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Wet dry appliance

Abstract

A cleaning device and methods for cleaning are provided. In one embodiment, the cleaning device includes a head assembly, a body assembly, and a handle assembly. The cleaning device also includes components that enable the cleaning device to operate in dry cleaning modes and wet cleaning modes. Dry cleaning modes can employ a vacuum assembly, including a motor, tubing, and a fluid recovery tank in order to draw in debris and waste into a fluid recovery tank. Wet cleaning modes can further employ a fluid supply tank, a pump, and tubing in order to supply fluid to a brushroll to aid in a cleaning process.

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Background/Summary

CROSS-REFERENCE TO RELATED APPLICATIONS (1) This application claims priority to U.S. Provisional Patent Application No. 63/285,867 filed on Dec. 3, 2021 and entitled "EXTRACTION CLEANER," the entire contents of which are hereby expressly incorporated by reference herein.

FIELD
(1) A cleaning device operable in wet and dry modes is provided.
BACKGROUND
(2) Conventional cleaning devices, such as dry vacuums and wet vacuums, perform cleaning operations using suction to take in debris and waste. Dry vacuums operate through the use of suction and may employ a brushroll or agitator to assist in freeing the debris and waste from a surface. Wet vacuums operate through the use of suction and a brushroll or pad, but they also supply fluid to the to-be-cleaned surface in order to assist in removal of debris and waste. The supply of fluid can occur directly, wherein fluid is sprayed onto a surface, or indirectly, wherein fluid is sprayed onto an applicator such as a brushroll. When fluid is sprayed onto a brushroll, application of the fluid can be uneven, resulting in inconsistent cleaning of the surface.
(3) When fluid is applied to the surface, the fluid will, incidentally, mix with the debris and waste, and the resulting slurry is drawn into the device using suction. Once inside the cleaning device, the fluid may need to be separated from the debris in order to ease in disposal. Disposal may require total removal of a fluid recovery tank, as well as disassembly of the tank.
(4) Accordingly, there remains a need to provide a better fluid application method to improve consistent fluid application, as well as to enable ease of waste disposal after being drawn into a vacuum cleaning device.
SUMMARY
(5) A cleaning device operable in dry and wet cleaning modes is provided. Related apparatuses and techniques are also provided.
(6) In one embodiment, a cleaning device is provided having a housing body with an upright handle assembly and a head assembly coupled thereto. A fluid recovery tank can be removably coupled to the housing body, and it can include a container having an opening in a top portion thereof extending into an inner chamber configured to hold a liquid therein. The inner chamber can have an inlet formed in a bottom wall and configured to receive fluid from the head assembly. The fluid recovery tank can also include a separator removably disposed within the opening in the container and configured to separate solid debris from fluid drawn into the inner chamber. The fluid recovery tank can also include a lid removably coupled to the separator. The lid can have an outlet fluidly coupled to the suction source such that a suction force can be applied through the outlet, the chamber, and the inlet to the head assembly to draw fluid and debris into the inner chamber. The fluid recovery tank can further include a pour spout formed in the separator and having an opening formed there through and in fluid communication with the inner chamber, wherein the separator is configured to allow fluid to be poured from the pour spout while retaining solid debris in the inner chamber.

(7) One or more of the following features can be included in any feasible combination. For example, the separator can include a lower surface that is spaced from the lid and from the bottom wall of the container. The lower surface of the separator can have an opening formed therein to allow fluid to pass therethrough while substantially preventing solid debris from passing therethrough. In certain embodiments, the lower surface of the separator can be substantially V-shaped with opposed walls oriented at an angle relative to one another and mated along a lower-most end thereof. The opening can be formed between the walls at the lower-most end.
(8) In another example, the separator can include a sidewall having a channel formed therein and aligned with the pour spout to allow fluid to flow from the container out the pour spot.
(9) In another example, the lid can include a removable filter disposed across the outlet. In certain aspects, the removable filter can include a first filter material having a first porosity and a second filter material having a second porosity that is different than the first porosity.
(10) In another example, the cleaning device can include a latch on the container and configured to engage the housing body to retain the fluid recovery tank on the housing body. In certain aspects, the latch can be positioned on a first side of the container and the pour spout can be positioned on a second side of the container opposite the first side.
(11) In another example, the inlet in the bottom wall can include a hollow standpipe extending from the bottom wall toward the lid and having an inner lumen there through for receiving fluid and debris from the head assembly. In certain aspects, the hollow standpipe can extend through an opening in the separator to deliver fluid and debris into the separator.
(12) In another example, the separator can include at least one deflector configured to direct fluid away from the lid. In certain aspects, the at least one deflector can be located proximate to the inlet. In further aspects, the at least one deflector can include a first deflector located proximate the inlet and a second deflector located below the inlet.
(13) In another embodiment, a fluid recovery tank for use on a cleaning device is provided. The fluid recovery tank can include a container having a bottom wall and sidewalls defining an inner chamber therein. The top of the container can be open, and the bottom wall can include a fluid inlet therein. The cleaning device can include a separator removably disposed within the open top of the container and extending into the chamber. A removable lid can be disposed in the separator. The separator can have a pour spout formed therein. The separator can separate the chamber into an upper portion and a lower portion. The separator can be configured to retain solid debris within the upper portion while allowing liquid in the bottom portion to be poured out of the pour spout.
(14) One or more of the following features can be included in any feasible combination. For example, the separator can include a lower surface that is spaced from the lid and from the bottom wall of the container. The lower surface of the separator can have an opening formed therein to allow fluid to pass there through while substantially preventing solid debris from passing there through.
(15) In another example, the separator can include a sidewall having a channel formed therein and aligned with the pour spout to allow fluid to flow from the container out the pour spot.
(16) In another example, the lid can include a removable filter disposed therein and configured to allow a suction force to be applied there through. In other aspects, the removable filter can include a first filter material having a first porosity and a second filter material having a second porosity that is different than the first porosity.
(17) In another example, the fluid recovery device can include a spring-biased latch movably mounted on an exterior surface of the container. In other aspects, the latch can be positioned on a first side of the container and the pour spout is positioned on a second side of the container opposite the first side.
(18) In another example, the inlet in the bottom wall can include a hollow standpipe extending from the bottom wall toward the lid and having an inner lumen there through for receiving fluid and debris from the head assembly. The hollow standpipe can extend through an opening in the

separator.
(19) In another example, the pour spout can be configured to be in an open position when the lid is in an open position and a closed position.
(20) In another example, the separator can include a seal configured to frictionally engage the container to create a water-tight seal therewith.
(21) In another example, the separator can include at least one deflector configured to direct fluid away from the lid. In certain aspects, the at least one deflector can be located proximate to the fluid inlet. In further aspects, the at least one deflector can include a first deflector located proximate the inlet and a second deflector located below the fluid inlet.
(22) In another embodiment, a cleaning device is provided and can include a head assembly containing a brushroll and a housing body coupled to the head assembly and having an upright handle extending therefrom. The housing body can include a suction source in fluid communication with the head assembly, a fluid supply assembly configured to retain fluid and to deliver fluid to the head assembly, and a fluid recovery tank configured to receive fluid from the head assembly using the suction source. The head assembly can include at least one spray nozzle in fluid communication with the fluid supply assembly and configured to emit fluid onto a first portion of the brushroll. The head assembly can further include at least one deflector disposed therein and configured to redirect fluid emitted by the at least one spray nozzle onto a second portion of the brushroll.
(23) One or more of the following features can be included in any feasible combination. For example, the at least one spray nozzle can include a left spray nozzle disposed on the left side of the head assembly and a right spray nozzle disposed on the right side of the head assembly. In other aspects, the at least one deflector includes a left deflector configured to redirect fluid emitted by the left spray nozzle and a right deflector configured to redirect fluid emitted by the right spray nozzle. In other aspects, the second portion of the brushroll can include a left end portion of the brushroll and a right end portion of the brushroll. The first portion of the brushroll can be a mid-position located between the left end portion and the right end portion. In still further aspects, the left spray nozzle and the right spray nozzle can be longitudinally aligned with one another.
(24) In another embodiment, the at least one deflector can be curved toward the at least one spray nozzle.
(25) In another embodiment, the at least one spray nozzle is configured to spray fluid in a substantially planar orientation. In other aspects, the at least one nozzle is configured to spray fluid in a fan pattern at a spray angle between about 10 and 60 degrees. In another example, the at least one spray nozzle is configured to spray fluid in a flat fan pattern along a plane substantially tangential to the brushroll.
(26) In another embodiment, a cleaning device is provided and can include a base housing having a brushroll chamber with a brushroll disposed therein, and a suction outlet disposed therein and in fluid communication with the brushroll chamber. The cleaning device can include at least one fluid delivery spray nozzle disposed in the brushroll chamber and configured to emit fluid onto a first portion of the brushroll. The cleaning device can include at least one deflector disposed in the brushroll chamber and configured to redirect fluid emitted by the fluid assembly onto a second portion of the brushroll.
(27) One or more of the following features can be included in any feasible combination. For example, the cleaning device can include a fluid recovery tank in fluid communication with the suction inlet and configured to receive fluid and debris from the suction inlet.
(28) In another example, the at least one fluid delivery spray nozzle can include first and second fluid delivery spray nozzles positioned on opposite ends of the brushroll and configured to delivery fluid along a length of the brushroll. The at least one deflector can be positioned within the brushroll chamber between the first and second fluid delivery spray nozzles. In certain embodiments, the at least one deflector can include a first deflector positioned adjacent to the first fluid delivery spray nozzle for deflecting fluid sprayed from the first fluid delivery nozzle, and a

second deflector positioned adjacent the second fluid delivery spray nozzle for deflecting fluid sprayed from the second fluid delivery spray nozzle.
(29) In another embodiment, the at least one deflector can include an elongate projection formed on an inner surface of the brushroll chamber and positioned within a flow path of fluid delivered by the at least one fluid delivery nozzle.
(30) In other aspects, the first portion of the brushroll can include a mid-portion of the brushroll and the second portion of the brushroll comprises first and second end portions of the brushroll.
(31) In another example, the at least one deflector can be molded into a housing at least partially defining the brushroll chamber.
(32) In another example, the at least one deflector can be positioned on an inner surface of the brushroll chamber above an opening within the brushroll chamber defining the suction inlet.
(33) In another example, the at least one nozzle can be configured to spray fluid in a substantially planar fan-shaped pattern.
(34) In another example, the at least one nozzle can include a first nozzle disposed in a right side of the brushroll chamber and a second nozzle disposed in the left side of the brushroll chamber. The at least one deflector can be a first pair of deflectors configured to redirect fluid emitted by the first nozzle and a second pair of deflectors configured to redirect fluid emitted by the second nozzle.
(35) In another embodiment, a fluid recovery tank for use on a cleaning device is provided. The fluid recovery tank can include a container having a bottom wall and sidewalls defining an inner chamber therein, a top of the container being open, the bottom wall including a fluid inlet therein, and the container having a longitudinal axis extending from the top to the bottom wall. The fluid recovery tank can include a latch movably coupled to an outer sidewall of the container and configured to move along an axis substantially parallel to the longitudinal axis of the chamber. The latch can include an engagement feature configured to engage a portion of a cleaning device to mate the container to a cleaning device. The fluid recovery tank can include a a separator removably disposed within the open top of the container and extending into the chamber, the separator being configured to separate solid debris from fluid within the inner chamber.
(36) One or more of the following features can be included in any feasible combination. For example, the latch can be movably disposed within a housing formed on the outer sidewall of the container. The latch can extend above an upper surface of the container. In certain embodiments, the latch can be spring-biased to a locking position. In another example, the latch can be disposed entirely outside the container.
(37) In another embodiment, the separator can have a bottom wall that is spaced from the bottom wall of the container. The bottom wall of the separator can have an opening formed therein to allow fluid to pass there through while substantially preventing solid debris from passing there through such that solid debris is retained within the separator.
(38) In another example, the fluid recovery tank can include a lid removably disposed within an opening formed in a top of the separator. In other aspects, the lid can include a filtration device.
(39) In another embodiment, a fluid recovery tank for use on a cleaning device is provided. The fluid recovery tank can include a container defining an inner chamber therein. The container can have a suction outlet configured to couple to a suction source for allowing a suction force to be applied to the inner chamber. The container can also have a fluid inlet for allowing fluid to be drawn into the chamber by the suction force. The fluid recovery tank can include a separator removably disposed within the container and having an opening formed therein and configured to allow fluid to pass there through while substantially preventing solid debris from passing there through such that solid debris is retained within the separator. The fluid recovery tank can include a button movably disposed on an exterior of the container and configured to move between a locked configuration in which the button is configured to engage a cleaning device to retain the container on the cleaning device, and an unlocked configuration in which the button is configured to disengage from a cleaning device to allow the container to be removed from the cleaning device.

(40) One or more of the following features can be included in any feasible combination. For example, a top of the button can be substantially parallel to a top of the container when the button is in the locked configuration and the unlocked configuration. The button can be biased to the locked configuration.
(41) In another embodiment, a top of the button can extend above the top of the container when the button is in the locked configuration, and the top of the button can extend above the top of the container when the button is in the unlocked configuration.
(42) In other aspects, the button can be disposed within a housing formed on an external surface of the container. The housing can include a biasing element disposed therein and can bias the button to the locked configuration. The button can include a protrusion configured to be received by a complementary depression on a cleaning device. In other aspects, the button can be curved to align with a contour of the cleaning device.
(43) In another embodiment, the fluid recovery tank can include a lid removably disposed within an opening in the separator, the lid defining the suction outlet. The lid can include at least one filter disposed therein and extending across the suction outlet. The at least one filter can include a first filter material having a first porosity and a second filter material having a second porosity greater than the first porosity.
(44) In another example, the fluid inlet can include a hollow standpipe extending into the inner chamber.
(45) The details of one or more variations of the subject matter described herein are set forth in the accompanying drawings and the description below. Other features and advantages of the subject matter described herein will be apparent from the description and drawings, and from the claims.

Description

DESCRIPTION OF DRAWINGS
(1) These and other features will be more readily understood from the following detailed description taken in conjunction with the accompanying drawings, in which:
(2) FIG. **1**A is a front perspective view of one embodiment of a cleaning device;
(3) FIG. **1**B is a front view of the cleaning device of FIG. **1**A;
(4) FIG. **1**C is a right side view of the cleaning device of FIG. **1**A;
(5) FIG. **1**D is cross-sectional right side view of the cleaning device of FIG. **1**A;
(6) FIG. **2**A is a front perspective view of a head assembly of the cleaning device of FIG. **1**A;
(7) FIG. **2**B is a right side view of the head assembly of FIG. **2**A;
(8) FIG. **2**C is a front view of the head assembly of FIG. **2**A;
(9) FIG. **2**D is a bottom view of the head assembly of FIG. **2**A;
(10) FIG. **2**E is a cross-sectional side view of the head assembly of FIG. **2**A;
(11) FIG. **2**F is a front perspective view of the head assembly of FIG. **2**A, having a linking assembly removed;
(12) FIG. **2**G is a front perspective view of the head assembly of FIG. **2**F, having a brushroll removed and showing a right support structure;
(13) FIG. **2**H is a front perspective view of the head assembly of FIG. **2**F, having a brushroll removed and showing a left support structure;
(14) FIG. **3**A is a right front perspective view of a brushroll used in the cleaning device of FIG. **1**A;
(15) FIG. **3**B is a left rear perspective view of the brushroll of FIG. **3**A;
(16) FIG. **3**C is a right side view of the brushroll of FIG. **3**A;
(17) FIG. **3**D is a left side view of the brushroll of FIG. **3**A;
(18) FIG. **4**A is a top perspective of another embodiment of a brushroll;
(19) FIG. **4**B is a right side view of the brushroll of FIG. **4**A;

(20) FIG. **4**C is a partial left perspective view of the brushroll of FIG. **4**A;
(21) FIG. **4**D is a partial cross-sectional view of the brushroll of FIG. **4**A;
(22) FIG. **5**A is a front perspective view of a brushroll cover used with the head assembly of FIG. **2**A;
(23) FIG. **5**B is a right side view of the brushroll cover of FIG. **5**A;
(24) FIG. **6**A is a front perspective view of a body assembly of the cleaning device of FIG. **1**A;
(25) FIG. **6**B is a right side view of the body assembly of FIG. **6**A;
(26) FIG. **6**C is front view of the body assembly of FIG. **6**A;
(27) FIG. **6**D is a cross-sectional side view of the body assembly of FIG. **6**A;
(28) FIG. **7**A is a front perspective view of a handle assembly of the cleaning device of FIG. **1**A;
(29) FIG. **7**B is a right side view of the handle assembly of FIG. **7**A;
(30) FIG. **7**C is a front view of the handle assembly of FIG. **7**A;
(31) FIG. **7**D is a cross-sectional side view of the handle assembly of FIG. **7**A
(32) FIG. **8**A is a front perspective view of the body assembly of FIG. **6**A, having a fluid supply tank and a recovery tank removed from their respective retaining areas;
(33) FIG. **8**B is a front view of the body assembly of FIG. **8**A;
(34) FIG. **8**C is a right side view of the body assembly of FIG. **8**A;
(35) FIG. **8**D is a bottom perspective view of the body assembly of FIG. **8**A;
(36) FIG. **9**A is a front perspective view of a motor assembly of the cleaning device of FIG. **1**A;
(37) FIG. **9**B is a right side view of the motor assembly of FIG. **9**A;
(38) FIG. **9**C is a front view of the motor assembly of FIG. **9**A;
(39) FIG. **9**D is a top view of the motor assembly of FIG. **9**A;
(40) FIG. **9**E is cross-sectional side view of the motor assembly of FIG. **9**A;
(41) FIG. **10**A is a front perspective view of a fluid recovery tank of the cleaning device of FIG. **1**A;
(42) FIG. **10**B is a right side view of the fluid recovery tank of FIG. **10**A;
(43) FIG. **10**C is a front view of the fluid recovery tank of FIG. **10**A;
(44) FIG. **10**D is a cross-sectional side view of the fluid recovery tank of FIG. **10**A;
(45) FIG. **10**E is a front perspective view of a separator of the fluid recovery tank of FIG. **10**A;
(46) FIG. **10**F is a rear side perspective view of the separator of FIG. **10**E;
(47) FIG. **10**G is a bottom view of the separator of FIG. **10**E;
(48) FIG. **10**H is a partial cross-sectional view of the separator of FIG. **10**E;
(49) FIG. **10**I is a perspective view of a lid of the fluid recovery tank of FIG. **10**A;
(50) FIG. **10**J is an exploded view of the lid of FIG. **10**I;
(51) FIG. **10**K is a rear perspective view of a latch of the fluid recovery tank of FIG. **10**A;
(52) FIG. **10**L is an exploded view of the fluid recovery tank of FIG. **10**A;
(53) FIG. **11**A is a right side view of another embodiment of a fluid recovery tank;
(54) FIG. **11**B is a partial left perspective view of a separator of the fluid recovery tank of FIG. **11**A;
(55) FIG. **11**C is a partial front view of the separator of FIG. **11**B;
(56) FIG. **11**D is a front perspective view of the fluid recovery tank of FIG. **11**A, having been installed in a body assembly of a cleaning device;
(57) FIG. **11**E is a partial cross-sectional view of the fluid recovery tank of FIG. **11**D, showing an upper end engaged in the body assembly;
(58) FIG. **11**F is a partial cross-sectional view of the fluid recovery tank of FIG. **11**D, showing a lower end engaged in the body assembly;
(59) FIG. **11**G is a front perspective view of a filter engaged in a body assembly according to the embodiment of FIG. **11**A;
(60) FIG. **11**H is a partial cross-sectional view of the filter of FIG. **11**G engaged in the body assembly;

(61) FIG. **11**I is a front perspective view of the filter of FIG. **11**G being disengaged from the body assembly;
(62) FIG. **12**A is a front perspective view of a fluid supply tank of the cleaning device of FIG. **1**A;
(63) FIG. **12**B is a front view of the fluid supply tank of FIG. **12**A;
(64) FIG. **12**C is a right side view of the fluid supply tank of FIG. **12**A;
(65) FIG. **12**D is a cross-sectional side view of the fluid supply tank of FIG. **12**A;
(66) FIG. **12**E is a front perspective cross-sectional view of the fluid supply tank of FIG. **12**A;
(67) FIG. **12**F is an exploded view of the fluid supply tank of FIG. **12**A;
(68) FIG. **13**A is a top view of a head assembly having no upper housing and showing components used in wet vacuum modes;
(69) FIG. **13**B is a top view of the tubing, fluid pump, and nozzles shown FIG. **13**A;
(70) FIG. **13**C is a front view of the application face of the head assembly of FIG. **13**A;
(71) FIG. **13**D is a partial front perspective view of a right side of the head assembly of FIG. **13**A, having a brushroll removed;
(72) FIG. **13**E is a partial front perspective view of the right side of the head assembly of FIG. **13**A, having an application face removed;
(73) FIG. **13**F is a partial cross-sectional view of the right side of the head assembly of FIG. **13**A;
(74) FIG. **13**G a partial front perspective view of the left side of the head assembly of FIG. **13**A
(75) FIG. **13**H is a partial front perspective view of the left side of the head assembly of FIG. **13**A, having the application face removed;
(76) FIG. **13**I is a front view of the application face of the head assembly of FIG. **13**A;
(77) FIG. **14**A is a front perspective view of a spray nozzle of the cleaning device of FIG. **1**A;
(78) FIG. **14**B is a right side view of the spray nozzle of FIG. **14**A;
(79) FIG. **14**C is a front view of the spray nozzle of FIG. **14**A;
(80) FIG. **14**D is a partial cross-sectional view of a head assembly including the spray nozzle of FIG. **14**A;
(81) FIG. **15**A is a front perspective view of an alternative embodiment of an application face;
(82) FIG. **15**B is a rear perspective view of the application face of FIG. **15**A;
(83) FIG. **15**C is a partial cross-sectional view of the application face of FIG. **15**A;
(84) FIG. **15**D is a partial cross-sectional view of a head assembly including the application face of FIG. **15**A;
(85) FIG. **16**A is a front view of the cleaning device of FIG. **1**A placed on a charging mat;
(86) FIG. **16**B is a front perspective view of the charging mat of FIG. **16**A;
(87) FIG. **16**C is a front perspective view of the charging mat of FIG. **16**A;
(88) FIG. **16**D is a front view of the charging mat of FIG. **16**A;
(89) FIG. **16**E is a right side view of the charging mat of FIG. **16**A;
(90) FIG. **16**F is a top view of the charging mat of FIG. **16**A; and
(91) FIG. **16**G is a rear perspective view of the cleaning device of FIG. **1**A, without a charging mat;
(92) FIG. **17**A is a perspective view of another embodiment of a fluid supply tank;
(93) FIG. **17**B is a partial perspective view of a separator of the fluid supply tank of FIG. **17**A;
(94) FIG. **17**C is another partial perspective view of the separator of FIG. **17**B;
(95) FIG. **17**D is another partial perspective view of the separator of FIG. **17**B;
(96) FIG. **18**A is a left side view of the fluid supply tank of FIG. **12**A, having a hollow standpipe according to another embodiment;
(97) FIG. **18**B is a left side view of the fluid supply tank of FIG. **12**A, having a hollow standpipe according to another embodiment;
(98) FIG. **18**C is a left side view of the fluid supply tank of FIG. **12**A, having a hollow standpipe according to another embodiment;
(99) FIG. **18**D is a left side view of a the fluid supply tank of FIG. **12**A, having a hollow standpipe according to another embodiment;

(100) FIG. **19**A is a right rear perspective view of another embodiment of a fluid supply tank having an external hollow standpipe;
(101) FIG. **19**B is a right side view of the fluid supply tank of FIG. **19**A;
(102) FIG. **20** is a right side view of another embodiment of a fluid supply tank having a fixed separator and an pivoting bottom;
(103) FIG. **21** is a partial cross-sectional view of a head assembly having a passive roller according to another embodiment; and
(104) FIG. **22** is a partial cross-sectional view of a head assembly having a brushroll cover with an arcuate inner extension;
(105) FIG. **23** is a partial perspective view of a fluid application face according to another embodiment.
(106) It is noted that the drawings are not necessarily to scale. The drawings are intended to depict only typical aspects of the subject matter disclosed herein, and therefore should not be considered as limiting the scope of the disclosure.

DETAILED DESCRIPTION

(107) Certain exemplary embodiments will now be described to provide an overall understanding of the principles of the structure, function, manufacture, and use of the devices and methods disclosed herein. One or more examples of these embodiments are illustrated in the accompanying drawings. Those skilled in the art will understand that the devices and methods specifically described herein and illustrated in the accompanying drawings are non-limiting exemplary embodiments and that the scope of the present invention is defined solely by the claims. The features illustrated or described in connection with one exemplary embodiment may be combined with the features of other embodiments. Such modifications and variations are intended to be included within the scope of the present invention.
(108) Further, in the present disclosure, like-named components of the embodiments generally have similar features, and thus within a particular embodiment each feature of each like-named component is not necessarily fully elaborated upon. Additionally, to the extent that linear or circular dimensions are used in the description of the disclosed systems, devices, and methods, such dimensions are not intended to limit the types of shapes that can be used in conjunction with such systems, devices, and methods. A person skilled in the art will recognize that an equivalent to such linear and circular dimensions can easily be determined for any geometric shape.
(109) A cleaning device is provided that includes fluid delivery and recovery systems that can be operated in combination with, or in place of, traditional vacuum modes in order to improve cleaning capabilities of the device. In certain exemplary embodiments, the cleaning device includes features to aid in fluid delivery in a more uniform manner to improve cleaning, as well as to aid in the recovery and disposal of fluid and debris (waste). For example, the cleaning device can include features located within the cleaning heading assembly that evenly distribute fluid onto a brushroll, thus allowing fluid to be evenly applied to a surface to be cleaned. The cleaning device can also include fluid recovery tank for collecting waste from the surface to be cleaned, and it can include features to aid in separating the debris from the fluid, as well as features to facilitate disposal of the waste. For example, the fluid recovery tank can include a pour spout to facilitate disposable of fluid, while retaining debris within the tank. The fluid recovery tank can also include a unique latch mechanism that aids in removal of the fluid recovery tank from the device without interfering with suction delivery to the tank and waste collection within the tank.
(110) With reference now to FIGS. **1**A-**1**D, an exemplary embodiment of a cleaning device **10** is shown. The illustrated cleaning device **10** generally includes a head assembly **100**, a body assembly **200**, a handle assembly **300**, and a vacuum assembly **400** (not shown). The cleaning device is shown disposed atop a charging mat **700**, which will be discussed below. As will be explained in detail below, the device **10** also includes fluid delivery and fluid recovery assemblies. In the illustrated embodiment, the handle assembly **300** includes a handle **310** and a stem **320**, and the

body assembly **200** includes a body housing **210** coupled to the stem **320**. The head assembly **100** can be coupled to the body housing **210** opposite the stem **320**. The head assembly **100** can include a head housing **110**, and small wheels **112**L, **112**R (not shown) rotatably and large wheels **114**L, **114**R rotatably coupled to the head housing **110** and configured to allow the cleaning device **10** to roll along a surface, and a brushroll, not shown in FIGS. **1**A-**1**D, disposed in the head assembly **100** and configured to rotate during operation of the cleaning device **10**.

(111) The vacuum assembly **400** (not shown), is disposed within the head and body assemblies **100**, **200** and is capable of taking in fluid, dirt, debris, and other waste through suction and storing it within the cleaning device **10**. In certain embodiments, the vacuum assembly **400** can include a motor and a motor fan, as will be discussed in more detail below. The motor and motor fan can be entirely contained in a motor housing disposed within the body assembly **200**. As will be discussed in more detail below, hosing (not shown) can be coupled to the motor fan and it can be disposed to run through the body assembly **200** to the head assembly **100** to allow the motor to generate a suction force to draw waste into the device **10**. Waste taken in by the vacuum assembly **400** through the hosing (not shown) can be deposited into a recovery tank removably disposed within the body assembly, as will also be discussed in more detail below.

(112) The cleaning device **10** can further include a fluid supply tank **610** capable of supplying fluid to an area to be cleaned in order to aid in a cleaning process. The fluid can be mixed with dirt and debris, and the waste can be drawn back into the cleaning device **10** with suction generated by the motor and deposited in the recovery tank **420**.

(113) FIGS. **2**A-**2**H depict the head assembly **100** in more detail. More specifically, FIGS. **2**A-**2**E depict the head assembly **100** including an articulator **250**, to be described in more detail below, and FIGS. **2**F-**2**H depict the head assembly **100** without the articulator **250**. As shown, the head assembly **100** includes a head housing **110**, which is substantially T-shaped when viewed from the bottom as shown in FIG. **2**D. The head assembly **100** can include wheels disposed on the head housing **110**, which aid in movement of the cleaning device **10**. In the illustrated embodiment, a set of left and right small wheels **112**L, **112**R is disposed on the bottom side **110***a* of the head housing **110** beneath left and right portions respectively, and a set of left and right large wheels **114**L, **114**R is disposed on left and right rear sides of the head housing **110**, respectively. Both the small wheels **112**L, **112**R and the large wheels **114**L, **114**R rotate to allow the cleaning device **10** to be maneuvered on surfaces.

(114) FIG. **2**E shows a cross-section of the head assembly **100** with hosing **230** extending from the front of the head assembly and up through the articulator. The hosing **230** will be discussed in more detail below, with respect to the vacuum assembly and the dry and wet cleaning operations.

(115) FIGS. **2**G and **2**H show the head assembly **100** with a brushroll cover **140** and a brushroll **150** removed, thereby providing a more-detailed view of the inner form of the head housing **110**. On an upper portion of the front side **110***d* of the head housing **110** is a cover support **116**, which can removably receive a brushroll cover **140**. Rearward of the cover support **116**, located on the top side **110***b* of the head housing **110**, is a cover button **118**, which can be actuated to release the brush cover **140** mounted to the head housing **110** to enable removal of the brush cover **140**. Extending from the front side **110***e* of the head housing **110**, especially as seen in FIGS. **2**G and **2**H, are the brushroll supports **120**L, **120**R, which are capable of holding a brushroll **150** for use during cleaning operations. The left and right brushroll supports **120**L, **120**R extend from the front side **120***e* of the head housing **110**. The left and right supports **120**L, **120**R each have a rounded top edge **120**La, **120**Ra and a substantially flat bottom edge **120**Lb, **120**Rb. Brushroll support structures **122**L, **122**R are located on interior faces **120**Lc, **120**Rc of both the left and right supports **120**L, **120**R. The left support structure **122**L, seen in FIG. **2**G, includes a rounded cutout portion **122**La capable of receiving a complimentary structure on the brushroll **150**, and the right support structure **120**R includes a rotatably coupled extension **122**Ra having a geometric interface capable of meshing with a corresponding geometric indentation of the brushroll **150**.

(116) The head assembly can further include light sources **119** disposed on the front of the left and right support structures **120**L, **120**R, which can act to illuminate a surface to be cleaned in order to aid in a cleaning process. The light sources **119** can be any kind of light source known, including a light-emitting diode, and the like.
(117) Also depicted in FIGS. **2**G and **2**H, a fluid application face **624** is located on the front side **110***e* of the head housing **110**. The fluid application face **624** has a generally hemi-cylindrical, concave shape so that, when a brushroll **150** is installed between the left and right supports **120**L, **120**R, the fluid application face **624** at least partially surrounds the outer face of the brushroll **150**. The fluid application face **624** occupies a top half of the front side **110***e* of the head housing **110**. One or more spray nozzles **630** and deflectors **640** can be disposed on the fluid application face **624**. The spray nozzles **630** and deflectors **640** will be discussed in more detail below with respect to FIGS. **13**A-**14**C.
(118) Beneath the fluid application face **624** and occupying a lower half of the front side **110***e* of the head housing **110** is an intake face **124**. The intake face includes a recessed façade leading to a central intake **126** therein. The left and right sides **124**L, **124**R of the intake face **124** can angle inward and lead to the central intake **126** itself. The central intake **126** forms a suction inlet that generally allows for dirt, debris, and waste to be taken into the cleaning device **10**, as will be discussed in more detail below.
(119) At the lower edge of the front side **110***e* of the head housing **110** below the intake face **124** is a flexible guide **128**. The flexible guide **128** can be gradually sloped upward from the front side **110***e* toward the rear, and it can extend the entire width of the front side **110***e* between the left and right supports **120**L, **120**R. The flexible guide **128** is formed such that, in a neutral position, the guide **128** extends below the bottom side **110***a* of the head housing **110**, which can be seen especially in FIGS. **2**B and **2**E. As a result, when the cleaning device **10** is placed upon a surface, the flexible guide **128** is biased against the surface, thereby allowing for waste to be fed toward the intake face **124** without leaving a gap for waste to avoid the cleaning device **10**.
(120) FIGS. **3**A-**3**D shown an embodiment of a brushroll **150**, which can be received between the left and right support structures **120**L, **120**R depicted in FIGS. **2**A-H. In various cleaning operations, the brushroll **150** is configured to rotate to loosen waste deposited on a surface to be cleaned. The brushroll **150** is also able to direct waste into the cleaning device. While the configuration of the brushroll **150** can vary, in one embodiment the brushroll **150** can have a substantially elongate cylindrical shape and can include a central dowel **152** and a cleaning material **154** surrounding the dowel **152**. The dowel **152** can be cylindrical, having right and left ends **152**R, **152**L, and it can be made of a rigid material, such as a hard plastic, metal, rubber, or a combination thereof, to provide the brushroll **150** with some support. The cleaning material **154** is attached to the outer surface of the dowel **152** along the entire length thereof and can be made of various cleaning materials, such as microfiber, bristles, or other materials known in the art, alone or in some combination. Further, the cleaning material **154** can be disposed in a variety of configurations on the outer surface of the dowel **152**, and it can be formed from one or more materials which can be intermixed or separated into specific regions.
(121) As mentioned previously, the brushroll **150** includes structures which can be retained by the left and right support structures **120**L, **120**R of the head assembly **110**. These structures can be located on or extending from the right and left ends **152**R, **152**L of the dowel **152**. FIGS. **3**A and **3**B show the right end **152**R of the dowel **152** in more detail. The right end **152** of the dowel **152** includes an indentation **156** having a geometric pattern that corresponds to a geometric interface of the protrusion **122**Ra on the right support structure **120**R. The geometric design is capable of providing a friction fit between the protrusion **122**Ra and the brushroll **150**, such that during a cleaning operation when the protrusion **122**Ra is rotatably driven, the brushroll **150** will rotate as well. FIGS. **3**C and **3**D show the left end **152**L of the dowel **152** in more detail. The left end **152**L of the dowel **152** includes an extension piece or tab **158** rotatably coupled thereon and configured

to be received within the rounded cutout portion **122**La of the left support structure **120**L of the head assembly **110**. When not in use, the tab **158** can be grasped by a user and the brushroll **150** can be removed from the left and right support structures **120**L, **120**R such as for inspection and maintenance or replacement.

(122) FIGS. **4**A-**4**D depict another embodiment of a brushroll. The brushroll **160**, as shown in FIG. **4**A, has a similar structure to brushroll **150** depicted in FIGS. **3**A-**3**D, and so elements with comparable structure and operation will not be described in detail. Generally, the brushroll **160** is substantially cylindrical in shape, and it includes a central dowel **162** surrounded by a cleaning material **164**. The brushroll **160** also includes a helical paddle **166** secured to the central dowel **162** and winding around the dowel **162** about an outer surface thereof. The paddle **166** extends radially beyond the cleaning material **164**, as can be seen in FIGS. **4**A and **4**B. The paddle **164** can be made of any suitable material, and may include, for example, rubber, plastic, or another similar material, and with this structure, in operation, the paddle **164** can flex and bend when impacting a cleaning surface in order to drive dirt, debris, and waste into the cleaning device **10**.

(123) On an outer surface of the brushroll **160**, similar to the brushroll **150**, are structures which can interface with corresponding structures on a head assembly **100**′ (not shown). For example, FIG. **4**B depicts a right side **162**R having a geometric interface which can operate similarly to the structure seen above in FIGS. **3**A and **3**B. On a left side **162**L, the brushroll **160** includes a rounded protrusion **168**, which can be received by a corresponding structure located on a brushroll support (not shown). FIG. **4**D depicts a partial-cross-sectional view of the protrusion **168**, which is biased to an extended position by a spring **170**. The end of the protrusion **168** is shaped to mate with a brush support and secure the brushroll **160** so that, during cleaning operations, the brushroll **160** can rotate to drive dirt, debris, and waste to the cleaning device **10**.

(124) As mentioned above, the head assembly **100** further includes a brushroll cover **140** removably attached to the top side **110***b* of the head housing **110**. FIGS. **5**A-**5**D show an embodiment of a brushroll cover **140**, which can be secured to the head assembly **110** to cover a brushroll **150**, **160** in order to prevent splash and spray from the brushroll **150**, **160** while it is in operation.

(125) The brushroll cover **140** is shaped to extend the entire width of the head housing **110** between the left and right sides **110***c*, **110***d*, and it extends from the top side **110***b* of the head housing **110**, over the rounded top edges **120**La, **120**Ra of the left and right support structures **120**L, **120**R, and ends just above the surface upon which the cleaning device **10** rests. This arrangement of the brushroll cover **140** can be seen in FIGS. **2**A, **2**C, and **2**F. The brushroll cover **140** extends to be nearly even with the bottom side **110***a* of the head housing **110**, thereby creating a small gap to allow for the introduction of waste into the cleaning device **10** during a cleaning process. The brushroll cover **140** can be removably attached to the head housing **110** at the top side **110***b* via the cover support **116**, as explained above. The brushroll cover **140** can also be attached to the head housing **110** via a hinge (not shown), such that the cover **140** can provide easy access to the brushroll **160**.

(126) With reference now to **6**A-**8**D, various views and components of an embodiment of the body assembly **200** of the cleaning device **10** are shown.

(127) The body assembly **200** can be operatively coupled to the head assembly **100** via an articulator **250**. The articulator **250**, as introduced with respect to FIGS. **2**A-**2**D and as shown again coupled to the body assembly **200** in FIGS. **6**A-**6**D, is coupled to the bottom of the body assembly **200** and can be at least partially disposed within the head assembly **100**. The illustrated articulator **250** is configured to articulate about two degrees of freedom. The articulator **250** has an outer housing **252** having a substantially elliptical cross-section that tapers in an upward direction to become larger, eventually coinciding with the size of the body assembly **200**. A first point of articulation **254**, allowing for articulation about a first degree of freedom, is mounted within the head assembly **100**. The first point of articulation **254** allows for the body assembly **200** to pivot

between a forward direction and a backward direction, as indicated by the arrows A-A in FIGS. **6**A-**6**D. A second point of articulation **256**, located above the first point of articulation **254**, allows for the body assembly **200** to pivot between a left direction and a right direction, as indicated by the arrows B-B in FIG. **2**A. One or both points of articulation **254**, **256** can be articulated at a given time. Further, in other embodiments, the body assembly **200** can articulate in any number of degrees of freedom about any number of points of articulation.

(128) The body assembly **200** includes a body housing **210** having a substantially cylindrical form with an elliptical cross-section. The body housing **210** includes a housing base **210***a* coupled to the articulator **250**, a rounded front side **210***b* and a rounded rear side **210***c* extending upward from the housing base **210***a*, and a top side **210***d*. The top side **210***d* of the body housing **210** in the illustrated embodiment is substantially flat and slopes downward at an angle from the rear side **210***c* to the front side **210***b*. The top side **210***d* of the body housing **210** is coupled to the handle assembly **300**, which extends from the body assembly **200** in a direction opposite the head assembly **100**.

(129) FIGS. **7**A-**7**D show the handle assembly in more detail, including the handle **310** coupled to the stem **320**. The illustrated handle **310** has a substantially trapezoidal handle frame **312** surrounding an interior handle aperture **314**. The illustrated handle frame **312** has a substantially flat bottom section **312***a*, and a front section **312***b* and a back section **312***c* extending upward from the bottom section **312***a* at substantially right angles relative to the bottom section **312***a*. The front section **312***b* is shorter than the back section **312***c*, and the top of each of the front section **312***b* and the back section **312***c* are connected by a top section **312***d*. The top section **312***d* is angled downward toward the front section **312***b* by virtue of the height discrepancy between the front section **312***b* and the back section **312***c*. The handle **312** further includes a power button **330** disposed on an upper exterior of the front section **312***b*, and an area rug button **340** disposed on a front exterior of the top section **312***d*. The functions of these buttons will be described in more detail below.

(130) The illustrated handle assembly **300** further includes a stem **320** disposed between an underside of the bottom section **312***a* of the handle **312** and the top side **210***d* of the body housing **210**. The stem **320** is substantially linear and has a nearly flat rear face **322** and a rounded front face **324**, such that the stem **320** has a substantially semicircular cross-section. A person skilled in the art will appreciate that the handle assembly can have a variety of other configurations.

(131) Referring again to the body assembly **200** the body housing **210** includes first and second cavities **210***e*, **210***f* for receiving components of the cleaning device **10**. The first and second cavities **210***e*, **210***f* are sized to receive a recovery tank **420** and a fluid supply tank **610** respectively, as shown in FIGS. **6**A-**6**D, such that when retained in their respective cavities, the recovery tank **420** and fluid supply tank **610** are shaped to conform to the overall cylindrical shape of the body assembly **200**.

(132) FIGS. **8**A-**8**D show the body assembly **200** with the recovery tank **420** and fluid supply tank **610** removed from the first and second cavities **210***e*, **210***f*, respectively. The first cavity **210***e*, located in the lower front side **210***b* of the body housing **210**, is sized to removably receive the recovery tank **420** such that, when retained in the first cavity **210***e*, the recovery tank **420** occupies the entirety of a lower region of the front side **210***b* of the body housing **210**. The first cavity **210***e* can include a seal **214** disposed on an upper side thereof and configured to seal against an upper portion of the retained recovery tank **420**. Next to the seal **214** is a divider **216**. The divider **216** can be porous to allow air to flow through the system during dry and wet cleaning operations, as will be described below in more detail. The recovery tank **420** is removable from the body housing **210** after actuation of a latch assembly **460** (not shown) extending outward from an upper extent of the recovery tank **420**, which releases the recovery tank **420** from engagement with a retaining slot **218**, located toward the front of the first cavity **210***e*. The second cavity **210***f*, located in an upper front portion **210***b* of the body housing, and occupying a substantial portion of the top side **210***d*,

receives the fluid supply tank **610** for use in wet cleaning processes. A fluid tank switch **212** is disposed in the top side **210***d* of the body housing **210** between the second cavity **210***f*. When the fluid tank switch **212** is actuated, a tank engagement feature **211** recedes into the body housing **210**, and the fluid supply tank **610** can be removed from the second cavity **210***f*. The recovery tank **420** and the fluid supply tank **610** will be described in greater detail below with respect to the cleaning processes that the cleaning device **10** may perform.

(133) As previously indicated, the cleaning device **10** can operate in both wet and dry cleaning modes. Dry cleaning modes generally include modes related to traditional vacuuming operations, such as vacuuming on hard surfaces or on softer surfaces, such as carpet. Dry cleaning modes rely on suction to take dirt and debris into the cleaning device for convenient disposal. In some dry cleaning modes, a brushroll can rotate to agitate debris and waste on a cleaning surface. The brushroll can loosen the dirt and debris while simultaneously directing it toward a suction intake of a cleaning device. In other dry cleaning modes, a brushroll does not rotate, and instead, suction is relied on alone to force dirt and debris into a cleaning device. Wet cleaning modes can generally include a cleaning device supplying fluid either directly or indirectly to a surface to aid in cleaning. The supplied fluid can act to loosen dirt and and debris stuck to the surface, and the dirtied fluid can be taken into the cleaning device through suction or other means. In some wet cleaning modes, like some dry cleaning modes described above, a brushroll can further assist in loosening dirt and debris off the surface and directing it toward a suction intake. In these wet cleaning modes, the fluid can be supplied directly to the brushroll in order to simultaneously apply the fluid to the surface while agitating the dirt and debris found on the surface. In other wet cleaning modes, fluid can be supplied directly to the surface and the brushroll can agitate the wetted surface. In still other modes, fluid can be supplied directly to the surface and a brushroll can remain stationary, thereby cleaning the surface with fluid and suction alone.

(134) The wet and dry cleaning modes can rely on a vacuum assembly **400**. In an exemplary embodiment, the vacuum assembly **400** includes a motor assembly **410**, a recovery tank **420**, and hosing **230** coupled to an intake, such as a central intake **126**, which together can be operated to draw waste into the cleaning device **10**.

(135) FIGS. **9**A-**9**E depict a motor assembly **410** according to the exemplary embodiment. The motor assembly **410** is configured to be disposed within the body housing **210** beneath the fluid supply tank **610** and the handle stem **320** and above the recovery tank **420**. The illustrated motor assembly **410** includes a motor **412** and a fan **414** encased in a motor housing **416**. The motor housing **416** is divided into a lower motor housing portion **416***a* and an upper motor housing portion **416***b* coupled to or integrally formed with the lower motor housing **416***a*, and the motor **412** and motor fan **414** are contained therebetween. At an upper extent of the upper motor housing portion **416***b* are left and right air vents **418**L, **418**R, which allow for air drawn into the cleaning device **10** to exit out the rear side **210***c* of the body housing **210**. When coupled together, the lower motor housing **416***a* and the upper motor housing **416***b* substantially surround and isolate the motor **412** and fan **414** from the rest of the cleaning device **10**. The motor assembly **410** sits atop the divider **216** disposed within the body assembly **200**. The divider **216** can be seen especially in FIG. **8**D, and it includes a plurality of apertures, which allow for air to flow through the divider **216** to facilitate the various cleaning operations which rely on suction. Moreover, the divider **216** forms an upper extent of the first cavity **210***e*, which receives the fluid recovery tank **420**.

(136) With reference now to FIGS. **10**A-**10**L, an exemplary embodiment of the recovery tank **420** is shown. The recovery tank **420** can be removably retained within the body housing **210** in the first cavity **210***e*, as explained above. The illustrated recovery tank **420** generally includes a container **422**, a separator **440**, a lid **460**, and a latch assembly **470**.

(137) FIGS. **10**A-**10**D and **10**L depict the container **422** in relation to the remainder of the recovery tank **420**. The container **422** has a bottom surface **422***a* and a sidewall **422***b* extending upward from the bottom surface **422***a*. As mentioned previously, the container sidewall **422***b* can have a rounded

front face **422***c* to conform with the overall substantially cylindrical shape of the body housing **210**. A rear face **422***d* of the sidewall **422***b* can be substantially flat. At an upper extent, the container can have a top end **422***e* that is open and is able to receive the separator **440** therein. The top end **422***e* can be sloped from the front and extending downward toward the rear face **422***d* of the sidewall **422***b*. The container **422** can also include an inlet on the bottom surface in the form of a hollow standpipe **424** that extends nearly the entirety of the container **422** height. The upper extent of the hollow standpipe is open to allow for fluid to pass into the container **422**. The hollow standpipe **424** can be disposed rearward of a center of the bottom surface **422***a*, closer to the rear face **422***d* of the sidewall **422***b*.

(138) FIGS. **10**E-**10**H show the separator **440** separated from the rest of the recovery tank **420**. The separator **440** can be received within the container top end **422***e* and can extend downward into the container **422** from the top end **422***e*, such that a lower end **440***a* of the separator **440** extends downward beyond an upper end of the standpipe **424** to a distance above the bottom surface **422***a* of the container **422**. The lower end **440***a* of the separator **440** can be shaped to allow the standpipe **424** to extend through an opening **440***b*, while surrounding the standpipe **424**. The lower end **440***a* of the separator **440** can also be sloped, similar to the top end **422***e* of the container **422**, however the lower end **440***a* of the separator **440** can slope downward from the rear face **422***d* of the container sidewall **422***b* to the front face **422***c*, bottoming out to a drain **442** some distance from the front face **422***c*. A secondary slope **444** can extend from the front face **422***c* of the sidewall **422***b* to the drain **442**. The drain **442** itself, shown in a bottom view in FIG. **10**G, can be in the form of a slot in the lower end **440***a* of the separator **440** that extends substantially the entire width thereof. On either side of the drain **442** are a plurality of ridges **446** defining channels **447** therebetween, which can act to catch and hold large debris, yet still allowing for fluids to pass through the drain **442**. FIG. **10**H is a cross-sectional view of the separator **440**, and the plane of the cross section is located within the drain **442** to provide a view of the plurality of ridges **446**. In this view, it can be seen that the ridges **446** form a wave pattern, so larger debris would be unable to fully block a pathway to the drain as fluid and smaller particles remain able to pass into the channels **447**. A person skilled in the art will appreciate that the drain and the ridges can have a variety of other configurations, and the separator can include any number of drain holes therein.

(139) The illustrates separator **440** also includes first and second deflectors **448***a*, **448***b* which extend downward in the container **422**. The first deflector **448***a* extends downward to partially cover the upper portion of the standpipe **424**. The first deflector **448***a* is curved and shaped like a quarter-pipe to extend frontward, over the standpipe **424** and past an upper extent of the standpipe **424**. The second deflector **448***b* extends at a downward angle from a front side of the standpipe **424** and out over the drain **442**. The first and second deflectors **448***a*, **448***b* are configured to mitigate the effects of splash back and to prevent fluids and debris from getting near the top end **422***e* of the container **422**. In other embodiments, the deflectors **448***a*, **448***b* may take on other forms, and they may extend in different angles, shapes, or regions of the container **422** as needed.

(140) On an underside of the separator **440** are first and second fluid level detectors **449***a*, **449***b* which extend downward from the separator **440**. The fluid level detectors **449***a*, **449***b* are configured to sense when fluid has reached a predetermined threshold, and upon the fluid level reaching the predetermined threshold, to send a signal to the cleaning device **10** to display an alert. In an exemplary embodiment, the first and second level detectors **449***a*, **449***b* have exposed electrical contacts which, when submerged in fluid, complete a circuit and send a signal to the cleaning device **10** to display an alert message signifying that the recovery tank **420** can be emptied. In other embodiments, other level detector arrangements can be used, such as, for example, a float, a displacer, or others.

(141) The separator **440** near the top end **422***e* of the container **422** can also include two openings, namely a spout **450** and a lid opening **452**. The illustrated spout **450** is disposed in a rear-most region of the separator **440** and has a curved lip **454** in a rear region thereof to allow for the

controlled disposal of fluid captured by the recovery tank **420**. The spout **450** is aligned with a channel **451**, shown in FIG. **10**D, formed in the back side of the separator such that a fluid flow pathway is defined between the back of the separator **440** and the container **422** for allowing fluid to flow therethrough. When the recovery tank **420** is retained within the body housing **210**, the spout **450** is pressed against the seal **214** disposed on the body housing **210** next to the divider **216** to prevent the premature expulsion of fluid from recovery tank **420**. When the recovery tank **420** is removed from the body housing **210**, the spout **450** is open and allows a user to invert the container **422** to pour fluid out of the spout. The lid opening **452** is positioned next to the spout **450**, closer the front sidewall **422***b* of the container **422**. The lid opening **452** is sized to securely receive a lid **460**, which can be removable from the lid opening **452** when the recovery tank **420** is not retained within the body housing **210**.

(142) The lid **460**, shown most clearly in FIGS. **10**I and **10**J, can be shaped to fit within the lid opening **452**. In the illustrated embodiment, the lid **460** is shaped approximately like a half ellipse and is skewed to align with the slope of the lid opening **452**. The lid **460** includes a frame **462** having a top support **462***a*, an open bottom **462***b*, an inner surface **462***c*, and an outer surface **462***d*. The outer surface **462***d* of the body frame **462** includes multiple grooves **464** that align with ridges **452***a* of the lid opening **452** and prevent the lid **460** from being over-inserted into the lid opening **452**. A mesh structure **466** can be hinged over the open bottom **462***b* of the frame **462**. The mesh structure **466** can have a first porosity which can act to prevent large particles from passing through the lid **460**, while still allow air to pass through the lid **460**. The mesh **466** can be made of plastic, but in other embodiments, the mesh **466** can be made from various materials, including metals, rubbers, or other materials known in the art. Contained within the frame **462** is a filter material **467** sized to fill the entirety of the frame **462**. The filter material **467**, in the exemplary embodiment, is made from a foam-like material, which has a second porosity that is smaller than the first porosity of the mesh **466**. In other embodiments, the filter material **467** can be made other materials which can act as filters, such as various pulps, plastics, sponges, or other materials known in the art. The filter material **467** can additionally have different porosities, which may be smaller, greater, or equal to the porosity of the mesh **466**, and this porosity can be varied depending upon the type of matter to be filtered. In the illustrated embodiment, the smaller porosity of the filter material **467** prevents the escape of other particles from the recovery tank **420** which may not be stopped by the mesh **466**. Covering the top of the frame **462** is a top support **462***a*, which, in the exemplary embodiment, is a scaffold that prevents the filter material **467** from being misaligned in the frame **462**. A central portion of the top support **462***a* includes a handle **463** to assist in removal of the lid **460** from the lid opening **452**. Surrounding a perimeter of the top support **462***a* and extending beyond the bounds of the frame is a gasket **468** which helps to seal the lid **460** into the lid opening **452**. In this way, fluid cannot pass around the lid **460** when it is seated in the lid opening **462**, and instead it must pass through the mesh **466** and the filter material **467**. When the recovery tank **420** is retained within the body housing **210**, such as depicted in FIGS. **6**A-**6**D, the lid **460** is pressed against the divider **216**, such that the container **422** and the motor assembly **410** are in fluid communication with each other.

(143) A latch assembly **470** extends from the front sidewall **422***b* of the recovery tank **420** and forms a part of the container top **422***e* is. The latch assembly **470** functions to secure the recovery tank **420** within body housing **210**, and it can be actuated to allow for removal of the recovery tank **420** from the first area **410***e* of the housing body **410**. The illustrated latch assembly **470** includes a latch seat **472**, acting as a kind of housing, which extends from the container sidewall **422***b* in the form of an arc-shaped protrusion. In this way, the latch is disposed entirely outside of the container **422**. The latch seat **472** is hollow and defines a depression **472***a*, seen in FIG. **10**D, which receives a latch **474** and a spring **475**. The spring **475** is positioned centrally in the latch seat **472**, and the latch **474** is seated in the latch seat **472** over the spring **475** such that the latch **474** is biased to a raised position, being lifted by the spring force of the spring **475**.

(144) The latch **474** itself, shown in FIGS. **10**A-**10**D and **10**K-**10**L, and especially FIG. **10**K, has an upper arc-shaped protrusion **476** which extends out of the latch seat **472** and above an upper extent of the container **422** and separator **440**. Inward from the arc-shaped protrusion **476** and also extending from the latch **474** out of the latch seat **472** is an engagement feature **478**, which can be received in the complimentary slot **218** on the body housing **210** in order to enable retention of the recovery tank **420**. The shape of the both the latch **474** and the latch seat **474** are curved to align with a contour of the container **422**, and, in turn, the cleaning device **10**. Actuation of the latch **474** counters the spring force and drives the latch **474** into the latch seat **472** in a downward direction. When the latch **474** is no longer actuated, the spring force returns the latch **474** to an upward position to extend above the latch seat **472** and above the container **422**, thereby also extending the engagement feature **478** into the complimentary slot **218**. Therefore, the latch is spring-biased to the locked position. In this way, the latch **474** moves vertically upward and downward, without moving laterally within the latch seat **472**, all the while remaining parallel, or substantially parallel, to the top of the container **422**. Further, in either the upward or downward position, the latch **474** extends above the top of the container **422**. Although the exemplary embodiment depicts a latch **474** as described above, other embodiments may use alternative structures to secure the recovery tank **420** in the body housing **210**, for example, a sliding mechanism, a clip, a knob, or another device known in the art.

(145) When the recovery tank **420** is mounted within the body housing **210**, hosing **230** extending between the body assembly and the head assembly can allow fluid and debris to be delivered to the recovery tank **420**. In particular, the hosing **230** can be located in a lower portion of the body housing, centrally disposed beneath the recovery tank **420**, and it can be configured to fluidly coupled to the outside of the standpipe **424** and to provide a fluid communication path between the container **422** and the central intake **126** in the head assembly **100**. The hosing **230** is flexible so as to not inhibit full articulation of the head assembly and body assembly at the articulator. When the recovery tank **420** is retained in the body housing **210**, an upper end of the hosing **230** contacts the lower end of the container **422** and creates a substantial seal around the inlet. Accordingly, the central intake **126** is in fluid communication with the recovery tank **420** when the recovery tank **420** is retained in the body housing **210**.

(146) When the recovery tank **420** is retained within the body housing **210**, the lid aligns with the divider **216** and is therefore in fluid communication with the motor and the suction path by virtue of the apertures contained within the divider.

(147) When operated in the dry cleaning modes, the sub-assemblies of the vacuum assembly **400** work together to enable debris to be drawn into the cleaning device **10** for disposal. In a dry cleaning mode, the motor assembly **410**, via the motor fan **414**, spins to draw in air through the central intake **126** located in the head assembly **100**. Air flows into the central intake **126** in the head assembly **100**, up through the hosing **230**, introduced above with respect to FIG. **2**E, and into the container **422** of the recovery tank **420**. When the cleaning device **10** is passed near waste and debris, the suction generated by the motor assembly **410** will draw the waste and debris through the vacuum assembly where it will enter the container **422** in the recovery tank **420**. Afterward, the airflow leaves the recovery tank **420** through the lid **460** passing through the mesh **466** and the filter material **467**, where it enters the motor assembly **410**. However, the mesh **466** and filter material **467** of the lid **460** does not allow the waste and debris to pass through, so instead it will become trapped in the container **422** until disposal. Finally, the airflow is vented out of the rear exhausts **418**L, **418**R of the motor assembly **410** through the rear side **210***c* of the body housing **210**.

(148) A person skilled in the art will appreciate that the recovery tank can have variety of other configurations. FIGS. **11**A-**11**H and **17**A-**20** depicted embodiments of recovery tanks having various configurations, features, and arrangements. Features similar to those described above for the embodiment of FIG. **10**A-**10**L will not be described again.

(149) FIGS. **11**A-**11**C show a recovery tank **520** that generally includes a container **522** and a separator **540**. The recovery tank **520** can be retained within a body assembly **210**′ of a cleaning device **10** so that it can be used during cleaning processes, as explained above. In this embodiment, the separator **540** is sized to be seated around a standpipe **524** while occupying an entire width of the container **522**. The standpipe **524** is received within a central shaft **540***b* built in to the separator **540** itself, which leads to an upper deflector **548** in the form of a quarter-pipe structure. Located on opposing sides of the central shaft are fluid detecting electrodes **549***a*, **549***b*, similar to those described previously. The separator **540** includes a flat bottom **540***a* and a porous rear side **540***c* that allows for fluid and smaller particles to pass through, while retaining larger particles.
(150) In other aspects, the recovery tank **520** may lack a built-in lid or filter system, and instead those components can be retained directly within the body assembly **210**′ of the cleaning device **10**. When the recovery system **520** is retained in the body assembly **210**′, the components can interact in order to enable the capture of dirt, debris, and waste, while allowing for air to flow freely through the system and facilitate suction.
(151) During a cleaning process, when a fluid level within the recovery tank **510** rises to a predetermined threshold to contact the electrodes **549***a*, **549***b*, the cleaning device **10** can measure a drop in resistance across the electrodes **549***a*, **549***b* and alert a user to the detected fluid level. The cleaning device **10** can also interrupt a cleaning process and prevent further cleaning until the electrodes **549***a*, **549***b* no longer detect a fluid level exceeding the predetermined threshold. Similarly to the embodiment described above with respect to FIGS. **10**A-**10**L, when disposing of captured dirt, debris, and waste, the separated liquid slurry can be emptied through a built-in pour spout **550** located at the top of the recovery tank **520**. Then, the separator **540** can be removed, and with it, captured particles too big to pass through the separator **540** can be easily disposed of.
(152) FIG. **11**D shows the recovery tank **520** retained within the body assembly **210**′. A handle **570** extends outward from the container **522** for allowing the recovery tank **520** to be pulled and removed from its retained position. When retained, an upper end of the separator **540** of the recovery tank **520** interfaces with a retention feature located within the body assembly **210**′, as shown in FIG. **11**E. At a lower end of the separator **540**, the body assembly **210**′ interacts with the container **522** in order to create a fluid pathway into the container **522** through the standpipe **524**, as shown in FIG. **11**F.
(153) FIGS. **11**G-**11**I show a retention and removal process for a filter **560**. The illustrated filter **560** is retained in a slot **552** so as to be disposed above a retained recovery tank **520**. The filter **560** interfaces with a filter retention feature **562**, depicted in FIG. **11**H, in order to secure it in place. The filter **560** further includes a front rim **564** to aid in removal, which, when the recovery tank **520** is retained in the body assembly **210**′, is blocked by an extension **521** located on the recovery tank **520**, as shown in FIG. **11**D. When the recovery tank **520** is not retained, this slot **552** is accessible by a user and can be used to remove the filter **560**, as shown in FIG. **11**I.
(154) FIGS. **17**A-**17**D depict another embodiment of a recovery tank **810** having the same configuration as recovery tank **520**, but that includes a peripheral seal **814** extending around an outer perimeter region thereof of the separator **812**. The peripheral seal **814** can be made from a variety of materials, such as rubber, plastic, elastic, or other materials. When placed within a container **816** having a lid **815**, the peripheral seal **814** can close off any gap left between the separator **812** and the sidewalls of the container **816**, thereby preventing the passage of fluid and/or debris around the separator **812**. In other words, a water-tight seal is formed. In operation, fluid and debris drawn into the container **816** must pass through the separator **812** via the drain **818**, rather than avoiding the separation process. Similar to embodiments described above, the separator **812** also includes a deflector **819** in the form of a wedge-shaped protrusion. While the deflector **819** can have any form or orientation, the deflector **819** is shown angled downward toward the area of the drain **818**. As fluid and debris are drawn into the recovery tank **810**, the deflector **819** can assist in preventing this fluid and debris from impacting unwanted areas of the recovery tank **810**, e.g., the

lid **815**.
(155) FIGS. **18**A-**18**D illustrate other embodiments of recovery tanks **820***a-d*, each having a configuration similar to recovery tank **420**, but that have a hollow standpipe positioned at various locations. When coupled to a cleaning device (e.g., cleaning device **10**) for various cleaning operations, such as those described herein, the recovery tanks **820***a-d* can be received by a complimentary structure located on the cleaning device (not shown). In this configuration, fluid and debris can still enter the recovery tank via the hollow standpipe, and the overall operation of the recovery assemblies **820***a-d* can occur in a substantially similar manner as described previously with respect to various embodiments detailed above.
(156) FIG. **18**A depicts a recovery tank **820***a* having a slanted lower sidewall **824***a*. The hollow standpipe **822***a* extends upward from the slanted sidewall **824***a*. FIG. **18**B depicts a recovery tank **820***b* having a rear carve-out portion in a rear sidewall **824***b* thereof. The hollow standpipe **822***b* extends laterally from the rear sidewall **824***b* and protrudes into the container **826***b* in an upward manner, curving to compensate for the initial lateral extension. FIG. **18**C depicts a recovery tank **820***c* having an irregularly shaped hollow standpipe **822***c*. The hollow standpipe **822***c* is shown extending into the container **828***c* from a bottom surface **824***c* thereof, before curving rearward at an approximate right angle. The hollow standpipe **822***c* extends along a rear sidewall **826***c* of the container **828***c* and then is depicted curving frontward before extending upward in a central portion of the container **828***c*. FIG. **18**D depicts the recovery tank **820***d* having a similar configuration as recovery tank **820***a*, depicted in FIG. **18**A, except that instead of a slanted lower sidewall, recovery tank **820***d* has a curved lower sidewall **824***d* from which the hollow standpipe **822***d* extends.
(157) FIGS. **19**A-**19**B depict another embodiment of a recovery tank **830** having an external hollow standpipe **832**. The hollow standpipe **832** is shown extending upward at a rear portion of the recovery tank **830** and then curving laterally such that it extends adjacent a rearward side of a lid **834**. The hollow standpipe **832**, like those described previously, can be in fluid communication with the interior of recovery tank **830**, such that fluid and debris can be drawn therethrough to be deposited within the container **836**. Although not shown in FIGS. **19**A-**19**B, the recovery tank **830** can include a separator (e.g., separator **812**), and the hollow standpipe **832** can be configured to deposit drawn-in fluid and debris onto the separator, to allow the drawn-in debris to be separated from the fluid.
(158) FIG. **20** depicts another embodiment of a recovery tank **840**. In this embodiment, the separator **842** is fixedly coupled to (e.g., unitary or integral with) the container **844** such that it cannot be removed from the container. As with prior embodiments, a hollow standpipe **846** can extend through the separator **842**. However, the hollow standpipe **846** can be fixed to or integral with the separator **842**. In this manner, the container **844**, the separator **842**, and the hollow standpipe **846** are integral with one another. The recovery tank **840** can also include a spout **845** disposed in the rear of the container **844**, which can allow for the disposal of captured fluid and small debris from the container **844**. A lid **848** can be removably coupled to the container **844** and can include a lower extension **848***a* extending downward over the hollow standpipe **846**. The extension **848***a* can redirect fluid and debris drawn into the container **844** toward the hollow standpipe **846**, thus preventing fluid and debris from flowing through the lid **848**. The container **844** can also include a removable bottom **847** that can allow for access to the region of the container **844** beneath the separator **842**. The removable bottom **847** can be attached to the container **844** in any number of ways, including a friction fit, a hinge, etc. The removable bottom **847** can include an intake port **847***a* with an upward extending collar **847***b*. The collar **847***b* can receive the hollow standpipe **846** therein and allow for the introduction of fluid and debris into the container therethrough.
(159) In addition to dry cleaning modes, the cleaning device is also operable in wet cleaning modes which employ the use of a fluid supply tank, a fluid pump, spray nozzles, and deflectors, in addition to the vacuum assembly with sub-assemblies described previously. FIGS. **12**A-**15**D

illustrate components of a fluid assembly for use in wet cleaning modes and operations, such as a fluid supply tank **610**, tubing **620**, a fluid pump **622**, a fluid application face **624**, and spray nozzles **630**

(160) As explained above, the body housing **210** includes a second cavity on the upper front face **210***b* that is shaped to receive and retain a fluid supply tank **610**. In the exemplary embodiment, as shown in FIGS. **12**A-**12**F, the fluid supply tank **610** includes a valve cap **612** removably threaded to a fluid tank **614**. The fluid tank **614** is divided into an upper tier **614***a* and a lower tier **614***b*, and each of the tiers **614***a*, **614***b* has a substantially hemi-cylindrical shape. The upper tier **614***a* is shaped to conform with the overall form of the body housing **210**, providing an outer limit for the upper front face **210***b* of the body housing **210**. The lower tier **614***b* is smaller than the upper tier **614***a* and is received internally within the body housing **210**, occupying part of the second area. The fluid tank **614** further defines a hollow interior, which receives fluid to be supplied by the cleaning device **10** during a wet cleaning operation. The valve cap **612** of the fluid supply tank **610** is threadably coupled to the lower tier **614***a*, and it permits one-way flow of fluid therethrough—from the hollow interior of the fluid tank **614** to externally thereof. The valve cap **612** is sized to be received in the second cavity **210***f* of the body housing **210** in a complementary recess. When the valve cap **612** is properly seated in the second cavity, fluid is able to flow therethrough, and when the valve cap **612** is not properly seated, the valve cap **612** can act to seal the fluid within the fluid supply tank **610**.

(161) As shown in FIGS. **12**E and **12**F, the lower tier **614***b* can further include a bleeder valve **616** and a retention depression **618**. As the fluid tank **614** empties of fluid, the bleeder valve **616** can allow for an equalization of pressure in the hollow interior to facilitate a constant supply of fluid to the cleaning device **10**, without creating a vacuum within the hollow interior. The retention depression **618**, in the exemplary embodiment, is a depression disposed in the lower tier **614***b* which is shaped to receive the tank engagement feature **211** on the body housing **210**, introduced above and depicted in FIGS. **8**A and **8**B. As explained above, actuation of the fluid tank switch **212** will allow for the fluid supply tank **610** to be removed from the second area, and specifically, in the exemplary embodiment, actuation of the fluid tank switch **212** retracts the tank engagement feature **211** into the body housing **210** so that it no longer engages the retention depression **618**.

(162) FIGS. **13**A-**13**I and **23** depict various components used in wet cleaning modes, including tubing **620**, a fluid pump **622**, and fluid application face **624**, and spray nozzles **630**. During a wet cleaning mode, fluid contained within the fluid supply tank **610** is expelled from the cleaning device **10** and onto a surface to be cleaned. When fluid leaves the fluid supply tank **610**, it is transported through the cleaning device **10** in tubing **620**. The tubing **620** connects to the fluid supply tank **610**, travels down the body assembly **200**, and then into the head assembly **100**.

(163) FIG. **13**A depicts an internal view of the head assembly **100** without the top side **110***b* of the head housing **110**. FIG. **13**B depicts only the tubing **620**, the fluid pump **622**, and the spray nozzles **630**, which are all contained within the head assembly **100**. The fluid pump **630** is configured to pump fluid from the fluid supply tank **610** through the cleaning device **10**. The tubing **630** connects the fluid supply tank **610** to the pump **622** and then leaves the pump **622** before splitting and finally connecting to the left and right spray nozzles **630**L, **630**R disposed on the fluid application face **624** of the head assembly **100**, as discussed above. Therefore, in this configuration, the fluid supply tank **610** is in fluid communication with the left and right spray nozzles **630**L, **630**R by way of the fluid pump **622** and tubing **620**. Operation of the cleaning device **10** during wet cleaning modes will be described in greater detail below.

(164) As previously explained and as shown in FIG. **13**C, the head assembly **100** includes a fluid application face **624** disposed on a front side **110***e* thereof. The fluid application face **624** is mounted to an upper portion of the front side **110***e* of the head housing **110**, and it spans a substantial width of the head housing between the left and right spray nozzles **630**L, **630**R. The face **624** is substantially cylindrical and concave in shape, protruding slightly toward a middle of

the face **624**. When viewed from a side perspective, such as seen in a partial cross-sectional view of FIG. **13**I, the face **624** is concave enough to allow for the left and right spray nozzles **630**L, **630**R to be fully contained within the resulting depression.

(165) Also contained on the fluid application face **624** are left and right deflectors **640**L, **640**R. Each deflector can be in the form of a projection extending generally perpendicular to the application face **624**. Both of the left and right deflectors **640**L, **640**R are shown as having a curved configuration, curving away from the spray nozzles **630**L, **630**R, however the deflectors can be planar or they can have alternative shapes and orientations in other embodiments. In the illustrated embodiment, the left and right deflectors **640**L, **640**R are molded directly onto the fluid application face **624**. In other embodiments, these deflectors could be removably attached to the fluid application face **624**, or may be attached—either molded or removably so—to another feature. The left and right deflectors **640**L, **640**R are at least partially disposed in the spray paths of the left and right spray nozzles **630**L, **630**R respectively so that, during a cleaning operation, the deflectors **640**L, **640**R are impacted by sprayed fluid. In an exemplary embodiment, the deflectors **640**L, **640**R are positioned a distance from each spray nozzle **630**L, **630**R that is sufficient to allow fluid spray from the spray nozzles to encounter the deflectors and to be deflected back toward the end of the brushroll, thus aiding in delivering fluid to the ends of the brushroll.

(166) The left and right spray nozzles **630**L, **630**R protrude from the fluid application face **624** and are generally aimed inward at each other, while also being aimed toward the brushroll **150**. In an exemplary embodiment, each of the left and right spray nozzles **630**L, **630**R is substantially similar, and as such, description will be made to only one spray nozzle **630** in a general manner. FIGS. **13**D-**13**F show the right side of the head assembly **100**, including the fluid application face **624**, right spray nozzle **630**R, and tubing **620**, while FIGS. **13**G-**13**I show the left side of the head assembly.

(167) FIG. **23** depicts a portion of a fluid application face **624**′ according to another embodiment. The fluid application face **624**′ can function similarly to the fluid application face **640**, through the cooperation of the right spray nozzle **630**R′ and the right deflector **640**R′, however the fluid application face **624**′ can include a secondary right deflector **640**R′ mounted thereon. The secondary right deflector **641**R′ is depicted in FIG. **23** as being larger than the right deflector **640**R′ and is also depicted as being positioned closer to the right spray nozzle **630**R′ than the right deflector **640**R′. However, the specific form and location of the secondary right spray nozzle **640**R′ could vary. In operation, the right spray nozzle **630**R′ and the secondary right spray nozzle **641**R′ can operate to redirect fluid emitted by the right spray nozzle **630**R′. The secondary right spray nozzle **641**R′ can be configured to direct additional fluid to a periphery of a brushroll.

(168) FIGS. **14**A-**14**D depict a spray nozzle **630** according to an embodiment. The spray nozzle **630** has a generally cylindrical form and includes a discharge port **632** in fluid communication with the fluid supply tank **610** and through which fluid is emitted. The discharge port **632** itself is wedge-shaped with a central hole **634**, and this arrangement creates a planar, fan-shaped spray pattern when fluid is emitted from the discharge port **632**. This planar, fan-shaped pattern can, in some embodiments, be between 5°-60°. In other embodiment, the fan-shaped pattern can be between 10°-50°. In still other embodiments, the fan-shaped pattern can be between 15°-45°.

(169) In some embodiments, the discharge port **632** can be rotated such that a spray angle θ is offset from a vertical axis by a few degrees. This offset can be anywhere from 1°-30° in either the clockwise or counter-clockwise orientation. In some embodiments, the offset is between 5°-25°. In still other embodiments, the offset is between 10°-20°. In the exemplary embodiment, the discharge port of the left spray nozzle is shown rotated approximately 15° counterclockwise from a vertical orientation. The spray nozzle **630** can also be aligned with a plane tangential to the surface of the brushroll **150** at a point on the brushroll **150** closest to the spray nozzle **630**, such that the angle of offset and the tangential plane would be substantially parallel, in order to maximize fluid coverage onto the brushroll **150**. The angle of offset φ could also vary by several degrees in either direction,

and in some embodiments may vary by as many as 1°, 2°, 3°, 4°, or 5° from the tangential plane. An exemplary view of the spray nozzle **630** with a spray angle skewed from the tangential plane is shown n FIG. **14**D.

(170) FIGS. **15**A-**15**D depict a fluid application face **650** with built-in spray nozzles **652** according to another embodiment. The fluid application face **650** is shown in FIG. **15**A, and it includes a single outlet **654** extending nearly the entire width of the face. At a rear side of the fluid application face **650** is a port **656** that is able to connect with tubing (not pictured) in order to fluidly couple the fluid application face **650** to a fluid path. Nested within the outlet **654** on the front side are spray nozzles **652** spaced evenly at the outlet **654**, and they are configured to output fluid along a path as shown in FIG. **15**C. In an exemplary embodiment, four spray nozzles **652** are dispersed evenly across the width of the outlet, however in other embodiments, the number of spray nozzles **652** and their positions can vary so that they are evenly or unevenly spaced. The spray nozzle **652** introduces fluid into the outlet, and the fluid flows in a path defined by the rounded contours of the outlet **654** before being emitted in a direction aimed toward a brushroll **150**. The supplied fluid volume can be large enough that fluid flows laterally within the outlet **654** and is therefore applied to a brushroll **150** from an entirety of the width of the outlet **654** in order to evenly coat the brushroll **150** with fluid, thereby preventing streaking during a cleaning operation.

(171) FIG. **15**D depicts a partial cross-section of a head assembly having the fluid application face **650** therein. In the illustrated embodiment, a comb **658** is disposed proximate to the brushroll **150**. During a cleaning operation, as the brushroll **150** rotates, the brushroll **150** may capture and pick up fibrous material. As the brushroll **150** rotates, if allowed, the fibrous material can become entwined around the brushroll **150** and interfere with the cleaning capabilities of the cleaning system **10**. The presence of the comb **658** assists in capturing fibrous material to prevent entwinement with the brushroll **150**, which then allows an operator to remove the captured material. Also depicted in FIG. **15**D is another embodiment of a rubber guide **660**, similar to the embodiment described above. While not shown, the comb **658** can be disposed on the brushroll cover **140** of FIGS. **5**A and **5**B, or on any embodiment presented herein.

(172) In another embodiment, the head assembly **100** can include at least one passive roller. FIG. **21** illustrates a first passive roller **161***a* and a second passive roller **161***b*, although one or the other may be used in place of both passive rollers **161***a*, **161***b*. The passive rollers **161***a*, **161***b* are substantially cylindrical and can be freely rotatable about central axes thereof. The first and/or second passive roller **161***a*, **161***b* can be configured to remove fluid from a surface and redirect it to a position where it can be drawn into the head assembly **100**. The first and/or second passive rollers **161***a*, **161***b* can also be configured to remove excess fluid from the brushroll **160**. The first passive roller **161***a* is shown disposed near a floor surface, while the second passive roller **161***b* is shown positioned near the central intake **126**. However, these locations can vary depending upon various arrangements of components as described herein.

(173) In another embodiment, the brushroll cover can aid in removing excess fluid from the brushroll. FIG. **22** depicts the head assembly **100** including a brushroll cover **140**′ having an arced inner wall extension **141**. The extension **141** can extend toward and into contact with the brushroll **160** to assist in the removal of excess fluid and debris trapped by the brushroll **160** itself during a cleaning operation. While the extension **141** is shown in FIG. **22** having leading and trailing edges **143***a*, **143***b*, the extension **141** can also gradually taper away from the brushroll **160**.

(174) In operations employing the fluid mode, such as in the wet vacuum modes referenced above, fluid is applied to elements of the device, a surface to be cleaned, or a combination thereof, in order to aid in dirt and waste removal.

(175) Wet cleaning modes can be activated through actuation of a wet cleaning switch **662**, which in one embodiment can be located on the top side of the body housing **210**. In order to prepare for cleaning in such modes, the fluid supply tank **610** is filled with a fluid and retained within the body housing **210**. The cleaning device **10** can operate normally in a dry cleaning mode in which the

vacuum assembly **400** is employed to suction in dirt and debris, but upon actuation of the wet cleaning switch **662**, the cleaning device **10** will also begin to emit fluid to aid in the cleaning process.

(176) In an exemplary embodiment, fluid is pumped out of the fluid supply tank **610** by the fluid pump **622** and is forced through the tubing **620** and out of the left and right spray nozzles **630**L, **630**R. The spray nozzles **630**L, **630**R are directed toward the brushroll **150** in order to spray a central region of the brushroll **150** with fluid. Some of the sprayed fluid is also directed at the deflectors, which as indicated above will deflect the sprayed fluid onto a different region of the brushroll **150**, such as an outer region on the left and right sides adjacent the central region. In this way, the brushroll **150** can be substantially and evenly coated by fluid emitted from the spray nozzles **630**L, **630**R. When the coated brushroll **150** spins over a cleaning surface, the rotation of the brushroll **150** and the emitted fluid can work together to loosen dirt and debris from the surface. Once the dirt and debris is loosened, it mixes with the emitted fluid and creates a slurry which can then be suctioned into the cleaning device **10** through the central intake **126**. From the central intake **126**, the slurry travels up the hosing **230** and into the container **422** of the recovery tank **420** via the standpipe **424** where it can then be separated into basic components with the separator **440**. The slurry will travel down the sloped portions of the separator and through the drain **442**. Larger debris will be captured by the ridges of the drain **442**, while smaller debris and fluid will fall to the bottom of the container **422**. As the slurry enters the container **422** through the standpipe **424**, any particulates and fluid which enter with excessive velocity will impact the deflector **640** and be redirected toward the rear of the container **422** and eventually toward the drain **442**. The slurry will undergo separation, with the fluid and smaller particles passing through the drain **442** and the larger particles being retained by the ridges **446**.

(177) When the fluid level detectors **449***a*, **449***b* sense that the fluid in the container **422** has reached the max level, an indicator will appear on the body assembly **200** indicating that the fluid must be emptied. In one embodiment, the cleaning device **10** can indicate that the fluid level has reached the max level by providing a red water droplet on the cleaning device **10**. The indicator can appear anywhere on the cleaning device **10**, and, for example, may appear on the top side **210***d* of the housing body **210**. At this point, the latch assembly **470** of the recovery tank **420** can be actuated, and the recovery tank **420** can be removed from the first cavity within the body housing **210**. Without needing to remove the lid, any waste in the bottom of the container **422** can be emptied through the spout **450** in the top of the recovery tank **420**. The container **422** can be tipped to guide the retained fluid toward the rear of the container **422**, closer to the channel **451**. To continue disposal, the container **422** can be tipped further to allow fluid to flow through the channel **451** and out the spout **450**, all while larger particles and debris retained by the separator **440** remain within the container **422**, unable to be disposed with the fluid. Once waste in the bottom of the container **422** has been emptied, the separator **440** can be removed from the container **422**. Larger particles captured by the separator **440**, which were too large to end up in the bottom of the container **422**, will be removed with the separator **440**. These larger particles can then be disposed of.

(178) During a wet cleaning operation, the fluid supply tank **610** can run low or run out of fluid. When the supply of fluid reaches a low point, such as when the fluid supply tank **610** is empty, the cleaning device **10** will be prevented from operating in a wet cleaning operation. If this happens, an alert can be presented on the device **10** that the fluid supply tank **610** must be refilled before a wet cleaning operation can begin, or, if one was in progress, can continue. In some embodiments, the alert can use the same water droplet as is used to indicate a max fluid level has been reached. In other embodiments, when indicating that the fluid supply tank **610** has run low, the water droplet can appear to pulse in a blue color, indicating that the fluid supply tank requires additional fluid. Once the fluid supply tank **610** is refilled, the cleaning device **10** can continue in the wet cleaning operation as before, or it may begin a new wet cleaning operation.

(179) In other embodiments, as shown in FIGS. **16**A-**16**G, a charging mat **700** can be provided for use with the cleaning device **10**. The illustrated charging mat **700** includes a substantially square base **710** with a depressed region **720** in the center. The depressed region **720** can be sized to correspond to the bottom of the head assembly **100**, and it can support the cleaning device **10** therein. The depressed region **720** can also include areas to receive the large and small wheels **112**, **114**, the brushroll in use, such as brushroll **150** or brushroll **160**, and the overall head housing **110**. The charging mat **700** can also include accessory holders **730** at a rear thereof, which can act as receptacles to receive attachments for the cleaning device **10**. These attachments vary, and can include replacement brushrolls, such as brushroll **150** and brushroll **160**, and other tools for cleaning. In some embodiments, the accessory holders **730** may not be included.
(180) Also located at the rear end of the charging mat **700** is a charging port **740** extending upwardly from the base **710**. The charging port **740** is configured to electrically couple to electrical contacts **220** located on the cleaning device **10**. The contacts **220** on the cleaning device **10** can be found at the rear of the body assembly **210**, as depicted in FIG. **16**G. Extending from the back of the charging mat **700** is a plug **750**, which can be inserted into an outlet to provide the entire charging mat **700**—and, in turn, the cleaning device **10**—with power. When connected to the charging mat **700**, the cleaning device **10** may turn on a battery life indicator to represent a simplified level of charge. In an embodiment, the battery life indicator is a battery image. As the cleaning device **10** charges to various levels, such as 25%, 50%, 75% and 100% capacity, the battery life indicator can proportionally indicate a relative charge level of the cleaning device. In other embodiments, the battery life indicator can be a different image, such as a pie chart, or a simple percentage indicator.
(181) As the cleaning device **10** is used, the same battery indicator can deplete as the device **10** loses power. The battery indicator can indicate the same levels when in use as when charging, displaying the stages in a reverse order as the cleaning device **10** uses power. In some embodiments, the cleaning device **10** can rely on a separate indicator for use during operation of the device **10**, in addition to the indicator for use during charging.
(182) Certain exemplary implementations have been described to provide an overall understanding of the principles of the structure, function, manufacture, and use of the systems, devices, and methods disclosed herein. One or more examples of these implementations have been illustrated in the accompanying drawings. Those skilled in the art will understand that the systems, devices, and methods specifically described herein and illustrated in the accompanying drawings are non-limiting exemplary implementations and that the scope of the present invention is defined solely by the claims. The features illustrated or described in connection with one exemplary implementation may be combined with the features of other implementations. Such modifications and variations are intended to be included within the scope of the present invention. Further, in the present disclosure, like-named components of the implementations generally have similar features, and thus within a particular implementation each feature of each like-named component is not necessarily fully elaborated upon.
(183) Approximating language, as used herein throughout the specification and claims, may be applied to modify any quantitative representation that could permissibly vary without resulting in a change in the basic function to which it is related. Accordingly, a value modified by a term or terms, such as “about,” “approximately,” and “substantially,” are not to be limited to the precise value specified. In at least some instances, the approximating language may correspond to the precision of an instrument for measuring the value. Here and throughout the specification and claims, range limitations may be combined and/or interchanged, such ranges are identified and include all the sub-ranges contained therein unless context or language indicates otherwise.
(184) One skilled in the art will appreciate further features and advantages of the invention based on the above-described implementations. Accordingly, the present application is not to be limited

by what has been particularly shown and described, except as indicated by the appended claims. All publications and references cited herein are expressly incorporated by reference in their entirety.

Claims

1. A fluid recovery tank for use on a cleaning device, comprising: a container defining an inner chamber therein, the container having a suction outlet configured to couple to a suction source for allowing a suction force to be applied to the inner chamber, and the container having a fluid inlet for allowing fluid to be drawn into the chamber by the suction force; a separator removably disposed within the container and having a separator opening formed therein and configured to allow fluid to pass therethrough while substantially preventing solid debris from passing therethrough such that solid debris is retained within the separator; and a button extending forward from a front sidewall of the container such that the button is housed external to and forward of the container and configured to move between a locked configuration in which the button is configured to engage the cleaning device to retain the container on the cleaning device, and an unlocked configuration in which the button is configured to disengage from the cleaning device to allow the container to be removed from the cleaning device.
2. The fluid recovery tank of claim 1, wherein a top of the button is substantially parallel to a top of the container when the button is in the locked configuration and the unlocked configuration.
3. The fluid recovery tank of claim 1, wherein the button is biased to the locked configuration.
4. The fluid recovery tank of claim 1, wherein a top of the button extends above a top of the container when the button is in the locked configuration.
5. The fluid recovery tank of claim 4, wherein the top of the button extends above the top of the container when the button is in the unlocked configuration.
6. The fluid recovery tank of claim 1, wherein the button is disposed within a housing formed on an external surface of the container, and wherein the housing includes a biasing element disposed therein and biases the button to the locked configuration.
7. The fluid recovery tank of claim 1, wherein the button includes a protrusion configured to be received by a complementary depression on the cleaning device.
8. The fluid recovery tank of claim 7, wherein the button is curved to align with a contour of the cleaning device.
9. The fluid recovery tank of claim 1, further comprising a lid removably disposed within a top opening in the separator, the lid defining the suction outlet.
10. The fluid recovery tank of claim 9, wherein the lid includes at least one filter disposed therein and extending across the suction outlet.
11. The fluid recovery tank of claim 10, wherein the at least one filter is a first filter material having a first porosity and a second filter material having a second porosity greater than the first porosity.
12. The fluid recovery tank of claim 1, wherein the fluid inlet comprises a hollow standpipe extending into the inner chamber.