



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
25.08.2021 Bulletin 2021/34

(51) Int Cl.:
A47L 5/26 (2006.01) **A47L 9/04** (2006.01)
A47L 9/12 (2006.01) **A47L 9/16** (2006.01)
A47L 9/28 (2006.01)

(21) Application number: **21155906.7**

(22) Date of filing: **09.02.2021**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

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(30) Priority: **19.02.2020 US 202062978503 P**

(54) **SURFACE CLEANING APPARATUS WITH DAMP CLEANING**

(57) A surface cleaning apparatus (10) such as a vacuum cleaner (10) includes a suction source (18), a recovery container (20), and a base assembly (64) with at least one agitator that can be dampened to provide damp

cleaning. More specifically a fluid delivery system (12) including at least one cleaning pad (90) can be carried by the base assembly (64) to provide damp cleaning.

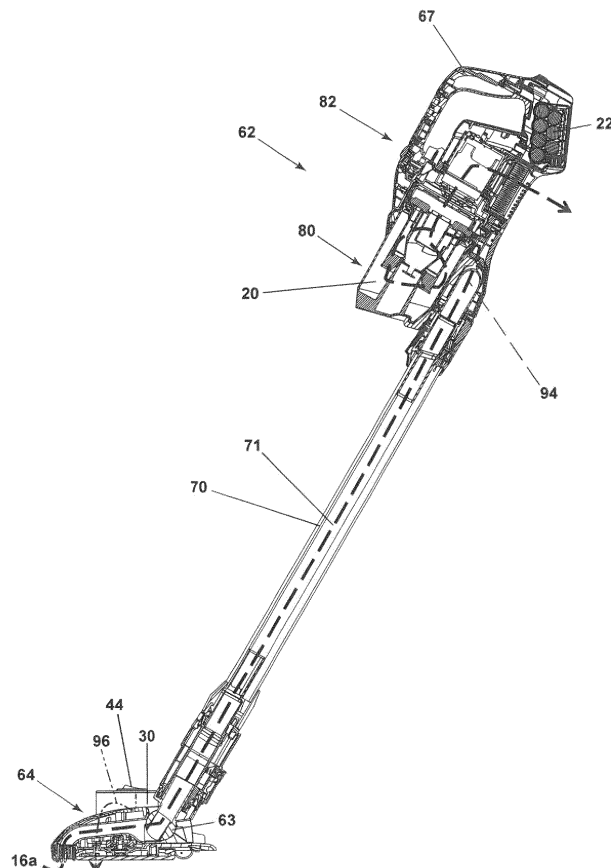


FIG. 6

Description

BACKGROUND

[0001] Surface cleaning apparatuses such as vacuum cleaners are well-known devices for removing dirt and debris from a variety of surfaces such as carpets, hard floors, or other fabric surfaces such as upholstery. Such surface cleaning apparatuses typically include a recovery system including a recovery container, a nozzle adjacent the surface to be cleaned and in fluid communication with the recovery container through a conduit, and a source of suction in fluid communication with the conduit to draw debris-laden air from the surface to be cleaned and through the nozzle and the conduit to the recovery container.

BRIEF DESCRIPTION

[0002] In one aspect, the present disclosure relates to a vacuum cleaner, having a base assembly including a suction nozzle and a fluid delivery system adapted to provide damp cleaning with a fluid supply container located on the base assembly, a hand-held portion having a hand grip and a suction source in fluid communication with the suction nozzle and configured for generating a working airstream, and a working air path from the suction nozzle to an air outlet in the hand-held portion and including the suction source.

[0003] In another aspect, the present disclosure relates to a surface cleaning system, comprising a first removable base assembly including a suction nozzle and a fluid delivery system adapted to provide a flow rate of 30 ml per minute or below to provide damp cleaning, a hand-held portion having a hand grip, a recovery container with a collector axis defined through a center thereof, and a suction source in fluid communication with the suction nozzle and the recovery container and configured for generating a working airstream, and a wand operably coupled to the hand-held portion and selectively coupled to the first removable base assembly, the wand defining at least a portion of a working air path extending from the suction nozzle to an air outlet in the hand-held portion and including the suction source.

BRIEF DESCRIPTION OF THE DRAWINGS

[0004] In the drawings:

FIG. 1 is a schematic view of a surface cleaning apparatus according to various aspects described herein.

FIG. 2 is a perspective view of the surface cleaning apparatus of FIG. 1 in the form of a hand-held vacuum cleaner including a base assembly and an upright assembly according to various aspects described herein.

FIG. 3 is a partially-exploded view of the vacuum

cleaner of FIG. 2.

FIG. 4 is a perspective view of the base assembly of FIG. 2.

FIG. 5 is a partially-exploded view of the base assembly of FIG. 4.

FIG. 6 is a side sectional view of the vacuum cleaner of FIG. 2.

FIG. 7 is a side sectional view of the base assembly of FIG. 6 illustrating a recovery air flow path and a fluid delivery path.

FIG. 8 is a side sectional view of a hand-held portion of the upright assembly of FIG. 2.

FIG. 9 is a partially-exploded view of an additional exemplary base assembly that can be selectively utilized with portions of the hand-held vacuum cleaner of FIG. 2 according to various aspects described herein.

FIG. 10 is a perspective view of a brushroll that can be utilized in the exemplary base assembly of FIG. 9 according to various aspects described herein.

FIG. 11 is a sectional view of the exemplary base assembly of FIG. 9.

FIG. 12 is a partially-exploded view of the exemplary base assembly of FIG. 9 illustrating a further exemplary brushroll that can be utilized in the base assembly.

DETAILED DESCRIPTION

[0005] The present disclosure relates to a surface cleaning apparatus that allows for "damp" cleaning with a dry vacuum. By way of non-limiting example this can include a surface cleaner that generally cleans debris from the surface. In the illustrated example, the surface cleaner is in the form of a hand-held surface cleaner by way of non-limiting example. Such hand-held cleaners can be in the form of a stick vacuum or wand vacuum by way of further non-limiting examples. The surface cleaning apparatus can also include a hand grip with a user interface for selective operation of components of the surface cleaning apparatus. A base assembly can include a recovery airflow path and a fluid delivery path, as well as a fluid delivery system and cleaning pad carried on the base assembly.

[0006] As used herein, the term "dry" vacuum cleaner is used to denote a vacuum cleaner that is not capable of fluid distribution or fluid recovery without the accessory tool, and may include, but is not limited to, upright, canister, stick-type, or hand-held vacuum cleaners, vacuum cleaners which are convertible between one or more of these types, or a built-in central vacuum cleaning system. It will be understood that dry vacuuming is different from an extraction of liquid wherein liquid is aspirated via a liquid recovery system. As used herein, the term "wet" surface cleaner is used to denote a surface cleaner that is capable of fluid distribution including liquid, steam, or a combination thereof, and/or fluid recovery with or without the accessory tool, and may include, but are not limited to, wet/dry vacuum cleaners, steam mops, or other wet surface cleaners.

ited to, mops, extractors and carpet cleaners, including upright, canister, stick-type, or hand-held vacuum cleaners, vacuum cleaners which are convertible between one or more of these types, or a built-in central vacuum cleaning system. Further, the vacuum cleaner used with the accessory tool(s) described herein can be adapted to clean bare surfaces, such as hardwood, linoleum, and tile or textile-covered surfaces, such as carpets and upholstery.

[0007] Aspects of the present disclosure involve damp cleaning. The term "damp" or "damp cleaning" as used herein refers to a cleaning process including relatively low moisture levels when compared to conventional "wet" cleaning processes, such as extraction or steam cleaning for example, which use relatively higher moisture levels. "Damp" as used herein indicates a light to moderate flow rate, preferably in the range of 30 ml/min and below, including approximately 10 - 30 ml/min. The flow rate could also include only below 30 ml/min. It will be understood that the damp fluid flow rate can be applied directly to a surface to be cleaned or intermediately to an agitator, which then delivers the fluid to the surface to be cleaned. In contrast, the term "wet" as used herein refers to relatively high moisture cleaning including a moderate to heavy liquid flow rate applied to a surface to be cleaned, typically in the range of 30 ml/min and above or 30ml/min - 100 ml/min for steam mops and approximately 300 - 1400 ml/min for extraction cleaners.

[0008] FIG. 1 is a schematic view of various functional systems of a surface cleaning apparatus in the form of an exemplary vacuum cleaner 10. The functional systems of the exemplary vacuum cleaner 10 can be arranged into any desired configuration including as a portable cleaner adapted to be hand carried by a user for cleaning relatively small areas. The vacuum cleaner 10 can be adapted to include a hose or other conduit, which can form a portion of the working air conduit between a nozzle and the suction source 18.

[0009] The vacuum cleaner 10 can include a fluid delivery system 12 for storing cleaning fluid and delivering the cleaning fluid to the surface to be cleaned, as well as a recovery system 14 for removing debris from the surface to be cleaned and storing the debris. The fluid delivery system 12 can include a fluid supply container 30 for storing cleaning fluid, as well as at least one fluid distributor 38 fluidly coupled to the fluid supply container 30. The recovery system 14 can include a suction inlet or suction nozzle 16, a suction source 18 in fluid communication with the suction nozzle 16 for generating a working air stream, and a recovery container 20 for separating and collecting debris from the working airstream for later disposal. A separator 21 can be formed in a portion of the recovery container 20 for separating entrained debris from the working air stream.

[0010] The suction nozzle 16 can be provided on a base or cleaning head adapted to move over the surface to be cleaned. At least one agitator 26 can be provided adjacent to the suction nozzle 16 for agitating the surface

to be cleaned so that the debris is more easily ingested into the suction nozzle 16. Some examples of agitators 26 include, but are not limited to, a horizontally-rotating brushroll, dual horizontally-rotating brushrolls, one or more vertically-rotating brushrolls, a stationary brush, or a cleaning or mopping pad. The at least one agitator 26 can also be configured to cling to or otherwise retain dirt or debris removed from the surface to be cleaned, such as a disposable cleaning pad, wherein such retained dirt or debris is not ingested into the suction nozzle 16.

[0011] The suction source 18 can be any suitable suction source, such as a motor/fan assembly, and is provided in fluid communication with the recovery container 20. The suction source 18 can be electrically coupled to a power source 22, such as a battery or by a power cord plugged into a household electrical outlet (not shown). A suction power switch 24 between the suction source 18 and the power source 22 can be selectively closed by the user, thereby activating the suction source 18.

[0012] The fluid delivery system 12 can further include a flow control system 36 for controlling the flow of fluid from the fluid supply container 30 to the distributor 38. In one configuration, the flow control system 36 can include at least one pump 40 which pressurizes the system 12, as well as a flow control valve 42 which controls the delivery of fluid to the distributor 38. In one example, the pump 40 can be coupled with the power source 22. An actuator 44 can be provided to actuate the flow control system 36 and dispense fluid to the distributor 38. The actuator 44 can be operably coupled to the valve 42 such that pressing the actuator 44 will open the valve 42. Additionally or alternatively, the valve 42 can be electrically actuated, such as by providing an electrical switch 46 between the valve 42 and the power source 22 that is selectively closed when the actuator 44 is pressed, thereby powering the valve 42 to move to an open position. In one example, the valve 42 can be a solenoid valve.

[0013] The fluid distributor 38 can include at least one distributor outlet 48 for delivering cleaning fluid from the fluid supply container 30. The at least one distributor outlet 48 can include any structure, such as a nozzle or spray tip; multiple outlets 48 can also be provided. More specifically, the distributor outlet 48 can deliver fluid indirectly to the surface to be cleaned, such as by delivering fluid onto the agitator 26. In the example shown, the agitator 26 can include a cleaning pad 90 aligned with the at least one distributor outlet 48 such that cleaning fluid is delivered onto the cleaning pad 90, thereby wetting the cleaning pad 90 for use in damp cleaning a surface to be cleaned. It is further contemplated that the at least one distributor outlet 48 can deliver cleaning fluid directly to a surface to be cleaned, for example if the cleaning pad 90 is removed from the vacuum cleaner 10 or if the cleaning pad 90 includes a void or hole around the distributor outlet 48.

[0014] Optionally, a heater 50 can be provided for heating the cleaning fluid prior to delivering the cleaning fluid. In the example illustrated in FIG. 1, an in-line heater 50

can be located downstream of the fluid supply container 30 and upstream of the pump 40. Other types of heaters 50 can also be used. In yet another example, the cleaning fluid can be heated using exhaust air from a motor-cooling pathway for the suction source 18.

[0015] The vacuum cleaner 10 as shown in FIG. 1 can be used to effectively remove debris from the surface to be cleaned in accordance with the following method. The sequence of steps discussed is for illustrative purposes only and is not meant to limit the method in any way as it is understood that the steps may proceed in a different logical order, additional or intervening steps may be included, or described steps may be divided into multiple steps.

[0016] In operation, the vacuum cleaner 10 is prepared for use by coupling the vacuum cleaner 10 to the power source 22. During operation of the fluid delivery system 12, cleaning fluid is supplied from the fluid supply container 30 to the distributor 38 and at least one distributor outlet 48 to the cleaning pad 90. The flow of fluid onto the cleaning pad 90 is such that the surface to be cleaned, such as a bare floor surface, can be moistened or dampened via fluid delivered indirectly through the cleaning pad 90. The recovery system 14 can be operated simultaneously with the damp cleaning pad 90 so that the vacuum cleaner 10 provides both dry vacuuming and damp cleaning at the same time. More specifically, during operation of the recovery system 14, the vacuum cleaner 10 draws in debris-laden working air through the suction nozzle 16 and into the downstream recovery container 20 where the debris is substantially separated from the working air. The airstream then passes through the suction source 18 prior to being exhausted from the vacuum cleaner 10. The recovery container 20 can be periodically emptied of collected debris.

[0017] FIG. 2 is a perspective view illustrating an example of the vacuum cleaner 10 according to various aspects described herein. For purposes of description related to the figures, the terms "upper," "lower," "right," "left," "rear," "front," "vertical," "horizontal," "inner," "outer," and derivatives thereof shall be described from the perspective of a user behind the vacuum cleaner 10, which defines the rear of the vacuum cleaner 10. However, it is to be understood that the disclosure may assume various alternative orientations, except where expressly specified to the contrary.

[0018] In the illustrated example, the vacuum cleaner 10 is illustrated as including an upright assembly 62 and a base assembly 64. The upright assembly 62 can be pivotally connected to the base assembly 64 for directing the base assembly 64 across the surface to be cleaned. The various systems and components schematically described for FIG. 1 can be supported by either or both the base assembly 64 and the upright assembly 62 of the vacuum cleaner 10. For example, the power source 22 and the recovery container 20 can be carried by the upright assembly 62, and the fluid supply container 30 and flow control system 36 can be positioned on the base

assembly 64.

[0019] The fluid supply container 30 as illustrated can include a replaceable or refillable container. In the illustrated example, the fluid supply container 30 is illustrated as including a small reservoir having an inlet that may be plugged via a selectively moveable cap. It will be understood that the fluid supply container 30 can be the only liquid supply on the vacuum cleaner 10. The fluid supply container 30 may define a small reservoir with a volume below 1,000 ml including that the reservoir may be smaller than 200 ml. This is in contrast to a larger reservoir of a typical wet surface cleaner, which can often hold at least 3,000-4,000 ml of cleaning liquid.

[0020] The flow control system 36 can include, among other things, a pump 40, a flow control valve 42, an actuator 44, and an electrical switch 46 (FIG. 1), at least some of which can be contained within a housing 34 located on the base assembly 64. The pump 40, flow control valve 42, and actuator 44 as described above for FIG. 1 may all be provided on the base assembly 64 and adapted to provided a flow rate suitable for damp cleaning. In the illustrated example, the housing 34 and fluid supply container 30 are positioned on opposing sides of the base assembly 64 although this need not be the case.

[0021] FIG. 3 illustrates a partially-exploded view of the vacuum cleaner 10 of FIG. 2. The upright assembly 62 includes a hand-held portion 66 supporting components of the recovery system 14, including, but not limited to, the suction source 18 and the recovery container 20. By way of non-limiting example, the suction source 18 can include a motor/fan assembly 124 (FIG. 8).

[0022] The hand-held portion 66 can be coupled to a wand 70 having at least one wand connector 72. In the illustrated example, both a first end 74 of the wand 70 and a second end 76 of the wand 70 include a wand connector 72. The wand connector 72 at the first end 74 of the wand 70 can couple to a first wand receiver 75 provided with the hand-held portion 66. The wand connector 72 at the second end 76 of the wand 70 can be coupled to the base assembly 64 via a second wand receiver 75. It is contemplated that the wand connectors 72 can be the same type of connector or can vary. Any suitable type of connector mechanism can be utilized, such as a quick connect mechanism or a tubing coupler in non-limiting examples.

[0023] A pivotal connection between the upright assembly 62 and the base assembly 64 can be provided by at least one pivoting mechanism. The pivoting mechanism can include a joint assembly 63 configured to pivot the upright assembly 62 in any suitable manner including front-to-back as illustrated. The joint assembly 63 is located between the wand 70 and the base assembly 64. More specifically, the joint assembly is provided between the second wand receiver 75 and the base assembly 64. The joint assembly 63 provides for pivotal forward and backward rotation between the wand 70 and the base assembly 64. Additionally or alternatively, the joint assembly 63 can be in the form of a multi-axis swivel joint

assembly for pivoting the upright assembly 62 from front-to-back and side-to-side with respect to the base assembly 64. Wheels 52 (FIG. 5) can be coupled to either or both of the joint assembly 63 and the base assembly 64 and adapted to move the base assembly 64 across the surface to be cleaned.

[0024] The hand-held portion 66 can also include the recovery container 20, illustrated herein as a dirt separation and collection module 80 fluidly coupled to the suction source 18 via an air outlet port (not shown). The dirt separation and collection module 80 can be removable from the hand-held portion 66 by a release latch 82 as shown so that it can be emptied of debris. For example, the dirt separation and collection module 80 can include the separator 21 enclosed by the recovery container 20. It is contemplated that the recovery container 20 can be removable from the hand-held portion 66 by the release latch 82. Alternatively, the release latch 82 can simultaneously release the recovery container 20 and the separator 21, and an additional release latch (not shown) can decouple the recovery container 20 and separator 21 for emptying debris.

[0025] An upper end of the hand-held portion 66 can further include a hand grip 67 for maneuvering the vacuum cleaner 10 over a surface to be cleaned. At least one user control mechanism 68 is provided on the hand grip 67 and coupled to the power source 22 (FIG. 6) for selective operation of components of the vacuum cleaner 10. In the contemplated example, the user control mechanism 68 is an electronic control that can form the suction power switch 24.

[0026] The agitator 26 of the illustrated example includes the cleaning pad 90. The cleaning pad 90 can be positioned on any suitable portion of the base assembly 64 including that it can be positioned on an underside of the base assembly 64. The agitator 26 can further include a set of brushes 92 positioned along a perimeter of the base assembly 64. While not illustrated the agitator can additionally or alternatively include a rotatable brushroll.

[0027] Any or all of the agitator(s) can be in fluid communication with the fluid supply container 30. In the illustrated example, the cleaning pad 90 is fluidly coupled with the fluid supply container 30 such that the at least one distributor outlet 48 can dampen the cleaning pad 90. While the at least one distributor outlet 48 is illustrated as delivering fluid to dampen the cleaning pad 90, which can be thought of as an unpowered manual damp pad, it is also contemplated that a manual brush, manual roller, powered brush, powered roller, or powered spinning pads or brush(es) could also be utilized for damp cleaning and that the at least one distributor outlet 48 could supply fluid thereto. In this manner the moisture is indirectly applied to the surface to be cleaned via the dampened article on the vacuum cleaner 10. It is also contemplated that the ability to provide damp cleaning with the vacuum cleaner 10 could also be included in an unpowered accessory connected to the vacuum hose or wand 70 or a powered accessory connected to the vacuum hose or

wand 70. In such a case, the fluid supply container 30 could be contained entirely on the accessory and not on the upright assembly 62 or the base assembly 64 of the vacuum cleaner 10.

[0028] A wand body 162 can enclose a wand conduit 71. In one example, the wand body 162 can be formed from an extrusion of aluminum, and is illustrated as having an exterior rounded triangular geometric profile defining an outer periphery. Wand connectors 72 can couple to the wand body 162 at each end 74 and 77. A first wand connector 72 can couple the wand body 162 to the base assembly 64 and a second wand connector 72 can couple the wand body 162 to the hand-held portion 66.

[0029] A decorative insert 166 can be coupled to at least a portion of the wand body 162. In the illustrated example, the decorative insert 166 can be in the form of a flat plate and configured to couple to a recessed portion defining a face of the triangular shaped wand body 162. Optionally, the decorative insert 166 can include rounded edges to form smooth surface transitions between an outer surface of the decorative insert and a second face of the wand body. It is contemplated that the decorative insert 166 can be formed of plastic, including transparent or translucent plastic. Optionally, the decorative insert 166 can include logos or other markings or indicators for operations of the vacuum cleaner 10, or locating features so as to couple a correct end of the wand body 162 to one of the base assembly 64 or hand-held portion 66 of the upright assembly 62, for example.

[0030] FIG. 4 illustrates the base assembly 64 in further detail including that the brushes 92 can be positioned on opposing sides of the base assembly 64 and also located forward, or in front of, the cleaning pad 90. The suction nozzle 16 can include multiple openings 17 positioned along a front edge of the base assembly 64 to direct dirt to a suction nozzle inlet 16a (FIG. 5) that generally extends long a length of the base assembly 64. From the suction nozzle inlet 16a, the debris travels through a working air path into the recovery container 20 (FIG. 3).

[0031] The fluid supply container 30 can include an aperture 31 and a closure 32 for selectively opening and closing the fluid supply container 30. For example, a user can fill the fluid supply container 30 with cleaning fluid via the aperture 31 and seal the fluid supply container 30 via the closure 32. The cleaning fluid can be a liquid such as water or a cleaning solution specifically formulated for hard surface cleaning. In one non-limiting example, the fluid supply container 30 can be in the form of a reservoir having a volume below 1,000 ml including that the reservoir may be smaller than 200 ml. By way of further example, the reservoir can include a volume ranging from 60 mL to 120 mL. In addition, the actuator 44 in the illustrated example is in the form of an on/off switch, whereby switching the actuator 44 to its "on" position causes the pump 40 (FIG. 1) to operate and generate a fluid flow from the fluid supply container 30 to the cleaning pad 90. Alternatively or additionally, a fluid actuator 45 can be provided on the hand grip 67 for operating the pump 40.

It will be understood that either or both of the actuator 44 and the fluid actuator 45 can be provided. For example, either or both of the actuator 44 and fluid actuator 45 can be in the form of a rocker switch, a push button, a toggle, or any other suitable mechanism for operating the pump 40 to generate a fluid flow from the fluid supply container 30 to the cleaning pad 90.

[0032] The flow rate of the supply of fluid to the cleaning pad 90 of the vacuum cleaner 10 can be <1% to about 10% of the flow rate for typical extraction cleaners. It will be understood that the application of fluid to the surface to be cleaned is indirect through the cleaning pad and that the at least one distributor outlet 48 does not apply the fluid directly to the surface to be cleaned. The flow rate is low enough that the transfer of fluid to the surface to be cleaned via the cleaning pad 90 would leave the surface damp to the user's touch. In comparison, typical extraction cleaners and other liquid-delivering floor cleaners, such as steam mops or wet/dry vacuum cleaners, purposefully wet the surface to be cleaned itself and even if an intermediate brush or agitator is used the surface, typically a surface is wetted to the point that the surface would be perceived as wet or saturated to the user's touch. In one specific example, the flow rate to the cleaning pad can range from approximately 10 ml/min to 20 ml/min. In comparison, a typical extraction cleaner has a liquid flow rate of approximately 300 ml/min - 1400 ml/min and a typical steam mop has a flow rate of approximately 30 ml/min - 100 ml/min.

[0033] FIG. 5 illustrates the underside of the base assembly 64 with the cleaning pad 90 removed. In this view, the distributor 38 is visible with multiple distributor outlets 48 extending at least partially along a width of the base assembly 64. The distributor 38 is fluidly coupled with the fluid supply container 30 such that cleaning fluid can flow from the fluid supply container 30 to the cleaning pad 90 via the distributor 38.

[0034] Furthermore, while the cleaning pad 90 is schematically illustrated as having a rectangular profile, it will be understood the cleaning pad 90 can have any suitable shape, form, or geometric profile. In non-limiting examples, the cleaning pad 90 can include a square profile, a circular profile, a microfiber cloth, a set of polishing brushes or tassels, a set of bristles, or a set of scrubbing brushes. In another non-limiting example, the cleaning pad 90 can include multiple layers such as a scrubbing layer, a polishing layer, or a layer containing a cleaning composition. In still other examples, the cleaning pad 90 can include multiple cleaning pads each secured on an underside of the base assembly 64, or the cleaning pad 90 can include a removable or re-usable cloth pad secured around a rigid frame within the base assembly 64.

[0035] Referring now to FIG. 6, a recovery airflow path 94 can be formed between the base assembly 64 and the dirt separation and collection module 80. For example, the wand 70 can include the wand conduit 71 that is fluidly connected to both the suction nozzle 16 as well as the dirt separation and collection module 80. A fluid

delivery path 96 is also illustrated within the base assembly 64 between the fluid supply container 30 and cleaning pad 90.

[0036] FIG. 7 illustrates additional details of the recovery airflow path 94 and fluid delivery path 96 within the base assembly 64. It will be understood that the recovery airflow path 94 is fluidly separated from the fluid delivery path 96. More specifically, the recovery airflow path 94 begins at the suction nozzle inlet 16a, which is located forward of the cleaning pad 90. The recovery airflow path extends from the suction nozzle inlet 16a through a conduit 65 within the base assembly 64, through the joint assembly 63, and into the wand conduit 71.

[0037] Conversely, the fluid delivery path 96 extends from the fluid supply container 30 to the distributor 38, through at least one distributor outlet 48, and to the cleaning pad 90. Moisture can be transferred to the surface to be cleaned via the dampened cleaning pad 90 for damp cleaning.

[0038] Turning to FIG. 8, the hand-held portion 66 is shown in further detail. In the illustrated example, the power source 22 is in the form of a battery pack containing one or more batteries, such as lithium-ion (Li-Ion) batteries. Optionally, the vacuum cleaner 10 can include a power cord (not shown) to connect to a wall outlet. In still another example, the power source 22 can include a rechargeable battery pack, such as by connecting to an external source of power to recharge batteries contained therein. The user control mechanism 68 can be in the form of a user interface printed circuit board located within the hand grip 67 as shown. In addition, a main controller 69, such as a main control printed circuit board, can be located adjacent the suction source 18 as shown.

[0039] The suction source 18 can be in the form of a through-flow suction fan connected to a motor 100, such as a brushless direct-current (BLDC) motor having an integrated motor controller. A pre-motor filter 102 can be provided within the recovery airflow path 94 (FIG. 6) upstream of the motor 100 to prevent debris from entering the motor 100 during operation. Alternatively, the suction source 18 can include a bypass suction fan connected to a motor 100. In the illustrated example, the separator 21 is coupled to the recovery container 20 and includes a cyclonic separator 84 as well as a bulk separator screen 86.

[0040] As illustrated, a wand axis 126 can be defined through the center of the wand 70 (FIG. 3) and wand connector 72. In the figure, the wand 70 is held upright, and thus the wand axis 126 is vertical. In this example, references to "a vertical axis" will be understood to also refer to the wand axis 126. It will be understood, that during use the wand 70 may be oriented in any suitable manner including angled with respect to the vertical axis.

[0041] A collector axis 128 can be defined through the center of the dirt separation and collection module 80, and a motor axis 130 can be defined through the center of the motor/fan assembly 124. It is contemplated that the wand axis 126, the collector axis 128, and the motor

axis 130 can all be parallel to one another as shown. Put another way, when the wand 70 is held upright such that the wand axis 126 is vertical, the collector axis 128 and the motor axis 130 are also vertical.

[0042] A grip axis 132 can be defined through the center of the hand grip 67 as shown. The grip axis 132 forms a grip angle 134 with respect to a vertical direction, such as 60 degrees in a non-limiting example. Further, a battery axis 136 can be defined through the center of the power source 22 (e.g., the battery pack) and intersect the grip axis 132. The battery axis 136 can also define a battery angle 138 with respect to a vertical direction, such as 30 degrees in a non-limiting example. Optionally, the grip axis 132 can be orthogonal to the battery axis 136.

[0043] The dirt separation and collection module 80 can include a dirt cup in the form of recovery container 20 with an inlet port in the form of the dirt inlet (not shown), and a separator assembly 140 coupled to the recovery container 20. Working air can enter through the dirt inlet (not shown) and swirls around a first stage separator assembly chamber 144 for centrifugally separating debris from the working air flow. The separator assembly 140 includes a first stage separator 142, such as a grill, that, in combination with the swirling working air, removes relatively large debris out of the working air which collects at a lower portion of the recovery container 20 defining a first stage collection area 146.

[0044] The working air moves through an inlet to a second stage separator or the separator screen 86 in the separator assembly 140, such as a grill or a mesh configured to filter smaller debris, and enters a second stage separation chamber 150, which is shown as the cyclonic separator 84 herein. Smaller debris removed from the working air collects in a second stage collection area 152 near the bottom of the recovery container 20. The first stage collection area 146 can surround the second stage collection area 152 as shown.

[0045] With additional reference to FIG. 8, an exhaust outlet 154 and filter housing 158 are fluidly coupled to an upper portion of the second stage separation chamber 150. Working air exits the second stage separation chamber 150 through the exhaust outlet 154 and at least one filter in the filter housing 158 and which is shown herein as a pre-motor filter 102 of the motor/fan assembly 124. The filtered working air flows into the motor/fan assembly 124 whereupon it can be exhausted into the surrounding atmosphere through an exhaust filter, i.e. a post-motor filter 156, and an air outlet of the working air pathway through the vacuum cleaner 10, which is shown herein as formed by an exhaust grill 153.

[0046] The outer surface of the first stage separator 142 can accumulate debris, such as hair, lint, or the like that may become stuck thereon and may not fall into the first stage collection area 146.

[0047] The separator assembly 140 can further include a ring 161 slidably coupled to the recovery container 20. The ring 161 can be coupled to a wiper 160, such as an annular wiper, configured to contact the first stage separator 142.

The separator assembly 140 can be lifted upwards with respect to the ring 161 and recovery container 20. During this lifting, the ring 161 remains coupled to the recovery container 20, and the wiper 160 slides or scrapes along the first stage separator 142 to remove accumulated debris from the outer surface of the first stage separator 142 or grill, which falls down to the first stage collection area 146.

[0048] When the separator assembly 140 has been raised to a predetermined level, it can lift away from the recovery container 20 along with the ring 161 and wiper 160. The recovery container 20 can then be inverted to remove dirt and debris from the first and second stage collection areas 146 and 152. After emptying, the separator assembly 140 can be repositioned within the recovery container 20 and the ring 161 can once again be coupled to the recovery container 20 for additional use of the vacuum cleaner 10.

[0049] Additional details of the dirt separation and collection module 80 are described in PCT Application No. PCT/US 19/39424, filed June 27, 2019, which is incorporated herein by reference in its entirety.

[0050] Working air along the recovery airflow path 94 (FIG. 6) can enter the separation and collection module 80 and flow through the bulk separator screen 86 before entering the cyclonic separator 84, thereby removing relatively large debris from the working air prior to centrifugally removing smaller debris from the working air upstream of the motor 100. Dirt, dust, and debris removed from the working air flow can collect in the recovery container 20. In this manner, the bulk separator screen 86, cyclonic separator 84, and pre-motor filter 102 can be utilized to filter the working air flowing through the motor 100 and out of the vacuum cleaner 10 during operation.

[0051] In addition, a moisture barrier 110 can be provided within the hand-held portion 66 as shown. The moisture barrier 110 can surround portions of the vacuum cleaner 10, including the power source 22, user control mechanism 68, or main controller 69 to prevent liquid contact with undesired or unsuitable portions of the vacuum cleaner 10. Examples of moisture barriers 110 include, but are not limited to, waterproof materials such as rubber, plastic, or silicone, and can be in the form of a membrane, strip, insulating panel, or other suitable forms. While the vacuum cleaner 10 is not contemplated for liquid ingestion or aspiration of liquid and the dampness from the cleaning pad 90 should not create any free liquid, if for some reason liquid is ingested, such a moisture barrier 110 would ensure that any liquid that escapes the recovery airflow pathway 94 and dirt separation and collection module 80 will not harm other components of the vacuum cleaner 10 located within the moisture barrier 110.

[0052] With reference to FIGS. 1-8, the vacuum cleaner 10 can be operated in a variety of ways. In one example of operation, the power source 22 can supply power for the suction source 18 to provide suction through the recovery airflow path 94. Debris removed from the surface

can be entrained within working air along the recovery airflow path 94 through the base assembly 64 and wand conduit 71 before flowing into the dirt separation and collection module 80. Such dirt and debris can be removed from the working air and collected within the recovery container 20, and cleaned working air can flow through the suction source 18 as shown. In this manner, the vacuum cleaner 10 can be operated in a "dry mode" whereby the suction source 18 is utilized to remove dirt or debris from a surface with the cleaning pad 90 removed from the base assembly 64.

[0053] In another example of operation, the vacuum cleaner 10 can be operated with the suction source switched on as well as the cleaning pad 90 attached to the base assembly 64 without operation of the fluid delivery system 12. As the base assembly 64 is directed over a surface, dirt and debris is removed from the surface via the suction nozzle 16, while the dry cleaning pad 90 can trap additional dirt or debris that may remain on the surface. In this manner, the vacuum cleaner 10 can be operated in a "polish mode" whereby the suction source 18 is utilized along with the dry cleaning pad 90 to remove dirt and debris from a surface, and provide additional cleaning or polishing via the cleaning pad 90.

[0054] In still another example of operation, the base assembly 64 can be directed over a surface while cleaning fluid is delivered from the fluid supply container 30 to the cleaning pad 90. The cleaning fluid can be automatically delivered, such as by gravity, or selectively delivered, such as via the actuator 44, thereby dampening the cleaning pad 90 as the base assembly 64 is moved over the surface to be cleaned and transferring moisture from the cleaning pad 90 to the surface. In this manner, the vacuum cleaner 10 can be operated in a "damp" mode whereby the cleaning pad 90 is utilized with cleaning fluid to clean the surface. It has been determined that an appropriate flow rate for damp cleaning is 30 ml/min or less.

[0055] In still another example of operation, the vacuum cleaner 10 can operate the suction source 18 simultaneously with supplying fluid to the surface via the cleaning pad 90. This can be considered "damp with suction" mode. It will be understood that this includes the fluid delivery system 12 being operated in concert with the recovery system 14 to clean a surface. It will further be understood that the fluid delivery system 12 may not require actuation for the same amount of time as the recovery system 14. For example, once a predetermined amount of liquid is applied to the cleaning pad 90 the vacuum cleaner 10 can continue to provide damp with suction until the cleaning pad 90 dries.

[0056] During the damp with suction mode, as the base assembly 64 is moved over a surface, dirt and debris can be removed from the surface by the suction nozzle 16 while moisture is simultaneously applied to the surface via the cleaning pad. In the instance where the base assembly 64 is only being moved in a forward direction this would include the suction nozzle 16 removing debris from the surface immediately prior to damp-cleaning the sur-

face via the cleaning pad 90, which has been dampened via the fluid from the fluid supply container 30.

[0057] After cleaning the debris, which is considered dry debris, can be emptied from the dirt bin and the dirty cleaning pad 90 can be removed. It is contemplated that the cleaning pad can be reusable such that it can be laundered and reused in a subsequent cleaning process or replaceable such that it can be removed after one or more uses and replaced with a new cleaning pad. Further, if the vacuum cleaner 10 is rechargeable the vacuum cleaner 10 can be recharged for the next use.

[0058] It will be understood that features or aspects of the various modes described above can be utilized in combination with one another. Such examples are given for illustration purposes only and are not intended to be limiting. The fluid delivery system 12 and recovery system 14 can each be operated independently or in concert with one another.

[0059] Further still, it will be understood that the vacuum cleaner 10 as thus far described can further be utilized with alternative base assemblies to further provide additional functionality. For example, the wand 70 can be adapted to operably couple with one or more alternative base assemblies. FIG. 9 illustrates one example of an exemplary base assembly 164. It will be appreciated that the base assembly 164 is similar to the base assembly 64 but does not include damp cleaning functionality and instead is a true dry vacuum. As a non-limiting example, the agitator of the illustrated example includes a brushroll 168 configured to rotate about a horizontal axis and operatively coupled to a drive shaft of a drive motor via a transmission, which can include one or more belts, gears, shafts, pulleys, or combinations thereof. An agitator housing 73 is provided around the suction nozzle 16 and defines an agitator chamber 79 for the brushroll 168.

[0060] As yet another non-limiting example, a pivotal connection between the upright assembly 62 and the base assembly 164 can be provided by at least one pivoting mechanism. In the illustrated example, the pivoting mechanism can include a multi-axis swivel joint assembly 170 configured to pivot the upright assembly 62 from front-to-back and side-to-side with respect to the base assembly 164. A lower portion 172 of the swivel joint assembly 170 is located between the wand 70 and the base assembly 164. The lower portion 172 of the swivel joint assembly 170 provides for pivotal forward and backward rotation between the wand 70 and the base assembly 164. An upper portion 174 of the swivel joint assembly 170 is also located between the wand 70 and the base assembly 164 and provides for lateral or side-to-side rotation between the wand 70 and base assembly 164. More specifically, the lower portion 172 of the swivel joint assembly 170 is coupled between the base assembly 164 and the upper portion 174 of the swivel joint assembly 170. The upper portion 174 of the swivel joint assembly 170 is coupled to the wand receiver 77 at the second end 76 of the wand 70. Wheels 52 can be coupled to the lower portion 172 of the swivel joint assembly 170 or directly

to the base assembly 164, and are adapted to move the base assembly 164 across the surface to be cleaned. As yet another non-limiting example, a recovery airflow conduit 176 can be formed between the agitator housing 73 and the dirt separation and collection module 80. For example, a wand conduit 71 in the base assembly 164 can be fluidly coupled to a wand conduit 71 within the wand 70. The wand conduit 71 can be flexible to facilitate pivoting movement of the swivel joint assembly 170 about multiple axes. The wand conduit 71 is fluidly connected to a dirt inlet (not shown) on the dirt separation and collection module 80 via the air outlet port (not shown).

[0061] The base assembly 164 can extend between a first side 180 and a second side 182 and a removable cover 184 can at least partially define the agitator chamber 79 therebetween. An aperture 186 is located in a portion of the second side 182 and allows for insertion and removal of the brushroll 168. A front bar 188 extends between the first side 180 and the second side 182 along a lower portion of the base assembly 164. The front bar 188 is configured to be located behind the removable cover 184 when the removable cover 184 is mounted. A headlight array 190 is illustrated as being located on the front bar 188 and extending along the width of the base assembly 164 between the first side 180 and the second side 182. The headlight array 190 can be any suitable illumination assembly including an LED headlight array. Even though the headlight array 190 is positioned under the removable cover 184 it can be considered to be positioned along an outer portion of the base assembly 164. In one example, the removable cover 184 can include a transparent portion such that when installed, the transparent portion covers and protects the headlight array 190 and permits emitted light to shine through to the surface to be cleaned. In another example, the removable cover 184 can leave the headlight array 190 uncovered so as not to block emitted light from the headlight array 190.

[0062] A brushroll 168 can be positioned within the agitator chamber 79 by sliding a first end through the aperture 186 located at the second side 182 of the base assembly 164. When fully inserted, a second end 168b of the brushroll 168 can be flush with the aperture 186. In addition, the wand conduit 71 can fluidly couple the agitator chamber 79 to the wand conduit 71.

[0063] The base assembly 164 can include a brush drive assembly 192 positioned opposite the aperture 186 and configured to drive rotational motion of the agitator 26 (e.g. brushroll 168) within the agitator chamber 79. The brush drive assembly 192 can have components including, but not limited to, a brush motor 226, a belt 228 within a belt housing 227, and a brush drive gear 220.

[0064] Additional details of the brushroll 168 are shown in FIG. 10. The first end of the brushroll 168 can include an end plate 194 having projections 196, such as teeth, configured to engage a portion of the brush drive assembly 192 (FIG. 15). The brushroll 168 further includes a central shaft 222 coupled to brush bearings 224 at each

end. In the illustrated example, the brushroll 168 includes a bristled brushroll 168 with offset, swept tufts 202 extending along an outer surface of the brushroll 168. The bristle tufts 202 can be positioned offset from a center line 204 of a tufting platform 206, and the tufts 202 can also be non-orthogonal to the tufting platform 206. In this manner, the bristled brushroll 168 can be configured to prevent hair from wrapping around the brushroll 168 during operation. Additional details of a similar brushroll are described in U.S. Publication No. 2018-0125315, which is incorporated herein by reference in its entirety.

[0065] The assembled base assembly 164 is shown in FIG. 11, where the projections 196 of the end plate are coupled with the brush drive gear 220. In this manner the brush drive gear 220 is also coupled to the central shaft 222 by way of a drive gear bearing 229. As the brush motor 226 drives rotation of the belt 228 and brush drive gear 220, the brushroll 168 can be rotated at a variety of speeds depending on the selected suction mode. A brush removal endcap 230 at the second end of the brushroll 168 provides for unlocking or removal of the brushroll 168 from the agitator chamber 79, such as for cleaning of the bristles tufts 202.

[0066] It is contemplated that a variety of agitators 26 and brushrolls 168 can be utilized within the agitator chamber 79. FIG. 12 illustrates a microfiber brushroll 210 that can be utilized. The microfiber brushroll 210 is similar to the bristled brushroll 168; one difference is the outer surface includes a microfiber layer instead of bristles. Whereas bristles can be utilized to lift hair and debris from carpet fibers, the microfiber layer can lift dirt and debris from hard surfaces such as wood or tile. Each of the brushrolls can include a brush removal endcap 198 including fasteners 212. In the illustrated example, the fasteners 212 include bayonet fasteners wherein a given brushroll is inserted through the aperture 186 and rotated, for example by 30 degrees, to lock the brushroll into place within the agitator chamber 79 via corresponding fastener receivers 214. It will be understood that other brushroll types not explicitly described can be utilized in the vacuum cleaner 10.

[0067] Dry vacuum cleaners can clean different surface types but do not generally dispense or recover fluid. The present disclosure provides a variety of benefits including the ability to damp clean a surface, including by way of non-limiting example a bare floor surface, while using the dry vacuum to pick up debris. In this manner, cleaning of the surface can be done in a shorter time and with less effort; further the surface is also left cleaner and shinier than would be accomplished with just a dry vacuum.

[0068] To the extent not already described, the different features and structures of the various examples of the present disclosure may be used in combination with each other as desired. Thus, the various features of the different examples may be mixed and matched as desired to form new embodiments, whether or not the new embodiments are expressly described.

[0069] For example, various characteristics, aspects, and advantages of the present disclosure may also be embodied in the following technical solutions defined by the following clauses and may include any combination of the following concepts:

[0070] A vacuum cleaner, having a base assembly including a suction nozzle and a fluid delivery system adapted to provide damp cleaning with a fluid supply container located on the base assembly, a hand-held portion having a hand grip and a suction source in fluid communication with the suction nozzle and configured for generating a working airstream, and a working air path from the suction nozzle to an air outlet in the hand-held portion and including the suction source.

[0071] The vacuum cleaner of any preceding clause wherein the fluid delivery system comprises at least one agitator fluidly coupled to the fluid supply container, and wherein the agitator is adapted to provide damp cleaning.

[0072] The vacuum cleaner of any preceding clause wherein the agitator is a cleaning pad.

[0073] The vacuum cleaner of any preceding clause wherein the agitator is operably coupled to a power source and the agitator is at least one of rotatable or spinning.

[0074] The vacuum cleaner of any preceding clause wherein the fluid delivery system further comprises a distributor provided to supply fluid to the agitator and a flow control system adapted to control a flow to the distributor from the fluid supply container at a flow rate of 30 ml per minute or less.

[0075] The vacuum cleaner of any preceding clause wherein the flow control system further comprises an actuator and at least one of a pump or a flow control valve operably coupled to the actuator.

[0076] The vacuum cleaner of any preceding clause wherein the actuator is located on the base assembly.

[0077] The vacuum cleaner of any preceding clause wherein the fluid supply container is less than 500 ml in volume.

[0078] The vacuum cleaner of any preceding clause wherein the headlight array includes a plurality of LEDs spaced along a width of the base assembly.

[0079] The vacuum cleaner of any permutation of any preceding clause wherein the beam is at a zero-degree beam angle.

[0080] The vacuum cleaner of any preceding clause wherein the working air path is at least partially defined by a wand operably coupled between the base assembly and the hand-held portion.

[0081] The vacuum cleaner of any preceding clause wherein the wand includes an outer periphery having a triangular profile.

[0082] The vacuum cleaner of any preceding clause wherein the wand includes a decorative insert operably coupled to a recess within a wand body and the decorative insert and the wand body together form the outer periphery or wherein the wand includes a tubular insert operably coupled within a recess of a wand body and the

tubular insert and the wand body together form the outer periphery.

[0083] The vacuum cleaner of any preceding clause, further comprising a swivel joint moveably coupling a lower end of the wand to the base assembly.

[0084] The vacuum cleaner of any preceding clause wherein the hand-held portion further comprises a debris removal assembly including a recovery container provided in fluid communication with the suction source.

[0085] The vacuum cleaner of any preceding clause wherein the suction source includes a motor/fan assembly operably coupled to the debris removal assembly to form a single, hand-carriable unit.

[0086] The vacuum cleaner of any preceding clause wherein the hand grip extends away from at least one of the motor/fan assembly or the recovery container to define a handle opening and where the handle grip is adapted to be gripped by a user.

[0087] The vacuum cleaner of any preceding clause, further comprising a pre-motor filter assembly mounted to the hand-held portion and defining a portion of the working air path, the pre-motor filter assembly comprising at least one pre-motor filter received within a filter chamber at an upper end of the recovery container.

[0088] The vacuum cleaner of any preceding clause wherein the debris removal assembly comprises a cyclonic separator chamber for separating contaminants from the working air path and a collection chamber for receiving contaminants separated in the separator chamber, the collection chamber defined at least in part by the recovery container.

[0089] The vacuum cleaner of any preceding clause wherein the debris removal assembly further comprises a second downstream cyclonic separator chamber and a second collection chamber for receiving contaminants separated in the second separator chamber.

[0090] The vacuum cleaner of any preceding clause wherein the second downstream cyclonic separator chamber is located concentrically within the cyclonic separator chamber.

[0091] The vacuum cleaner of any preceding clause wherein an inner housing is selectively receivable within the recovery container and the inner housing defines the second downstream cyclonic separator chamber and the second collection chamber.

[0092] The vacuum cleaner of any preceding clause, further comprising an annular wiper configured to slidably contact a portion of the inner housing.

[0093] The vacuum cleaner of any preceding clause wherein the base assembly further comprises an agitator chamber at the suction nozzle and a removable brushroll selectively located therein.

[0094] A surface cleaning system, comprising a first removable base assembly including a suction nozzle and a fluid delivery system adapted to provide a flow rate of 30 ml per minute or below to provide damp cleaning, a hand-held portion having a hand grip, a recovery container with a collector axis defined through a center there-

of, and a suction source in fluid communication with the suction nozzle and the recovery container and configured for generating a working airstream, and a wand operably coupled to the hand-held portion and selectively coupled to the first removable base assembly, the wand defining at least a portion of a working air path extending from the suction nozzle to an air outlet in the hand-held portion and including the suction source.

[0095] The surface cleaning system of any preceding clause further comprising a second removable base assembly including a second suction nozzle and wherein the first removable base assembly and the second removable base assembly are interchangeable.

[0096] The surface cleaning system of any preceding clause wherein the suction source includes a motor/fan assembly operably coupled to the recovery container to form a single, hand-carriable unit and the motor/fan assembly defines a motor axis that is parallel to the wand axis and the collector axis.

[0097] The surface cleaning system of any permutation of any preceding clause wherein a grip axis is defined through a center of the handle grip and forms an acute angle with respect to the collector axis.

[0098] The surface cleaning system of any preceding clause, further comprising a battery pack located on the hand-held portion and wherein a battery axis is defined through the center of the battery pack and intersects the grip axis at an orthogonal angle.

[0099] While aspects of the present disclosure have been specifically described in connection with certain specific examples thereof, it is to be understood that this is by way of illustration and not of limitation. Reasonable variation and modification are possible within the scope of the forgoing disclosure and drawings without departing from the spirit of the present disclosure which is defined in the appended claims. Hence, specific dimensions and other physical characteristics relating to the examples disclosed herein are not to be considered as limiting, unless the claims expressly state otherwise.

Claims

1. A vacuum cleaner (10), comprising:

a base assembly (64) including a suction nozzle (16) and a fluid delivery system (12) adapted to provide damp cleaning with a fluid supply container (30) located on the base assembly (64); a hand-held portion (66) having a hand grip (67) and a suction source (18) in fluid communication with the suction nozzle (16) and configured for generating a working airstream; a working air path from the suction nozzle (16) to an air outlet in the hand-held portion (66) and including the suction source (18).

2. The vacuum cleaner (10) of claim 1 wherein the fluid

delivery system (12) comprises at least one agitator (26) fluidly coupled to the fluid supply container (30), and wherein the agitator (26) is adapted to provide damp cleaning.

3. The vacuum cleaner (10) of claim 2 wherein the agitator (26) is a cleaning pad (90).
4. The vacuum cleaner (10) of claim 2 wherein the agitator (26) is operably coupled to a power source and the agitator (26) is at least one of rotatable or spinning.
5. The vacuum cleaner (10) of any of claims 2-4 wherein the fluid delivery system (12) further comprises a distributor (38) provided to supply fluid to the agitator (26) and a flow control system (36) adapted to control the supply to the distributor (38) from the fluid supply container (30) at a flow rate of 30 ml per minute or less.
6. The vacuum cleaner of any of claims 1-5 wherein the flow control system (36) further comprises an actuator (44) and at least one of a pump (40) or a flow control valve (42) operably coupled to the actuator (44).
7. The vacuum cleaner of claim 6 wherein the actuator (44) is located on the base assembly (64).
8. The vacuum cleaner (10) of any of claims 1-7 wherein the fluid supply container (30) is less than 500 ml in volume.
9. The vacuum cleaner (10) of any of claims 1-8 wherein the working air path is at least partially defined by a wand (40) operably coupled between the base assembly (64) and the hand-held portion (66).
10. The vacuum cleaner (10) of claim 9, further comprising a swivel joint (170) moveably coupling a lower end of the wand (40) to the base assembly (64).
11. The vacuum cleaner (10) of claim 9 or claim 10 wherein the hand-held portion (66) further comprises a debris removal assembly (60) including a recovery container (20) provided in fluid communication with the suction source (18), which includes a motor/fan assembly (124) operably coupled to the debris removal assembly (60) to form a single, hand-carriable unit (66).
12. The vacuum cleaner (10) of claim 11 wherein the hand grip (67) extends away from at least one of the motor/fan assembly (124) or the recovery container (20) to define a handle opening and where the hand grip (67) is adapted to be gripped by a user.

13. The vacuum cleaner (10) of claim 11 or claim 12, further comprising a pre-motor filter assembly mounted to the hand-held portion (66) and defining a portion of the working air path, the pre-motor filter assembly comprising at least one pre-motor filter (102) received within a filter chamber at an upper end of the recovery container (20). 5
14. The vacuum cleaner (10) of claim 11 wherein the debris removal assembly comprises a cyclonic separator chamber (144) for separating contaminants from the working air path and a collection chamber (146) for receiving contaminants separated in the separator chamber (144), the collection chamber (146) defined at least in part by the recovery container (20). 10 15
15. The vacuum cleaner (10) of any of claims 1-14 wherein the base assembly (64) further comprises an agitator chamber (79) at the suction nozzle (16) and a removable brushroll (168) selectively located therein and wherein the fluid delivery system (12) supplies a liquid thereto during operation at a flow rate of 30 ml per minute or less. 20 25

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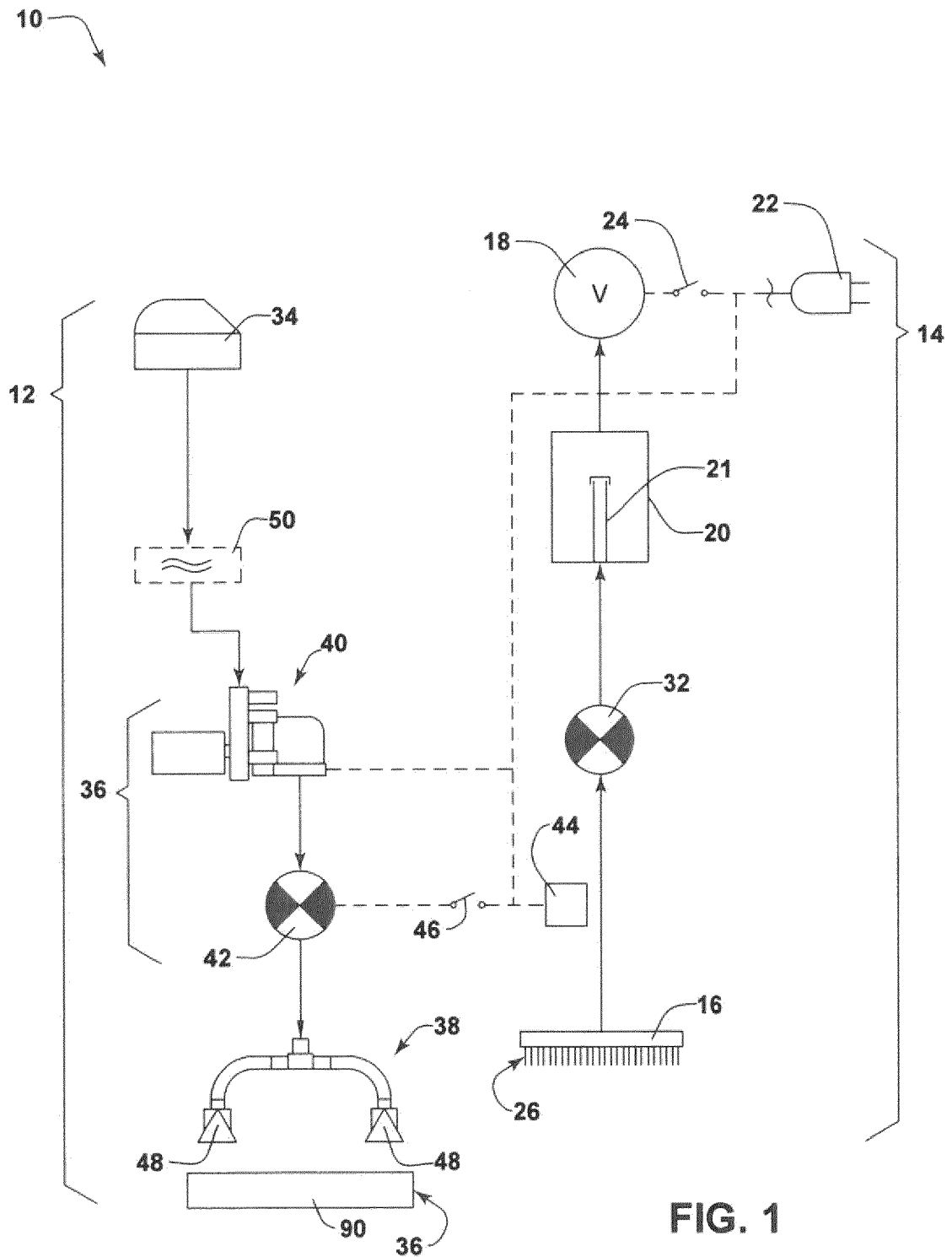


FIG. 1

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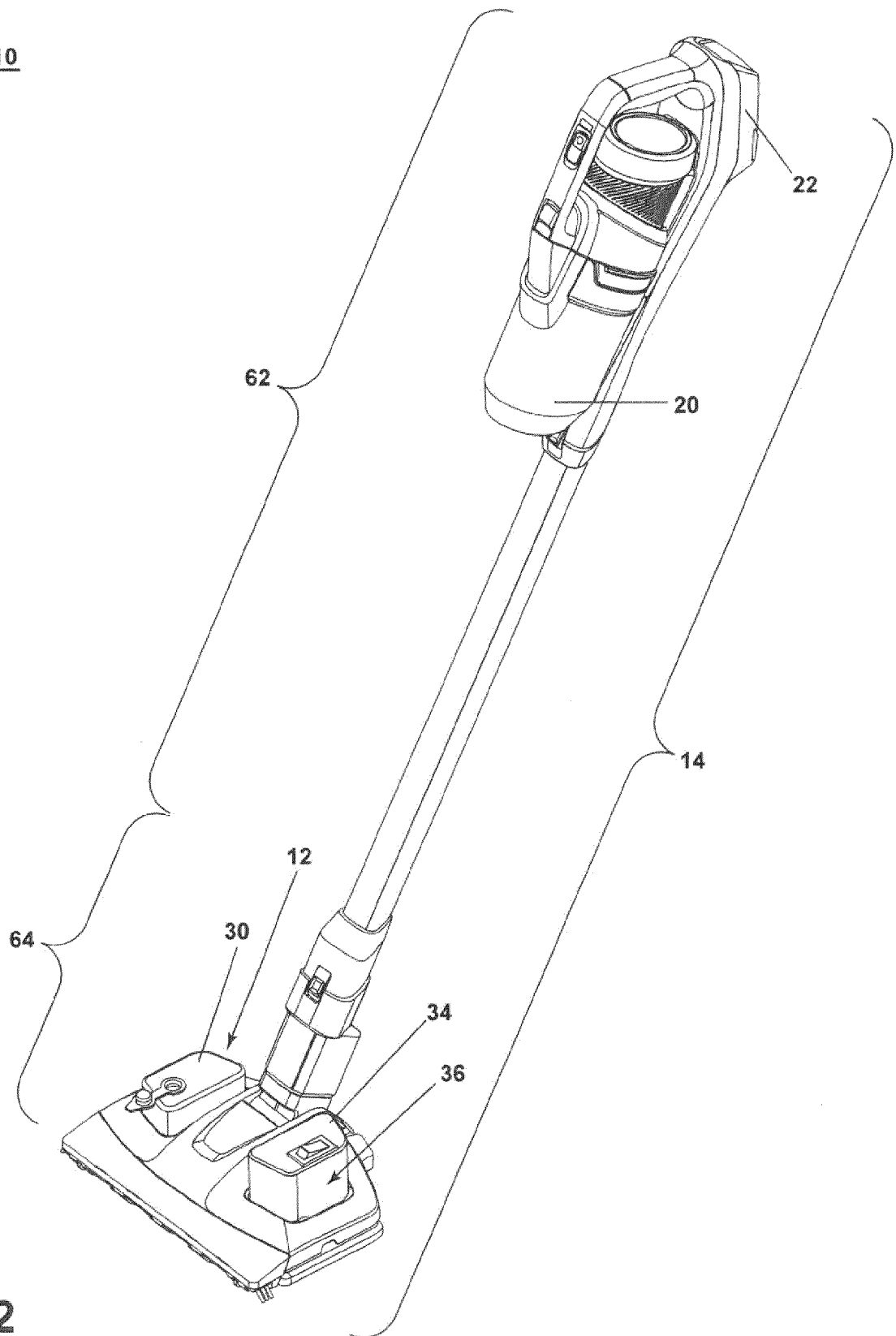


FIG. 2

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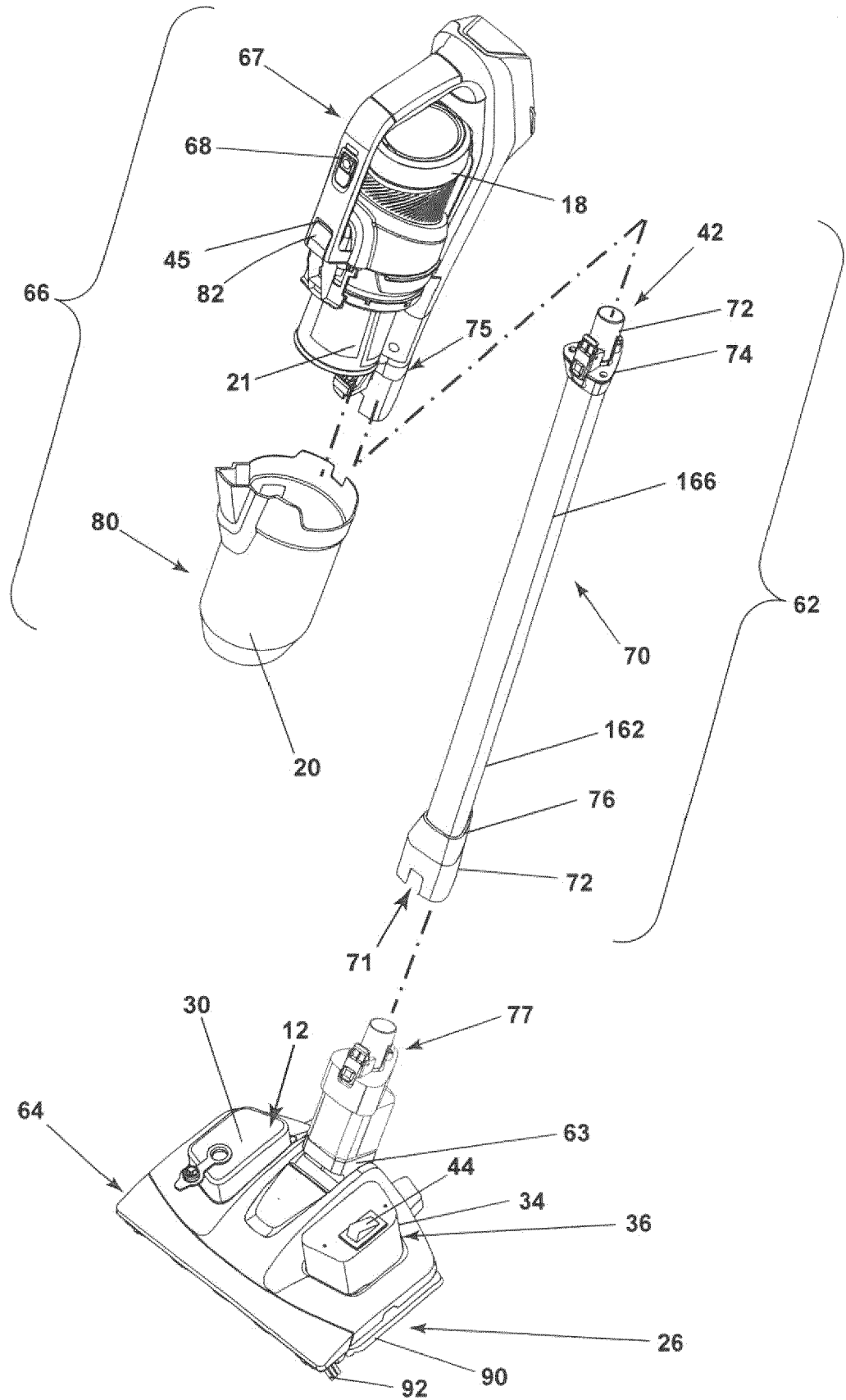


FIG. 3

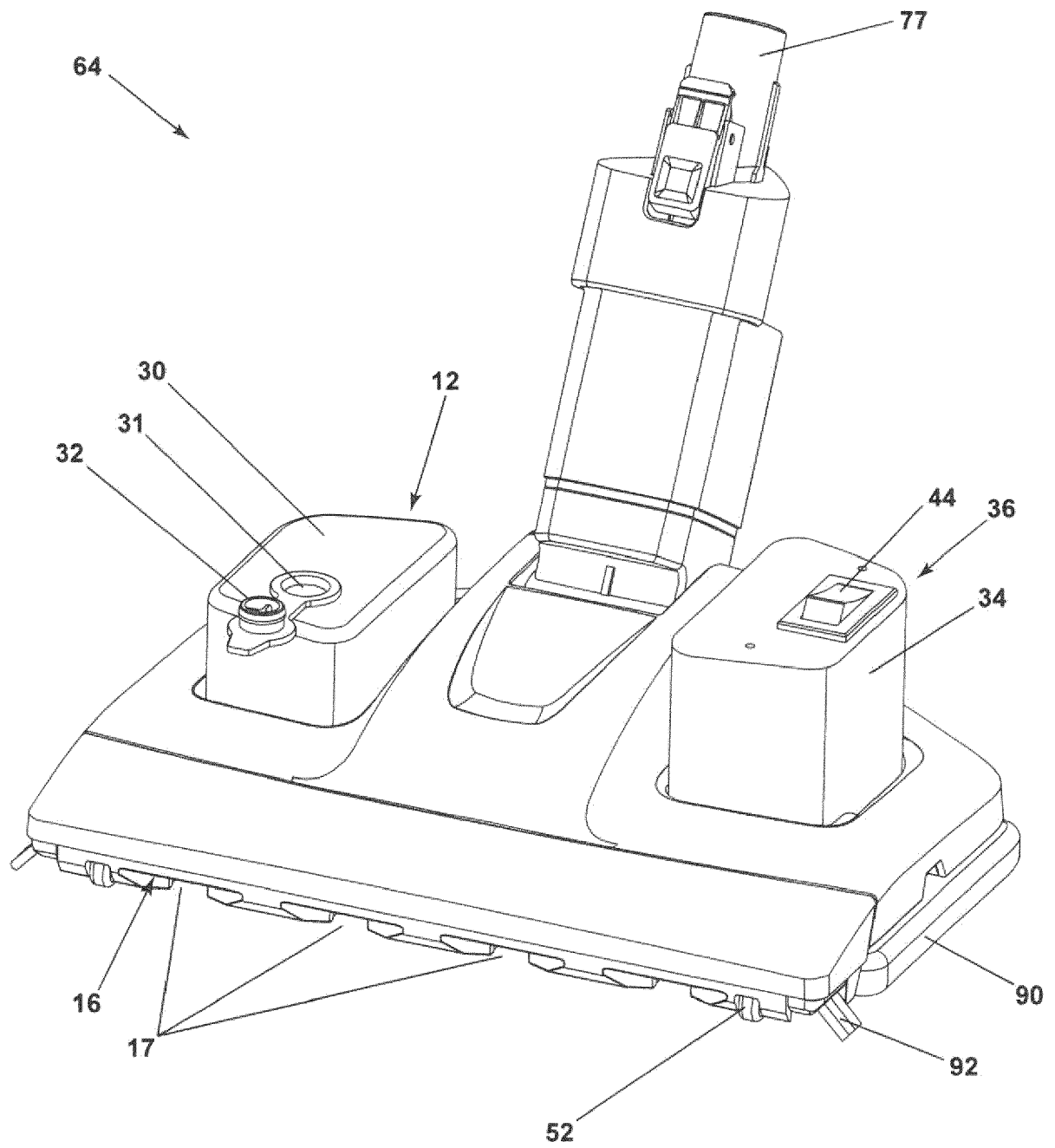


FIG. 4

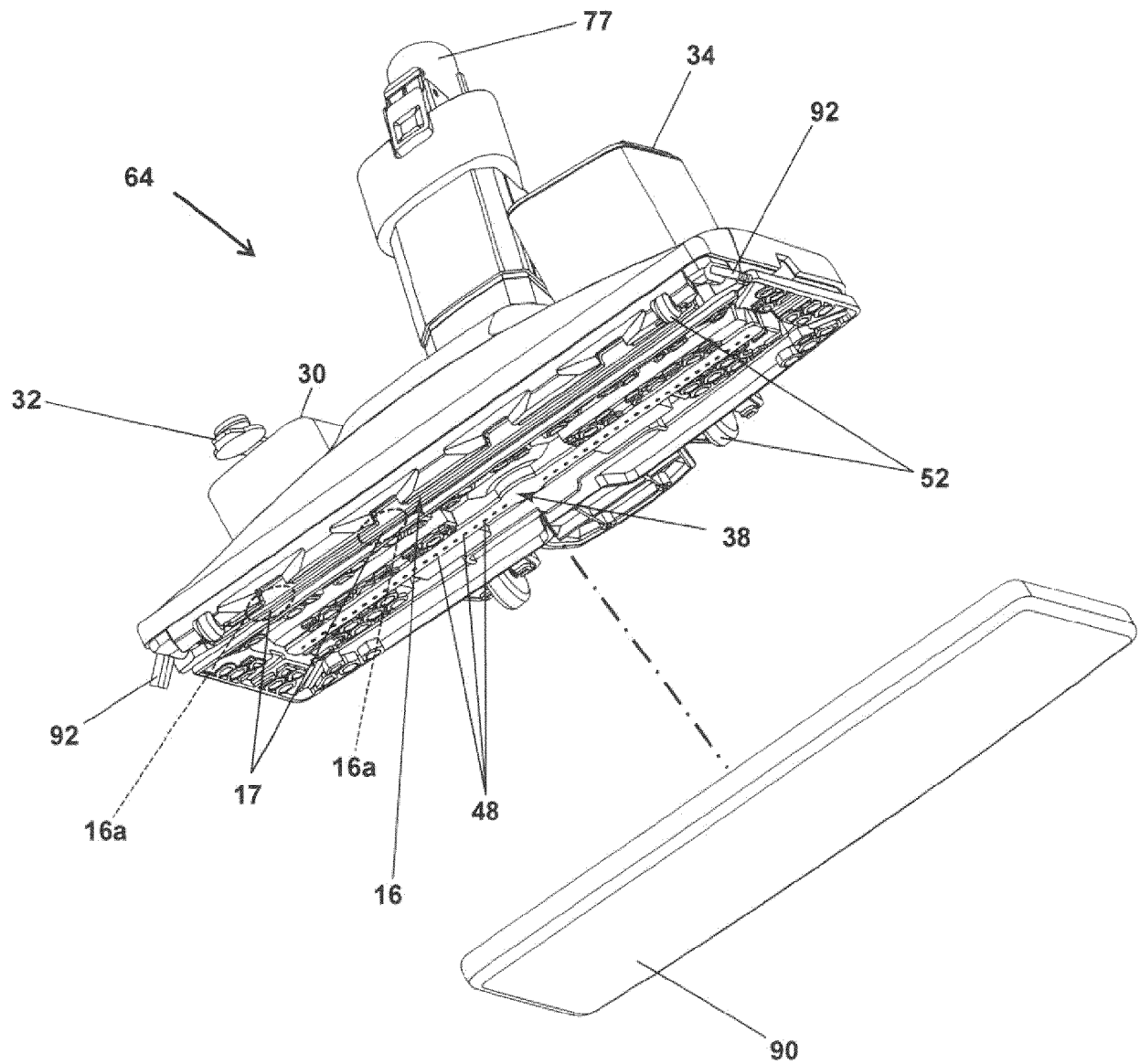


FIG. 5

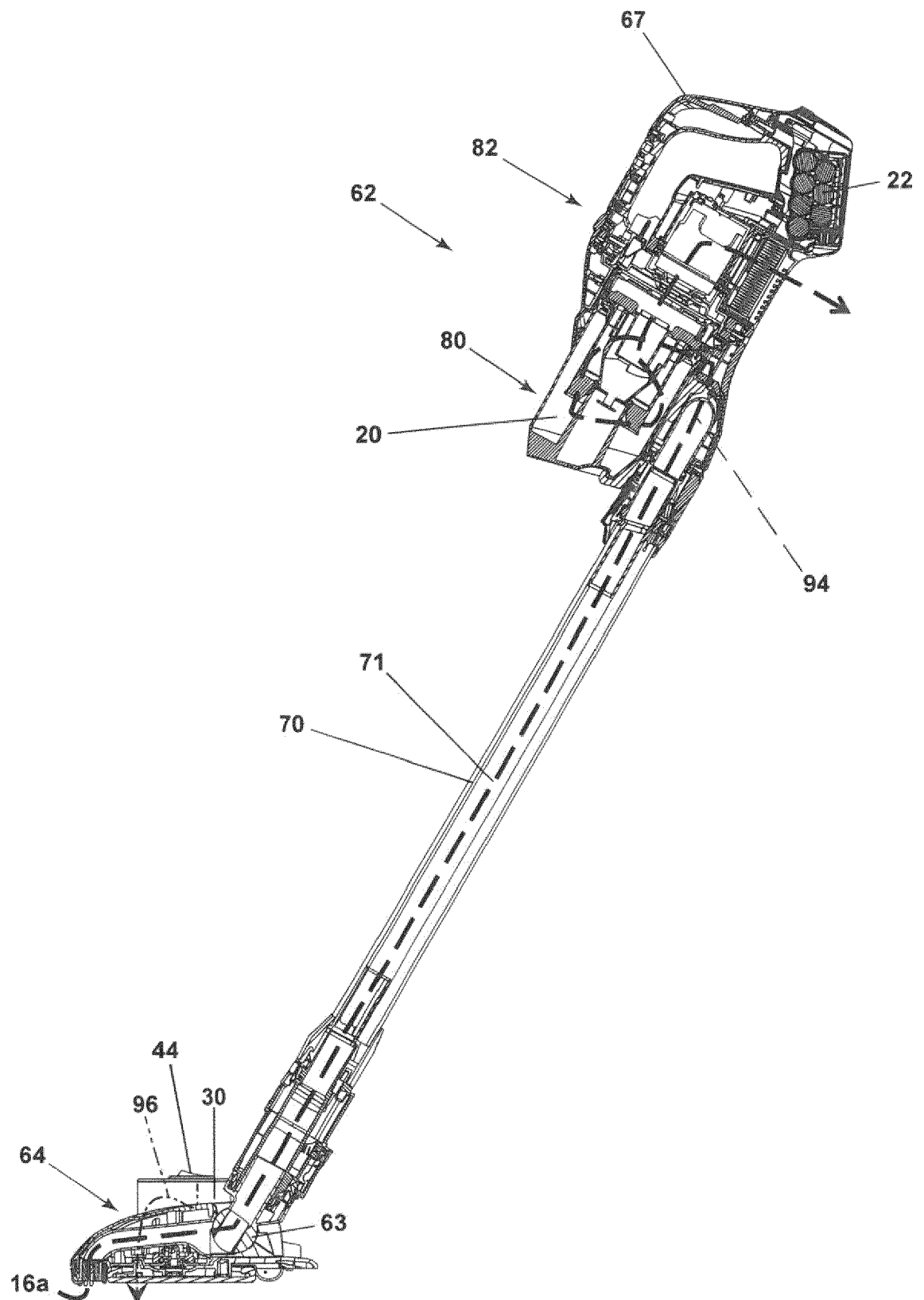


FIG. 6

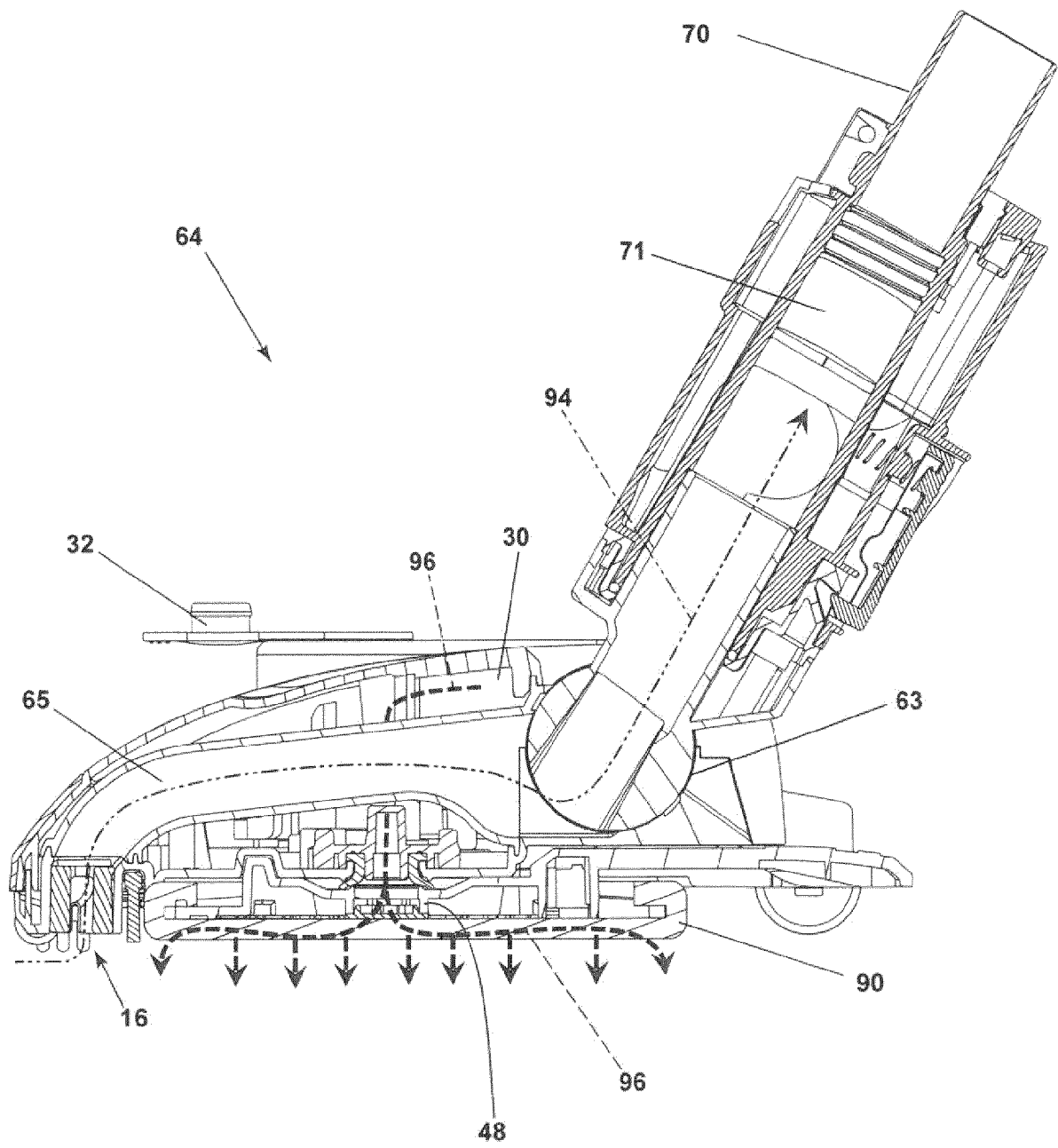


FIG. 7

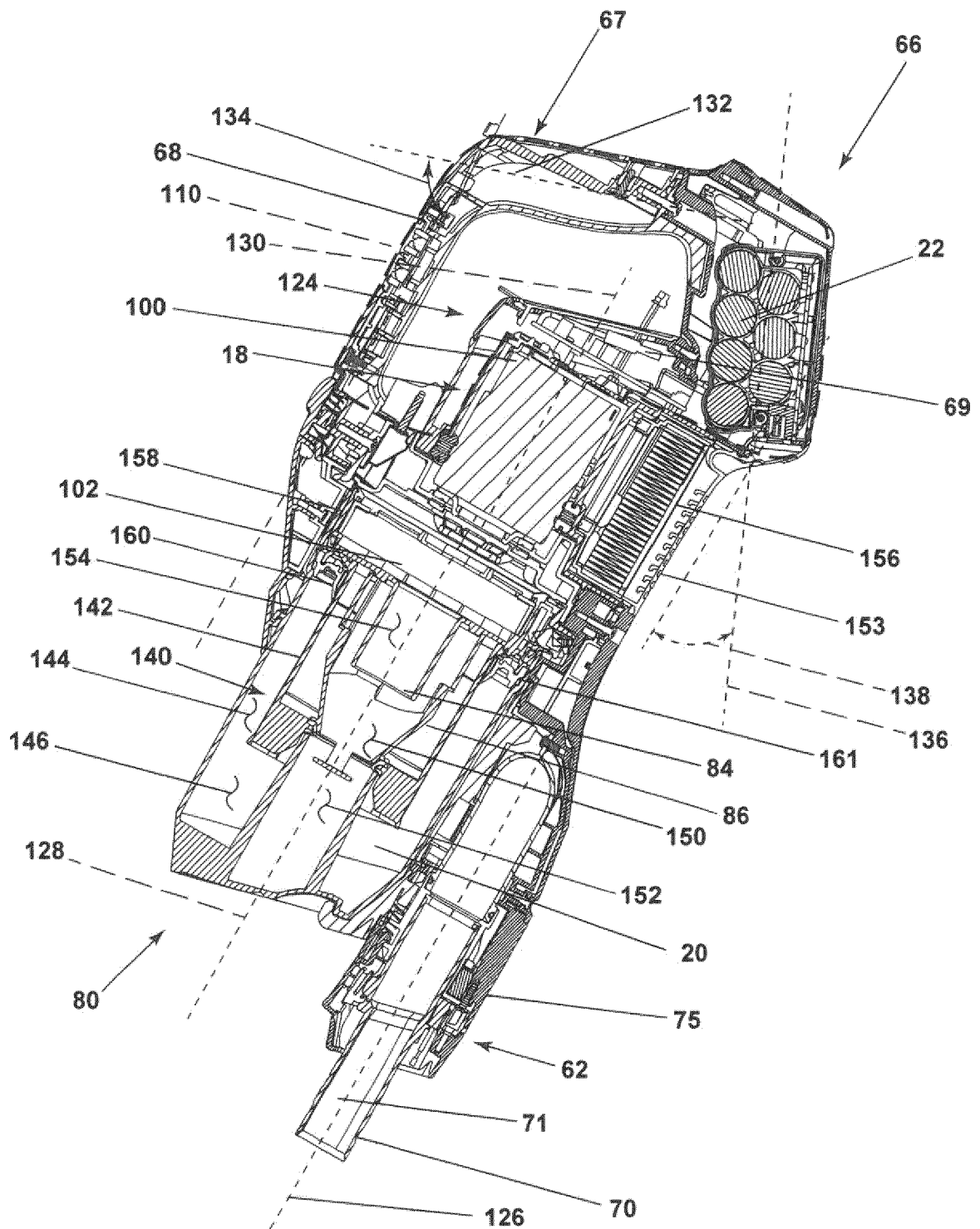
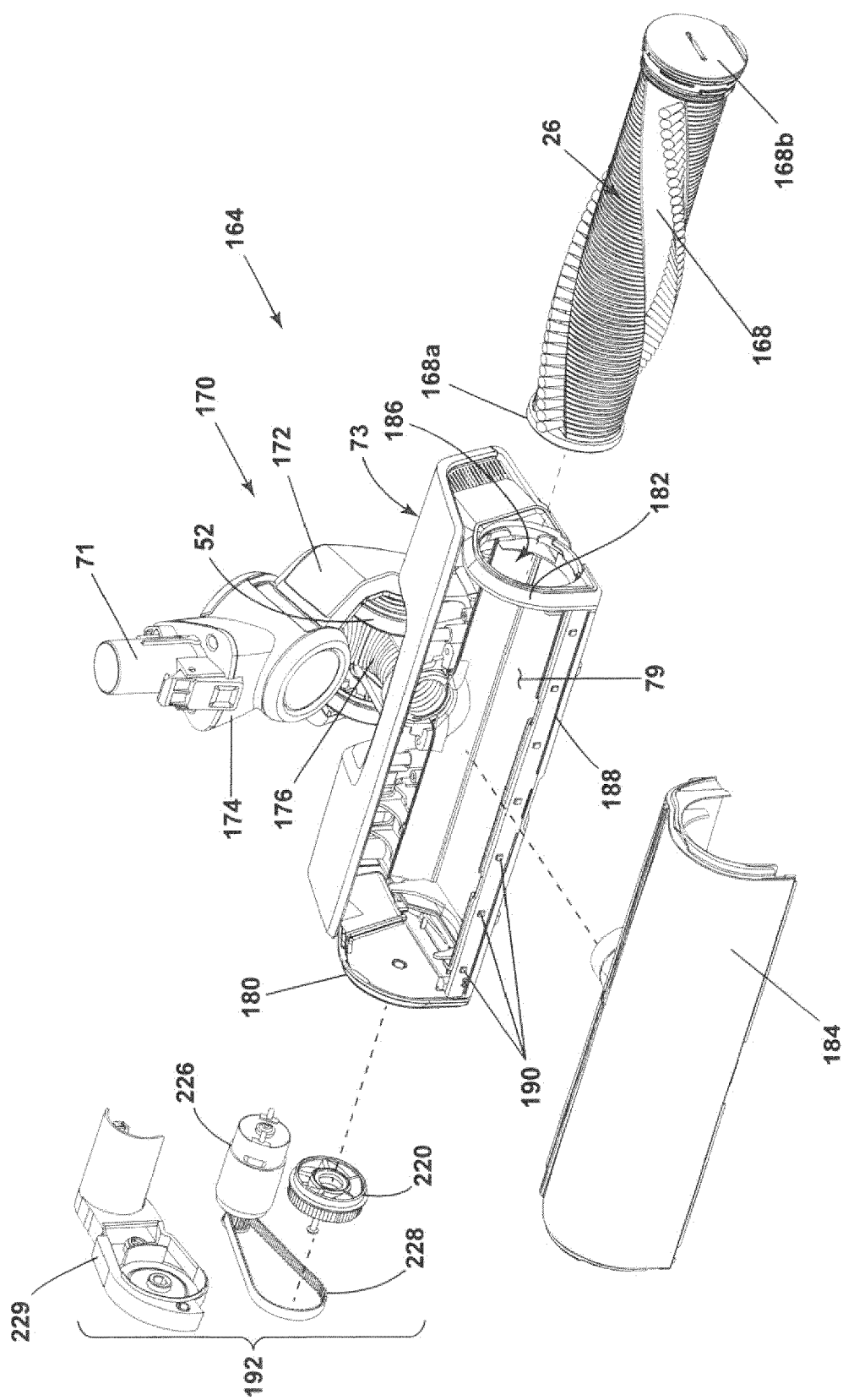


FIG. 8



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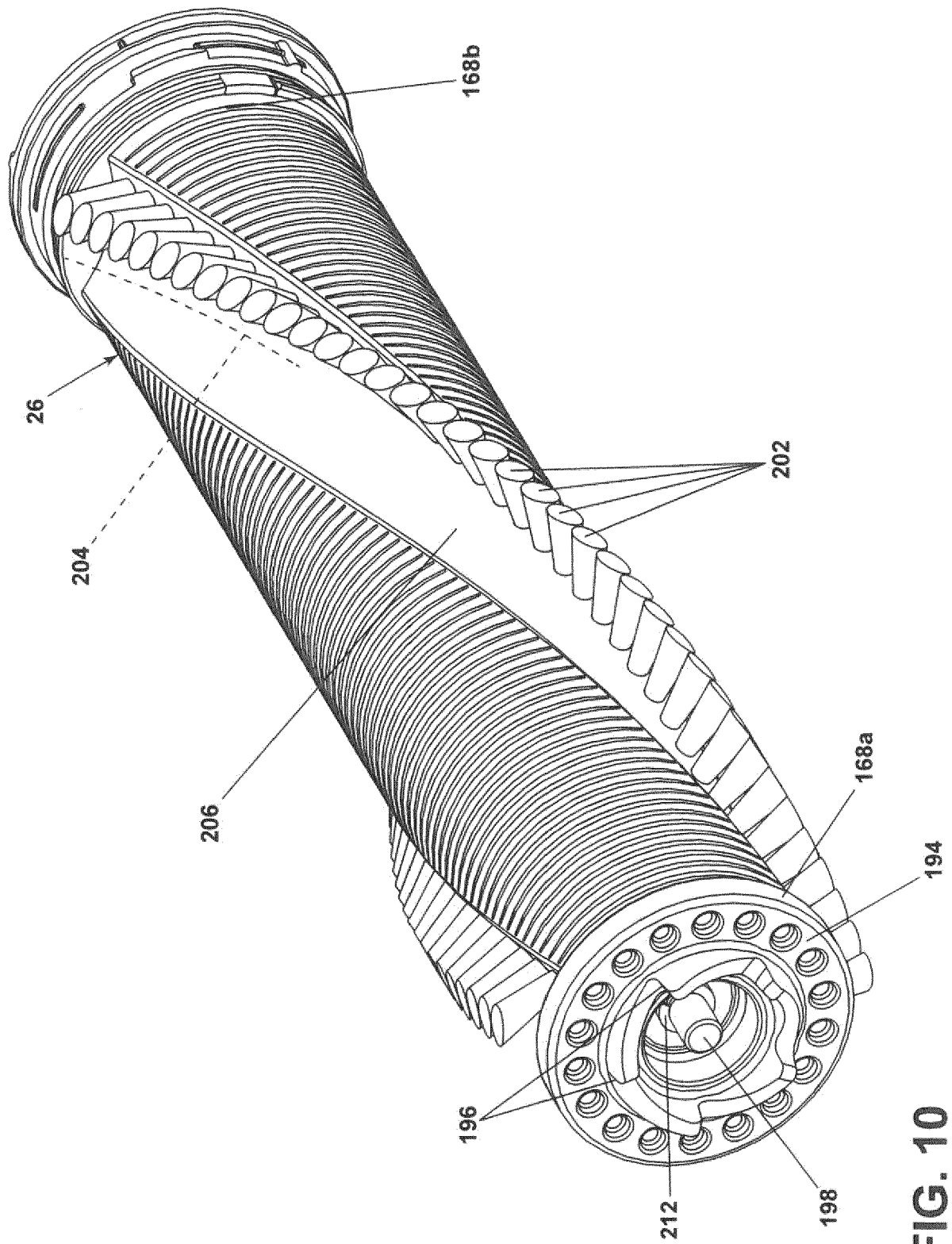


FIG. 10

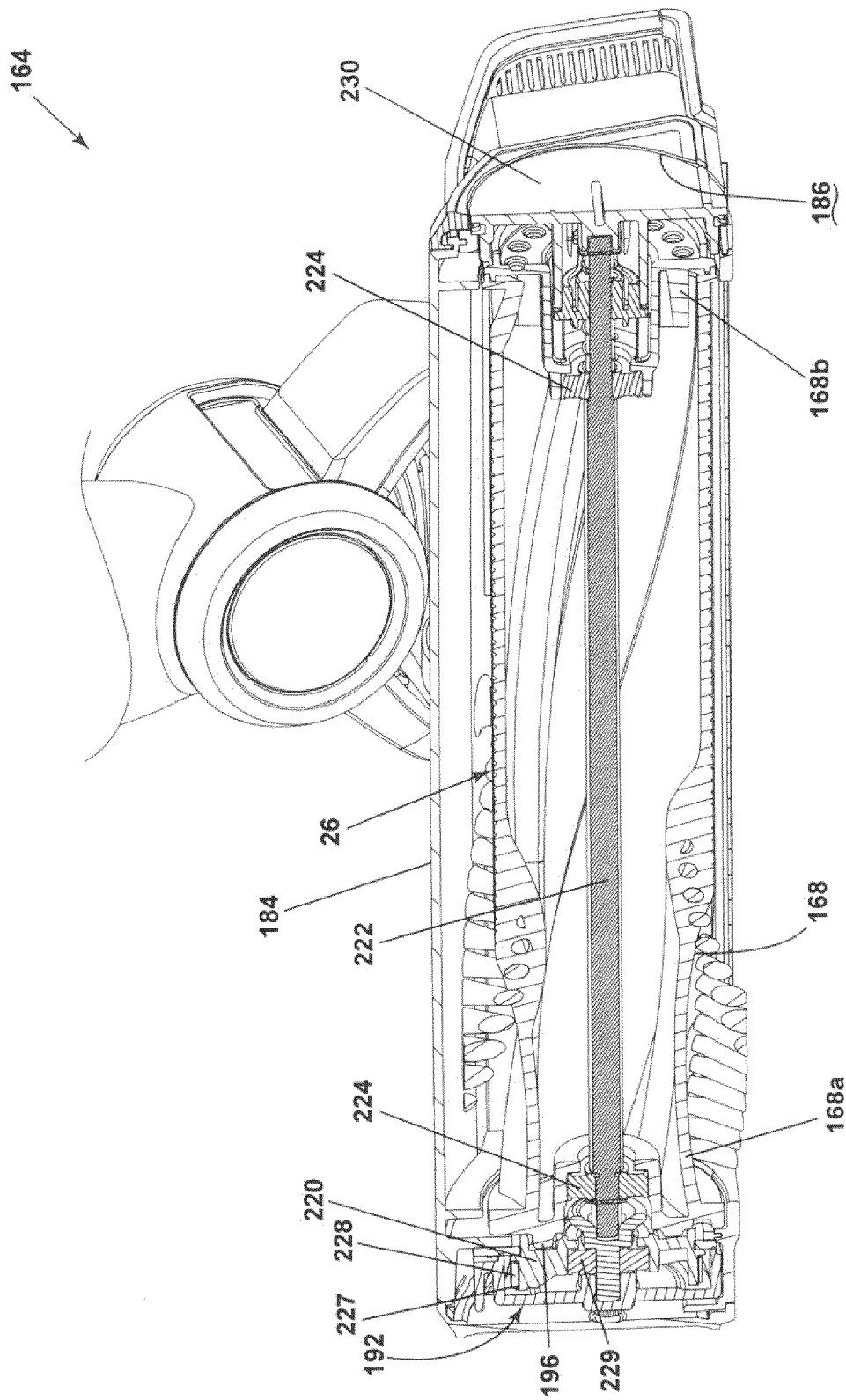


FIG. 11

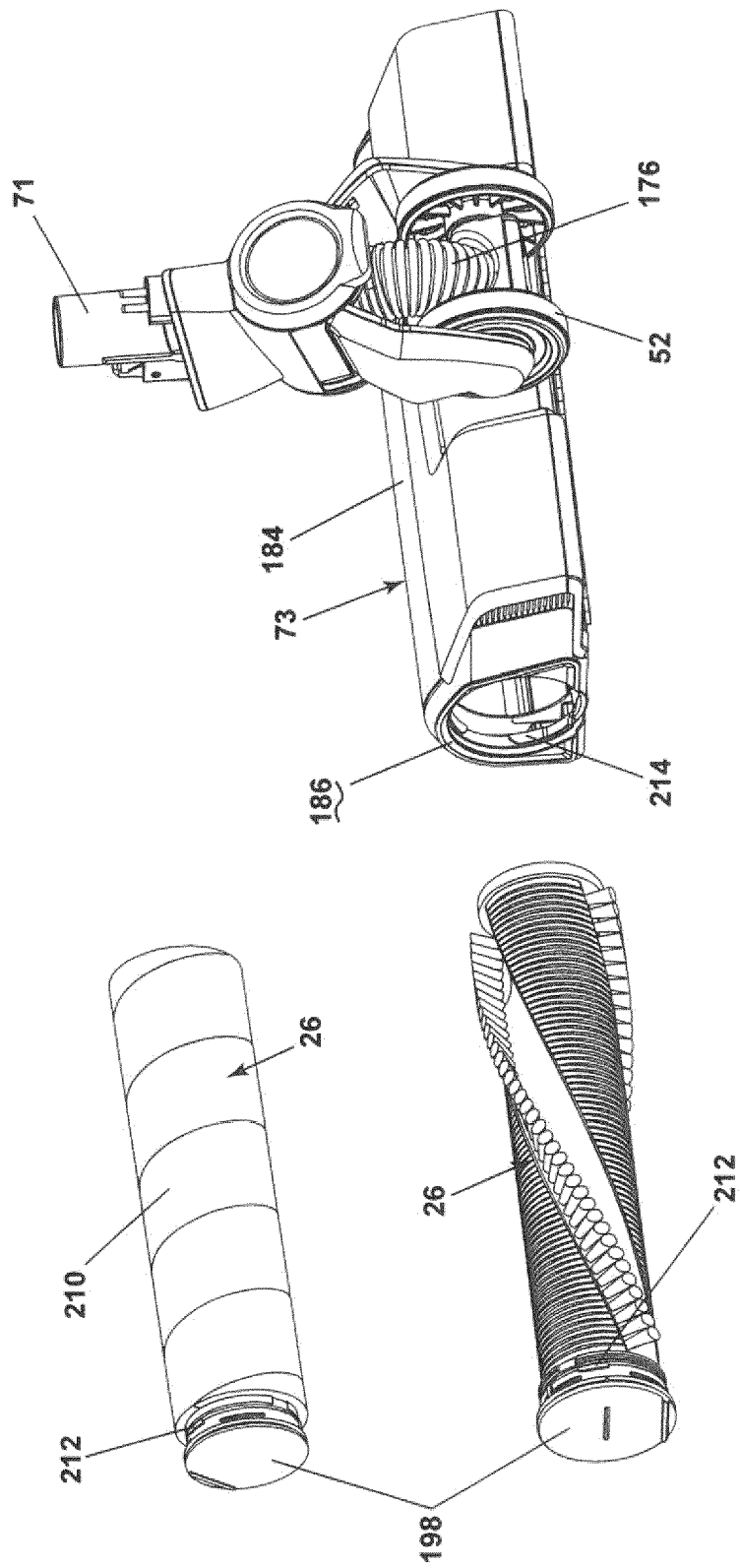


FIG. 12



EUROPEAN SEARCH REPORT

Application Number
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EPO FORM 1503 03.82 (P04C01)

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	JP S56 6366 U (-) 20 January 1981 (1981-01-20)	1-6,8-15	INV.
A	* the whole document *	7	A47L5/26 A47L9/04 A47L9/12
X	US 2006/085941 A1 (LEE YONG W [KR] ET AL) 27 April 2006 (2006-04-27)	1-6,8-15	A47L9/16 A47L9/28
A	* paragraphs [0031] - [0058]; claims; figures *	7	
X	US 2009/064448 A1 (OH JANG-KEUN [KR] ET AL) 12 March 2009 (2009-03-12)	1-6,8-15	
A	* paragraphs [0037] - [0074]; claims; figures *	7	
X	CN 110 236 454 A (SUZHOU EUP ELECTRIC CO LTD) 17 September 2019 (2019-09-17)	1-15	
A	* paragraphs [0021] - [0040]; claims; figures *		
X	JP S55 54931 A (TOKYO ELECTRIC CO LTD) 22 April 1980 (1980-04-22)	1-6,8-15	TECHNICAL FIELDS SEARCHED (IPC)
A	* claims; figures *	7	A47L
X	AU 646 947 B2 (VAX APPLIANCES AUSTRALIA) 10 March 1994 (1994-03-10)	1,5,6,8-14	
A	* pages 6-14; claims; figures *		
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 23 June 2021	Examiner Lopez Vega, Javier
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 21 15 5906

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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23-06-2021

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP S566366 U	20-01-1981	NONE	
US 2006085941 A1	27-04-2006	CN 1765294 A GB 2419515 A KR 20060037185 A US 2006085941 A1	03-05-2006 03-05-2006 03-05-2006 27-04-2006
US 2009064448 A1	12-03-2009	NONE	
CN 110236454 A	17-09-2019	NONE	
JP S5554931 A	22-04-1980	NONE	
AU 646947 B2	10-03-1994	NONE	

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 1939424 W [0049]
- US 20180125315 A [0064]