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HARD SURFACE CLEANING DEVICE

ABSTRACT

The present invention relates to a hard surface cleaning device. The hard surface cleaning device comprises: a suction assembly for creating a suction flow, the suction assembly comprising a suction unit and an electric motor for driving the suction unit; a suction nozzle in fluid communication with the suction assembly for sucking the liquid air mixture from the hard surface; a cleaning flow path between the suction nozzle and the suction assembly; a battery for providing power to the electric motor; and a shell containing the suction assembly and a cleaning flow path therein, and an internal fluid path is provided inside the shell and is independent of the cleaning flow path.

HARD SURFACE CLEANING DEVICE

Field

[0001] The present invention relates to the field of surface cleaning, and more particularly to a hard surface cleaning device.

Background

[0002] A hard surface cleaning device is a device configured to clean hard surfaces such as glass surfaces. The hard surface cleaning device can perform cleaning and automatically absorb waste water and dirt produced during the cleaning at the same time, ensuring that the hard surface is clean and traceless.

[0003] By using such a hard surface cleaning device, surfaces such as floor surfaces or table surfaces, or tiled wall surfaces or for example glass surfaces, in particular for window glass, can be cleaned. The hard surface cleaning device may be guided along a surface to be cleaned, and the hard surface cleaning device has a suction nozzle which is in fluid communication with a suction assembly and configured to suck a liquid air mixture. The suction assembly generates a suction air flow, under the action of which the liquid air mixture can be sucked from the surface to be cleaned or from a cleaning member of the hard surface cleaning device that is in contact with the surface, for example. For example, a scraper may be used as the cleaning member.

[0004] Such hard surface cleaning devices inevitably come into contact with water during use or during cleaning and, in addition, since such hard surface cleaning devices are in many cases required to be used outdoors, they may be used when raining or may be drenched by temporarily being placed outdoors and may even be turned upside down. If the hard surface cleaning device leaks water, the water is easy to contact with electrical parts of the hard surface cleaning device after permeating into the hard surface cleaning device, so that potential safety hazards such as short circuit or electric leakage are caused to the hard surface cleaning device, and the normal operation of the hard surface cleaning device is influenced.

[0005] Accordingly, there remains a need in the art for a hard surface cleaning device that is water resistant, wherein the hard surface cleaning device is capable of isolating electrical parts from water, draining water from the interior of the hard surface cleaning device through an

internal fluid path, without the risk of short circuits or electrical leakage or the like due to water flowing into the hard surface cleaning device.

Summary of Invention

[0006] It is an object of the present application to provide a hard surface cleaning device that is water resistant, and the hard surface cleaning device can effectively isolate the electrical parts from water, thereby facilitating the cleaning function to be safely performed by draining water along an internal fluid path even in case that water presents inside the hard surface cleaning device, improving the safety and service life of the hard surface cleaning device.

[0007] To solve the above technical problems, in one aspect of the present application, there is provided a hard surface cleaning device comprising:

[0008] a suction assembly for creating a suction flow, the suction assembly comprising a suction unit and an electric motor for driving the suction unit;

[0009] a suction nozzle in fluid communication with the suction assembly for sucking the liquid air mixture from the hard surface;
a cleaning flow path between the suction nozzle and the suction assembly;
a battery for providing power to the electric motor; and
a shell containing the suction assembly and a cleaning flow path therein, and an internal fluid path is provided inside the shell and is independent of the cleaning flow path.

[0010] In an embodiment of an aspect of the application, a motor chamber containing the electric motor and a suction unit chamber shell containing the suction unit are formed inside the shell, wherein the suction unit chamber shell is sealingly separated from the motor chamber, and the suction unit chamber is in communication with the internal fluid path.

[0011] In an embodiment of an aspect of the application, a fluid discharge port is provided at a lower part of the shell, and the internal fluid path communicates the suction unit chamber with the fluid discharge port.

[0012] In an embodiment of an aspect of the application, the shell comprises a handle and a side wall portion opposite to the handle, and the internal fluid path is provided in the handle and/or the side wall portion.

[0013] In an embodiment of an aspect of the application, a one-way valve is provided in the internal fluid path to prevent liquid entering the internal fluid path from flowing back into the suction unit chamber.

[0014] In an embodiment of an aspect of the application, the internal fluid path is integrally formed by the shell.

[0015] In an embodiment of an aspect of the application, the internal fluid path comprises a connecting tube connecting the suction unit chamber and the fluid discharge port.

[0016] In an embodiment of an aspect of the application, a sealing ring is fitted over the connecting tube and a recess is provided in the side wall portion of the shell to receive the sealing ring to hold the sealing ring in position in a vertical direction.

[0017] In an embodiment of an aspect of the application, the fluid discharge port is located remotely from the handle, preferably on the other side of the shell opposite to the handle.

[0018] In an embodiment of an aspect of the application, the shell is provided with a battery mounting portion in a lower part thereof, and the battery is removably mounted to the battery mounting portion, and the battery mounting portion is water-tightly separated from the internal fluid path, and preferably the battery mounting portion is separated from the internal fluid path by a seal.

[0019] In an embodiment of an aspect of the application, the shell comprises a battery receiving skirt at the bottom, and preferably the shell is provided with a flange at the fluid discharge port, and the flange extends beyond the battery receiving skirt.

[0020] In an embodiment of an aspect of the application, the battery receiving skirt is integrally formed with the shell.

[0021] In an embodiment of an aspect of the application, the battery receiving skirt is formed as a separate component, and the battery receiving skirt is coupled to the shell.

[0022] In an embodiment of an aspect of the application, the battery receiving skirt comprises a soft portion by means of which the battery is able to be installed into the hard surface cleaning device and removed from the hard surface cleaning device.

[0023] In an embodiment of an aspect of the application, the battery receiving skirt comprises opposing soft portions which are located on both sides of the battery receiving skirt.

[0024] In an embodiment of an aspect of the application, the battery comprises a release button, the position of which corresponds to the position of the soft portion, and the release button is operable by pressing the soft portion.

[0025] In the embodiment of the application, due to the design of the internal fluid path, the hard surface cleaning device can effectively isolate the electrical parts from water, and the water in the hard surface cleaning device is discharged through the internal fluid path, so that the cleaning function can be safely realized, and the safety and the service life of the hard surface cleaning device are improved.

Brief Description of Drawings

[0026] Objectives and features of the present invention will become apparent from the following detailed description with reference to the accompanying drawings. However, it should be understood that the drawings are designed for illustration only, and are not intended to limit the present invention.

[0027] FIG. 1 is a perspective view of a hard surface cleaning device according to an embodiment of the present invention.

[0028] FIG. 2 is a cross-sectional view of a hard surface cleaning device according to an embodiment of the present invention.

[0029] FIG. 3 is a perspective view of a portion of the hard surface cleaning device in FIG. 1 according to an embodiment of the present invention, for more clearly showing an internal structure of the hard surface cleaning device.

[0030] FIG. 4 is an exploded perspective view of a portion of the hard surface cleaning device in FIG. 3 according to an embodiment of the present invention.

[0031] FIG. 5 is a cross-sectional view of a portion of the hard surface cleaning device in FIG. 3 according to an embodiment of the present invention.

[0032] FIG. 6 is a perspective view of a portion of the hard surface cleaning device of FIG. 1 according to one embodiment of the invention, wherein the left half-shell of the shell, the liquid storage tank and separating component are omitted to more clearly show the internal construction of the hard surface cleaning device.

[0033] FIG. 7 is a cross-sectional view of a portion of a hard surface cleaning device corresponding to FIG. 6, showing an internal fluid path of the hard surface cleaning device.

[0034] FIG. 8 is a schematic flow diagram of a cleaning process of a hard surface cleaning device according to one embodiment of the invention.

[0035] FIG. 9 is a schematic flow diagram of an internal fluid path of a hard surface cleaning device according to an embodiment of the invention.

Description of Embodiments

[0036] The technical solutions of the present invention will be described clearly and completely below with reference to the drawings; obviously, the described embodiments are some rather than all of the embodiments of the present invention. All other embodiments obtained by those of ordinary skill in the art based on the embodiments in the present invention without creative effort shall fall within the scope of protection of the present invention.

[0037] It should be noted that when an element is referred to as being "fixed to" or "arranged at" another element, it may be directly or indirectly on the other element. When an element is

referred to as being "connected to" another element, it may be directly or indirectly connected to the other element.

[0038] It should be understood that the orientations or positional relationships indicated by the terms "length", "width", "upper", "lower", "front", "rear", "left", "right", "vertical", "horizontal", "top", "bottom", "inner", "outer", etc. are based on the orientations or positional relationships shown in the drawings, and are only for the convenience of describing the present application and simplifying the description, rather than indicating or implying that the device or element referred to must have a specific orientation or be constructed and operated in a specific orientation, and therefore cannot be construed as limiting the present application. In addition, the terms "first" and "second" are used for descriptive purposes only, and cannot be construed as indicating or implying relative importance or implicitly indicating the number of technical features indicated. Thus, features defined with "first" and "second" may explicitly or implicitly include one or more of the features. In the description of the present application, "a plurality of" means two or more, unless explicitly and specifically defined otherwise.

[0039] The various specific technical features and embodiments described in this section may be combined in any suitable manner unless there is a contradiction. For example, different implementations may be formed by combining different specific technical features/embodiments/implementations. In order to avoid unnecessary repetition, the various possible combinations of the specific technical features/embodiments/implementations in the present application will not be described separately.

[0040] Various embodiments of a hard surface cleaning device according to the present invention are schematically showed in the drawings, where the hard surface cleaning device is generally indicated by reference number 1000. In the shown embodiments, the hard surface cleaning device 1000 is designed as a manually guided hard surface cleaning device with which liquid can be sucked up from a hard surface, for example, from window glass or from a table surface, or, for example, from a tiled wall or from a wall or glass of a shower room.

[0041] In an embodiment of the present invention, the hard surface cleaning device 1000 includes a suction assembly for creating a suction flow, a suction nozzle 3 in fluid communication with the suction assembly and configured to suck a liquid air mixture, a cleaning flow path between the suction nozzle 3 and the suction assembly, a separating component 500

configured to separate liquid from the sucked liquid air mixture, and a liquid storage tank 2 configured to contain the separated liquid. In the embodiments of the present invention, the cleaning flow path includes a receiving chamber 200 between the suction nozzle 3 and the separating component 500. The receiving chamber 200 is independent of a shell 1 of the hard surface cleaning device 1000 and is located inside the shell 1. In one embodiment of the invention, an internal fluid path independent of the cleaning flow path is provided inside the shell of the hard surface cleaning device 1000. In one embodiment of the invention, the internal fluid path is integrally formed by the shell 1.

[0042] As shown in FIG. 1, the hard surface cleaning device 1000 includes the shell 1. The suction nozzle 3 and the liquid storage tank 2 are detachably held on the shell 1. In an embodiment of the present invention, the shell 1 includes a left half-shell 11 and a right half-shell 12. In an embodiment of the present invention, the shell 1 is configured with a handle 5. A user can grip the handle 5 with one hand during operation to guide the hard surface cleaning device 1000 along a surface to be cleaned. In an embodiment of the present invention, a switch 6 is provided at an upper portion of the handle 5, and the user can start the hard surface cleaning device 1000 by, for example, pressing the switch 6 with a thumb. In an embodiment of the present invention, the shell 1 may preferably receive at least one rechargeable battery 4, in particular lithium-ion battery. The suction assembly can be supplied with power by the battery 4. In one embodiment of the present invention, the shell 1 includes a battery mounting portion 14 (see FIG. 6), and the battery 4 is mounted in the battery mounting portion 14. In an embodiment of the present invention, the shell 1 may further include a charging port (not shown) for charging the hard surface cleaning device 1000, so as to charge the rechargeable battery of the hard surface cleaning device 1000 as required. In one embodiment of the present invention, the charging port is covered with a waterproof cover to prevent water from entering the charging port when charging is not performed. In an embodiment of the present invention, the shell 1 further includes a discharge opening 13 to facilitate the discharge of air or gas sucked by the hard surface cleaning device 1000 to the ambient environment.

[0043] FIG. 2 is a cross-sectional view of a hard surface cleaning device 1000 according to an embodiment of the present invention. In an embodiment of the present invention, a suction assembly is arranged above the handle 5 in the shell 1, and the suction assembly includes a suction turbine or blade 110, and an electric motor 120 for driving the suction turbine 110. The suction assembly can suck air so that the sucked air, liquid and even solid dirt can be sucked into

the cleaning flow path (e.g., the receiving chamber 200) via the suction nozzle 3, and air is separated by the separating component 500 and then discharged by the suction turbine 110 to the ambient environment via the discharge opening 13. In an embodiment of the present invention, the suction assembly further includes a suction shell 130. The suction shell 130 surrounds and supports the suction turbine 110 and the electric motor 120. In an embodiment of the present invention, the suction shell 130 includes a throat portion 135 and a horn portion 131, and an outer periphery of the throat portion 135 is sealingly connected to the receiving chamber 200. The horn portion 131, together with a motor shell surrounding the electric motor 120, forms a suction chamber. In one embodiment of the invention, the suction chamber includes an exhaust passage 132 at an upper portion. In one embodiment of the invention, two exhaust passages 132 are located on both sides of the suction turbine 110. In one embodiment of the invention, the exhaust passage 132 opens to a position in a vertical direction above the axis of rotation of the suction turbine 110. In one embodiment of the present invention, the exhaust passage 132 takes a meandering path such that liquid, such as water, cannot enter the suction chamber via the exhaust passage 132.

[0044] In one embodiment of the invention, the shell 1 comprises a discharge opening 13 at a position corresponding to the exhaust passage 132, to facilitate the discharge of air or gas sucked by the hard surface cleaning device 1000 into the ambient environment via the suction turbine 110. In one embodiment of the present invention, the left and right half-shells 11 and 12 respectively include respective discharge openings 13 to correspond to the exhaust passages 132 on both sides of the suction turbine 110 respectively, thereby facilitating the discharge of air or gas sucked by the hard surface cleaning device 1000 into the ambient environment via the suction turbine 110.

[0045] As shown in FIG. 1, the shell 1 further includes a textured portion 111 at the rear end of the electric motor 120. In one embodiment of the present invention, the left and right half-shells 11 and 12 respectively include respective textured portions 111. In one embodiment of the present invention, a motor chamber 330 is formed between the shell 1 and a motor shell for accommodating the electric motor 120 at a location substantially corresponding to the textured part 111, and water should be prevented from entering the motor chamber 330, as will be described later.

[0046] FIG. 3 is a perspective view of a portion of hard surface cleaning device 1000 of FIG. 1 according to one embodiment of the present invention, for more clearly showing an internal structure of the hard surface cleaning device 1000. FIG. 4 is an exploded perspective view of a portion of the hard surface cleaning device 1000 of FIG. 3 according to one embodiment of the invention. FIG. 5 is a cross-sectional view of a portion of hard surface cleaning device 1000 of FIG. 3 according to one embodiment of the present invention.

[0047] With reference to FIGS. 3-5 and with continuing reference to FIG. 2, the hard surface cleaning device 1000 further comprises a cleaning flow path which is configured to receive the liquid air mixture from the suction nozzle 3 and separate liquid and air therein from each other. In one embodiment of the invention, the cleaning flow path includes a receiving chamber 200. The receiving chamber 200 receives the liquid air mixture from the suction nozzle 3. The cleaning flow path further includes a separating component 500 located downstream of the receiving chamber 200, and the separating component 500 is configured to separate liquid and gas in the liquid air mixture from each other. In an embodiment of the present invention, the receiving chamber 200 has a receiving interface 201 for sealing connection with the suction channel 30 of the suction nozzle 3. The receiving chamber 200 further has a separating interface 202 at the lower end thereof for sealing connection with the separating component 500, so as to guide the liquid air mixture received from the suction nozzle 3 to the separating component 500. In an embodiment of the present invention, the receiving chamber 200 further includes a discharge interface 203. The discharge interface 203 is connected to the suction assembly, for sucking and discharging the separated gas or air into the ambient environment. In an embodiment of the present invention, a sealing element 240 such as an O-shaped ring is provided between the discharge interface 203 and the throat portion 135 of the suction shell 130 of the suction assembly, so as to prevent the liquid air mixture sucked into the receiving chamber 200 from overflowing or leaking from the discharge interface 203.

[0048] A liquid storage tank 2 for containing the liquid separated in the separating component 500 is detachably held in the shell 1. In an embodiment of the present invention, the liquid storage tank 2 is made of a transparent material so that a user can observe how much liquid is stored in the liquid storage tank 2. In an embodiment of the present invention, a holding member 7 includes a collar portion 73. The holding member 7 is arranged between the liquid storage tank 2 and the separating component 500 in a vertical axial direction by means of the collar portion 73, and the holding member 7 is nested on the separating component 500 from below. In an

embodiment of the present invention, the holding member further includes an arm portion 71 extending downwardly. The arm portion 71 includes a projection 72 protruding towards the liquid storage tank 2. A corresponding drainage outlet 21 is provided on an outer periphery of an upper portion of a wall portion 20 of the liquid storage tank 2. The projection 72 can be plugged into the drainage outlet 21 to seal the liquid storage tank 2, so that the holding member 7 can be detachably connected to an upper portion of the liquid storage tank 2 and hold the liquid storage tank 2 in the shell 1. When the projection 72 is moved away from the drainage outlet 21, the liquid in the liquid storage tank 2 can be discharged through the drainage outlet 21.

[0049] As shown in FIG. 2, the separating component 500 can be inserted into the liquid storage tank 2 from above. The separating component 500 has a circumferential groove 515 on an outer periphery of an upper portion thereof, and a sealing element 250 such as an O-shaped ring (see FIG. 5) can be arranged in the circumferential groove 515. When the separating component 500 is inserted into the liquid storage tank 2, the sealing element 250 abuts against an inner wall of a neck of the liquid storage tank 2, so as to seal the liquid storage tank 2 relative to the separating component 500. In an embodiment of the present invention, the sealing element 250 is further used to form a frictional fit between the liquid storage tank 2 and the separating component 500, so as to facilitate the sealing mount of the liquid storage tank 2 to the hard surface cleaning device 1000 and easy detachment of the liquid storage tank 2 from the hard surface cleaning device 1000.

[0050] As shown in FIGS. 2-5, after assembly, the molded seal 270 is located between the separating interface 202 of the receiving chamber 200 and the upper end of the separating component 500 for sealingly connecting the receiving chamber 200 to the separating component 500, for guiding the liquid air mixture received from the suction nozzle 3 to the separating component 500. In an alternative embodiment of the invention, in the operation state, the liquid air mixture will flow from said receiving chamber 200 into the separating component 500 for separation. In an alternative embodiment of the present invention, a connector 260 couples the separating component 500 to the throat portion 135 of the suction shell 130. Of course, the connector 260 may be not connected to the receiving chamber 200 or the separating interface 202, but is directly coupling the separating component 500 to the suction shell 130. Preferably, as shown in FIG. 5, the connector 260 couples the center tube 555 of the separating component 500 with the throat portion 135 of the suction shell 130, so as to facilitate sucking the air or gas separated from the separating component 500 into the suction shell 130 and subsequently

discharging into the ambient environment. In addition, by means of the connector 260, the liquid air mixture in the receiving chamber 200 is isolated from the separated gas or air in the center tube 555 of the separating component 500 and the throat portion 135 of the suction shell 130, which helps to prevent the liquid from flowing into the suction shell 130 and thereby prevent contamination caused thereby. In an alternative embodiment of the present invention, a filter/adsorbent element may be provided at the connector 260 and/or the center tube 555 to adsorb air bubbles or residual water in the gas that may be present.

[0051] Referring to FIG. 5, the separating component 500 includes a mixture inlet 580 at an upper end, a liquid discharge port 530 at a lower end, and a gas discharge port 550 at a higher height with respect to the liquid discharge port 530. In one embodiment of the invention, the center tube 555 is hollow, that is, a gas discharge passage 590 is formed inside the center tube 555. In one embodiment of the present invention, the gas discharge port 550 is the lowermost end of the gas discharge passage 590. In one embodiment of the present invention, the center tube 555 forms a gas discharge port 550 at a lower end and a gas exit outlet 570 at an upper end. In the embodiment of the present invention, the lowermost end of the separating component 500 does not contact the bottom of the liquid storage tank 2 in the mounted state. Thus, the liquid air mixture first enters the liquid storage tank 2 through the liquid discharge port 530, and then the air or gas flows from the space within the liquid storage tank 2 into the gas discharge port 550, then flows by suction action through the gas discharge passage to enter the suction assembly, in particular into the suction shell 130 of the suction assembly, and then is discharged into the ambient environment via the discharge opening 13 of the shell 1.

[0052] FIG. 8 is a schematic flow diagram of a cleaning process of a hard surface cleaning device 1000 according to one embodiment of the invention. In FIG. 8, different arrow types represent flow paths of liquid, air, liquid air mixture, respectively, where solid arrows represent liquid and dashed arrows represent gas or air. As indicated by the arrows in FIG. 8, the liquid air mixture enters the receiving chamber 200 via the nozzle assembly 3, continues to flow downstream under the influence of gravity, enters the separating component 500, at which the liquid is separated from the liquid air mixture and the liquid is collected in the liquid storage tank 2 while the gas or air is sucked away from the gas discharge port 550 under the suction action of the suction turbine 120, enters the suction shell 130 and is then discharged to the ambient environment via the discharge opening 13 of said shell 1.

[0053] During the operation of the hard surface cleaning device 1000, it is difficult to achieve a thorough or complete separation of gas and liquid, and the gas sucked by the suction turbine 120 is usually accompanied with liquid. In other words, liquid flows together with the gas into the suction chamber and is discharged to the ambient environment via the exhaust passage 132 and the discharge opening 13 of the shell 1. This may result that the liquid entrained in the gas remains inside the hard surface cleaning device 1000, and the liquid, in particular water, needs to be drained from inside the hard surface cleaning device 1000 to avoid affecting the useful life of the hard surface cleaning device 1000.

[0054] FIG. 6 is a perspective view of a portion of the hard surface cleaning device 1000 of FIG. 1 according to one embodiment of the invention, wherein the left half-shell 11 of the shell, the fluid storage tank 2 and the separating component 500 are omitted to more clearly illustrate the internal construction of the hard surface cleaning device 1000. As shown in FIG. 6, with combined reference to FIG. 7, the hard surface cleaning device 1000 includes an internal fluid path 300. In one embodiment of the present invention, the internal fluid path 300 is independent of the clean flow path for sucking the liquid air mixture and separating the liquid and gas from the liquid air mixture. FIG. 7 is a cross-sectional view of a portion of the hard surface cleaning device 1000 corresponding to FIG. 6, wherein the internal fluid path 300 of hard surface cleaning device 1000 is more clearly shown. In one embodiment of the present invention, a suction unit chamber 310 is formed between the shell 1 and the suction unit. The suction unit chamber 310 is in fluid communication with the internal fluid path. The liquid (e.g., water entrained by gas, rainwater flowing in outdoors, etc.) entering inside the hard surface cleaning device via the exhaust passage 132, the discharge opening 13, etc. is collected in the suction unit chamber 310. The shell 1 further comprises a side wall portion 16 opposite to the handle 5. The side wall part 16 is disposed below the suction unit chamber, and the upper end of the side wall part 16 is located at a substantially lowest position of the suction unit chamber 310.

[0055] In one embodiment of the invention, the internal fluid path 300 further comprises a connecting tube 302 in the side wall portion 16 to communicate the suction unit chamber 310 of the shell with a lower space 320. In one embodiment of the invention, the sealing ring 301 is nested on a connecting tube 302, and the side wall portion 16 of the shell 1 is provided with a recess to receive the sealing ring 301 to fix the sealing ring 301 in position in the vertical direction. The sealing ring 301 seals the space between the connecting tube 302 and the inner wall of the shell 1 to prevent fluid from continuing to flow down along the inner wall of the

shell 1. The lower space 320 is located above the battery mounting portion 14. A fluid discharge port 303 is also provided on the shell 1 and is located at the lowest position of the lower space 302 and at the foremost side of the shell 1, in order to discharge the fluid entering the suction unit chamber 310 and the lower space 320, thereby avoiding the risk of short circuit or electrical leakage, etc. due to the flowing of water into the hard surface cleaning device 1000. A flange 304 is also provided on the shell 1, and the flange 304 is disposed below the fluid discharge port 303 and is used for guiding the fluid to be discharged outwardly. In one embodiment of the invention, the flange 304 extends beyond the battery receiving skirt 15, thereby avoiding the fluid or water flowing into the battery 4 which is located below the battery receiving skirt 15, to further avoid the risk of water flowing into the battery 4. In one embodiment of the present invention, a one-way valve is provided in the internal fluid path 300 to prevent liquid entering the internal fluid path 300 from flowing back into the suction unit chamber 310.

[0056] With continued reference to FIGS. 6-7, in one embodiment of the invention, a motor chamber 330 is formed between the shell 1 and a motor shell for accommodating the electric motor 120, and it should be avoided that water flows into the motor chamber 330. In one embodiment of the invention, the motor chamber 330 is sealingly separated from the suction unit chamber 310 accommodating the suction unit. In one embodiment of the present invention, a sealing member 350 is provided at the outside of the motor shell, and the sealing member 350 sealingly separates the motor chamber 330 from the suction unit chamber 310, thereby preventing the fluid or water entering the suction unit chamber 310 from entering the motor chamber 330. In one embodiment of the invention, referring to FIG. 9, the motor chamber 330 is separated from the other parts, e.g. via sealing member 360, so that a part of the internal fluid path may be formed between the underside of the motor chamber 330 and the shell 1. The lower side of the motor chamber 330 is in fluid communication with the rear space 340 inside the shell 1 by means of a connecting tube 302, for example. The rear space 340 is located above the battery mounting portion 14. A rear fluid discharge port 305 is also provided on the shell 1 at the rear portion thereof, and the rear fluid discharge port 305 is located at the rear side of the shell 1 so as to drain fluid entering the space below the motor chamber 330 and the rear space 340, thereby avoiding the risk of short circuits or electrical leakage, etc. due to water flowing into the hard surface cleaning device 1000. A flange 306 is also provided on the shell 1, and the flange 306 is disposed below the rear fluid discharge port 305 and extends beyond the battery receiving skirt 15 for directing fluid outwardly, thereby avoiding fluid or water flowing into the underlying battery 4, to further avoid the risk of water entering the battery 4.

[0057] FIG. 9 is a schematic flow diagram of the internal fluid path 300 of a hard surface cleaning device 1000 according to one embodiment of the invention. In FIG. 9, arrows represent the flowing paths of the fluid. Fluid entering the interior of the hard surface cleaning device 1000 is first collected in the suction unit chamber 310. The sealing ring 301 prevents the fluid from continuing to flow down along the inner wall of the shell 1. The fluid continues to flow down within the connecting tube 302 into the lower space 302 and is then discharged from the hard surface cleaning device 1000 via the fluid discharge port 303 located at the front side.

[0058] In one embodiment of the invention, the internal fluid path 300 is located on the front side of the hard surface cleaning device 1000. Since the hard surface cleaning device 1000 is typically angled relative to vertical during operation to allow the suction nozzle 3 to better contact the surface to be cleaned, fluid remaining inside the hard surface cleaning device 1000 can be more easily discharged from the fluid discharge port 303 through the internal fluid path 300. In addition, the fluid discharge port 303 is relatively remote from a user operating the hard surface cleaning device 1000 and the fluid discharge port 303 is located at a relatively lowest or lower position on the front side of the shell 1 so that fluid discharged from the fluid discharge port 303 will exit the hard surface cleaning device 1000 directly and will not flow onto the user, which further avoids the risk of contamination of the hard surface cleaning device 1000, and in particular of the battery 4, by the fluid, and also avoids the risk of contamination of the user by the fluid.

[0059] In one embodiment of the present invention, the shell 1 takes the form of a left-right half-divided configuration, and the battery mounting portion 14 is also located on the left half-shell 11 and the right half-shell 12, respectively. In one embodiment of the present invention, a seal 141 is provided on the battery mounting portion 14, and the seal 141 seals the battery mounting portion 14 watertight against the internal fluid path 300, preventing fluid or water flow from entering or contacting the battery 4 within the battery mounting portion 14, reducing the risk of short circuits.

[0060] In one embodiment of the invention, the electrical parts of the hard surface cleaning device 1000 are waterproofly isolated and the electrical parts are physically isolated from the internal fluid path of the hard surface cleaning device 1000 and can be sealed with respect to the hard surface cleaning device 1000 by means of the seal(s). Thereby, the electrical parts are sealed watertight, thereby avoiding the risk of short circuits or electrical leakage.

[0061] In one embodiment of the invention, the shell 1 includes a battery receiving skirt 15 at the bottom. In one embodiment, the battery receiving skirt 15 is part of the shell 1. In another embodiment, the battery receiving skirt 15 is a separate component from the shell 1. In the embodiment of FIG. 6, the battery receiving skirt 15 is shown as transparent, so as to easily observe the battery therein. In one embodiment, the battery receiving skirt 15 includes a soft portion 151. The soft portion 151 preferably includes two soft portions 151 disposed on both sides of the battery receiving skirt 15. In use, a user can insert the battery 4 into the battery receiving skirt 15 from the bottom and hold the battery 4 in place by means of the soft portion 151. When it is needed to remove the battery 4, the user can release the battery 4 from the hard surface cleaning device 1000 by pressing the soft portion 151. In one embodiment of the invention, the battery 4 has a release button, not shown, at a position corresponding to the soft portion 151, and the release button can be coupled with the soft portion 151 to lock the battery 4 in place when mounting the battery 4 to the battery receiving skirt 15. When the user presses the soft portion 151, a pressing force can be transmitted to the release button, thereby the battery 4 can be released. By virtue of the battery receiving skirt comprising a soft portion, the battery can be quickly installed and removed without using tools, which improves the ease of use and experience of the hard surface cleaning device.

[0062] With the hard surface cleaning device according to the invention, due to the design of the internal fluid path, the electrical parts can be effectively isolated from water, and water inside the hard surface cleaning device is drained through the internal fluid path, thereby safely realizing the cleaning function, improving the safety and prolonging the service life of the hard surface cleaning device.

[0063] Although the description herein is based on various embodiments, it is by no means the case that each embodiment includes only one independent technical solution. This manner of presentation is adopted herein purely for the sake of clarity. Those skilled in the art should consider the specification in its entirety; the technical solutions in the various embodiments may also be suitably combined to form other embodiments understandable to those skilled in the art. The scope of the present invention is defined by the attached claims, rather than by the above description. Thus, it is intended that all modifications falling within the meaning and scope of equivalent elements of the claims shall be included in the present invention.

[0064] To those skilled in the art, the present invention is not limited to the details of the above exemplary embodiments, and may be implemented in other specific forms without deviating from the spirit or basic features of the present invention. Therefore, the above embodiments should be considered as exemplary and not restrictive.

CLAIMS

1. A hard surface cleaning device comprising:

a suction assembly for creating a suction flow, the suction assembly comprising a suction unit and an electric motor for driving the suction unit;

a suction nozzle in fluid communication with the suction assembly for sucking the liquid air mixture from the hard surface;

a cleaning flow path between the suction nozzle and the suction assembly;

a battery for providing power to the electric motor; and

a shell containing the suction assembly and a cleaning flow path therein, and an internal fluid path is provided inside the shell and is independent of the cleaning flow path.

2. The hard surface cleaning device according to claim 1, characterized in that, a motor chamber containing the electric motor and a suction unit chamber shell containing the suction unit are formed inside the shell, wherein the suction unit chamber shell is sealingly separated from the motor chamber, and the suction unit chamber is in communication with the internal fluid path.

3. The hard surface cleaning device according to claim 2, characterized in that, a fluid discharge port is provided at a lower part of the shell, and the internal fluid path communicates the suction unit chamber with the fluid discharge port.

4. The hard surface cleaning device according to claim 3, characterized in that, the shell comprises a handle and a side wall portion opposite to the handle, and the internal fluid path is provided in the handle and/or the side wall portion.

5. The hard surface cleaning device according to claim 5, characterized in that, a one-way valve is provided in the internal fluid path to prevent liquid entering the internal fluid path from flowing back into the suction unit chamber.

6. The hard surface cleaning device according to claim 4, characterized in that, the internal fluid path is integrally formed by the shell, wherein preferably the internal fluid path comprises a connecting tube connecting the suction unit chamber and the fluid discharge port.

7. The hard surface cleaning device according to claim 6, characterized in that, a sealing ring is fitted over the connecting tube and a recess is provided in the side wall portion of the shell to receive the sealing ring to hold the sealing ring in position in a vertical direction.

8. The hard surface cleaning device according to claim 3, characterized in that, the fluid discharge port is located remotely from the handle, preferably on the other side of the shell opposite to the handle.

9. The hard surface cleaning device according to claim 3, characterized in that, the shell is provided with a battery mounting portion in a lower part thereof, and the battery is removably mounted to the battery mounting portion, and the battery mounting portion is water-tightly separated from the internal fluid path, and preferably the battery mounting portion is separated from the internal fluid path by a seal.

10. The hard surface cleaning device according to claim 3, characterized in that, the shell comprises a battery receiving skirt at the bottom, and preferably the shell is provided with a flange at the fluid discharge port, and the flange extends beyond the battery receiving skirt.

11. The hard surface cleaning device according to claim 10, characterized in that, the battery receiving skirt is integrally formed with the shell.

12. The hard surface cleaning device according to claim 10, characterized in that, the battery receiving skirt is formed as a separate component, and the battery receiving skirt is coupled to the shell.

13. The hard surface cleaning device according to claim 10, characterized in that, the battery receiving skirt comprises a soft portion by means of which the battery is able to be installed into the hard surface cleaning device and removed from the hard surface cleaning device.

14. The hard surface cleaning device according to claim 13, characterized in that, the

battery receiving skirt comprises opposing soft portions which are located on both sides of the battery receiving skirt.

15. The hard surface cleaning device according to claim 13, characterized in that, the battery comprises a release button, the position of which corresponds to the position of the soft portion, and the release button is operable by pressing the soft portion.

Techtronic Cordless GP
Patent Attorneys for the Applicant
SPRUSON & FERGUSON

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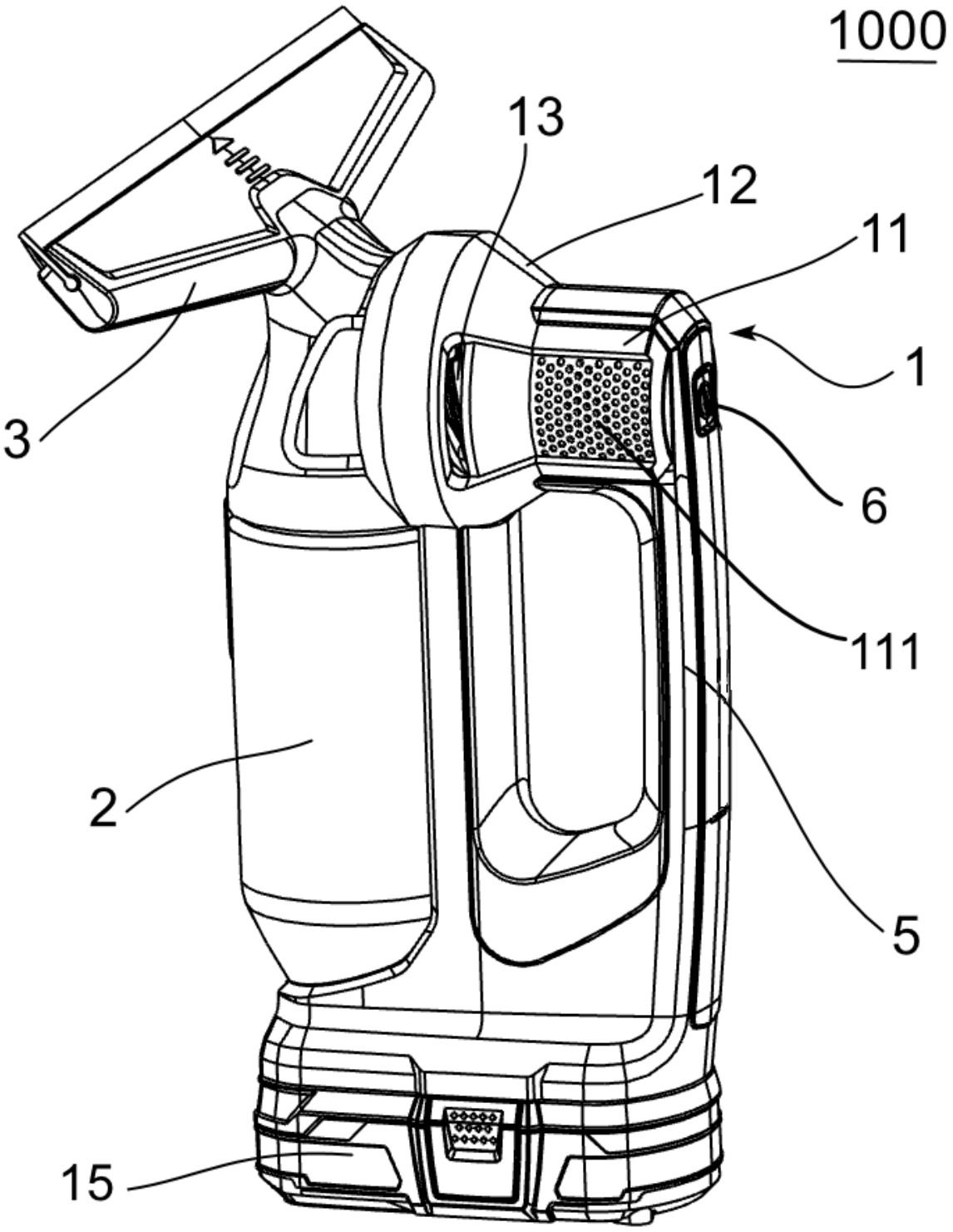

FIG. 1

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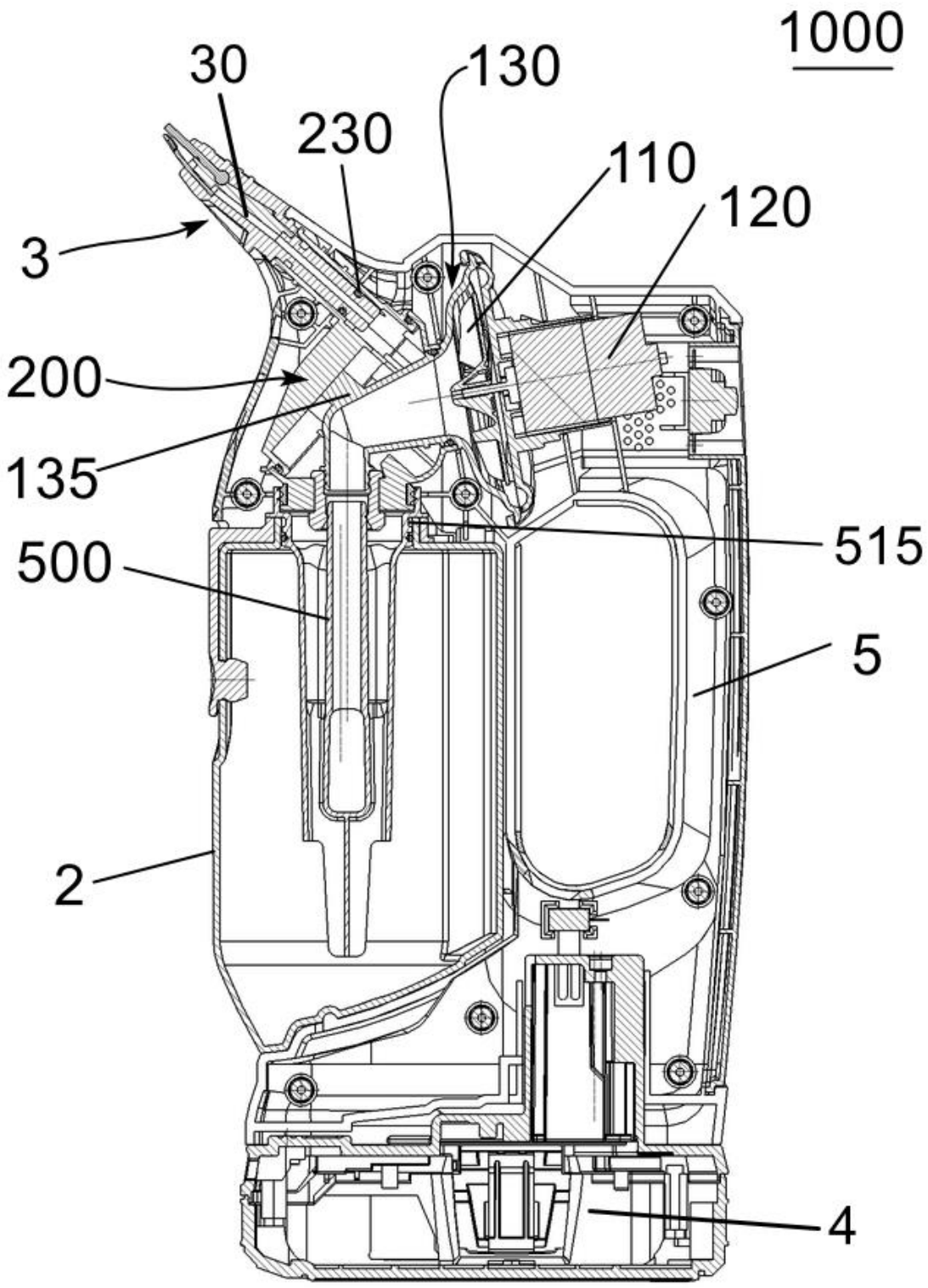

FIG. 2

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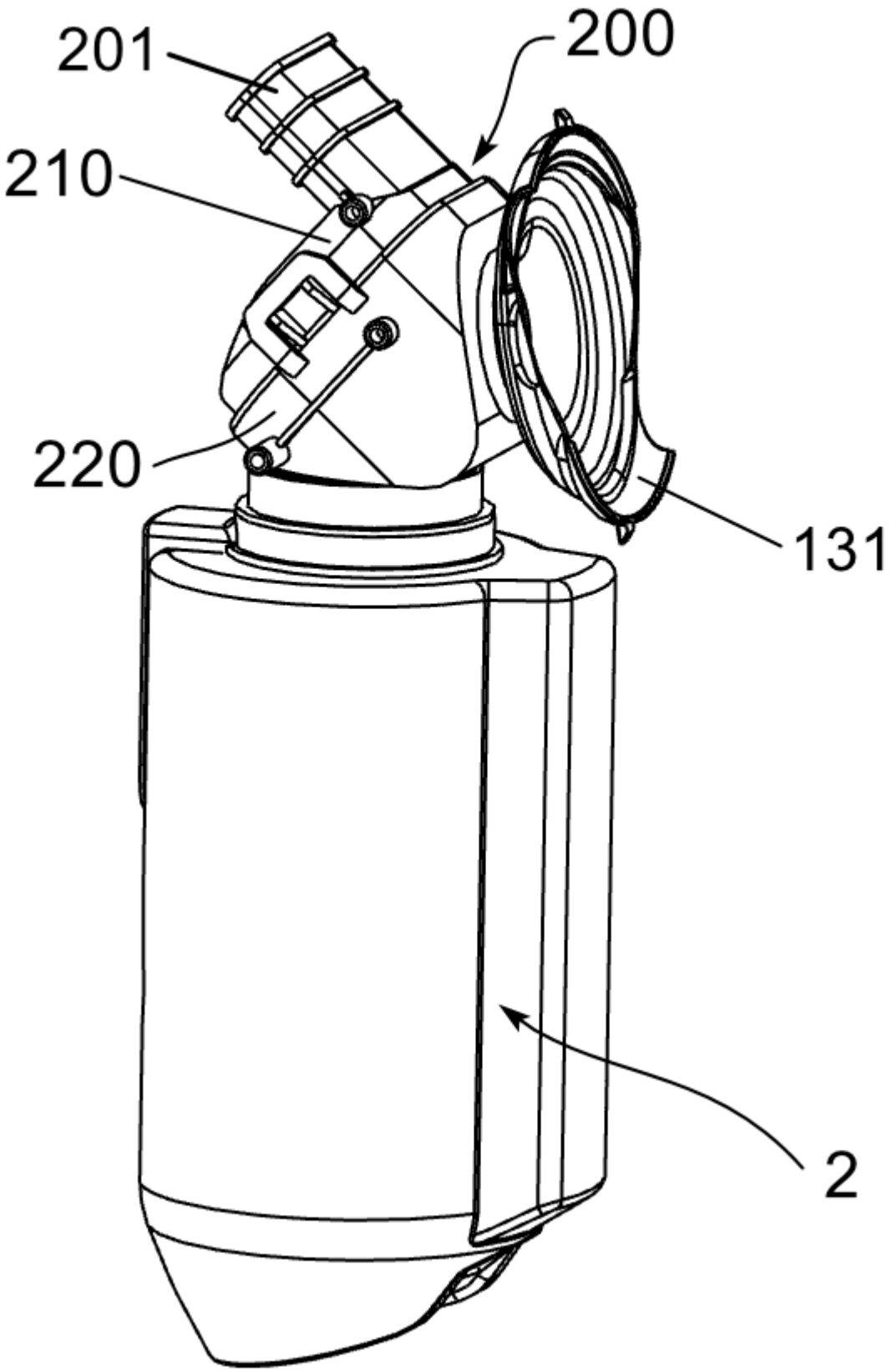

FIG. 3

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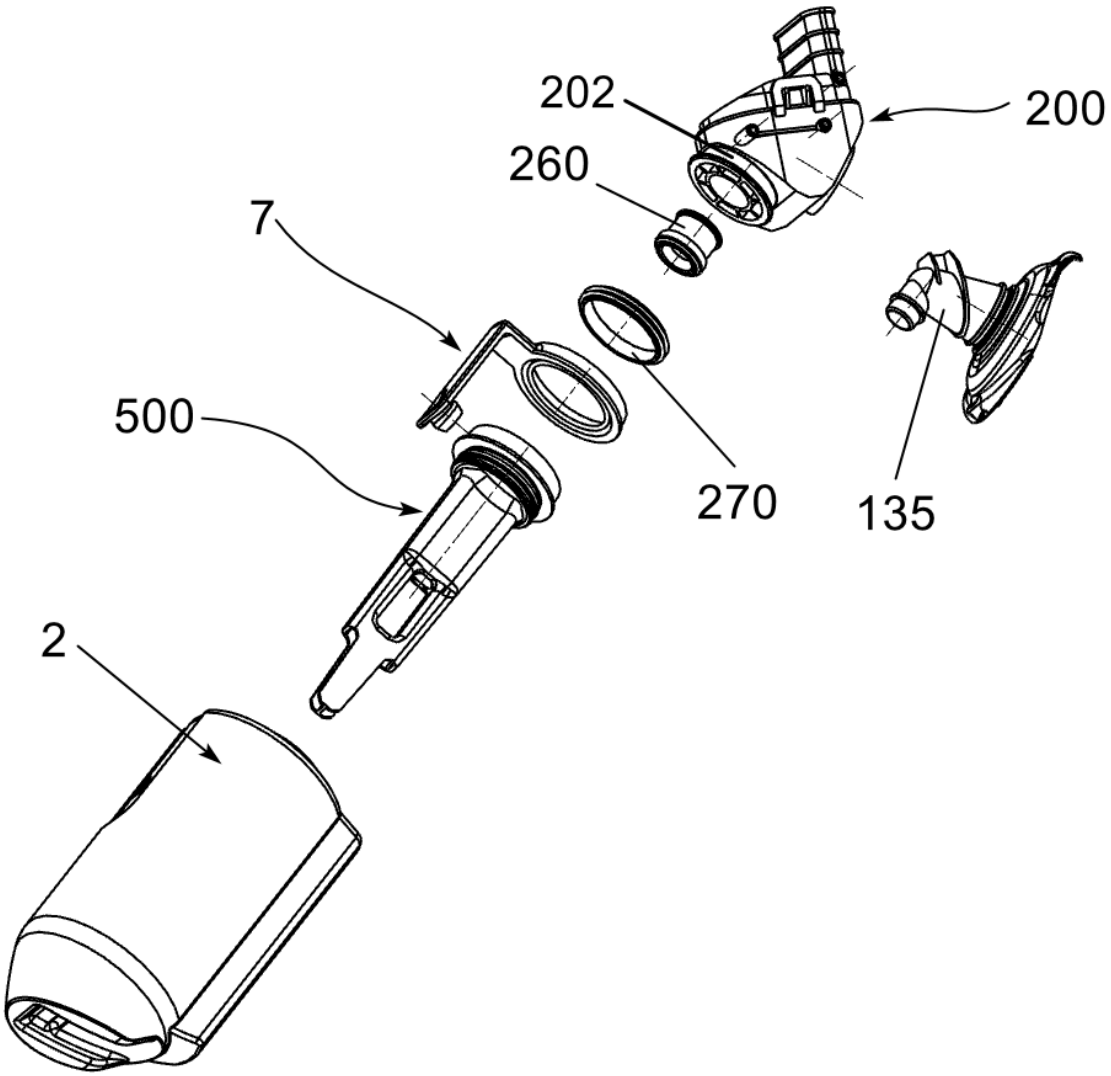

FIG. 4

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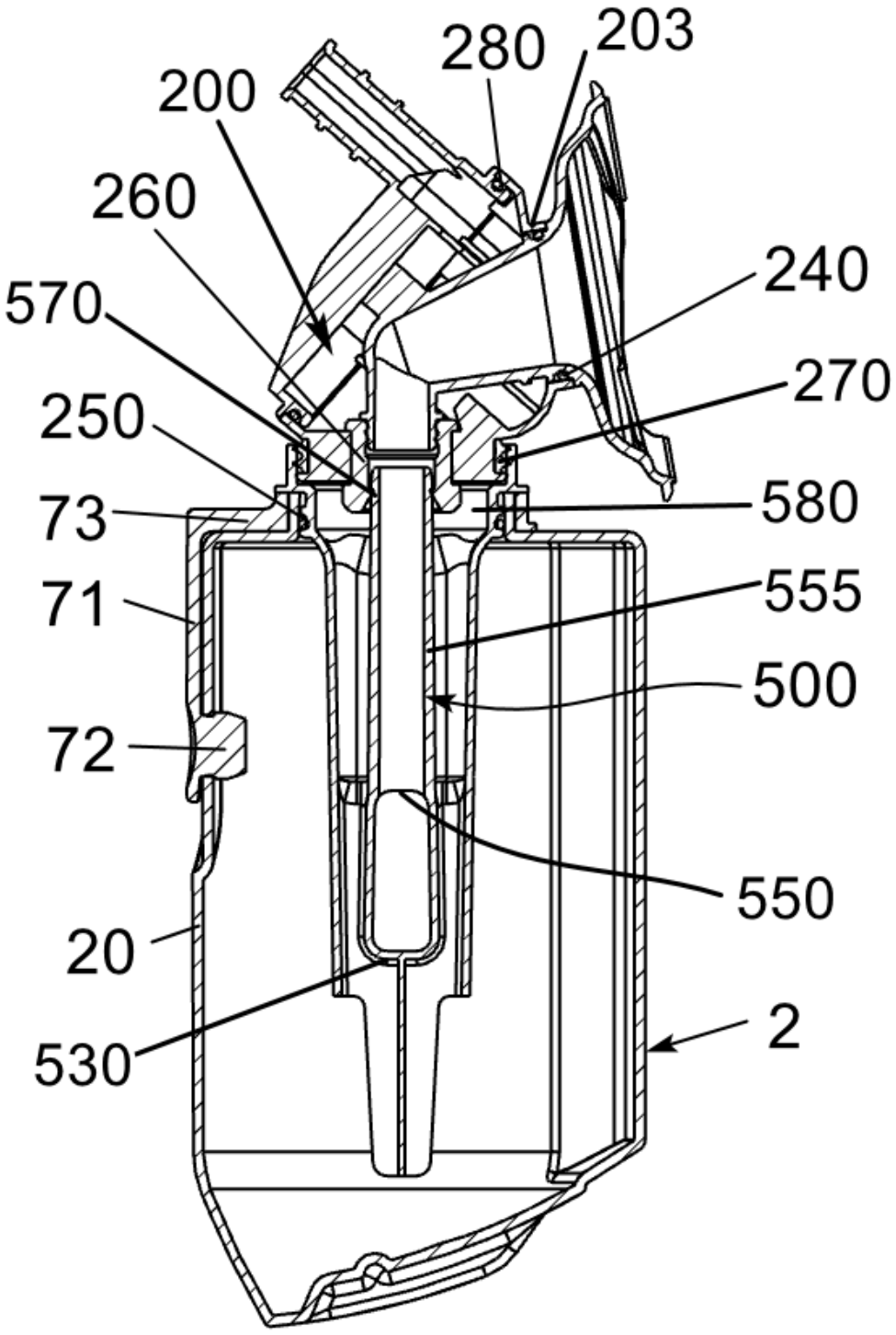

FIG. 5

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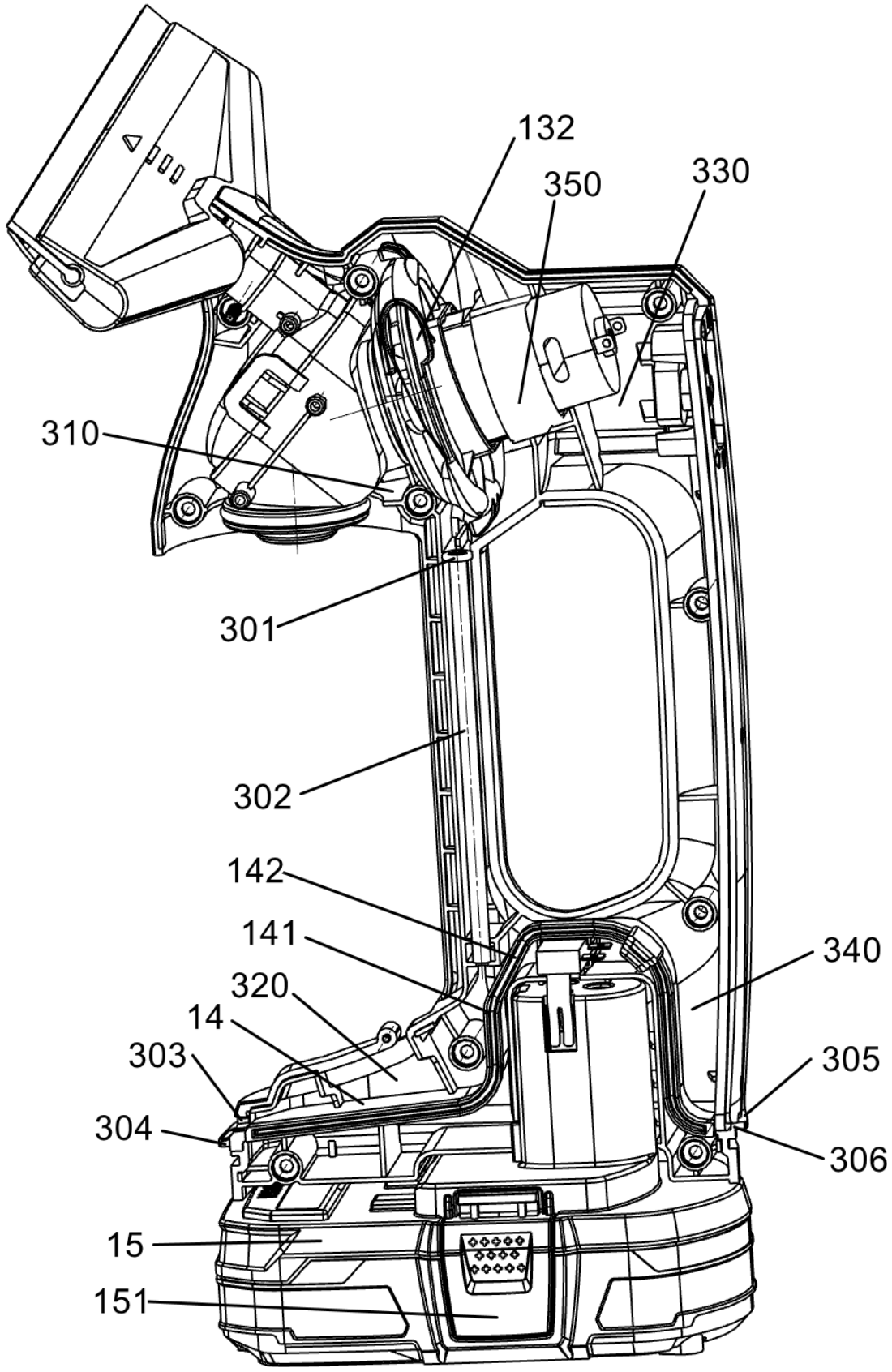

FIG. 6

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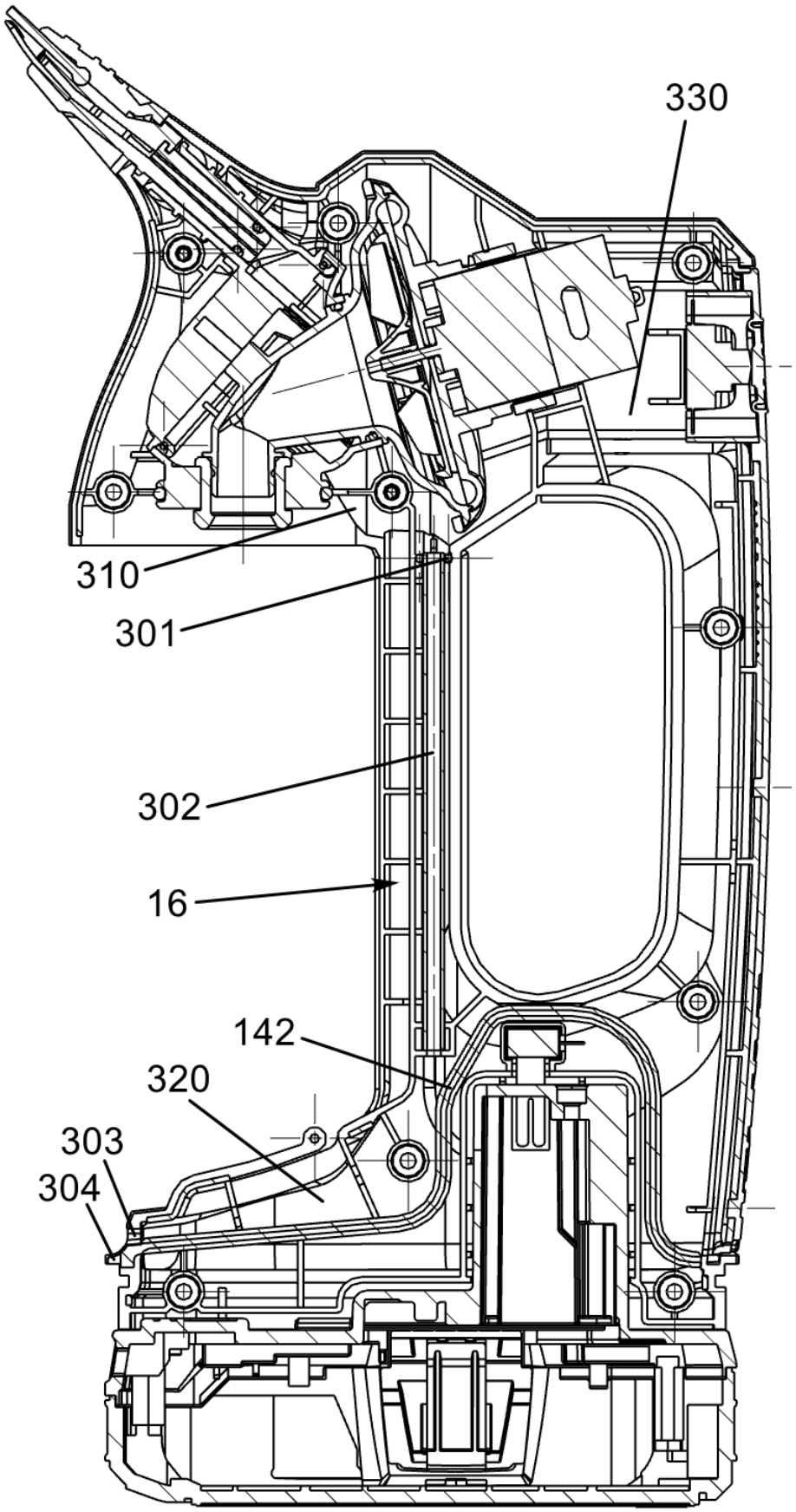

FIG. 7

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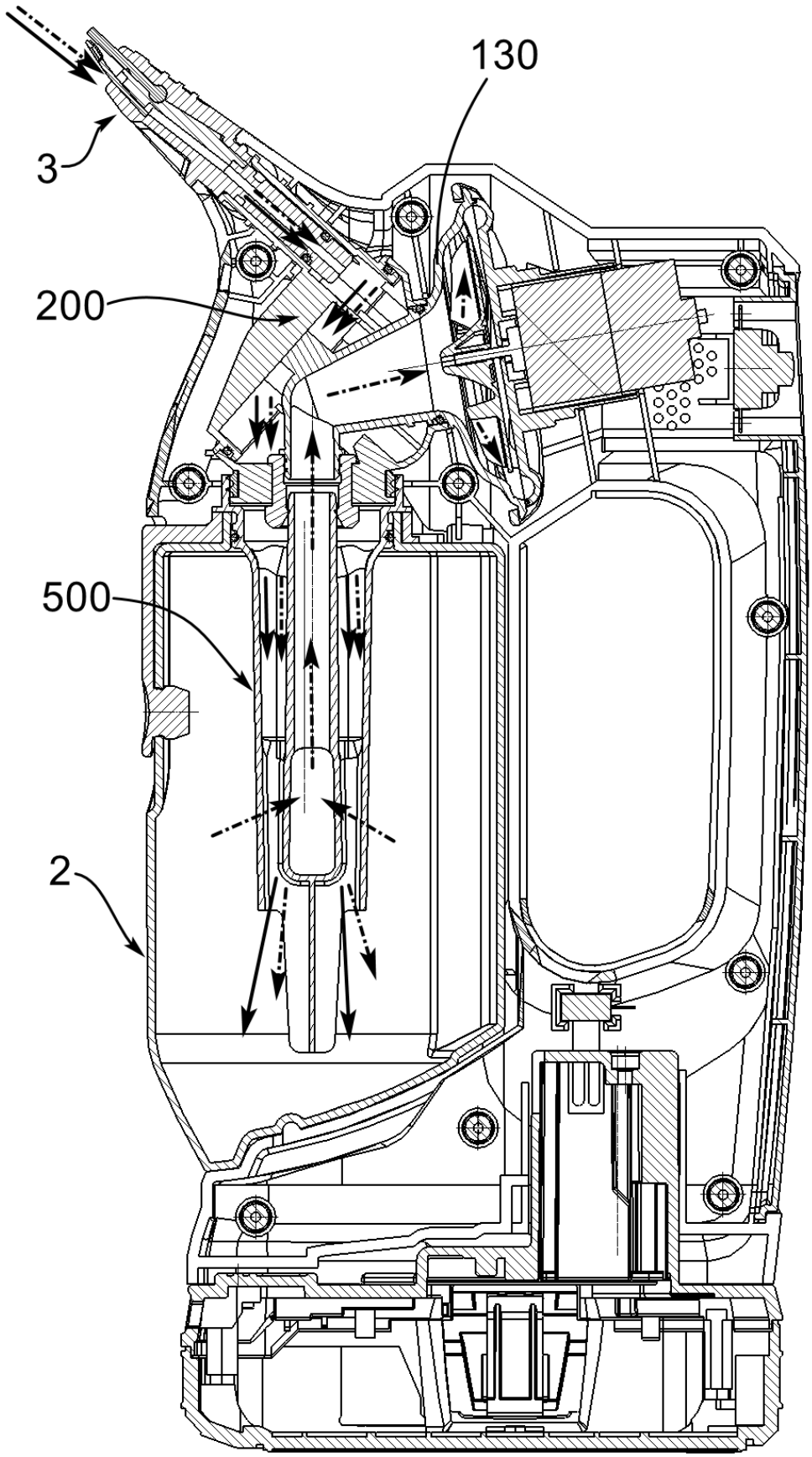

FIG. 8

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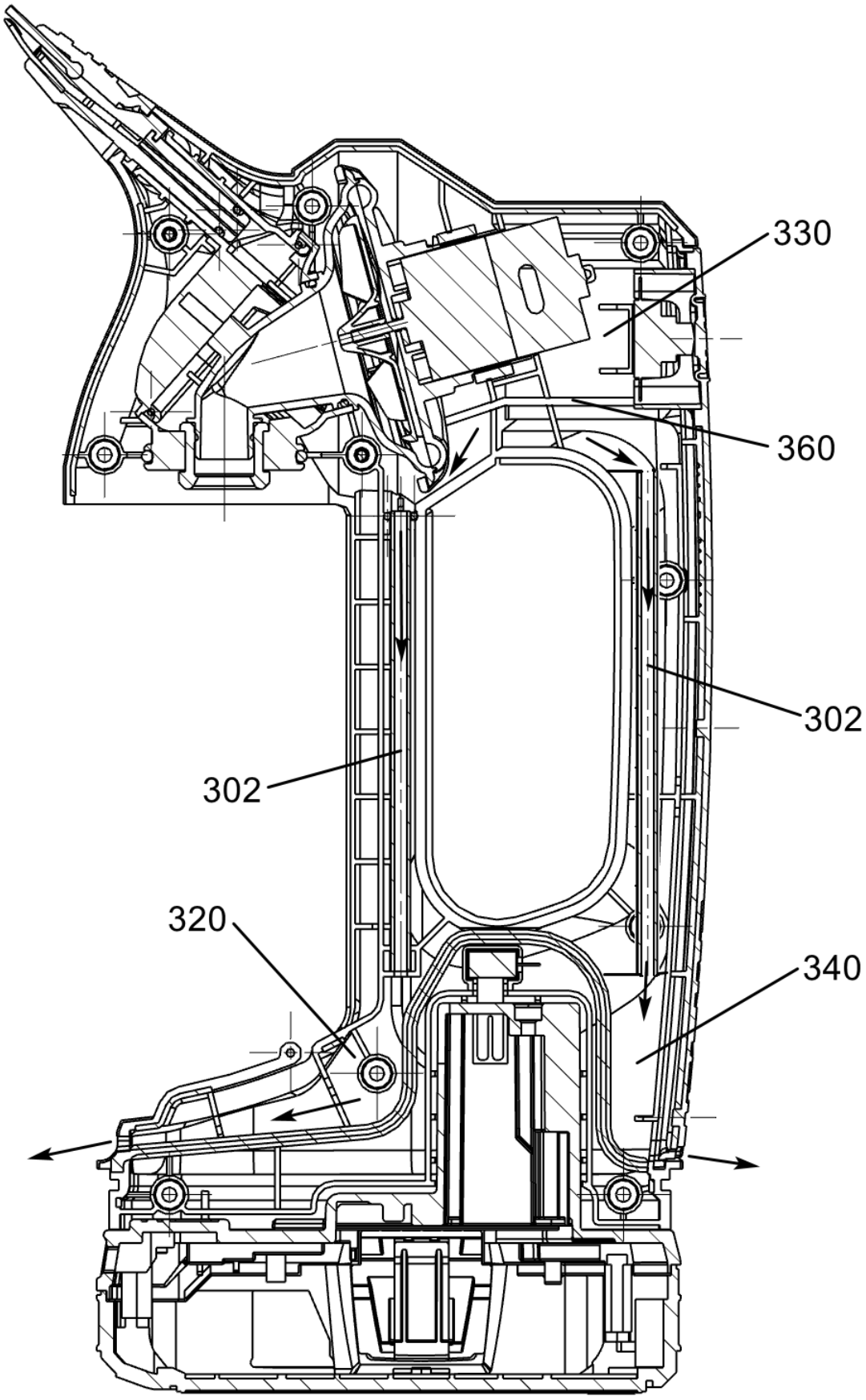

FIG. 9