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(54) Title: FLOOR TREATMENT APPARATUS

(57) Abstract: Disclosed herein are surface treatment apparatuses for cleaning treating a surface including, but not limited to steam cleaning floors. Various embodiments are disclosed that give a user the ability to control steam production, or switch between cleaning functions, by manipulating a shaft of a surface treatment apparatus. Also disclosed, is a floor treatment apparatus configured to receive a roll of cleaning material that is simultaneously unrolled for cleaning and rolled for disposal.

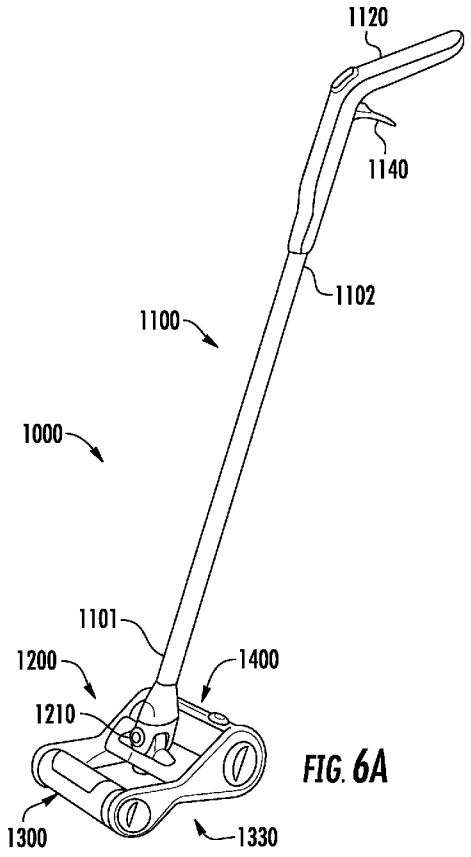



FIG. 6A

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# FLOOR TREATMENT APPARATUS

## TECHNICAL FIELD

**[0001]** This disclosure generally relates to surface treatment apparatuses, and more particularly to apparatuses configured to collect debris both with and without steam.

## BACKGROUND

**[0002]** Surface treatment appliances are used in the home, office and other locations to treat floors and other surfaces. Various types of surface treatment appliances, such as appliances with oscillating and/or rotating brushes, are known for cleaning carpets. Additionally, certain types of surface treating appliances, such as spray appliances with padded configurations or cleaning apparatuses with steam cleaning heads, may be used for cleaning hard floors.

## SUMMARY

**[0003]** Disclosed herein is a surface treatment apparatus is comprising a steam cleaning head. The steam cleaning head comprises a plurality of rollers configured to rotate about axes defined through the cleaning head and wherein the steam cleaning head is configured to deliver steam. The surface treatment head further comprises a body pivotably connected to steam cleaning head and a steam source configured to be switched between an on setting, wherein the steam source supplies steam to the steam cleaning head, and an off setting. The steam source is switched to the on setting when the body is in a first orientation relative to the steam cleaning head. And the steam source is switched to the off setting when the body is in a second orientation relative to the steam cleaning head.

**[0004]** In some embodiments, the body may rotate about a longitudinal axis relative to the steam cleaning head and about a latitudinal axis with respect to the steam cleaning head. The second orientation of the body is substantially perpendicular to the steam cleaning head, in some embodiments. And, in some embodiments, the first orientation of the body is at an oblique angle to the steam cleaning head. Also, the rollers may comprise a cleaning instrument, in some embodiments.

**[0005]** Another embodiment disclosed herein comprises a surface treatment apparatus comprising: a wand comprising a first end and a second end; a handle connected to the first end of the wand; and a cleaning roll unit connected to the second end of the wand.

**[0006]** The cleaning roll unit comprises a clean roll housing configured to receive a roll of cleaning material and a dirty roll housing. In some embodiments, the clean roll housing and dirty roll housing are configured to transfer the cleaning material from the clean roll housing to the dirty roll housing with a section of the cleaning material extending between the clean roll housing and the dirty roll housing.

**[0007]** The cleaning material may further comprise a free edge attachable to the dirty roll housing. And, the dirty roll housing is removable in some embodiments. The clean roll housing is removable, in some embodiments. The surface cleaning apparatus can also comprise a cleaning material advancing mechanism for advancing the cleaning material from the clean roll housing to the dirty roll housing. The cleaning material advancing mechanism can include a trigger on the handle of the wand. And, the cleaning material may be disposable in some embodiments.

**[0008]** Another embodiment disclosed herein comprises a surface treatment apparatus. The surface treatment apparatus comprises a head, the head comprising: a first cleaning instrument; and a second cleaning instrument configured to switch between a cleaning position, wherein the second cleaning element is lowered relative to the head, and a standby position, wherein the second cleaning element is raised relative to the head. The surface treatment apparatus further comprises a shaft pivotably connected to the head. In some embodiments, the second cleaning instrument is configured to switch to the cleaning position when the shaft is in a first orientation relative to the head and wherein the second cleaning instrument is configured to switch to a standby position when the shaft is in a second orientation relative to the head. The shaft is configured to rotate about a longitudinal axis relative to the head and about a latitudinal axis relative to the head. And, in some embodiments, the first orientation of the shaft relative to the body and the second orientation of the shaft relative to the body are separated by 180 degrees.

**[0009]** In some embodiments, the second cleaning instrument comprises a brush guard. In other embodiments, the second cleaning instrument comprises a brush roll. Suction may be generated through the brush roll into the head in some embodiments.

**[0010]** In some embodiments, the surface treatment apparatus further comprises a motor configured to run when the shaft is in the first orientation and configured not to run when the shaft is in the second orientation. In some embodiments, the surface treatment apparatus further comprises a vacuum device configured to generate suction when the shaft is in the first orientation and configured not to generate suction when the shaft is in the second relative orientation.

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0011]** Figures 1-1f are schematic diagrams illustrating exemplary embodiments of a surface treatment apparatus, in accordance with the present disclosure;

**[0012]** Figure 2a-2d are schematic diagrams illustrating exemplary embodiments of a steam roller system of the surface treatment apparatus shown in FIG.s 1-1f, in accordance with the present disclosure;

**[0013]** Figure 3 is a schematic diagram illustrating an exemplary embodiment of actuation mechanism for generating and applying steam using the surface treatment apparatus shown in FIG. 1-1f, in accordance with the present disclosure;

**[0014]** Figures 4-4d are schematic diagrams illustrating exemplary embodiments of a driving mechanism for driving the steam roller system FIG. 2-2d, in accordance with the present disclosure.

**[0015]** Figure 5 is a schematic diagram illustrating another embodiment of a surface treatment apparatus, in accordance with the present disclosure.

**[0016]** FIG. 6A is a perspective view of a surface cleaning apparatus with a cleaning roll, consistent with embodiments of the present disclosure.

**[0017]** FIG. 6B is an exploded perspective view of a cleaning roll unit of the surface cleaning apparatus shown in FIG. 6A with a clean roll housing and a dirty roll housing, consistent with embodiments of the present disclosure.

**[0018]** FIG. 7A is a perspective view of a clean roll housing including a cleaning material roll, consistent with embodiments of the present disclosure.

**[0019]** FIG. 7B is a perspective view of the cleaning roll material being unrolled from the clean roll housing, consistent with embodiments of the present disclosure.

**[0020]** FIG. 8 is a side view of a trigger on a handle of the surface cleaning apparatus for causing the cleaning material to advance, consistent with embodiments of the present disclosure.

**[0021]** FIG. 9 illustrates disposal of used cleaning material, consistent with embodiments of the present disclosure.

**[0022]** FIG. 10 is a perspective view of a surface cleaning apparatus with a cleaning roll and a cleaning liquid reservoir, consistent with embodiments of the present disclosure.

**[0023]** FIG. 11 is a perspective view of a docking station for the surface cleaning apparatus shown in FIG. 10.

**[0024]** FIG. 12 is a perspective view of the surface cleaning apparatus shown in FIG. 10 in the docking station shown in FIG. 11.

**[0025]** FIG. 13 is a perspective view of a cleaning roll cartridge, consistent with embodiments of the present disclosure.

**[0026]** FIGS. 14A and 14B are perspective views illustrating a wand being attached to the cleaning roll cartridge shown in FIG. 13.

**[0027]** FIG. 15 is a side view of the cleaning roll cartridge shown in FIG. 13 attached to the wand.

**[0028]** FIG. 16 is a side view of two embodiments of a cleaning roll cartridge, consistent with the present disclosure.

**[0029]** FIGS. 17 and 18 illustrate an embodiment of a cleaning material advancing mechanism for advancing the cleaning material in a surface cleaning apparatus, consistent with embodiments of the present disclosure.

**[0030]** FIG. 19 is a photograph illustrating a prototype of a surface cleaning apparatus with a cleaning roll, consistent with embodiments of the present disclosure.

**[0031]** FIG. 20 illustrates an embodiment of a surface treatment apparatus with a body in a first orientation relative to the head.

**[0032]** FIG. 21 illustrates an embodiment of a surface treatment apparatus with a body in a second orientation relative to the head.

**[0033]** FIG. 22 illustrates an embodiment of a surface treatment apparatus with a second cleaning instrument in a cleaning position.

**[0034]** FIG. 23 illustrates an embodiment of a surface treatment apparatus with a second cleaning instrument in a standby position.

## DETAILED DESCRIPTION

**[0035]** It will be appreciated by those of ordinary skill in the art that the embodiments disclosed herein can be embodied in other specific forms without departing from the spirit or essential character thereof. The presently disclosed embodiments are therefore considered in all respects to be illustrative and not restrictive.

**[0036]** Example embodiments will now be described hereinafter with reference to the accompanying drawings, which form a part hereof, and which illustrate example embodiments which may be practiced. As used in the disclosures and the appended claims, the terms "embodiment", "example embodiment", and "exemplary embodiment" do not necessarily refer to a single embodiment, although they may, and various example embodiments may be readily combined and interchanged, without departing from the scope or spirit of example embodiments. Furthermore, the terminology as used herein is for the purpose of describing example embodiments only and is not intended to be limitations. In this respect, as used herein, the term “in” may include “in” and “on”, and the terms “a,” “an” and “the” may include singular and plural references. Furthermore, as used herein, the term “by” may also mean “from”, depending on the context. Furthermore, as used herein, the term "if" may also mean "when" or "upon," depending on the context. Furthermore, as used herein, the words “and/or” may refer to and encompass any and all possible combinations of one or more of the associated listed items.

**[0037]** FIG. 1 depicts an illustrative embodiment of a cleaning appliance that may be used for cleaning or otherwise treating a floor surface, such as a carpet and/or hard floor. It should be appreciated that cleaning appliances described herein also may be used as treatment apparatuses that treat or operate on a surface to perform one or more functions other than cleaning.

**[0038]** As illustrated, the cleaning appliance (or surface treatment apparatus) 100 may include a shaft portion 101, a main body 103, and a steam cleaning head 105. The shaft portion 101 may include a handle 102, and a fluid tank 104. The shaft portion 101 may be made from aluminum, polycarbonate or other materials. In an embodiment, at least a portion of the shaft portion 101 may be made of a transparent or semi-opaque material so the user can see through the shaft portion 101 and determine the amount of fluid remaining in the shaft portion 101. The shaft portion 101 may also be a solid color. As illustrated in FIG. 1a, in one embodiment, the fluid

tank 104 may extend into an inner portion of the handle 102. In another embodiment, the handle 102 may be removably connected to the fluid tank 104 as shown in FIG. 1f.

**[0039]** By utilizing the shaft portion 101 to store fluids, the steam application device 101 can store a large volume of fluid while maintaining a streamlined design, allowing the steam application device 100 to operate for an extended period of time without needing to be refilled.

**[0040]** As illustrated in FIG. 1b, the shaft portion 101 may include a fluid inlet 106 for receiving fluid into the fluid tank 104. In one embodiment, the fluid inlet 106 may be located on the handle 102 of the shaft. In another embodiment, the fluid inlet 106 may be located on the fluid storage tank 104. The fluid inlet 106 may also be located in numerous other positions on the shaft portion 101.

**[0041]** In one embodiment, a screw cap may be used to seal the fluid inlet 106 when the steam application device is in use. And, as can be appreciated, a variety of other sealing elements can be used to seal the fluid inlet 106. As illustrated in FIG. 1c, in one embodiment, the fluid inlet 106 is enclosed inside a cavity on the surface of the shaft portion 101 with an inlet cover 107 hinged to the shaft portion 101. The inlet cover may protect the inlet 106 from damage while the steam application device is in use. Other attachment mechanism may also be used to attach the inlet cover 107 to the shaft portion 101 or handle 102.

**[0042]** As illustrated in FIG. 1d, in one embodiment, the shaft portion 101 may be illuminated by a lighting system 108. The lighting system 108 may be located at an end portion of the shaft portion 101 and positioned to direct colored light through the shaft portion 101. In other embodiments, the lighting system 108 may be located elsewhere on the steam application device. The lighting system 108 may be controlled to emit light when the steam application device 100 is running low on fluid thereby alerting the user to refill the fluid tank 104. In an embodiment, the lighting system 108 may include a plurality of LEDs operable to emit different color light. Different LED of the plurality of LEDs may be illuminated depending on the amount of fluid present in the fluid tank 104. In an alternative embodiment, the shaft portion 101 has a fluid gauge (not shown) that measures the amount of fluid in the fluid tank 104. This gauge can be read by the user to determine the amount of fluid in the fluid tank 104. In another embodiment, the shaft portion 101 may include a digital display (not shown) that indicates the amount of fluid in the fluid tank 104.

**[0043]** As illustrated in FIG. 1e, in one embodiment, the shaft portion 101 may be removably connected to the main body 103. This allows the shaft portion 101 to be removed so the fluid tank can be conveniently filled with fluid at a water source (not shown), such as a tap. In an embodiment, the shaft portion 101 may include a shaft outlet 110. The shaft outlet 110 permits water to flow from the fluid tank 104 to the main body 103 when the shaft portion 101 is connected to the main body 103. The shaft portion 101 may include a valve (not shown) which seals the shaft outlet 110. In one embodiment, the valve may be manually actuated. In another embodiment, this valve may be automatically actuated by a mechanical device that causes it to close when the shaft portion 101 is removed from the main body 103 and to open when the shaft portion 101 is connected to the main body 103. The shaft outlet 110 may be connected to the main body 103 by dry-break coupling to prevent fluid from leaking out while the steam application device is in use. As can be appreciated, numerous locking mechanisms can be used to secure the shaft portion 101 to the main body 103. In an embodiment, a push button release mechanism (not shown) may be used to detach the shaft portion 101 from the main body 103.

**[0044]** In another embodiment, a base (not shown) connects the shaft portion 101 to the main body. In this embodiment, the fluid tank 104 may be removably attached to the base while the handle 102 is permanently attached to the base. In this way, the fluid tank 104 can be removed from the steam application device to be filled with fluid. As can be appreciated, numerous kinds of locking mechanism can be used to secure the shaft portion 101 to the main body 103 and the base. A push button release mechanism (not shown) may be used to detach the shaft portion 101 from the main body 104 and the base; however a variety of other methods may be employed.

**[0045]** Referring to FIG. 1f, in an embodiment, the handle 102 may be removably connected to the fluid tank 104, and the fluid inlet 106 may be disposed in an interface between the fluid tank 104 and the handle 102. When the steam application device is in use and the handle 102 is connected to fluid tank 104, the fluid inlet 106 may be enclosed by the handle 102. When the handle 102 is disconnected from the fluid tank 104, the fluid inlet 106 may be exposed for more refilling. As can be appreciated, various means may be employed to removably connect the handle 102 to the fluid tank 104. A screw cap or a variety of other means can be used to seal the fluid inlet 106. In an embodiment, the fluid tank 104 may be filled by retractable funnel hose (not shown) attached to the fluid tank 104 that can be extended to a fluid source.

**[0046]** In one embodiment the main body 103 may include an end portion operable to connect to the shaft portion 101, a shaft inlet (not shown) to receive fluid from the shaft, a heating element (not shown) to convert fluid into steam, and an outlet to project steam (not shown). In one embodiment, the main body 103 also includes a pump (not shown) to forcibly pressure steam out of the steam outlet. The main body 103 also may have a mode selector (not shown) so the user can choose the flow rate that steam is expressed through the steam outlet. In an embodiment, the main body 103 responds to manual, downward pressure applied by the user to increase the steam-flow rate through the outlet.

**[0047]** As shown in Figure 1g, in one embodiment, the main body 103 and the shaft portion 101 may be removed as a unit from the steam cleaning head 105 to form a lift-away precision steam applicator 112. Steam can then be expressed directly through the steam outlet 114 onto the surface being cleaned. Steam release can be actuated by a trigger, a button, manual pressure, or other release mechanism known in the art. In one embodiment, the handle 102 may be configured to allow the user to employ a pump action to pressure steam through the steam outlet 114. As can be appreciated, numerous lock and release mechanism can be used to connect and disconnect the lift-away precision steam applicator 112 to the steam cleaning head 105 including but not limited to a lever, or push button release mechanism.

**[0048]** In one embodiment the steam cleaning head 105 may comprise a mop, such as a single side mop, double sided mop, or a double sided pocket mop. In another embodiment, the steam cleaning head 105 may comprise a steam roller. As can be appreciated, a variety of steam cleaning heads can be incorporated into this device.

**[0049]** In one embodiment, the steam cleaning head 105 may comprise a steam roller 200, as shown in FIG. 2. The steam roller 200 may include dual rollers 210, as shown in FIG. 2a. The dual rollers 210 are supported by a yoke 212. In one embodiment the dual rollers 210 are sheltered by a protective cover 214, as shown in FIG. 2b. The dual rollers 210 may be configured to rotate about substantially parallel axes, in the same rotational direction or opposite directions.

**[0050]** In one embodiment, the dual rollers 210 are formed in a tubular structure with perforations. One or both of the dual rollers 210 may include a cleaning pad 216 on the exterior of the dual rollers 210, as shown in FIG. 2c. Microfibre or numerous other materials can be used to form the cleaning pad 216. Different types of material may be used for the cleaning pad 216

for different cleaning tasks such as dusting, buffing, polishing, scrubbing, wide area grout, and steaming. In one embodiment the cleaning pads 216 are bonded to the dual rollers 210 on a spiral to create a continuous-rolling cleaning process as the steam application device 100 is rolled across the surface to be cleaned. In one embodiment, the steam application device 100 may include a suction source between the dual rollers 210. And in another embodiment, the steam cleaning head 105 also includes a change-over valve (not shown) that directs steam either to the dual rollers 210 or to a space between the dual rollers 210. As can be appreciated, a variety of control mechanisms can be used to control the change-over valve between positions including but not limited to levers, buttons, and switches.

**[0051]** In one embodiment, the yoke 212 includes retractable roller holders 218 so the dual rollers 210 may be detached for cleaning or maintenance. A variety of other mechanisms could also be used to detach and attach the rollers from the yoke 212 including a push button release on the shaft portion 101 or handle 102, as shown in FIG.s 2d and 2e. In one embodiment the cleaning pads 216 may be removed from the dual rollers 210 either to be cleaned or replaced.

**[0052]** The steam roller 200 may include a steam inlet (not shown) to receive steam from the main body 103 and a steam outlet (not shown) to project steam onto the cleaning surface. In one embodiment the steam roller 200 may include a plurality of steam outlets (not shown). And in another embodiment, steam outlets may be located proximate to marked zones on the surface of the dual rollers 210 to aid the user in applying the steam to a clean surface.

**[0053]** In one embodiment, the steam expression can be actuated by a trigger (not shown). In another embodiment steam expression can be actuated by a switch (not shown). As can be appreciated, numerous different actuation mechanism can be used to actuate the steam expression. The actuating device can be located anywhere on the steam application device including but not limited to the main body 103 or the shaft portion 101 (e.g., the handle 102).

**[0054]** In one embodiment both the steam roller 210 and the flow of steam release can be controlled by modulating downward pressure on the steam application device 100, as shown in FIG.s 3 and 3a. In FIG. 3 the steam application device is in an off position. And in FIG. 3a the steam application device is in an active position. The harder the downward pressure, the more steam is released through the steam outlet 310. And, in one embodiment, a steam blast through the steam outlet 310 may be produced by downward pressure on the steam application device 100.

**[0055]** In one embodiment, the movement of the steam application device 100 is manually powered. In an alternative embodiment, the movement of the application device is motorized. As can be appreciated, a variety of means can be utilized to power the motor including but not limited to battery power or electric power. In one embodiment, the steam application device includes a semi-auto cord rewind.

**[0056]** In one embodiment, the movement of the dual rollers 210 may be assisted by a dual gear mechanism 410, as shown in FIG.s 4, 4a, 4b, and 4d. The gear mechanism 410 may be driven clockwise, counter clockwise, in opposite directions, or in the same direction. In one embodiment, the gear ratios can be designed for differential speeds front to back to provide easier steering. In one embodiment the gear mechanism 410 is motorized. As can be appreciated, the gear mechanism 410 can be powered by numerous sources including but not limited to batteries or electric power. And as is illustrated in FIG. 4c, one embodiment includes a protective cover 414 to shelter the dual rollers 210. In another embodiment, the steam roller 200 includes a hinged steam transfer port on the side of the dual rollers 210 opposite the gear mechanism 410. In an embodiment, an activation of the gear mechanism 410 may be synchronized with outputting the steam to the steam cleaning head 105.

**[0057]** As illustrated in FIG. 5, in an embodiment, the steam application device 500 may include a shaft 501 and a steam cleaning head 505. The shaft 501 includes a handle 502, and a fluid tank 504. In this embodiment, the steam application device 500 may be similar to the steam application device 100 except not having a main body. In one embodiment, a heating element (not shown) may be located in the steam cleaning head 505. The steam head also may have at least one steam outlets (not shown). In an embodiment, the pump (not shown) may be located in the steam cleaning head 505 to force steam out of the steam outlet. The pump can be manually powered. In another embodiment, the pump is motorized.

**[0058]** Referring to FIGS. 6A and 6B, a surface cleaning apparatus (or surface treatment apparatus) 1000, consistent with embodiments disclosed herein, includes a wand 1100 coupled to a cleaning roll unit 1200. The cleaning roll unit 1200 includes the cleaning material roll that unrolls to present an unused section of cleaning material, as will be described in greater detail below. The wand 1100 is generally an elongated structure with a handle 1120 at one end 1102, which may be referred to as a first end, and the cleaning roll unit 1200 at the other end 1101,

which may be referred to as the second end. The wand 1100 may be pivotably coupled to the cleaning roll unit 1200 with a pivot or swivel joint 1210.

**[0059]** In this embodiment, the cleaning roll unit 1200 includes a base 1220 that receives a clean roll housing 1300 containing the cleaning material roll 1321 and a dirty roll housing 1400 that receives the used cleaning material 1420. A section 1330 of the cleaning material 1320 extends across the bottom region of the cleaning roll unit 1200 (FIG. 6A) for cleaning a surface, such as a hard surface. The base 1220 includes a cleaning material support 1280 for supporting the section 1330 of cleaning material 1320. The clean roll housing 1300 is removably held in the base 1220, for example, with an engaging member 1240 that axially engages the housing 130, thereby allowing the cleaning material roll to be replaced. In this embodiment, the used material 1420 is rolled around a take up spool 1460, which may be removable held in the base 1220, for example, with an engaging member 1260 that axially engages the take up spool 1460, thereby allowing the used cleaning material to be removed for disposal. Alternatively, or additionally, the dirty roll housing 1400 may be removed from the cleaning roll unit 1200 for disposing the used cleaning material.

**[0060]** As shown in greater detail in FIGS. 7A and 7B, the clean roll housing 1300 includes an exit region 1340 (e.g., a slot) that allows the cleaning material 1320 to pass through when the cleaning material 1320 is unrolled. The cleaning material 1320 may include any known or commercially available cleaning cloth or pad such as an electrostatic dusting cloth or pad, a reusable cloth or pad (e.g., a washable microfiber fabric), or a disposable cloth or pad (e.g., paper towel). The cleaning material 1320 may be imparted with a cleaning substance, such as any known or commercially available cleaning chemical or agent. The cleaning substance may be wet or may be a dry, water-activated cleaning substance. The clean roll housing 1300 may be sold as a cartridge 1310 including a prepackaged cleaning material roll 1320. Alternatively, the cleaning material roll 1320 may be sold separately for loading into the clean roll housing 1300.

**[0061]** The end 1360 of the cleaning material 1320 may be engaged with the take up spool 1460 and/or other mechanism in the dirty roll housing 1400. The cleaning material 1320 may be advanced as needed to present unused sections 1330 of cleaning material 132 while receiving the used cleaning material 1420 in the dirty roll housing 1400. The used cleaning material 1420 may be rolled in the dirty roll housing 1400, may be collected without rolling or may be cut and removed as it is used. Unrolling the cleaning material roll and presenting unused sections of

cleaning material avoids interruptions to change cleaning pads and extends the cleaning sessions and minimizes user contact with the used cleaning material. Although the illustrated embodiment shows the clean roll housing 1300 at the front of the cleaning roll unit 1200, the clean roll housing 1300 may also be at the rear.

**[0062]** The unused sections 1330 of the cleaning material 1320 may be advanced manually, for example, by rotating the take up spool 1460 in the dirty roll housing 1400 or by friction when pushing the surface cleaning apparatus 1000 across the surface. Alternatively, or additionally, the surface cleaning apparatus 1000 may also include a material advancing mechanism for advancing the unused sections 1330 of the cleaning material 1320. The material advancing mechanism may include known mechanisms for feeding and advancing a sheet of material, such as a ratcheting system. The material advancing mechanism may be located on the cleaning roll unit 1200 and may be user actuated by a trigger 1140, as shown in FIG. 8, on the handle 1120 or other mechanism (e.g., a pedal on the cleaning roll unit 1200). The material advancing mechanism may also advance the unused section 1330 automatically and periodically during use. An embodiment of the material advancing mechanism is described in greater detail below.

**[0063]** As shown in FIG. 9, the used cleaning material 1420 may be removed from the dirty roll housing 1400 for easy disposal. The used cleaning material 1420 may be removed from the dirty roll housing 1400 after all of the cleaning material has been used. The used cleaning material 1420 may also be cut and removed before all of the cleaning material has been used, for example, to remove used cleaning material with undesired odors or germs. The cleaning roll unit 1200 may thus include a cutting mechanism for cutting the cleaning material between the used and unused section, as will be described in greater detail below. Alternatively, or additionally, the cleaning material may include rows of perforations to allow manual severing and/or a serrated edge may be used to cut the cleaning material along any location.

**[0064]** Referring to FIG. 10, another embodiment of a surface cleaning apparatus 5000, consistent with embodiments of the present disclosure, includes a wand 5100 with a cleaning liquid reservoir 5160 for delivering cleaning liquid (e.g., water or water with a cleaning substance) to the cleaning material. The surface cleaning apparatus 5000 may thus be used a dry mode and a wet mode, for example, by first cleaning with a dry cleaning material and then cleaning with a wet cleaning material. Where the cleaning material includes a dry, water-activated cleaning substance, for example, the liquid reservoir 5160 may deliver water to the

cleaning material to activate the cleaning substance. The cleaning liquid may be sprayed on the surface being cleaned in advance of the cleaning roll unit 5200 such that the cleaning material contacts the cleaning liquid when moving over the wet surface. The cleaning liquid may also be sprayed directly on, or otherwise delivered directly to, the cleaning material as it advances out of the clean roll housing 5300. The liquid delivery from the reservoir 5160 may be automatic or may be user activated, for example, by a trigger 5140 on the handle 5120.

**[0065]** Referring to FIGS. 11 and 12, a docking station 5500 may be used to heat a cleaning liquid (e.g., water or water with a cleaning substance) and to transfer the cleaning liquid to the cleaning liquid reservoir 5160 on the surface cleaning apparatus 5000. The docking station 5500 may include a docking station reservoir 5520 containing the liquid and a heater for heating the liquid. The docking station 5500 and the surface cleaning apparatus 5000 may include fluid connections (e.g., ports) that are engaged when the surface cleaning apparatus 5000 is docked to allow the fluid to be transferred when docked. The fluid transfer process may be initiated automatically or using a button or other user activation on the docking station 5500 or the surface cleaning apparatus 5000. Using the docking station to heat the water or liquid, allows the surface cleaning apparatus 5000 to deliver hot water or liquid without having to power the surface cleaning apparatus 5000.

**[0066]** Referring to FIGS. 13-15, an embodiment of a cleaning roll cartridge 8200 is described in greater detail. This embodiment of a cleaning roll cartridge 8200 includes a clean roll housing 8300 containing a cleaning material roll 8320 and a dirty roll housing 8400 for receiving used cleaning material. A cleaning material support 8280 extends between the housings 8300, 8400 for supporting a section of cleaning material during use. The cleaning material may be imparted with a cleaning substance (e.g., wet or dry), such as a brand name cleaning substance. Thus, the cleaning roll cartridges 8200 may be sold as disposable cartridges under a known cleaning brand.

**[0067]** The cleaning roll cartridge 8200 may be removably coupled directly to a wand 8100, as shown in FIGS. 14A and 14B. The wand includes an attachment mechanism 8110, for example, including a member with tabs that engage one or more recesses on one or both of the housings 8300, 8400 and/or the support 8280.

**[0068]** FIG. 16 shows the two different embodiments of cleaning roll cartridges 1310, 8200 described above. One embodiment of a cleaning roll cartridge 1310 includes only a clean roll housing 1300 containing a cleaning material roll and another embodiment of a cleaning roll

cartridge 8200 includes a clean roll housing 8300 containing a cleaning material roll and an empty dirty roll housing 8400. The cleaning roll cartridge 8200 may facilitate disposal of the used cleaning material.

**[0069]** FIGS. 17 and 18 illustrate an embodiment of a material advancing mechanism that may be used to advance the cleaning material in the surface cleaning apparatus described herein. In this embodiment, a feed system includes one or more rollers 12620 that feed the cleaning material into the dirty roll housing 12400 and thus unroll the cleaning material in the clean roll housing 12300 to present unused sections of cleaning material. The cleaning material 12320 may include a molded piece 12360 configured to be engaged by the feed system. The used material that is fed into the dirty roll housing may be stored for later disposal. Additionally or alternatively, a cutting blade 12700 may be used to cut the material for immediate disposal. The dirty roll housing 12400 may also be eliminated such that the used cleaning material is cut and removed without storage.

**[0070]** FIG. 20 depicts another embodiment of the surface treatment apparatus 2000 comprising a steam cleaning head 2010, and a plurality of rollers 2020. In different embodiments, the rollers 2020 can comprise different forms, many examples of which have been described above. The rollers 2020 can be configured to translate the steam cleaning head 2010 about a cleaning surface. The rollers 2020 may rotate about axes 2021 that are defined through the steam cleaning head 2020. The steam cleaning head 2010 may be configured to deliver steam to a cleaning surface. In some embodiments, the rollers 2020 can also comprise cleaning instruments. As the rollers 2020 roll across a surface they can pick up dirt and debris or scrub the surface. In some embodiments, a removable cleaning pad 2030 can be coupled with the rollers. The rollers 2020 can be used in conjunction with a steam cleaner, or they may comprise cleaning roll housings, as have been described elsewhere in this application. The cleaning pad 2030 may be washable or disposable. And, as can be appreciated, the cleaning pad 2030 may be comprised of many different materials and come in different forms. As can also be appreciated, the rollers 2020 may be removable. Different types of rollers 2020 may be used for different cleaning applications.

**[0071]** The surface treatment apparatus 2000 may further comprise a body 2040. In some embodiments the body 2040 may be pivotably connected to the steam cleaning head 2010. As can be appreciated, a joint, socket, swivel, or other means may be utilized to allow the body 2040

to rotate about a longitudinal axis relative to the steam cleaning head 2020 and to pivot along a latitudinal axis relative to the head. Combined, these two axes of rotation all a user to rotate the body 2040 in a wide range of motion thereby giving the user the ability to maneuver the steam cleaning head 2020 into areas that are difficult to reach.

**[0072]** The surface treatment apparatus 2000 may also comprise a steam generator 2050. In some embodiments, the steam generator 2050 may be disposed in the body. But, it may be disposed in the head 2010 or elsewhere in other embodiments. As c can be appreciated, the steam generator can take many different forms.

**[0073]** The steam generator 2050 may have multiple settings that correspond to different steam production rates. In some embodiments, the steam generator 2050 may have two settings. An on setting and an off setting. When the steam generator 2050 is on it will supply steam. When it is off, it will not.

**[0074]** In some embodiments, the steam generator 2050 may be switched from an on setting or an off setting by movement of the body 2040. The steam generator 2050 may be configured to be turned on when the body 2040 is in a first orientation relative to the steam cleaning head 2010. And, the steam generator 2050 may be configured to be turned off when the body 2040 is in a second orientation relative to the steam cleaning head 2010. As can be appreciated, in different embodiments, the first and second orientation can take different forms. In some embodiments, as depicted in FIG. 21, the body 2040 may be in the first orientation whenever the body 2040 is at an oblique angle relative to the steam cleaning head 2010. In some embodiments, the body 2040, as depicted in FIG. 20, may be in the second orientation when the body is perpendicular, or substantially perpendicular, to the steam cleaning head 2010. As can be appreciated, the surface treatment apparatus 2000 may also comprise additional orientations that correspond to additional settings of the steam generator 2010. For example, one embodiment could have a third orientation wherein the steam generator 2010 produces a steam blast. Some embodiments may also comprise an on/off switch disposed at another location of the surface treatment apparatus 2000. In some embodiments, an on/off switch may be located on the body or a handle 2060. And, allowing for rotation of the body 2040 about longitudinal and latitudinal axes allows for various combinations of rotations, which in turn allows for various orientations. And these orientations can be used to give a user control over any manner of functions.

**[0075]** In some embodiments, the rollers 2020 of the steam cleaning apparatus 2000 may be configured to comprise a clean roll housing and a dirty roll housing, as described elsewhere in the specification, wherein a roll of cleaning material may be transferred from one roll 2020 to another with a section of cleaning material extending between the rollers 2020.

**[0076]** In another embodiment, as depicted in FIG. 22, a surface treatment apparatus 2200 comprises a head 2210 which comprises a first cleaning instrument 2220 and a second cleaning instrument 2230. In different embodiments, the first cleaning instrument 2220 may comprise different forms. In some embodiments, it may comprise a cleaning pad. In different embodiments, the second cleaning instrument 2230 may comprise different forms. In some embodiments, the second cleaning instrument 2230 may comprise a brush roll. In some embodiments, suction may generated through the brush roll 2230 into the head 2210. The first cleaning instrument 2230 may be configured for one type of floor treatment and the second cleaning instrument 2230 may be configured for another type of floor treatment. For example, the first cleaning instrument 2220 may be configured to perform a sweeping or mopping function, while the second cleaning 2230 instrument is configured to operate as a dust pan, or vacuum device. In some embodiments the first cleaning instrument 2220 and the second cleaning instrument 2230 may be disposed on opposite ends of the head 2210. The second cleaning instrument 2230 may be comprised to switch between a cleaning position, as depicted in FIG. 22, and a standby position, as depicted in FIG. 23. When in the cleaning position, the second cleaning instrument 2230 is lowered relative to the cleaning head 2210 so that the second cleaning instrument may make contact with a surface to be cleaned or treated. When in the standby position, the second cleaning instrument 2230 is raised relative to the head 2210 so that it does not make contact with the cleaning surface. In this way, the second cleaning instrument 2230 will be positioned so it does not interfere with the cleaning functionality of the first cleaning instrument 2210. As can be appreciated, there are many ways to configure the second cleaning instrument 2230 so that it can be raised and lowered relative to the head 2310.

**[0077]** The surface treatment apparatus 2200 may further comprise a shaft 2240 pivotably connected to head 2210. In some embodiments, the shaft 2240 may be configured to pivot about a longitudinal axis with respect to the head 2210. In some embodiments, the shaft 2240 may be configured to pivot about a latitudinal axis with respect to the head 2210. In other embodiments, the shaft 2240 may be able to pivot about a longitudinal and a latitudinal axis with respect to the

head 2210. This will give the shaft 2240 a wide range of motion and allow a user to maneuver the head 2210 into difficult to reach spots by the shaft 2240.

**[0078]** In some embodiments the second cleaning instrument 2230 may be switched between the standby position and cleaning position by the orientation of the shaft 2240 relative to the head 2210. In some embodiments, the second cleaning instrument 2240 will be configured to switch to cleaning position when the shaft 2240 is in a first orientation relative to the head 2210, and the second cleaning instrument 2240 will be configured to switch to standby position when the shaft 2240 is in a second orientation relative to the head 2210. In some embodiments, the first and second orientations of the shaft may be separated by 180 degrees, which is illustrated in FIG.s 22 and 23 which depict the shaft 2240 in a first and second orientation, respectfully.

**[0079]** As can be appreciated, the second cleaning instrument 2230 may also have additional positions, in some embodiments, and the shaft 2240 may have additional orientations to switch between positions. And allowing for rotation of the shaft 2240 about longitudinal and latitudinal axes allows for various combinations of rotations, which in turn allows for various orientations.

**[0080]** In some embodiments, the surface treatment apparatus 2200 may further comprise a motor 2350. The motor 2250 may power a vacuuming device in some embodiments. In some embodiments the motor may be configured to be turned on when the second cleaning instrument 2230 is in the cleaning position. And the motor 2250 may be configured to be turned off when the second cleaning 2230 instrument is in the standby positon. The motor 2350 may generate suction into the head 2210 at an opening disposed at the second cleaning instrument 2230. In some embodiments, the shaft 2210 may further comprise a two-sided handle 2260 each side of the handle corresponding to a relative orientation of the shaft 2210 and surface treatment. In this way, while the shaft 2240 is in a first orientation, a user may use the first cleaning instrument 2220 without interference from the second cleaning instrument 2230 for a first cleaning purpose, then pivot shaft 2240 to the second orientation, which will lower the second cleaning instrument 2230 into a cleaning position and turn on the motor allowing the user to perform a second cleaning operation. In some embodiments, the second cleaning instrument 2230 may comprise a steam mop and the orientation of the shaft my turn a steam generator on or off.

**[0081]** While various embodiments in accordance with the disclosed principles have been described above, it should be understood that they have been presented by way of example only, and are not limiting. Thus, the breadth and scope of the example embodiments described herein

should not be limited by any of the above-described exemplary embodiments, but should be defined only in accordance with the claims and their equivalents issuing from this disclosure. Furthermore, the above advantages and features are provided in described embodiments, but shall not limit the application of such issued claims to processes and structures accomplishing any or all of the above advantages.

**[0082]** Words of comparison, measurement, and timing such as "at the time," "equivalent," "during," "complete," and the like should be understood to mean "substantially at the time," "substantially equivalent," "substantially during," "substantially complete," etc., where "substantially" means that such comparisons, measurements, and timings are practicable to accomplish the implicitly or expressly stated desired result. Words relating to relative position of elements such as "about," "near," "proximate to," and "adjacent to" shall mean sufficiently close to have a material effect upon the respective system element interactions.

**[0083]** Additionally, the section headings herein are provided for consistency with the suggestions under 37 C.F.R. 1.77 or otherwise to provide organizational cues. These headings shall not limit or characterize the invention(s) set out in any claims that may issue from this disclosure. Specifically and by way of example, although the headings refer to a "Technical Field," such claims should not be limited by the language chosen under this heading to describe the so-called technical field. Further, a description of a technology in the "Background" is not to be construed as an admission that technology is prior art to any invention(s) in this disclosure. Neither is the "Summary" to be considered as a characterization of the invention(s) set forth in issued claims. Furthermore, any reference in this disclosure to "invention" in the singular should not be used to argue that there is only a single point of novelty in this disclosure. Multiple inventions may be set forth according to the limitations of the multiple claims issuing from this disclosure, and such claims accordingly define the invention(s), and their equivalents, that are protected thereby. In all instances, the scope of such claims shall be considered on their own merits in light of this disclosure, but should not be constrained by the headings herein.

**What is claimed is:**

1. A surface treatment apparatus, comprising:

a steam cleaning head comprising:

a plurality of rollers configured to rotate about axes defined through the cleaning head and wherein the steam cleaning head is configured to deliver steam;

a body pivotably connected to steam cleaning head; and

a steam source configured to be switched between:

an on setting wherein the steam source is supplies steam to the steam cleaning head; and

an off setting; and

wherein the steam source is switched to the on setting when the body is in a first orientation relative to the steam cleaning head and switched to the off setting when the body is in a second orientation relative to the steam cleaning head.

2. The surface treatment apparatus of claim 1, wherein the body may rotate about a longitudinal axis relative to the steam cleaning head and about a latitudinal axis with respect to the steam cleaning head.
3. The surface treatment apparatus of claim 1, wherein the second orientation of the body is substantially perpendicular to the steam cleaning head.
4. The surface treatment apparatus of claim 3, wherein the first orientation of the body is at an oblique angle to the steam cleaning head.
5. The surface treatment apparatus of claim 1, wherein the rollers may comprise a cleaning instrument.
6. A surface treatment apparatus comprising:

a wand comprising a first end and a second end;

a handle connected to the first end of the wand;

a cleaning roll unit connected to the second end of the wand and comprising:

a clean roll housing configured to receive a roll of cleaning material; and

a dirty roll housing;

wherein the clean roll housing and dirty roll housing are configured to transfer the cleaning material from the clean roll housing to the dirty roll housing with a section of the cleaning material extending between the clean roll housing and the dirty roll housing.

7. The surface treatment apparatus of claim 6, wherein the cleaning material further comprises a free edge attachable to the second dirty roll housing.
8. The surface treatment apparatus of claim 6, wherein the dirty roll housing is removable.
9. The surface treatment apparatus of claim 6, wherein the clean roll housing is removable.
10. The surface cleaning apparatus of claim 6, further including a cleaning material advancing mechanism for advancing the cleaning material from the clean roll housing to the dirty roll housing.
11. The surface cleaning apparatus of claim 10 wherein the cleaning material advancing mechanism includes a trigger on the handle of the wand.
12. The surface cleaning apparatus of claim 6 wherein the cleaning material is disposable.
13. A surface treatment apparatus comprising:

a head comprising:

a first cleaning instrument;

a second cleaning instrument configured to switch between:

a cleaning position wherein the second cleaning element is lowered relative to the head; and

a standby position wherein the second cleaning element is raised relative to the head;

a shaft pivotably connected to the head; and

wherein the second cleaning instrument is configured to switch to the cleaning position when the shaft is in a first orientation relative to the head and wherein the second cleaning instrument is configured to switch to a standby position when the shaft is in a second orientation relative to the head.

14. The surface treatment apparatus of claim 13, wherein the shaft is configured to rotate about a longitudinal axis relative to the head and about a latitudinal axis relative to the head.
15. The surface treatment apparatus of claim 13, wherein the first orientation of the shaft relative to the body and the second orientation of the shaft relative to the body are separated by 180 degrees.
16. The surface treatment apparatus of claim 13, wherein the second cleaning instrument comprises a brush guard.

17. The surface treatment apparatus of claim 13, wherein the second cleaning instrument comprises a brush roll.
18. The surface treatment apparatus of claim 17, wherein suction is generated through the brush roll into the head.
19. The surface treatment apparatus of claim1 3, further comprising a motor configured to run when the shaft is in the first orientation and configured not to run when the shaft is in the second orientation.
20. The surface treatment apparatus of claim 13, further comprising a vacuum device configured to generate suction when the shaft is in the first orientation and configured not to generate suction when the shaft is in the second relative orientation.

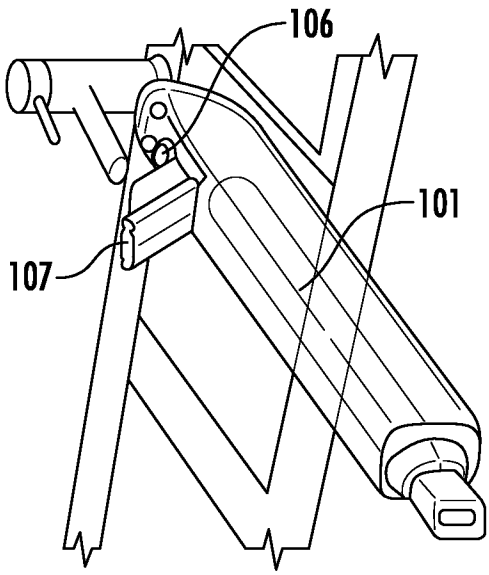



FIG. 1C

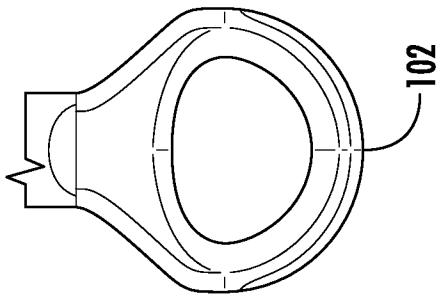



FIG. 1A

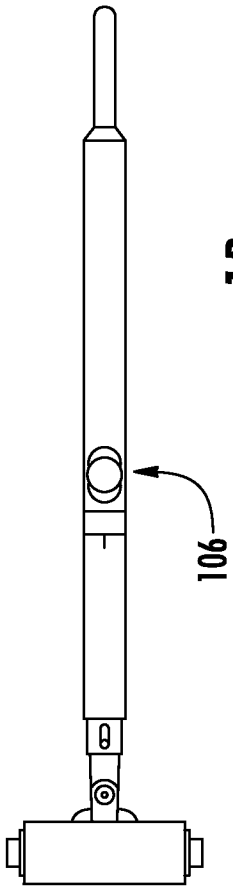



FIG. 1B

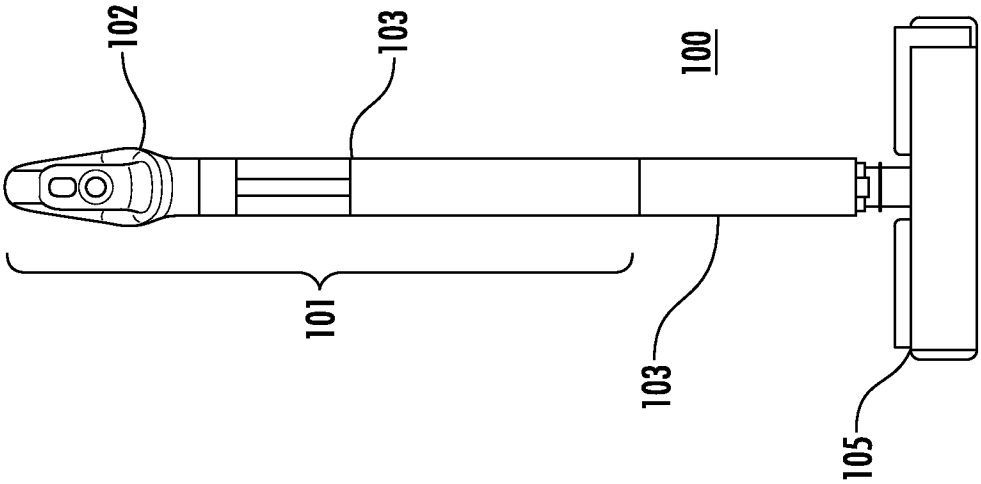



FIG. 1

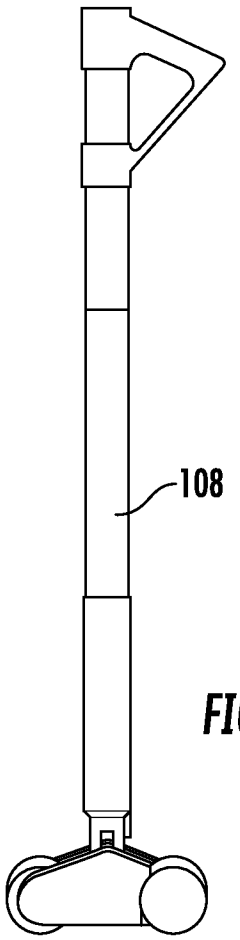



FIG. 1D

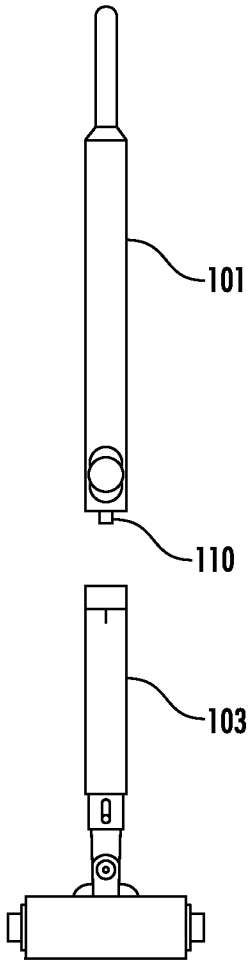



FIG. 1E

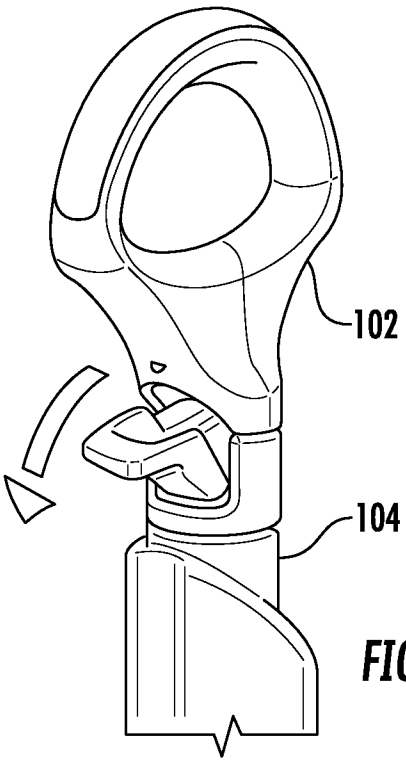



FIG. 1F

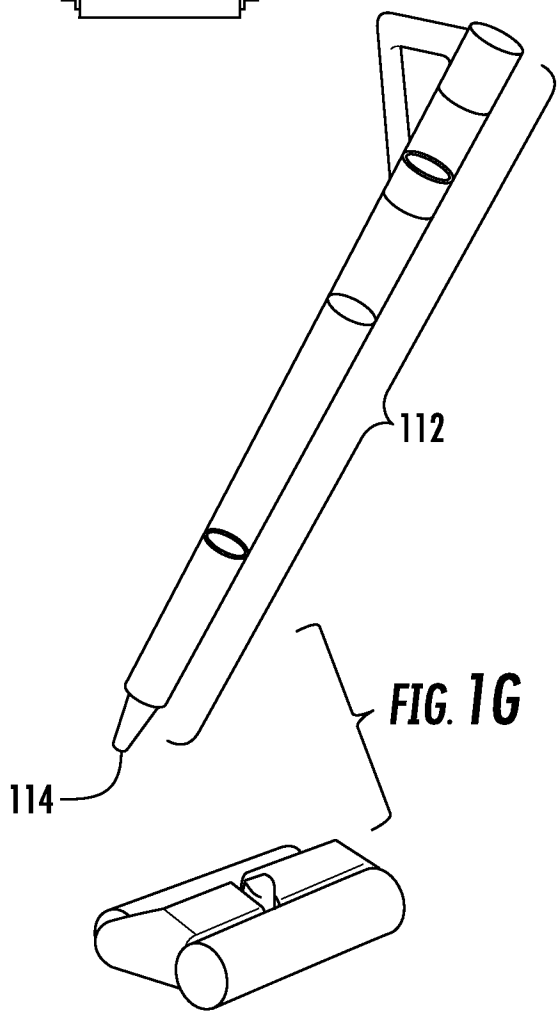



FIG. 1G

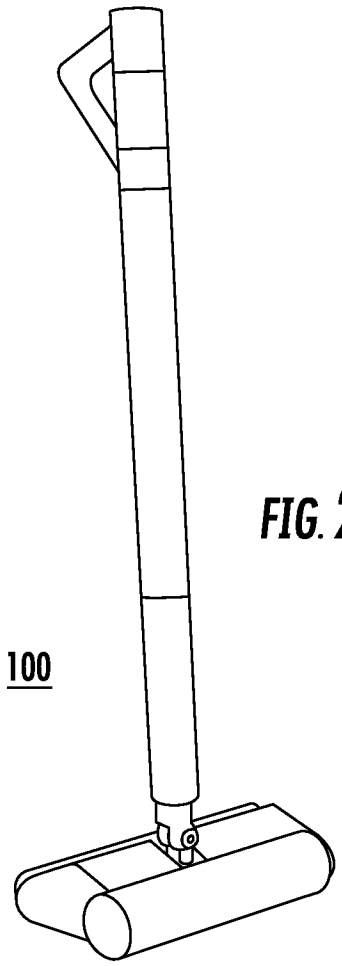



FIG. 2

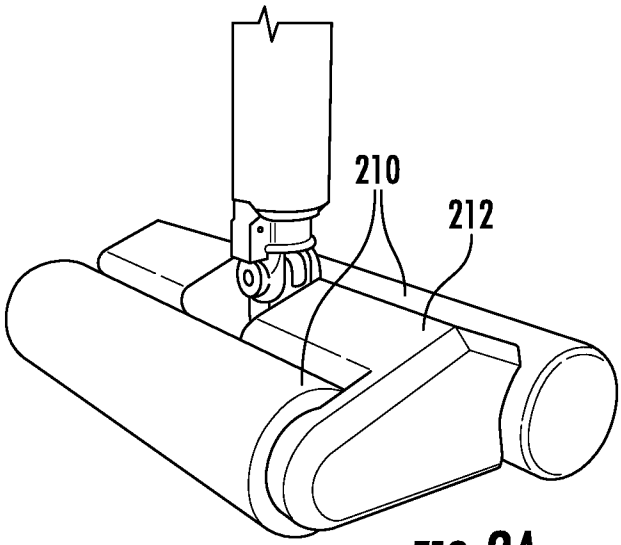



FIG. 2A

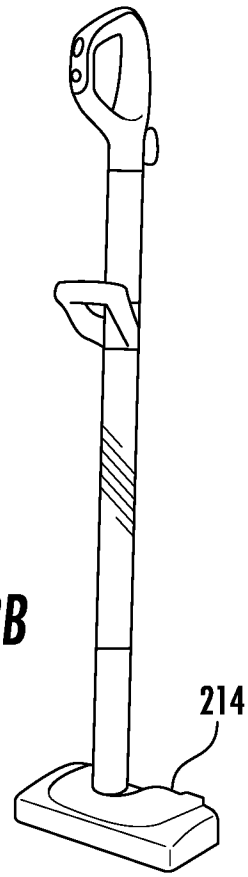



FIG. 2B

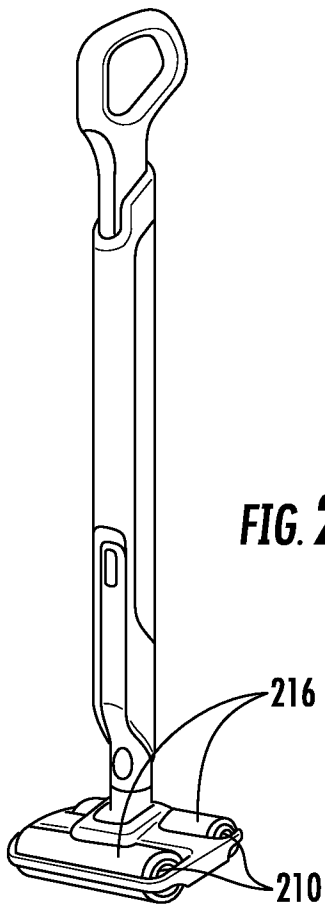



FIG. 2C

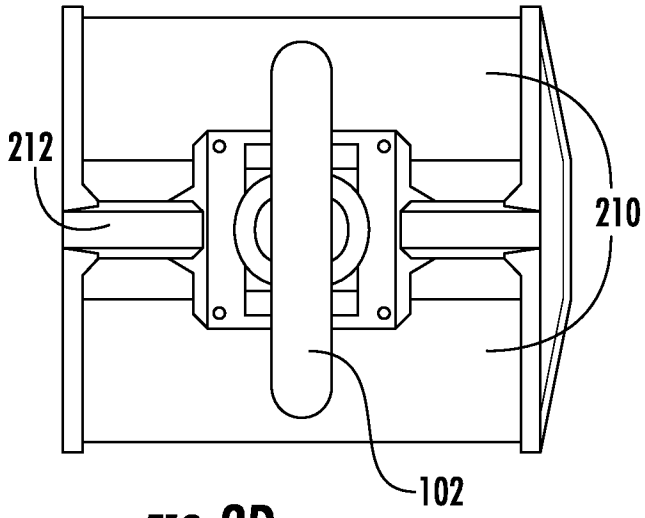



FIG. 2D

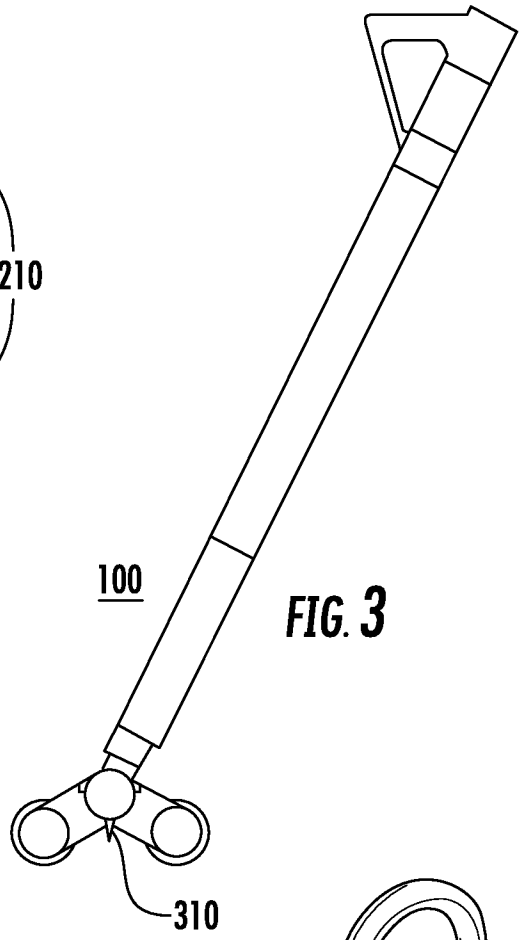



FIG. 3

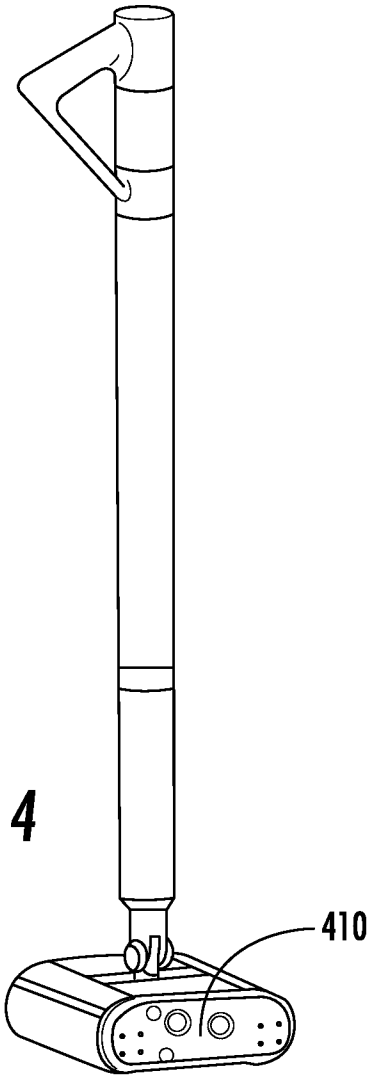



FIG. 4

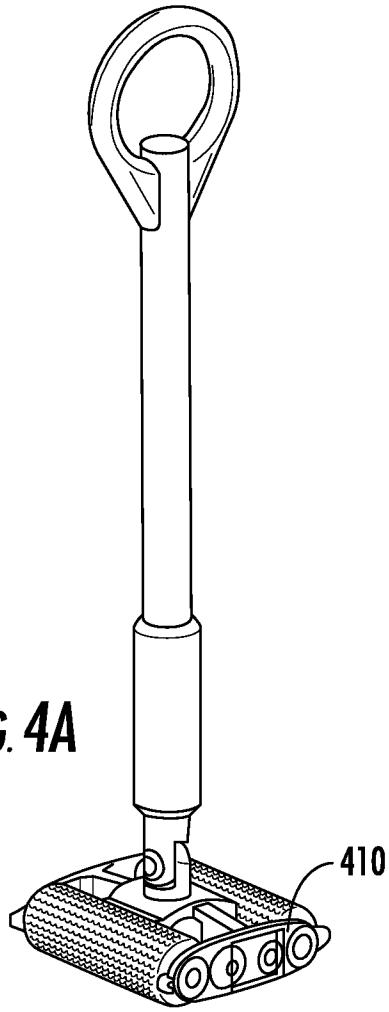



FIG. 4A

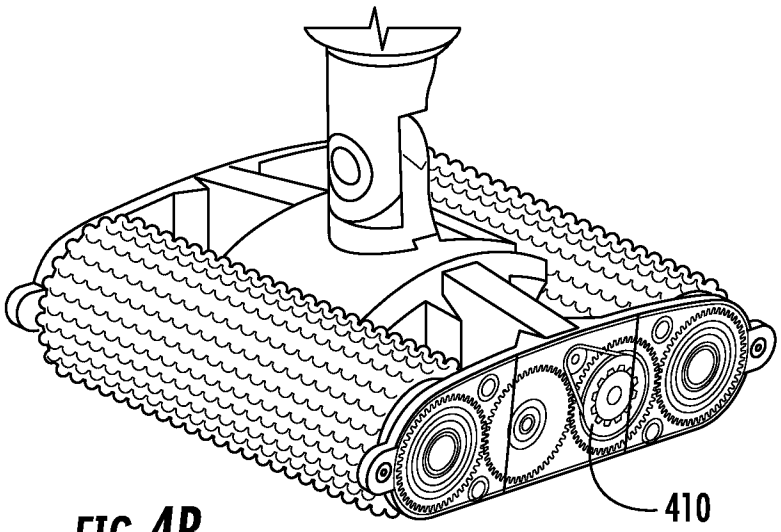



FIG. 4B

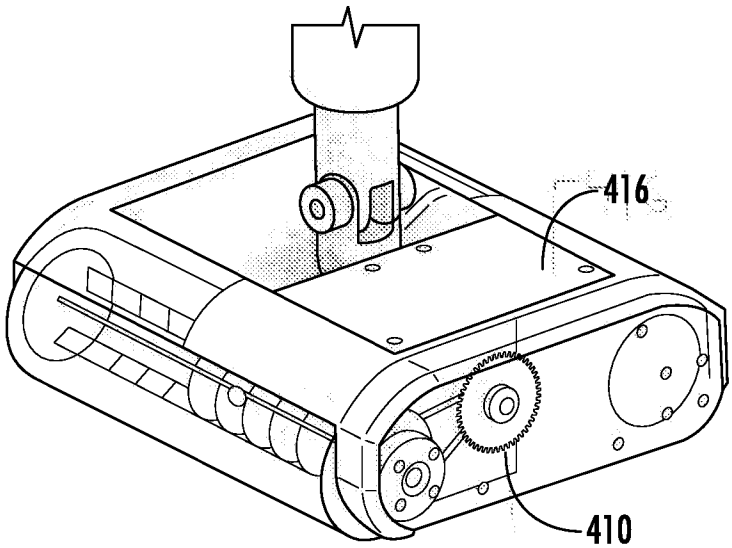



Figure 4c

FIG. 4C

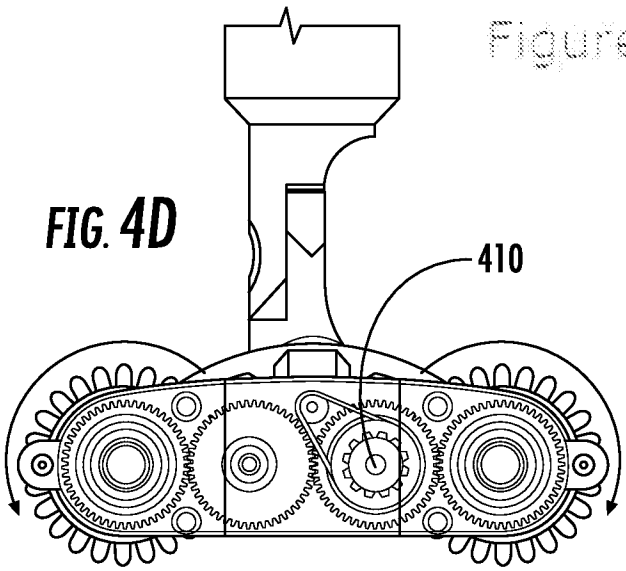



FIG. 4D

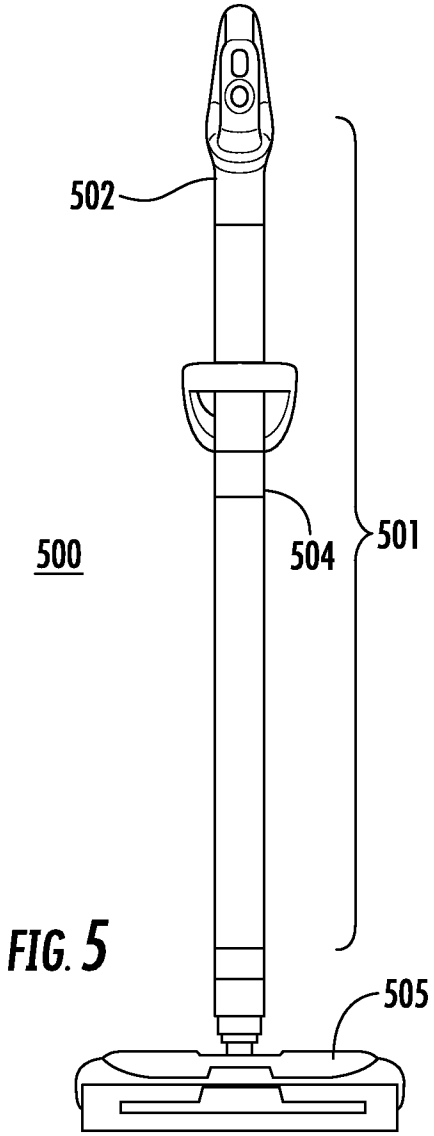

502
500
504
501
505

FIG. 5

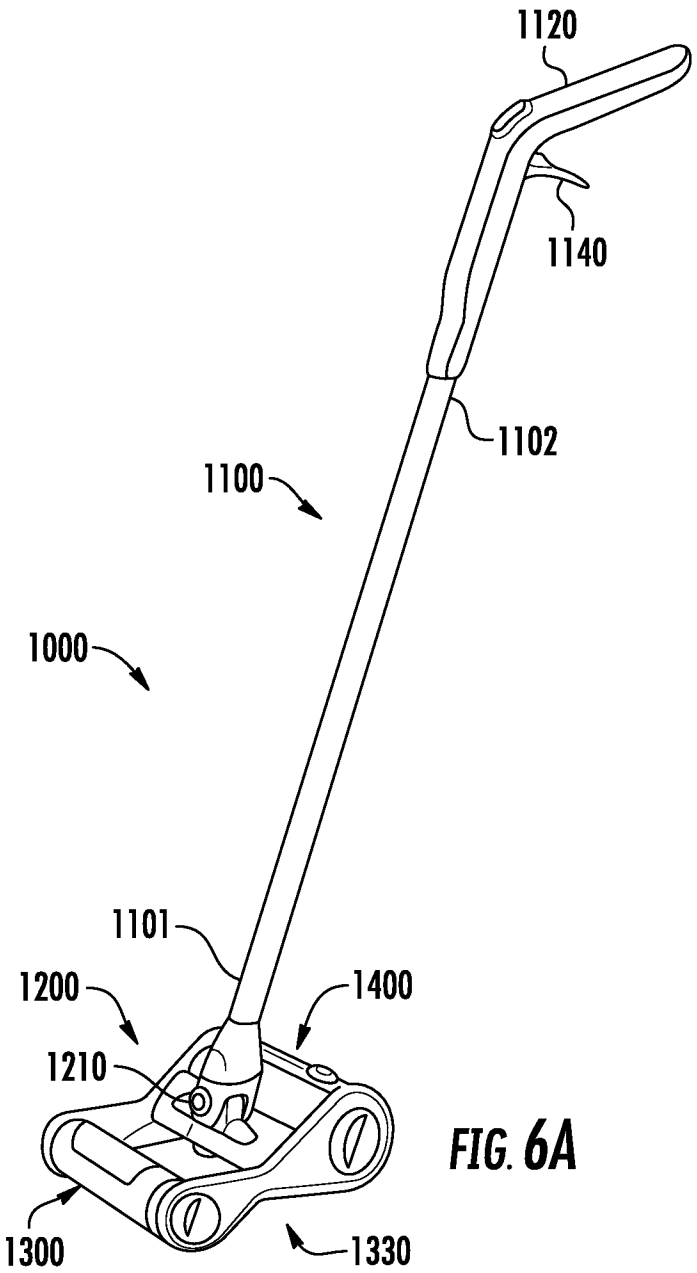

1120
1140
1102
1100
1000
1101
1200
1400
1210
1300
1330

FIG. 6A

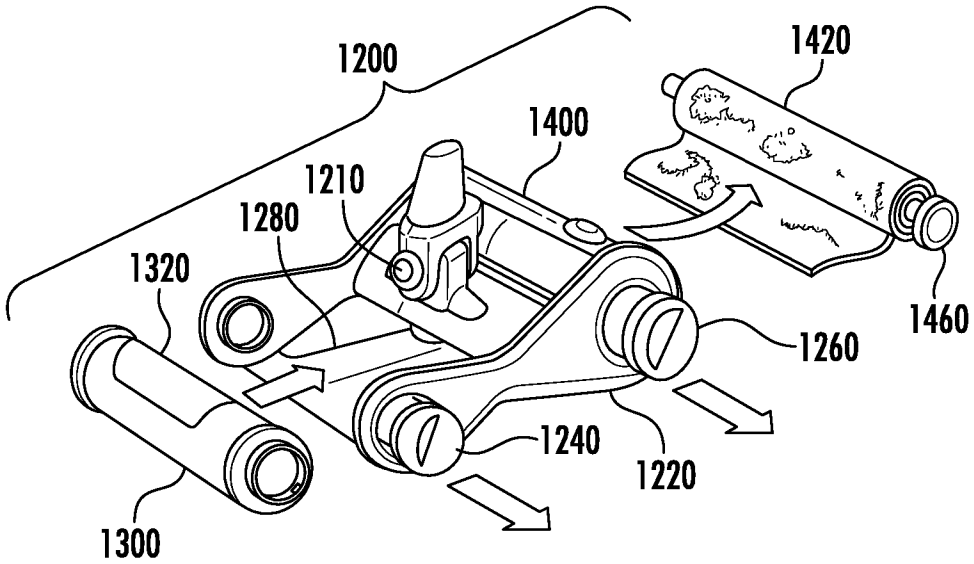



FIG. 6B

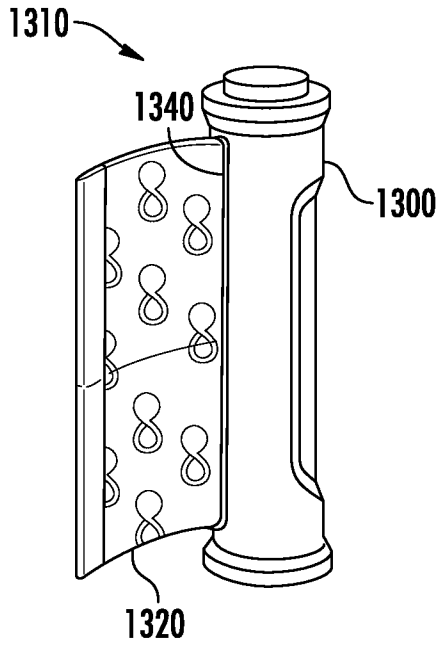



FIG. 7A

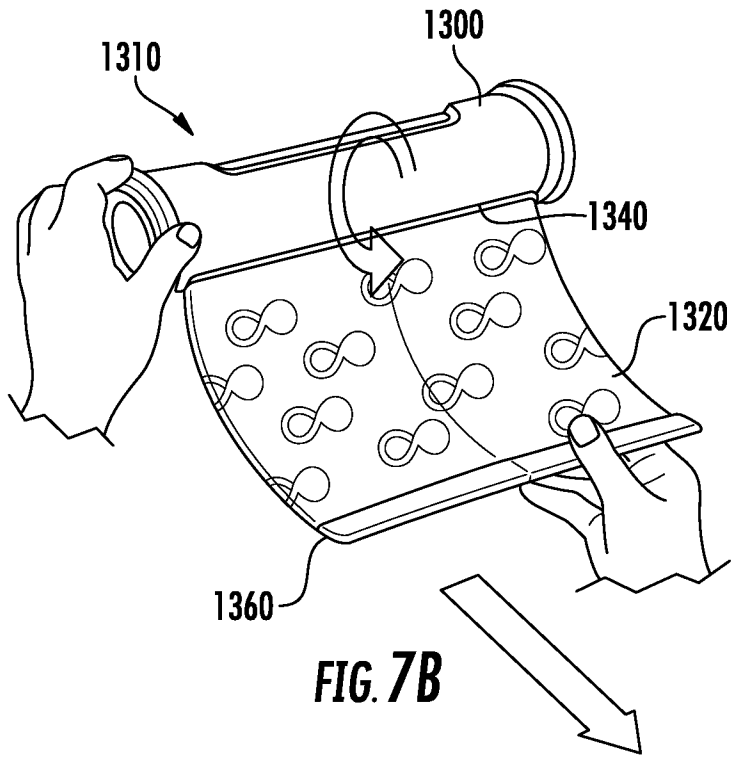



FIG. 7B

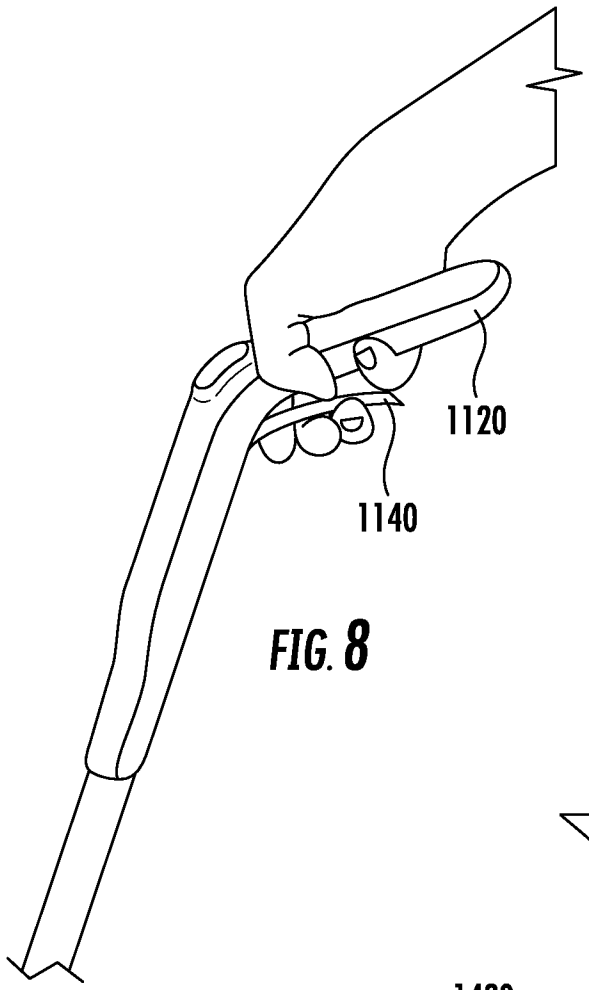



FIG. 8

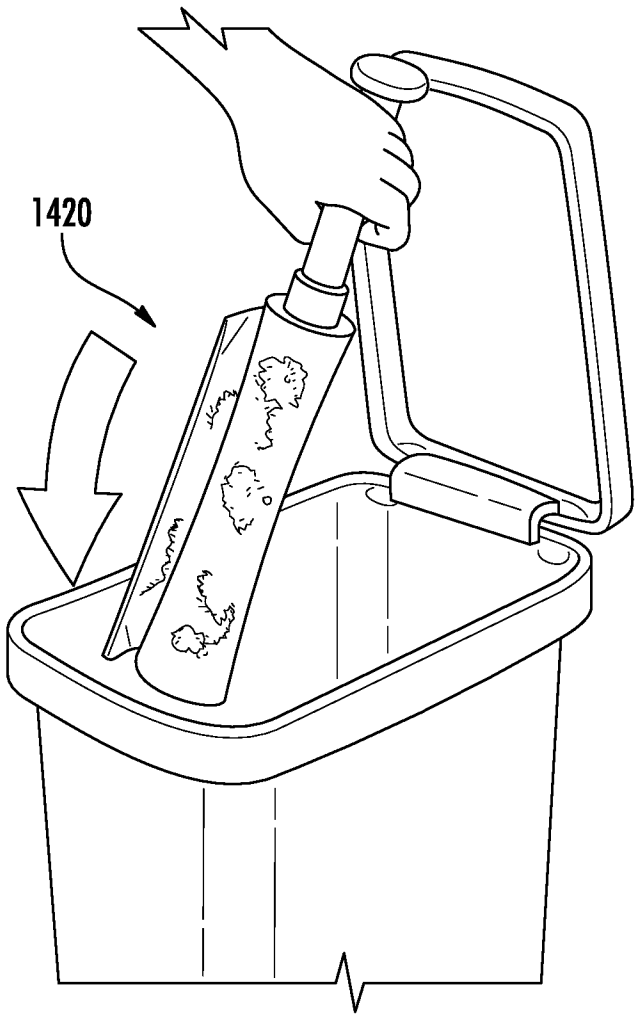



FIG. 9

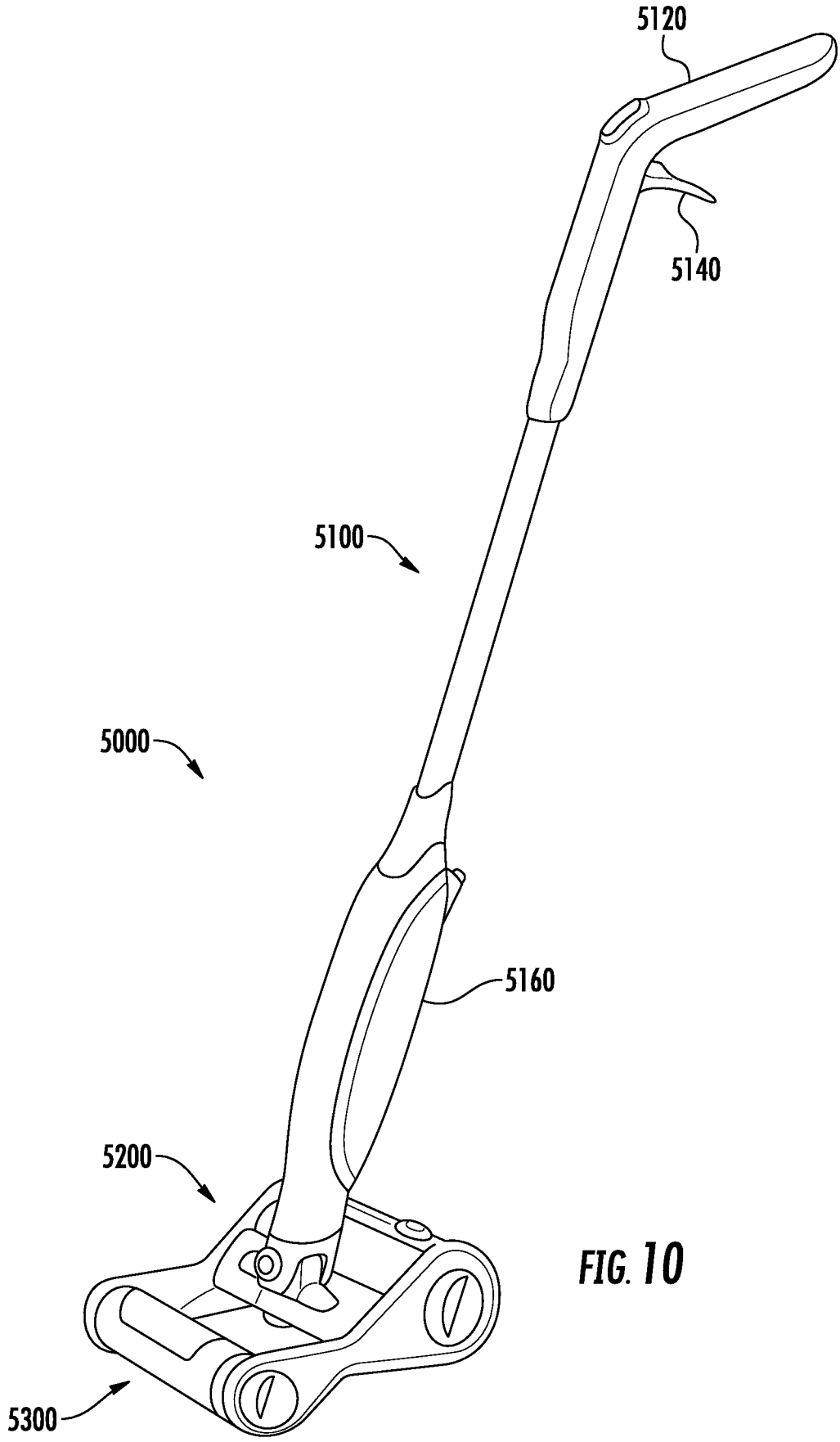



FIG. 10

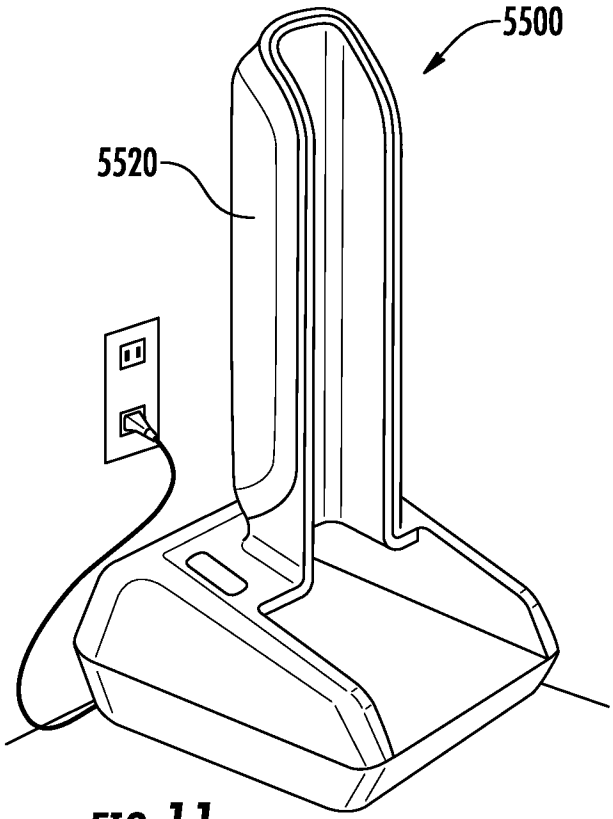



FIG. 11

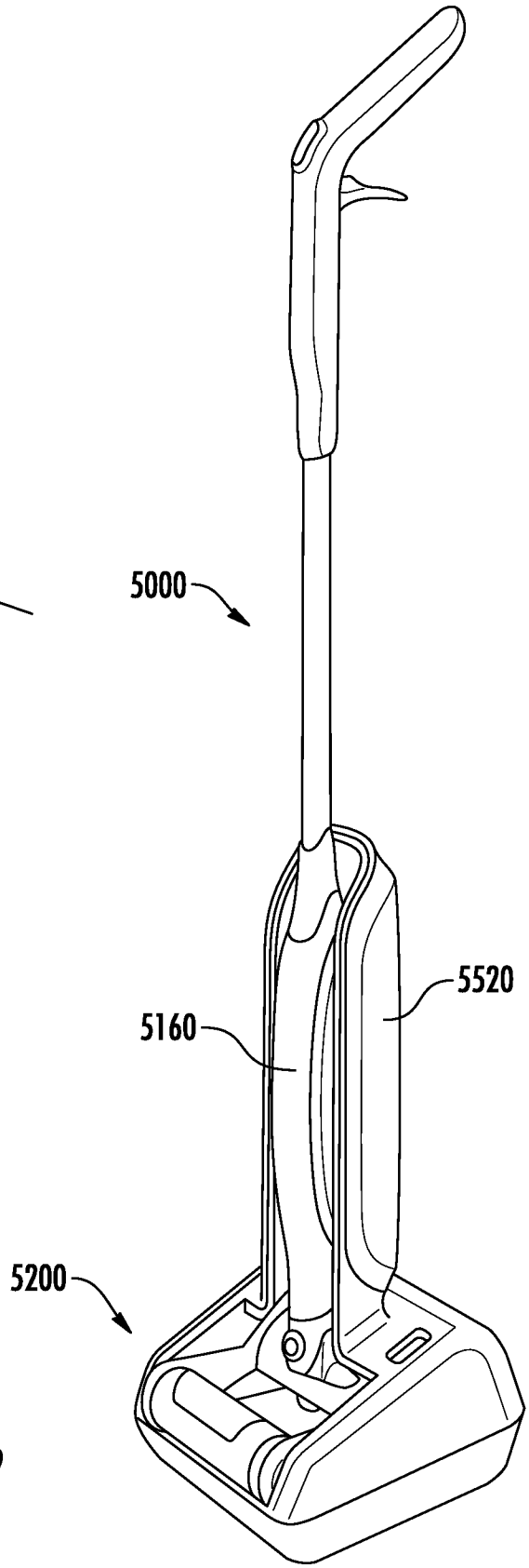



FIG. 12

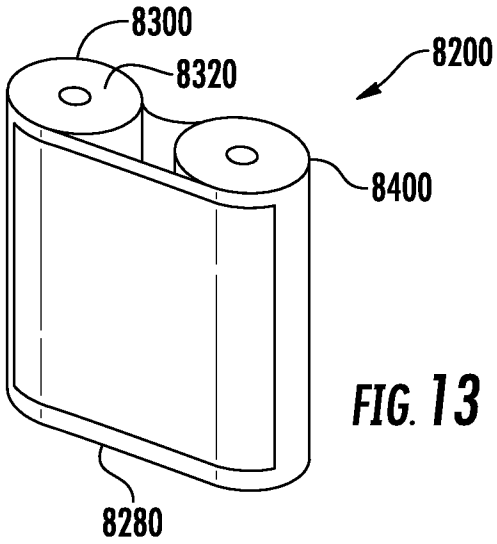



FIG. 13

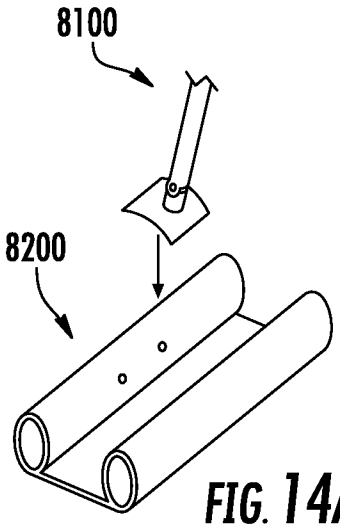



FIG. 14A

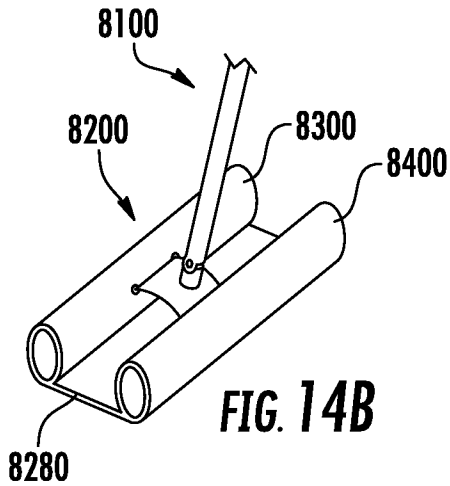



FIG. 14B

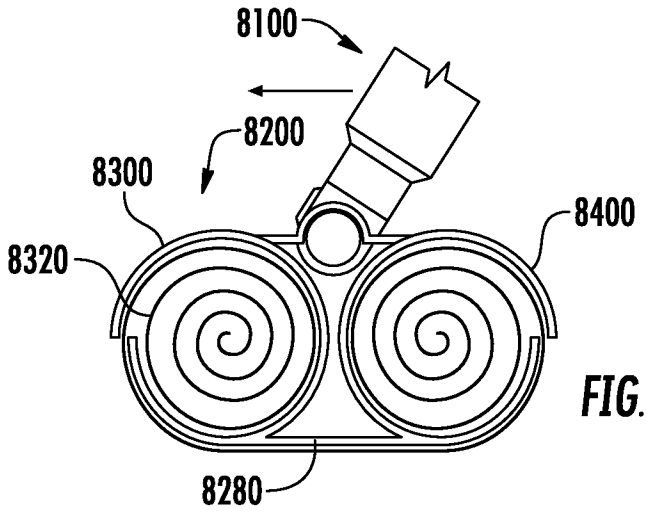



FIG. 15

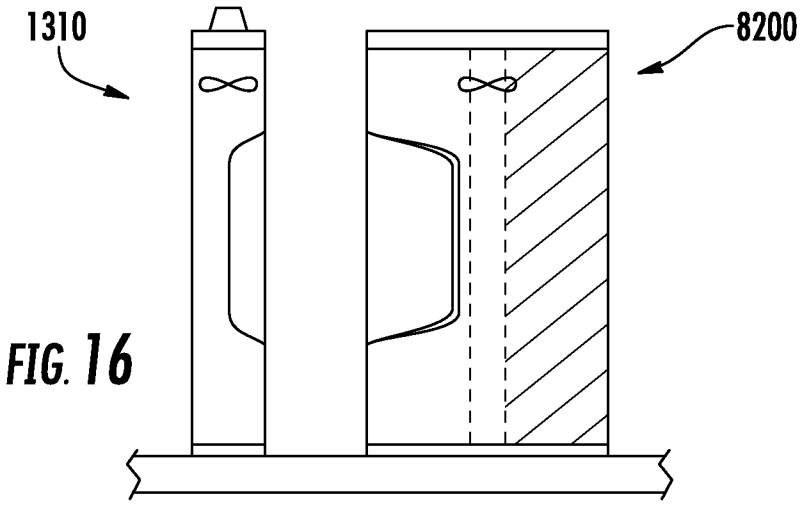



FIG. 16

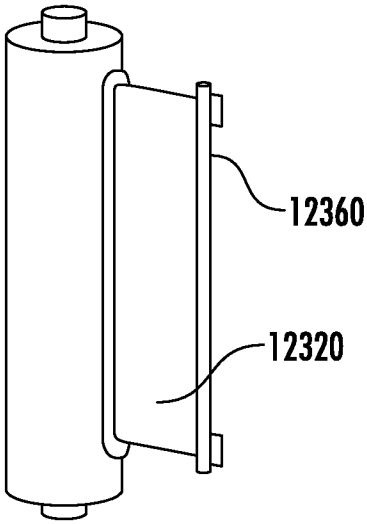



FIG. 17

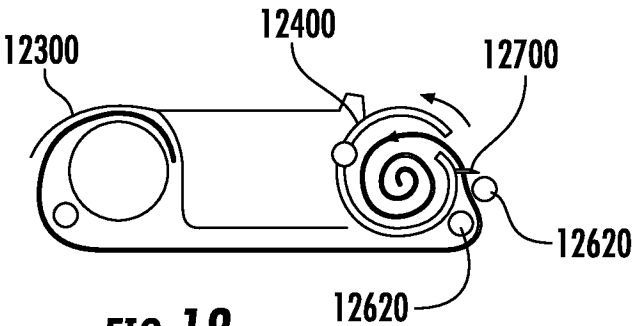



FIG. 18

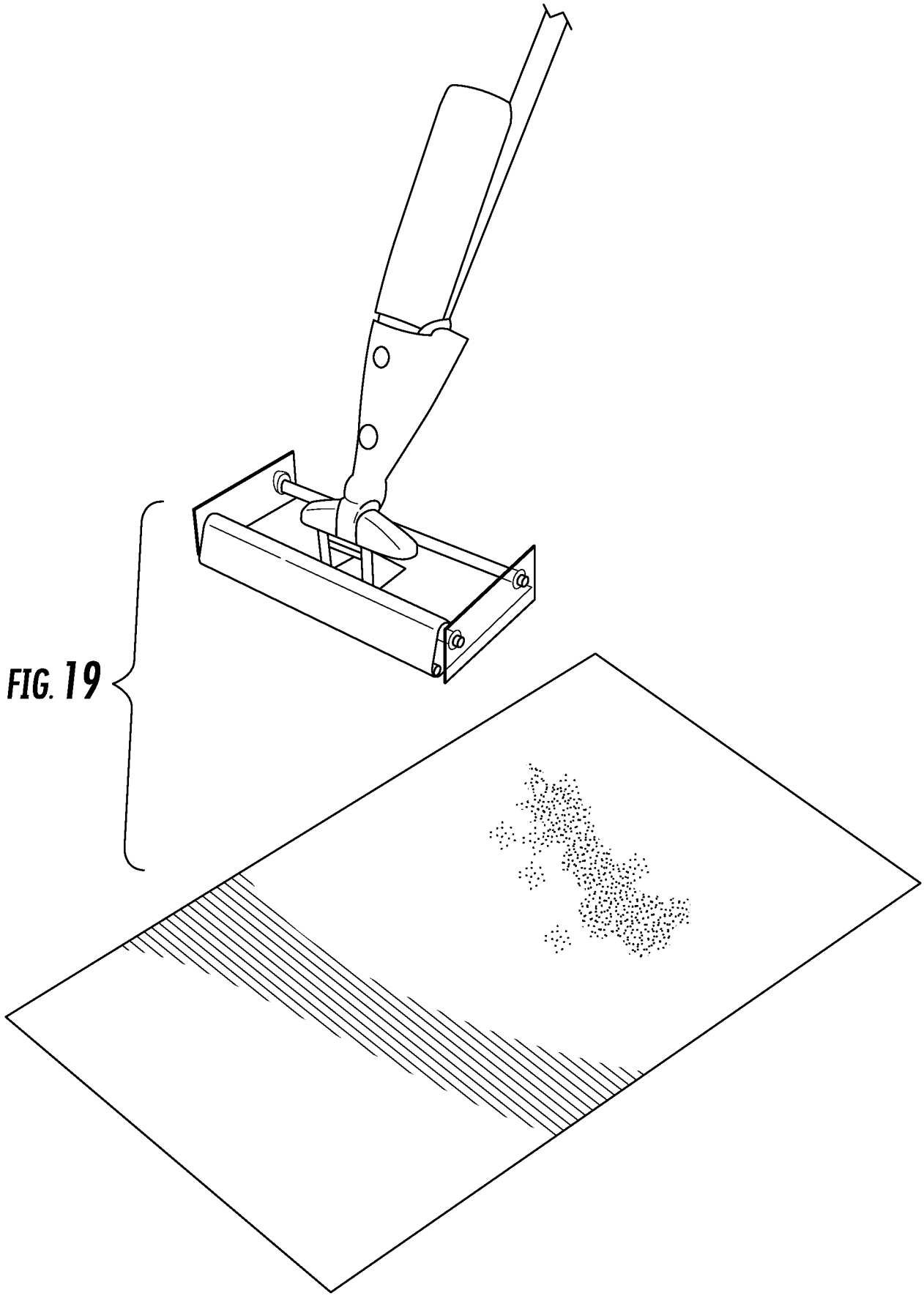


FIG. 19

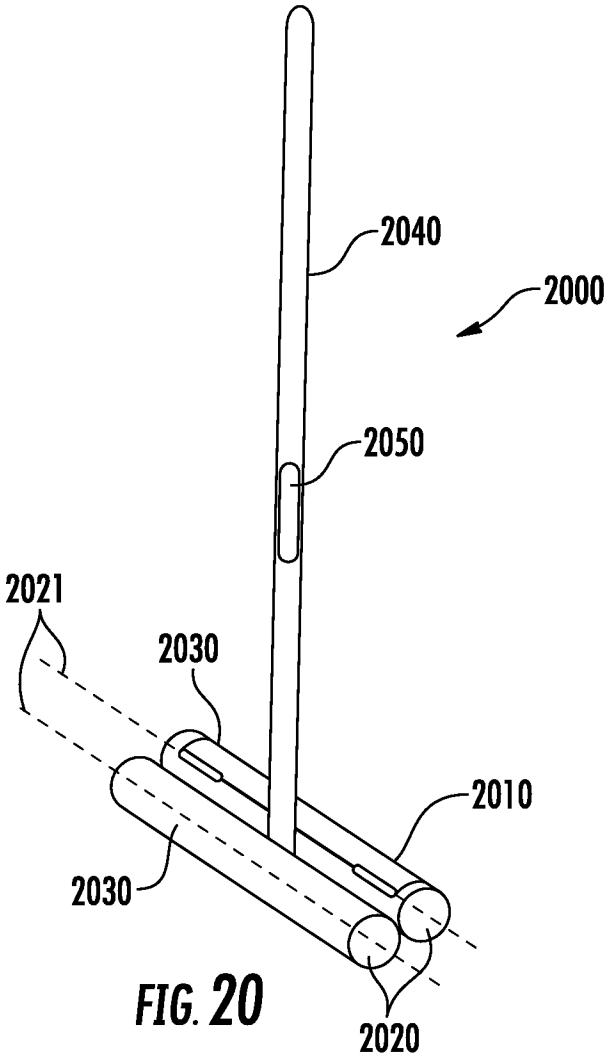

2040
2000
2050
2021
2030
2010
2030
2020

FIG. 20

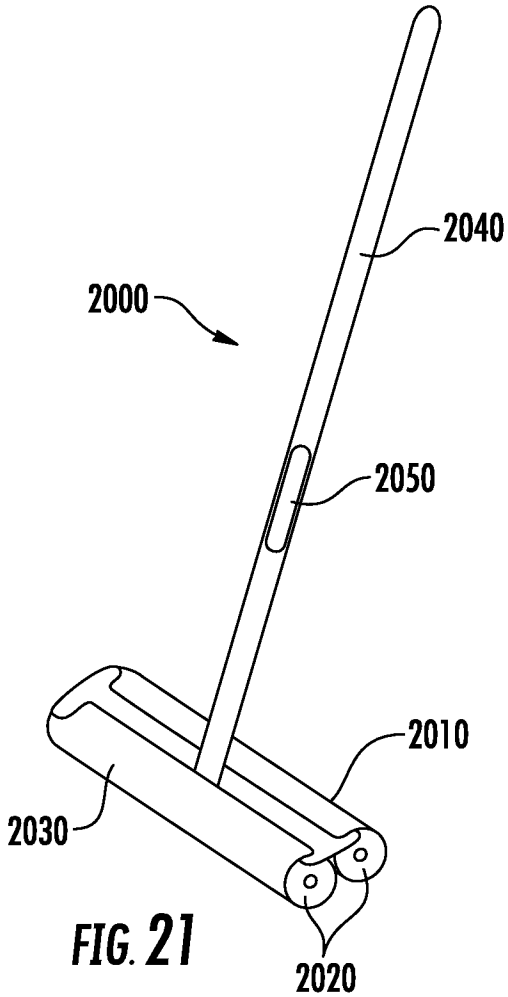

2040
2000
2050
2010
2030
2020

FIG. 21

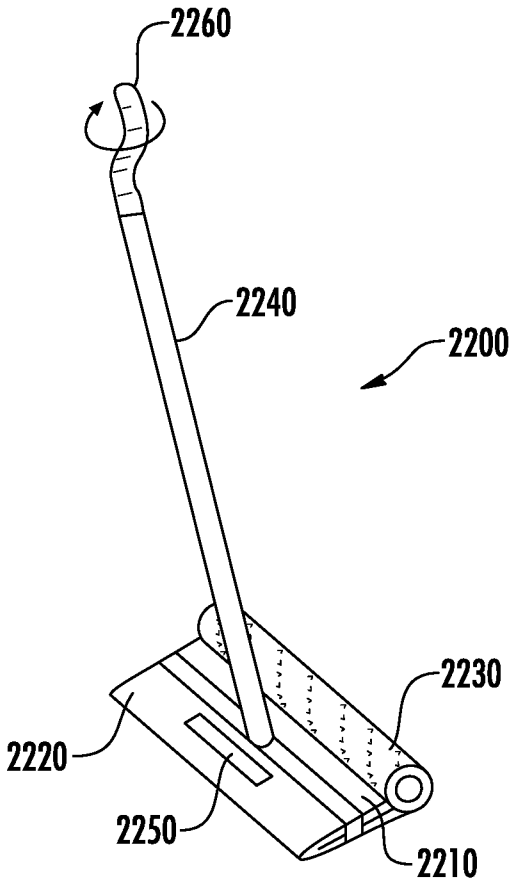

2260
2240
2200
2230
2220
2250
2210

FIG. 22

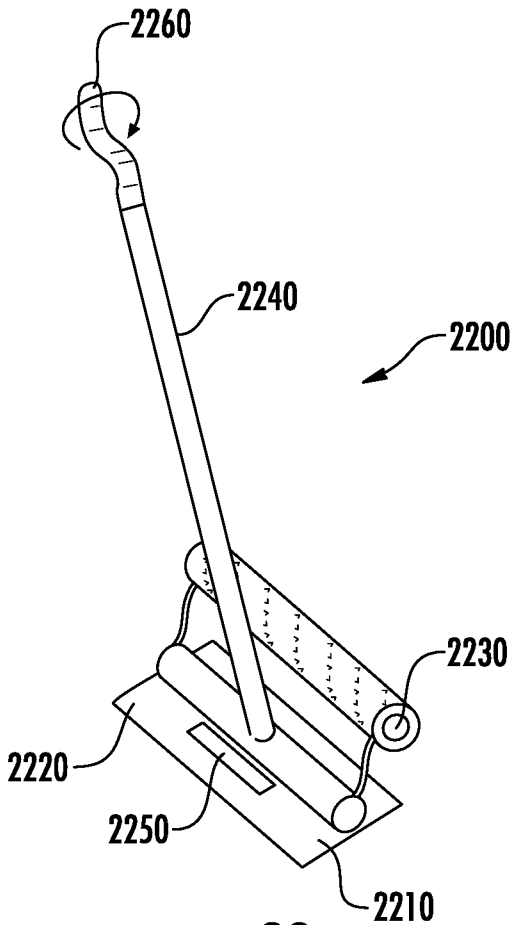

2260
2240
2200
2230
2220
2250
2210

FIG. 23

# INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 16/34494

A. CLASSIFICATION OF SUBJECT MATTER
IPC(8) - A47L 11/00, 11/02, 11/18, 11/34, 13/10, 13/20, 13/22 (2016.01)
CPC - A47L 11/00, 11/02, 11/18, 11/34, 11/4041, 11/4086, 13/20, 13/22, 13/225
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC(8): A47L 11/00 (2016.01);
CPC: A47L 11/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
IPC(8): A46B 5/00, A46B 11/00, A46B 11/02, A46B 11/08, A46B 13/00, A47K7/02, A47L 1/00, A47L 1/08 (2016.01); CPC: A46B 5/0054, A46B 5/0075, A46B 5/0083, A46B 13/001, A46B 2200/302, A46B 2200/3073, A47L 1/00, A47L 1/08 (keyword limited; terms below)

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
PatBase; Google Patents; Google Web; Search Terms Used: apparatus appliance vacuum vacuum-cleaner device tool clean* treat* steam* wash* vapor vapour roll* tub* reel reels spool spools cylinder cylinders axes axis center on working function* operat* disconnected off engag* disengag* body shaft wand housing pivot* rotat* position* angl* orientation

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| Y | US 2014/0076359 A1 (Hansen) 20 March 2014 (20.03.2014), entire document, especially Fig. 1, Fig. 4; para [0017], [0034]. | 1-5 |
| Y | US 2014/0259510 A1 (CONRAD) 18 September 2014 (18.09.2014), entire document especially Fig. 1, Fig. 4; para [0070], para [0074], para [0083], para [0096], para [0098]. | 1-5 |
| A | US 8,627,543 B2 (Vrdoljak et al.) 14 January 2014 (14.01.2014), entire document, especially col 14 lns 56-57, col 14 lns 57-61. | 1-5 |
| A | US 2014/0259516 A1 (Scolari) 18 September 2014 (18.09.2014), entire document. | 1-5 |
| A | US 2006/0090284 A1 (Chen) 04 May 2006 (04.05.2006), entire document. | 1-5 |
| A | US 2007/0130719 A1 (ZHOU) 14 June 2007 (14.06.2007), entire document. | 1-5 |
| A | US 2009/0320231 A1 (Rosenzweig et al.) 31 December 2009 (31.12.2009), entire document. | 1-5 |

☐ Further documents are listed in the continuation of Box C. ☐

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

| Date of the actual completion of the international search | Date of mailing of the international search report |
|---|---|
| 28 July 2016 (28.07.2016) | 20 OCT 2016 |
| Name and mailing address of the ISA/US<br>Mail Stop PCT, Attn: ISA/US, Commissioner for Patents<br>P.O. Box 1450, Alexandria, Virginia 22313-1450<br>Facsimile No. 571-273-8300 | Authorized officer:<br>Lee W. Young<br>PCT Helpdesk: 571-272-4300<br>PCT OSP: 571-272-7774 |

Form PCT/ISA/210 (second sheet) (January 2015)

# INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 16/34494

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

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

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

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

This International Searching Authority found multiple inventions in this international application, as follows:
---SEE EXTRA SHEET---

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:
1-5

**Remark on Protest**

☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.

☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.

☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 16/34494

Box No. III: Observations where unity of invention is lacking

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees must be paid.

Group I: Claims 1-5, directed to a surface treatment apparatus having a plurality of rollers, axes, a body, a steam source, an on setting, and an off setting.

Group II: Claim 6-12 directed to a surface treatment apparatus having a first end, a second end, a handle, a cleaning roll unit, a clean roll housing, a roll of cleaning material, a dirty roll housing, a section of the cleaning material.

Group III: Claim 13-20 directed to a surface treatment apparatus having a first cleaning instrument, a second cleaning instrument, a cleaning position, and a standby position.

The inventions listed as Groups I-III do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons:

SPECIAL TECHNICAL FEATURES
The invention of Group I includes the special technical feature of a plurality of rollers, axes, a body, a steam source, an on setting, and an off setting, not required by the claims of Group II and III.

The invention of Group II includes the special technical feature of a first end, a second end, a handle, a cleaning roll unit, a clean roll housing, a roll of cleaning material, a dirty roll housing, a section of the cleaning material, not required by the claims of Group I and III.

The invention of Group III includes the special technical feature of a first cleaning instrument, a second cleaning instrument, a cleaning position, and a standby position, not required by the claims of Group I and II.

COMMON TECHNICAL FEATURES

Groups I-III share the common technical features of a surface cleaning apparatus. However, this shared technical feature does not represent a contribution over prior art as being anticipated by US 2010/0229315 A1 to Rosenzweig, which discloses a surface cleaning apparatus (surface cleaning apparatus, 100, Fig. 1).

Groups II and III share the common technical features of a wand. However, this shared technical feature does not represent a contribution over prior art as being anticipated by US 2010/0229315 A1 to Rosenzweig, which discloses a wand (handle assembly, 104, Fig. 1).

Groups I and III share the common technical features of a head. However, this shared technical feature does not represent a contribution over prior art as being anticipated by US 2010/0229315 A1 to Rosenzweig, which discloses a head (cleaning head, 102, Fig. 1).

As the common technical features were known in the art at the time of the invention, these cannot be considered special technical feature that would otherwise unify the groups.

Therefore, Groups I-III lack unity under PCT Rule 13 because they do not share a same or corresponding special technical feature.