34 within threads 108 of connector 98 and then sliding the raised lip portion 112 of the slide connector between inwardly extending flanges 116 and 118 which are integrally formed with the base.

In accordance with my invention, a suction air pipe 100 extends upwardly from connector 98 for delivering suction air and entrained dirt to the upper portion of filter bag 32. Thus, the dirt in the filter bag remains in the lower portion of the bag away from the air entry to the bag. As illustrated, the stand pipe 100 is provided with a tapered end 130 for reception within the upper part of coupling 98.

As shown in FIG. 3, a coupling 132 is provided for connecting the filter bag 32 to stand pipe 100, and as illustrated it includes a 90° bend leading into the bag 32.

As shown more particularly in FIG. 6, the rear mating half shell 82 is provided with an enlarged opening 134 for per-

mitting quick removal of the filter bag and the stand pipe 100. A suitable cover 136 is provided for closing the opening.

As shown more particularly in FIG. 3, the front and rear mating halves of the upper housing are provided with an inwardly extending wall 138 for separating the electric motor suction fan chamber of the upper housing from the filter chamber of the upper housing. As shown in FIG. 3, an enlarged opening 139 is provided in the wall and generally flat secondary filter 140 may be positioned over the opening for filtering the air before it enters the motor fan unit 30. With this arrangement, suction air flows inwardly through nozzle 20, through hose 34, through connector 98, through standpipe 100, through 90° coupling 132 and then through the filter bag 32. The air then flows through secondary filter 140, through air inlet openings 144 formed in the motor fan unit, outwardly through openings 145 in the motor fan unit and then outwardly through louvered exhaust opening 33 which is formed in the front wall of the front casing half 80.

From the foregoing description, it will be appreciated that my improved low-cost vacuum cleaner is achieved with the use of a minimum number of parts which may readily be formed and assembled to each other. Generally cylindrical bearings 52 and 54 are integrally formed with the inner walls 44 and 46 of the base and the same inner walls which are utilized for forming the bearings 52 and 54 also support the wheels 36, 38, 40 and 42. The other portion of my unique bearing construction includes two protruding bosses 70 and 72 which are integrally formed with the upper housing 28. Accordingly, the upper housing is uniquely pivoted to the lower base 12 without the use of separate bearing elements. Thus, an exceedingly simple arrangement is provided which requires a minimum number of parts.

It can also be appreciated that with applicant's unique construction, a very short length of hose 34 which may be readily removed for cleaning is provided for coupling the suction nozzle 20 to connector 98. The length of hose may be removed by simply lifting slide connector 110 out of receptacle 114 and unthreading the upper portion of the hose 34 from coupling 98.

What I claim is:

1. An electric vacuum cleaner comprising:
 - a. a molded upper housing formed from mating shell halves;
 - b. an electric motor and suction fan positioned within said upper housing;
 - c. a filter bag positioned within said upper housing above said electric motor and suction fan;
 - d. a generally U-shaped vacuum cleaner base having a forward portion and two rearwardly extending leg portions, each of said leg portions having an inner wall and an outer wall;
 - e. a suction air inlet nozzle located within the forward portion of said base;
 - f. a generally circular bearing opening located in each of said inner walls, said bearing openings being oppositely arranged with respect to each other for pivotally mounting said upper housing on said base;
 - g. two oppositely arranged protruding bosses formed with said upper housing, a portion of each said protruding bosses being integrally formed with one of said mating shell halves and the remaining portion of each of said protruding bosses being integrally formed from the other mating shell half, one of said protruding bosses extending through one of said circular bearing openings and the other protruding boss extending through the other circular bearing opening whereby said upper housing is conveniently pivoted to said U-shaped base.
2. An electric vacuum cleaner comprising:
 - a. an upper housing having an electric motor and suction fan positioned therein;
 - b. a filter bag also positioned in said housing above said electric motor and suction fan;
 - c. a generally U-shaped vacuum cleaner base having a forward portion and two rearwardly extending leg portions;

- d. a suction air inlet nozzle located within the forward portion of said base;
 - e. a pair of supporting plates, one of said plates forming an inner wall of one of said legs and the other plate forming an inner wall of the other leg;
 - f. a wheel mounted for rotation on each of said plates whereby said vacuum cleaner may be conveniently manipulated over a floor to be cleaned;
 - g. a generally circular bearing opening located in each of said plates, said bearing openings being oppositely arranged with respect to each other for pivotally mounting said upper housing on said base; and
 - h. two oppositely arranged protruding bosses integrally formed with said upper housing, one of said protruding bosses extending through one of said circular bearing openings and the other protruding boss extending through the other circular bearing opening whereby said upper housing is conveniently pivoted to said U-shaped base.
3. An electric vacuum cleaner construction as defined in claim 2 wherein an output shaft from said electric motor extends through an aperture formed in one of said protruding bosses for driving a brush located in said suction air inlet nozzle.
4. An electric vacuum cleaner comprising:
- a. an upper housing having an electric motor and suction fan positioned therein;
 - b. a filter bag positioned within said upper housing above said electric motor and suction fan;
 - c. a generally U-shaped vacuum cleaner base having a forward portion and two rearwardly extending leg portions, each of said leg portions having an inner wall and an outer wall;
 - d. a suction air inlet nozzle located within the forward portion of said base;

- e. said upper housing being pivotally mounted on said base between said rearwardly extending leg portions;
 - f. a flexible hose positioned between the inner walls of said leg portions, said flexible hose having two ends, one of said ends being in communication with said suction air inlet nozzle and being removably connected to said base, the other end of said flexible hose being removably connected to said upper housing, said flexible hose extending through said upper housing at one side of said electric motor and suction fan.
5. A vacuum cleaner construction as defined in claim 4 wherein a slide connector is provided for removably connecting said one end of said hose to said base, and a threaded connector is provided for connecting the other end of said hose to said upper housing whereby one end of said hose may be readily lifted out of said slide connector and then the hose may be unthreaded from the upper housing connector.
6. An electric vacuum cleaner as defined in claim 5 wherein a suction air pipe is positioned within said upper housing and extends upwardly within said housing from said threaded connector.
7. An electric vacuum cleaner as defined in claim 6 wherein said filter bag includes an air inlet opening and said filter bag inlet opening is connected to the upper portion of said suction air pipe.
8. A vacuum cleaner as defined in claim 4 wherein said upper housing is separated into a filter bag chamber and a lower electric motor suction fan chamber, and a generally rectangular opening is formed in said upper housing between said filter bag chamber and said electric motor and suction fan chamber.

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