A vacuum cleaner includes a body having a nozzle assembly, a handle assembly, a bag compartment and a suction generator compartment. A suction generator is held in the suction generator compartment. The bag compartment includes a wall and a plurality of v-shaped ribs projecting from the wall into the bag compartment.
BAG COMPARTMENT FOR VACUUM CLEANER

TECHNICAL FIELD

[0001] This document relates to the floor care appliance field and, more particularly, to a bag compartment for a vacuum cleaner.

BACKGROUND

[0002] Upright and canister vacuum cleaners that utilize a filter bag to collect dirt and debris are well known in the art. Such vacuum cleaners include a suction generator that draws an air stream entrained with dirt and debris through the filter bag. The filter bag includes a porous wall that captures the dirt and debris but allows the passage of the air stream. The relatively clean air stream then passes over the suction generator to provide cooling to the suction generator motor before being exhausted into the environment.

[0003] In order to maintain optimum operating efficiency, the filter bag must be maintained away from the walls of the bag compartment so as to allow the free passage of the air stream through the porous filter bag material. U.S. Pat. No. 7,752,707 to Mayes, et al and assigned to the assignee of the present invention illustrates a vacuum cleaner with a bag compartment and cooperating bag cage specifically adapted to achieve this purpose.

[0004] The present vacuum cleaner includes a unique and novel series of ribs on the wall of the bag compartment that allow for enhanced air flow through the porous material of the filter bag and then more efficiently direct that air flow to the outlet leading from the bag compartment to the suction generator. This results in improved vacuum cleaner performance.

SUMMARY

[0005] A vacuum cleaner is provided having a body including a nozzle assembly, a handle assembly, a bag compartment and a suction generator compartment. A suction generator is held in the suction generator compartment. Further, the bag compartment includes a wall and a plurality of V-shaped ribs projecting from the wall into the bag compartment. Each rib of the plurality of V-shaped ribs includes two opposing legs and an apex. Further, each rib includes a groove. The groove is provided at the apex and may be centered on the apex. Each rib is also continuous. Each rib has a height H1 at the groove that is less than the height H2 at a portion of the rib not including the groove. The ratio of the height H1 to the height H2 is typically between about 1:3 and about 1:6.

[0006] The bag compartment also includes an inlet and an inlet end and an outlet and an outlet end. The plurality of V-shaped ribs are spaced along the wall between the inlet end and the outlet end with the apaxes pointing toward the outlet end. Further, the grooves in the plurality of V-shaped ribs increase in size from the inlet end to the outlet end. Thus each groove in the series has enhanced capacity for allowing air flow.

[0007] In addition, the vacuum cleaner includes two air flow ribs extending along the wall across the plurality of V-shaped ribs from the inlet end to the outlet end. In one particularly useful embodiment the two air flow ribs diverge from one another as they extend from the inlet end to the outlet end. The apaxes of the plurality of the V-shaped ribs are positioned between the two airflow ribs with the grooves centered on the apaxes.

[0008] Still further describing the vacuum cleaner, the wall includes an access door and the plurality of V-shaped ribs are provided on the access door. In addition, the wall includes a surface opposite the access door. Longitudinal air guides project from that surface into the bag compartment and extend from the inlet end toward the outlet end. V-shaped rib extensions extend from the plurality of V-shaped ribs to one of the longitudinal air guides. Further, the inlet projects through the surface opposite the access door and the outlet projects through the wall. An angled grate is positioned between the surface of the end wall overlying that outlet.

[0009] In the following description there is shown and described several different vacuum cleaner embodiments. As should be realized, the vacuum cleaner is capable of still other different embodiments and its several details are capable of modification in various, obvious aspects. Accordingly, the drawings and descriptions will be regarded as illustrative in nature and not as restrictive.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] The accompanying drawings incorporated herein and forming a part of the specification, illustrate several aspects of the vacuum cleaner and together with the description serve to explain certain principles of the vacuum cleaner. In the drawings:

[0011] FIGS. 1a-1d are respective front elevational, left side elevational, rear elevational and bottom plan views of the current vacuum cleaner;

[0012] FIG. 2 is an exploded perspective view illustrating the interior of the filter bag and suction generator compartments;

[0013] FIG. 3 is a cross sectional view illustrating air flow through the vacuum cleaner;

[0014] FIG. 4 is a partially cross sectional view illustrating air flow into the suction generator in the suction generator compartment;

[0015] FIGS. 5a-5c are respective rear elevational, right rear perspective and left rear perspective views of the access door of the bag compartment;

[0016] FIG. 5d is a detailed perspective view illustrating a groove in one of the V-shaped ribs;

[0017] FIG. 6a is a front perspective view of the interior of the bag compartment further illustrating air flow; and

[0018] FIGS. 6b and 6c are respective front perspective and front elevational views with the grate removed to show the outlet port in the bag compartment;

[0019] Reference will now be made in detail to the present preferred embodiment of the vacuum cleaner, examples of which are illustrated in the accompanying drawings.

DETAILED DESCRIPTION OF THE VACUUM CLEANER

[0020] Reference is now made to FIGS. 1a-1d illustrating an upright vacuum cleaner 10. The vacuum cleaner 10 has a body 12 that includes a nozzle assembly 14, a handle assembly 16, a bag compartment 18 and a suction generator compartment 20. See also FIGS. 2 and 3. In the illustrated embodiment, both the bag compartment 18 and suction generator compartment 20 are part of the handle assembly 16. It should be appreciated, however, that in other embodiments either or both of these compartments 18, 20 could be provided as part of the nozzle assembly 14.
The nozzle assembly 14 includes an agitator cavity 22 that receives a rotary agitator 24. The rotary agitator 24 includes bristle tufts or other resilient projections 26 that function to brush dirt and debris from the underlying nap of a carpet being cleaned. The handle assembly 16 is pivotally connected to the nozzle assembly 14 in the manner of upright vacuum cleaners known in the art. Thus, the handle assembly 16 may be pivoted from the upright storage position illustrated in FIGS. 1a-1c into an inclined position whereby an operator may freely move the vacuum cleaner 10 to and fro to clean an underlying floor or carpet. The handle assembly 16 includes a lower housing 28 that defines the suction generator compartment 20 and an upper housing 30 that defines the bag compartment 18. The upper housing 30 includes a front access door 32.

As illustrated in FIGS. 2, 3 and 6a-6c, the bag compartment 18 includes an inlet 34 at an inlet end 36 of the bag compartment and an outlet 38 in an outlet end 40 of the bag compartment. As best illustrated in FIG. 2, an angled grate 42 is positioned between the rear wall surface 44 and the outlet end wall 40 overlying the outlet 38. As should be appreciated, the grate 42 is illustrated in FIGS. 2 and 6a. However, the grate 42 is removed in FIGS. 6b and 6c so as to better illustrate the outlet 38.

During vacuum cleaner operation, the suction generator 46 in the suction generator compartment 20 generates a negative pressure that draws an air stream through the agitator cavity 22 around the rotary agitator 24. Simultaneously, the agitator 24 is rotated at high speeds so that the bristle tufts 26 best dirt and debris from the nap of an underlying carpet or rug being cleaned. This dirt and debris is entrained in the air stream and travels from the agitator cavity 22 through a conduit system 48 to the inlet 34 that extends through the rear wall 44 of the bag compartment 18. A filter bag 50 is received over the end of the inlet 34 so that the air stream with entrained dirt and debris is directed into the filter bag.

The filter bag 50 is made from a filter material that traps dirt and debris while allowing the passage of relatively clean air. Accordingly, dirt and debris is trapped in the filter bag 50 while clean air passes through the filter bag 50 and travels through the filter bag compartment 18 and the grate 42 to the outlet 38. An optional filter element 52 may be provided behind the grate 42 and over the outlet 38 (see particularly FIG. 3). The air stream is then directed through the conduit 54 into the suction generator compartment 20 (see particularly FIGS. 3 and 4). The air stream is then drawn into the inlet end 56 of the suction generator 46. The air stream then passes over the motor of the suction generator 46 to provide cooling before being exhausted from the suction generator compartment 20 to the environment through the vent 58. Here it should be noted that the suction generator 46 is mounted in the suction generator compartment 20 so as to seal against the partition 60 that separates the inlet portion 62 of the suction generator compartment 18 from the outlet portion 64 of the suction generator compartment.

In order to optimize the operating efficiency of the vacuum cleaner 10, it should be appreciated that the wall 66 of the bag compartment 18 includes a plurality of chevron or v-shaped ribs 68 that project from the wall into the bag compartment (see particularly FIGS. 5a-5c). In the illustrated embodiment, these v-shaped ribs 68 are provided on the inner wall surface 66 of the access door 32. It should be appreciated, however, that the v-shaped ribs 68 could be provided on any inner wall surface of the bag compartment 18 if desired.

As illustrated, each v-shaped rib 68 includes two opposing legs 70 and an apex 72. Each apex 72 points toward the outlet end 40 of the bag compartment 18. Further each v-shaped rib 68 includes a groove 74 that is provided at and centered on each apex 72. See also FIG. 5d. Each rib 68 is continuous and each rib has a height H1 at the groove 74 that is less than the height H2 at any portion of the rib not including the groove. In one particularly useful embodiment the ratio of the height H1 to the height H2 is between about 1:3 and about 1:6.

As should be appreciated from viewing FIGS. 3 and 5a-5c, the plurality of v-shaped ribs 68 are spaced along the wall 66 between the inlet end 36 and the outlet end 40 of the bag compartment 18. Rib extensions 69 extend around the corners 71 of the access door 32 and along the sides 73 thereof (see FIGS. 5b and 5c). As should further be appreciated from carefully reviewing FIGS. 5a-5d, the grooves 74 in the plurality of v-shaped ribs 68 increase in size from the inlet end 36 to the outlet end 40.

As further illustrated in FIGS. 5a-5d, two air flow ribs 76 extend along the wall 66 across the plurality of v-shaped ribs 68 from the inlet end 36 to the outlet end 40. The two air flow ribs 76 diverge from one another from the inlet end 36 toward the outlet end 40. The apexes 72 and grooves 74 of the v-shaped ribs 68 are positioned between the two air flow ribs 76 which define an express airflow pathway 75 leading to the outlet end 40 of the bag compartment 18. In the illustrated embodiment each groove 74 is substantially as wide as the space between the diverging ribs 76 that is intersected by the rib 68 on which the groove is formed.

During vacuum cleaner operation, the v-shaped ribs 68 function to maintain an airflow passage or gap 78 between the filter bag 50, the ribs 68 and the wall 66 of the access door 32. Accordingly, the air stream may freely flow from the interior of the filter bag 50 through the wall of the filter bag into the airflow passage 78. The air stream is then directed by the v-shaped ribs 68 downwardly toward the apexes 72. The grooves 74 at each succeeding apex 72 increase in size so as to accommodate additional airflow which is directed through the grooves toward the outlet end 40 where the airstream may flow freely through the angled grate 42 into the outlet 38.

The wall 44 at the rear of the bag compartment 18 opposite the access door 32 includes a series of longitudinal air guides 82 that project from the surface into the bag compartment and extend from the inlet end 36 toward the outlet end 40. Additional airflow ribs 84 extend around the wall at the sides of the bag compartment 18 from the longitudinal air guides 82 to the removable access door 32. These extensions further direct the airflow along left and right sides of the filter bag 50 toward the v-shaped ribs 68 so that the air stream may pass through the grooves 74 along the access door 32 and flow smoothly to the outlet 38. As should be appreciated, air passing through the rear wall of the filter bag 50 flows cleanly and smoothly in the channels 86 formed between the longitudinal air guides 82 toward the angled grate 42 and through the optional filter element 56 into the outlet 38.

In summary, numerous benefits result from employing the concepts of this vacuum cleaner 10. Specifically, the v-shaped ribs 68 and the cooperating rib extensions 84 function to maintain an open airflow passage 78 between the filter bag 50, the ribs 68 and the wall 66 of the bag compartment 18. The ribs 68, the extensions 84, the diverging airflow ribs 76
and the cooperating grooves 74 at the apexes 72 of the
v-shaped ribs synergistically cooperate to smoothly and ef-
ciently guide the air stream through the airflow passage 78,
the angled grate 42, the optional filter element 52, and the
outlet 38 toward the suction generator 46. The longitudinal
air guides 82 along the rear wall 44 of the bag compartment 18
provide longitudinal, continuous channels 86 that function to
also enhance airflow through the rear of the filter bag 50 and
the bag compartment 18 toward the suction generator 46. In
this way, the vacuum cleaner 10 provides more efficient and
effective cleaning.

[0032] The foregoing description of the preferred embed-
diments of the present vacuum cleaner have been presented for
purposes of illustration and description. It is not intended to
be exhaustive or to limit the vacuum cleaner to the precise
form disclosed. Obvious modifications or variations are pos-
sible in light of the above teachings. The embodiments were
chosen and described to provide the best illustration of the
principles of the current vacuum cleaner and its practical
application to thereby enable one of ordinary skill in the art to
utilize the vacuum cleaner in various embodiments and with
various modifications as are suited to the particular use con-
templated. All such modifications and variations are within
the scope of the current vacuum cleaner as determined by the
appended claims when interpreted in accordance with the
broadth to which they are fairly, legally and equitably entitled.
The drawings and preferred embodiments do not and are not
intended to limit the ordinary meaning of the claims in their
fair and broad interpretation in any way.

What is claimed:
1. A vacuum cleaner, comprising:
   a body including a nozzle assembly, a handle assembly, a
   bag compartment and a suction generator compartment;
   and
   a suction generator held in said suction generator compart-
ment;
   said bag compartment including a wall and a plurality of
   v-shaped ribs projecting from said wall into said bag
   compartment.
2. The vacuum cleaner of claim 1, wherein each rib of said
   plurality of v-shaped ribs includes two opposing legs and an
   apex.
3. The vacuum cleaner of claim 2, wherein each rib of said
   plurality of v-shaped ribs includes a groove.
4. The vacuum cleaner of claim 3, wherein said groove is
   provided at said apex.
5. The vacuum cleaner of claim 4, wherein said groove is
   centered on said apex.
6. The vacuum cleaner of claim 5, wherein each rib is
   continuous and each said rib has a height H1 at said groove
   that is less than a height H2 at a portion of said rib not
   including said groove.
7. The vacuum cleaner of claim 6, wherein a ratio of the
   height H1 to the height H2 is between about 1:3 and about 1:6.
8. The vacuum cleaner of claim 3, wherein said bag compart-
   ment includes an inlet at an inlet end and an outlet at an
   outlet end and said plurality of v-shaped ribs are spaced along
   said wall between said inlet end and said outlet end.
9. The vacuum cleaner of claim 8, wherein said grooves in
   said plurality of v-shaped ribs increase in size from said inlet
   end to said outlet end.
10. The vacuum cleaner of claim 9, wherein said grooves
    are provided at said apexes of said plurality of v-shaped ribs.
11. The vacuum cleaner of claim 10, further including two
    air flow ribs extending along said wall across plurality of
    v-shaped ribs from said inlet end to said outlet end.
12. The vacuum cleaner of claim 11, wherein said two air
    flow ribs diverge from one another between said inlet end and
    said outlet end.
13. The vacuum cleaner of claim 12, wherein said apexes of
    said plurality of v-shaped ribs are positioned between said
    two air flow ribs.
14. The vacuum cleaner of claim 13, wherein said grooves
    are centered on said apexes.
15. The vacuum cleaner of claim 14, wherein said wall
    includes an access door and said plurality of v-shaped ribs are
    provided on said access door.
16. The vacuum cleaner of claim 15, wherein said wall
    further includes a surface opposite said access door.
17. The vacuum cleaner of claim 16, further including
    longitudinal air guides projecting from said surface into said
    bag compartment and extending from said inlet end toward
    said outlet end.
18. The vacuum cleaner of claim 17, further including
    additional airflow ribs extending from said longitudinal air
    guides toward said access door.
19. The vacuum cleaner of claim 18, wherein said inlet
    projects through said surface and said outlet protects through
    a said end wall.
20. The vacuum cleaner of claim 19, further including an
    angled grate positioned between said surface and said end
    wall overlying said outlet.

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