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(54) CLEANING APPARATUS WITH SPRING-LOADED TANK DOOR

(57) A cleaning apparatus (10) includes a body (12) having a handle (84), an actuator (26), and an actuator linkage (28) coupled with the actuator (26). A recovery tank (20) assembly includes a recovery tank (20) having a proximal end (20a), a distal end (20b), and an outer tank wall (22) extending therebetween to define a collection chamber (24), a door (18) operably coupled to the distal end (20b) of the recovery tank (20) to selectively close a bottom opening of the collection chamber (24), and at least one engagement linkage (30, 32a, 32b, 32c, 36, 38) configured to selectively couple with the actuator linkage (28). The at least one engagement linkage (30, 32a, 32b, 32c, 36, 38) is operably coupled to the recovery tank (20) and operably coupled with the door (18). A biasing member (44, 46) is configured to bias the door (18) to a closed position. A force applied to the actuator (26) sufficient to overcome a biasing force of the biasing member (44, 46) moves the at least one engagement linkage (30, 32a, 32b, 32c, 36, 38) toward the door (18) and, consequently, rotate the door (18) to an opened position.

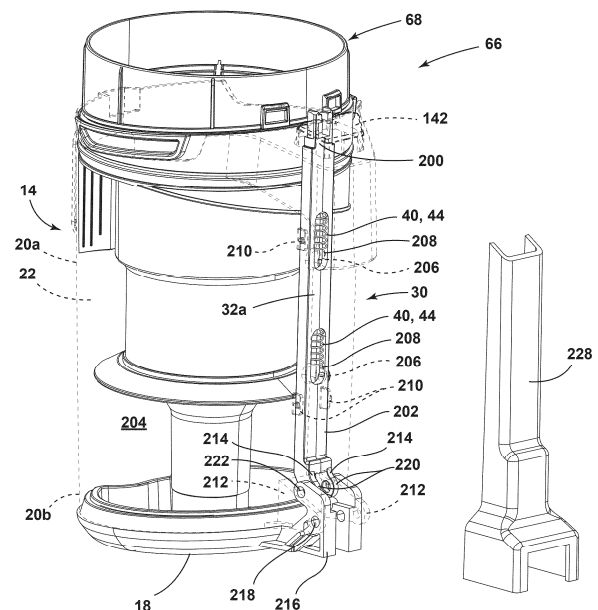


FIG. 10

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Description

FIELD

[0001] The present application generally related to a cleaning apparatus with a spring-loaded tank door, and, more particularly, a cleaning apparatus with a spring-biased actuation assembly for adjusting a tank door to an opened position with the tank door biased to a closed position.

BACKGROUND

[0002] Vacuum cleaners can draw dirt from a surface using a vacuum system. The dirt is generally collected in dirty tanks or dust bins for later disposal. These dirty tanks and dust bins often rely on manual latches to secure a tank lid in a closed state for collecting the dirt in the tank or bin.

BRIEF SUMMARY

[0003] According to one aspect of the present disclosure, a cleaning apparatus includes a body having a handle, an actuator, and an actuator linkage coupled with the actuator. A recovery tank assembly includes a recovery tank having a proximal end, a distal end, and an outer tank wall extending therebetween to define a collection chamber, a door operably coupled to the distal end of the recovery tank to selectively close a bottom opening of the collection chamber, and at least one engagement linkage configured to selectively couple with the actuator linkage. The at least one engagement linkage is operably coupled to the recovery tank and operably coupled with the door. A biasing member is configured to bias the door to a closed position. A force applied to the actuator sufficient to overcome a biasing force of the biasing member moves the at least one engagement linkage toward the door and, consequently, rotate the door to an opened position.

[0004] According to another aspect of the present disclosure, a cleaning apparatus includes a body and a recovery tank removably coupled to the body at a tank interface. The recovery tank includes flanges extending from an outer tank wall. A door includes a coupling projection, and the coupling projection is operably coupled to the flanges to define a rotational axis for the door to move between a closed position and an opened position. An actuation assembly includes an actuator operably coupled to the body. An actuator linkage extends from the actuator to proximate the tank interface of the body. An elongated linkage includes a proximal end configured to selectively engage with an end of the actuator linkage and a distal end operably coupled with the door proximate to the rotational axis. At least one biasing member is operably coupled with at least one of the body and the recovery tank. The at least one biasing member is configured to bias the door to the closed

position. Movement of the actuator in response to an applied force is configured to move the actuator linkage and the elongated linkage against a biasing force of the at least one biasing member which, consequently, moves the coupling projection and causes the door to rotate about the rotational axis to the opened position.

[0005] According to yet another aspect of the present disclosure, a recovery tank assembly for a cleaning apparatus that includes a tank door actuator is disclosed.

10 The recovery tank assembly includes a recovery tank having an outer tank wall defining a collection chamber. A release latch is operably coupled to a proximal end of the recovery tank for engaging the cleaning apparatus. An engagement linkage extends along an outer surface of the outer tank wall. The engagement linkage includes a proximal end proximate to the release latch to selectively couple with the tank door actuator. A door is operably coupled to the recovery tank. The door is configured to rotate about a rotational axis between an opened position and a closed position. A distal end of the engagement linkage is operably coupled to the door proximate to the rotational axis. At least one biasing member is operably coupled to the recovery tank and at least one of the engagement linkage and the door. The at least one biasing member is configured to bias the door to the closed position. Movement of the engagement linkage toward the door in response to a force applied by the tank door actuator is configured to overcome a biasing force of the at least one biasing member to adjust the door to the opened position. At least one of the biasing force and the movement of the engagement linkage away from the door in response to a release of the force applied to the tank door actuator is configured to adjust the door to the closed position.

35 [0006] These and other features, advantages, and objects of the present disclosure will be further understood and appreciated by those skilled in the art by reference to the following specification, claims, and appended drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] In the drawings:

45 FIG. 1 is a schematic diagram of a cleaning apparatus with an actuation assembly for controlling movement of a door of a recovery tank, according to an aspect of the present disclosure;
FIG. 2 is a side perspective view of a cleaning apparatus with a door actuation assembly for controlling a recovery tank door, according to an aspect of the present disclosure;
FIG. 3 is a cross-sectional view of the cleaning apparatus of FIG. 2 taken along lines III-III, according to an aspect of the present disclosure;
50 FIG. 4 is a partial enlarged view of a base of the cleaning apparatus of FIG. 3 taken at area IV, according to an aspect of the present disclosure;

FIG. 5 is a partial enlarged view of a hand module of the cleaning apparatus of FIG. 3 taken at area V, according to an aspect of the present disclosure; FIG. 6 is a partial, partially exploded cross-sectional view of a hand module of a cleaning apparatus including a suction assembly, a handle, and a portion of a tank door actuation assembly that includes an actuator, an actuator linkage, and a biasing member, according to an aspect of the present disclosure; FIG. 7 is a partial, partially exploded side perspective view of a recovery tank assembly with an engagement linkage of a door actuation assembly that is coupled to a tank door, according to an aspect of the present disclosure; FIG. 8 is a partial cross-sectional view of a tank door actuation assembly with an actuator linkage coupled with a biasing member and an elongated engagement linkage, according to an aspect of the present disclosure; FIG. 9A is a partial cross-sectional view of a recovery tank assembly with an actuation assembly and a tank door biased to a closed position, according to an aspect of the present disclosure; FIG. 9B is a partial cross-sectional view of a recovery tank assembly with an actuation assembly adjusting a tank door to an opened position, according to an aspect of the present disclosure; FIG. 10 is a partially exploded, side perspective view of a recovery tank assembly with a cover exploded from an outer tank wall to illustrate a portion of an actuation assembly including an engagement linkage operably coupled with biasing members, according to an aspect of the present disclosure; FIG. 11 is a partial side perspective view of a recovery tank assembly with a door engaging a recovery tank and an actuation assembly with biasing members disposed proximate to a door rotational axis, according to an aspect of the present disclosure; FIG. 12 is a partial, partially exploded side perspective view of a recovery tank assembly with an engagement linkage of a door actuation assembly that is configured to abut a tank door, according to the present disclosure; FIG. 13 is a partial, enlarged cross-sectional view of a distal end of an engagement linkage of an actuation assembly in relationship to a coupling projection of a tank door, according to the present disclosure; FIG. 14 is a partial, partially exploded side perspective view of a recovery tank assembly with multiple engagement linkages of a door actuation assembly that is configured to abut a tank door, according to the present disclosure; and FIG. 15 is a partial cross-sectional view of a recovery tank assembly with an actuation assembly adjusting a tank door to an opened position, according to an aspect of the present disclosure.

[0008] The components in the figures are not neces-

sarily to scale, emphasis instead being placed upon illustrating the principles described herein.

DETAILED DESCRIPTION

[0009] The present illustrated embodiments reside primarily in combinations of method steps and apparatus components related to a cleaning apparatus with spring-loaded tank door. Accordingly, the apparatus components and method steps have been represented, where appropriate, by conventional symbols in the drawings, showing only those specific details that are pertinent to understanding the embodiments of the present disclosure so as not to obscure the disclosure with details that will be readily apparent to those of ordinary skill in the art having the benefit of the description herein. Further, like numerals in the description and drawings represent like elements.

[0010] For purposes of description herein, the terms "upper," "lower," "right," "left," "rear," "front," "vertical," "horizontal," and derivatives thereof shall relate to the disclosure as oriented in FIGS. 1 and 2. Unless stated otherwise, the term "front" shall refer to the surface of the element closer to an intended viewer, and the term "rear" shall refer to the surface of the element further from the intended viewer. However, it is to be understood that the disclosure may assume various alternative orientations, except where expressly specified to the contrary. It is also to be understood that the specific devices and processes illustrated in the attached drawings, and described in the following specification are simply exemplary embodiments of the inventive concepts defined in the appended claims. Hence, specific dimensions and other physical characteristics relating to the embodiments disclosed herein are not to be considered as limiting, unless the claims expressly state otherwise.

[0011] The terms "including," "comprises," "comprising," or any other variation thereof, are intended to cover a non-exclusive inclusion, such that a process, method, article, or apparatus that comprises a list of elements does not include only those elements but may include other elements not expressly listed or inherent to such process, method, article, or apparatus. An element preceded by "comprises a ..." does not, without more constraints, preclude the existence of additional identical elements in the process, method, article, or apparatus that comprises the element.

[0012] With reference to FIGS. 1-15, reference numeral 10 generally designates a cleaning apparatus that includes a body 12, a recovery tank assembly 14 selectively couplable to the body 12, and an actuation assembly 16 for adjusting a position of a lid or door 18 of the recovery tank assembly 14. The recovery tank assembly 14 includes a recovery tank 20 having a first or proximal end 20a, a second or distal end 20b and an outer tank wall 22 extending between the ends 20a, 20b to define a collection chamber 24. The door 18 of the recovery tank assembly 14 is operably coupled to the distal end 20b the

recovery tank 20 to selectively close a bottom opening of the collection chamber 24 for retaining debris materials and selectively open the collection chamber 24 for disposing of the collected debris materials. The actuation assembly 16 includes an actuator 26, such as a trigger or button, operably coupled with the body 12. An actuator linkage 28 is coupled with the actuator 26. The actuator 26 and the actuator linkage 28 may be collectively referred to as a tank door actuator.

[0013] The actuation assembly 16 includes at least one engagement linkage 30 that operably couples the actuator linkage 28 with the door 18. Each configuration of the at least one engagement linkage 30 may include an elongated linkage 32, which may have different configurations referred to herein as elongated linkages 32a-32c. The elongated linkages 32 are generally configured to slide or move along the outer tank wall 22. In certain aspects, the at least one engagement linkage 30 includes the single elongated linkage 32a directly coupled to the door 18 (see FIGS. 7-11). In further non-limiting aspects, the at least one engagement linkage 30 includes the single, elongated linkage 32b that moves to push against an abutting surface 34 of the door 18 (see FIGS. 12 and 13). In additional or alternative aspects, the at least one engagement linkage 30 may include a relatively shorter elongated linkage 32c, a connector linkage 36, and a coupling linkage 38 (see FIGS. 14 and 15). The actuator linkage 28 is configured to move the engagement linkage(s) 30 to adjust the position of the door 18.

[0014] Moreover, in certain aspects, the actuator linkage 28 and the engagement linkage(s) 30 may be integrally formed to provide one, elongated actuator linkage 28 to adjust the position of the door 18. In such examples, the integrally formed, elongated actuator linkage 28 can extend from the actuator 26 to the door 18. This results in a single, pushrod-like linkage that is one piece from the actuator 26 to the door 18. Further, the actuator linkage 28 may be integrally formed with some of the engagement linkages 30, such as, for example, the elongated linkage 32. These integrally formed configurations may be advantageous for when the recovery tank 20 is more integrated into the cleaning apparatus 10 and removed from the body 12 less often or is not removable. Additionally or alternatively, the integrally formed configurations may be advantageous for when the actuation assembly 16 is located in another location, such as a rear side of the recovery tank 20.

[0015] At least one biasing member 40 is configured to bias the door 18 to a closed position. The biasing member 40 may include one or more of a body biasing member 42 operably coupled with the actuator linkage 28, a link biasing member 44 operably coupled with recovery tank 20 and/or the engagement linkage(s) 30, and/or a lid biasing member 46 operably coupled with the door 18 and/or the recovery tank 20. In this regard, the door 18 is generally retained in the closed position and is actively adjusted to an opened position by the actuation assembly

16. Without the movement of the actuation assembly 16, the door 18 may be configured to return to or remain in the closed position. The actuator linkage 28 is configured to move in response to a force applied to or movement of the actuator 26. The actuator linkage 28 is configured to move in a first direction 48, toward the door 18, which causes the actuator linkage 28 to push or move the engagement linkage(s) 30 in the first direction 48.

[0016] A force applied to the actuator 26 sufficient to overcome the biasing force of the biasing member(s) 40 may cause the actuator 26, and, consequently, the actuator linkage 28, and the engagement linkage(s) 30 to move in the first direction 48, resulting in movement or rotation of the door 18 to the opened position. This force may be maintained to retain the door 18 in the opened position. Upon release of the force applied to the actuator 26 and/or movement of the actuator linkage 28 and, consequently, the engagement linkage(s) 30 in a second direction 50 away from the door 18, the door 18 is configured to return to the closed position in response, at least in part, to the biasing force of the biasing member(s) 40. Movement of the linkages 28, 30 may also assist in returning the door 18 to the closed position. In certain aspects where the actuator 26 has a configuration other than a depressible button, engagement of the actuator 26 may result in the force being applied to the biasing member(s) 40 through another component.

[0017] Referring to FIG. 1, the cleaning apparatus 10 generally includes a suction assembly 60 including a suction source 62 for generating a vacuum or suction effect at a suction inlet 64 to capture the debris material from a surface being cleaned. As used herein, the terms "debris material(s)" may include dirt, soil, dust, hair, stains, lint, food, and other similar dry or semi-dry materials. Based on the configuration and use of the cleaning apparatus 10, the surface being cleaned may be an underlying surface or another surface, which may be horizontal or vertical surfaces. The vacuum or suction effect generated by the suction source 62 is configured to draw air, which may be referred to as working air, and the debris materials into the cleaning apparatus 10 and direct the working air and debris materials along an airflow path.

[0018] The air and debris materials are drawn into a separation and collection assembly 66, which generally includes the recovery tank assembly 14 and a filter assembly 68. The filter assembly 68 may be disposed at least partially in the collection chamber 24 and may also be disposed along the airflow path between the collection chamber 24 and the suction source 62. In the separation and collection assembly 66, the debris materials are separated from the working air and collected in the collection chamber 24 of the recovery tank 20 for later disposal. The working air is directed through the filter assembly 68, through the suction assembly 60, and is exhausted from the cleaning apparatus 10 at an exhaust outlet 70. Each of the suction inlet 64 and exhaust outlet 70 may be a single opening or multiple openings.

[0019] Typically, due to gravitational forces, the debris materials are collected at a distal, bottom, or lower end of the collection chamber 24 when the cleaning apparatus 10 is in an upright position as illustrated in FIG. 3 or near upright position. In the illustrated configuration, the door 18 is coupled to the bottom or distal end 20b of the recovery tank 20 and, therefore, the debris materials may be collected on or near the door 18 when the door 18 is closed. The door 18 is biased to the closed position to retain the debris materials in the collection chamber 24. The door 18 may be moved to the opened position by the actuation assembly 16 for releasing the debris materials from the collection chamber 24 for disposal. Typically, the door 18 is manually moved to the opened position in response to manual adjustment of the actuation assembly 16. However, automatic, motorized, or other actuation assemblies 16 may be utilized without departing from the teachings herein.

[0020] The actuation assembly 16 may be included or operably coupled with the body 12, the recovery tank assembly 14, or both, as in the configuration described herein. In the illustrated configuration, the actuation assembly 16 includes the actuator 26, the actuator linkage 28 coupled with the actuator 26, and the at least one engagement linkage 30 coupled to the actuator linkage 28 and the door 18. In certain non-limiting aspects, the actuator 26 and the actuator linkage 28 may be coupled with the body 12 and the at least one engagement linkage 30 may be coupled with the recovery tank assembly 14. A user or consumer may move or otherwise utilize the actuation assembly 16 to adjust the door 18 to the opened position, and the door 18 may automatically return to the closed position when the user disengages the actuation assembly 16. The actuation assembly 16 described herein may assist the user with emptying the collection chamber 24 in a one-handed process, which can maximize the user experience.

[0021] Referring still to FIG. 1, as well as FIG. 2, the cleaning apparatus 10 may have a variety of configurations. For example, the cleaning apparatus 10 may be a vacuum cleaner. The vacuum cleaner may be usable in an upright mode of operation where the vacuum cleaner can be maneuvered along the underlying floor surface. In the illustrated configuration of FIG. 2, the cleaning apparatus 10 is an upright vacuum cleaner that is often referred to as a stick vacuum. The cleaning apparatus 10 may also be a portable unit or have a removable portable unit such as a carrying assembly or hand module 72. In such examples, the cleaning apparatus 10 or portion of the cleaning apparatus 10 may be hand carried by the user. The portable unit may be smaller and lighter to allow the user to more easily carry and maneuver the portable cleaning apparatus 10 during, for instance, above floor cleaning. In certain aspects, the cleaning apparatus 10 may be used in an upright cleaning mode, as well as in one or more handheld portable modes.

[0022] Referring still to FIG. 2, as well as FIGS. 3-5, the cleaning apparatus 10 generally includes a foot or base

80 for engaging the underlying surface and an elongated wand 82 extending from the base 80. The elongated wand 82 may be operably coupled with the base 80 to operate as an upright support for the cleaning apparatus 10 and may also be separated from the base 80. It is contemplated that the cleaning apparatus 10 may have an upright housing in lieu of or in addition to the removable elongated wand 82. The cleaning apparatus 10 can also include the handheld or hand module 72 coupled to the elongated wand 82. In this way, the elongated wand 82 can extend between and couple the base 80 with hand module 72, while also being removable from both. Alternatively, the hand module 72 may be disposed proximate to the base 80.

[0023] The hand module 72 may include the body 12 and a handle 84 for maneuvering the cleaning apparatus 10. The handle 84 may be part of the body 12 or may be a separate component coupled to the body 12. In non-limiting examples, the hand module 72 may support or include the suction assembly 60, the separation and collection assembly 66, and/or a portion of the actuation assembly 16. In the illustrated example, the body 12 houses the suction assembly 60, supports the recovery tank assembly 14, and supports the actuator 26 and the actuator linkage 28 of the actuation assembly 16.

[0024] In various aspects, the cleaning apparatus 10 may include a power source 86, such as a battery or battery pack. In the illustrated configuration, the hand module 72 supports the battery pack, allowing the suction source 62 to be powered when the hand module 72 is used separately from other components of the cleaning apparatus 10 as described herein. The cleaning apparatus 10 may also include a power cord for engaging a power outlet, such as a household or building electrical outlet. The power source 86 may be configured to power various electrical components in the cleaning apparatus 10, such as the suction source 62. A power switch 88 may be arranged between the power source 86 and the electrical components. The power switch 88 can be selectively closed by the user to activate the electrical components.

[0025] Referring still to FIGS. 2-5, an exemplary cleaning apparatus 10 is illustrated. The cleaning apparatus 10 includes at least one suction inlet 64 for capturing the debris materials from the surface being cleaned. Depending on the configuration of the cleaning apparatus 10, the cleaning apparatus 10 may have or include multiple suction inlets 64 that can be used for different cleaning processes, which each suction inlet 64 typically being in fluid communication with the recovery tank 20 and the suction source 62 for collecting the debris materials. It is contemplated that a single airflow path may be utilized with each suction inlet 64 disposed along the airflow path or separate airflow paths for one or more suction inlets 64 may be utilized without departing from the teachings herein.

[0026] Referring still to FIGS. 3 and 4, the cleaning apparatus 10 includes the base 80 for engaging the

underlying surface and the elongated wand 82, which can be removably coupled with the base 80. The base 80 includes a base housing 94 and wheels 96 operably coupled to the base housing 94. The base 80 is adapted to be moved relative to the underlying surface via the wheels 96. In various aspects, the base 80 defines or is in fluid communication with at least one suction inlet 64, which may be referred to as a base suction nozzle 98. Movement of the base 80 is configured to move the base suction nozzle 98 relative to the surface being cleaned.

[0027] The base 80 may also include an agitator 100 operably coupled with the base housing 94. The agitator 100 may be positioned proximate or adjacent to the base suction nozzle 98 and is configured to agitate the surface being cleaned to disrupt the debris materials. Disruption of the debris materials on the surface being cleaned may assist with capturing the debris materials with the suction effect at the base suction nozzle 98. The agitator 100 may be configured as at least one brushroll, at least one horizontally rotating brushroll, at least one vertically rotating brushroll, at least one stationary brushroll, etc. The agitator 100 may be operably coupled with an agitator 100 drive system, which may include motor gears, etc. for rotating or otherwise moving agitator 100.

[0028] The base 80 may also include an interior wall 102, which may extend from an upper, inner surface of the base 80. In the illustrated configuration, the interior wall 102 is disposed between the agitator 100 and the base suction nozzle 98. The interior wall 102 may engage the agitator 100 to assist in removing debris materials from the agitator 100. Additionally or alternatively, the interior wall 102 may form a barrier to catch or block debris materials that are released from the brushroll during the cleaning process. The interior wall 102 may assist with directing debris materials to the suction base nozzle 98.

[0029] The base 80 is operably coupled with a conduit 104 that is in fluid communication with the base suction nozzle 98. In the illustrated configuration, an inlet end of the conduit 104 is disposed proximate to the agitator 100 and an outlet end of the conduit 104 is disposed proximate to the elongated wand 82 to provide fluid communication between the base suction nozzle 98 and elongated wand 82. At least one connector 106 may be coupled or included in the base 80. The connector(s) 106 may define a receiving passage 108 to receive or be in fluid communication with an inlet end 110 of the elongated wand 82 and the outlet end of the conduit 104 to fluidly couple the conduit 104 and the elongated wand 82. The connector(s) 106 may be coupled with a coupling joint 112 to operably couple the base 80 with the elongated wand 82. The coupling joint 112 may be disposed proximate conduit 104 and can be a pivoting single-axis joint or may be a rotational, multi-axis joint.

[0030] The conduit 104 may be flexible for allowing movement of the connector 106 and consequently, the elongated wand 82 relative to the base 80. The conduit 104 may extend generally horizontally from the base

housing 94 and then curve to extend generally vertically toward the elongated wand 82. The conduit 104 is configured to guide the debris material from the base 80 and toward the elongated wand 82 along the airflow path.

[0031] As illustrated, the elongated wand 82 forms a portion of the airflow path between the base 80 and the hand module 72. The connector 106 may include a latch 118 for engaging and disengaging the inlet end 110 of the elongated wand 82 with the connector 106 and, consequently, the base 80. The inlet end 110 of the elongated wand 82 may be inserted into the receiving passage 108 and coupled to the connector 106 via the latch 118. The elongated wand 82 may also be removed from the receiving passage 108 and used separately from the base 80, alone or with an accessory tool 120. When the elongated wand 82 is removed from the receiving passage 108, the suction source 62 is no longer in fluid communication with the base 80 due to disruption in the airflow path. The suction source 62 remains in fluid communication with the elongated wand 82 and the inlet end 110 of the elongated wand 82 can form one of the suction inlets 64, which may be referred to as a wand suction nozzle. The wand suction nozzle may be manually maneuvered relative to the cleaning apparatus 10 and along the surface being cleaned. This configuration may be advantageous for applying the suction effect to small areas or crevices, as well as for vertical surfaces.

[0032] The inlet end 110 of the elongated wand 82 may be coupled with the accessory tool 120. In the illustrated configuration, the elongated wand 82 also includes a tool support 122 coupled thereto for supporting the accessory tool 120 when the accessory tool 120 is not in use. The accessory tool 120 is configured to utilize various features of the cleaning apparatus 10, such as the suction assembly 60 and the separation and collection assembly 66. In such examples, the suction assembly 60 can be used to generate the suction effect at a tool suction nozzle (e.g., one of the suction inlets 64). The accessory tool 120 can be maneuvered by the user relative to the surface being cleaned. The accessory tool 120 may provide different or additional functions and features to the cleaning apparatus 10 for different cleaning processes. For example, the accessory tool 120 may be a dusting brush, a crevice tool, a pet hair tool, or any other tool that can utilize the suction or vacuum effect. The accessory tool 120 can maximize user experience by allowing the user to utilize the accessory tool 120 separately from the base 80 for collecting debris material.

[0033] Additionally, in examples where the cleaning apparatus 10 includes the detachable hand module 72, an outlet end 124 of the elongated wand 82 may be removably coupled with the hand module 72 for using the hand module 72 separate from the elongated wand 82 and/or the base 80. The hand module 72 may define or include a receiver 126 that can receive the outlet end 124 of the elongated wand 82 and/or an end of the accessory tool 120. A latch 128 may be included on the hand module 72 for securing the elongated wand 82 or accessory tool

120 to the hand module 72. It is contemplated that the receiver 126, which forms a portion of the airflow path, can also form an additional suction inlet 64 without the elongated wand 82 or the accessory tool 120.

[0034] Referring now to FIGS. 3 and 5, the hand module 72 includes the body 12 and the handle 84. The handle 84 may provide a grasping location for the user to maneuver the cleaning apparatus 10 relative to the surface being cleaned. The handle 84 may include a user interface 134 for activating one or more components of the cleaning apparatus 10. The user interface 134 may include the actuator 26 (e.g., the button or trigger) for adjusting the position of the door 18 of the recovery tank assembly 14 as described herein.

[0035] The suction assembly 60 may be at least partially disposed within the body 12. The suction assembly 60 is in fluid communication with the suction inlet 64 for generating the working airflow along the airflow path. The suction assembly 60 generally includes a motor/fan cover or housing, and the suction source 62 is disposed at least partially within the motor/fan housing 136. The motor/fan housing 136 may be a single integrated component or formed of several components coupled together. The suction source 62 may be or include a motorized fan assembly or vacuum motor. In certain aspects, the suction source 62 may include an impeller assembly with a motor that drives the impeller assembly. The suction source 62 may have any configuration that generates the vacuum/suction effect.

[0036] The cleaning apparatus 10 generally includes the exhaust outlet 70 proximate to the suction assembly 60. For example, the exhaust outlet 70 may be defined by the body 12 proximate to the suction assembly 60, such as on opposing lateral sides thereof. The suction source 62 is configured to direct the air along the airflow path and exhaust or vent the air from the cleaning apparatus 10 via the exhaust outlet 70.

[0037] Referring still to FIGS. 3 and 5, the body 12 may include a tank support 138, which is illustrated as a receiver or hook extending from the body 12. In the illustrated configuration, the tank support 138 defines a recess or receiving space. The recovery tank 20 may include a lower coupler 140, which is configured to be positioned on the tank support 138 and received in the receiving space. The lower coupler 140 may be a hook that can slidably engage an upper surface of the tank support 138 and be positioned in the receiving space. In the illustrated configuration, the lower coupler 140 on the recovery tank 20 and the tank support 138 on the body 12 each have rounded engagement surfaces to provide a sliding engagement therebetween to promote movement of the lower coupler 140 into the receiving space. The engagement between the tank support 138 and the lower coupler 140 is configured to couple the recovery tank 20 to the body 12 and support the distal end 20b of the recovery tank 20. This engagement may be at any location between the recovery tank 20 and the body 12 without departing from the teachings herein.

[0038] The recovery tank assembly 14 may also include a release latch 142, which can assist with coupling the proximal end 20a of the recovery tank 20 to the body 12. In this way, the recovery tank assembly 14 may be coupled to the body 12 in two locations. The release latch 142, which may also be referred to as a release button, is operably coupled with a biasing member 144, which is illustrated as a coil or compression spring. The biasing member 144 is configured to bias the release latch 142 away from the distal end 20b of the recovery tank 20 (e.g., upwards, toward the body 12). The user may apply a force on the release latch 142 to move the release latch 142 against a biasing force and away from the body 12 to engage and disengage the recovery tank 20 with the body 12.

[0039] The release latch 142 includes one or more latch projections 146 extending outwardly therefrom. The latch projections 146 generally extend upward, toward the body 12 and are configured to be selectively disposed within receiving notches 148 defined by the body 12. When the latch projections 146 are disposed in the receiving notches 148, the engagement therebetween is configured to couple the recovery tank assembly 14 to the body 12. The biasing force assists with retaining the release latch 142 in the upward position and in engagement with the body 12, retaining the latch projections 146 in the receiving notches 148. To remove the recovery tank 20 from the body 12, the user can press the release latch 142, which moves the latch projections 146 out of the receiving notches 148.

[0040] Typically, to couple the recovery tank 20 to the body 12, the user may position the lower coupler 140 on the tank support 138. The user may then rotate the recovery tank 20, moving the proximal end 20a of the recovery tank 20 toward the body 12. The user may position the latch projections 146 in the receiving notches 148. To remove the recovery tank 20, the user may move the release latch 142 to move the latch projections 146 out of the receiving notches 148. The user may then rotate the recovery tank 20 away from the body 12 and remove the lower coupler 140 from the tank support 138.

[0041] The recovery tank 20 includes opposing open ends 20a, 20b. The first end 20a may be the top or proximal end 20a and the second end 20b may be the bottom or distal end 20b when the cleaning apparatus 10 is used on an underlying surface. The ends 20a, 20b may also be referred to as an upper end 20a and a lower end 20b when the cleaning apparatus 10 is at or near the upright position. The proximal end 20a is generally arranged at the tank interface with the body 12 and closer to the handle 84. The distal end 20b is generally positioned farther from the handle 84 compared to the proximal end 20a. The distal end 20b being farther from the handle 84 assists with the user holding the handle 84 and emptying the recovery tank 20 from the bottom or distal end 20b.

[0042] The recovery tank 20 includes or defines the collection chamber 24 for collecting debris material for later disposal. The recovery tank 20 includes the outer

tank wall 22, which may have a cylindrical or frustoconical shape. The recovery tank 20 includes an inlet conduit 160, which is coupled to an outlet conduit 162 of the body 12 to provide fluid communication between the suction inlet 64 and the recovery tank 20. In the illustrated configuration, the airflow into the recovery tank 20 is generally normal or perpendicular to a longitudinal extent or central axis of the recovery tank 20. This configuration may be advantageous for providing cyclonic or toroidal airflow within the recovery tank 20.

[0043] Referring still to FIGS. 3 and 5, the recovery tank 20 may be operably coupled with the filter assembly 68, which may be downstream of the recovery tank 20 along the airflow path. The filter assembly 68 may include a filter housing 164 configured to close the collection chamber 24 at the proximal end 20a and house a filter 166. Accordingly, the filter housing 164 and the door 18 may close opposing ends of the recovery tank 20.

[0044] The filter assembly 68 may also include a filter shroud 168 disposed at least partially within the collection chamber 24. Often, the filter shroud 168 may be disposed along the central axis to assist with forming the cyclonic airflow path in the collection chamber 24 for cyclonic-based systems. The filter shroud 168 may be operably coupled with the filter housing 164 and/or the outer tank wall 22 to position the filter shroud 168 toward an upper portion of the collection chamber 24 proximate to the inlet conduit 104. The filter shroud 168 may assist with the separation process and serve to protect the filter 166. The filter shroud 168 generally defines apertures that may be sized to allow the airflow and/or smaller or fine debris material to flow therethrough, while reducing and preventing larger debris material from flowing therethrough.

[0045] The filter shroud 168 may include or be coupled with an end feature 170, which may be a plate or skirt to assist with the separation process. The filter shroud 168 may separate an outer chamber portion 172 of the collection chamber 24 from an inner chamber portion 174 of the collection chamber 24. The filter shroud 168 may be a generally hollow, tubular structure, with the inner chamber portion 174 within the filter shroud 168 and downstream of the outer chamber portion 172 along the airflow path. The inner chamber portion 174 may house inner separators 176, which may also be referred to as inner cyclones 176. The inner cyclones 176 may have frustoconical housings that are each wider proximate to the filter 166 and narrower proximate to the end feature 170. Ends of the inner cyclones 176 may be open, allowing air to flow through the upper openings toward the filter 166 and debris material to fall through lower openings into a collection space of the inner chamber portion 174.

[0046] A collection tube 180 may be disposed below and in fluid communication with the inner separators 176 to collect the fine debris materials that are separated from the airflow in the inner separators 176. The collection tube 180 may be coupled with the end feature 170, having a wider inlet end to receive the debris materials and a narrower collection end to engage the door 18. A seal or

gasket 182 may be disposed at the collection end for engaging the door 18 and forming a seal therebetween. The seal may assist with retaining the fine debris materials in the collection tube 180 separate from the outer chamber portion 172.

[0047] In various aspects, the suction assembly 60 and the separation and collection assembly 66 may provide a single-stage cyclonic separation process. Additionally or alternatively, the cleaning apparatus 10 may provide a two-stage cyclonic separation process, such as, in the illustrated configuration. In this two-stage process, a first stage is defined in the outer chamber portion 172 of the collection chamber 24 for separating larger debris materials from the working airflow. A second stage is defined in the inner chamber portion 174, such as within the inner cyclones 176. Each inner cyclone may generate a cyclonic or toroidal airflow therein. Generally, one or both of the cyclonic stages may be centered on the central axis of the collection and separation assembly. The first and second stages may be concentric. It is contemplated that additional separation stages or a single separation stage may be utilized that departing the teachings herein.

[0048] With two separation stages, the first cyclonic separation stage can be defined in the outer chamber portion 172. The air and debris material are drawn into the collection chamber 24 and spun or rotated around the filter shroud 168. The suction source 62 is configured to generate a high-velocity airflow, which causes the larger debris to separate from the airflow and be collected at the bottom or distal end 20b of the outer chamber portion 172. The bottom of the outer chamber portion 172 is generally defined by the door 18.

[0049] The airflow, along with smaller or fine debris materials, may be directed by the suction source 62 through the apertures of the filter shroud 168 for the second cyclonic separate separation stage. The air is configured to rotate or spin in the inner separators 176. The high-velocity rotational airflows within the inner chamber portion 174 (e.g., within the inner cyclones 176) may cause smaller debris material to be separated from airflow. The smaller debris materials are configured to fall through the lower openings of the inner separators 176 to be collected in the collection space of the collection tube 180 (e.g. the bottom of the inner chamber portion 174), which may also be defined by the door 18.

[0050] The airflow is then directed through the filter 166 before reaching the suction source 62. The filter 166 can be removably received in a filter chamber of the filter housing 164. The filter 166 may be any porous, nonporous, folded, pleated, etc. material or media for further filtering the airflow before the air is directed around or through the suction source 62.

[0051] In the illustrated configuration, the cleaning apparatus 10 is a cyclonic-based cleaning apparatus 10 where the separation of debris material from the working air may be achieved through centrifugal force. The debris carrying working or may be rotated or spun at high speeds by the suction effect generated by the suction

source 62 and configuration of the separation and collection assembly 66. However, other separation processes may be utilized without departing the teachings herein.

[0052] Referring still to FIGS. 3 and 5, the recovery tank assembly 14 includes the door 18 operably coupled to the recovery tank 20 to enclose the opening defined at the bottom or distal end of the collection chamber 24. The door 18 is configured to abut or otherwise engage the outer tank wall 22 around the collection chamber 24 when in the closed position. A gasket 186 may be coupled with the door 18. The gasket 186 may extend along an engagement location between the door 18 and the outer tank wall 22. The gasket 186 may assist with providing an additional seal at the bottom of the collection chamber 24 for retaining the debris material in the collection chamber 24. When the door 18 is closed, the gasket 186 is positioned between the door 18 and the outer tank wall 22 that forms the opening to provide a seal, reducing or preventing leaks and retaining collected debris in the collection chamber 24. The gasket 186 may provide a fluid-tight seal between the outer tank wall 22 and the door 18. The gasket 186 is generally constructed of an elastically deformable material to provide the seal and reduce or prevent leaks.

[0053] The door 18 extends across both the inner chamber portion 174 and the outer chamber portion 172. In various aspects, the door 18 includes an inner protrusion 188, which is configured to abut the lower or distal end of the collection tube 180 and/or the gasket 182 coupled to the collection tube 180 to provide a seal between the collection spaces for the outer and inner chamber portions 172, 174. When the door 18 is in the closed position, the door 18 encloses the collection chamber 24 and assists with separating the outer and inner chamber portions 172, 174. The user can selectively open the door 18 to release the debris material that has been collected in the collection chamber 24 for disposal. The door 18 may open and close both the inner chamber portion 174 and the outer chamber portion 172 simultaneously.

[0054] Referring to FIGS. 6-11, the cleaning apparatus 10 may include the actuation assembly 16 for adjusting the position of the door 18 of the recovery tank assembly 14. The actuation assembly 16 may allow the user to carry and open the cleaning apparatus 10 or the hand module 72 in one hand and use the same hand to open the door 18. For example, the user may be carrying the hand module 72 by the handle 84 to dispose of the debris material collected in the recovery tank 20. While holding the handle 84, the user may utilize the same hand to engage the actuation assembly 16, which causes the door 18 to open. The actuation assembly 16 may allow additional door latches to be omitted. Cleaner configurations with door latches often utilize two hands to hold the cleaner with one hand and operate the door latch with the other hand, which may be less efficient and less convenient for the user.

[0055] The actuation assembly 16 generally includes

the actuator 26, the actuator linkage 28, the at least one engagement linkage 30, and at least one biasing member 40. In the example illustrated in FIG. 7, the at least one engagement linkage 30 includes the elongated linkage 32a that is coupled to both the actuator linkage 28 and the door 18. The actuator 26 is typically configured as the button or trigger, which may be part of the user interface 134 for the cleaning apparatus 10. Generally, the button 26 is accessible on the handle 84 such that the user can be carrying the cleaning apparatus 10 and at the same time engage the button 26.

[0056] The actuator linkage 28 is coupled with the button 26. The actuator linkage 28 may be integrally formed with the button 26 or may be a separate component that is coupled with the button 26. The actuator linkage 28 generally extends from the handle 84 and through the body 12. In certain aspects, a portion of the actuator linkage 28 may be visible in a space proximate to the handle 84 or, alternatively, the actuator linkage 28 may not be visible outside of the body 12. The actuator linkage 28 may extend through the body 12 in a manner that does not significantly impinge the functions of the cleaning apparatus 10. For example, as illustrated, the actuator linkage 28 extends proximate to the suction assembly 60 and the release latch 142 at a front of the cleaning apparatus 10. Ends of the actuator linkage 28 may be offset from one another by an angled connecting segment, which may allow the actuator linkage 28 to move within the body 12 without significantly affecting the function of the cleaning apparatus 10 or movement of the actuator linkage 28. The configuration and location of the actuator linkage 28 may depend on the configuration of the cleaning apparatus 10.

[0057] Referring still to FIGS. 6-8, the actuator linkage 28 includes a connecting end 192 for engagement with the elongated linkage 32a. The connecting end 192 may be disposed proximate to a tank interface of the body 12 (e.g., where the recovery tank assembly 14 couples with the body 12, generally with fluid communication at the tank interface), such as proximate to the release latch 142. The connecting end 192 may define or include a lower coupling feature 194, which is illustrated as opposing notches 194. The notches 194 are configured to receive coupling features 196, illustrated as projections 196, of the elongated linkage 32a. It is contemplated that the actuator linkage 28 may include the projections 196 and elongated linkage 32a may include the notches 194 or other selectively engageable features may be utilized without departing from the teachings herein.

[0058] The actuator linkage 28 is generally operably coupled with the body biasing member 42, which is illustrated as a coil or compression spring. The biasing member 42 is arranged about the actuator linkage 28 proximate to the connecting end 192. The biasing member 42 is configured to bias the actuator linkage 28 in the second, upward direction 50 (e.g., toward the handle 84). When the actuator linkage 28 is moved by the button 26,

the actuator linkage 28 is moved against a biasing force of the biasing member 42. Accordingly, when the applied force is released from the button 26, the biasing member 42 is configured to bias the actuator linkage 28 away from the elongated linkage 32a to return the button 26 to an initial position.

[0059] The engagement between actuator linkage 28 and the engagement linkage 30 (e.g., the elongated linkage 32a) may be proximate to the release latch 142. This may be advantageous for disengaging the recovery tank assembly 14 from the body 12 and the elongated linkage 32a from the actuator linkage 28 with a same or similar movement. As the user moves the recovery tank assembly 14 away from the body 12, the projections 196 of the elongated linkage 32a are configured to move out of the notches 194 to disengage from the actuator linkage 28 and allow separation of the linkages 28, 32a along with separation of the recovery tank assembly 14 from the body 12. The two coupling features 194, 196 on the linkages 28, 32a may have sloped surfaces and/or rounded edges to promote the engagement and disengagement. Further, one or both of the linkages 28, 32a may be configured to elastically deform to disengage in response to a force pulling the recovery tank assembly 14 away from the body 12 and to engage in response to a pushing force to couple the recovery tank assembly 14 with the body 12. As the tank assembly is positioned on the tank support 138 and the latch projections 146 on the release latch 142 are positioned in the receiving notches 148, the linkages 28, 32a may automatically engage or connect with one another.

[0060] The elongated linkage 32a extends along a height of the recovery tank assembly 14. A first or proximal end 200 of the elongated linkage 32 includes the projections 196 for engaging the actuator linkage 28, and a second or distal end 202 is coupled to the door 18. The proximal end 200 may be disposed proximate to the release latch 142. The elongated linkage 32 generally extends along an outer surface 204 of the outer tank wall 22 and may be parallel with the longitudinal extent of the recovery tank 20. The elongated linkage 32a is configured to slide, move, or otherwise adjust along the outer surface 204 to move the door 18.

[0061] Referring still to FIGS. 6-9, in various aspects, the outer tank wall 22 defines at least one protrusion 206 and, in the illustrated configuration, two protrusions 206. The elongated linkage 32a defines a corresponding number of slots 208 that each receive a respective protrusion 206. The protrusions 206 may be configured to define a range of movement of the elongated linkage 32a. For example, in an initial position where the door 18 is closed, the protrusions 206 are disposed at lower ends of the slots 208. When the engagement linkage 30 is shifting to move the door 18 to the opened position, the movement of the elongated linkage 32a may move the slots 208 relative to the protrusions 206 until the protrusions 206 are disposed at upper ends of the slots 208, reducing or preventing additional movement toward the door 18.

When the protrusions 206 are at the upper ends of the slots 208, the door 18 is in the opened position.

[0062] The outer tank wall 22 may also define guides 210. The guides 210 may be disposed on opposing sides of the engagement linkage 30 (e.g., the elongated linkage 32a). The guides 210 may abut or be disposed adjacent to side surfaces of the elongated linkage 32a, assisting with the sliding movement of the elongated linkage 32a. The guides 210 may not substantially impinge movement of the elongated linkage 32a but provide a movement path for the elongated linkage 32a. The guides 210 may also reduce side-to-side movement, maximizing the up-and-down movement for moving the door 18.

[0063] The recovery tank assembly 14 includes flanges 212 extending outwardly from the outer tank wall 22. Typically, the flanges 212 may be vertically aligned with the release latch 142, however other arrangements are contemplated depending on the configuration of the actuation assembly 16. The distal end 202 of the elongated linkage 32a may include one or more engagement extensions 214 that extend away from the outer surface 204 between the flanges 212. Generally, an acute angle is defined between the engagement extensions 214 and the outer surface 204. In the illustrated configuration, the distal end 202 includes two engagement extensions 214 with each engaging or disposed adjacent to an inner surface of a respective flange 212. The flanges 212 may provide protection for and guide movement of the connected components, such as the door 18 and the elongated linkage 32a.

[0064] Referring to FIGS. 9A-11, the door 18 includes a coupling projection 216, which extends between the flanges 212. The configuration of the coupling projection 216 may depend on the components coupled to the coupling projection 216. In the illustrated configuration of FIGS. 9A and 9B, the coupling projection 216 extends outward, toward the release latch 142 (e.g., toward a top of the cleaning apparatus 10), and then toward the outer tank wall 22, forming a "U" or hook shape. This shape may be advantageous for providing engagement locations to both the flanges 212 and the elongated linkage 32a, as well as for guiding movement of the door 18.

[0065] The coupling projection 216 generally defines two engagement locations 218, 220. The first engagement location 218 is for an engagement between the door 18 and the flanges 212 (e.g., the recovery tank 20), and the second engagement location 220 is for an engagement between the door 18 and the elongated linkage 32a. Generally, the first or tank engagement location 218 is disposed outward and lower than the second or link engagement location 220.

[0066] The door 18 is configured to rotate about a rotational axis defined at the first or tank engagement location 218 (i.e., defined through the flanges 212). In the illustrated configuration, when the cleaning apparatus 10 is upright, this rotational axis is generally a horizontal rotational axis. Other configurations are contemplated

depending on the configuration of the cleaning apparatus 10. The rotational axis is generally fixed relative to the recovery tank 20, providing a pivoting or rotating engagement for the door 18 as the door 18 opens and closes.

[0067] The second or link engagement location 220 may be a rotational engagement that is configured to move relative to the recovery tank 20 and is defined through the elongated linkage 32a. The elongated linkage 32a is configured to slide or move toward the door 18 in response to a force from the actuator linkage 28. The distal end 202 of the elongated linkage 32a is coupled to the coupling projection 216, and, with movement of the elongated linkage 32a in the first or downward direction 48, the elongated linkage 32a is configured to move an end 222 of the coupling projection 216 downward. As the end 222 of the coupling projection 216 moves downward, the coupling projection 216 rotates about a second rotational axis between the elongated linkage 32 and the door 18 at the link engagement location 220. This rotation may allow movement of the components relative to one another, while the door 18 also rotates about the rotational axis at the tank engagement location 218. Accordingly, the elongated linkage 32 is configured to move the end 222 of the coupling projection 216 in the first direction 48, and the door 18 is configured to rotate about the fixed rotational axis and the moveable rotational axis to adjust to the opened position.

[0068] Referring now to FIGS. 10 and 11, the actuation assembly 16 may include at least one additional biasing member 40, in addition to the biasing member 42 that engages the actuator linkage 28. The biasing member(s) 40 may include one or both of the first or link biasing member 44 and the second or lid biasing member 46. The biasing member(s) 44, 46 operably coupled to the recovery tank 20 are configured to bias the door 18 to the closed position alone or in combination with the body biasing member 42. In this way, when the user is not engaging the actuator 26 (e.g., the actuator 26 is free of the applied force or the applied force is released), the door 18 is biased toward and remains in the closed position. Accordingly, the door 18 may be actively adjusted to the opened position by the user overcoming the biasing force(s).

[0069] The actuation assembly 16 may include the link biasing member 44, which may engage the elongated linkage 32a. In certain aspects, the actuation assembly 16 may include multiple link biasing members 44. The link biasing members 44 may be positioned in or proximate to the slots 208, between the protrusions 206 and the upper ends of the slots 208. In other words, the link biasing member 44 may be operably coupled with both the recovery tank 20 at or proximate to the protrusions 206 and the elongated linkage 32a at or proximate to the slots 208. For example, the link biasing members 44 may be disposed between the protrusions 206 and the upper ends of the slots 208. The link biasing members 44 may be compression springs. When the elongated linkage 32a moves in the first direction 48, the elongated

linkage 32a is configured to move against the biasing force of the link biasing members 44 and compress the biasing members 44. The link biasing members 44 are configured to bias the elongated linkage 32a in the second direction 50. The biasing force may assist with moving the elongated linkage 32a in the second direction 50, which causes the end 222 of the coupling projection 216 to move in the second direction 50 and the door 18 to rotate to the closed position.

[0070] Additionally or alternatively, the actuation assembly 16 may include the lid biasing member 46, which may be disposed at or proximate to the rotational axis. Typically, the lid biasing member 46 is disposed at the rotational axis at the tank engagement location 218. In this regard, the biasing member 46 is operably coupled to the recovery tank 20 at the flanges 212 and the door 18 at the coupling projection 216. However, the lid biasing member(s) 46 may additionally or alternatively be at the engagement with the elongated linkage 32a without departing from the teachings herein. The actuation assembly 16 may include multiple lid biasing members 46, such as one proximate to each flange 212, which may assist in applying a more even biasing force to move the door 18. The lid biasing members 46 may be configured as torsion springs at the rotational axis. The door 18 may rotate against the biasing force of the torsion spring to the opened position. Upon release of the force applied to the actuator 26, the biasing force of the lid biasing members 46 is applied to the door 18 to rotate the door 18 in the opposing direction and adjust the door 18 to the closed position. The actuation assembly 16 may include one or both of the compression spring(s) 44 and the torsion spring(s) 46 for automatically returning the door 18 to the closed position upon the user disengaging the actuator 26.

[0071] As illustrated in FIG. 10, the cleaning apparatus 10 may include a cover 228 extending over the at least one engagement linkage 30. The cover 228 may extend from proximate the release latch 142 to the door 18 along the outer surface 204 of the recovery tank 20. The cover 228 may conceal the at least one engagement linkage 30 and the engagement between the at least one engagement linkage 30 and the door 18. The engagement linkage 30 may be configured to move within a channel defined between the cover 228 and the outer tank wall 22. Additionally, the cover 228 may protect components of the actuation assembly 16 by placing the moving components between the cover 228 and the outer tank wall 22.

[0072] In operation, the user is configured to engage the actuator 26 or button 26 by applying a force to the button 26, which moves or depresses the button 26 further into the handle 84. This movement causes the actuator linkage 28 to move in the first or downward direction 48 toward the recovery tank assembly 14. The movement of the actuator linkage 28 is configured to move the engagement linkage 30 in the same first or downward direction 48 based on the engagement be-

tween the linkages 28, 30 by the coupling features 194, 196. The elongated linkage 32a is configured to move along the outer surface 204 toward the door 18, moving the slots 208 relative to the protrusions 206. The movement of the engagement linkage 30 is configured to move the coupling projection 216, causing the door 18 to rotate about the rotational axis to the opened position. This movement of the actuation assembly 16 causes the components to move against the biasing force of the biasing members 40.

[0073] Upon release of the applied force on the button 26, the body biasing member 42 operably coupled with the actuator linkage 28 is configured to adjust to the actuator linkage 28 in the second or opposing direction 50 away from the recovery tank 20 (e.g., upwards). The movement of the actuator linkage 28 may pull or move the elongated linkage 32 in the second direction 50, based on the engagement of the coupling features 194, 196. Additionally or alternatively, the link biasing member 44 may move the elongated linkage 32 in the second direction 50 with the biasing force and/or the lid biasing member 46 may rotate the door 18 in the opposing direction toward the closed position. One or more of the movements of the linkages 28, 32a and the biasing forces are configured to automatically rotate the door 18 to the closed position upon the user disengaging the actuator 26. The biasing forces may also be configured to hold or retain the door 18 in the closed position.

[0074] Referring to FIG. 12 and 13, an additional or alternative configuration of the actuation assembly 16 is illustrated, with the differences being the inclusion of the elongated linkage 32b with a different configuration of the distal end 202 in lieu of the elongated linkage 32a (see FIGS. 6-11) and a different configuration of the coupling projection 216. In this configuration, the distal end 202 of the elongated linkage 32b may not be directly coupled with the coupling projection 216. The distal end 202 may include an engagement projection 236, which projects outward, away from the outer surface 204 to form an increased thickness at the distal end 202.

[0075] The coupling projection 216 may define a generally "L" or triangular shape and engages the flanges 212 to define the rotational axis. In lieu of the "U" shape for engaging the engagement linkage 30, the coupling projection 216 defines the abutting surface 34 configured to be engaged by the engagement projection 236 of the elongated linkage 32b when the elongated linkage 32b is moved in the first direction 48. The elongated linkage 32b may be spaced from the abutting surface 34 when the door is closed and push against the abutting surface 34 to move the door 18 to the opened position. The configuration of the engagement projection 236 and the abutting surface 34 may cause the door 18 to be fully opened when the protrusions 206 are at the upper ends of the slots 208. The engagement projection 236 and the abutting surface 34 may be configured to slidably engage one another as the door 18 moves between the opened and closed positions.

[0076] Similar to the configuration illustrated in FIGS. 6-11, the elongated linkage 32b in FIGS. 12 and 13 is configured to push or move the coupling projection 216 to cause the door 18 to rotate about the rotational axis. The elongated linkage 32b is configured to move into contact with and/or push against the abutting surface 34 to move the door 18. Upon release of this pushing force when the actuator 26 is released, the elongated linkage 32b may move away from the door 18. The elongated linkage 32b may disengage from the door 18 or remain in contact without applying a force to the door 18. The door 18 is configured to return to the closed position in response to movement of the elongated linkage 32b in the second direction 50 and/or the biasing forces of one or more biasing member 40.

[0077] Referring to FIGS. 14 and 15, an additional or alternative configuration of the actuation assembly 16 is illustrated, with the differences being in the configuration of at least one engagement linkage 30 and the configuration of the coupling projection 216. The at least one engagement linkage 30 includes the elongated linkage 32c, the connector linkage 36, and the coupling linkage 38. The elongated linkage 32c is substantially similar to the elongated linkage 32a described with respect to FIGS. 6-11 with a shorter length to provide space for the additional two linkages 34, 36. The elongated linkage 32c in this configuration may not be directly coupled to the door 18 but may be indirectly coupled to the door 18 via the additional linkages 34, 36.

[0078] The distal end 202 of the elongated linkage 32c includes the two engagement extensions 214 extending outwardly from the outer tank wall 22 generally above the flanges 212. The connector linkage 36 may be coupled to the engagement extensions 214. As illustrated, the connector linkage 36 includes two pins that are configured to engage the engagement extensions 214. At an opposing end, the connector linkage 36 includes or defines apertures for receiving pins or similar features of the coupling linkage 38. The coupling linkage 38 may define pins at opposing first and second ends 238, 240 for coupling to the connector linkage 36 and the door 18. Different structures or features for coupling the linkages 32c, 34, 36 together and promoting or reducing movement therebetween to move the door 18 are also contemplated without departing from the teachings herein.

[0079] Referring still to FIGS. 14 and 15, the coupling projection 216 extends outward from the outer tank wall 22 and then at an obtuse angle, extending outward and upward (e.g., toward the body 12). The coupling projection 216 includes the tank engagement location 218 for engaging the flanges 212 and the link engagement location 220 for engaging the coupling linkage 38. In this configuration, the link engagement location 220 is outward and upward relative to the tank engagement location 218, which generally increases a distance the coupling projection 216 extends from the outer tank wall 22. The coupling projection 216 may also be configured to engage the flanges 212 at the tank engagement location

218. In such examples, the coupling projection 216 may be coupled with the flanges 212 at one side (e.g., an outer side) and the coupling linkage 38 may engage the flanges 212 from an opposing side (e.g., an inner side). The coupling linkage 38 may engage the flanges 212 at a location between the first and second ends 238, 240.

[0080] In operation, the elongated linkage 32c is configured to slide or move along the outer tank wall 22 in response to a force from the actuator linkage 28. The elongated linkage 32c moves until the protrusions 206 are at the upper ends of the slots 208. Movement of the elongated linkage 32c in the first, downward direction 48 generally causes movement of the connector linkage 36 in the first, downward direction 48. The connector linkage 36 may remain in a fixed relationship relative to the elongated linkage 32c or may rotate based on the configuration of the recovery tank assembly 14 and the actuation assembly 16.

[0081] The movement of the connector linkage 36 in the first direction 48 causes movement of the first end 238 of the coupling linkage 38 in the first direction 48. The movement of the first end 238 causes the coupling linkage 38 to rotate about the rotational axis defined at the tank engagement location 218. Rotation of the coupling linkage 38 may cause the second end 240 of the coupling linkage 38 to move in the second upward direction 50. The second end 240 of the coupling linkage 38 may be directly engaged with the coupling projection 216 such that movement of the second end 240 causes the coupling projection 216 to move upwards and, consequently, cause the door 18 to rotate about the rotational axis to the opened position. The link engagement location 220 between the coupling linkage 38 and the coupling projection 216 may be a movable rotational engagement to assist with the components moving relative to one another as the door 18 opens.

[0082] Upon release of this pushing force when the actuator 26 is released, the elongated linkage 32c may move away from the door 18. The elongated linkage 32c may pull or move the connector linkage 36 and, consequently, the first end 238 of the coupling linkage 38 in the second direction 50. Movement of the linkages 32c, 36, 38 can allow or assist the door 18 in rotating toward the closed position. The door 18 is configured to return to the closed position in response to movement of the linkages 32c, 36, 38 in the second direction 50 and/or the biasing forces of one or more biasing member 40.

[0083] Referring again to FIGS. 1-15, the cleaning apparatus 10 described herein may provide for an efficient separation, collection, and disposal process for debris materials captured during the cleaning process, which can maximize the user experience. The recovery tank 20 forms a sealed container to collect debris material and dust within the cleaning apparatus 10. The outer tank wall 22 may be made of durable materials for use in a cleaning environment that uses the vacuum effect, such as plastic or metal. The flanges 212 may also be formed of durable material, such as plastic or metal, to support

the engagement and movement of various components (e.g., the door 18 and the engagement linkage(s) 30). The recovery tank 20 and the door 18 may be manufactured using techniques, such as molding, welding, or machining depending on the material of each component. The door 18 is configured to fit securely over the opening of the recovery tank 20 to seal the bottom or distal end of the collection chamber 24. The door 18 is rotatably coupled with the recovery tank 20, forming a hinge or hinge-like engagement that allows the door 18 to open and close smoothly.

[0084] The actuation assembly 16 can be used in a variety of cleaning apparatuses 10, including both residential and commercial cleaning apparatuses 10. The actuation assembly 16, coupled with both the body 12 and the recovery tank assembly 14, may assist the user in collecting and subsequently releasing the collected debris material from the collection chamber 24 using one hand. The user may grasp the cleaning apparatus 10 at the handle 84 and, with the same hand, engage the actuator 26, such as by pressing the button 26 into the handle 84. The engagement or movement of the actuator 26 is configured to move the actuator linkage 28 against the biasing force of the biasing member 42, which, consequently, moves the engagement linkage(s) 30 (e.g., the elongated linkage 32a in FIGS. 7 and 9A-11, the elongated linkage 32b in FIGS. 12 and 13, and/or the elongated, connector, and coupling linkages 32c, 34, 36 in FIGS. 14 and 15).

[0085] The linkages 28, 30 are configured to move in the first direction 48, generally downward or toward the door 18. This movement and the engagement of the linkage(s) 30 with the door 18 causes the door 18 to rotate to the opened position, against the biasing force of one or more of the body biasing member 42, the link biasing member 44, and/or the lid biasing member 46. When the door 18 is manually moved by the user engaging the actuation assembly 16, the biasing members 40 are configured to compress or move against the biasing force, allowing the door 18 to be adjusted to the opened position. The opened position of the door 18 may depend on the configuration of various components, such as the linkages 28, 30 and the door 18 and the relationship therebetween. Generally, the door 18 is configured to rotate about 90° to the opened position.

[0086] Upon the user disengaging the actuator 26 (e.g., releasing the force applied to the button 26), the door 18 is configured to automatically return to and be retained in the closed position without additional action by the user. The body biasing member 42 is configured to move the actuator linkage 28 in the second direction 50, away from the door 18 with the biasing force. This movement may cause the engagement linkage(s) 30 to move in the second, upward direction 50. Additionally or alternatively, the biasing force of the link biasing member 44 may move the elongated linkage 32a-32c in the second direction 50 and/or the biasing force of the lid biasing member 46 may rotate the door 18 toward/to the closed

position. The biasing members 40 used with the actuation assembly 16 create tension or tension forces that bias and retain the door 18 in the closed position (e.g., the original position of the door 18) when not in use and when the actuator 26 is not directly engaged by the user. In other words, the door 18 is biased toward/to the closed position, is retained in the closed position by the actuation assembly 16, and automatically returns to the closed position.

[0087] When returning to the closed position, the gasket 186 can automatically form the seal proximate to the outer tank wall 22, sealing the collection chamber 24. The gasket 182 from the collection tube 180 may automatically form the seal with the inner protrusion 188 of the door 18, separating the outer and inner chamber portions 172, 174. The gaskets 182, 186 may provide a tight or fluid-tight seal, reducing or preventing leaks to maintain debris material in the collection chamber 24. Accordingly, when the door 18 is retained in the closed position by the actuation assembly 16, the door 18 automatically seals the collection chamber 24 for use in the cleaning process, which may be accomplished automatically without a secondary, manual latch.

[0088] Referring still to FIGS. 1-15, the recovery tank assembly 14 may include an additional locking feature 244 for securing the door 18 to the closed position, along with the actuation assembly 16. The locking feature 244 may be advantageous for securing the door 18 in the closed position, reinforcing the actuation assembly 16. The actuation assembly 16 and biasing forces may generally be sufficient for retaining the door 18 in the closed position when the collection chamber 24 is full, such that the locking feature 244 may provide additional support or reinforcement for the actuation assembly 16 and/or feedback to the user.

[0089] The locking feature 244 may automatically engage when the door 18 returns to the closed position without any additional action taken by the user. The locking feature 244 may include mating components on the door 18 and the outer tank wall 22 that engage one another when the door 18 is closed. The locking feature 244 may be magnets, clasps, clips, pins, snap features, etc. which may automatically engage one another when the door 18 is closed and may be automatically disengaged in response to the movement/force of the actuation assembly 16. In other words, engagement of the actuator 26 assembly may cause the locking feature 244 to disengage automatically for the door 18 to move to the opened position without the user manually disengaging the locking feature 244.

[0090] Referring still to FIGS. 1-15, the actuation assembly 16 provides a spring-loaded tank that can omit a secondary, manual latch on the door 18. These secondary latches often result in the consumer using two hands to open a dirty tank, which can be inconvenient or difficult for the consumer. The actuation assembly 16 described herein promotes or allows single-handed use of the cleaning apparatus 10 for opening the door 18 and dis-

posing of the collected debris materials. The spring-loaded actuation assembly 16 may automatically regulate the opening and closing of the recovery tank 20, reducing or eliminating the use of manual latches to increase efficiency and maximize the user experience.

[0091] Use of the present device may provide a variety of advantages. For example, the door 18 may be biased to and retained in the closed position by the actuation assembly 16. Additionally, the recovery tank assembly 14 may include an additional reinforcing locking feature 244 that can automatically engage and disengage with the function of the actuation assembly 16. Also, secondary manual latches for the door 18 may be omitted from the recovery tank assembly 14. Further, the spring-loaded actuation assembly 16 may be coupled to both the body 12 and the recovery tank assembly 14 and components on the different portions may automatically engage and disengage to couple and remove the recovery tank assembly 14 from the body 12. Moreover, the gaskets 182, 186 may assist with sealing the collection chamber 24 when the door 18 is closed. Additionally, the hinged engagement between the door 18 and flanges 212 of the recovery tank 20 may allow for smooth rotation between the opened and closed position. Further, the user can carry the cleaning apparatus 10 or the hand module 72 and, with the same hand, engage the actuator 26 to move the door 18 to the opened position with one hand, maximizing the user experience. Upon release of the actuator 26, the door 18 may automatically return to the closed position, sealing the collection chamber 24 for additional cleaning processes. Additional benefits and advantages may be realized and/or achieved.

[0092] The device disclosed herein is further summarized in the following paragraphs and is further characterized by combinations of any and all various aspects described herein.

[0093] According to an aspect of the present disclosure, a cleaning apparatus includes a body having a handle, an actuator, and an actuator linkage coupled with the actuator. A recovery tank assembly includes a recovery tank having a proximal end, a distal end, and an outer tank wall extending therebetween to define a collection chamber, a door operably coupled to the distal end of the recovery tank to selectively close a bottom opening of the collection chamber, and at least one engagement linkage configured to selectively couple with the actuator linkage. The at least one engagement linkage is operably coupled to the recovery tank and operably coupled with the door. A biasing member is configured to bias the door to a closed position. A force applied to the actuator sufficient to overcome a biasing force of the biasing member moves the at least one engagement linkage toward the door and, consequently, rotate the door to an opened position.

[0094] According to an aspect of the present disclosure, at least one engagement linkage extends along an outer surface of an outer tank wall. The at least one engagement linkage defines a slot. A recovery tank in-

cludes a protrusion that extends into the slot to define a range of movement of the at least one engagement linkage.

[0095] According to an aspect of the present disclosure, a biasing member is operably coupled to a recovery tank proximate to a protrusion of the recovery tank and is operably coupled with at least one engagement linkage proximate a slot. The biasing member is configured to bias the at least one engagement linkage away from a door to bias the door to a closed position.

[0096] According to an aspect of the present disclosure, a recovery tank includes a flange extending from an outer tank wall. A door is configured to rotate about a rotational axis extending through the flange between opened and closed positions. A biasing member is operably coupled to the recovery tank at the flange and the door proximate to the rotational axis of the door.

[0097] According to an aspect of the present disclosure, a biasing member is operably coupled with a connecting end of an actuator linkage. An actuator and the actuator linkage are operably coupled with a body. The connecting end is configured to selectively couple with at least one engagement linkage.

[0098] According to an aspect of the present disclosure, at least one engagement linkage includes a single elongated linkage with a proximal end configured to selectively couple with an actuator linkage and a distal end is coupled with a coupling projection of a door.

[0099] According to an aspect of the present disclosure, at least one engagement linkage includes a single elongated linkage with a proximal end configured to selectively couple with an actuator linkage and a distal end is configured to engage an abutting surface of a coupling projection of a door.

[0100] According to an aspect of the present disclosure, at least one engagement linkage includes an elongated linkage, a connector linkage, and a coupling linkage. The elongated linkage includes a proximal end configured to selectively couple with an actuator linkage and a distal end coupled with the connector linkage. The coupling linkage is coupled to the connector linkage and a coupling projection of a door.

[0101] According to an aspect of the present disclosure, a cleaning apparatus includes a body and a recovery tank removably coupled to the body at a tank interface. The recovery tank includes flanges extending from an outer tank wall. A door includes a coupling projection, and the coupling projection is operably coupled to the flanges to define a rotational axis for the door to move between a closed position and an opened position. An actuation assembly includes an actuator operably coupled to the body. An actuator linkage extends from the actuator to proximate the tank interface of the body. An elongated linkage includes a proximal end configured to selectively engage with an end of the actuator linkage and a distal end operably coupled with the door proximate to the rotational axis. At least one biasing member is operably coupled with at least one of the body and the

recovery tank. The at least one biasing member is configured to bias the door to the closed position. Movement of the actuator in response to an applied force is configured to move the actuator linkage and the elongated linkage against a biasing force of the at least one biasing member which, consequently, moves the coupling projection and causes the door to rotate about the rotational axis to the opened position.

[0102] According to an aspect of the present disclosure, at least one biasing member includes a biasing member operably coupled to a connecting end of an actuator linkage and a body.

[0103] According to an aspect of the present disclosure, at least one biasing member includes at least one of a compression spring operably coupled to a recovery tank and an elongated linkage and a torsion spring operably coupled to the recovery tank and a door proximate to a rotational axis.

[0104] According to an aspect of the present disclosure, a connecting end of an actuator linkage includes a receiving notch. A proximal end of the elongated linkage includes a projection configured to be selectively disposed within the receiving notch when a recovery tank is coupled with a body.

[0105] According to an aspect of the present disclosure, a cover is coupled to an outer tank wall over an elongated linkage.

[0106] According to an aspect of the present disclosure, an outer tank wall includes a protrusion extending from an outer surface thereof. An elongated linkage defines a slot that is movable relative to the protrusion to define a range of movement for the elongated linkage.

[0107] According to an aspect of the present disclosure, a body includes a handle. An actuator is operably coupled to the handle. An actuator linkage extends through the body.

[0108] According to an aspect of the present disclosure, a locking feature is operably coupled to at least one of a recovery tank and a door.

[0109] According to an aspect of the present disclosure, a recovery tank assembly for a cleaning apparatus that includes a tank door actuator is disclosed. The recovery tank assembly includes a recovery tank having an outer tank wall defining a collection chamber. A release latch is operably coupled to a proximal end of the recovery tank for engaging the cleaning apparatus. An engagement linkage extends along an outer surface of the outer tank wall. The engagement linkage includes a proximal end proximate to the release latch to selectively couple with the tank door actuator. A door is operably coupled to the recovery tank. The door is configured to rotate about a rotational axis between an opened position and a closed position. A distal end of the engagement linkage is operably coupled to the door proximate to the rotational axis. At least one biasing member is operably coupled to the recovery tank and at least one of the engagement linkage and the door. The at least one biasing member is configured to bias the door to the

closed position. Movement of the engagement linkage toward the door in response to a force applied by the tank door actuator is configured to overcome a biasing force of the at least one biasing member to adjust the door to the opened position. At least one of the biasing force and the movement of the engagement linkage away from the door in response to a release of the force applied to the tank door actuator is configured to adjust the door to the closed position.

[0110] According to an aspect of the present disclosure, at least one biasing member includes a first biasing member operably coupled to a recovery tank and an engagement linkage proximate to an outer tank wall and a second biasing member operably coupled to the recovery tank and a door proximate to a rotational axis.

[0111] According to an aspect of the present disclosure, a locking feature is operably coupled to at least one of a recovery tank and a door. The locking feature is configured to automatically engage when the door is in a closed position.

[0112] According to an aspect of the present disclosure, a gasket is coupled to a door and configured to engage an outer tank wall when the door is in a closed position to seal a bottom of a collection chamber.

[0113] It will be understood by one having ordinary skill in the art that construction of the described disclosure and other components is not limited to any specific material. Other exemplary embodiments of the disclosure disclosed herein may be formed from a wide variety of materials, unless described otherwise herein.

[0114] For purposes of this disclosure, the term "coupled" (in all of its forms, couple, coupling, coupled, etc.) generally means the joining of two components (electrical or mechanical) directly or indirectly to one another. Such joining may be stationary in nature or movable in nature. Such joining may be achieved with the two components (electrical or mechanical) and any additional intermediate members being integrally formed as a single unitary body with one another or with the two components. Such joining may be permanent in nature or may be removable or releasable in nature unless otherwise stated.

[0115] It is also important to note that the construction and arrangement of the elements of the disclosure as shown in the exemplary embodiments is illustrative only. Although only a few embodiments of the present innovations have been described in detail in this disclosure, those skilled in the art who review this disclosure will readily appreciate that many modifications are possible (e.g., variations in sizes, dimensions, structures, shapes, and proportions of the various elements, values of parameters, mounting arrangements, use of materials, colors, orientations, etc.) without materially departing from the novel teachings and advantages of the subject matter recited. For example, elements shown as integrally formed may be constructed of multiple parts or elements shown as multiple parts may be integrally formed, the operation of the interfaces may be reversed or otherwise

varied, the length or width of the structures and/or members or connector or other elements of the system may be varied, the nature or number of adjustment positions provided between the elements may be varied. It should be noted that the elements and/or assemblies of the system may be constructed from any of a wide variety of materials that provide sufficient strength or durability, in any of a wide variety of colors, textures, and combinations. Accordingly, all such modifications are intended to be included within the scope of the present innovations.

[0116] It will be understood that any described processes or steps within described processes may be combined with other disclosed processes or steps to form structures within the scope of the present disclosure. The exemplary structures and processes disclosed herein are for illustrative purposes and are not to be construed as limiting

20 Claims

1. A cleaning apparatus (10), comprising:

a body (12) having a handle (84);
an actuator (26);
an actuator linkage (28) coupled with the actuator (26); and
a recovery tank (20) assembly including:

a recovery tank (20) having a proximal end (20a), a distal end (20b), and an outer tank wall (22) extending therebetween to define a collection chamber (24), the distal end (20b) being disposed farther from the handle (84) than the proximal end (20a);
a door (18) operably coupled to the distal end (20b) of the recovery tank (20) to selectively close a bottom opening of the collection chamber (24);
at least one engagement linkage (30, 32a, 32b, 32c, 36, 38) configured to selectively couple with the actuator linkage (28), wherein the at least one engagement linkage (30, 32a, 32b, 32c, 36, 38) is operably coupled with the door (18); and
a biasing member (44, 46) operably coupled to the recovery tank (20) and configured to bias the door (18) to a closed position, wherein movement of the actuator linkage (28) in response to a force applied to the actuator (26) sufficient to overcome a biasing force of the biasing member (44, 46) moves the at least one engagement linkage (30, 32a, 32b, 32c, 36, 38) toward the door (18) and, consequently, rotates the door (18) to an opened position.

2. The cleaning apparatus (10) of claim 1, wherein the

- at least one engagement linkage (30, 32a, 32b, 32c, 36, 38) extends along an outer surface (204) of the outer tank wall (22), and wherein the at least one engagement linkage (30, 32a, 32b, 32c, 36, 38) defines a slot (208), and further wherein the recovery tank (20) includes a protrusion (206) that extends into the slot (208) to define a range of movement of the at least one engagement linkage (30, 32a, 32b, 32c, 36, 38).
3. The cleaning apparatus (10) of claim 2, wherein the biasing member (44) is operably coupled to the recovery tank (20) proximate to the protrusion (206) of the recovery tank (20) and is operably coupled with the at least one engagement linkage (30, 32a, 32b, 32c, 36, 38) proximate the slot (208), and wherein the biasing member (44) is configured to bias the at least one engagement linkage (30, 32a, 32b, 32c, 36, 38) away from the door (18) to bias the door (18) to the closed position.
 4. The cleaning apparatus (10) of either of claims 2 or 3, wherein the at least one engagement linkage (30, 32a, 32b, 32c, 36, 38) includes an elongated linkage (32a, 32b, 32c), and wherein the biasing member (44) includes a compression spring operably coupled to the recovery tank (20) and the elongated linkage (32a, 32b, 32c).
 5. The cleaning apparatus (10) of claim 1, wherein the recovery tank (20) includes a flange (212) extending from the outer tank wall (22), and wherein the door (18) is configured to rotate about a rotational axis extending through the flange (212) between the opened and closed positions, and further wherein the biasing member (46) is operably coupled to the recovery tank (20) at the flange (212) and the door (18) proximate to the rotational axis of the door (18).
 6. The cleaning apparatus (10) of any one of claims 1-5, wherein the biasing member (46) includes a torsion spring operably coupled to the recovery tank (20) and the door (18) proximate to the rotational axis.
 7. The cleaning apparatus (10) of any one of claims 1-6, further comprising:
a biasing member (42) operably coupled with a connecting end (192) of the actuator linkage (28), wherein the actuator (26) and the actuator linkage (28) are operably coupled with the body (12), and wherein the connecting end (192) is configured to selectively couple with the at least one engagement linkage (30, 32a, 32b, 32c, 36, 38).
 8. The cleaning apparatus (10) of any one of claims 1-6, wherein the at least one engagement linkage (30, 32a, 32b, 32c, 36, 38) includes an elongated linkage (32a, 32b, 32c) with a proximal end (200) configured to selectively couple with the actuator linkage (28) and a distal end (202) coupled with a coupling projection of the door (18).
 9. The cleaning apparatus (10) of any one of claims 1-6, wherein the at least one engagement linkage (30, 32a, 32b, 32c, 36, 38) includes an elongated linkage (32a, 32b, 32c) with a proximal end (200) configured to selectively couple with the actuator linkage (28) and a distal end (202) configured to engage an abutting surface (34) of a coupling projection (216) of the door (18).
 10. The cleaning apparatus (10) of any one of claims 1-6, wherein the at least one engagement linkage (30, 32a, 32b, 32c, 36, 38) includes an elongated linkage (32a, 32b, 32c), a connector linkage (36), and a coupling linkage (38), and wherein the elongated linkage (32a, 32b, 32c) includes a proximal end (200) configured to selectively couple with the actuator linkage (28) and a distal end (202) coupled with the connector linkage (36), and further wherein the coupling linkage (38) is coupled to the connector linkage (36) and a coupling projection of the door (18).
 11. The cleaning apparatus (10) of any one of claims 8-10, wherein a connecting end (192) of the actuator linkage (28) includes a receiving notch (148), and wherein the proximal end (20a) of the elongated linkage (32a, 32b, 32c) includes a projection (196) configured to be selectively disposed within the receiving notch (148) when the recovery tank (20) is coupled with the body (12).
 12. The cleaning apparatus (10) of any one of claims 8-11, further comprising:
a cover (228) coupled to the outer tank wall (22) over the elongated linkage (32a, 32b, 32c).
 13. The cleaning apparatus (10) of any one of claims 1-12, wherein the body (12) includes a handle (84), and wherein the actuator (26) is operably coupled to the handle (84), and further wherein the actuator linkage (28) extends through the body (12).
 14. The cleaning apparatus (10) of any one of claims 1-13, further comprising:
a locking feature (244) operably coupled to at least one of the recovery tank (20) and the door (18), wherein the locking feature (244) is configured to automatically engage when the door (18) is in the closed position.
 15. The cleaning apparatus (10) of any one of claims 1-14, further comprising:
a gasket (182) coupled to the door (18) and configured to engage the outer tank wall (22) when the door

(18) is in the closed position to seal a bottom of the collection chamber (24).

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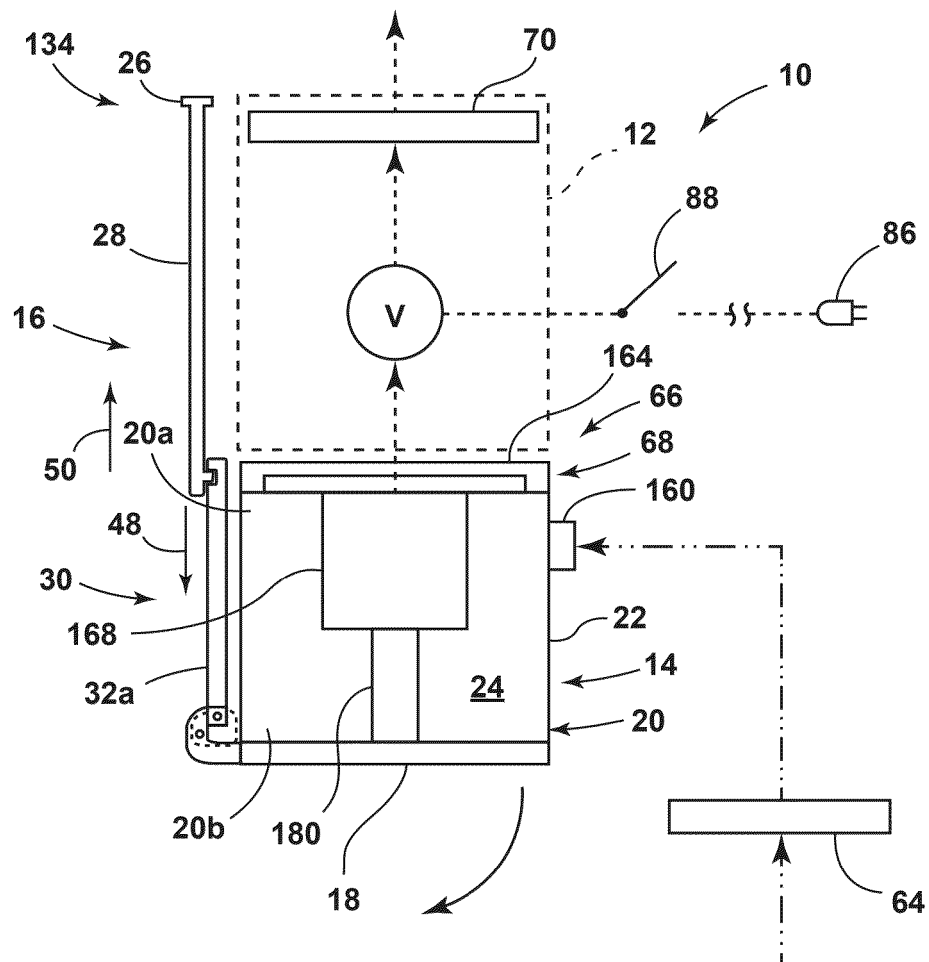


FIG. 1

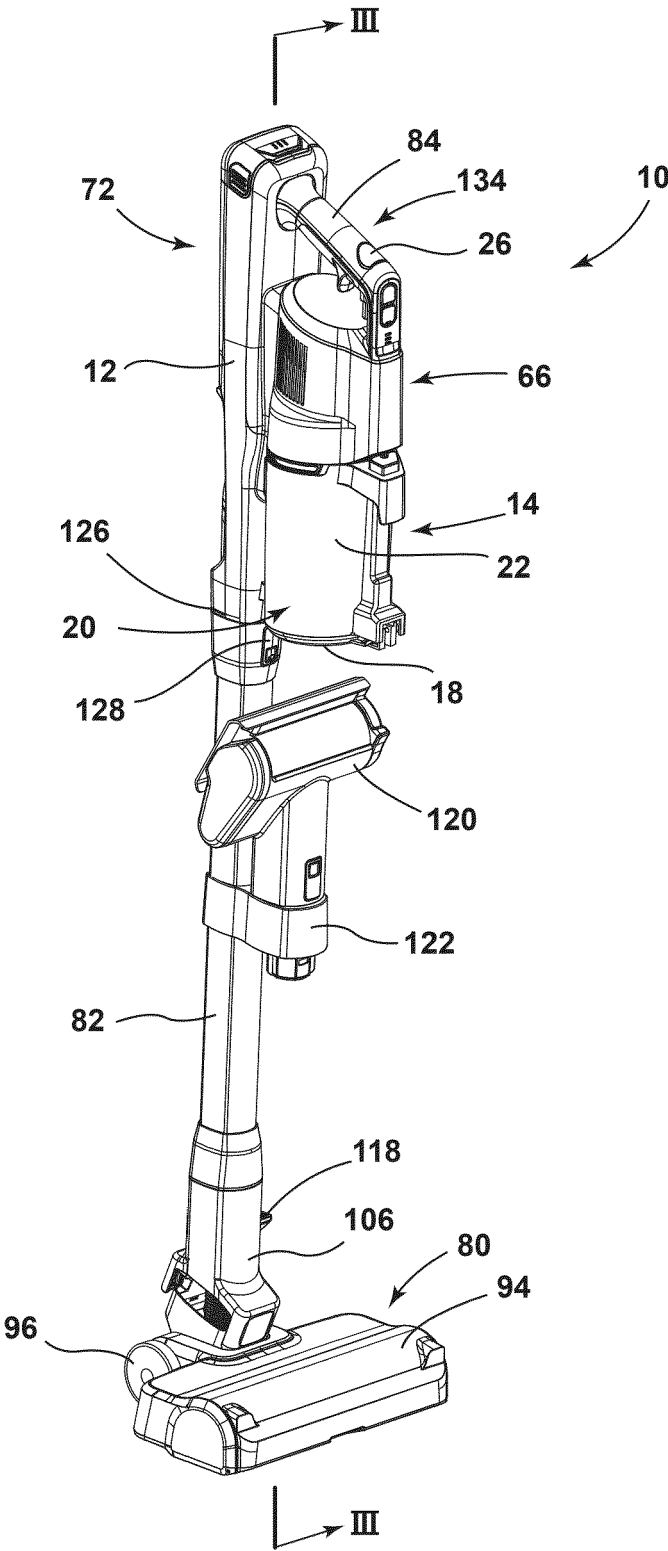
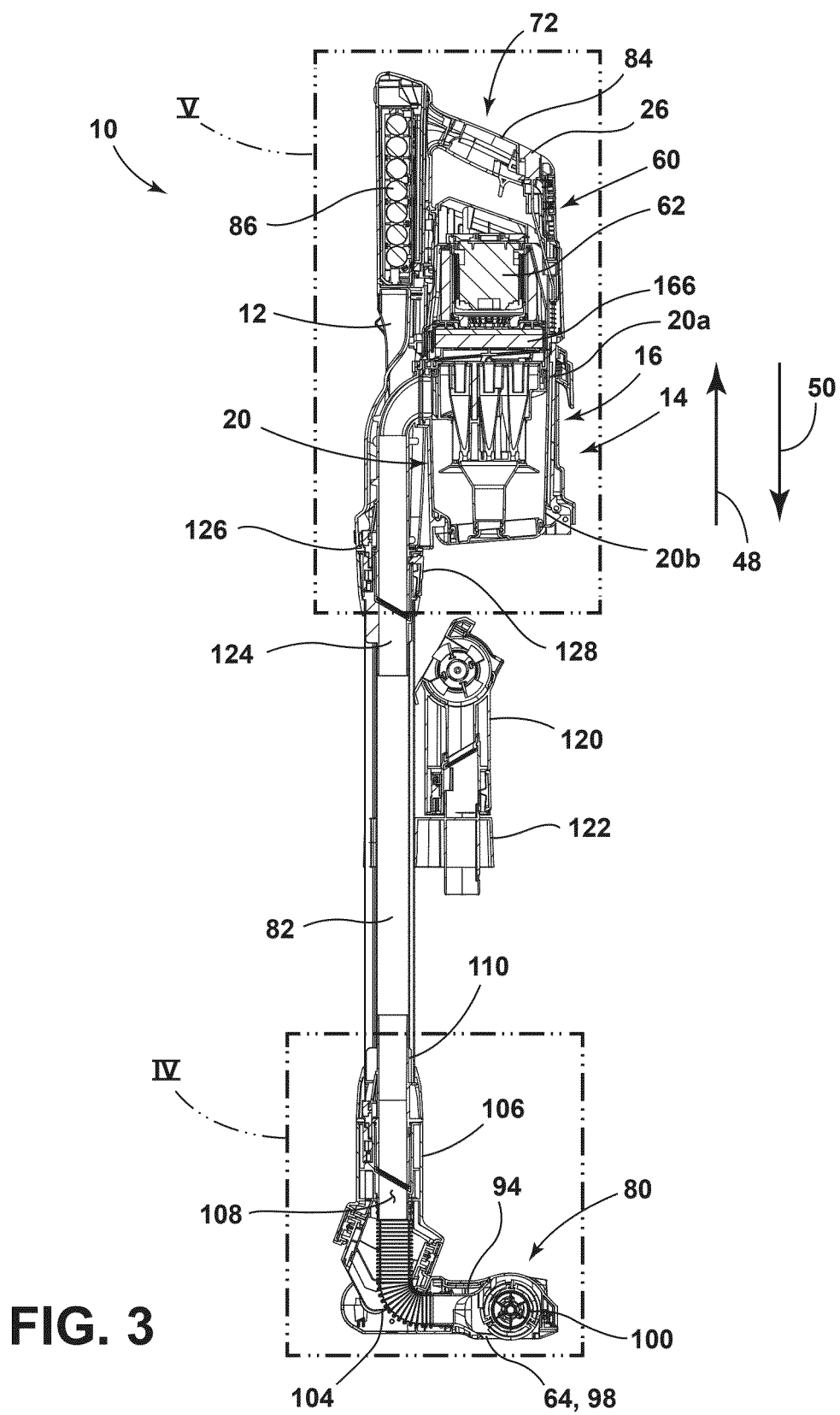


FIG. 2



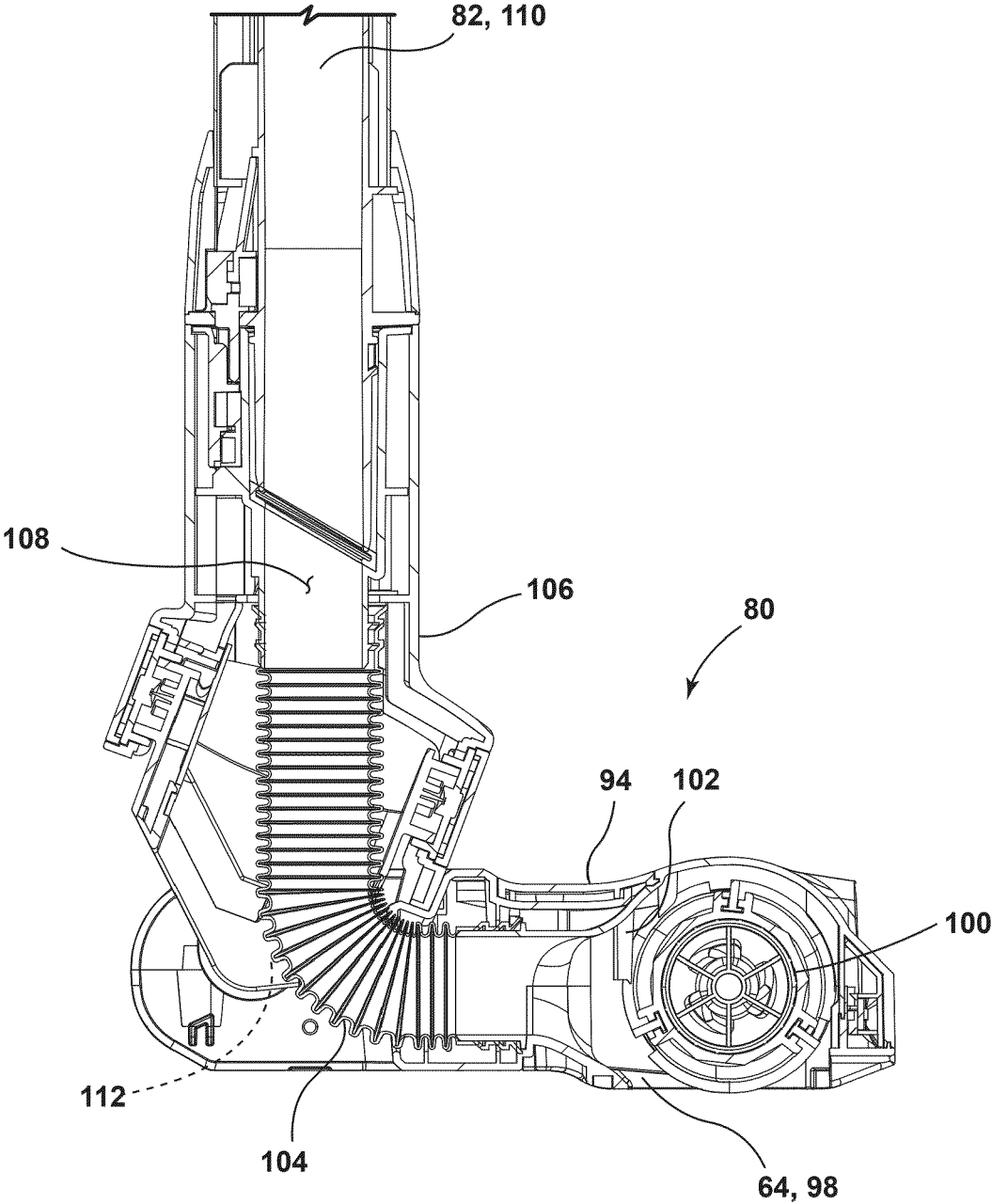


FIG. 4

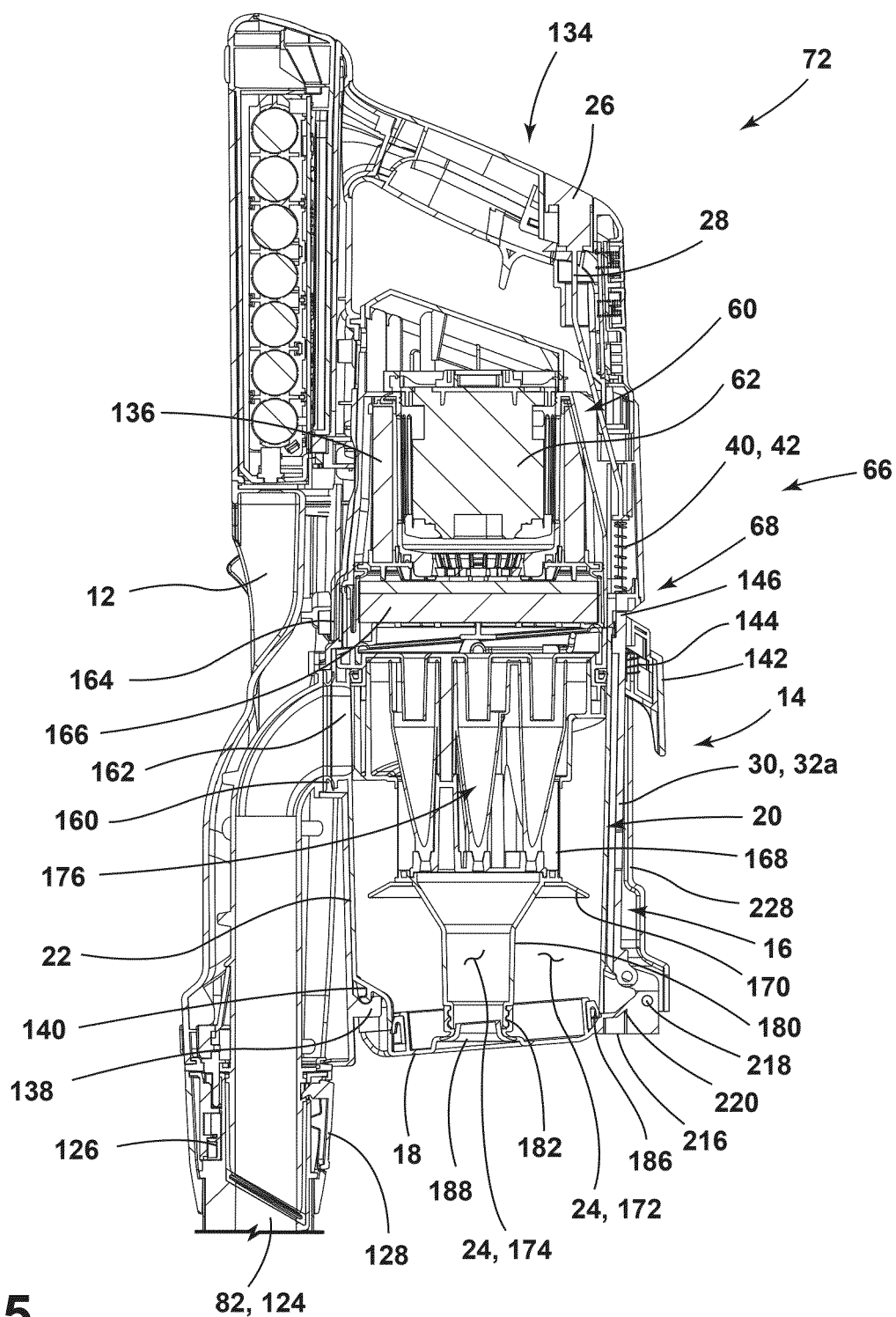


FIG. 5

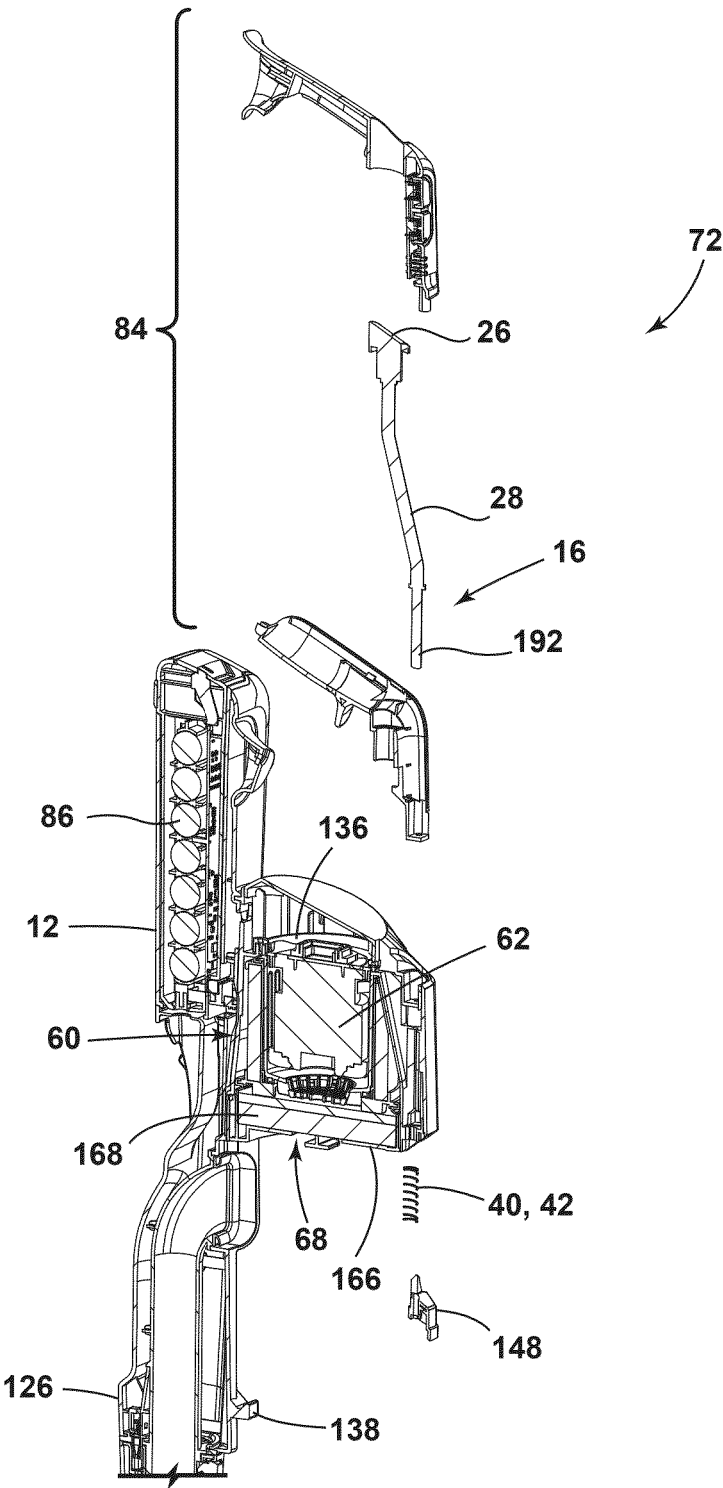


FIG. 6

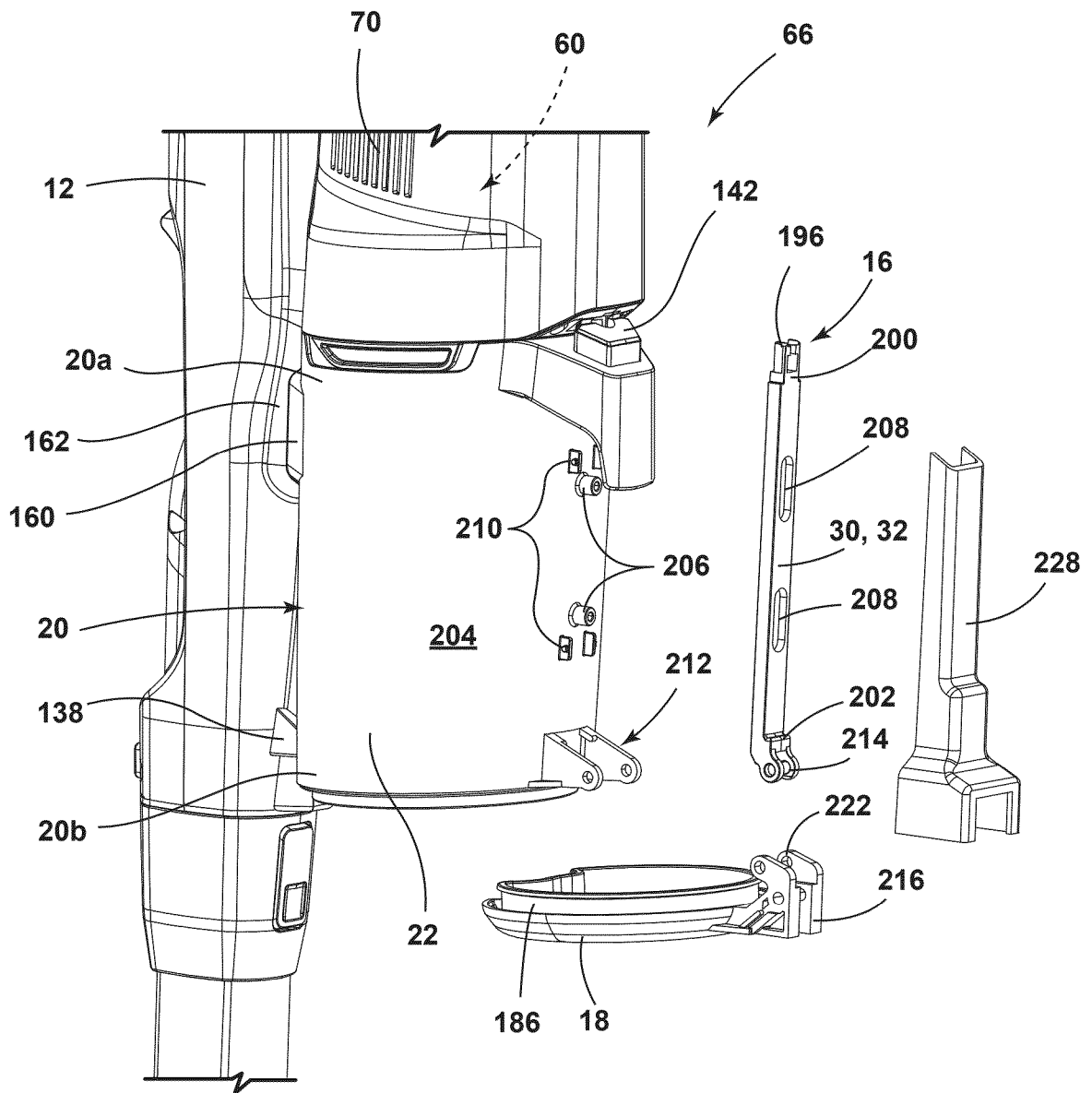


FIG. 7

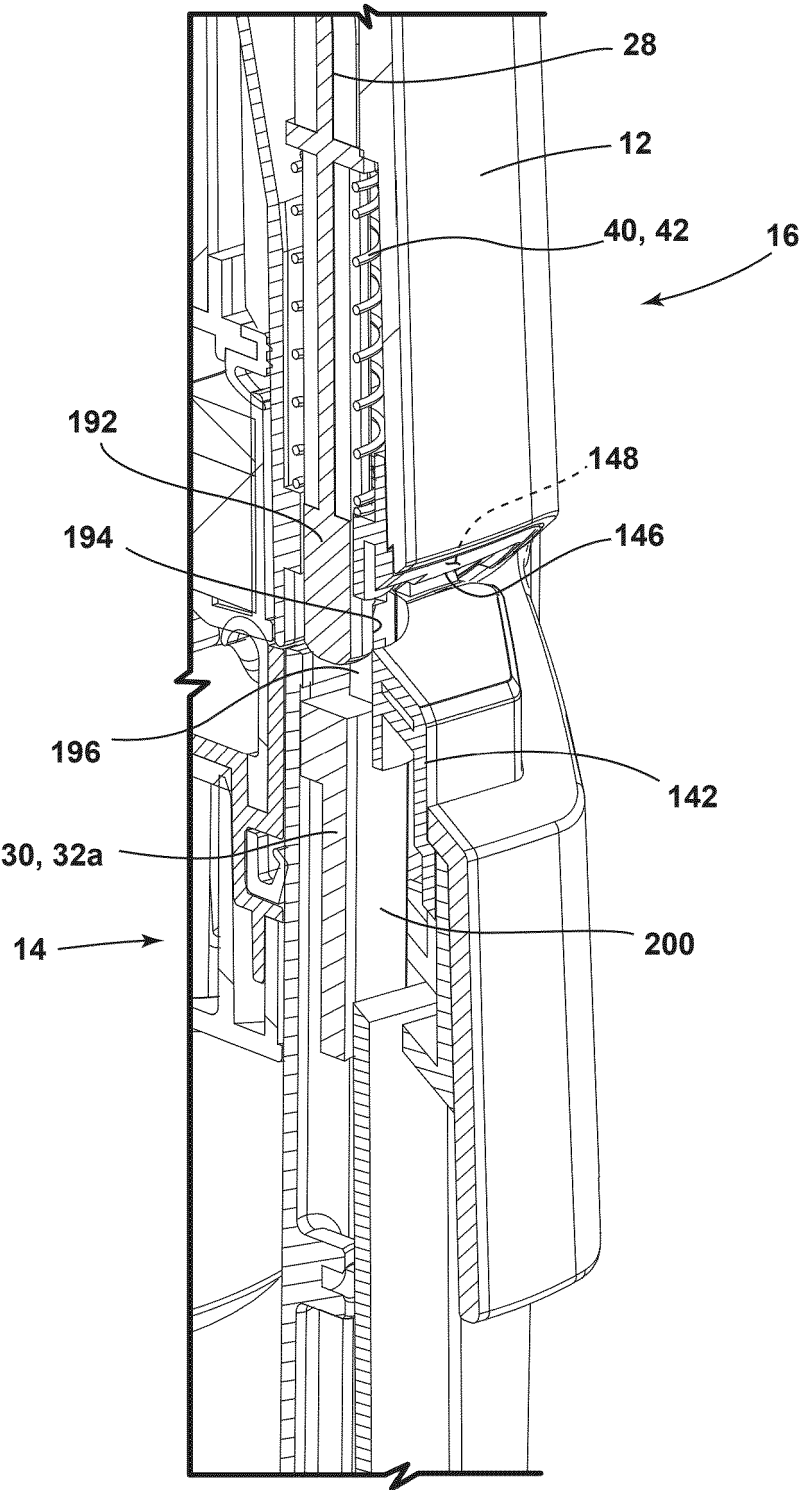


FIG. 8

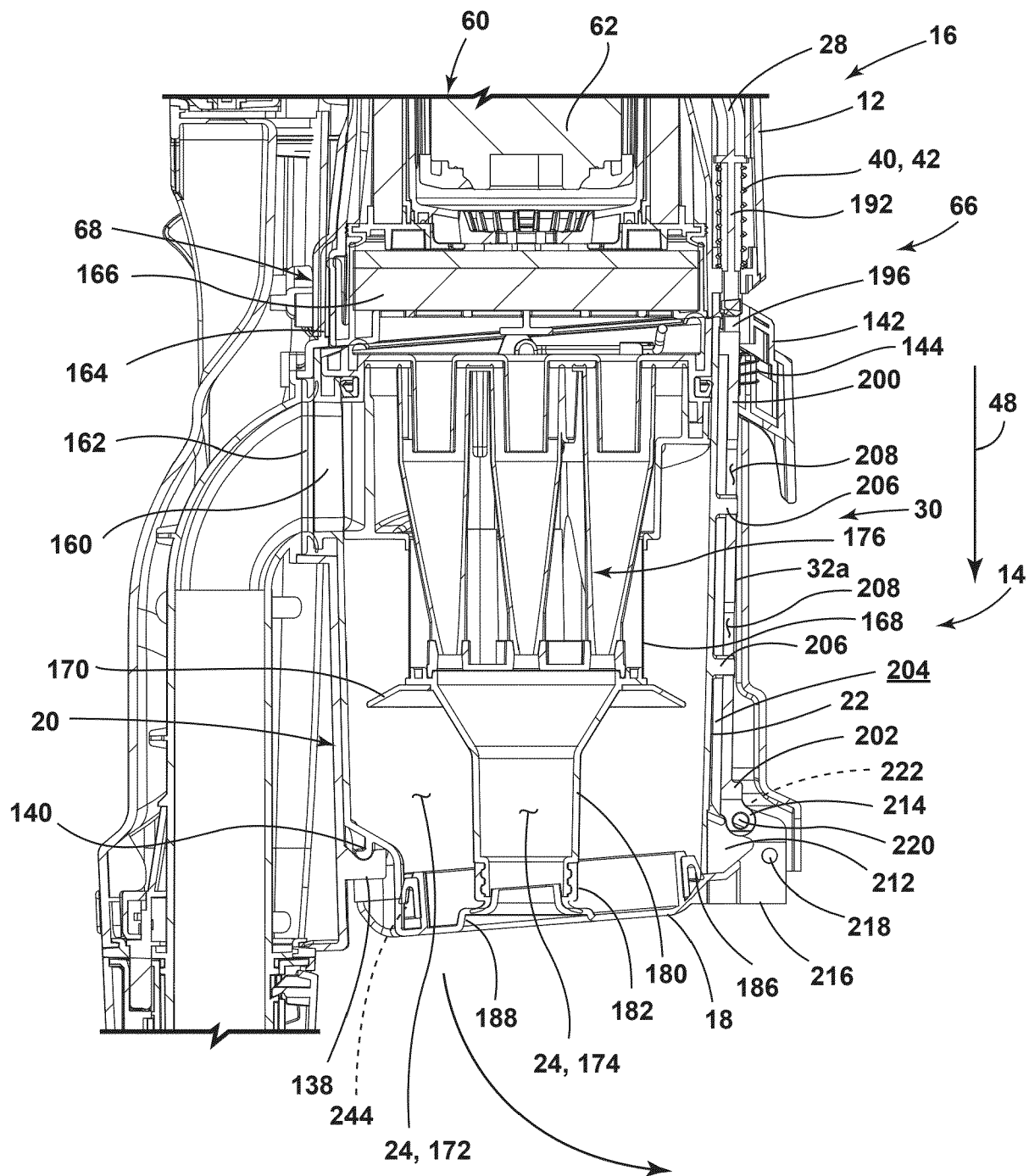


FIG. 9A

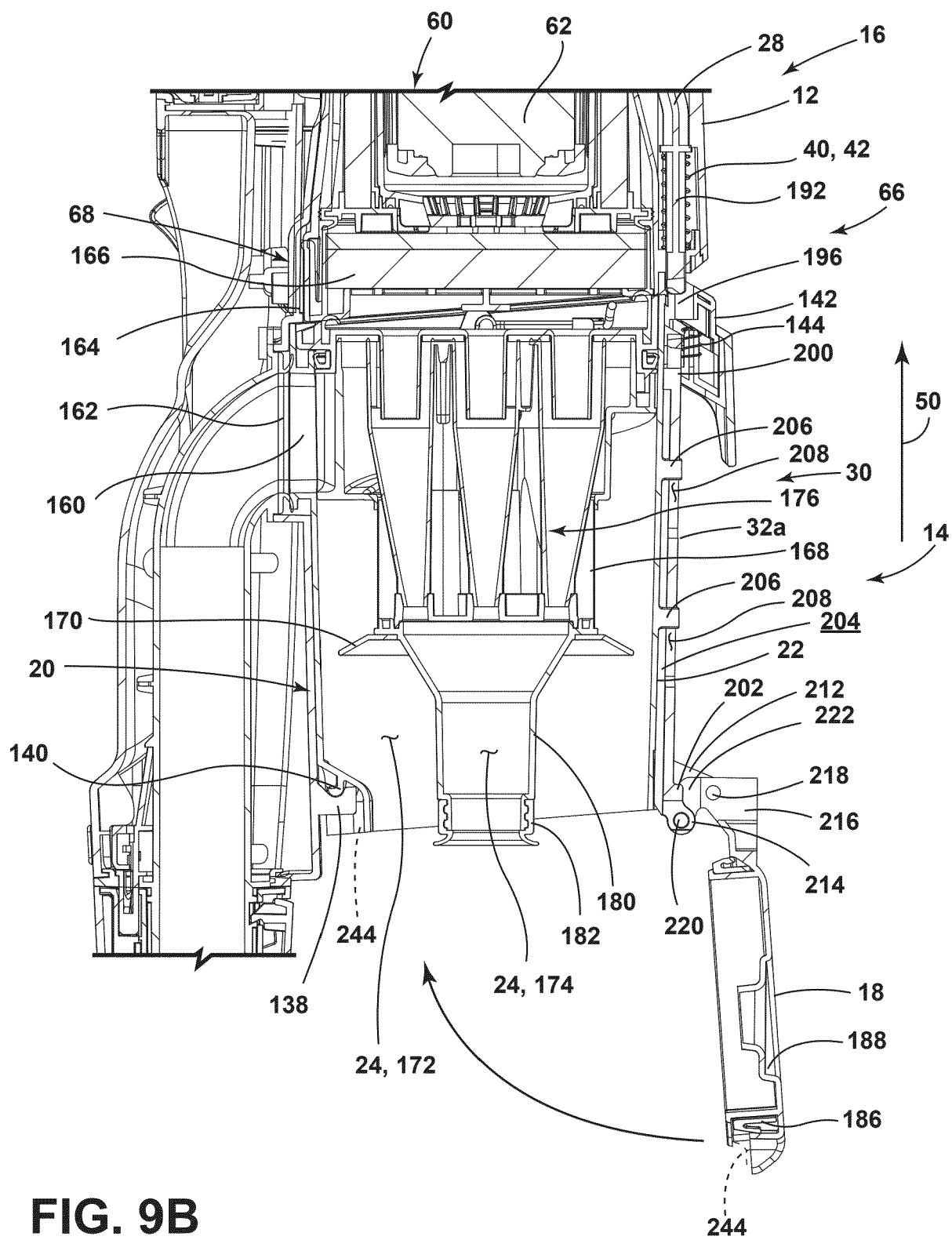


FIG. 9B

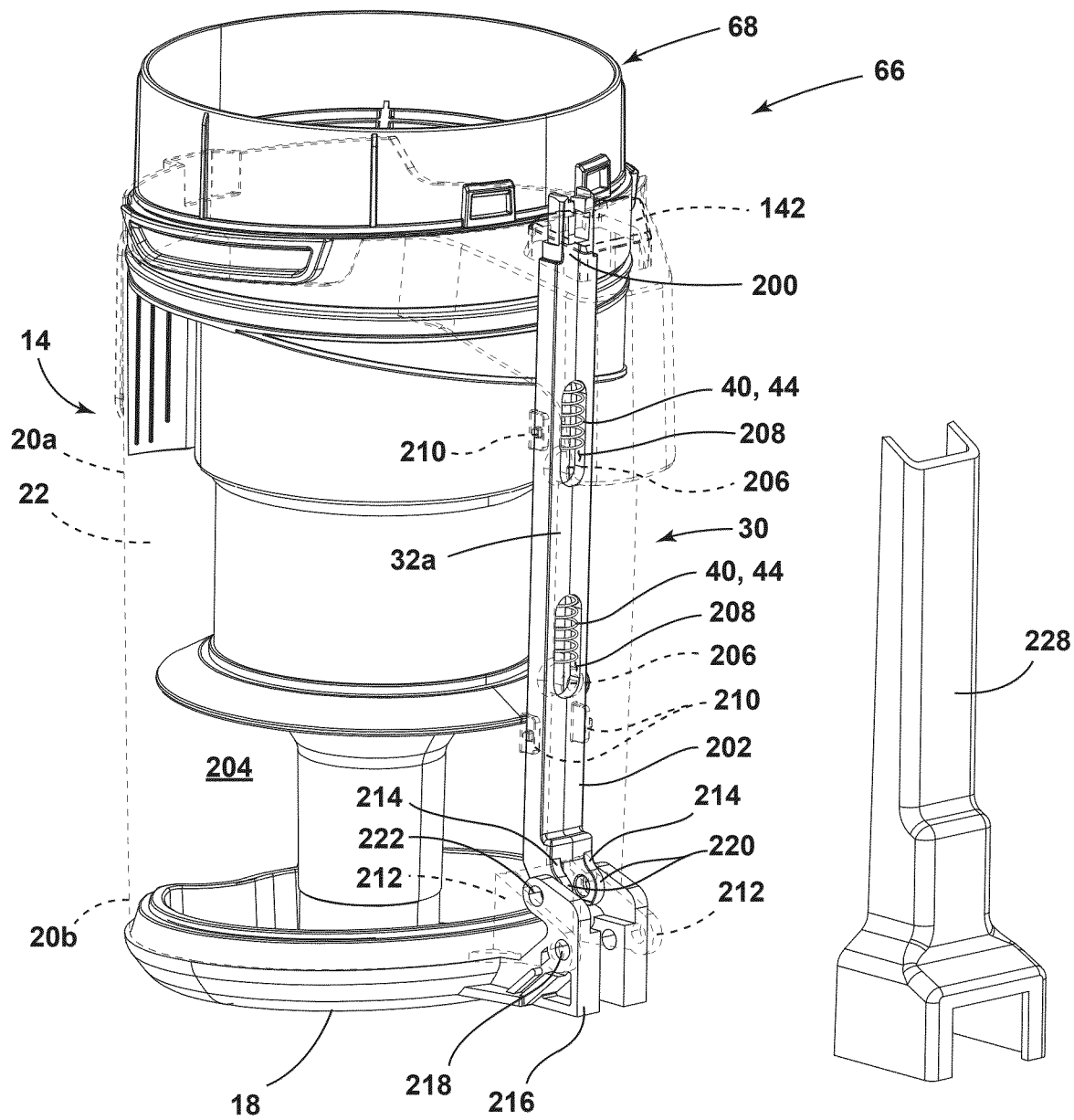


FIG. 10

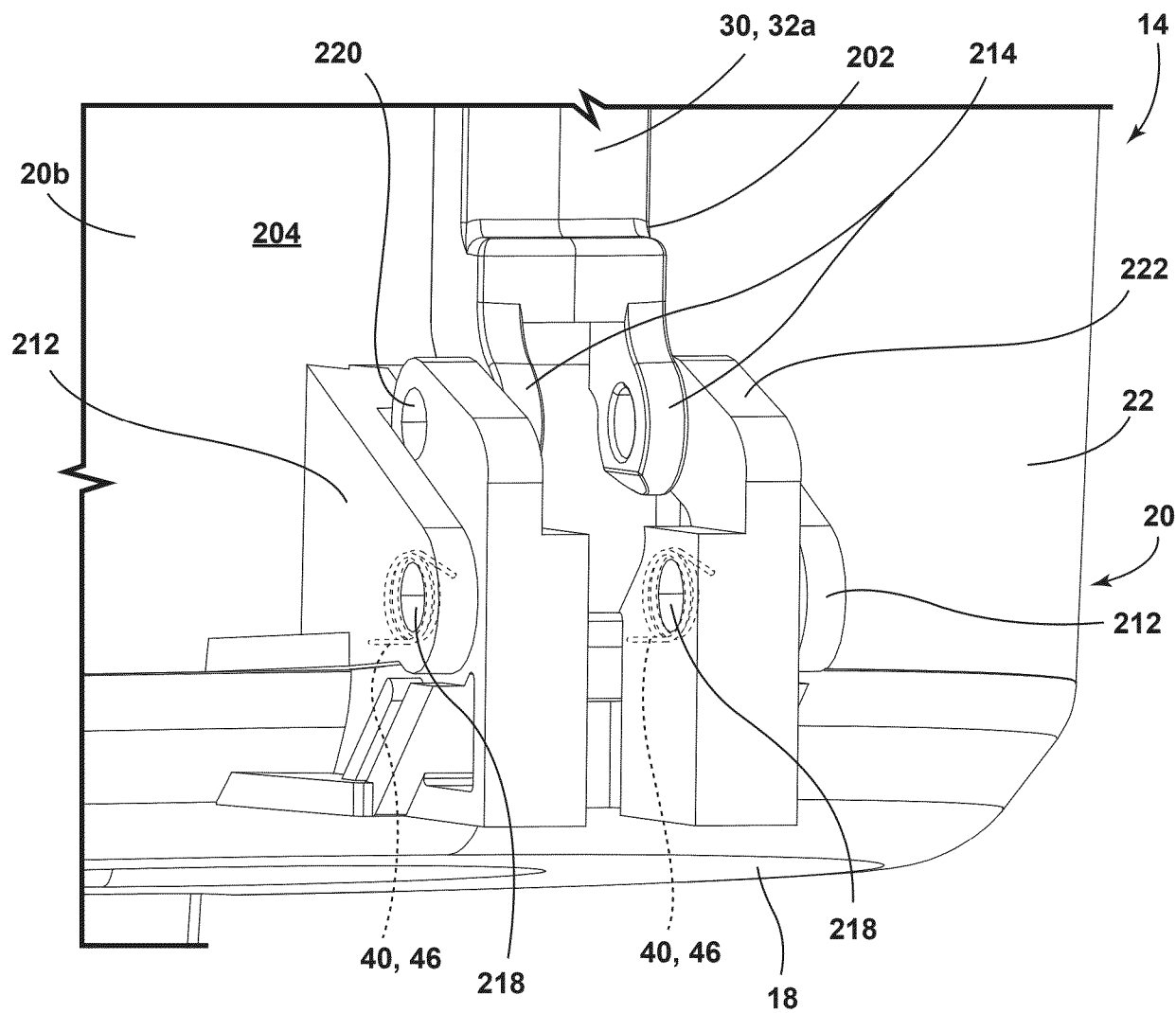


FIG. 11

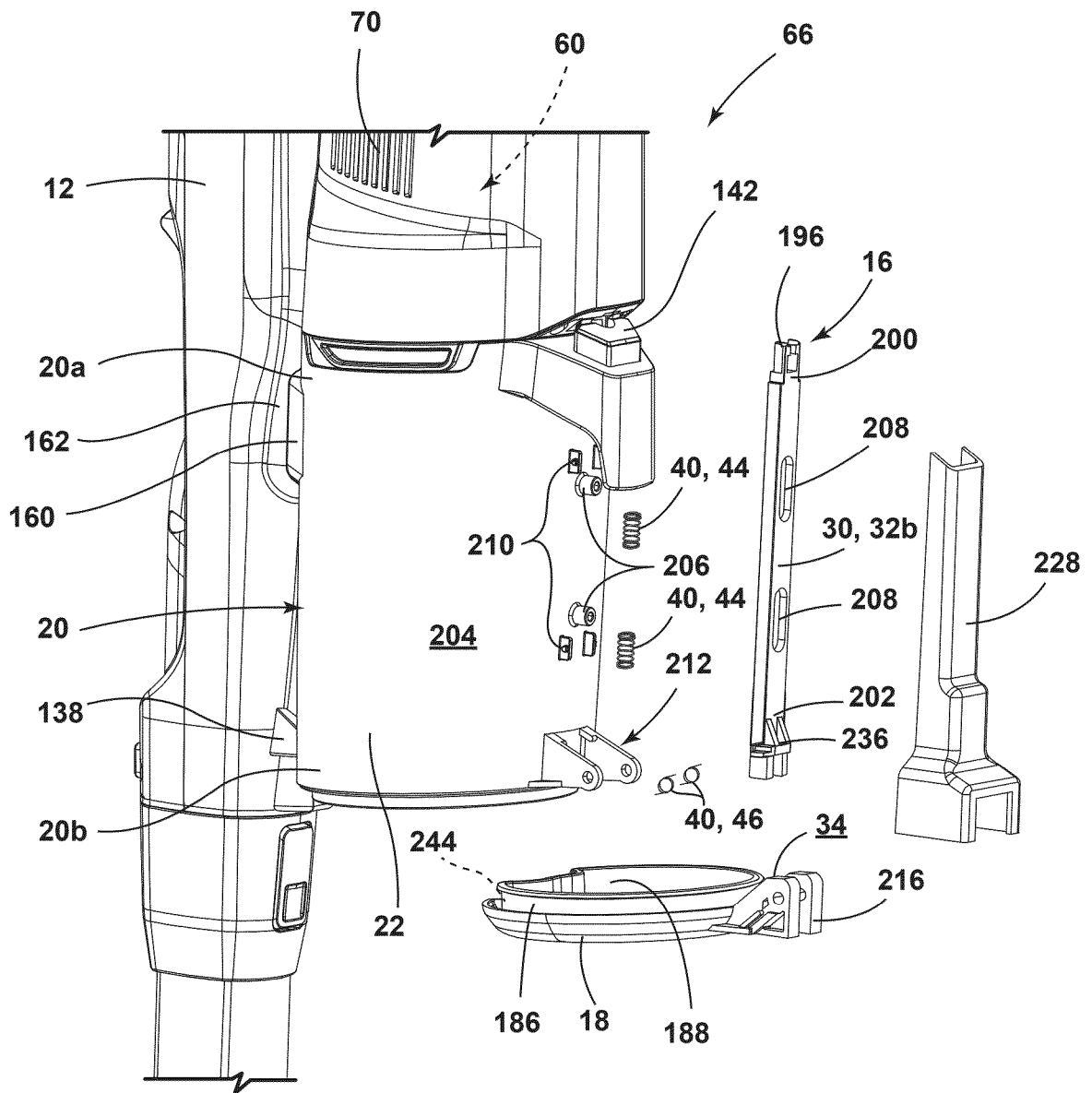


FIG. 12

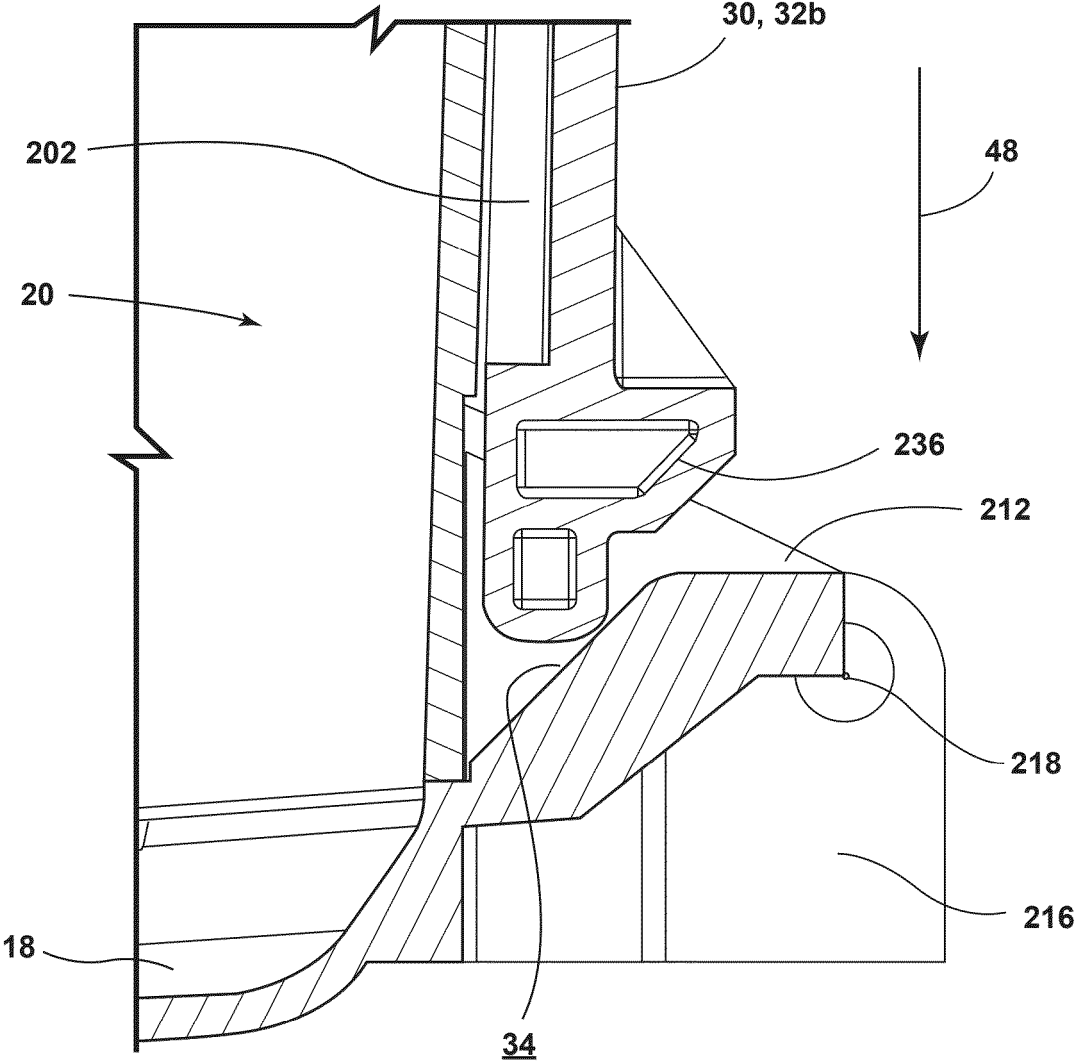


FIG. 13

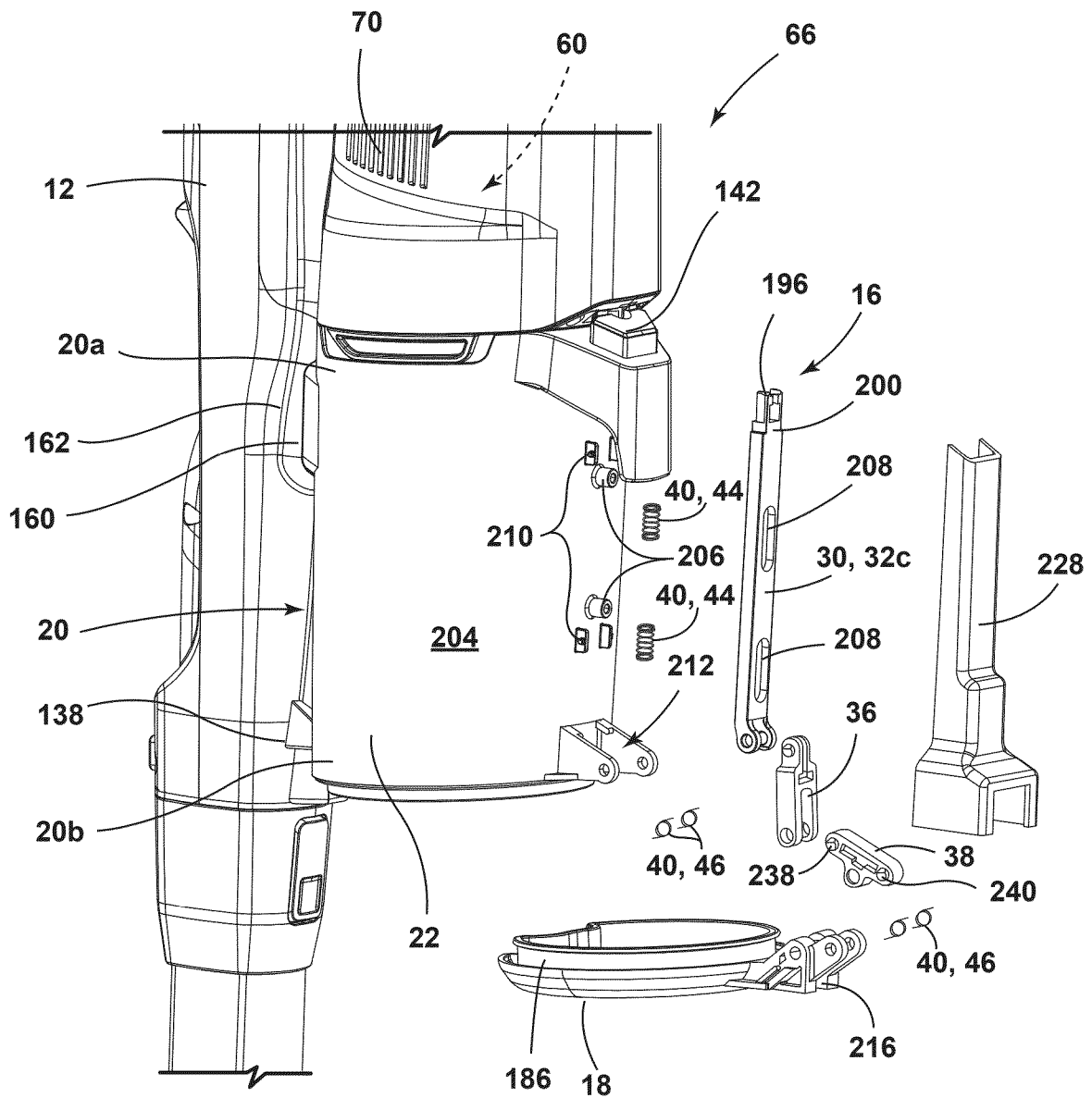


FIG. 14

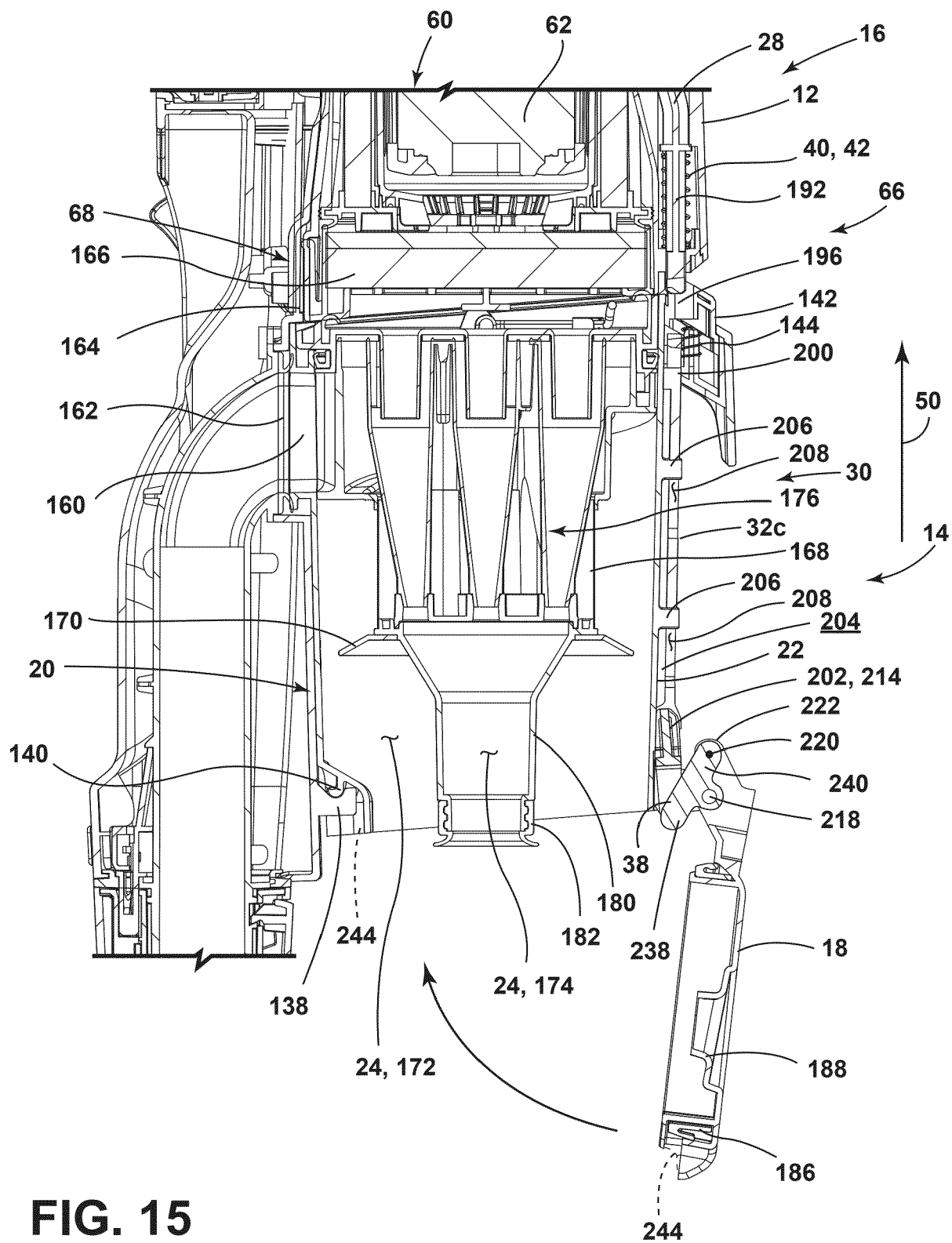


FIG. 15



EUROPEAN SEARCH REPORT

Application Number

EP 25 21 4726

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	US 11 779 174 B2 (OMACHRON INTELLECTUAL PROPERTY INC [CA]) 10 October 2023 (2023-10-10)	1-12, 14, 15	INV. A47L9/10 A47L9/14
A	* figures 18-21 *	13	A47L9/16 A47L9/32
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A	* figures 18-33 *	13	
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The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
Munich		9 March 2026	Trimarchi, Roberto
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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 25 21 4726

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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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