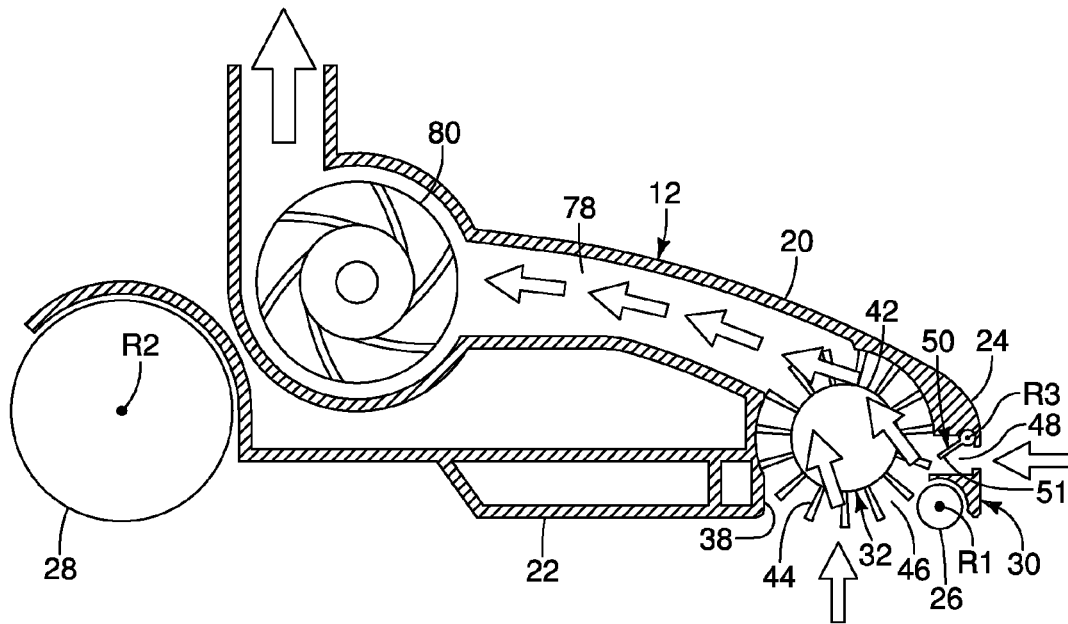




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BOSSSES(10) **Pub. No.: US 2019/0090704 A1**(43) **Pub. Date: Mar. 28, 2019**(54) **VACUUM CLEANER HAVING HINGED
INLET COVER**(52) **U.S. Cl.**
CPC . *A47L 9/02* (2013.01); *A47L 5/30* (2013.01);
A47L 9/0072 (2013.01)(71) Applicant: **Zenith Technologies, LLC**, Fort
Lauderdale, FL (US)(72) Inventor: **Mark D. BOSSES**, Boca Raton, FL
(US)(21) Appl. No.: **15/715,925**(22) Filed: **Sep. 26, 2017****Publication Classification**(51) **Int. Cl.**
A47L 9/02 (2006.01)
A47L 9/00 (2006.01)(57) **ABSTRACT**

A vacuum cleaner basically includes a motor, first and second inlets and a cover. The motor is configured to create flow through a suction path. The first inlet and the second inlet are disposed in the housing in fluid communication with the suction path. A cover is pivotably disposed in the second inlet. The cover is movable between a first position in which the second inlet is substantially covered to substantially prevent fluid from flowing through the second inlet and a second position in which fluid is allowed to flow through the second inlet.



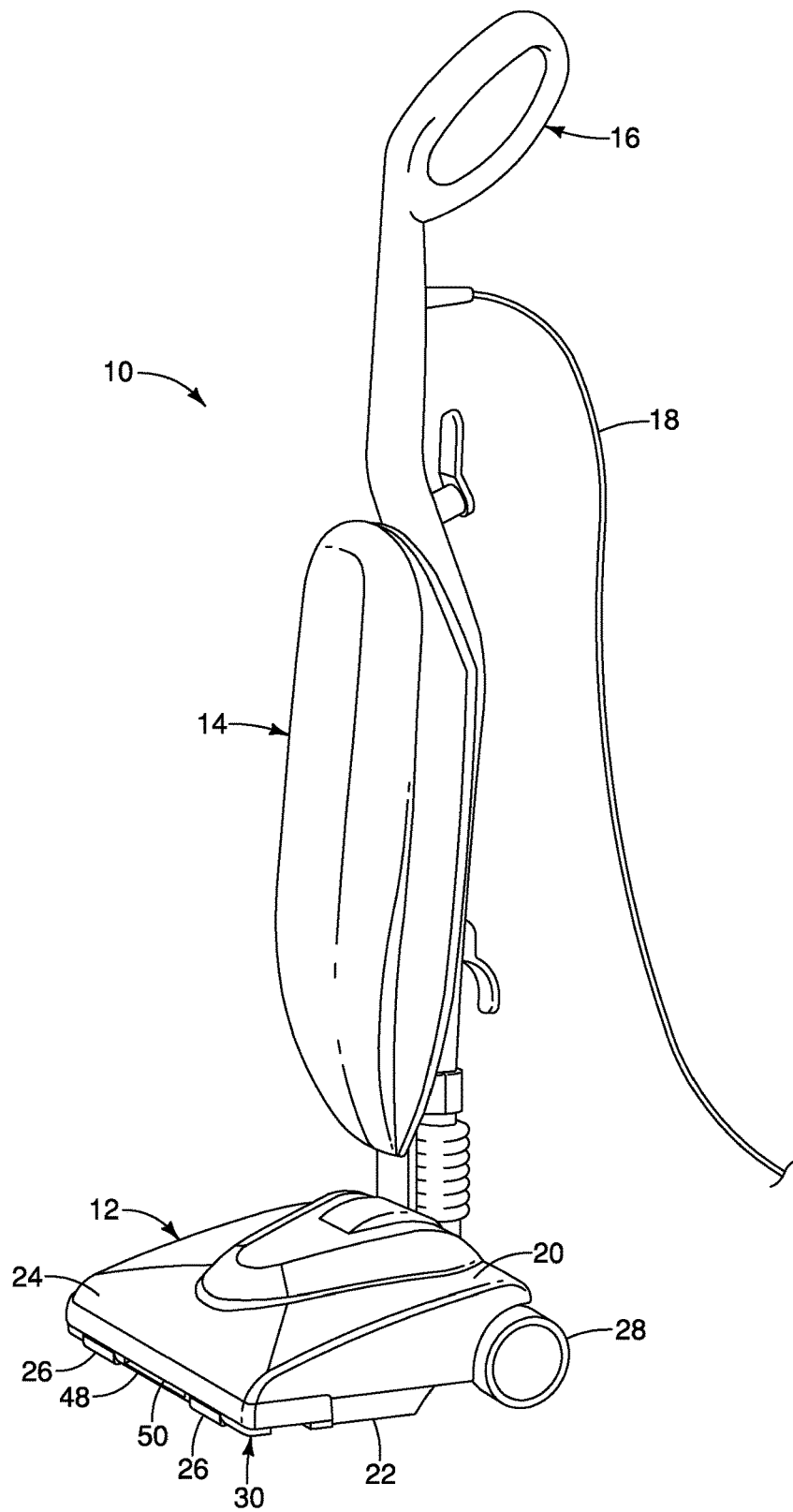


FIG. 1

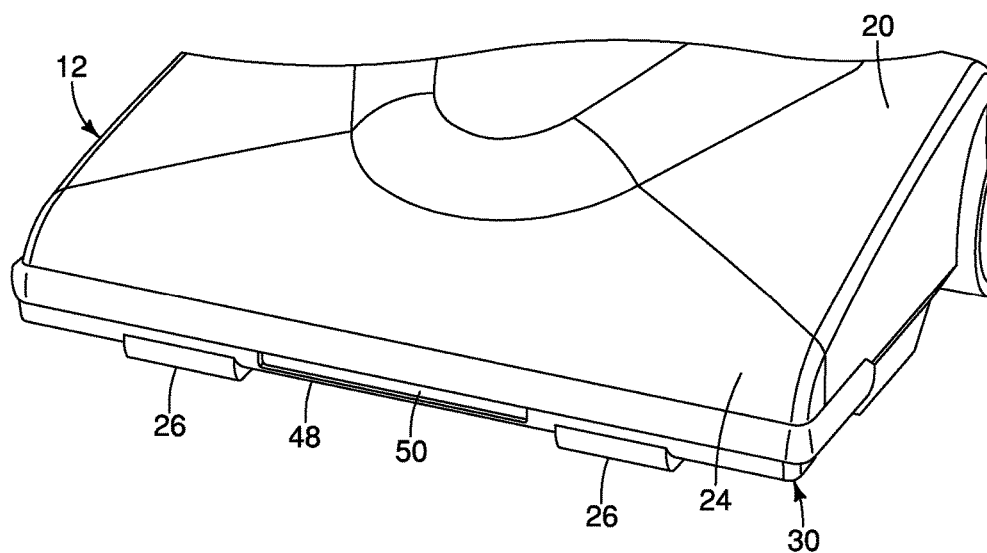


FIG. 2

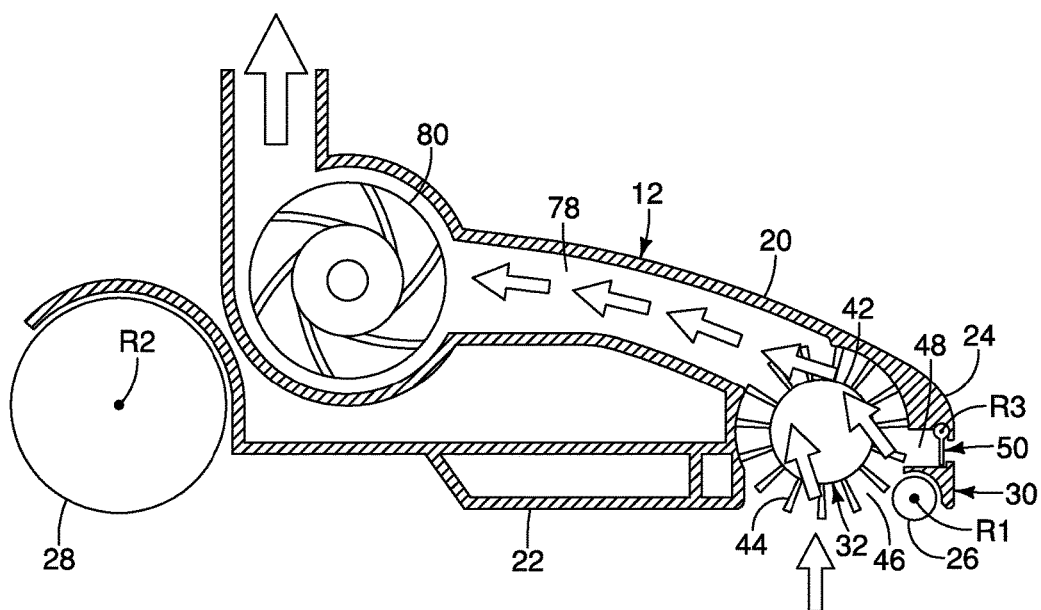


FIG. 3

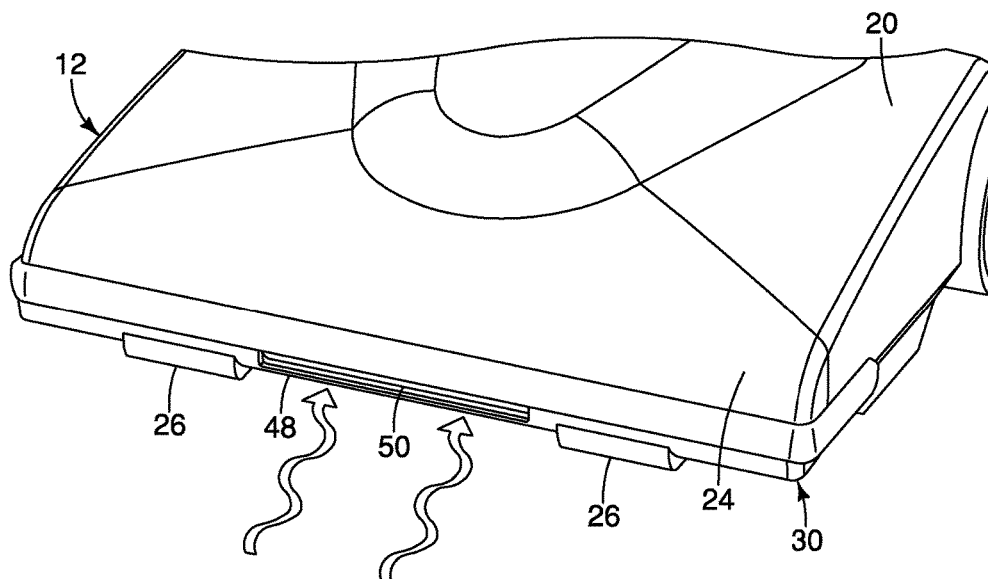


FIG. 4

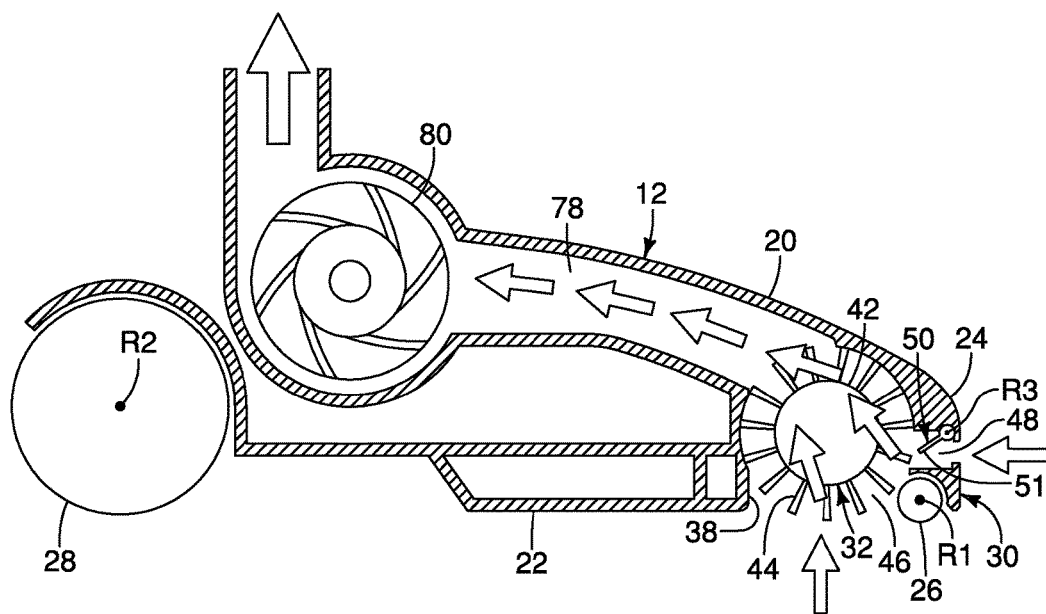


FIG. 5

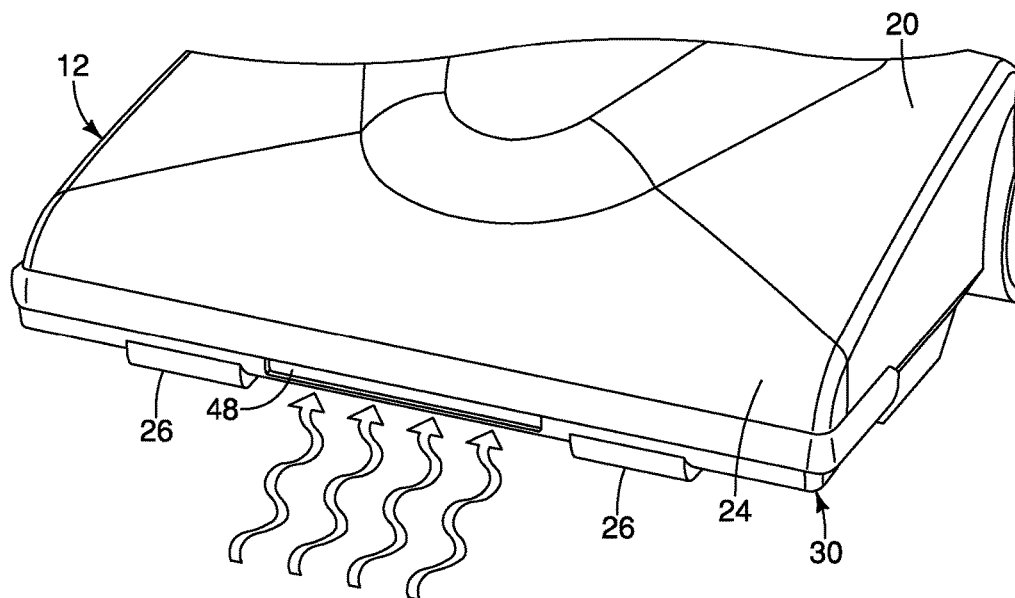


FIG. 6

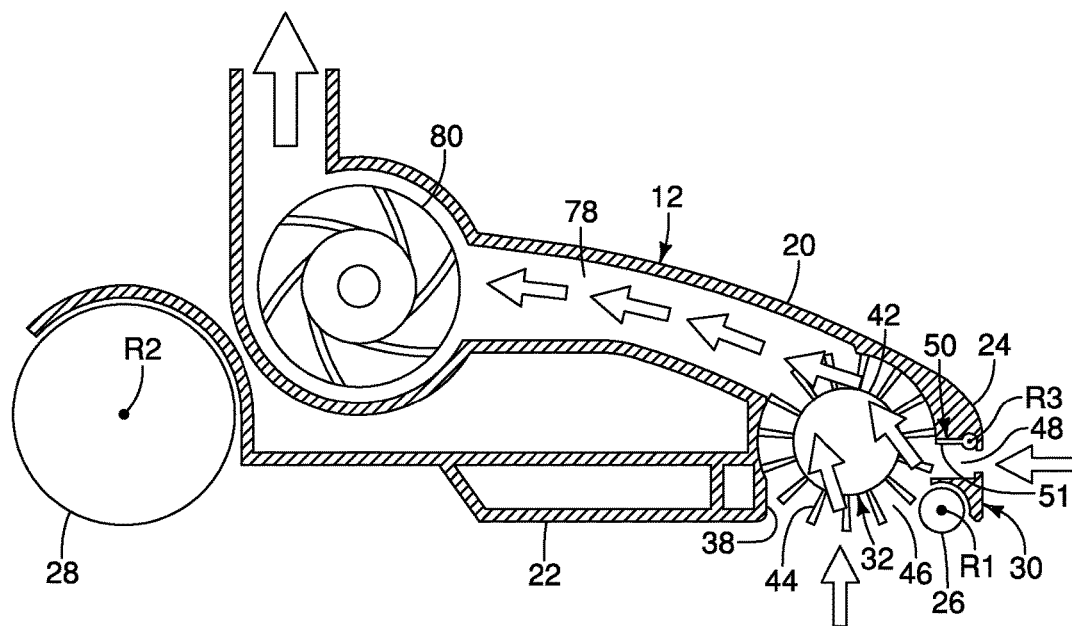


FIG. 7

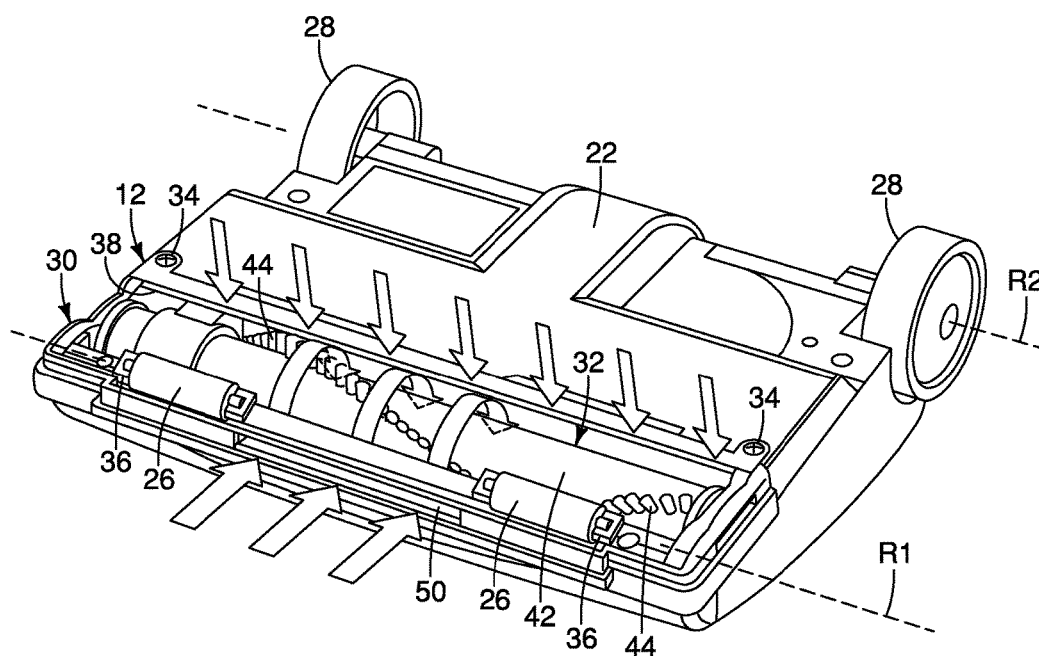


FIG. 8

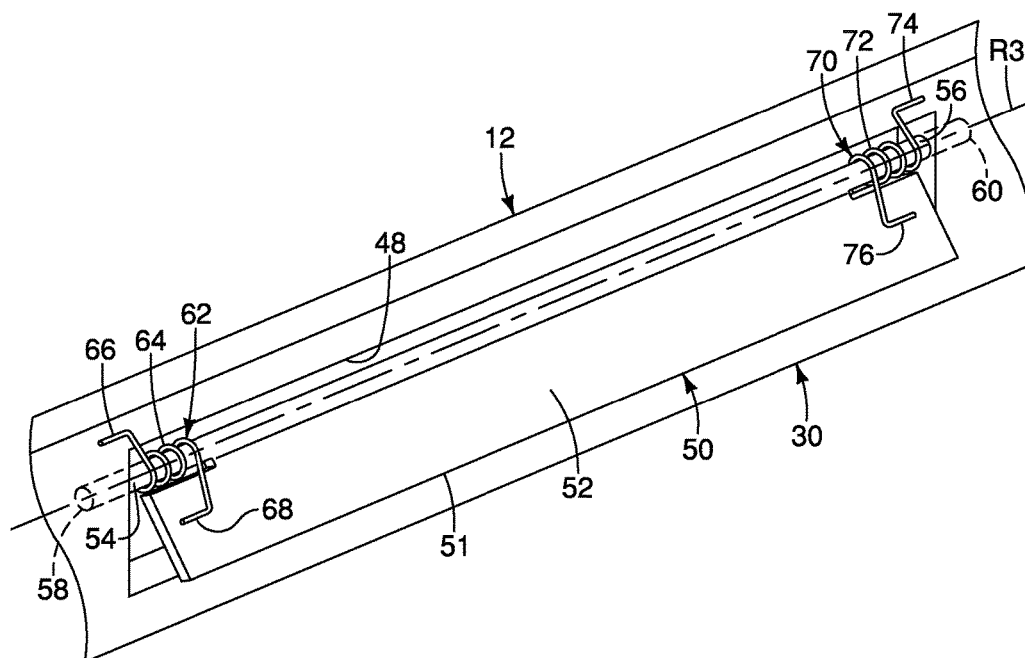


FIG. 9

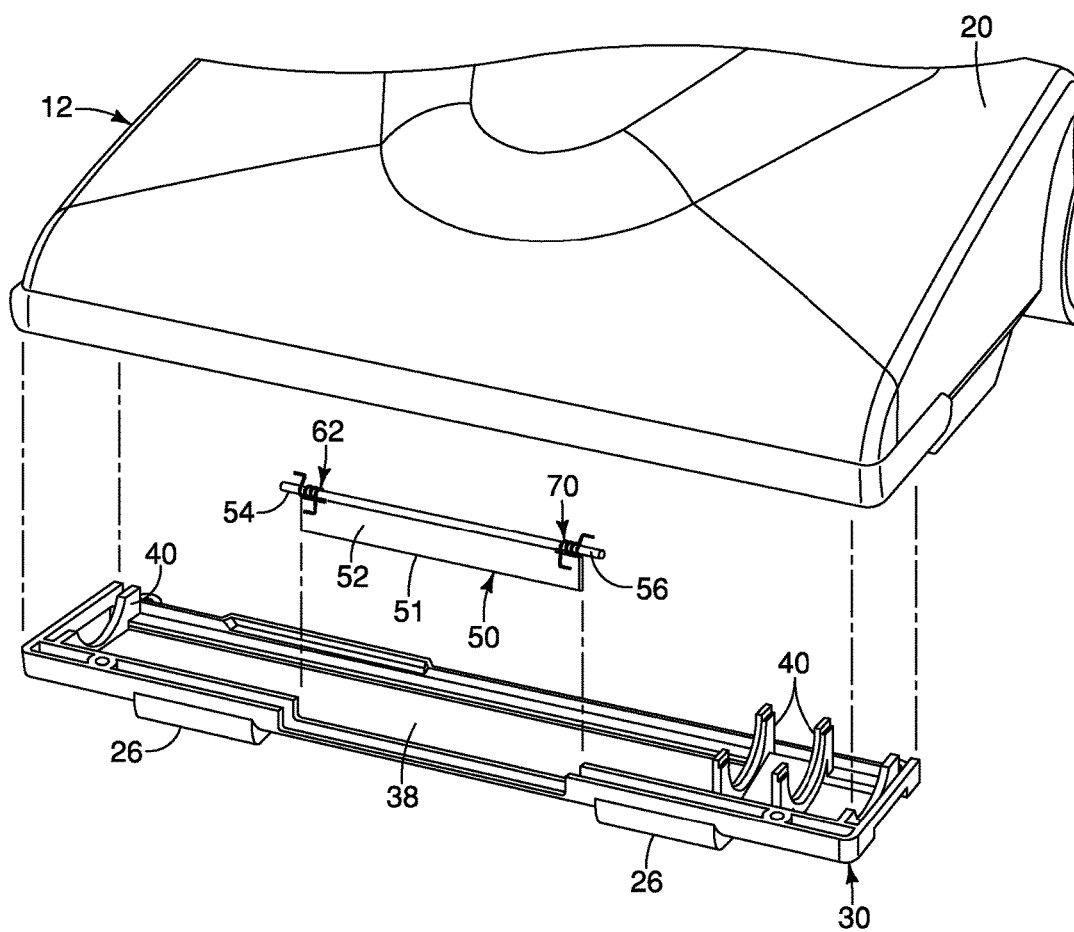


FIG. 10

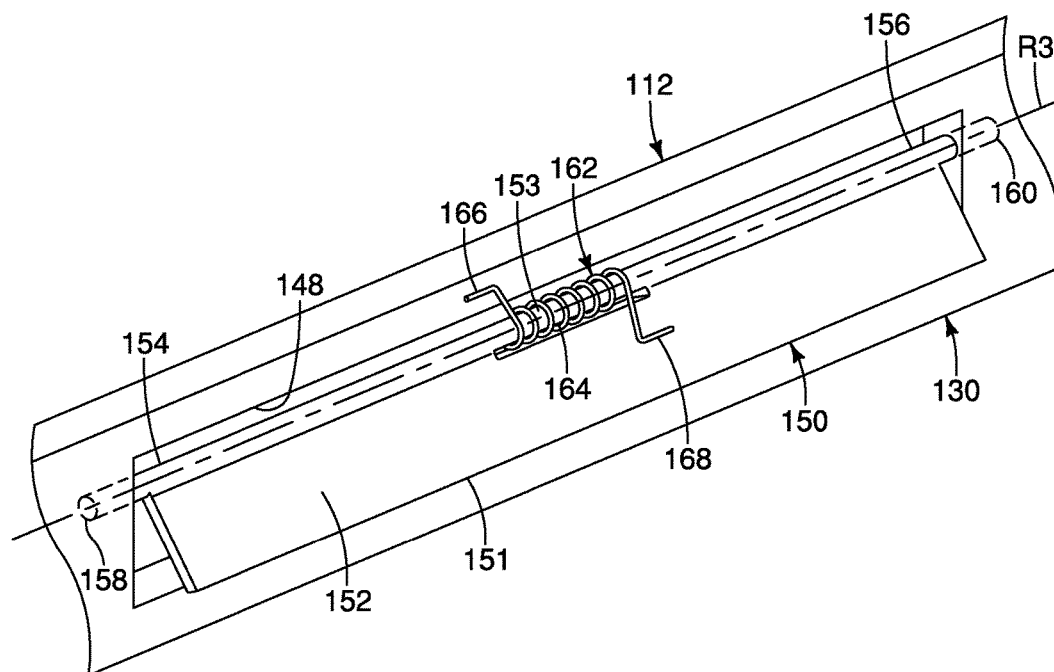


FIG. 11

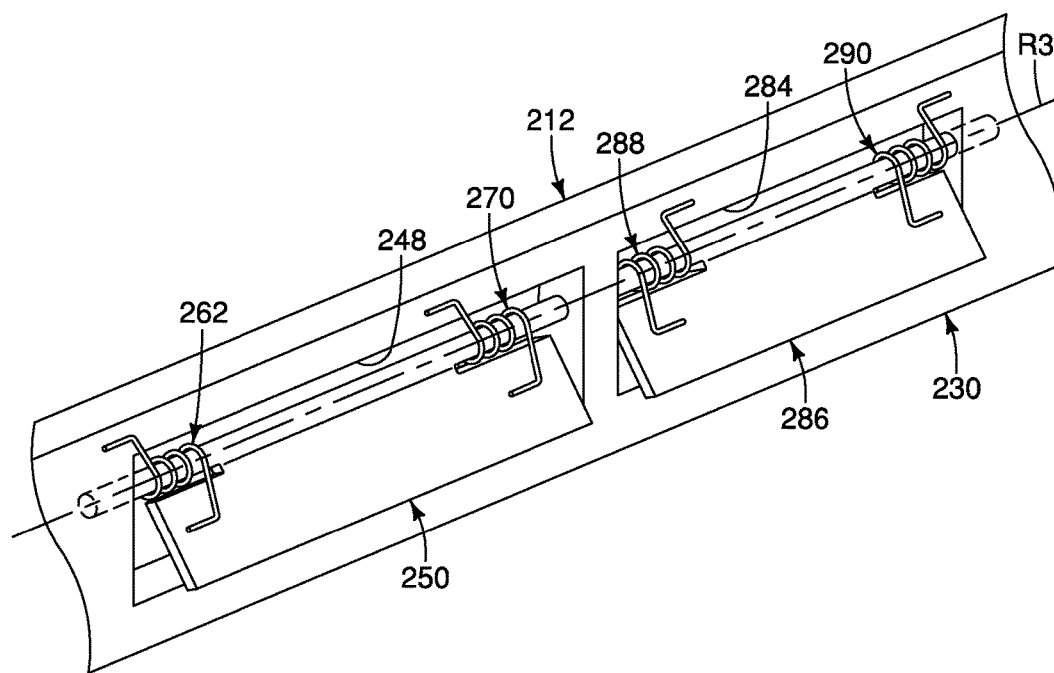


FIG. 12

VACUUM CLEANER HAVING HINGED INLET COVER

BACKGROUND

Field of the Invention

[0001] This invention generally relates to a vacuum cleaner. More specifically, the present invention relates to a vacuum cleaner having a hinged inlet cover.

Background Information

[0002] Vacuum cleaners typically use a suction nozzle that is movable across a surface to be cleaned. The suction created at an inlet in the nozzle results in the removal of free dirt particles accumulated on the surface. However, ground-in dirt is frequently encountered when cleaning carpets or other textured surfaces, and reliance on suction for removal of such ground-in dirt has proven to be unsatisfactory.

[0003] Vacuum cleaners are provided with devices that agitate the carpet surface to dislodge ingrained dirt particles. For example, mechanical beaters physically strike the carpet surface to loosen dirt particles. Such agitators are often located on the vacuum cleaner nozzle head, so that dirt can be dislodged and instantly removed by moving the nozzle head across a soiled carpet surface. An example of a mechanical beater is a cylindrical rotatable beater brush having a plurality of extending resilient bristles and prongs that physically beat the carpet as the nozzle head is moved.

[0004] A recent trend in carpet manufacturing is soft carpets, which are made of softer yarns. Denier quantifies the softness of the yarn, and is the weight in grams of 9,000 meters of the yarn. The larger the denier, the thicker the yarn. Denier per filament (DPF) represents the size of an individual filament of the yarn. The lower the DPF, the softer the fiber. Traditional home carpets have a DPF of between approximately 12 to 18 DPF. The new soft carpet trend has resulted in carpets having a DPF between approximately 3.5 to 4.5 DPF. These soft yarns can have three to four times as many filaments as in the traditional home carpets. Traditional strands of yarn have approximately 120 filaments. The soft strands of yarn can have approximately 700 or more filaments.

SUMMARY

[0005] Generally, the present disclosure is directed to various features of a vacuum cleaner. In one feature, a vacuum cleaner is provided in which an inlet cover is hingedly connected.

[0006] In view of the state of the know technology and in accordance with a first aspect of the present disclosure, a vacuum cleaner is basically provided with a motor, first and second inlets and a cover. The motor is configured to create flow through a suction path. The first inlet and the second inlet are disposed in the housing in fluid communication with the suction path. The cover is pivotably disposed in the second inlet. The cover is movable between a first position in which the second inlet is substantially covered to substantially prevent fluid from flowing through the second inlet and a second position in which fluid is allowed to flow through the second inlet.

[0007] In accordance with a second aspect of the present invention, the vacuum cleaner according to the first aspect includes a biasing member biasing the cover to the first position.

[0008] In accordance with a third aspect of the present invention, the vacuum cleaner according to the second aspect is configured so that the cover is movable to the second position upon a suction force exerted on the cover being greater than a biasing force exerted by the biasing member on the cover.

[0009] In view of the state of the known technology and in accordance with a fourth aspect of the present disclosure, a vacuum cleaner is basically provided with a housing, a motor, a base, a cover and a spring member. A suction path is in fluid communication with the housing. The motor is configured to create flow through the suction path. The base has a first inlet and a second inlet in fluid communication with the suction path. The cover is hingedly connected to the base. The cover is pivotable between a first position in which the second inlet is substantially covered to substantially prevent fluid from flowing through the second inlet and a second position in which fluid is allowed to flow through the second inlet.

[0010] In accordance with a fifth aspect of the present invention, the vacuum cleaner according to the fourth aspect includes a first biasing member connected between the base and the cover to bias the cover to the first position.

[0011] In accordance with a sixth aspect of the present invention, the vacuum cleaner according to the fifth aspect is configured so that the cover is movable to the second position upon a suction force exerted on the cover being greater than a biasing force exerted by the first biasing member on the cover.

[0012] In accordance with a seventh aspect of the present invention, the vacuum cleaner according to the fourth aspect includes a surface agitator movably disposed in the base. The second inlet is disposed below an uppermost part of the surface agitator and in front of the surface agitator.

[0013] In accordance with an eighth aspect of the present invention, the vacuum cleaner according to the fifth aspect is configured so that the first biasing member is a torsion spring.

[0014] In accordance with a ninth aspect of the present invention, the vacuum cleaner according to the fourth aspect is configured so that a free end of the cover in the second position is disposed rearwardly with respect to the free end of the cover in the first position.

[0015] In accordance with a tenth aspect of the present invention, the vacuum cleaner according to the fourth aspect is configured so that the cover pivots about an axis substantially perpendicular to a lengthwise direction of the base.

[0016] In accordance with an eleventh aspect of the present invention, the vacuum cleaner according to the fifth aspect is configured so that a first end of the first biasing member engages the base and a second end of the first biasing member engages the cover.

[0017] In accordance with a twelfth aspect of the present invention, the vacuum cleaner according to the eleventh aspect is configured so that a body of the first biasing member is disposed on a first pivot axle of the cover.

[0018] In accordance with a thirteenth aspect of the present invention, the vacuum cleaner according to the fifth

aspect is configured so that a second biasing member is connected between the base and the cover to bias the cover to the first position.

[0019] In accordance with a fourteenth aspect of the invention, the vacuum cleaner according to the thirteenth aspect is configured so that the second biasing member is laterally spaced from the first biasing member.

[0020] In accordance with a fifteenth aspect of the invention, the vacuum cleaner according to the fourteenth aspect is configured so that the second biasing member is a torsion spring. A body of the second biasing member is disposed on a second pivot axle of the cover.

[0021] In view of the state of the known technology and in accordance with a sixteenth aspect of the present disclosure, a vacuum cleaner is basically provided with a housing, a motor, a base, first and second covers and first and second spring members. A suction path is in fluid communication with the housing. The motor creates flow through the suction path. The base has a first inlet, a second inlet and a third inlet in fluid communication with the suction path. The first cover is hingedly connected to the base. The first cover is pivotable between a first position in which the second inlet is substantially covered to substantially prevent fluid from flowing through the second inlet and a second position in which fluid is allowed to flow through the second inlet. The second cover is hingedly connected to the base. The second cover is pivotable between a first position in which the third inlet is substantially covered to substantially prevent fluid from flowing through the third inlet and a second position in which fluid is allowed to flow through the third inlet.

[0022] In accordance with a seventeenth aspect of the present invention, the vacuum cleaner according to the sixteenth aspect is configured so that a first spring member is connected between the base and the first cover to bias the first cover to the first position, and a second spring member is connected between the base and the second cover to bias the second cover to the first position.

[0023] In accordance with an eighteenth aspect of the present invention, the vacuum cleaner according to the sixteenth aspect is configured so that the third inlet is disposed laterally adjacent the second inlet.

[0024] In accordance with a nineteenth aspect of the present invention, the vacuum cleaner according to the seventeenth aspect is configured so that the first and second covers are movable to the respective second positions when a suction force exerted on the first and second covers is greater than first and second spring forces respectively exerted by the first and second spring members on the first and second covers.

[0025] In accordance with a twentieth aspect of the present invention, the vacuum cleaner according to the sixteenth aspect is configured so that each of the second and third inlets is substantially perpendicular to the first inlet.

[0026] Also, other objects, features, aspects and advantages of the disclosed vacuum cleaner will become apparent to those skilled in the art from the following detailed description, which, taken in conjunction with the annexed drawings, discloses several embodiments of the vacuum cleaner.

BRIEF DESCRIPTION OF THE DRAWINGS

[0027] Referring now to the attached drawings which form a part of this original disclosure:

[0028] FIG. 1 is a perspective view of a vacuum cleaner in accordance with an exemplary embodiment;

[0029] FIG. 2 is a perspective view of a base of the vacuum cleaner of FIG. 1 with a cover in a closed position;

[0030] FIG. 3 is a side elevational view in cross section of the base of the vacuum cleaner of FIG. 2;

[0031] FIG. 4 is a perspective view of the base of the vacuum cleaner of FIG. 1 with the cover in a partially opened position;

[0032] FIG. 5 is a side elevational view in cross section of the base of the vacuum cleaner of FIG. 4;

[0033] FIG. 6 is a perspective view of the base of the vacuum cleaner of FIG. 1 with the vent cover in a fully opened position;

[0034] FIG. 7 is a side elevational view in cross section of the base of the vacuum cleaner of FIG. 6;

[0035] FIG. 8 is a lower perspective view of the base of the vacuum cleaner of FIG. 1;

[0036] FIG. 9 is a partial inner perspective view of the cover of the vacuum cleaner of FIG. 1;

[0037] FIG. 10 is an exploded assembly view of the base of the vacuum cleaner of FIG. 1;

[0038] FIG. 11 is a partial inner perspective view of a cover of a vacuum cleaner in accordance with another exemplary embodiment of the present invention.

[0039] FIG. 12 is a partial inner perspective view of first and second covers of a vacuum cleaner in accordance with another exemplary embodiment of the present invention.

[0040] Throughout the drawing figures, like reference numerals will be understood to refer to like parts, components and structures.

DETAILED DESCRIPTION OF EXEMPLARY EMBODIMENTS

[0041] Selected exemplary embodiments will now be explained with reference to the drawings. It will be apparent to those skilled in the vacuum cleaner field from this disclosure that the following descriptions of the exemplary embodiments are provided for illustration only and not for the purpose of limiting the invention as defined by the appended claims and their equivalents.

[0042] As shown in FIG. 1, and according to various exemplary embodiments, a vacuum cleaner 10 includes a head or base 12, a housing 14 for receiving debris, a handle 16, and a cord 18 for connecting the vacuum cleaner 10 to a source of electrical power. The housing can be, for example a bag housing or any other suitable apparatus for receiving debris collected during operation of the vacuum cleaner 10. The vacuum cleaner can be any suitable type of vacuum cleaner, such as, but not limited to, direct air and bypass air upright vacuum cleaners, canister vacuum cleaners, stick vacuum cleaners and multi-surface vacuum cleaners. The various components and interactions of the vacuum cleaner 10 would be understood by one of ordinary skill in the art.

[0043] The base 12 includes a top surface 20 and a lower surface 22. The top surface 20 includes a front portion 24, which may be curved as best shown in the exemplary embodiment of FIGS. 1 to 9. A set of front wheels 26 and a set of rear wheels 28 are rotatably connected to the base 12. The front wheels 26 are rotatable about a first rotation axis R1 and the rear wheels 28 are rotatable about a second rotation axis R2, as shown in FIG. 3. The first and second rotation axes R1 and R2 extend in a lateral (left-to-right)

direction of the vacuum cleaner 10. The first and second rotation axes R1 and R2 are substantially parallel to one another. The first and second rotation axes R1 and R2 extend substantially perpendicularly to a longitudinal (front-to-back) direction of the vacuum cleaner 10. The front and rear wheels 26 and 28 facilitate pushing and pulling the vacuum cleaner 10 during operation. In an exemplary embodiment, as shown in FIG. 8, the front wheels 26 have an increased width and the rear wheels 28 have an increased diameter, respective to each other, to help reduce friction and to allow the vacuum cleaner 10 to be used with a variety of carpet types.

[0044] A cover plate 30 and a surface agitator, such as a brush roll 32, are connected to the lower surface 22 of the base 12, as shown in FIGS. 8 and 10. The surface agitator, such as the brush roll 32, is movably disposed in the base 12. In an exemplary embodiment, the cover plate 30 secures the brush roll 32 to the base 12. The cover plate 30 has a plurality of fastener openings 34 to receive fasteners connecting the cover plate 30 to the base 12. The front wheels 26 can be connected to the cover plate 30, as shown in FIGS. 8 and 10, or directly to the base 12. In an exemplary, the cover plate 30 includes bearing housings 36 for receiving the front wheels 26. The cover plate 30 also includes an opening 38 for receiving the brush roll 32. A plurality of support members 40 extend across the opening 38 to facilitate supporting the brush roll 32. The support members 40 preferably extend in a direction parallel to a longitudinal, or front-to-rear, direction of the vacuum cleaner. The brush roll 32 is a rotating cylinder 42 having a helical bristle 44 extending from the cylinder. Different types of brush rolls 32 or other carpet agitators may be used in place of, or in addition to, the cover plate 30.

[0045] As best shown in FIG. 5, the opening 38 in the cover plate 30 acts as a first inlet, or suction, inlet 46. Depending on the cover plate 30, the base 12, and the intended use of the vacuum cleaner 10, more air flow inlets may also be provided, including various apertures or slots.

[0046] As best shown in the exemplary embodiment illustrated in FIGS. 2-10, the vacuum 10 includes a second inlet, or vent, 48. The second inlet 48 acts as a second air inlet in addition to the air inlet provided in the first inlet 46. The second inlet 48 is positioned in the base 12, for example in the top surface 20 or the lower surface 22. As best shown in FIGS. 8 and 10 of the exemplary embodiment, the second inlet 48 is incorporated with the cover plate 30. As shown in FIGS. 3, 5 and 7, the second inlet 48 is preferably substantially perpendicular to the first inlet 46.

[0047] A cover 50 is pivotably disposed in the second inlet 48, as shown in FIG. 3, to control the flow of fluid through the second inlet. The cover 50 is hingedly connected to the base 12, as shown in FIG. 9. The cover 50 is pivotable between a first position, as shown in FIGS. 2 and 3, and a second position, as shown in FIGS. 4 to 7. The cover 50 includes a main body 52, as shown in FIG. 9. A first pivot axle 54 extends from the main body 52 in a first direction, and a second pivot axle 56 extends from the body 52 in a second direction. The second direction is substantially opposite the first direction. The first and second pivot axles 54 and 56 are preferably coaxial. The first and second pivot axles 54 and 56 are received by openings 58 and 60 in the base 12 to allow the cover 50 to pivot with respect to the base 12. The cover 50 pivots about an axis R3 that is substantially perpendicular to a lengthwise direction of the

base 12 of the vacuum cleaner 10. The pivot axis R3 of the cover 50 is preferably substantially parallel to the rotational axes R1 and R2 of the front and rear wheels 26 and 28.

[0048] As shown in FIG. 9, a first biasing, or spring, member 62 is connected between the base 12 and the cover 50 to bias the cover 50 to the first position. A body 64 of the first spring member 62 is disposed on the first pivot axle 54. A first end 66 of the first spring member 62 engages the base 12. Preferably, the first end 66 of the first spring member 62 engages an inner surface of the base 12 above the second inlet 48. A second end 68 of the first spring member 62 engages the cover 50. Preferably, the second end 68 of the first spring member 62 engages an inner surface of the cover 50. The first spring member 62 is preferably a torsion spring, although any suitable spring member can be used to bias the cover 50 to the first position.

[0049] As shown in FIG. 9, a second biasing, or spring, member 70 is connected between the base 12 and the cover 50 to bias the cover 50 to the first position. A body 72 of the second spring member 70 is disposed on the second pivot axle 56. A first end 74 of the second spring member 70 engages the base 12. Preferably, the first end 74 of the second spring member 70 engages an inner surface of the base 12 above the opening 38. A second end 76 of the second spring member 70 engages the cover 50. Preferably, the second end 76 of the second spring member 70 engages an inner surface of the cover 50. The second spring member 70 is laterally spaced from the first spring member 62 in a width direction of the base 12 of the vacuum cleaner 10 such that the first and second spring member 62 and 70 are disposed at opposite ends of the cover 50. The second spring member 70 is preferably a torsion spring, although any suitable spring member can be used to bias the cover 50 to the first position. Although FIG. 9 illustrates first and second spring members 62 and 70 biasing the cover 50 to the first position, any suitable number of spring members, such as one or more than three, can be used.

[0050] When the cover is in the first position, as shown in FIGS. 2 and 3, the second inlet 48 is substantially covered to substantially prevent fluid from flowing through the second inlet 48. The first position corresponds to the cover 50 being in a fully closed position.

[0051] When the cover 50 is in the second position, as shown in FIGS. 4 to 7, fluid is allowed to flow through the second inlet 48. The second position corresponds to a position in which the cover 50 is moved to allow fluid to flow through the second inlet 48. As shown in FIGS. 4 and 5, the cover 50 is pivoted about the pivot axis R3 to a partially open position, which is approximately forty-five degrees from the first position. As shown in FIGS. 6 and 7, the cover 50 is pivoted about the pivot axis R3 to a fully opened position in which the cover 50 is pivoted approximately ninety degrees from the first position shown in FIGS. 2 and 3. As shown in FIGS. 3, 5 and 7, a free end 51 of the cover 50 is disposed rearwardly in the second position with respect to the free end of the cover in the first position. The cover is positionable in at least one position between the first position (FIGS. 2 and 3) and the fully opened position (FIGS. 6 and 7), such as the partially opened position shown in FIGS. 4 and 5.

[0052] As best shown in FIGS. 3, 5 and 7, the cover 50 is variably positionable to increase the amount of airflow through the second inlet 48. The cover 50 is pivotable between a closed position shown in FIGS. 2 and 3, a fully

opened position shown in FIGS. 6 and 7, an intermediate position shown in FIGS. 4 and 5, and various other positions therebetween. In an exemplary embodiment, the cover 50 is pivotable between a first position in which the cover 50 substantially covers the second inlet 48 to substantially prevent fluid from flowing therethrough and a second position in which fluid is allowed to flow through the second inlet 48. The first position, therefore, does not need to fully close the second inlet 48.

[0053] Softer carpets have an increased surface area of the fibers, which increases the drag across a surface with the vacuum cleaner. Additionally, the increased surface area increases the difficulty of pulling air through the carpet, which slows down or stops the mechanical beaters, such as the brush roll 32, of the vacuum cleaner. Soft yarn strands also lack the stiffness of traditional carpets, such that vacuum cleaners tend to sink in the soft carpets. The soft yarn strands tend to form a more complete seal around the vacuum cleaner base, thereby increasing suction at the point of contact with the soft carpet surface. The more the vacuum cleaner base sinks into the soft carpet, the greater the suction and the difficulty of operating the vacuum cleaner. Being able to automatically adjust the airflow through the second inlet 48 allows a user to compensate for the issues raised with softer carpets, while also allowing the vacuum cleaner to automatically adjust to different types of carpeted surfaces.

[0054] The first and second spring members 62 and 70 exert a biasing, or spring, force that biases the cover 50 to the first position (FIGS. 2 and 3). When there is difficulty in drawing air through the first inlet 46, such as when soft yarn strands seal the first inlet 46 as described above, suction is increased in the second inlet 48. When the suction exerted on the cover 50 is larger than the spring force biasing the cover to the first position, the cover 50 is pivotably drawn to the second position (FIGS. 4 to 7), thereby allowing fluid to flow through the second inlet 48. The amount of suction exerted on the cover 50 determines the pivot amount of the cover 50 such that the greater the suction exerted on the cover the larger the pivot amount of the first cover. The relief of suction to the second inlet 48 clears the seal at the first inlet 46 due to the carpet. As suction is returned to the first inlet 46, the suction at the second inlet 48 is reduced. When the suction at the second inlet 48 is less than the spring force of the first and second spring members 62 and 70, the spring members 62 and 70 cause the cover 50 to pivotably return to the first position. The spring forces can be selected such that the cover 50 is always in a partially open position during operation of the vacuum cleaner 10. Alternatively, the spring forces can be selected to be larger such that the cover 50 only moves when a blockage occurs at the first inlet 46, and the cover 50 pivotably returns to the fully closed position when the blockage is cleared.

[0055] When the cover 50 is in the fully closed position, as shown in FIG. 3, such that substantially no fluid flows through the second inlet 48, the entire fluid flow substantially passes through the first inlet 46 in the lower surface 22 of the base 12. When the cover 50 is automatically pivoted to the second position, as shown in FIGS. 5 and 7, fluid flow is generated through the second inlet 48, thereby relieving suction through the first inlet 46. By relieving the suction through the first inlet 46, the vacuum cleaner 10 becomes easier to push and pull such that the mobility of the vacuum cleaner will be easier for the user. Additionally, slowing

down or stopping the brush roll 32 is relieved or eliminated. The additional air path through the second inlet 48 prevents the soft carpet strands from forming a complete seal with the first inlet 46 that can stop operation of the vacuum cleaner 10. By drawing air in through both the first inlet 46 and the second inlet 48, the vacuum cleaner 10 continuously operates when cleaning soft carpets. The second inlet 48 is preferably disposed above the free ends of the carpet strands of the carpet being cleaned, such that the carpet strands do not interfere with the airflow through the second inlet 48.

[0056] As best shown in FIGS. 3, 5 and 7, the second inlet 48 directs airflow to the base 12, for example, a bottom region of the base 12 proximate the brush roll 32, for example, in front of the brush roll 32 and the first inlet 46. The second inlet 48 is positioned to receive air from in front of the base 12, for example, approximately perpendicular to the longitudinal axis of the brush roll 32 or approximately perpendicular to the airflow of the first inlet 46 or substantially perpendicular to a mean vector of the airflow through the first inlet 46. Depending on the cover plate 30 and the brush roll 32, the flow of fluid through the second inlet 48 may be substantially perpendicular to the airflow through the first inlet 46, as shown in FIGS. 5 and 7. In alternative embodiments, the second inlet 48 can be positioned to provide airflow at other locations of the base 12 or a suction path 78. The second inlet 48 is positioned in the base 12 as close to the surface to be cleaned as possible. This allows for less venting, achieving sufficient suction to perform a cleaning operation on a carpet while still permitting mobility in softer carpets. For example, the second inlet 48 is positioned in the base 12, adjacent the lower surface 22, or positioned in the cover plate 30 positioned below the lower surface 22. In an exemplary embodiment the second inlet 48 is positioned approximately within five inches of a surface to be cleaned. In another exemplary embodiment, the second inlet 48 is positioned approximately within one inch of a surface to be cleaned. As shown in FIGS. 3, 5 and 7, the second inlet 48 is disposed below an uppermost part of the surface agitator, such as the brush roll 32. The second inlet 48 is preferably disposed in front of the surface agitator, such as the brush roll 32, in a lengthwise direction of the base 12 of the vacuum cleaner 10.

[0057] A suction motor 80 is disposed in the base 12 of the vacuum cleaner 10, as shown in FIGS. 3, 5 and 7. Alternatively, the suction motor 80 can be disposed elsewhere, for example in the body of the vacuum cleaner 10 or in any other suitable location. The suction motor 80 generates a suction force, as shown in FIGS. 3, 5, 7 and 8, at the first inlet 46 and the second inlet 48 in the base 12, and through a suction path 78. The motor 80 also drives the brush roll 32. Alternatively, a separate motor 80 can be used to drive the brush roll 32.

[0058] When powered during operation of the vacuum cleaner 10, air is drawn into the suction path 78 through the first inlet 46 in the lower surface 22 of the base 12. When the cover 50 is pivoted to the second position, as shown in FIGS. 5 and 7, air is drawn into the suction path 78 through the first inlet 46 and through the second inlet 48. The suction path 78 continues to the filter bag (not shown) to collect dirt and debris. The filter bag can be disposed in the housing 14.

[0059] As shown in FIG. 11, a vacuum cleaner in accordance with a second exemplary embodiment of the present invention is substantially similar to the vacuum cleaner 10 of the first exemplary embodiment except for the differences

described below. Similar parts are identified with similar reference numerals, except increased by 100 (i.e., 1xx, accordingly).

[0060] The cover **150** is hingedly connected to the base **112**, as shown in FIG. **11**. A spring member **162** is connected between the cover **112** and the base **150** to bias the cover **150** to the first position. A body **164** of the spring member **162** is disposed on a central pivot axle **153** of the cover **153**. The central pivot axle **153** is disposed between the first pivot axle **154** and the second pivot axle **156**, such that the spring member **162** is disposed approximately at the center of the cover **150**. A first end **166** of the spring member **162** engages the base **112**. Preferably, the first end **166** of the spring member **162** engages an inner surface of the base **112** above the second inlet **148**. A second end **168** of the spring member **162** engages the cover **150**. Preferably, the second end **168** of the spring member **162** engages an inner surface of the cover **150**. The first spring member **162** is preferably a torsion spring, although any suitable biasing member can be used to bias the cover **150** to the first position. Operation of the cover **150** is substantially similar to that of the cover **50** of the first exemplary embodiment described with reference to FIGS. **1** to **10**.

[0061] As shown in FIG. **12**, a vacuum cleaner in accordance with a third exemplary embodiment of the present invention is substantially similar to the vacuum cleaner **10** of the first exemplary embodiment except for the differences described below. Similar parts are identified with similar reference numerals, except increased by 200 (i.e., 2xx, accordingly).

[0062] A third inlet **284** is disposed in the base **212**. A second cover **286** is hingedly connected to the base **212**. The second cover **286** is independently pivotable with respect to the first cover **250**. The first and second covers **250** and **286** preferably pivot about the same pivot axis **R3**. The second cover **286** is pivotable between a first position in which the third inlet **284** is substantially covered to substantially prevent fluid from flowing through the third inlet **284** and a second position in which fluid is allowed to flow through the third inlet **284**. The second cover **286** includes third and fourth spring members **288** and **290** to bias the second cover **286** to the first position.

[0063] The third inlet **284** is disposed laterally adjacent the second inlet **248**, as shown in FIG. **12**. Alternatively, the third inlet **284** can be disposed at any suitable location in the base **212** to provide an inlet in addition to the first inlet (**46**, FIG. **3**) and the second inlet **248**.

[0064] The first and second covers **250** and **286** function substantially similarly to the cover **50** of the first exemplary embodiment described with reference to FIGS. **1** to **10**. Alternatively, the first and second covers **250** and **286** can have a single spring member, as shown in FIG. **11**.

[0065] The foregoing detailed description of the certain exemplary embodiments has been provided for the purpose of explaining the principles of the invention and its practical application, thereby enabling others skilled in the art to understand the invention for various exemplary embodiments and with various modifications as are suited to the particular use contemplated. This description is not necessarily intended to be exhaustive or to limit the invention to the exemplary embodiments disclosed. Any of the exemplary embodiments and/or elements disclosed herein may be combined with one another to form various additional embodiments not specifically disclosed. Accordingly, addi-

tional embodiments are possible and are intended to be encompassed within this specification and the scope of the appended claims. The specification describes specific examples to accomplish a more general goal that may be accomplished in another way.

[0066] In understanding the scope of the present invention, the term “comprising” and its derivatives, as used herein, are intended to be open ended terms that specify the presence of the stated features, elements, components, groups, integers, and/or steps, but do not exclude the presence of other unstated features, elements, components, groups, integers and/or steps. The foregoing also applies to words having similar meanings such as the terms, “including”, “having” and their derivatives. Also, the terms “part”, “section”, “portion”, “member” or “element” when used in the singular can have the dual meaning of a single part or a plurality of parts unless otherwise stated.

[0067] As used herein, the following directional terms “forward”, “rearward”, “front”, “rear”, “up”, “down”, “above”, “upper”, “below”, “lower”, “upward”, “upwardly”, “downward”, “downwardly”, “top”, “bottom”, “side”, “vertical”, “horizontal”, “perpendicular” and “transverse” as well as any other similar directional terms refer to those directions of a vacuum cleaner in an upright position for use. Accordingly, these directional terms, as utilized to describe the vacuum cleaner should be interpreted relative to a vacuum cleaner in an upright position on a horizontal surface. The terms “left” and “right” are used to indicate the “right” when referencing from the right side as viewed from the rear of the vacuum cleaner, and the “left” when referencing from the left side as viewed from the rear of the vacuum cleaner.

[0068] Also, it will be understood that although the terms “first” and “second” may be used herein to describe various components, these components should not be limited by these terms. These terms are only used to distinguish one component from another. Thus, for example, a first component discussed above could be termed a second component and vice versa without departing from the teachings of the present invention. The term “attached” or “attaching”, as used herein, encompasses configurations in which an element is directly secured to another element by affixing the element directly to the other element; configurations in which the element is indirectly secured to the other element by affixing the element to the intermediate member(s) which in turn are affixed to the other element; and configurations in which one element is integral with another element, i.e. one element is essentially part of the other element. This definition also applies to words of similar meaning, for example, “joined”, “connected”, “coupled”, “mounted”, “bonded”, “fixed” and their derivatives. Finally, terms of degree such as “substantially”, “about” and “approximately” as used herein mean an amount of deviation of the modified term such that the end result is not significantly changed.

[0069] While only selected embodiments have been chosen to illustrate the present invention, it will be apparent to those skilled in the art from this disclosure that various changes and modifications can be made herein without departing from the scope of the invention as defined in the appended claims. For example, unless specifically stated otherwise, the size, shape, location or orientation of the various components can be changed as needed and/or desired so long as the changes do not substantially affect their intended function. Unless specifically stated otherwise,

components that are shown directly connected or contacting each other can have intermediate structures disposed between them so long as the changes do not substantially affect their intended function. The functions of one element can be performed by two, and vice versa unless specifically stated otherwise. The structures and functions of one embodiment can be adopted in another embodiment. It is not necessary for all advantages to be present in a particular embodiment at the same time. Every feature which is unique from the prior art, alone or in combination with other features, also should be considered a separate description of further inventions by the applicant, including the structural and/or functional concepts embodied by such feature(s). Thus, the foregoing descriptions of the exemplary embodiments according to the present invention are provided for illustration only, and not for the purpose of limiting the invention as defined by the appended claims and their equivalents.

What is claimed is:

1. A vacuum cleaner, comprising:

a motor configured to create flow through a suction path;
a housing;

a first inlet and a second inlet disposed in the housing in fluid communication with the suction path; and

a cover pivotably disposed in the second inlet, the cover being movable between a first position in which the second inlet is substantially covered to substantially prevent fluid from flowing through the second inlet and a second position in which fluid is allowed to flow through the second inlet.

2. The vacuum cleaner of claim 1, wherein

a biasing member biases the cover to the first position.

3. The vacuum cleaner of claim 2, wherein

the cover is movable to the second position upon a suction force exerted on the cover being greater than a biasing force exerted by the biasing member on the cover.

4. A vacuum cleaner, comprising:

a housing;

a suction path in fluid communication with the housing;
a motor configured to create flow through the suction path;

a base having a first inlet and a second inlet in fluid communication with the suction path; and

a cover hingedly connected to the base, the cover being movable between a first position in which the second inlet is substantially covered to substantially prevent fluid from flowing through the second inlet and a second position in which fluid is allowed to flow through the second inlet.

5. The vacuum cleaner of claim 4, wherein

a first biasing member is connected between the base and the cover to bias the cover to the first position.

6. The vacuum cleaner of claim 5, wherein

the cover is movable to the second position upon a suction force exerted on the cover being greater than a biasing force exerted by the first biasing member on the cover.

7. The vacuum cleaner of claim 4, wherein

a surface agitator is movably disposed in the base, the second inlet being disposed below an uppermost part of the surface agitator and in front of the surface agitator.

8. The vacuum cleaner of claim 5, wherein

the first biasing member is a torsion spring.

9. The vacuum cleaner of claim 4, wherein

a free end of the cover in the second position is disposed rearwardly with respect to the free end of the cover in the first position.

10. The vacuum cleaner of claim 4, wherein

the cover pivots about an axis substantially perpendicular to a lengthwise direction of the base.

11. The vacuum cleaner of claim 8, wherein

a first end of the first biasing member engages the base and a second end of the first biasing member engages the cover.

12. The vacuum cleaner of claim 11, wherein

a body of the first spring member is disposed on a first pivot axle of the cover.

13. The vacuum cleaner of claim 5, wherein

a second biasing member is connected between the base and the cover to bias the cover to the first position.

14. The vacuum cleaner of claim 13, wherein

the second biasing member is laterally spaced from the first biasing member.

15. The vacuum cleaner of claim 14, wherein

the second biasing member is a torsion spring, a body of the second spring member being disposed on a second pivot axle of the cover.

16. A vacuum cleaner, comprising:

a housing;

a suction path in fluid communication with the housing;

a motor for creating flow through the suction path;

a base having a first inlet, a second inlet and a third inlet in fluid communication with the suction path;

a first cover hingedly connected to the base, the first cover being movable between a first position in which the second inlet is substantially covered to substantially prevent fluid from flowing through the second inlet and a second position in which fluid is allowed to flow through the second inlet;

a second cover hingedly connected to the base, the second cover being movable between a first position in which the third inlet is substantially covered to substantially prevent fluid from flowing through the third inlet and a second position in which fluid is allowed to flow through the third inlet.

17. The vacuum cleaner of claim 16, wherein

a first spring member is connected between the base and the first cover to bias the first cover to the first position; and

a second spring member is connected between the base and the second cover to bias the second cover to the first position.

18. The vacuum cleaner of claim 16, wherein

the third inlet is disposed laterally adjacent the second inlet.

19. The vacuum cleaner of claim 17, wherein

the first and second covers are movable to the respective second positions when a suction force exerted on the first and second covers is greater than first and second spring forces respectively exerted by the first and second spring members on the first and second covers.

20. The vacuum cleaner of claim 16, wherein

each of the second and third inlets is substantially perpendicular to the first inlet.

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