(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 4 324 373 A2**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
21.02.2024 Bulletin 2024/08

(21) Application number: **23187532.9**

(22) Date of filing: **25.07.2023**

(51) International Patent Classification (IPC):
A47L 5/22 *(2006.01)* ***A47L 5/24*** *(2006.01)*
A47L 5/36 *(2006.01)* ***A47L 9/00*** *(2006.01)*

(52) Cooperative Patent Classification (CPC):
A47L 5/225; A47L 5/24; A47L 5/36; A47L 5/365; A47L 9/0063; A47L 2201/024

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

(30) Priority: **03.08.2022 US 202217880499**

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(54) **DOCKING UNIT FOR A SURFACE CLEANING APPARATUS**

(57) A mobile free standing air treatment unit comprises an air treatment unit, a first docking unit for a first vacuum cleaner comprising a first dirty air inlet in flow communication with an outlet port of the first vacuum cleaner and a first clean air outlet in flow communication with an inlet port of the first vacuum cleaner and a vacuuming unit, wherein the mobile free standing air treatment unit is operable in a docking mode using a first air flow path and a cleaning mode using a second air flow path.

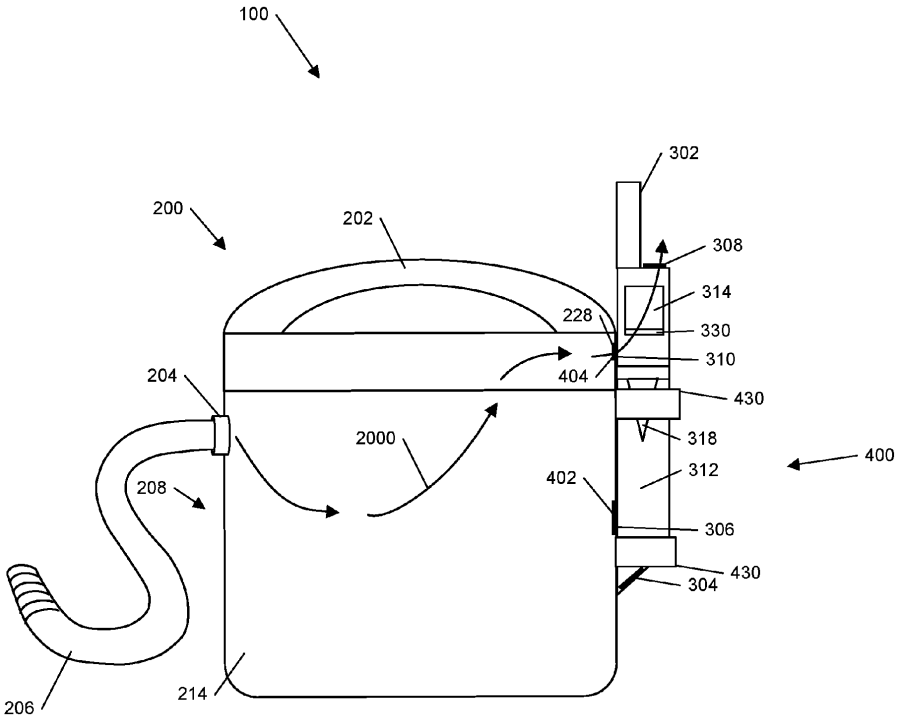

FIG. 3

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Description

FIELD

[0001] This application relates to the field of surface cleaning apparatus and docking units for use with the same.

INTRODUCTION

[0002] The following is not an admission that anything discussed below is part of the prior art or part of the common general knowledge of a person skilled in the art.

[0003] Various types of surface cleaning apparatus are known, including upright surface cleaning apparatus, canister surface cleaning apparatus, stick surface cleaning apparatus, central vacuum systems, and hand carriable surface cleaning apparatus such as hand vacuums. Further, various designs for cyclonic hand vacuum cleaners, including battery operated cyclonic hand vacuum cleaners, are known in the art.

[0004] Various types of docking units are known which include one or more surface cleaning apparatus. The dirt collection regions of a docking unit may be internal to the docking unit. The docking units may also include a suction motor and fan system used to empty the surface cleaning apparatus while the surface cleaning apparatus is in communication with the docking system.

SUMMARY

[0005] In accordance with one aspect of this disclosure, a mobile free standing air treatment unit is provided having an air treatment unit and a first docking unit for a first vacuum cleaner. The mobile free standing air treatment unit further includes a vacuuming unit. The mobile free standing air treatment unit is operable in a first docking mode in which the first vacuum cleaner is docked at the first docking unit and the mobile free standing air treatment unit is operable to withdraw dirt from the first vacuum cleaner into the air treatment unit and a cleaning mode in which the first vacuum cleaner is docked at the first docking unit and the mobile free standing air treatment unit is operable to clean a surface. An advantage of this design is that the dirt collected from multiple sources may be stored in a single region to be emptied, thereby simplifying the emptying process. Additionally, the suction motor and/or energy storage member of the first vacuum cleaner may be used to power the cleaning mode of the mobile free standing air treatment unit. Accordingly, the mobile free standing air treatment unit in combination with the first vacuum cleaner provides essentially a second vacuum cleaner which may have a larger dirt collection capacity. Accordingly, by using the suction motor and/or energy storage member of the first vacuum cleaner as part of the mobile free standing air treatment unit, a second vacuum cleaner may be provided, thereby saving cost, simplifying manufacture, and reducing weight of the unit.

[0006] In accordance with this aspect, there is provided: a mobile free standing air treatment unit comprising:

(a) an air treatment unit;
(b) a first docking unit for a first vacuum cleaner comprising a first dirty air inlet and a first clean air outlet wherein, when a first vacuum cleaner is docked at the first docking unit, the first dirty air inlet is connected in flow communication with an outlet port of the first vacuum cleaner, which outlet port is downstream from a dirt collection unit of the first vacuum cleaner, and the first clean air outlet is connected in flow communication with an inlet port of the first vacuum cleaner, which inlet port is upstream of a motor and fan assembly of the first vacuum cleaner;
(c) a vacuuming unit comprising a second dirty air inlet;
(d) a first air flow path extending from the first dirty air inlet to the first clean air outlet, wherein the air treatment unit is provided in the first air flow path;
(e) a second air flow path extending from the second dirty air inlet to the first clean air outlet, wherein the air treatment unit is also provided in the second air flow path,

wherein the mobile free standing air treatment unit is operable in a first docking mode in which the first vacuum cleaner is docked at the first docking unit and is connected in air flow communication with the first dirty air inlet whereby the mobile free standing air treatment unit is operable using the first air flow path to withdraw dirt from the first vacuum cleaner and collect withdrawn dirt in the air treatment unit. wherein the mobile free standing air treatment unit is operable in a cleaning mode in which the first vacuum cleaner is docked at the first docking unit and the first clean air outlet is connected in air flow communication with the inlet port of the first vacuum cleaner whereby the mobile free standing air treatment unit is operable using the second air flow path to clean a surface.

[0007] In any embodiment, the the mobile free standing air treatment unit may have an absence of a fan and motor assembly.

[0008] In any embodiment, when the first vacuum cleaner is docked at the first docking unit, the fan and motor assembly of the first vacuum cleaner may be the sole air moving member of a combined mobile free standing air treatment unit and first vacuum cleaner. Alternately, the mobile free standing air treatment unit may also have a fan and motor assembly which may be used concurrently with the fan and motor assembly of the first vacuum cleaner.

[0009] In any embodiment, the air treatment unit may be removably mounted to the mobile free standing air treatment unit, the air treatment unit may have an openable door and, when the door is opened, dirt may be emptyable from the air treatment unit, and the air treat-

ment unit may be removable from the mobile free standing air treatment unit with the door closed.

[0010] In any embodiment, the air treatment unit may comprise a first stage air treatment member, which may comprise a first dirt collection region, and a downstream second stage comprising a second stage air treatment member.

[0011] In any embodiment, the first dirt collection region may comprise a first stage cyclone and the second stage air treatment member may comprise a second cyclone.

[0012] In any embodiment, the first dirt collection region may comprise a first stage air treatment chamber having a dirt collection region at a lower end thereof and the second stage air treatment member may comprise a second cyclone.

[0013] In any embodiment, an air impermeable bag may be removably receivable in the first dirt collection region whereby, in operation, dirt may be collected in the bag and the first dirt collection region may be openable and, when the first dirt collection region is opened, the bag may be removable.

[0014] In any embodiment, the first dirt collection region may have an openable lid and, when the lid is opened, the bag may be removable upwardly.

[0015] In any embodiment, the vacuuming unit may include a flexible hose and, in the second cleaning mode, the flexible hose may be positioned upstream of the second dirty air inlet.

[0016] In any embodiment, the mobile free standing air treatment unit may further include a second docking unit for a second vacuum cleaner and a third air flow path, the second docking unit may comprise a third dirty air inlet and the third air flow path extending from the third dirty air inlet to the first clean air outlet, wherein the mobile free standing air treatment unit may be operable in a second docking mode in which the first vacuum cleaner is docked at the first docking unit and is connected in air flow communication with the first dirty air inlet and the second vacuum cleaner is docked at the second docking unit and is connected in air flow communication with the first dirty air inlet, whereby the mobile free standing air treatment unit may be operable using the third air flow path to withdraw dirt from the second vacuum cleaner.

[0017] In any embodiment, the air treatment unit may also be provided in the third air flow path and, in the second docking mode the mobile free standing air treatment unit may be operable using the third air flow path to withdraw dirt from the second vacuum cleaner and collect withdrawn dirt in the air treatment unit.

[0018] In any embodiment, the second vacuum cleaner may be an autonomous vacuum cleaner.

[0019] In any embodiment, the first vacuum cleaner may have an on board energy storage member and the first docking unit further may comprise a first charging unit whereby the first vacuum cleaner may be rechargeable when docked at the first docking unit.

[0020] In accordance with another aspect of this disclosure, a docking apparatus is provided with an air treatment unit, a first docking unit and a second docking unit. The first docking unit is for a first vacuum cleaner and the second docking unit is for a second vacuum cleaner. The air treatment unit is positioned in a first air flow path of the first vacuum cleaner and a second air flow path of the second vacuum cleaner. An advantage of this design is that the dirt collection regions of each of the first and second vacuum cleaners may be emptied into a single location, thereby facilitating simplified emptying of multiple devices. Additionally, the docking apparatus may be used to recharge each of the first and second vacuum cleaners. Optionally, the fan and motor assembly and/or energy storage member of the first vacuum cleaner may be used to operate the docking unit when the second vacuum cleaner is being emptied into the dock.

[0021] In accordance with this aspect, there is provided: a docking apparatus comprising:

(a) an air treatment unit;
(b) a first docking unit for a first vacuum cleaner comprising a first dirty air inlet and a first clean air outlet wherein, when a first vacuum cleaner is docked at the first docking unit, the first dirty air inlet is connected in flow communication with an outlet port of the first vacuum cleaner, which outlet port is downstream from a dirt collection unit of the first vacuum cleaner, and the first clean air outlet is connected in flow communication with an inlet port of the first vacuum cleaner, which inlet port is upstream of a motor and fan assembly of the first vacuum cleaner;
(c) a second docking unit comprising a second dirty air inlet, wherein, when a second vacuum cleaner is docked at the first docking unit, the second dirty air inlet is connected in flow communication with an outlet port of the second vacuum cleaner, which outlet port is downstream from a dirt collection unit of the second vacuum cleaner;
(d) a first air flow path extending from the first dirty air inlet to the first clean air outlet, wherein the air treatment unit is provided in the first air flow path;
(e) a second air flow path extending from the second dirty air inlet to the first clean air outlet, wherein the air treatment unit is also provided in the second air flow path,

wherein the docking apparatus is operable in a first docking mode in which the first vacuum cleaner is docked at the first docking unit and is connected in air flow communication with the first dirty air inlet whereby the docking apparatus is operable using the first air flow path to withdraw dirt from the first vacuum cleaner and collect withdrawn dirt in the air treatment unit.

wherein the docking apparatus is operable in a second docking mode in which the first vacuum cleaner is docked at the first docking unit and is connected in air flow communication with the first clean air outlet and the second vacuum cleaner is docked at the second docking unit and

is connected in air flow communication with the second dirty air inlet whereby the docking apparatus is operable using the second air flow path to withdraw dirt from the second vacuum cleaner and collect withdrawn dirt in the air treatment unit.

[0022] In accordance with another aspect of this disclosure, a docking unit is provided with an air treatment unit comprising an air impermeable bag removably receivable in the first dirt collection region and a first a first docking unit for a first vacuum cleaner. Dirt may be withdrawn from the first vacuum cleaner into the bag and the dirt collection chamber may be opened to remove the bag. When the dirt collection chamber is opened, the docking unit is inoperable. An advantage of this design is that a user may be prevented from accidentally operating the docking unit when the dirt collection region is opened, thereby preventing accidental evacuation of the first vacuum cleaner while the dirt collection region is opened.

[0023] In accordance with this aspect, there is provided: a docking unit comprising:

(a) an air treatment unit comprising a first stage air treatment stage, which comprises an openable first dirt collection region, wherein an air impermeable bag is removably receivable in the first dirt collection region;
(b) a first docking unit for a first vacuum cleaner comprising a first dirty air inlet wherein, when a first vacuum cleaner is docked at the first docking unit, the first dirty air inlet is connected in flow communication with an outlet port of the first vacuum cleaner, which outlet port is downstream from a dirt collection unit of the first vacuum cleaner; and,
(c) a first air flow path extending from the first dirty air inlet to a clean air outlet, wherein the air treatment unit is provided in the first air flow path,

wherein the docking unit is operable in a first docking mode in which the first vacuum cleaner is docked at the first docking unit and is connected in air flow communication with the first dirty air inlet whereby the docking unit is operable using the first air flow path to withdraw dirt from the first vacuum cleaner and collect withdrawn dirt in the bag, wherein, when the first dirt collection region is opened, the bag is removable,
and wherein the docking unit is inoperable when the first dirt collection region is open.

[0024] In any embodiment, the docking unit may be inoperable when a bag is absent from the first dirt collection region.

[0025] In any embodiment, the first dirt collection region may have an openable lid and, when the lid is opened, the bag is removable upwardly.

[0026] In any embodiment, the air treatment unit may comprise a second stage air treatment member comprising a second dirt collection region and dirt collected in the second dirt collection region may be emptyable into the bag.

[0027] These and other aspects and features of various embodiments will be described in greater detail below.

BRIEF DESCRIPTION OF THE DRAWINGS

[0028] For a better understanding of the described embodiments and to show more clearly how they may be carried into effect, reference will now be made, by way of example, to the accompanying drawings in which:

FIG. 1 is a schematic view of a mobile free standing air treatment unit and a first vacuum cleaner in accordance with an embodiment;

FIG. 2 is a schematic view of the mobile free standing air treatment unit of FIG. 1 in a first docking mode in which a first vacuum cleaner is docked at a first docking unit and is connected in air flow communication with a first dirty air inlet;

FIG. 3 is a schematic view of the mobile free standing air treatment of FIG. 1 in a cleaning mode of operation in which the first vacuum cleaner is docked at the first docking unit and the first clean air outlet is connected in air flow communication with the inlet port of the first vacuum cleaner;

FIG. 4 is a schematic view of another mobile free standing air treatment unit including a docking unit wherein an air treatment unit is removed;

FIG. 5 is a schematic view of the mobile free standing air treatment unit of FIG. 4 wherein the air treatment unit is mounted in position;

FIG. 6 is a schematic view of the mobile free standing air treatment unit of FIG. 4 in a cleaning mode;

FIG. 7 is a schematic view of another mobile free standing air treatment unit including a docking unit with the lid opened;

FIG. 8 is a schematic view of another mobile free standing air treatment unit including a docking unit, with the lid closed, and robotic vacuum;

FIG. 9 is a schematic view of the mobile free standing air treatment unit of FIG. 8 with a hand vacuum cleaner and robotic vacuum cleaner docked in a first mode of evacuation; and,

FIG. 10 is a schematic view of the mobile free standing air treatment unit of FIG. 8 in a second mode of evacuation.

[0029] The drawings included herewith are for illustrat-

ing various examples of articles, methods, and apparatuses of the teaching of the present specification and are not intended to limit the scope of what is taught in any way.

DESCRIPTION OF EXAMPLE EMBODIMENTS

[0030] Various apparatuses, methods and compositions are described below to provide an example of an embodiment of each claimed invention. No embodiment described below limits any claimed invention and any claimed invention may cover apparatuses and methods that differ from those described below. The claimed inventions are not limited to apparatuses, methods and compositions having all of the features of any one apparatus, method or composition described below or to features common to multiple or all of the apparatuses, methods or compositions described below. It is possible that an apparatus, method or composition described below is not an embodiment of any claimed invention. Any invention disclosed in an apparatus, method or composition described below that is not claimed in this document may be the subject matter of another protective instrument, for example, a continuing patent application, and the applicant(s), inventor(s) and/or owner(s) do not intend to abandon, disclaim, or dedicate to the public any such invention by its disclosure in this document.

[0031] The terms "an embodiment," "embodiment," "embodiments," "the embodiment," "the embodiments," "one or more embodiments," "some embodiments," and "one embodiment" mean "one or more (but not all) embodiments of the present invention(s)," unless expressly specified otherwise.

[0032] The terms "including," "comprising" and variations thereof mean "including but not limited to," unless expressly specified otherwise. A listing of items does not imply that any or all of the items are mutually exclusive, unless expressly specified otherwise. The terms "a," "an" and "the" mean "one or more," unless expressly specified otherwise.

[0033] As used herein and in the claims, two or more parts are said to be "coupled", "connected", "attached", or "fastened" where the parts are joined or operate together either directly or indirectly (i.e., through one or more intermediate parts), so long as a link occurs. As used herein and in the claims, two or more parts are said to be "directly coupled", "directly connected", "directly attached", or "directly fastened" where the parts are connected in physical contact with each other. None of the terms "coupled", "connected", "attached", and "fastened" distinguish the manner in which two or more parts are joined together.

[0034] Furthermore, it will be appreciated that for simplicity and clarity of illustration, where considered appropriate, reference numerals may be repeated among the figures to indicate corresponding or analogous elements. In addition, numerous specific details are set forth in order to provide a thorough understanding of the example embodiments described herein. However, it will be understood by those of ordinary skill in the art that the example embodiments described herein may be practiced without these specific details. In other instances, well-known methods, procedures, and components have not been described in detail so as not to obscure the example embodiments described herein. Also, the description is not to be considered as limiting the scope of the example embodiments described herein.

[0035] As used herein, the wording "and/or" is intended to represent an inclusive - or. That is, "X and/or Y" is intended to mean X or Y or both, for example. As a further example, "X, Y, and/or Z" is intended to mean X or Y or Z or any combination thereof.

[0036] As used herein and in the claims, two elements are said to be "parallel" where those elements are parallel and spaced apart, or where those elements are collinear.

General description of a vacuum cleaner that is dockable with a mobile free standing air treatment unit

[0037] Referring to Figure 1, an exemplary embodiment of a surface cleaning apparatus is shown generally as 300. The following is a general discussion of apparatus 300, which provides a basis for understanding several of the features that are discussed herein. As discussed subsequently, each of the features may be used individually or in any particular combination or sub-combination in this or in alternate embodiments disclosed herein.

[0038] Surface cleaning apparatus 300 may be any surface cleaning apparatus which may be docked with a docking unit and optionally may be emptied by a docking unit.

[0039] Embodiments described herein include a cyclonic air treatment member 316, and a surface cleaning apparatus 300 including the same. Surface cleaning apparatus 300 may be any type of surface cleaning apparatus, including for example a hand vacuum cleaner as shown, a stick vacuum cleaner, an upright vacuum cleaner, a canister vacuum cleaner, a robotic vacuum cleaner, an extractor, or a wet/dry type vacuum cleaner.

[0040] In Figures 1-10, surface cleaning apparatus 300 is illustrated as a hand vacuum cleaner, which may also be referred to also as a "handvac" or "handheld vacuum cleaner". As used herein, a hand vacuum cleaner is a vacuum cleaner that can be operated to clean a surface generally one-handedly. That is, the entire weight of the vacuum may be held by the same one hand used to direct a dirty air inlet of the vacuum cleaner with respect to a surface to be cleaned. For example, handle 302 and dirty air inlet 304 may be rigidly coupled to each other (directly or indirectly), such as being integrally formed or separately molded and then non-removably secured together (e.g., adhesive or welding), so as to move as one while maintaining a constant orientation relative to each other. This is to be contrasted with canister and upright vacuum cleaners, whose weight is typically supported by a surface (e.g., a floor) during use. When a canister vacuum

cleaner is operated, or when an upright vacuum cleaner is operated in a 'lift-away' configuration, a second hand is typically required to direct the dirty air inlet at the end of a flexible hose.

[0041] Still referring to Figures 1-10, surface cleaning apparatus 300 includes a main body or a handvac body having an air treatment member 316 (which may be permanently affixed to the main body or may be removable in part or in whole therefrom for emptying), a dirty air inlet 304, a clean air outlet 308, and an air flow path extending between the dirty air inlet 304 and the clean air outlet 308.

[0042] Surface cleaning apparatus 300 has a front end 322, a rear end 324, an upper end (also referred to as the top) 326, and a lower end (also referred to as the bottom) 328, as exemplified in Figure 1. In the embodiment shown, dirty air inlet 304 is at a portion of apparatus front end 322 and clean air outlet 308 is at a rearward portion of apparatus 300 at apparatus rear end 324. It will be appreciated that dirty air inlet 304 and clean air outlet 308 may be positioned in different locations of apparatus 300.

[0043] A suction motor 314 is provided to generate vacuum suction through air flow path, and may be positioned within a motor housing. Suction motor 314 may be a fan and motor assembly including an electric motor and impeller blade(s). In the illustrated embodiment, suction motor 314 is positioned in the air flow path downstream of air treatment member 316. In this configuration, suction motor 314 may be referred to as a "clean air motor". Alternatively, suction motor 314 may be positioned upstream of air treatment member 316, and be referred to as a "dirty air motor".

[0044] Air treatment member 316 is configured to remove particles of dirt and other debris from the air flow. Any air treatment member 316 that is emptiable by a docking unit may be used.

[0045] In the illustrated example, air treatment member 316 includes a cyclone assembly (also referred to as a "cyclone bin assembly") having a single cyclonic cleaning stage with a single cyclone 318 and a dirt collection chamber 312 (also referred to as a "dirt collection region", "dirt collection bin", "dirt bin", or "dirt chamber"). Cyclone 318 has a cyclone chamber. Dirt collection chamber 312 may be external to the cyclone chamber (i.e., dirt collection chamber 312 may have a discrete volume from that of cyclone chamber) or it may be internal of the cyclone chamber as exemplified. Cyclone 318 and dirt collection chamber 312 may be of any configuration suitable for separating dirt from an air stream and collecting the separated dirt respectively, and may be in communication with dirt outlet(s) of the cyclone chamber.

[0046] In alternate embodiments, air treatment member 316 may include a cyclone assembly having two or more cyclonic cleaning stages arranged in series with each other. Each cyclonic cleaning stage may include one or more cyclones arranged in parallel with each other and one or more dirt collection chambers, of any suitable configuration. The dirt collection chamber(s) may be external to the cyclone chambers of the cyclones. Each cyclone may have its own dirt collection chamber or two or more cyclones fluidically connected in parallel may have a single common dirt collection chamber.

[0047] In alternate embodiments, air treatment member 316 need not be cyclonic and may comprise or consist of a non-cyclonic momentum separator, in which case the air treatment member 316 may have one or more air treatment chambers.

[0048] In the illustrated example, surface cleaning apparatus 300 has an outlet port 306, which when in an evacuation mode, may be connected in air flow communication with dirty air inlet 304. An inlet port 310 is also provided on surface cleaning apparatus 300, which when in an evacuation mode, may be in air flow communication with the clean air outlet 308.

[0049] Surface cleaning apparatus 300 may include a pre-motor filter 330 provided in the air flow path downstream of air treatment member 316 and upstream of suction motor 314. Pre-motor filter 330 may be formed from any suitable physical, porous filter media. For example, pre-motor filter 330 may be one or more of a foam filter, felt filter, HEPA filter, or other physical filter media. In some embodiments, pre-motor filter 330 may include an electrostatic filter, or the like. Pre-motor filter 330 may be located in a pre-motor filter housing that is external to the air treatment member 316.

[0050] Dirty air inlet 304 may be at the front end 322 of the surface cleaning apparatus 300. Optionally, front end 322 may be used as a nozzle to directly clean a surface. Alternatively, or in addition to functioning as a nozzle, front end 322 may be connected (e.g., directly connected) to the downstream end of any suitable accessory tool such as a rigid air flow conduit (e.g., an above floor cleaning wand), a crevice tool, a mini brush, and the like. As shown, dirty air inlet 304 may be positioned forward of air treatment member 316, although this need not be the case.

[0051] Accordingly, in operation, after activating suction motor 314, dirty air enters apparatus 300 through dirty air inlet 304 and is directed to the cyclone 318. The dirty air flow may be directed to enter the cyclone 318 in a tangential direction so as to promote cyclonic dirt separation. Dirt particles and other debris may be disentrained (i.e., separated) from the dirty air flow as the dirty air flow travels through cyclone 318. The disentrained dirt particles and debris may be discharged from cyclone 318 through a cyclone dirt outlet into dirt collection chamber 312 that is external to the cyclone chamber, where the dirt particles and debris may be collected and stored until dirt collection chamber 312 is emptied. Alternately, as exemplified, the dirt particles and debris may be collected and stored in a dirt collection chamber 312 that is internal of (part of) a cyclone chamber until dirt collection chamber 312 is emptied.

[0052] Air exiting cyclone 318 may be directed to the optional pre-motor filter 330. The air flow may pass through pre-motor filter 330, and then exit into suction

motor 314 and then discharged from apparatus 300 through clean air outlet 308. Prior to exiting the clean air outlet 308, the treated air may pass through a post-motor filter, which may be one or more layers of filter media.

[0053] Power may be supplied to suction motor 314 and other electrical components of apparatus 300 from an onboard energy storage member, which may include, for example, one or more batteries 332 or other energy storage device such as a capacitor. In the illustrated embodiment, apparatus 300 includes a battery pack 332. Battery pack 332 may be permanently connected to apparatus 300 and rechargeable in-situ, or removable from apparatus 300. In the example shown, battery pack 332 is located within handle 304. Alternatively, or in addition to battery pack 332, power may be supplied to apparatus 300 by an electrical cord (not shown) connected to apparatus 300 that can be electrically connected to mains power by at a standard wall electrical outlet.

Mobile Free Standing Air Treatment Unit

[0054] In accordance with this aspect, which may be used by itself or in combination with one or more other aspects, there is provided a mobile free standing air treatment unit 100, which is operable as a vacuum cleaner and as a docking station. Accordingly, the mobile free standing air treatment unit 100 having an air treatment unit 208, a vacuuming unit 200, and a first docking station (referred to herein as a first docking unit 400) for receiving a surface cleaning apparatus 100. When the surface cleaning apparatus 300 is docked at the docking unit 400, the mobile free standing air treatment unit 100 may be used to empty the surface cleaning apparatus 300 and/or to clean a surface. To this end, the mobile free standing air treatment unit 100 may use one or more operating components of the surface cleaning apparatus 300 to perform one or both of these operations, e.g., by using a suction motor and/or energy storage member of the surface cleaning apparatus 300.

[0055] Accordingly, the mobile free standing air treatment unit 100 may be operable in a first docking mode in which the surface cleaning apparatus 300 is docked at the docking unit 400 and is evacuated and/or a cleaning mode in which the surface cleaning apparatus 300 is docked at the docking unit 400 and the mobile free standing air treatment unit 100 is operable to clean a surface. An advantage of this aspect is that a dirt collection region in the mobile free standing air treatment unit 100 may be used both to receive dirt evacuated from the surface cleaning apparatus 300 and dirt collected from use of the unit 100 in the cleaning mode. Accordingly, a user may only need to empty a single dirt collection region for multiple cleaning devices. Another advantage is that the suction motor and/or energy storage member of one device may be used in the operation of another device, e.g., a suction motor and/or energy storage member of the surface cleaning apparatus 300 may be used to provide motive force and/or power to the vacuuming unit 200 in the cleaning mode.

[0056] In accordance with this aspect, referring to Figure 1, shown therein is an exemplary embodiment of a mobile free standing air treatment unit 100. The mobile free standing air treatment unit 100 includes a vacuuming unit 200 and a docking unit 400. The vacuuming unit 200 and a docking unit 400 may be a one piece assembly such that the docking unit is permanently mounted to, or integrally formed as part of, the vacuuming unit 200. Figure 2 also depicts a surface cleaning apparatus 300 that is dockable with the docking unit 400.

[0057] Vacuuming unit 200 may be in the form of any type of surface cleaning apparatus. For example, it may have any type of dirty air inlet and any type of air treatment member or members. Further, it may be any type of surface cleaning apparatus as discussed herein such as a portable vacuum cleaner (e.g., a pod vacuum cleaner), a cannister vacuum cleaner, an upright vacuum cleaner, etc.

[0058] In Figures 1-10, vacuuming unit 200 is exemplified as a wet/dry vacuum cleaner, which may also be referred to as a "cannister" and may be optionally seated or removably mounted to a wheeled base of the like. As used herein, a wet/dry vacuum cleaner is a vacuum cleaner that can be operated in wet or dry conditions. The wet/dry vacuum cleaner may be moveable generally by the handle 202 with a second hand typically required to direct air through an optional flexible hose 206 into a dirty air inlet 204.

[0059] Referring to Figure 1, vacuuming unit 200 comprises an air treatment unit 208, a dirty air inlet 204, a clean air outlet 228, and an air flow path extending between the dirty air inlet 204 and the clean air outlet 228.

[0060] Air treatment member 208 is configured to remove particles of dirt and other debris from the air flow. Air treatment member 208 may be any type of air treatment member or members as described with respect to air treatment member 316.

[0061] As exemplified in Figure 5, air treatment member 208 comprises a cyclone assembly 236 having a single cyclonic cleaning stage 230 with a single cyclone 236 and a dirt collection chamber 214 that is internal of the cyclone 236.

[0062] In some embodiments, the air treatment unit 208 may include a plurality of air treatment stages. As exemplified in Figures 5 and 6, the air treatment unit 208 may include a first stage air treatment member 236 and a downstream second stage 232 having a second stage air treatment member 234. As shown, the first stage air treatment member 236 may include the first dirt collection region 214 positioned at a lower end. In some embodiments, there may be a plurality of dirt collection chambers.

[0063] It will be appreciated that the first stage air treatment member and the second stage air treatment member 234 may use any air treatment elements known in the air/dirt separation arts for treating an inflow of dirty air and otherwise separating the air flow from air-en-

trained dirt and may have one or more air treatment elements. For example, the first and/or second stage air treatment member 234 may be a filter media, a cyclone, a momentum separator, a bag or some combination thereof. As exemplified in Figure 6, the first stage air treatment member 236 is a cyclone and the second stage air treatment member 234 is a filter media. In some embodiments, the first dirt collection region 214 may include a first stage cyclone 236 and a second stage air treatment member 234 may include a second cyclone.

[0064] The dirty air flow may be directed to enter the cyclone 236 in a tangential direction so as to promote cyclonic action. Dirt particles and other debris may be disentrained (i.e., separated) from the dirty air flow as the dirty air flow travels through cyclone 236. The disentrained dirt particles and debris may discharge from cyclone 236 into dirt collection chamber 214, where the dirt particles and debris may be collected and stored until dirt collection chamber 214 is emptied.

[0065] Air exiting cyclone 236 may be directed to enter the second stage 232, for example, a second cyclone. The air flow may separate the dirt particles and other debris as the air travels through the second stage 232. The separated dirt particles may discharge from the second cyclone into dirt collection chamber or region 214. In alternate embodiments, the separated dirt particles may discharge from the second cyclone into a second dirt collection chamber.

[0066] In some embodiments, first dirt collection region 214 and second stage air treatment member 234 may each include a cyclone assembly having two or more cyclonic cleaning stages arranged in series with each other. Each cyclonic cleaning stage may include one or more cyclones arranged in parallel with each other and one or more dirt collection chambers, of any suitable configuration. The dirt collection chamber(s) may be external to the cyclone chambers of the cyclones. Each cyclone may have its own dirt collection chamber or two or more cyclones fluidically connected in parallel may have a single common dirt collection chamber.

[0067] In some embodiments, air exiting cyclone 236 may be directed into a filter located within the second stage air treatment member 234. Alternately, or in addition, the air exiting the second cyclone may be directed into a filter. The air may pass through the filter and then exit the vacuuming unit 200 through clean air outlet 228. Prior to exiting the clean air outlet 308, the treated air may pass through a post-motor filter, which may be one or more layers of filter media.

[0068] In order to enable the air treatment unit 208 to operate to evacuate dirt from a docked vacuum cleaner, the air treatment unit is connectable in air flow communication with a dirt collection region of the docked vacuum cleaner. Accordingly, air treatment unit 208 may include a second dirty air inlet 226. If the suction motor 314 of the docked vacuum cleaner 300 is used during an evacuation operation to provide some or all of the air flow, then the air treatment unit 208 is also connectable in air flow communication with the docked vacuum cleaner at a location upstream of the suction motor 314 and an air flow path may therefore extend from second dirty air inlet 226 to clean air outlet 228. As exemplified in Figures 1-2, the second dirty air inlet 226 may form a first inlet 402 and the clean air outlet 228 may form a first outlet 404 of the docking unit 400.

[0069] As exemplified in Figure 2, the docking unit 400 is configured to engage the surface cleaning apparatus 300 such that the outlet port 306 of the surface cleaning apparatus 300 is connected in flow communication with first inlet 402 of the docking unit 400 and inlet port 310 is connected in flow communication with first outlet 404 of the docking unit 400.

[0070] The outlet port 306 of surface cleaning apparatus 300 may be at any location known in the art and, as exemplified, it may be in a wall of the dirt collection chamber 312. The inlet port 310 of surface cleaning apparatus 300 may be at any location known in the art and, as exemplified, it may be upstream of suction motor 314 of the surface cleaning apparatus 300 wherein the location is isolated from the cyclone 318.

[0071] The mobile free standing air treatment unit 100 may operate with multiple air flow paths. For example, it may be operable to empty a docked surface cleaning apparatus 300 and it may be operable as a surface cleaning apparatus. In such an embodiment, in a first docking mode, the mobile free standing air treatment unit 100 may have a first air flow path 1000 to withdraw dirt from a docked surface cleaning apparatus 300 and, in a cleaning mode, it may have an air flow path 2000 to draw dirt from a surface to be cleaned.

[0072] As exemplified in Figures 2, 5 and 9, the first air flow path 1000 may extend from the first inlet 402 to the first outlet 404, with the air treatment unit 208 in provided in the first air flow path 1000. As exemplified in Figures 3 and 6, the second air flow path 2000 may extend from the dirty air inlet 204 to the first outlet 404, with the air treatment unit 208 is provided in the second air flow path 2000. Accordingly, air may enter the vacuuming unit 200 through either the dirt air inlet 226 or the dirty air inlet 204.

[0073] In the first docking mode (shown in Figures 2, 5 and 9) the surface cleaning apparatus 300 may be docked at the docking system 400 and connected in air flow communication with the first inlet 402. When in the first docking mode, the mobile free standing air treatment unit 100 is operable using the first air flow path 1000 to withdraw dirt from the surface cleaning apparatus 300 and collect the withdrawn dirt in the air treatment unit 208. In other words, the first air flow path 1000 may be used to evacuate dirt from the dirt collection region 312 of the surface cleaning apparatus 300 into the dirt collection region 214 in the air treatment unit 208.

[0074] Optionally, as exemplified, the suction motor 314 of the surface cleaning apparatus 300 is used to draw air through the first air flow path 1000. It will be appreciated that, in other embodiments, a different suction motor may be used, e.g., the suction motor may be

part of the mobile free standing air treatment unit 100.

[0075] In the cleaning mode (shown in Figures 3 and 6) the surface cleaning apparatus 300 is docked at the docking system 400 and the first outlet 404 is connected in air flow communication with the inlet port 310 of the surface cleaning apparatus 300. The mobile free standing air treatment unit 100 is operable using the second air flow path 2000 to clean a surface. In other words, the second air flow path 2000 may be used to collect dirt through the inlet 206 such that the mobile free standing air treatment unit 100 may be used to clean the surface.

[0076] Optionally, as exemplified, the suction motor 314 of the surface cleaning apparatus 300 is used to draw air through the first air flow path 2000. It will be appreciated that, in other embodiments, a different suction motor may be used, e.g., the suction motor may be part of the mobile free standing air treatment unit 100

[0077] By providing two different air flow paths for two different modes of operation, the dirt from the vacuuming unit 200 and the surface cleaning apparatus 300 in the air treatment unit 208 may both be collected in the dirt collection region 214. For example, the surface cleaning apparatus 300 may be docked at the docking system 400 and may use the first air flow path 100 to remove collected dirt from the surface cleaning apparatus 300 into the dirt collection region 214. The user may then proceed to use the surface cleaning apparatus 300 for further cleanup of a surface and/or may empty the dirt collected by multiple surface cleaning apparatus from a single location.

[0078] It will be appreciated that the docking unit 400 may be any design capable of facilitating the formation of the first air flow path 1000 and/or the second air flow path 2000 between the surface cleaning apparatus 300 and the vacuum unit 200. For example, the docking unit 400 may be adjacent to, or integrally formed with, the vacuum unit 200 (e.g., Figures 1-3), or may be an independent docking unit 400 (e.g., Figures 4-7).

[0079] As exemplified in Figures 1-3, the docking unit 400 is attached directly to air treatment member 208. The docking unit 400 may use any method to align a surface cleaning apparatus 300 within the docking unit 400 such that the air flow path 1000 and/or 2000 can be formed. For example, system 400 includes two coupling members 430 for surface cleaning apparatus 300 to contact. As exemplified in Figure 2, the coupling members 430 are sleeves that are attached to the air treatment unit 208 for receiving the surface cleaning apparatus 300. In some embodiments, the system 400 may include a single sleeve for the surface cleaning apparatus 300 to contact. Other examples of coupling the surface cleaning apparatus 300 to the unit 208 may include a clip, a slot within the air treatment unit 208, magnets, and/or any other coupling member for connecting the surface cleaning apparatus 300 to docking system 400.

[0080] As exemplified in Figures 2-3, when the surface cleaning apparatus 300 is docked at the docking system 400 ready for evacuation, the first inlet 402 is connected in flow communication with the outlet port 306 of the surface cleaning apparatus 300 and clean air outlet 404 is connected in flow communication with the inlet port 310 of surface cleaning apparatus 300. In other words, when the surface cleaning apparatus 300 is positioned in the docking system 400, the outlet port 306 is aligned with the inlet port 402 and the inlet port 310 is aligned with the outlet port 404, thereby facilitating the air flow path 1000.

[0081] Accordingly, when in the first docking mode with the docking unit of Figures 1-3, as illustrated in Figure 2, the first air flow path 1000 may travel from dirt collection chamber 312 of surface cleaning apparatus 300, out outlet port 306 and through first inlet 402 of the docking unit 400. Air flow path 1000 may then travel through docking unit 400 to dirty air outlet 408 and through second dirty air inlet 226 of air treatment unit 208 into the air treatment unit 208. From there, air flow path 1000 may travel through clean air outlet 228 of air treatment unit 208 to clean air inlet 410 of docking unit 400. Air flow path 1000 may then continue through clean air outlet 404 of docking unit 400, inlet port 310 of surface cleaning apparatus 300, suction motor 314 and out clean air outlet 308.

[0082] As exemplified in Figures 4-7, the docking unit 400 is an independent region that provides an intermediary coupling region between the surface cleaning apparatus 300 and the vacuuming unit 200. In some embodiments, as exemplified in Figure 4, the docking unit 400 includes a location, e.g., base 406, for receiving the air treatment unit 208 and vacuuming unit 200, and a location 420 for the surface cleaning apparatus 300 to be docked. Docking unit 400 may use any method to align the vacuuming unit 200 and air treatment unit 208 within the station 400. Docking unit 400 may further include any method to align surface cleaning apparatus within the station 400.

[0083] Referring to Figure 4, as exemplified, the docking unit 400 comprises a body 401 having a base 406. As shown, the docking unit 400 is generally configured as a vertical, rectangular structure, having an upright section. It will be appreciated that the docking unit 400 may have any other suitable shape or design.

[0084] When in the first docking mode with the docking unit of Figures 4-9, as illustrated in Figure 5, the docking unit 400 may include a first docking outlet 408 and a second inlet 410. First docking outlet 408 may be connected in fluid communication with the second dirty air inlet 226 of air treatment unit 208 and the second inlet 410 may be connected in fluid communication with the clean air outlet 228 of air treatment unit 208. As illustrated in Figure 5, the air flow path 1000 is the similar to the air flow path 1000 shown in Figure 2, but the air passes through the body of the docking unit 400, from inlet 402 to outlet 408, and then through inlet 226 and from outlet 228 through inlet 410 and then through outlet 410.

[0085] Referring to Figures 3 and 6, as exemplified, the unit 100 is in a cleaning mode. As illustrated in Figure 3, the second air flow path 2000 extends from the dirty air inlet 204 of vacuuming unit 200 through air treatment

member 208 to outlet 404. Outlet 404 is in fluid communication with inlet port 310 of surface cleaning apparatus 300. The second air flow path 2000 may extend, as illustrated, from the inlet port 310 through the suction motor 314 of surface cleaning apparatus 310 and out the clean air outlet 308. As illustrated in Figure 6, the second air flow path 2000 is similar to the air flow path 2000 illustrated in Figure 3, except that the air also passes through the body of the docking unit 400, from the dirty air inlet 204 of vacuuming unit 200 through air treatment member 208 to clean air outlet 228 and through clean air inlet 410 of docking unit 400. Air flow path 2000 may then continue through clean air outlet 404 of docking unit 400, inlet port 310 of surface cleaning apparatus 300, suction motor 314 and out clean air outlet 308.

[0086] In some embodiments, the vacuuming unit 200 may include a flexible hose 206 and/or other accessory positioned upstream of the second inlet 204. When the surface cleaning apparatus 300 is docked and operating in the cleaning mode, the flexible hose 206 may be used to clean areas proximate the mobile free standing air treatment unit 100. As exemplified in Figures 1-3, 5, 6, and 8-10, the flexible hose 206 may protrude from the air treatment unit 208 and may be in fluid communication with second inlet 204. It will be appreciated that the flexible hose 206 may be located anywhere on the air treatment unit 208.

[0087] During operation in the cleaning mode, as exemplified in Figures 3 and 6 and illustrated by the second air flow path 2000, air may travel from the flexible hose 206, through the second inlet 204 and into the air treatment member 208 where the dirt is collected within the dirt collection chamber 214.

[0088] The flexible hose 206 may be any length and/or size. The flexible hose 206 may be connected (e.g., directly connected) to the downstream end of any suitable accessory tool such as a rigid air flow conduit (e.g., an above floor cleaning wand), a crevice tool, a mini brush, or any other cleaning apparatus.

Removable air treatment unit

[0089] In accordance with this aspect, which may be used by itself or in combination with one or more other aspects, the air treatment unit 208 may be removably mounted to the mobile free standing air treatment unit 100, such as for emptying or cleaning.

[0090] Air treatment unit 208 may be removable from the mobile free standing air treatment unit 100 for emptying, either with the dirt collection chamber 214 thereof closed or with the dirt collection chamber 214 open (e.g., a lid 244 may be removed). Accordingly, the air treatment unit 208 may be removably mounted to a main body. The main body may comprise, consist essentially of or consist of the docking unit 400. Accordingly, the body 401 of the docking unit 400 may be the main body of the vacuuming unit 200 or the mobile free standing air treatment unit 100 may have a main body to which the docking unit 400 and the vacuuming unit 200 may be mounted and the air treatment unit 208 may be removable therefrom.

[0091] In order to empty the air treatment unit 208 the air treatment unit 208 may have an openable door 216. The door 216 may be positioned anywhere on the air treatment unit 208. When the door 216 is opened, dirt may be emptyable from the air treatment unit 208. The air treatment unit 208 may be removable from the mobile free standing air treatment unit 100 with the door 216 closed. Accordingly, a user may remove the air treatment unit 208 from the unit 100 with the door 216 closed, such that dirt does not accidentally spill. The user may then move the air treatment unit 208 and empty the dirt collection region 214.

[0092] Optionally, the door 216 may be revealed when the air treatment unit 208 is removed. For example, door 216 may be part or all of a lower wall of the air treatment unit 208.

[0093] The door 216 may open by any means. As exemplified in Figure 4, the openable door 216 may have a handle 218 and may be pivotably openable in an outward direction from air treatment member 208 around a hinge 220. In some embodiments, the door 216 may open by, including, but not limited to, sliding, opening inwardly, and/or may be fully removably from the air treatment unit 208.

Suction source

[0094] In accordance with this aspect, which may be used by itself or in combination with one or more other aspects, a common motor and fan assembly may be used to operate the surface cleaning apparatus 300 when used to clean a surface and the mobile free standing air treatment unit 100 when the surface cleaning apparatus 300 is docked.

[0095] Accordingly, the mobile free standing air treatment unit 100 may operate using suction motor 314 located within the surface cleaning apparatus 300. As such, each of the docking mode and cleaning mode may be operable using, for example, suction motor 314 of the surface cleaning apparatus 300. Accordingly, in some embodiments, vacuuming unit 200 may not include a fan and motor assembly. Using a single suction motor 314 may reduce the initial cost since an independent suction motor is not required to operate the unit 100. Additionally, providing an absence of suction motor in the vacuuming unit 200 may simplify the design, decrease weight, and make manufacturing more efficient.

Power source

[0096] In accordance with this aspect, which may be used by itself or in combination with one or more other aspects, a common power source may be used to operate the surface cleaning apparatus 300 when used to clean a surface and the mobile free standing air treatment unit 100 when the surface cleaning apparatus 300 is

docked.

[0097] Accordingly, the mobile free standing air treatment unit 100 may operate using a single energy storage member, and optionally suction motor 314, located within the surface cleaning apparatus 300. As such, each of the docking mode and cleaning mode may be operable using, for example, battery 332, optionally with suction motor 314, of the surface cleaning apparatus 300. Accordingly, in some embodiments, vacuuming unit 200 may not include an on board energy storage member and it may optionally not include a power cord. Using a single energy storage member may reduce the initial cost since an independent battery is not required to operate the unit 100. Additionally, providing an absence of energy storage member in the vacuuming unit 200 may simplify the design, decrease weight, and make manufacturing more efficient.

[0098] When in the first docking mode, the sole air moving member of the unit 100 may be the suction motor 314 of surface cleaning apparatus 300. As exemplified in Figures 2, 3, 5, 6, and 9, the mobile free standing air treatment unit 100 may be operable through first flow path 1000 and second air flow path 2000 through the sole air movement provided by the suction motor 314 and fan assembly of surface cleaning apparatus 300. In other words, when the surface cleaning apparatus 300 is docked at the first docking unit 400, the suction motor 312 of the surface cleaning apparatus 300 may be the sole air moving member of a combiner mobile free standing air treatment unit 100 and surface cleaning apparatus 300.

[0099] While the unit 100 and the surface cleaning apparatus 300 may use suction motor 314 of the surface cleaning apparatus 300 as a common suction source as discussed previously, as exemplified in Figure 4, a suction motor 212 may be provided in the vacuuming unit 200 to generate vacuum suction through an air flow path, and may be positioned within a motor housing. Suction motor 212 may be a fan-motor assembly including an electric motor and impeller blade(s). In embodiments where the vacuuming unit 200 includes a suction motor 212, it will be appreciated that either or both of the suction motor 314 and 212 may be used to facilitate air movement through the first air flow path 1000 and/or the second air flow path 2000.

Charging unit

[0100] In accordance with this aspect, which may be used by itself or in combination with one or more other aspects, the unit 100 may include a charging station to recharge an on board energy storage member. For example, the unit 100 may include an energy storage member and may be operable in a portable mode when not connected to a mains power supply. Alternately, or in addition, surface cleaning apparatus 300 may include an energy storage member. In any such case, the unit 100 may be connected to a mains power supply by a power cord and may therefore recharge an energy storage member provided in unit 100 and/or surface cleaning apparatus 300.

[0101] For example, docking unit 400 may include a charging unit 414 where the energy storage member 332 of the surface cleaning apparatus 300 is rechargeable when docked at the docking system 400. Accordingly, the surface cleaning apparatus 300 may be charged by the same docking unit 400 while surface cleaning apparatus 300 is emptied, thereby providing a single device used for multiple operations. The surface cleaning apparatus 300 may evacuate dirt from the dirt collection chamber 312 at the same time that energy storage member 332 is charged at charging unit 414.

[0102] As exemplified in Figure 5, docking unit 400 may include a charging unit 414 that may be powered by electrical connection (power cord) 412. As shown, electrical connection 412 may be a connection to a mains power supply, such as, for example, an outlet to be plugged into a wall. In some embodiments, the power supply of the docking unit 400 used to recharge the surface cleaning apparatus 300 may be an on board energy storage member located within docking unit 400.

[0103] In some embodiments, unit 100 may be designed such that the unit 100 may be carried by the user with the handle 202 of the vacuuming unit 200. Accordingly, the user may clean up areas with larger spills with vacuuming unit 200 and clean smaller, harder to reach areas with the surface cleaning apparatus 300. In other words, the suction motor 314 and/or battery 332 of the surface cleaning apparatus 300 may be used to provide suction and/or electrical power to the vacuuming unit 200 to clean surfaces using the second air flow path 2000 and/or the surface cleaning apparatus 300 may be separated from the vacuuming unit 200 to clean harder to reach areas.

A Plurality of Surface Cleaning Apparatus

[0104] In accordance with this aspect, which may be used by itself or in combination with one or more other aspects, the mobile free standing air treatment unit 100 is provided a second docking unit for a second surface cleaning apparatus. The second docking unit includes a third dirty air inlet and a third air flow path extending from the third dirty air inlet to the first clean air outlet. When the second surface cleaning apparatus is docked at the second docking unit, the mobile free standing air treatment unit 100 may use the third air flow path to withdraw dirt from the second surface cleaning apparatus.

[0105] An advantage of this design is that dirt collected by the second surface cleaning apparatus may be evacuated into the same dirt collection region as the first surface cleaning apparatus 300. Another advantage is that the first and second surface cleaning apparatus may each be charged while docked at the first and second docking units, respectively. A further advantage is that the same power source or fan and motor assembly may

be used to evacuate dirt from the second surface cleaning apparatus as is used to evacuate dirt from the first surface cleaning apparatus 300.

[0106] In accordance with this aspect, as exemplified in Figures 8-10, the mobile free standing air treatment unit 100 may include a second docking unit 450 for a second surface cleaning apparatus 500. The docking unit 450 may include a third dirty air inlet 452 and a third air flow path 3000 extending from the third dirty air inlet 452 to a clean air outlet, which may be the first clean air outlet 404 if the fan and motor assembly is suction motor 314 of surface cleaning apparatus 300.

[0107] The mobile free standing air treatment unit 100 may be operable in a second docking mode where the surface cleaning apparatus 300 is docked in the docking unit 400 and is connected in air flow communication with the first inlet 402 and the second surface cleaning apparatus 500 is docked at the docking unit 450 and is connected in air flow communication with the third dirty air inlet 452. The mobile free standing air treatment unit 100 may be operable using the third air flow path 3000 to withdraw dirt from the second surface cleaning apparatus 500. In other words, the third air flow path 3000 may be used to evacuate dirt collected in the surface cleaning apparatus 500 into the dirt collection region 214, as exemplified by the air flow path 3000 shown in Figure 10.

[0108] The second surface cleaning apparatus 500 may be any type of surface cleaning apparatus, including, but not limited to, an autonomous vacuum cleaner (as exemplified in Figures 8-10) a hand vacuum cleaner, a stick vacuum cleaner, an upright vacuum cleaner, a canister vacuum cleaner, an extractor, a wet/dry type vacuum cleaner, or the like.

[0109] The autonomous surface cleaning apparatus (also referred to herein as a robotic vacuum cleaner) may be of any shape and configuration. As exemplified in Figures 8-10, the robotic vacuum cleaner 500 may have a housing 506 defined by a generally circular configuration. One or more wheels 508 may be provided, at a lower end of the vacuum housing 506, for moving the robotic vacuum cleaner 500 over surfaces requiring cleaning. It will be appreciated that, in alternate embodiments, housing 500 may not have a circular configuration, but have any other suitable design or shape.

[0110] It will be appreciated that the second docking unit 450 may be any size, shape, and/or position proximate to, or integral with, the unit 100. As with first docking unit 400, second docking unit 450 may be a one piece assembly with the air treatment unit 208 and/or first docking unit 400, e.g., it may be non-removably mounted thereto or integrally formed therewith,

[0111] As exemplified in Figures 8-10, the docking unit 450 is positioned below the base 406 of first docking unit 400. For example, the docking unit 450 may be positioned adjacent to air treatment unit 208 and/or positioned adjacent to surface cleaning apparatus 300.

[0112] As exemplified in Figure 8, the second surface cleaning apparatus 500 may include an outlet port 502 and docking unit 450 may include a third dirty air inlet 452. The third dirty air inlet 452 may be positioned to be in fluid flow communication with the outlet port 502 of the second surface cleaning apparatus 500 when the second surface cleaning apparatus 500 is docked in the docking unit 450 of the mobile free standing air treatment unit 100. In other words, the outlet port 502 may be aligned with and abutted by the third dirty air inlet 452 to position the air treatment unit 510 of the second surface cleaning apparatus 500 in the air flow path 3000. Removably coupling the dirt outlet 502 may be to the dirt inlet 452 of the docking unit 450 may allow for the transfer of dirt and debris collected by the second surface cleaning apparatus 500 into the dirt collection region 214 of the mobile free standing air treatment unit 100. The outlet port 502 may be provided at any location in the robot housing 506, including, but not limited to, at a rear end, top end or lower end of housing 506. There may be a plurality of dirt outlet ports 502 provided on the vacuum 500.

[0113] The dirt outlet 502 may be in fluid communication with an air treatment unit 510 located inside the robot housing 506. The air treatment element may be, including, but not limited to, a cyclone, a filter, a momentum separator, a bag or some combination thereof. As exemplified in Figure 8, the air treatment unit 510 may include a robot dirt collection chamber 504 for storing dirt collected by the robotic vacuum cleaner 500 during the course of cleaning. The robotic vacuum cleaner 500 may have a one or a plurality of dirt bins or dirt collection chambers 504. The robot dirt collection chamber 504 may be fixedly secured in position in the robot housing 506 or may be removable from the robot housing 506.

[0114] The robotic vacuum cleaner 500 may include a suction motor to draw, or assist in drawing, dirt into robot dirt bin 504 by providing an air flow passage from a dirty air inlet to a clean air outlet. The dirty air inlet and clean air outlet may be positioned at a lower end of the robotic vacuum cleaner 500, but it will be appreciated that they may be positioned anywhere on the robot body 506. In some embodiments, one or more pre-motor filters may be provided in the airflow path upstream of the suction motor. Pre-motor filters can be formed from any suitable physical, or porous filter media. For example, pre-motor filters may be one or more of a foam filter, a felt filter, a HEPA filter, or other physical filter media. In some embodiments, pre-motor filter may include, for example, an electrostatic filter.

[0115] In a second docking mode, the same dirt chamber may be used to collect dirt that is evacuated from the second surface cleaning apparatus 500 as is used to collect dirt that is evacuated from the first surface cleaning apparatus 300. Accordingly, the air treatment unit 208 may be provided in the third air flow path 3000. For example, in the second docking mode, the mobile free standing air treatment unit 100 may be operable using the third air flow path 3000 to evacuate dirt from the second surface cleaning apparatus 500 into the air treatment unit 208. Accordingly, the dirt from multiple surface clean-

ing apparatus may be evacuated into a single dirt collection region 214, which may be subsequently emptied by the user.

[0116] As shown in Figure 10, third air flow path 3000 may direct air from the second surface cleaning apparatus 500 through the mobile free standing air treatment unit 100 and into the air treatment unit 208. Dirt collected in the dirt collection chamber 504 of the second surface cleaning apparatus 500 may be directed through the outlet port 502 of the second surface cleaning apparatus 500, through the second inlet 452 of the docking unit 450, and into the air treatment unit 208 through dirty air outlet 408 and second dirty air inlet 226.

[0117] In the second docking mode, the power source and/or the fan and motor assembly used to evacuate the first surface cleaning apparatus 300 in the first docking mode may be used. Accordingly, as exemplified in Figure 10 and illustrated by the third air flow path 3000, the motive power used to evacuate the second surface cleaning apparatus 500 in the second docking mode may be derived from the suction motor 314 of surface cleaning apparatus 300. In other words, the evacuation of the second surface cleaning apparatus 500 may use the suction motor 314 of the first surface cleaning apparatus 300, without requiring additional motive power from either the air treatment unit 208 and/or the second surface cleaning apparatus 500. Therefore, in Figure 10, once the dirt has been collected within the air treatment member 208, the air may be withdrawn from the air treatment member 208 along air flow path 3000 through the suction motor 314 of surface cleaning apparatus 300 and out the clean air outlet 308.

[0118] It will be appreciated that the mobile free standing air treatment unit 100 may receive and/or couple with any number of surface cleaning apparatus and/or vacuuming units. For example, in some embodiments, the mobile free standing air treatment unit 100 may not include a vacuuming unit 200 and may receive a first surface cleaning apparatus 300 and a second surface cleaning apparatus 500. Accordingly, in such an embodiment, the mobile free standing air treatment unit 100 may be referred to as a docking apparatus 100 and may operate in the first docking mode and the second docking mode without operating in a cleaning mode.

Docking unit Including Air-Impermeable Bag

[0119] In accordance with this aspect, which may be used by itself or in combination with one or more other aspects, the mobile free standing air treatment unit 100 may removeably receive an air impermeable bag in the first dirt collection region 214 of the mobile free standing air treatment unit 100. An advantage of this design is that dirt may be evacuated from one or more surface cleaning apparatus and/or may be collected using vacuuming unit 200 and be deposited into the bag, providing a single location for dirt collection that is removable from the dirt collection region. Collecting dirt in the bag may provide for a cleaner operation when emptying the dirt collection region, since dirt may not directly contact the dirt collection region.

[0120] In accordance with this aspect, an air impermeable bag 222 may be removably receivable in the dirt collection region 214 where, in operation, dirt is collected in the bag 222. The first dirt collection region 214 may be openable and when it is opened, the bag 222 may be removable 222, e.g., in an upward direction. In some embodiments, the mobile free standing air treatment unit 100 may be inoperable when the dirt collection region is opened to remove the bag 222. In other words, opening the dirt collection region 214 may prevent accidental operation of the mobile free standing air treatment unit 100.

[0121] As exemplified in Figure 7, the first dirt collection region 214 may have an openable lid 224 and, when the lid 224 is opened, the bag 222 may be removable upwardly out of the dirt collection region 214. When lid 224 is lifted from the dirt collection chamber 214, the interior of the dirt collection chamber 214 may be accessible from the upward direction.

[0122] In some embodiments, the dirt collection chamber 214 may not include the bag 222 and the dirt collection chamber 214 may be emptied by opening the lid 224 and, e.g., inverting dirt collection chamber 214.

[0123] The lid 224 may be secured, e.g., to dirt collection chamber 214, in an operating position as exemplified in Figure 6 by a locking member such as a snap fit, a bayonet mount, or any other means. In some embodiments, the lid 224 may include the first air treatment stage and/or the second air treatment stage.

[0124] Using the bag 222 may reduce the amount of residual dirt left in the dirt collection region 214 when the dirt collection region 214 is emptied. For example, without the bag 222, dust may remain within the dirt collection region 214 of the air treatment unit 208 and may require more effort to remove it.

[0125] As shown in Figures 6 and 7, the bag 222 may be attached to the inner surface of dirt collection region 214. In the illustrated example, bag 222 may include two or more fastening members 221 on outer surfaces of the bag 222. The inner surface of dirt collection region 214 may include two or more corresponding fastening members 223 to attach the fastening members of bag 222 to secure the bag 222 within the dirt collection region 214. The bag 222 may be in communication with the dirt collection region 214 by, including, but not limited to, a hook and loop system, a clip, a magnet, a suction device, a peg, or some combination thereof. It will be appreciated that the bag may be held in position in the dirt collection region 214 by any means known in the art.

[0126] In some embodiments, as described previously, the air treatment unit 208 may include a plurality of cleaning stages. The plurality of cleaning stages may each be emptyable into the bag 222. Accordingly, all cleaning stages of each surface cleaning apparatus 300, 500 may be emptyable into a single bag 222 for facilitating efficient emptying of the unit 100.

[0127] In some embodiments, air treatment unit 208 may include a method to sense if dirt collection chamber 214 has been opened, such as a sensor (not shown). For example, as shown in Figure 7, the lid 224 of air treatment member 208 has been opened and bag 222 is able to be removed from dirt collection chamber 214. A sensor of air treatment unit 208 may then communicate with mobile free standing air treatment unit 100to prevent operation of the mobile free standing air treatment unit 100.

[0128] In some embodiments, the mobile free standing air treatment unit 100 may be inoperable when a bag 222 is absent from the first dirt collection region 214. Accordingly, a user may be prevented from accidentally operating the unit 200 and/or evacuating the surface cleaning apparatus 300 if there is no bag 222 in the dirt collection region 214.

[0129] While the above description describes features of example embodiments, it will be appreciated that some features and/or functions of the described embodiments are susceptible to modification without departing from the spirit and principles of operation of the described embodiments. For example, the various characteristics which are described by means of the represented embodiments or examples may be selectively combined with each other. Accordingly, what has been described above is intended to be illustrative of the claimed concept and non-limiting. It will be understood by persons skilled in the art that other variants and modifications may be made without departing from the scope of the invention as defined in the claims appended hereto. The scope of the claims should not be limited by the preferred embodiments and examples, but should be given the broadest interpretation consistent with the description as a whole.

Claims

1. A mobile free standing air treatment unit comprising:

(a) an air treatment unit;
(b) a first docking unit for a first vacuum cleaner comprising a first dirty air inlet and a first clean air outlet wherein, when a first vacuum cleaner is docked at the first docking unit, the first dirty air inlet is connected in flow communication with an outlet port of the first vacuum cleaner, which outlet port is downstream from a dirt collection unit of the first vacuum cleaner, and the first clean air outlet is connected in flow communication with an inlet port of the first vacuum cleaner, which inlet port is upstream of a motor and fan assembly of the first vacuum cleaner;
(c) a vacuuming unit comprising a second dirty air inlet;
(d) a first air flow path extending from the first dirty air inlet to the first clean air outlet, wherein the air treatment unit is provided in the first air flow path;
(e) a second air flow path extending from the second dirty air inlet to the first clean air outlet, wherein the air treatment unit is also provided in the second air flow path,

wherein the mobile free standing air treatment unit is operable in a first docking mode in which the first vacuum cleaner is docked at the first docking unit and is connected in air flow communication with the first dirty air inlet whereby the mobile free standing air treatment unit is operable using the first air flow path to withdraw dirt from the first vacuum cleaner and collect withdrawn dirt in the air treatment unit, and

wherein the mobile free standing air treatment unit is operable in a cleaning mode in which the first vacuum cleaner is docked at the first docking unit and the first clean air outlet is connected in air flow communication with the inlet port of the first vacuum cleaner whereby the mobile free standing air treatment unit is operable using the second air flow path to clean a surface.

2. The mobile free standing air treatment unit of claim 1 wherein the mobile free standing air treatment unit has an absence of a fan and motor assembly.

3. The mobile free standing air treatment unit of claim 1 wherein, when the first vacuum cleaner is docked at the first docking unit, the fan and motor assembly of the first vacuum cleaner is the sole air moving member of a combined mobile free standing air treatment unit and first vacuum cleaner.

4. The mobile free standing air treatment unit of claim 1 wherein the air treatment unit is removably mounted to the mobile free standing air treatment unit, the air treatment unit has an openable door and, when the door is opened, dirt is emptyable from the air treatment unit, and the air treatment unit is removable from the mobile free standing air treatment unit with the door closed.

5. The mobile free standing air treatment unit of claim 1 wherein the air treatment unit comprises a first stage air treatment member, which comprises a first dirt collection region, and a downstream second stage comprising a second stage air treatment member.

6. The mobile free standing air treatment unit of claim 5 wherein the first dirt collection region comprises a first stage cyclone and the second stage air treatment member comprises a second cyclone.

7. The mobile free standing air treatment unit of claim 5 wherein the first dirt collection region comprises a

first stage air treatment chamber having a dirt collection region at a lower end thereof and the second stage air treatment member comprises a second cyclone.

8. The mobile free standing air treatment unit of claim 5 wherein an air impermeable bag is removably receivable in the first dirt collection region whereby, in operation dirt is collected in the bag and the first dirt collection region is openable and, when the first dirt collection region is opened, the bag is removable.

9. The mobile free standing air treatment unit of claim 8 wherein the first dirt collection region has an openable lid and, when the lid is opened, the bag is removable upwardly.

10. The mobile free standing air treatment unit of claim 1 wherein the vacuuming unit includes a flexible hose and, in the second cleaning mode, the flexible hose is positioned upstream of the second dirty air inlet.

11. The mobile free standing air treatment unit of claim 1 further comprising a second docking unit for a second vacuum cleaner and a third air flow path, the second docking unit comprising a third dirty air inlet and the third air flow path extending from the third dirty air inlet to the first clean air outlet, wherein the mobile free standing air treatment unit is operable in a second docking mode in which the first vacuum cleaner is docked at the first docking unit and is connected in air flow communication with the first dirty air inlet and the second vacuum cleaner is docked at the second docking unit and is connected in air flow communication with the first dirty air inlet, whereby the mobile free standing air treatment unit is operable using the third air flow path to withdraw dirt from the second vacuum cleaner.

12. The mobile free standing air treatment unit of claim 11 wherein the air treatment unit is also provided in the third air flow path and, in the second docking mode the mobile free standing air treatment unit is operable using the third air flow path to withdraw dirt from the second vacuum cleaner and collect withdrawn dirt in the air treatment unit.

13. The mobile free standing air treatment unit of claim 12 wherein the second vacuum cleaner is an autonomous vacuum cleaner.

14. The mobile free standing air treatment unit of claim 1 wherein the first vacuum cleaner has an on board energy storage member and the first docking unit further comprises a first charging unit whereby the first vacuum cleaner is rechargeable when docked at the first docking unit.

15. A docking apparatus comprising:

(a) an air treatment unit;
(b) a first docking unit for a first vacuum cleaner comprising a first dirty air inlet and a first clean air outlet wherein, when a first vacuum cleaner is docked at the first docking unit, the first dirty air inlet is connected in flow communication with an outlet port of the first vacuum cleaner, which outlet port is downstream from a dirt collection unit of the first vacuum cleaner, and the first clean air outlet is connected in flow communication with an inlet port of the first vacuum cleaner, which inlet port is upstream of a motor and fan assembly of the first vacuum cleaner;
(c) a second docking unit comprising a second dirty air inlet, wherein, when a second vacuum cleaner is docked at the first docking unit, the second dirty air inlet is connected in flow communication with an outlet port of the second vacuum cleaner, which outlet port is downstream from a dirt collection unit of the second vacuum cleaner;
(d) a first air flow path extending from the first dirty air inlet to the first clean air outlet, wherein the air treatment unit is provided in the first air flow path;
(e) a second air flow path extending from the second dirty air inlet to the first clean air outlet, wherein the air treatment unit is also provided in the second air flow path,

wherein the docking apparatus is operable in a first docking mode in which the first vacuum cleaner is docked at the first docking unit and is connected in air flow communication with the first dirty air inlet whereby the docking apparatus is operable using the first air flow path to withdraw dirt from the first vacuum cleaner and collect withdrawn dirt in the air treatment unit, and

wherein the docking apparatus is operable in a second docking mode in which the first vacuum cleaner is docked at the first docking unit and is connected in air flow communication with the first clean air outlet and the second vacuum cleaner is docked at the second docking unit and is connected in air flow communication with the second dirty air inlet whereby the docking apparatus is operable using the second air flow path to withdraw dirt from the second vacuum cleaner and collect withdrawn dirt in the air treatment unit.

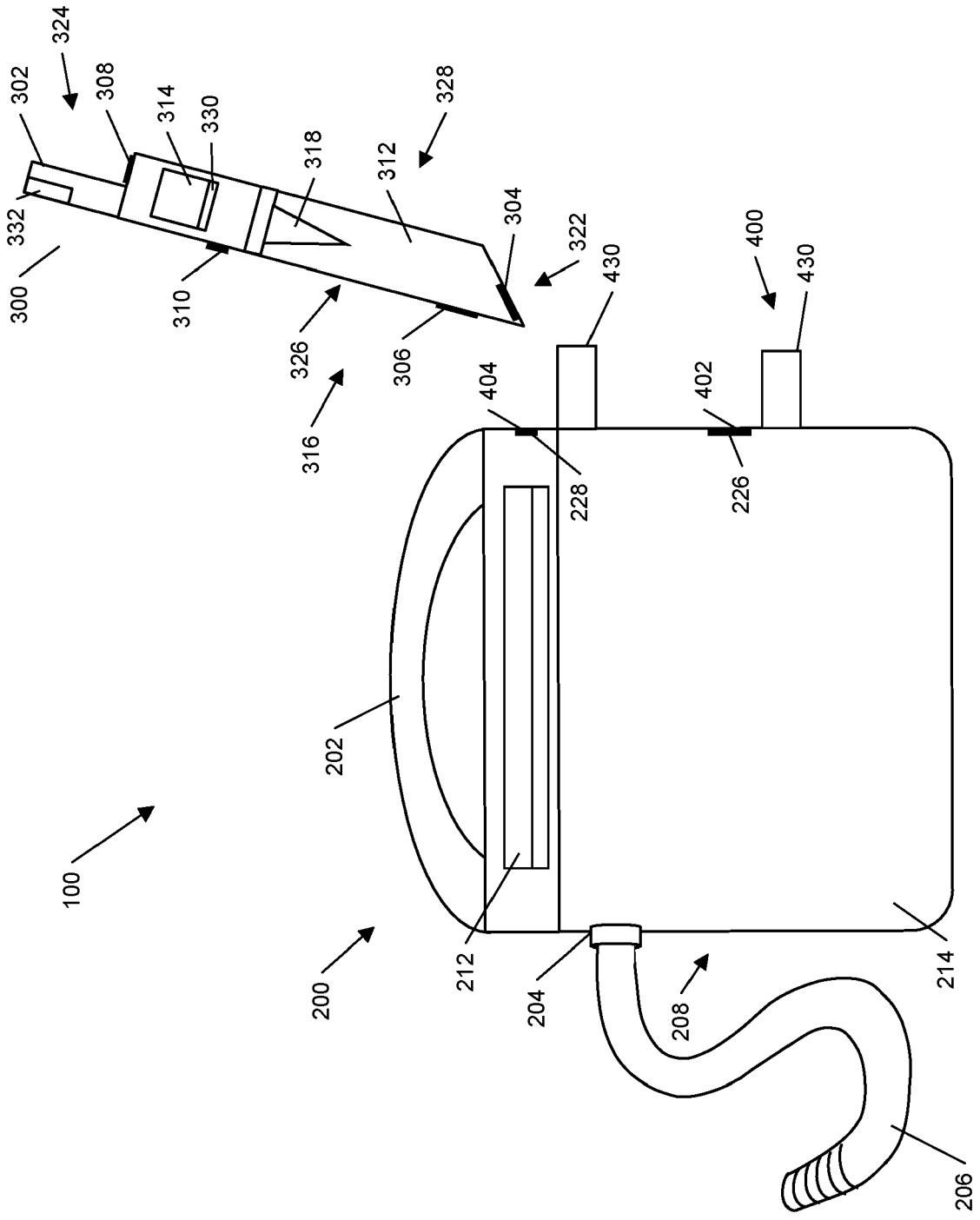
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FIG. 1

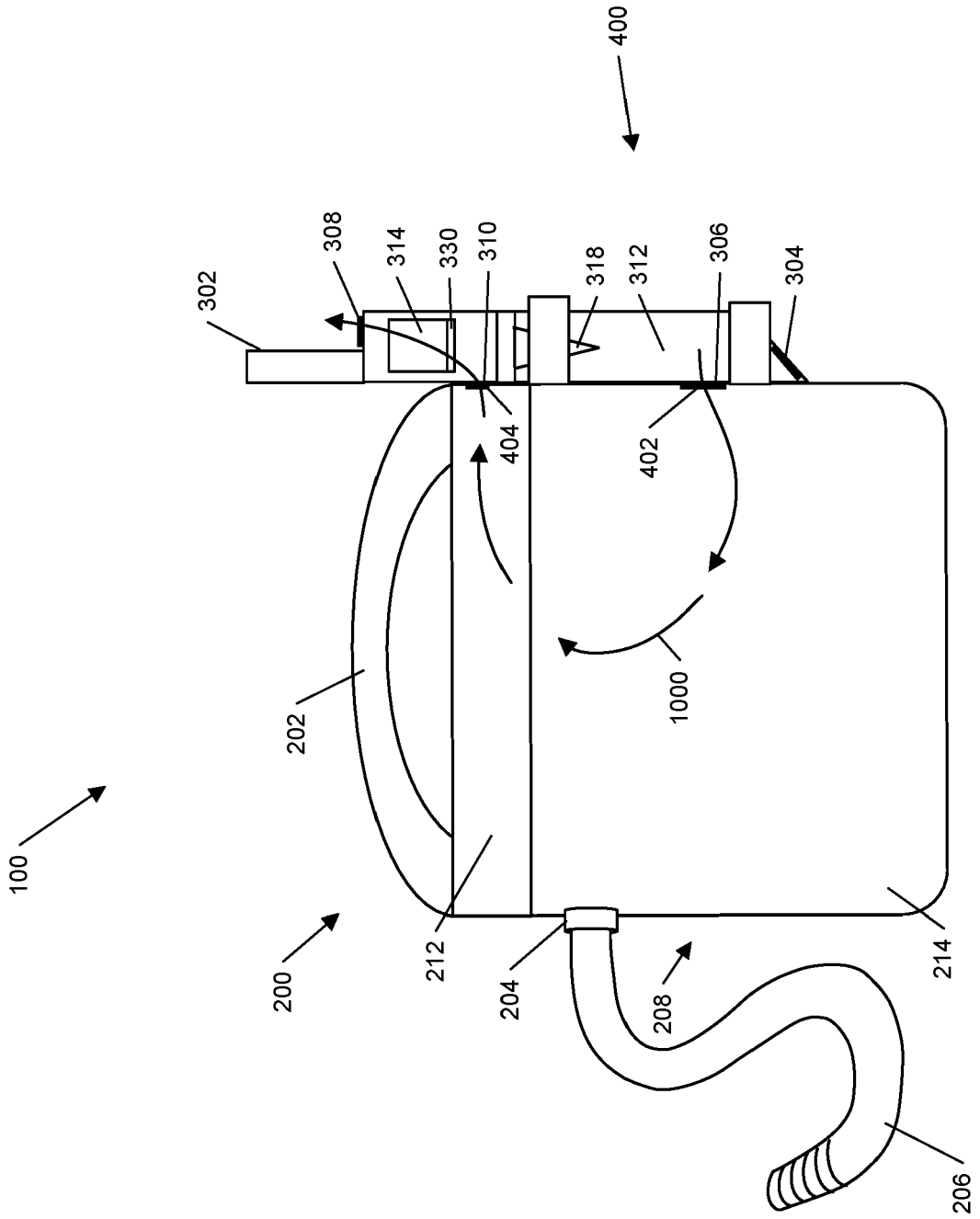
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FIG. 2

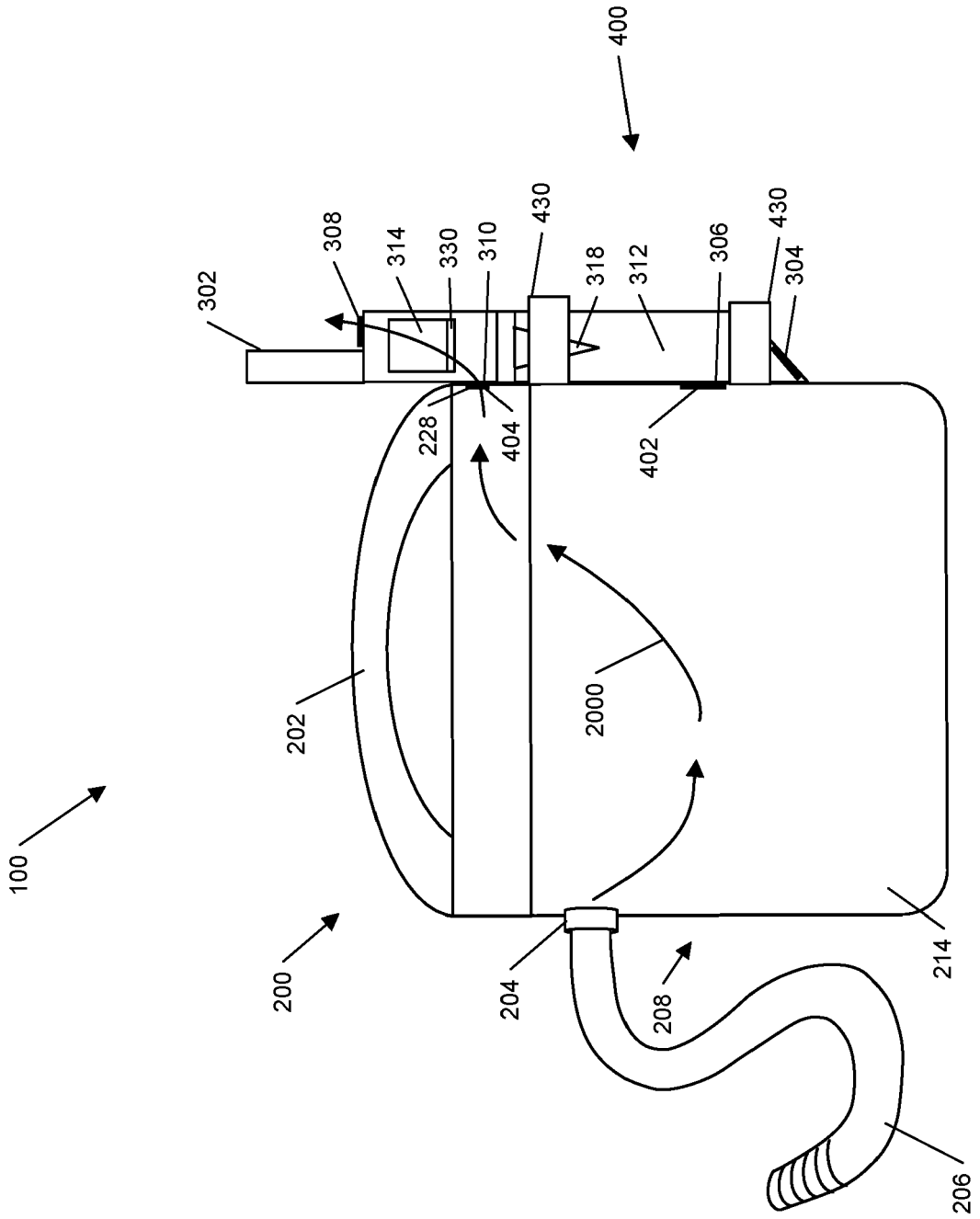
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FIG. 3

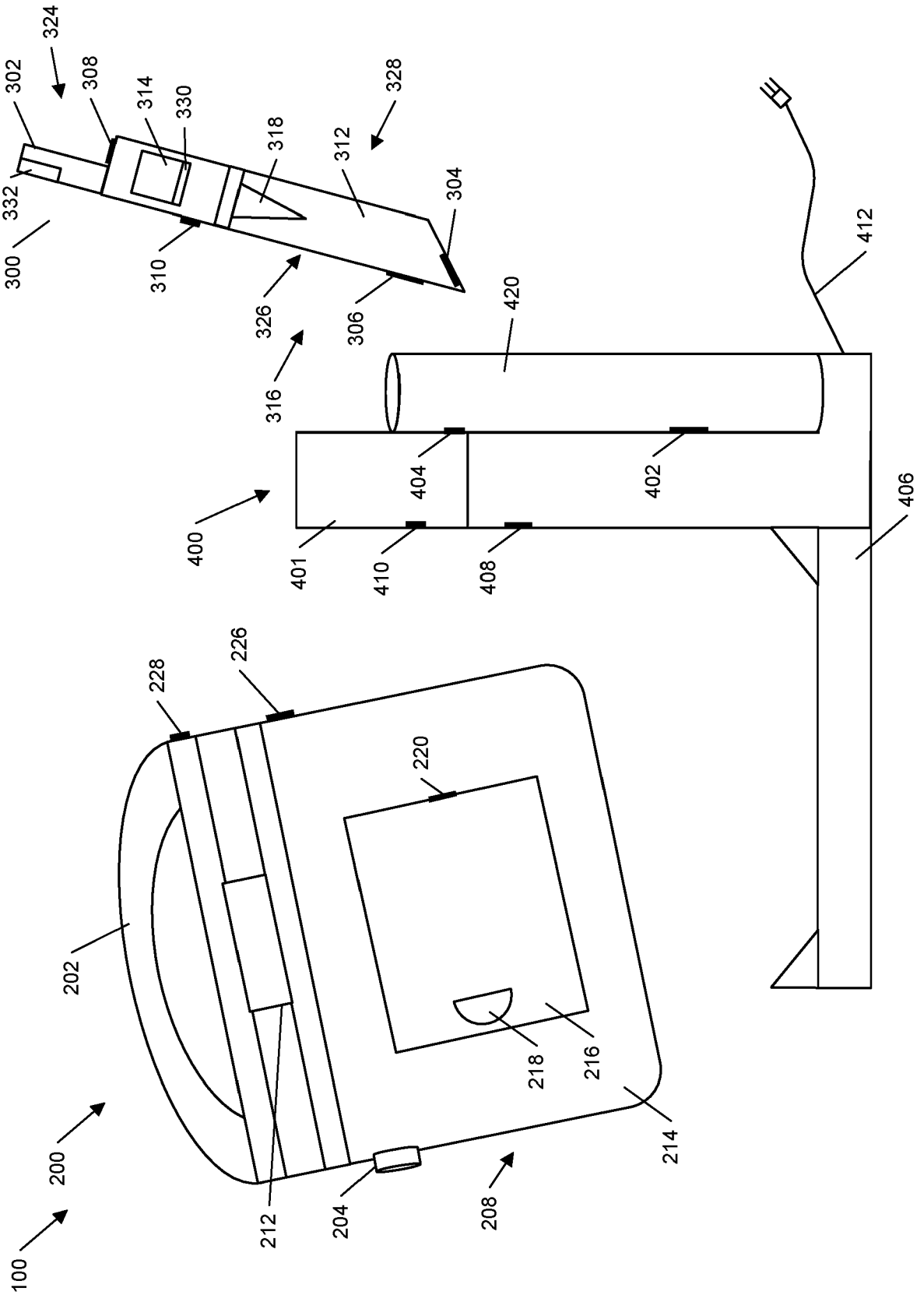
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FIG. 4

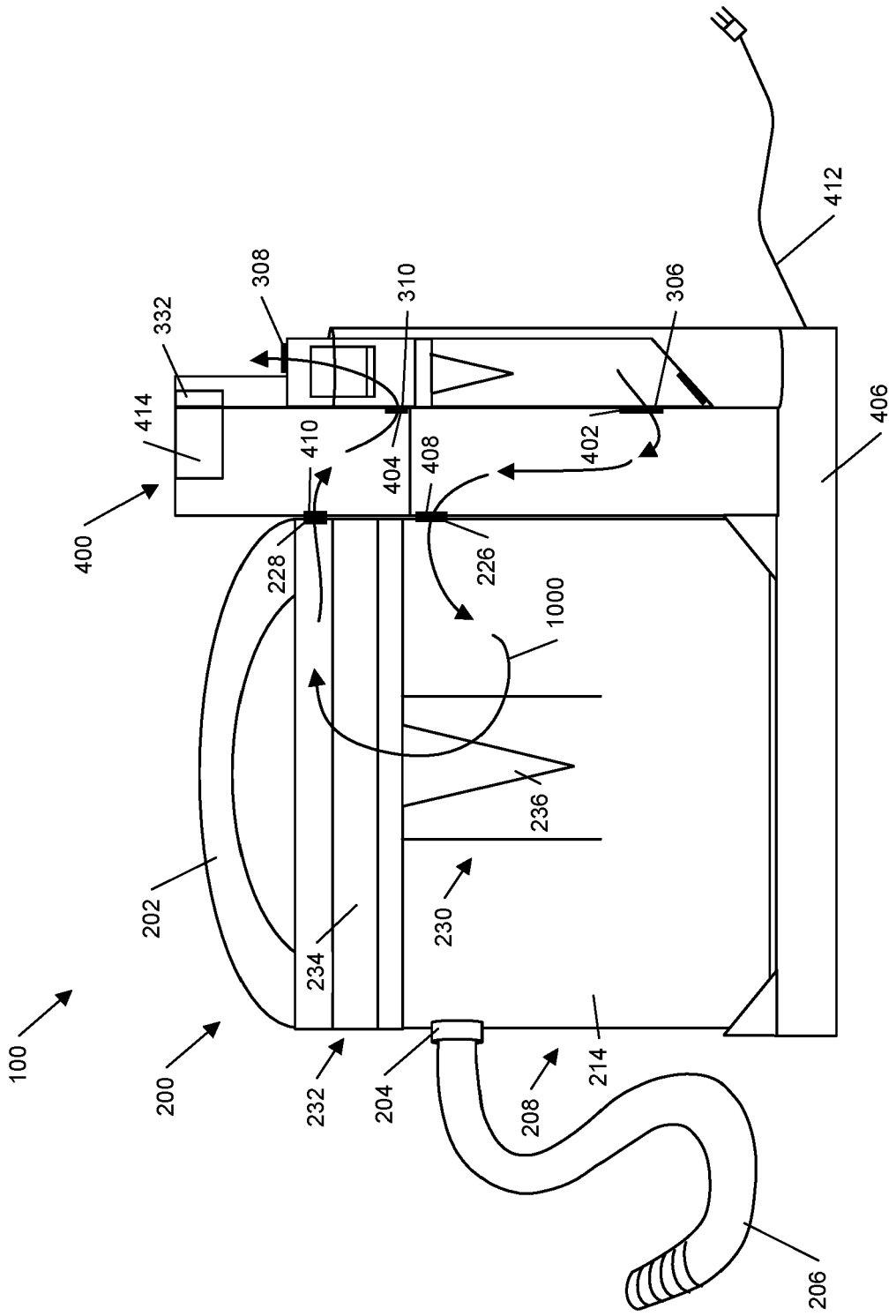
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FIG. 5

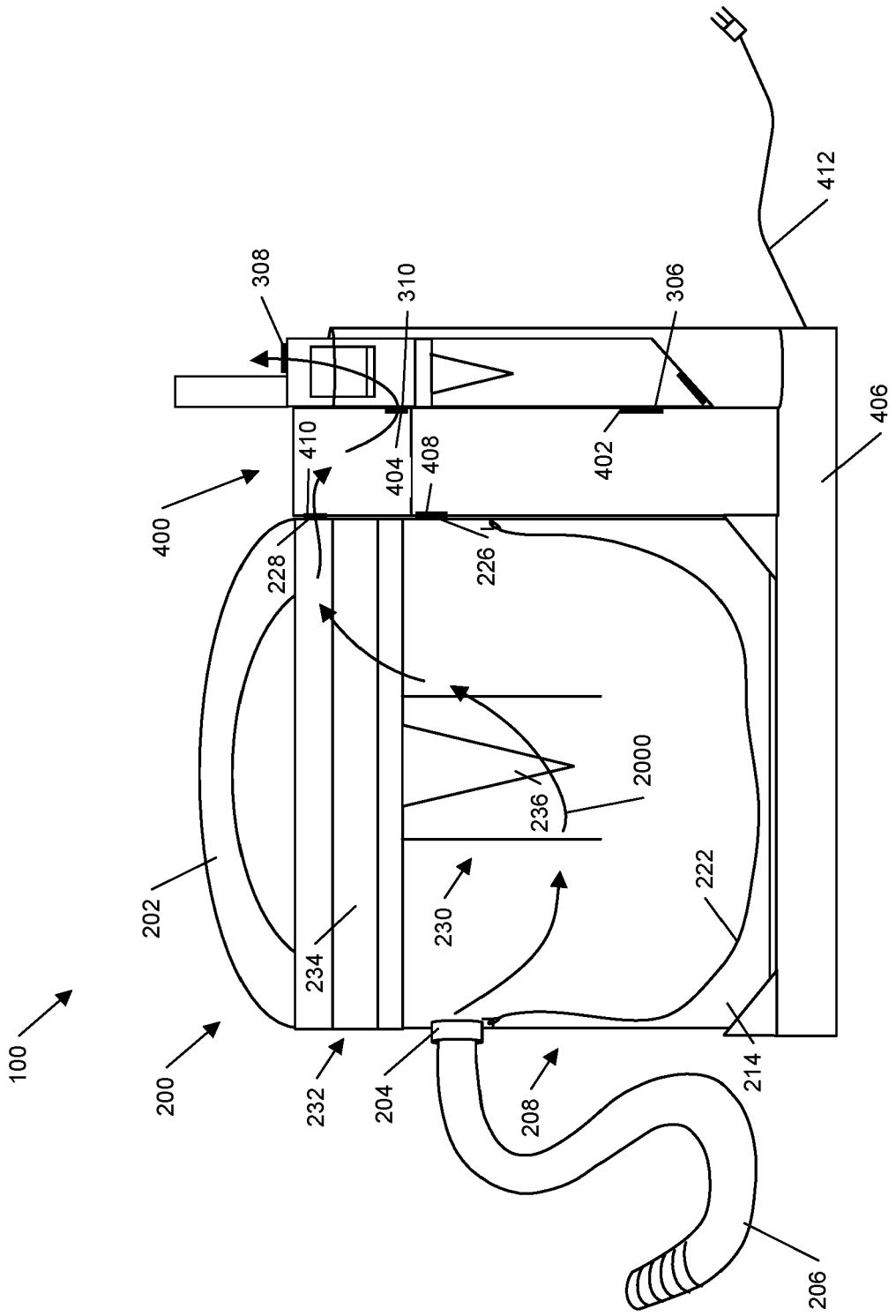
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FIG. 6

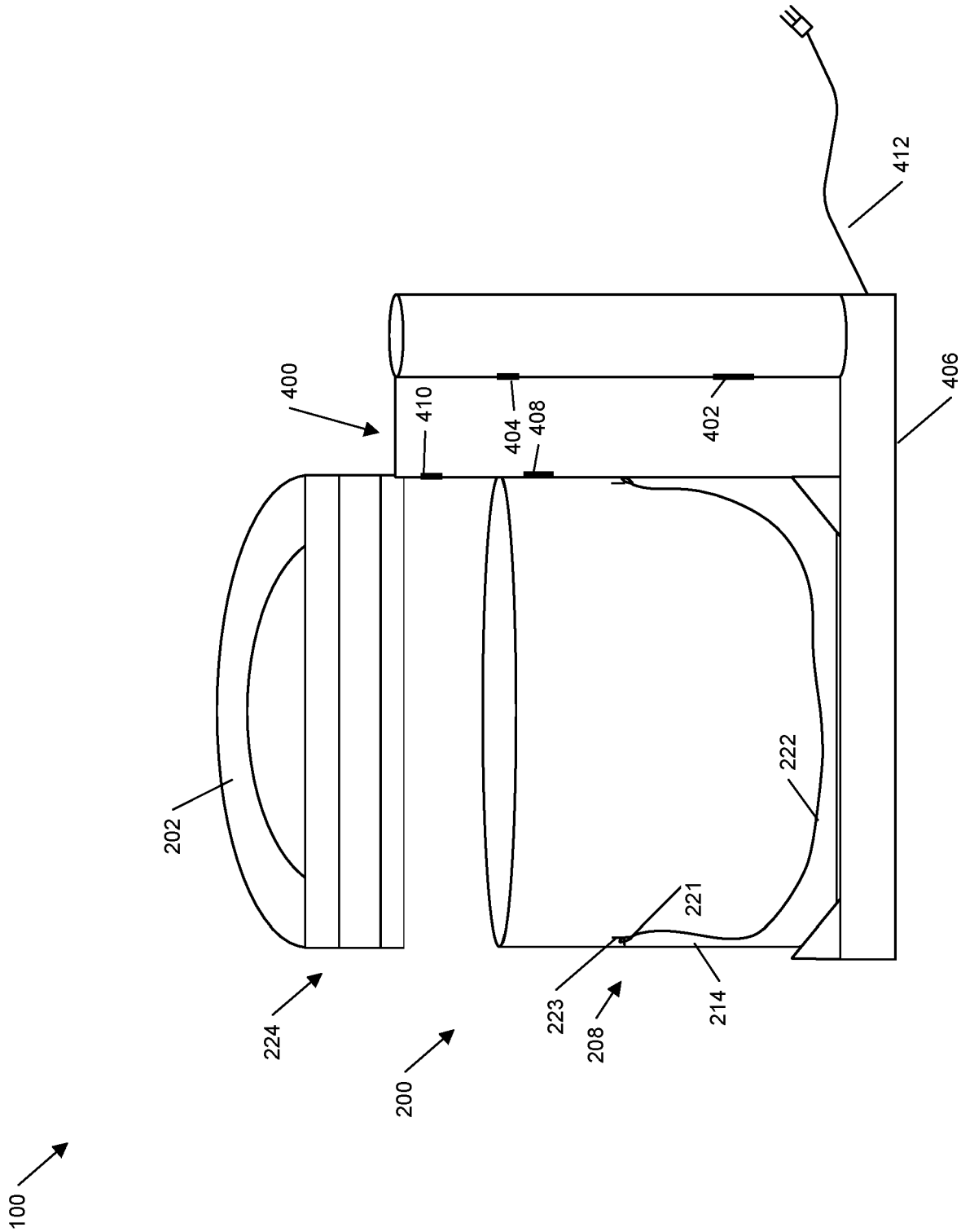

FIG. 7

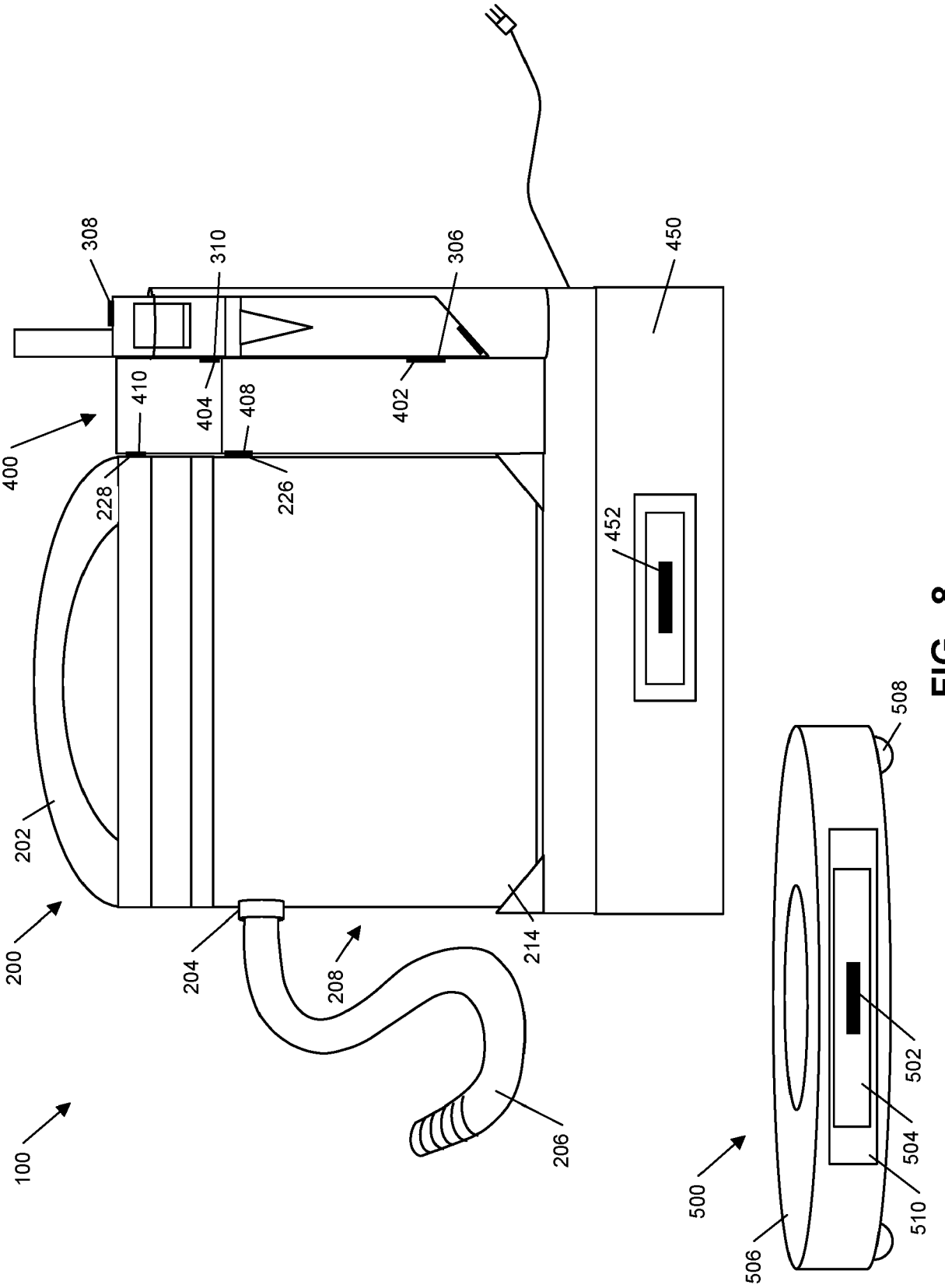
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FIG. 8

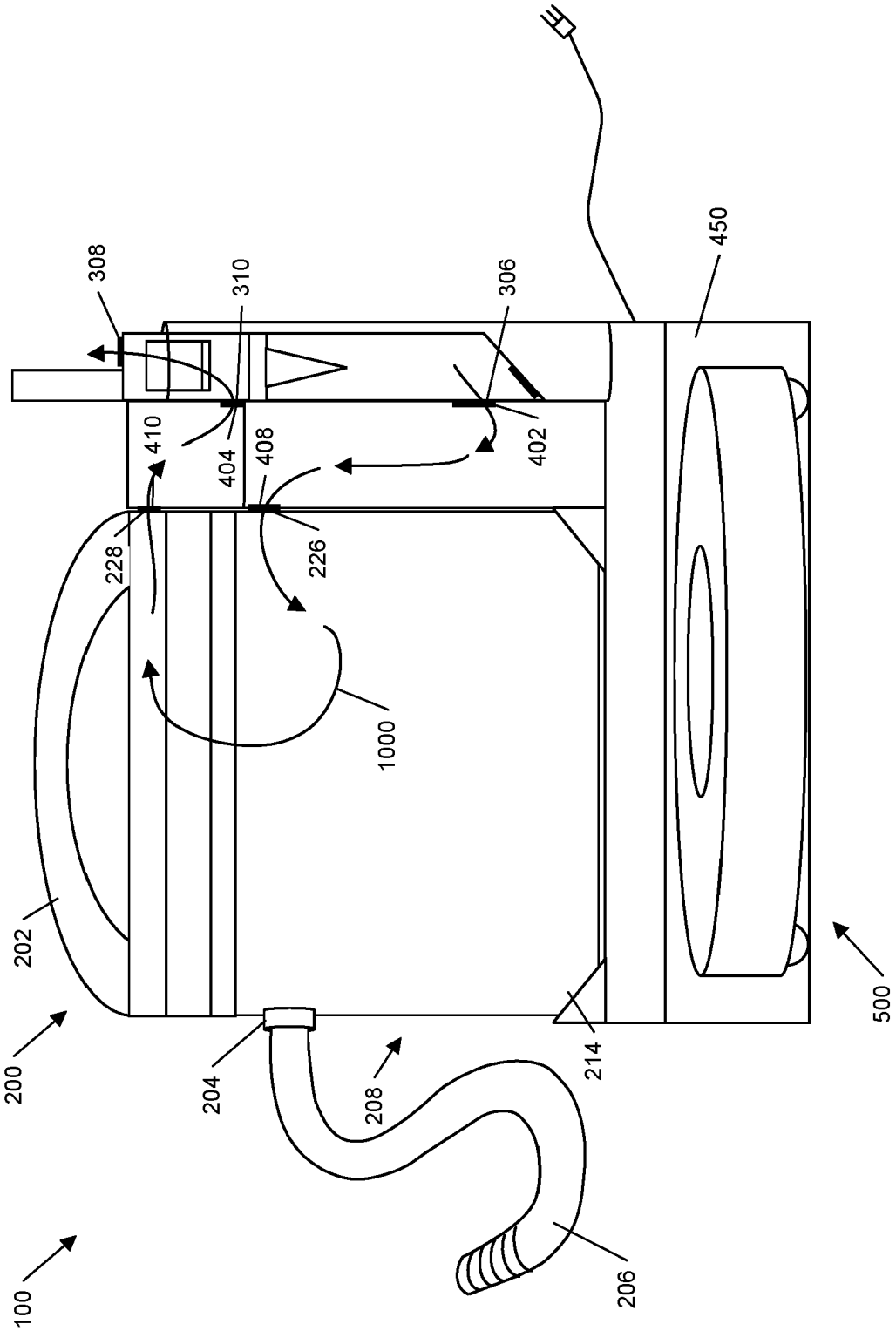
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FIG. 9

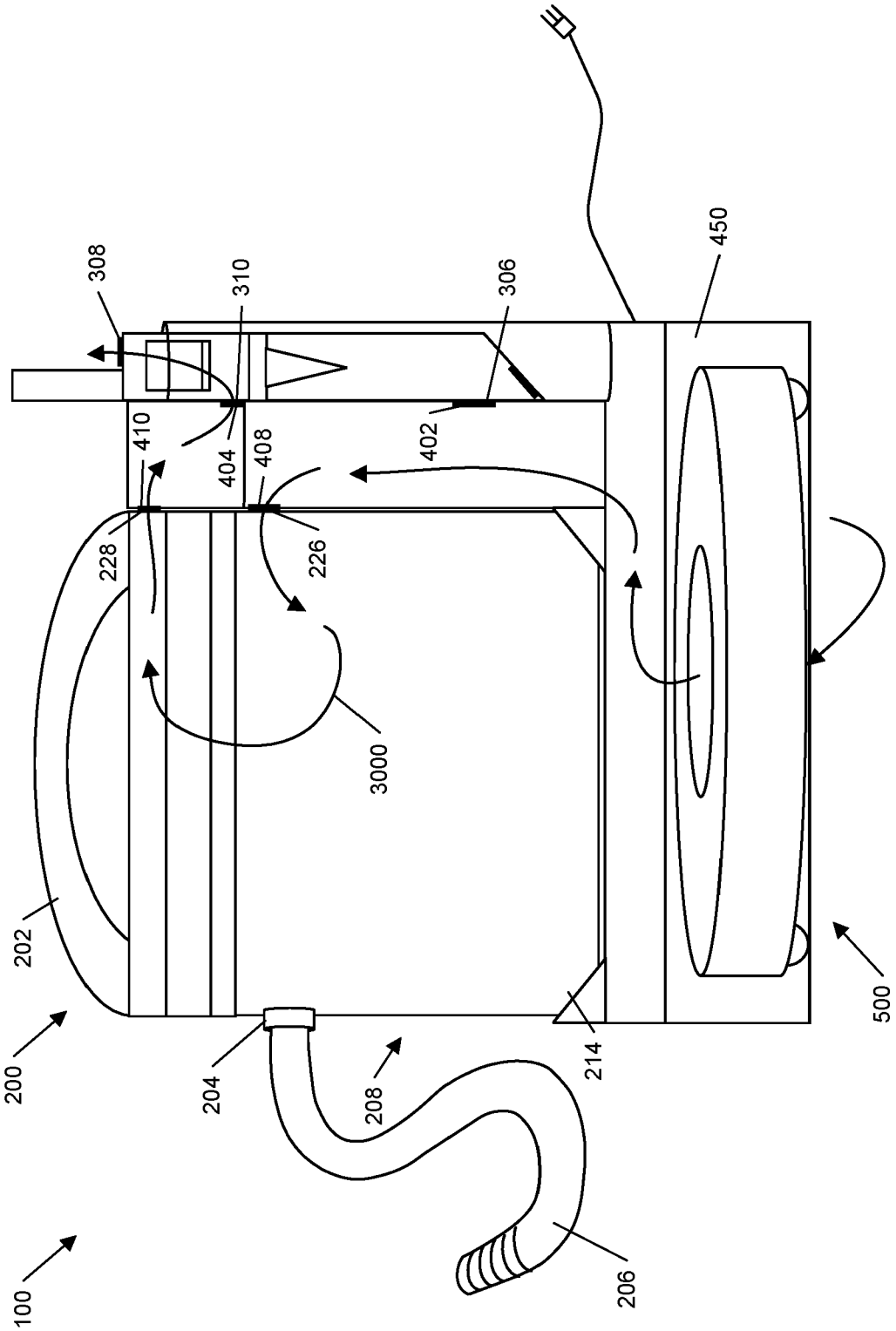
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FIG. 10