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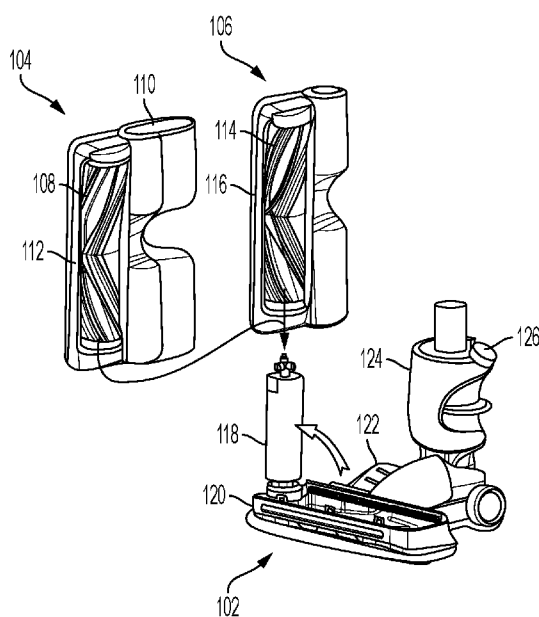


FIG. 2A

(57) Abstract: A vacuum cleaner includes a nozzle assembly 102 at a distal end of the vacuum cleaner 100. The nozzle assembly 102 has a base unit 120. The vacuum cleaner 100 also includes a handle 104 at a proximal end of the vacuum cleaner 100, a waste receptacle 108, a motor 106 configured to draw air through the nozzle assembly 102 and into the waste receptacle 108, and a mechanical motor 118 disposed on the nozzle assembly 102. An agitation member 108, 114 can be detachably coupled to the base unit 120 with a cover 112, 116 over the agitation member 108, 114 and fixed to the base unit 120. The agitation member 108, 114 may also be part of a cassette 104, 106 along with the cover, such that the entire cassette 104, 106 is detachably coupled to the base unit 120.

SWAPPABLE BRUSHROLL OR CASSETTE FOR VACUUM CLEANER

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BACKGROUND

[0001] Cleaning tools such as vacuum cleaners have been used for decades to aid in cleaning dirt and other debris from floors. Most vacuum cleaners have a built-in motor to facilitate air suction and an area to collect dirt, but the units are often heavy and bulky, thus making it difficult to deftly maneuver the unit around a given floorspace. The vacuum cleaner may also not pick up debris from every surface as effectively. Accordingly, there exist some drawbacks and other unsolved issues that limit the convenience of vacuum cleaners.

BRIEF DESCRIPTION OF THE DRAWINGS

[0002] Features and advantages of embodiments of the claimed subject matter will become apparent as the following Detailed Description proceeds, and upon reference to the Drawings, in which:

[0003] FIG. 1 illustrates an isometric, three-dimensional view of a vacuum cleaner, in accordance with some embodiments of the present disclosure.

[0004] FIG. 2A illustrates a three-dimensional view of the nozzle assembly with interchangeable cassettes, in accordance with some embodiments of the present disclosure.

[0005] FIG. 2B illustrates a three-dimensional view of the nozzle assembly with an installed cassette in the nozzle assembly, in accordance with some embodiments of the present disclosure.

[0006] FIG. 3 illustrates a three-dimensional view of another nozzle assembly of a vacuum cleaner, in accordance with some embodiments of the present disclosure.

[0007] FIG. 4 illustrates a three-dimensional view of changing a brushroll from the nozzle assembly of FIG. 3, in accordance with some embodiments of the present disclosure.

[0008] FIG. 5A illustrates a three-dimensional view of another nozzle assembly having an installed cassette, in accordance with some embodiments of the present disclosure.

[0009] FIG. 5B illustrates a three-dimensional view of the cassette from FIG. 5A, in accordance with some embodiments of the present disclosure.

[0010] FIG. 5C illustrates a three-dimensional view of the cover from the cassette of FIG. 5A, in accordance with some embodiments of the present disclosure.

[0011] FIGs. 5D and 5E illustrate methods of coupling a given cassette with a nozzle assembly, in accordance with some embodiments of the present disclosure.

[0012] FIG. 6A illustrates another nozzle assembly with a cassette having no agitation structure, in accordance with some embodiments of the present disclosure.

[0013] FIG. 6B illustrates the cover of the cassette having no agitation structure, in accordance with some embodiments of the present disclosure.

[0014] FIG. 7 illustrates a cassette having more than one agitation structure, in accordance with some embodiments of the present disclosure.

[0015] Although the following Detailed Description will proceed with reference being made to illustrative embodiments, many alternatives, modifications, and variations thereof will be apparent in light of this disclosure.

DETAILED DESCRIPTION

[0016] As noted above, there are some non-trivial issues with the designs of most vacuum cleaners. Many of the issues pertain to matters of convenience for the user. For example, vacuum cleaners include a nozzle assembly having a brushroll or similar agitation member to facilitate the collection of debris off of a surface. A given brushroll may effectively collect dirt from one type of surface, but may not be as effective on another type of surface. Surface types can include carpet, tile, hardwood floor, rug, concrete, or linoleum to name a few examples. Changing the brushroll to a different type is either not possible on most vacuum designs or requires inconveniently changing the entire nozzle assembly or connecting various parts.

[0017] According to an embodiment, a vacuum cleaner includes a nozzle assembly at a distal end of the vacuum cleaner. The nozzle assembly has a base unit. The vacuum cleaner also includes a handle at a proximal end of the vacuum cleaner, a waste receptacle, a motor configured to draw air through the nozzle assembly and into the waste receptacle, a mechanical motor disposed on the nozzle assembly, and a cassette configured to detachably couple to a portion of the base unit. The cassette includes an agitation member and a cover over the agitation member. The mechanical motor is configured to rotate the agitation member when the cassette is coupled to the portion of the base unit.

[0018] According to another embodiment, a vacuum cleaner includes a nozzle assembly at a distal end of the vacuum cleaner. The nozzle assembly has a base unit. The vacuum cleaner also includes a handle at a proximal end of the vacuum cleaner, a waste receptacle, a motor configured to draw air through the nozzle assembly and into the waste receptacle, a mechanical motor disposed on the nozzle assembly, an agitation member detachably coupled to the base unit, and a cover over the agitation member and fixed to the base unit. The agitation member is configured to be removed from the base unit or installed into the base unit independently from the cover.

[0019] According to another embodiment, a nozzle structure configured for use on a vacuum cleaner includes a base unit, a first arm extending from a front face of the base unit, a second arm extending from the front face of the base unit parallel to the first arm, a mechanical motor, a cover fixed to a hinge on the first arm and configured to rotate about the hinge towards the second arm, and a mechanical catch or latch on the first arm, the second arm, or both the first and second arms configured to couple with an agitation member.

[0020] These and other such embodiments will be described in more detail herein.

[0021] The description uses the phrases "in an embodiment" or "in embodiments," which may each refer to one or more of the same or different embodiments. Furthermore, the terms "comprising," "including," "having," and the like, as used with respect to embodiments of the present disclosure, are synonymous. When used to describe a range of dimensions, the phrase "between X and Y" represents a range that includes X and Y.

[0022] Spatially relative terms, such as "beneath," "below," "lower," "above," "upper," and the like, may be used herein for ease of description to describe one element or feature's relationship to another element (s) or feature (s) as illustrated in the figures. The spatially relative terms are intended to encompass different orientations of the device in use or operation in addition to the orientation depicted in the figures. The apparatus may be otherwise oriented (rotated 90 degrees or at other orientations) and the spatially relative descriptors used herein may likewise be interpreted accordingly.

[0023] Figure 1 illustrates a perspective three-dimensional view of a vacuum cleaner 100, according to an embodiment. Vacuum cleaner 100 has the general shape of a stick vacuum, however, it should be understood that the embodiments described herein with regards to the nozzle assembly may be used on any type of vacuum cleaner, such as a stick vacuum cleaner, canister vacuum cleaner, or upright vacuum cleaner. In some embodiments, vacuum cleaner 100 includes a nozzle assembly 102 at a distal end of vacuum cleaner 100 while a handle 104 may be coupled to a proximal end of vacuum cleaner 100. Nozzle assembly 102 can include a

rotatable brush head or any other type of cleaning head for facilitating the gathering of debris from the floor or other surfaces.

[0024] According to some embodiments, vacuum cleaner 100 also includes at least a motor 106 and a waste receptacle 108. Motor 106 may be any suitable vacuum motor, such as a universal motor, that draws air up through nozzle assembly 102 and into waste receptacle 108.

[0025] According to some embodiments, the waste receptacle 108 may have a substantially cylindrical shape to fit with the overall form factor of vacuum cleaner 100. Waste receptacle 108 may have any suitable elongated geometry.

[0026] Figure 2A illustrates a three-dimensional illustration of nozzle assembly 102 along with interchangeable cassettes to be placed into nozzle assembly 102, according to some embodiments. A first cassette 104 may be designed to effectively pick up debris from a first type of floor surface while a second cassette 106 may be designed to effectively pick up debris from a second type of floor surface. For example, first cassette 104 may include a first agitation member 108 and a liquid interface 110 to clean hardwood floors with the aid of liquid added to the cleaning surface, and second cassette 106 may include a second agitation member 114 designed to clean a carpeted surface. More generally, first cassette 104 may be a “wet” cassette that is designed to interface with liquid provided by the vacuum cleaner during cleaning and second cassette 106 may be a “dry” cassette that does not interface with any liquid provided by the vacuum cleaner. In the illustration, first agitation member 108 and second agitation member 114 are brushrolls with any number of bristles, however, any number of other agitation structures can be used to pick up debris.

[0027] According to some embodiments, first cassette 104 includes a first cover 112 and second cassette 106 includes a second cover 116. First and second covers 112 and 116 may serve various purposes. For examples, the covers protect the underlying agitation members and may also form a vacuum seal to allow debris to be sucked up further into the vacuum cleaner. In some embodiments, first and second covers 112 and 116 can include agitation structures that aid in dislodging debris from agitation members 108 and 114, respectively. Covers 112 and 116 may be opaque, transparent, or translucent.

[0028] According to some embodiments, first cassette 104 and second cassette 106 are interchangeable within nozzle assembly 102. In one example, a mechanical motor 118 extends upwards from a base unit 120 and either cassette may be placed over mechanical motor 118 and rotated into base unit 120. Mechanical motor 118 may be a stepper motor or any other suitable motor design that provides mechanical rotation to a corresponding agitation member. The cassette may snap into place once rotated down into base unit 120 to form the nozzle

assembly as illustrated in Figure 2B. Any cassette installed into base unit 120 may be mechanically coupled to motor 118 for driving the agitation member. In some embodiments, mechanical motor 118 is located elsewhere on nozzle assembly 102 or on another part of the vacuum cleaner and the cassette is instead placed over a connection member or otherwise snapped into place within base unit 120.

[0029] To remove a given cassette from within base structure 120, a pedal 122 may be depressed (by using a user's foot, for example) to release the cassette from base unit 120. In some embodiments, the release of the cassette may automatically rotate the cassette and/or motor 118 upwards to any angle above base unit 120 or to a substantially 90-degree angle about base unit 120. The upwards rotation of the cassette and/or motor 118 may be facilitated using a torsion spring and a rotary damper to slow its motion as it approaches the final angle. The cassette may then be slipped off of mechanical motor 118 or any other connection member. Any cassettes not loaded into base unit 120 may be stored on the vacuum cleaner itself, such as placed in a compartment coupled to the body of the vacuum cleaner, or clipped to the body of the vacuum cleaner.

[0030] In some embodiments, the vacuum cleaner may include a liquid reservoir 124 for holding any type of cleaning fluid or water. The cleaning fluid may be dispensed onto the cleaning surface when used in conjunction with a "wet" cassette designed to interface with liquid reservoir 124, such as first cassette 104, according to some embodiments. An inlet 126 may also be provided into liquid reservoir 124 to fill it with any desirable liquid.

[0031] According to some embodiments, nozzle assembly 102 includes one or more sensors that determine what cassette has been loaded into base unit 120. Each cassette may include any type of unique identifier (e.g., barcode, RFID tag, pin arrangement, etc.) that is read by a sensor on base unit 120 or on some other part of nozzle assembly 102. One or more different actions may be performed upon determining what cassette has been loaded into base unit 120. For example, upon determining that first cassette 104 has been loaded into base unit 120, liquid flow from liquid reservoir 124 may be unlocked or otherwise enabled. In contrast, loading a dry cassette, such as second cassette 106, into base unit 102 may cause liquid flow to be blocked or otherwise disabled from liquid reservoir 124. In some examples, the rotational speed of the agitation member of a loaded cassette may be adjusted based on what type of cassette it is. In some examples, the suction power of the vacuum cleaner may also be adjusted based on what cassette has been loaded into base unit 102.

[0032] Although two cassettes are discussed with reference to Figures 2A and 2B, it should be understood that any number of different cassettes can be used with nozzle assembly 102.

Each of the different cassettes may have a corresponding agitation structure for picking up debris, with different agitation structures used for the efficient removal of debris from different surfaces. Each cassette can be quickly installed and removed from base unit 120 of nozzle assembly 102. Furthermore, each cassette can be easily cleaned and/or stored as the motor and any corresponding gear structures remain on nozzle assembly 102 or elsewhere on the vacuum cleaner. Any of the cassettes may also include other features not explicitly illustrated such as, for example, receptacles for debris, cleaning solutions, air fresheners, or sensors.

[0033] Figure 3 illustrates another example of a nozzle assembly 102 having a translucent cover 302. A second pedal 304 may be provided along the vacuum cleaner to remove nozzle assembly 102 from the end of the vacuum cleaner.

[0034] In some examples, only the agitation member (e.g., a brushroll) may be replaced within nozzle assembly 102. Figure 4 illustrates the removal of a first agitation member 402 to be replaced with a second agitation member 404 within nozzle assembly 102, according to some embodiments. In this example, first agitation member 402 is a brushroll having any number of bristles or flaps. Both agitation member 402 and cover 302 may be rotated upwards and away from base unit 120 about a hinge or other similar structure as indicated by the arrow, to facilitate the removal of first agitation member 402. Agitation member 402 and cover 302 may be rotated to any angle above base unit 120, such as a substantially 90 degree angle, as illustrated in Figure 4. Once rotated into an unloading position, first agitation member 402 may be slid upwards and away from base unit 120 while cover 302 remains. Second agitation member 404 may then be slid down onto any connection structure and rotated back towards base unit 120 along with cover 302. In this example, second agitation member 404 is a brushless roll. Any type of agitation member can be removed and/or installed in this way. According to some embodiments, a mechanical motor 406 is located separately from where the agitation members are installed. In some examples, mechanical motor 406 rotates along with agitation member 404 and cover 302.

[0035] Figure 5A illustrates another example of a nozzle assembly 500 having a base structure 502 and a cassette 504 removably coupled with base structure 502. Cassette 504 may be similar to any of the cassettes described above. Accordingly, cassette 504 includes at least a cover 506 and an agitation member 508 to assist in picking up debris. According to some embodiments, a front face of cover 506 includes any number of entrance elements 510 that help to direct debris towards agitation member 508. In some examples, entrance elements 510 also block large debris from entering into the system to prevent jamming. According to some embodiments, cassette 504 is coupled to or otherwise rests upon a first arm 512 and a second

arm 514 of base unit 502. Each of first arm 512 and second arm 514 extend parallel to one another away from a front-facing surface of base unit 502, according to some embodiments. As mentioned above, cover 506 may form a vacuum or suction seal around agitation member 508 such that debris is drawn back into an exit port 516, according to some embodiments. Exit port 516 may be located anywhere along the front facing surface of base structure 502 or along any side surfaces of base structure 502.

[0036] Figure 5B illustrates an example of cassette 504 removed from base unit 502. Entrance elements 510 may have any size or shape to allow passage for different sized debris. In some examples, different cassettes include covers having differently sized and/or shaped entrance elements 510.

[0037] Figure 5C illustrates an example of cover 506 with agitation member 508 removed. According to some embodiments, the inside surface of cover 506 may include one or more cover structures 518, such as a blade or rib structure. Cover structure 518 may be positioned to scrape along a portion of agitation member 508 as it rotates to dislodge debris from agitation member 508. The debris can then be sucked further into the vacuum cleaner via exit port 516. In other examples, cover structure 518 is designed to squeegee liquid off of the surface of agitation member 508 as it rotates.

[0038] Figure 5D illustrates another example of placing cassette 504 into base unit 502 of the vacuum cleaner. In this example, cassette 504 is lowered onto base unit 502 and may snap or clamp into place. A mechanical catch or latch may be engaged to snap or clamp cassette 504 into place. In some embodiments, first arm 512 and second arm 514 of base unit 502 each includes a mechanical catch or latch to engage with cassette 504. In some embodiments, one of first arm 512 or second arm 514 of base unit 502 includes a mechanical catch or latch to engage with cassette 504. In some embodiments, cassette 504 merely rests upon first arm 512 and second arm 514 and engages with a mechanical latch or catch located on a front face of base unit 502.

[0039] Figure 5E illustrates another example of placing cassette 504 into base unit 502 of the vacuum cleaner. In this example, cassette 504 is first placed on or near an edge of first arm 512 and then rotated downwards onto base unit 502 to engage with or otherwise contact second arm 514. In some embodiments, cassette 504 may couple with a mechanical catch or latch on first arm 512 combined with a hinge that allows cassette 504 to rotate about the hinge and into void 520 between first arm 512 and second arm 514. Another mechanical catch or latch may be present on second arm 514 to engage with cassette 504.

[0040] Not all cassettes need to include an agitation member. Figure 6A illustrates an example of a cassette 602 having a cover 604 that engages with one or both of first arm 512 and second arm 514. No agitation structure is present such that suction alone is used to pick up debris and pull it into exit port 516 from underneath cover 604. FIG. 6B illustrates a view of cassette 602 following its removal from base unit 502. Cassette 602 may include entrance elements 606 similar to those discussed above.

[0041] Figure 7 illustrates another example of a cassette 700 having a cover 702 that is wide enough to fit more than one agitation member, according to some embodiments. In the illustrated example, cover 702 includes a first agitation member 704 and a second agitation member 706. According to some embodiments, first agitation member 704 and second agitation member 706 are the same type of agitation member (e.g., same type of brushrolls or brushless rolls). In other examples, first agitation member 704 is a different type compared to second agitation member 706. First agitation member 704 may be the same size as second agitation member 706, or they may be different sizes. In an embodiment, first agitation member 704 and second agitation member 706 rotate in the same direction during operation to pick up debris while in other embodiments, first agitation member 704 rotates in the opposite direction compared to second agitation member 706. Any number of agitation members may be used depending on the available space beneath cover 702.

[0042] It should be understood that the nozzle assembly and/or cassette designs illustrated, for example, in any of Figures 2A – 7 can be utilized within any type of vacuum cleaner. For example, the illustrated nozzle assembly and/or cassette designs can be used within any standard upright vacuum cleaner, any stick vacuum cleaner, or any canister vacuum cleaner.

[0043] Numerous specific details have been set forth herein to provide a thorough understanding of the embodiments. It will be understood in light of this disclosure, however, that the embodiments may be practiced without these specific details. In other instances, well known operations and components have not been described in detail so as not to obscure the embodiments. It can be appreciated that the specific structural and functional details disclosed herein may be representative and do not necessarily limit the scope of the embodiments. In addition, although the subject matter has been described in language specific to structural features and/or methodological acts, it is to be understood that the subject matter defined in the appended claims is not necessarily limited to the specific features or acts described herein. Rather, the specific features and acts described herein are disclosed as example forms of implementing the claims.

CLAIMS

What is claimed is:

1. A vacuum cleaner, comprising:
 - a nozzle assembly at a distal end of the vacuum cleaner, the nozzle assembly having a base unit;
 - a handle at a proximal end of the vacuum cleaner;
 - a waste receptacle;
 - a motor configured to draw air through the nozzle assembly and into the waste receptacle;
 - a mechanical motor disposed on the nozzle assembly, wherein the mechanical motor is configured to rotate away from the base unit to an angle above the base unit; and
 - a cassette comprising
 - an agitation member, and
 - a cover over the agitation member.
2. The vacuum cleaner of claim 1, wherein the cassette is configured to slide over the mechanical motor when the mechanical motor is orientated at the angle above the base unit
3. The vacuum cleaner of claim 2, further comprising a hinge at one edge of the base unit, wherein the cassette and the mechanical motor are configured to rotate together about the hinge.
4. The vacuum cleaner of claim 1, wherein the angle is substantially 90 degrees.
5. The vacuum cleaner of claim 1, wherein the cassette further comprises a liquid interface configured to dispense liquid upon a surface beneath the agitation member.
6. The vacuum cleaner of claim 5, further comprising a liquid reservoir configured to provide liquid to the liquid interface on the cassette.
7. The vacuum cleaner of claim 1, wherein the cassette is configured to detachably couple to the mechanical motor.

8. The vacuum cleaner of claim 1, further comprising a pedal configured to disengage the cassette from the mechanical motor.
9. The vacuum cleaner of claim 1, wherein the cover forms a vacuum seal over the agitation member when the cassette is rotated into the base unit.
10. The vacuum cleaner of claim 1, wherein the agitation member is a brushroll with a plurality of bristles or flaps.
11. The vacuum cleaner of claim 1, wherein the agitation member is a brushless roll.
12. The vacuum cleaner of claim 1, wherein the cover is transparent or translucent.
13. The vacuum cleaner of claim 1, wherein the agitation member is a first agitation member and the cassette further comprises a second agitation member.
14. The vacuum cleaner of claim 1, wherein the cover comprises one or more entrance features at a front face of the cover.
15. The vacuum cleaner of claim 1, wherein the vacuum cleaner is a stick vacuum.
16. The vacuum cleaner of claim 1, wherein the vacuum cleaner is a canister vacuum.
17. The vacuum cleaner of claim 1, wherein the vacuum cleaner is an upright vacuum.
18. A vacuum cleaner, comprising:
 - a nozzle assembly at a distal end of the vacuum cleaner, the nozzle assembly having a base unit;
 - a handle at a proximal end of the vacuum cleaner;
 - a waste receptacle;
 - a motor configured to draw air through the nozzle assembly and into the waste receptacle;
 - a mechanical motor disposed on the nozzle assembly;
 - an agitation member detachably coupled to the base unit;
 - a cover over the agitation member and fixed to the base unit; and
 - a hinge at one edge of the base unit, wherein the agitation member and the cover are configured to rotate together about the hinge to an angle above the base unit.

19. The vacuum cleaner of claim 18, wherein the agitation member is configured to be removed from the base unit or installed into the base unit independently from the cover.
20. The vacuum cleaner of claim 18, wherein the mechanical motor is coupled to a portion of the base unit adjacent to the cover and agitation member.
21. The vacuum cleaner of claim 20, wherein the mechanical motor is configured to rotate together with the agitation member and the cover.
22. The vacuum cleaner of claim 18, further comprising a pedal configured to disengage the agitation member from the base unit.
23. The vacuum cleaner of claim 18, wherein the cover forms a vacuum seal over the agitation member when the agitation member is fully engaged in the base unit.
24. The vacuum cleaner of claim 18, wherein the agitation member is a brushroll with a plurality of bristles or flaps.
25. The vacuum cleaner of claim 18, wherein the agitation member is a brushless roll.
26. The vacuum cleaner of claim 18, wherein the cover is transparent or translucent.
27. The vacuum cleaner of claim 18, wherein the agitation member is a first agitation member and the vacuum cleaner comprises a second agitation member configured to be installed onto the base unit following removal of the first agitation member.
28. The vacuum cleaner of claim 18, wherein the cover comprises a cover structure that is configured to remove debris from the agitation member during rotation of the agitation member.
29. The vacuum cleaner of claim 18, wherein the cover comprises one or more entrance features at a front face of the cover.
30. The vacuum cleaner of claim 18, wherein the vacuum cleaner is a stick vacuum.
31. The vacuum cleaner of claim 18, wherein the vacuum cleaner is a canister vacuum.
32. The vacuum cleaner of claim 18, wherein the vacuum cleaner is an upright vacuum.

33. A vacuum cleaner, comprising:
- a nozzle assembly at a distal end of the vacuum cleaner, the nozzle assembly having a base unit;
 - a handle at a proximal end of the vacuum cleaner;
 - a waste receptacle;
 - a motor configured to draw air through the nozzle assembly and into the waste receptacle;
 - a mechanical motor disposed on the nozzle assembly;
 - a first cassette configured to detachably couple to a portion of the base unit, wherein the first cassette comprises a first cover and one or more first entrance features at a front face of the first cover; and
 - a second cassette configured to detachably couple to the portion of the base unit, wherein the second cassette comprises a second cover and one or more second entrance features at a front face of the second cover that are different than the one or more first entrance features.
34. The vacuum cleaner of claim 33, wherein the first cassette or second cassette is configured to couple to or rest upon a first arm and a second arm of the base unit.
35. The vacuum cleaner of claim 34, wherein the first cassette or second cassette is coupled to the base unit by pressing the first cassette or second cassette downwards onto the first arm and second arm of the base unit.
36. The vacuum cleaner of claim 34, wherein the first cassette or second cassette is coupled to the base unit by rotating the first cassette or second cassette about a hinge on the first arm of the base unit towards the second arm of the base unit.
37. The vacuum cleaner of claim 36, wherein the first cassette or second cassette couples with a mechanical catch or hinge on the second arm of the base unit.
38. The vacuum cleaner of claim 33, wherein one or both of the first cassette and the second cassette includes a rotatable agitation member.
39. The vacuum cleaner of claim 38, wherein the mechanical motor is configured to rotate the rotatable agitation member when the first cassette or the second cassette is coupled to the base unit.

40. The vacuum cleaner of claim 38, wherein one or both of the first cassette and the second cassette includes a cover structure configured to scrape along a portion of the rotatable agitation member as the rotatable agitation member rotates.
41. The vacuum cleaner of claim 33, wherein the one or more first entrance features have a different size compared to the one or more second entrance features.
42. The vacuum cleaner of claim 33, wherein the one or more first entrance features have a different shape compared to the one or more second entrance features.
43. The vacuum cleaner of claim 33, wherein the first cassette is a wet cassette, and the second cassette is a dry cassette.

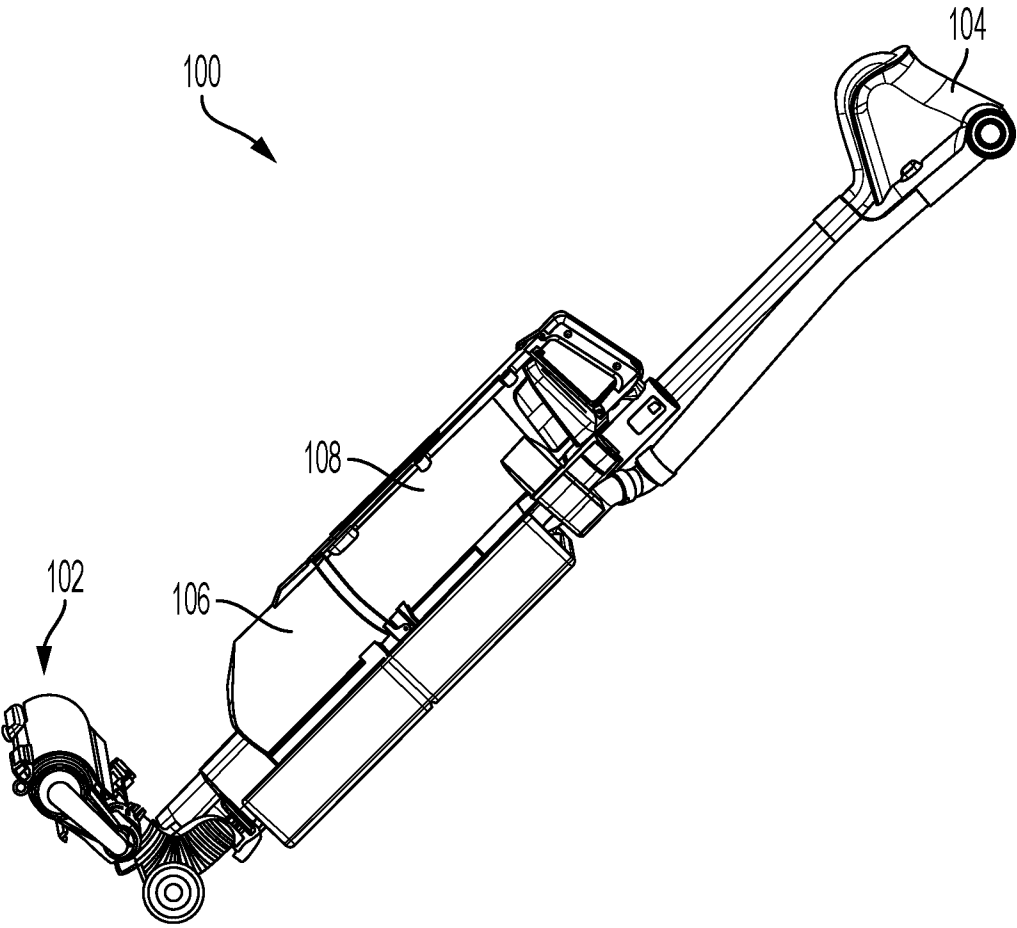


FIG. 1

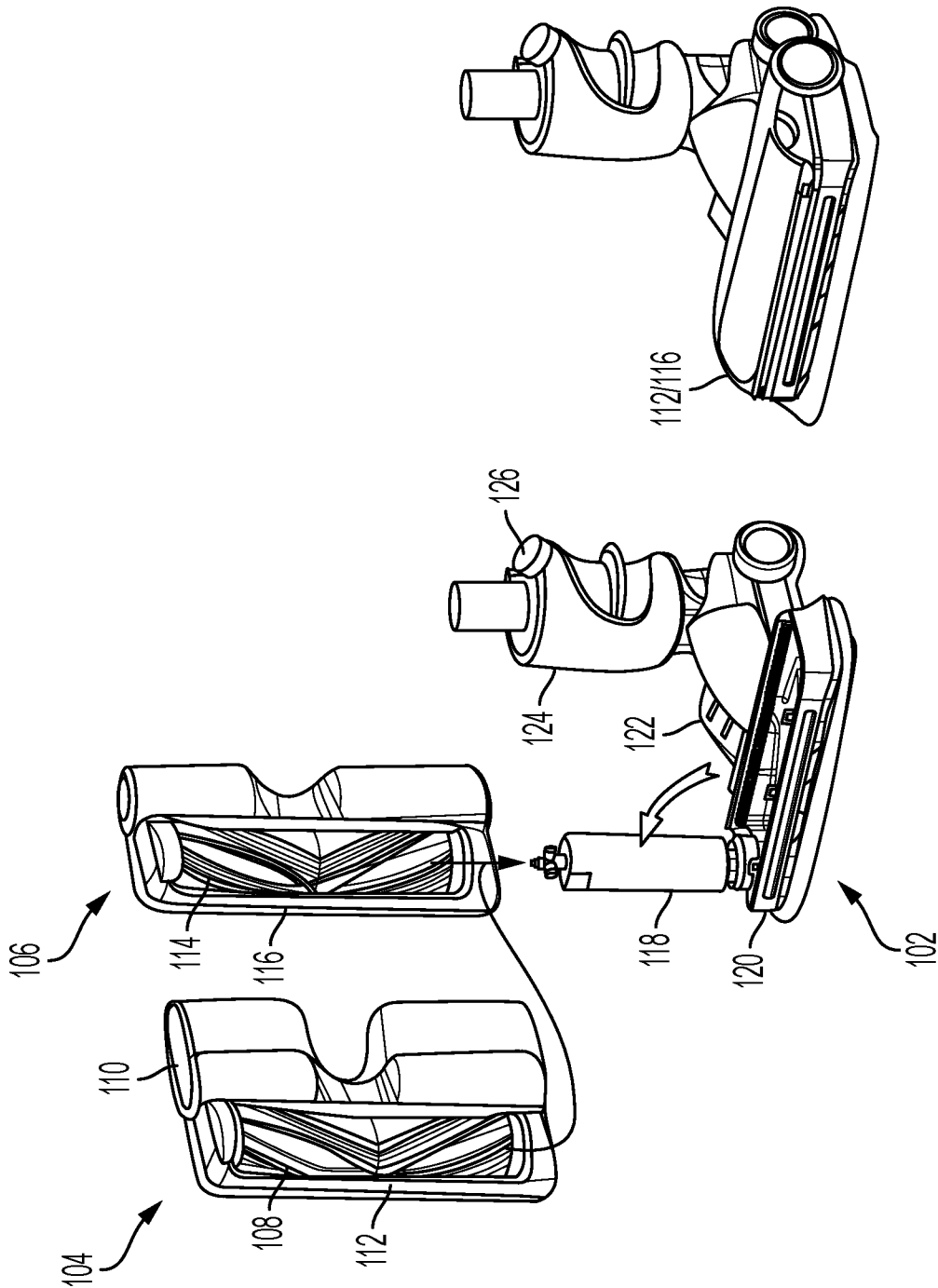


FIG. 2B

FIG. 2A

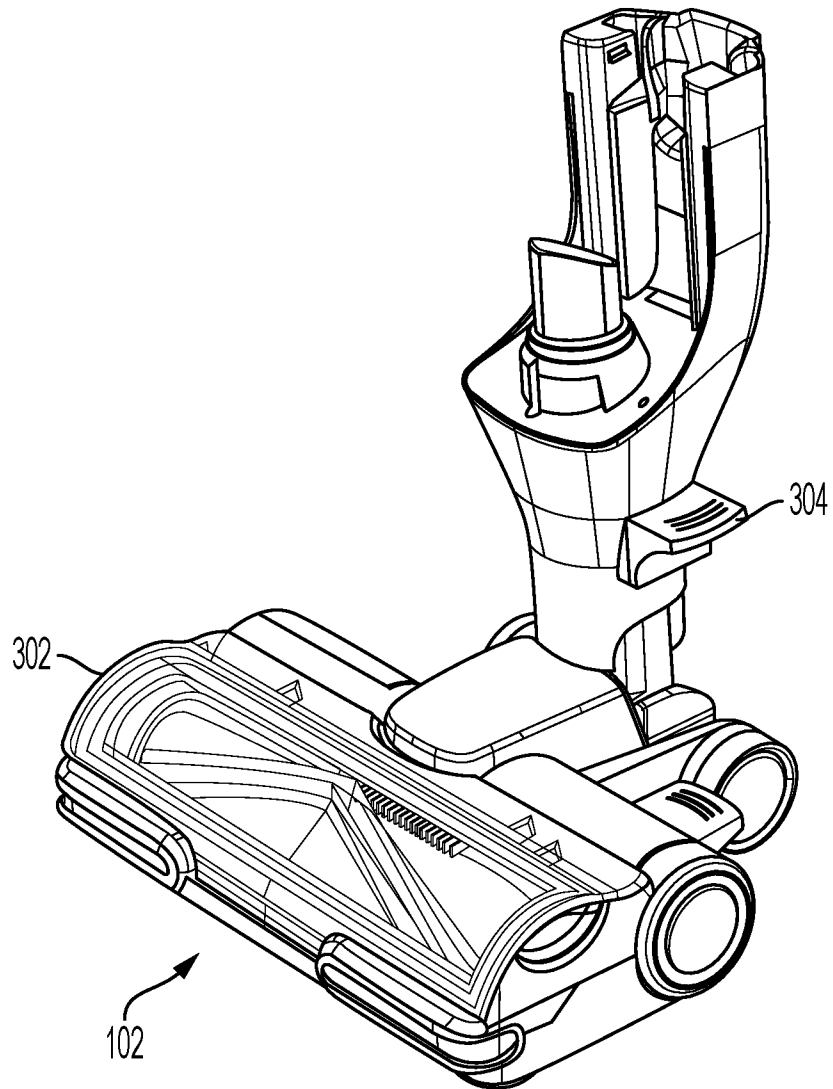


FIG. 3

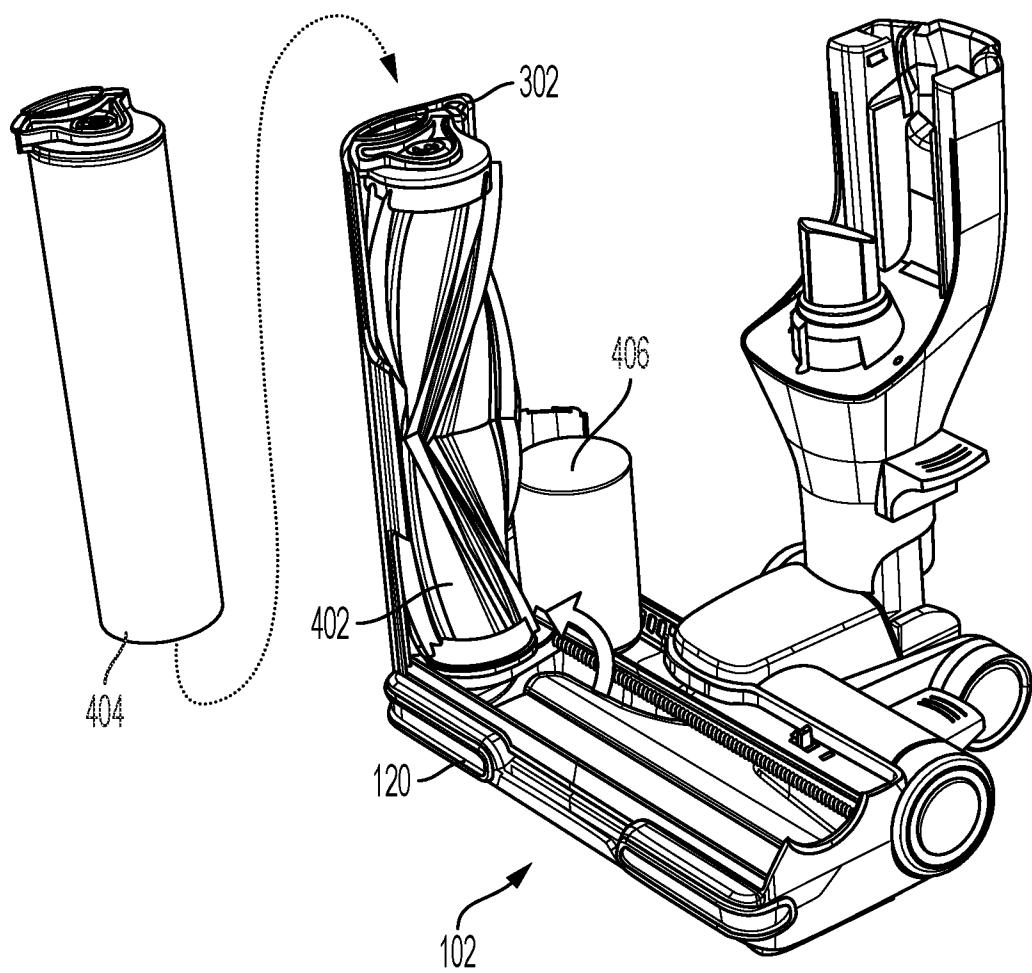


FIG. 4

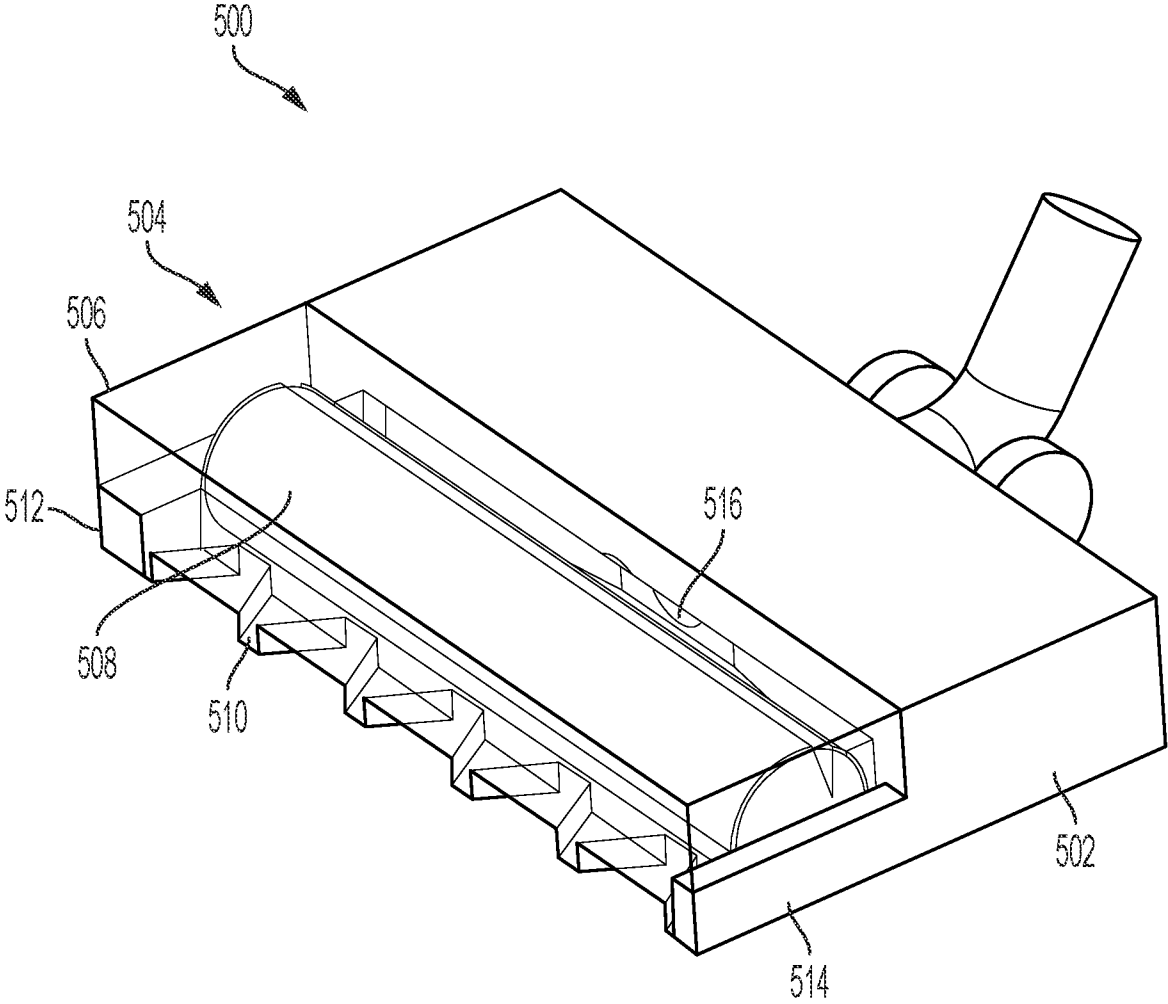


FIG. 5A

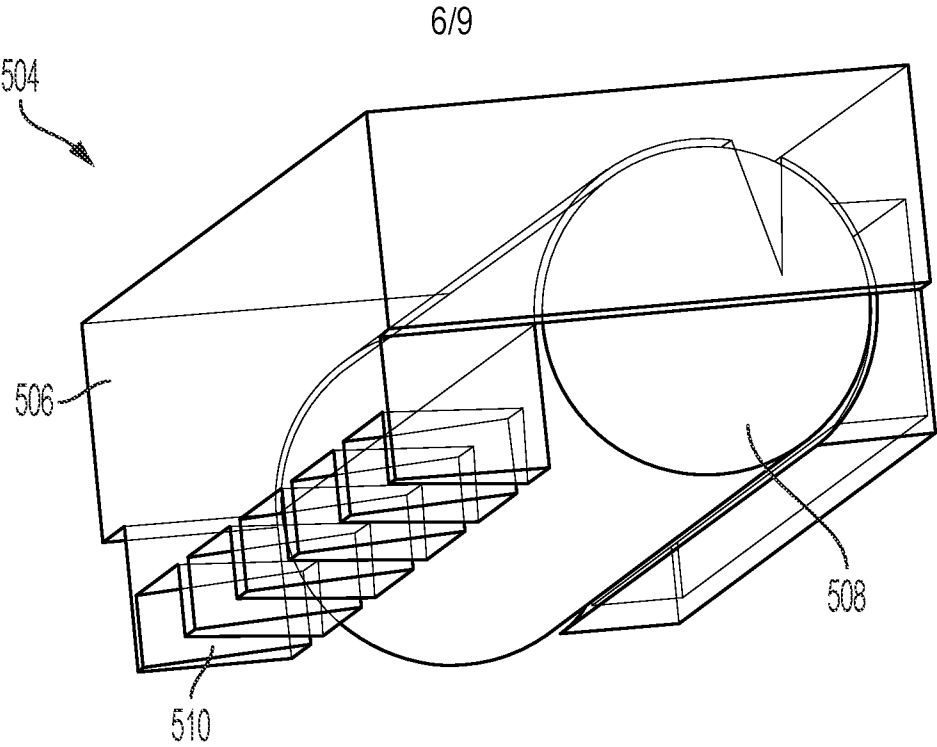


FIG. 5B

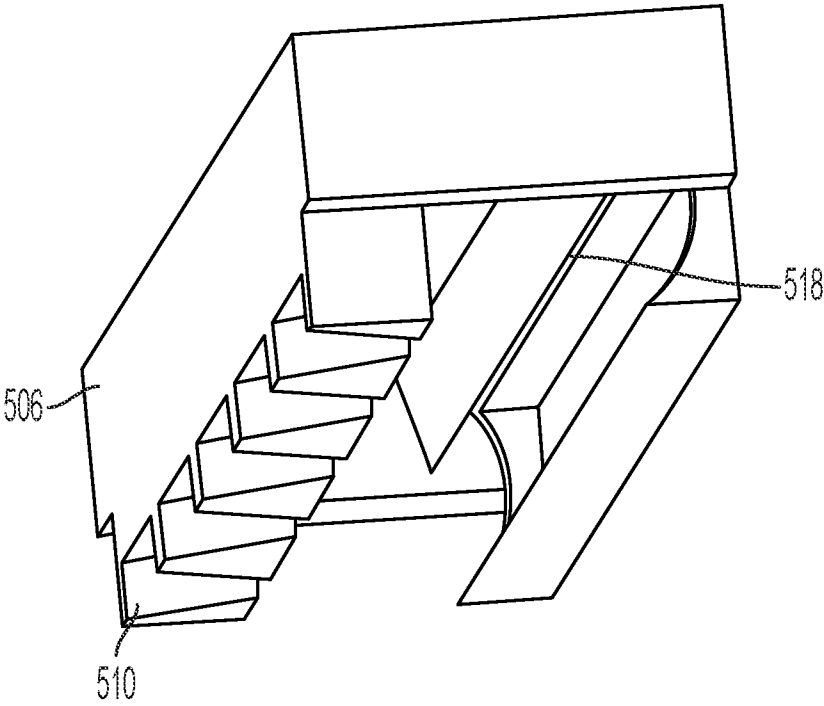


FIG. 5C

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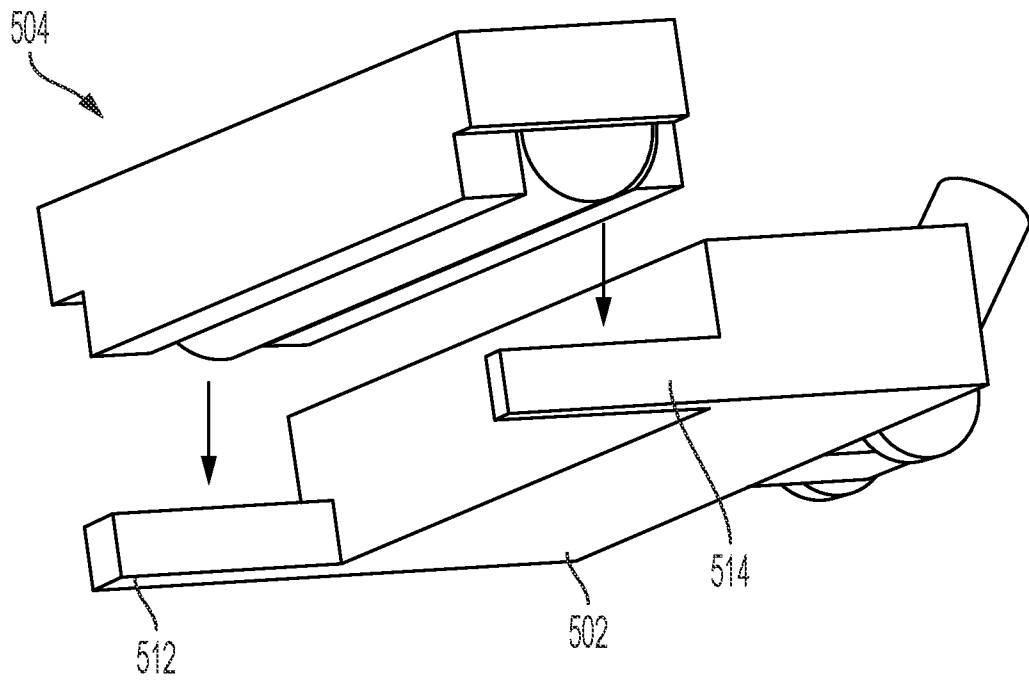


FIG. 5D

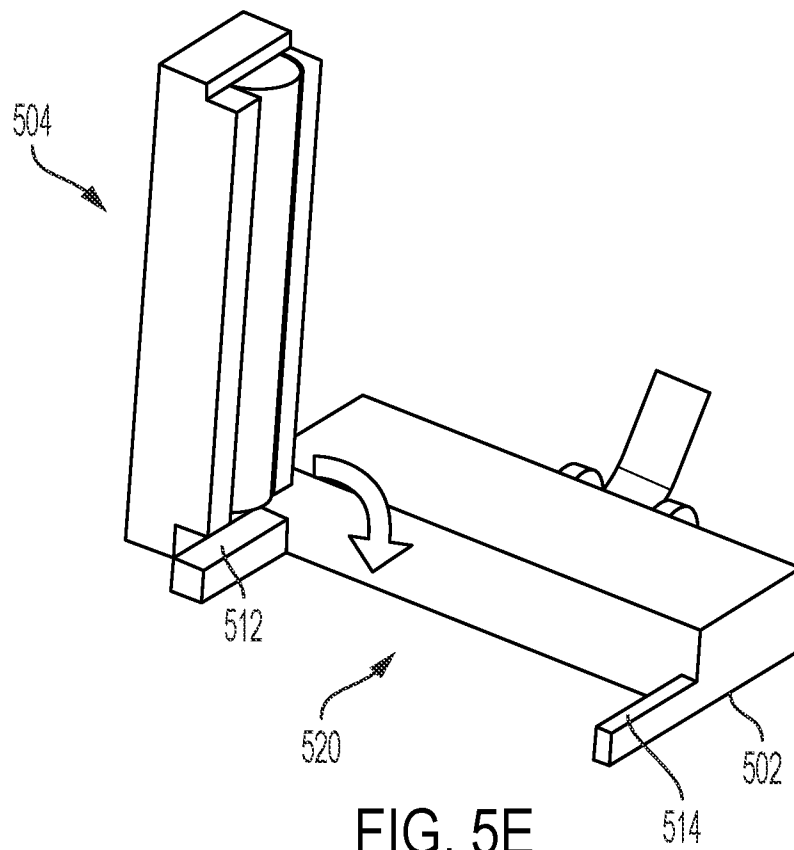


FIG. 5E

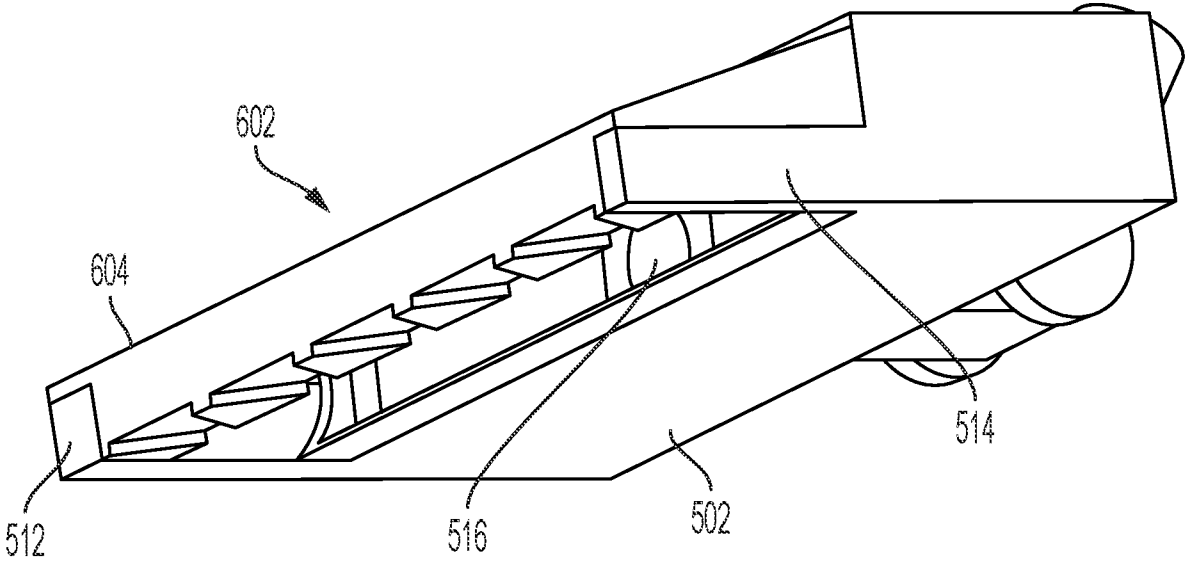


FIG. 6A

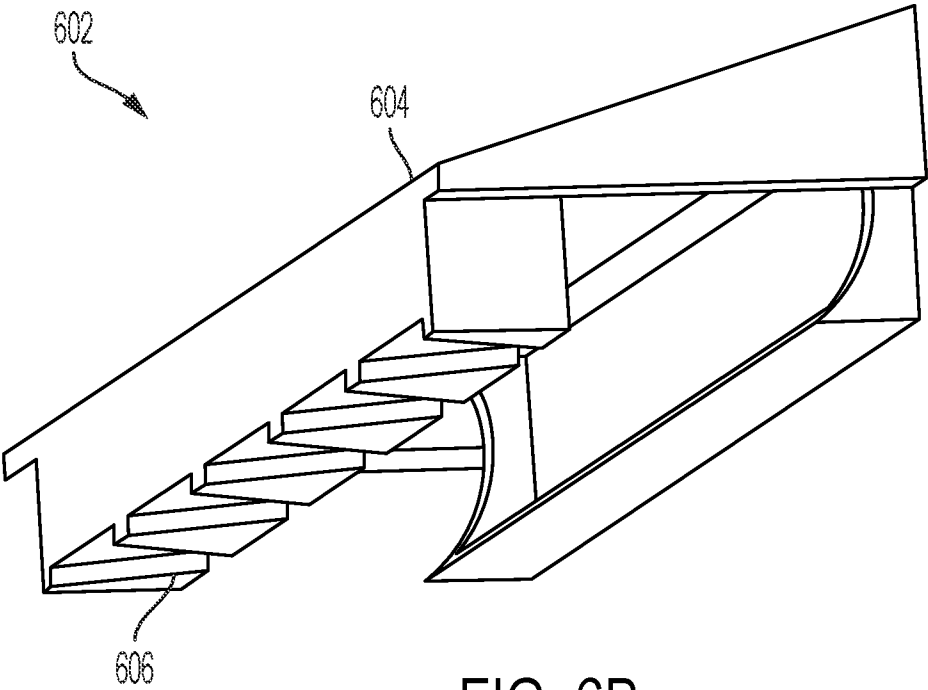


FIG. 6B

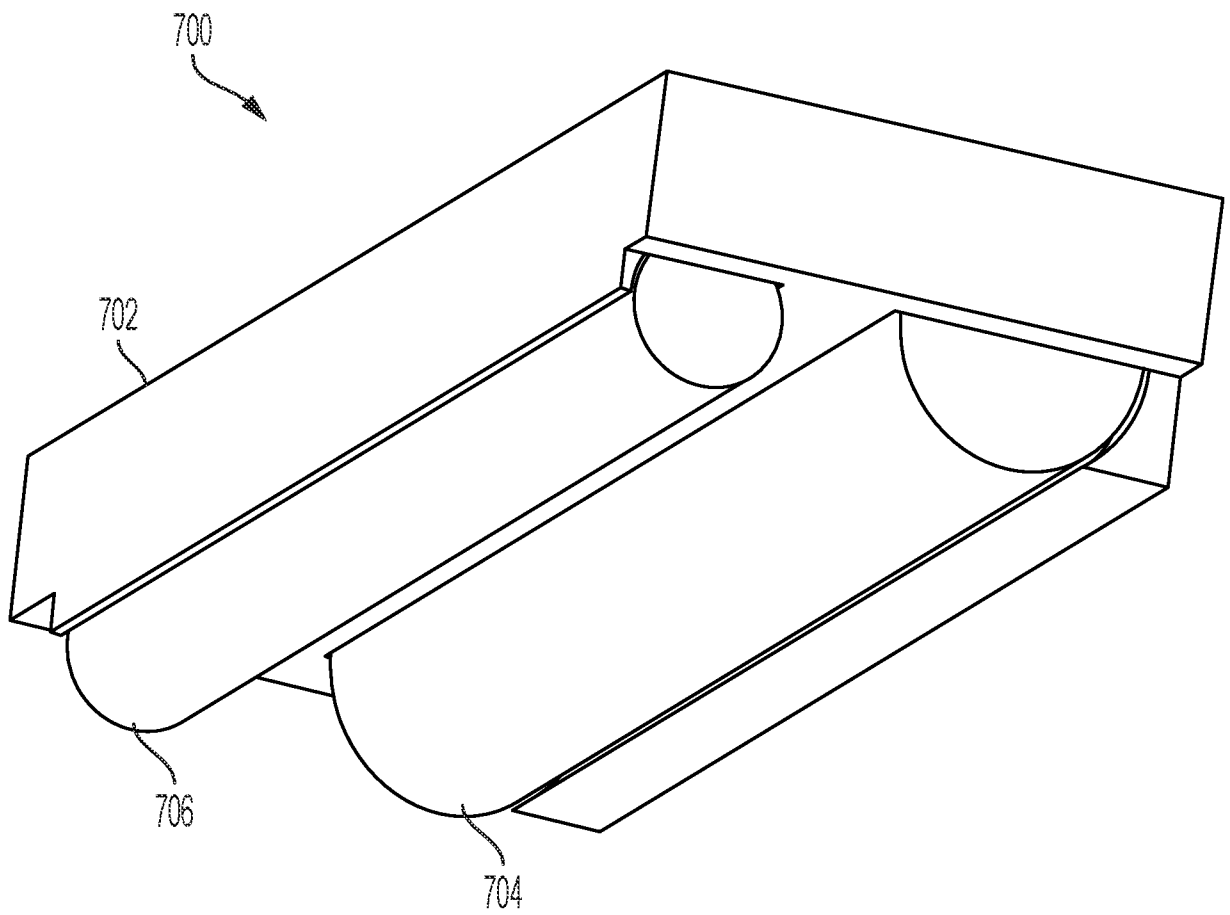


FIG. 7

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2024/033755

A. CLASSIFICATION OF SUBJECT MATTER INV. A47L5/30 A47L9/04 ADD.		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols) A47L		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) EPO-Internal		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2017/188765 A1 (SONG BINGXIAN [CN]) 6 July 2017 (2017-07-06)	1, 3, 4
A	paragraph [0041] - paragraph [0069]; figures 1-5	2
A	US 2022/346612 A1 (OLDFIELD EDWARD RICHARD [GB] ET AL) 3 November 2022 (2022-11-03) paragraph [0026] - paragraph [0031]; figures 2A, 2B	1 - 4
☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.		
* Special categories of cited documents : "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family		
Date of the actual completion of the international search 1 October 2024		Date of mailing of the international search report 06/12/2024
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016		Authorized officer Masset, Markus

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2024/033755

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims;; it is covered by claims Nos.:

1 - 4

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-4

A vacuum cleaner having nozzle assembly with a slidable cassette

2. claims: 1, 5, 6

A vacuum cleaner having nozzle assembly with a liquid interface

3. claims: 1, 7, 8

A vacuum cleaner having nozzle assembly with a detachable cassette

4. claims: 1, 9, 18, 23

A vacuum cleaner having nozzle assembly with a cover as a vacuum seal

5. claims: 1, 10, 11, 18, 24, 25

A vacuum cleaner having nozzle assembly with a brushroll or brushless roll

6. claims: 1, 12, 18, 26

A vacuum cleaner having nozzle assembly with a translucent cover

7. claims: 1, 13, 18, 27

A vacuum cleaner having nozzle assembly with a second agitation member

8. claims: 1, 14, 18, 28, 29

A vacuum cleaner having nozzle assembly with a cover having entrance features

9. claims: 1, 15-18, 30-32

A vacuum cleaner having nozzle assembly being a stick, a canister or an upright vacuum

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

10. claims: 18-21

A vacuum cleaner having nozzle assembly with agitating
member independently from the cover

11. claims: 18, 22

A vacuum cleaner having nozzle assembly with a pedal

12. claims: 33-43

A vacuum cleaner having nozzle assembly with a first and
second cassette

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/US2024/033755

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			EP	3187083 A1	05-07-2017
			JP	2017121468 A	13-07-2017
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			WO	2017117897 A1	13-07-2017

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			JP	2023078227 A	06-06-2023
			KR	20210057178 A	20-05-2021
			US	2022346612 A1	03-11-2022
			WO	2020074859 A1	16-04-2020
