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

(11) **EP 4 563 059 A1**

(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
04.06.2025 Bulletin 2025/23

(21) Application number: **23844833.6**

(22) Date of filing: **08.03.2023**

(51) International Patent Classification (IPC):
A47L 11/40 *(2006.01)* ***A47L 11/30*** *(2006.01)*

(52) Cooperative Patent Classification (CPC):
A47L 11/30; A47L 11/40

(86) International application number:
PCT/CN2023/080348

(87) International publication number:
WO 2024/021615 (01.02.2024 Gazette 2024/05)

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

(30) Priority: **28.07.2022 CN 202210901598**
28.07.2022 CN 202210899744
28.07.2022 CN 202221975551 U

(71) Applicant: **Beijing Roborock Technology Co., Ltd.**
Beijing 102206 (CN)

(72) Inventors:
- **ZHOU, Yongfei**
  Beijing 102206 (CN)
- **LI, Xing**
  Beijing 102206 (CN)
- **LI, Xiang**
  Beijing 102206 (CN)
- **ZHU, Mingyang**
  Beijing 102206 (CN)
- **MI, Chang**
  Beijing 102206 (CN)
- **LUO, Guangzhong**
  Beijing 102206 (CN)
- **OUYANG, Dalin**
  Beijing 102206 (CN)

(74) Representative: **Michalski Hüttermann & Partner Patentanwälte mbB**
Kaistraße 16A
40221 Düsseldorf (DE)

(54) CLEANING DEVICE AND CLEANING SYSTEM

(57) A cleaning device (20) and a cleaning system (100). The cleaning device (20) comprises a cleaning base (21) and a device body (22) pivotally connected to the cleaning base (21). The device body (22) further comprises: a wastewater tank (25) detachably assembled on one side of the device body (22); a power source (273) assembled on the other side of the device body (22); a first air duct (241) connecting the wastewater tank (25) and an air inlet (2731) of the power source (273) in a bending manner; and a second air duct (242) connecting an air outlet (2732) of the power source (273) and an air outlet (221) of the cleaning device (20). When the power source (273) is turned on, a working airflow flows through the cleaning base (21), the wastewater tank (25), and the first air duct (241) into the power source (273), and flows through the air outlet (2732) of the power source (273), the second air duct (242), and the air outlet (221) of the cleaning device (20) to be discharged.

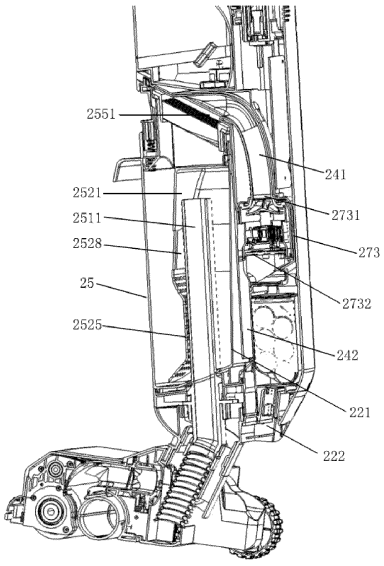


FIG. 2

EP 4 563 059 A1

Description

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] The present disclosure claims priorities to Chinese Patent Application Nos. 202210901598.6, 202210899744.6 and 202221975551.6, each filed on July 28, 2022, the disclosures of all of which are herein incorporated as a part of the present disclosure by reference in their entireties.

TECHNICAL FIELD

[0002] The present disclosure relates to the field of automatic cleaning technologies and, in particular, relates to a cleaning device and a cleaning system.

BACKGROUND ART

[0003] With the continuous development of technology, cleaning devices, such as floor scrubbers, have been used in a wide range of families. Compared with traditional manual cleaning, the floor scrubbers are more time-saving and labor-saving.

[0004] Typically, the floor scrubber includes a device body and a cleaning base. The device body is internally provided with a water recycle tank (for example, a wastewater tank), a cleaning liquid tank (for example, a clean water tank), and a main fan for suction. The cleaning base includes a cleaning roller for mopping. Generally, two cleaning rollers are provided to guarantee the cleaning efficiency. A clean cleaning liquid (for example, water) is sprayed through a built-in water pipe onto the fluffy cleaning rollers, which rotate at a high speed to scrub the floor. With the wide application of the floor scrubbers, there is a common demand for the reasonable structural layout of all components in the floor scrubber to make the overall structure more compact.

SUMMARY

[0005] The present disclosure provides a cleaning device and a cleaning system.

[0006] In some embodiments of the present disclosure, a cleaning device is provided. The cleaning device includes:

a cleaning base configured to be applicable to moving on a surface to be cleaned; and
a device body extending longitudinally in a first direction and pivotally connected to the cleaning base, the device body including:

a wastewater tank detachably assembled on one side of the device body;
a power source assembled on another side of the device body, a direction from the one side to the another side of the device body being approximately perpendicular to the first direction;

a first air duct communicating the wastewater tank to an air inlet of the power source; and
a second air duct communicating an air outlet of the power source to an air outlet of the cleaning device, wherein in response to turn-on of the power source, the cleaning device is configured to enable a working airflow sequentially to flow through the cleaning base, the wastewater tank, the first air duct, the power source, the second air duct, and the air outlet of the cleaning device for discharge.

[0007] In some embodiments of the present disclosure, a cleaning device is provided. The cleaning device includes:
a device housing, including:

a cleaning base configured to be applicable to moving on a surface to be cleaned, and
a device body extending longitudinally in a first direction and pivotally connected to the cleaning base; and
a device air duct configured to form a flow path for a working airflow,
wherein the device air duct is at least composed of a wastewater suction nozzle, a wastewater tank and a power source, and when the power source is turned on, the working airflow sequentially flows through the wastewater suction nozzle, the wastewater tank and the power source; and
the device air duct includes a front air duct and a rear air duct, which are disposed in front of and behind an air outlet of the wastewater tank, respectively, and an overall flow direction of the working airflow in the front air duct is opposite to that of the working airflow in the rear air duct.

[0008] In some embodiments of the present disclosure, a cleaning device is provided. The cleaning device includes:

a cleaning base configured to be applicable to moving on a surface to be cleaned, the cleaning base including a wastewater suction nozzle; and
a device body extending longitudinally in a first direction and pivotally connected to the cleaning base, the device body including:

a power source configured to generate a movable working airflow when the power source is turned on, and
a wastewater tank configured to accommodate wastewater recycled from a cleaned surface,

wherein a moving path of the working airflow sequentially passes through the wastewater suction nozzle, the wastewater tank and the power source,

and the working airflow contains the wastewater, which is collected and accommodated by the wastewater tank; and
the power source includes an air inlet and an air outlet, and the working airflow enters the power source from the air inlet which is in the first direction and faces a direction away from the cleaning base.

[0009] In some embodiments of the present disclosure, a cleaning system is provided. The cleaning system includes:

a station; and
the cleaning device described in any embodiment above, the station being configured to support the cleaning device.

[0010] In some embodiments of the present disclosure, a cleaning device is provided. The cleaning device includes:

a device body extending longitudinally in a first direction, the device body including:

a clean water tank accommodation portion configured to accommodate a clean water tank, the clean water tank accommodation portion including:
a first chassis configured to bear the clean water tank, wherein the first chassis includes at least one first liquid leakage port; and
a wastewater tank accommodation portion configured to accommodate a wastewater tank, the wastewater tank accommodation portion including:
a side wall of the wastewater tank accommodation portion, the side wall extending in the first direction,

wherein the first liquid leakage port and the side wall of the wastewater tank accommodation portion are fluidically communicated, and configured to enable a liquid in the first chassis to be discharged via the first liquid leakage port and the side wall of the wastewater tank accommodation portion.

[0011] In some embodiments of the present disclosure, a cleaning device is provided. The cleaning device includes:

a device body extending longitudinally in a first direction, the device body including:

a clean water tank accommodation portion configured to accommodate a clean water tank, and
a wastewater tank accommodation portion configured to accommodate a wastewater tank;

a wastewater suction nozzle configured to enable wastewater from a cleaned surface to be sucked into an inlet of the cleaning device; and
a wastewater suction channel configured to fluidically communicate to the wastewater suction nozzle and the wastewater tank,
wherein the clean water tank accommodation portion and the wastewater tank accommodation portion are both fluidically communicated to the wastewater suction channel, such that a liquid accumulated in the clean water tank accommodation portion and in the wastewater tank accommodation portion is diverted to the wastewater suction channel so as to be recycled into the wastewater tank.

[0012] In some embodiments of the present disclosure, a cleaning system is provided. The cleaning system includes:

a station; and
the cleaning device described in any embodiment above, the station being configured to support the cleaning device.

[0013] In some embodiments of the present disclosure, a cleaning device is provided. The cleaning device includes:

a device housing, including:

a device body extending longitudinally in a first direction, and
a cleaning base pivotally connected to the device body; and

a liquid supply system configured to supply a cleaning liquid to a cleaning brushroll and/or a surface to be cleaned, the liquid supply system including:

a liquid storage apparatus configured to store the cleaning liquid, and
a liquid supply pipeline, including:
a liquid dispensing connector configured to dispense the cleaning liquid, the liquid dispensing connector including:

a liquid inlet configured as an inlet for the cleaning liquid, and
at least two liquid outlets, wherein the closer the liquid outlet in the at least two liquid outlets to the liquid inlet is, the larger the caliber of the liquid outlet is.

[0014] In some embodiments of the present disclosure, a washing system is further provided, and includes:

a station; and
the cleaning device described in the embodiment

above, the station being configured to support the cleaning device.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] To describe the technical solutions in the embodiments of the present disclosure or in the prior art more clearly, the following briefly introduces the accompanying drawings to be used in the description of the embodiments or the prior art. Obviously, the accompanying drawings in the following description show merely some embodiments of the present disclosure, and those of ordinary skills in the art can still derive other drawings from these accompanying drawings without creative efforts.

FIG. 1 is a schematic structural diagram of a cleaning device according to some embodiments of the present disclosure;

FIG. 2 is a partially sectional view of a cleaning device according to some embodiments of the present disclosure;

FIG. 3 is a schematic structural diagram of a wastewater tank according to some embodiments of the present disclosure;

FIG. 4 is a schematic structural diagram of a wastewater tank body according to some embodiments of the present disclosure;

FIG. 5 is a schematic structural diagram of a cover bracket according to some embodiments of the present disclosure;

FIG. 6 is a partially schematic structural diagram of a cover bracket according to some embodiments of the present disclosure;

FIG. 7 is a schematic diagram of an air duct and a flow direction of a working airflow during operation of a fan of the cleaning device according to some embodiments of the present disclosure;

FIG. 8 is a schematic structural diagram of a cleaning device body according to some embodiments of the present disclosure;

FIG. 9 is a schematic structural diagram of an accommodation chassis of a clean water tank according to some embodiments of the present disclosure;

FIG. 10 is a top view of a water receiving structure according to some embodiments of the present disclosure;

FIG. 11 is a side view of a water receiving structure according to some embodiments of the present disclosure;

FIG. 12 is a schematic structural diagram of an accommodation chassis of a wastewater tank from a top view according to some embodiments of the present disclosure;

FIG. 13 is a schematic structural diagram of an accommodation chassis of a wastewater tank from a bottom view according to some embodiments of the present disclosure;

FIG. 14 is a sectional view of a disassembly structure of a handle assembly according to some embodiments of the present disclosure;

FIG. 15 is a schematic structural diagram of a cleaning base according to some embodiments of the present disclosure;

FIG. 16 is a schematic diagram of an internal structure of a cleaning base according to some embodiments of the present disclosure;

FIG. 17 is a schematic structural diagram of a water dispensing connector according to some embodiments of the present disclosure;

FIG. 18 is a schematic structural diagram of a brushroll accommodation chamber according to some embodiments of the present disclosure;

FIG. 19 is a schematic diagram of the brushroll accommodation chamber from another view according to some embodiments of the present disclosure;

FIG. 20 is a schematic diagram of a running direction of a wastewater suction channel according to some embodiments of the present disclosure;

FIG. 21 is a schematic structural diagram of a cleaning system according to some embodiments of the present disclosure; and

FIG. 22 is a schematic explosive structural diagram of a station according to some embodiments of the present disclosure.

[0016] Description of reference numerals:
cleaning system 100, station 10, cleaning device 20, cleaning base 21, cleaning brushroll 211, device body 22, air outlet 221 of the cleaning device, handle assembly 23, first air duct 241, second air duct 242, wastewater tank 25, wastewater tank body 251, wastewater pipeline 2511, handle 2512, cover bracket 252, first support frame 2521, second support frame 2522, third support frame 2523, filter screen 2525, recess 2526, second through hole 2527, filter window 2528, second end 255, filter assembly 2551, assembly portion 2552 of the wastewater tank body, clean water tank 26, power source (fan) 273, air inlet 2731 of the power source, and air outlet 2732 of the power source.

DETAILED DESCRIPTION

[0017] To make the objectives, technical solutions and advantages of the present disclosure clearer, the present disclosure will be further described in detail below with reference to the accompanying drawings. Obviously, the described embodiments are only part, but not all, of the embodiments of the present disclosure. All other embodiments obtained by those of ordinary skills in the art without creative effort based on the embodiments in the present disclosure shall fall within the scope of protection of the present disclosure.

[0018] It should be noted that the terms "include", "contain", or any other variants are intended to cover nonexclusive inclusion, such that a commodity or appa-

ratus including a series of elements not only includes those elements, but also includes other inexplicitly listed elements, or also includes the inherent elements of such a commodity or apparatus. Without more restrictions, an element defined by the phrase "including a ..." does not exclude the existence of an additional identical element in the commodity or apparatus including such an element.

[0019] Typically, a cleaning device (for example, a floor scrubber) includes a device housing, which is divided into a device body and a cleaning base. The device body is provided with a water recycle tank (for example, a wastewater tank), a cleaning liquid tank (for example, a clean water tank), and a main fan for suction. The cleaning base includes a cleaning brushroll for mopping. The number of the cleaning brushrolls may be, for example, 1, 2, or more. In general, two cleaning brushrolls are arranged to guarantee cleaning efficiency. A clean cleaning liquid (for example, clean water) is sprayed onto the fluffy cleaning brushroll by means of a built-in water pipe, and the cleaning brushrolls rotate at a high speed to mop the floor. At the same time, a negative pressure is formed in a device air duct of the cleaning device by a main fan, such that wastewater after a surface is cleaned is sucked through a suction nozzle of the cleaning device, and is drawn into the wastewater tank with a wastewater return path used as part of the device air duct of the cleaning device.

[0020] After use, the cleaning device is usually put back into a station, where the cleaning brushroll can be cleaned and dried. The cleaning brushroll is dried, for example, by air drying or heat drying.

[0021] The optional embodiments of the present disclosure will be described in detail below with reference to the accompanying drawings.

[0022] In the related art, a fan assembly of the cleaning device imposes a certain risk due to the suction power generated by a rotating impeller, and is usually disposed on the relatively upper part of the device. When the cleaning device is maintained by a user, for example, when the wastewater tank is installed or removed, an accident tends to occur easily because the fan is accidentally touched by a hand. If a protective screen is disposed on the periphery of the fan, the air output of the fan will be affected.

[0023] To this end, a cleaning device is provided according to an embodiment of the present disclosure. A fan and a wastewater tank are oppositely arranged approximately in a horizontal direction, such that a user will not accidentally touch the fan when maintaining the cleaning device, which improves safety and operability. Moreover, in the embodiment of the present disclosure, a first air duct is bent to allow a more compact structure layout of the cleaning device, which saves space while reducing the center of gravity of the overall cleaning device. Furthermore, the bent air duct can also effectively reduce noise generated when the fan operates, thereby improving the use experience.

[0024] Specifically, as an example of the cleaning device provided by the embodiment of the present disclosure, FIG. 1 is a schematic structural diagram of the cleaning device according to some embodiments of the present disclosure. As shown in FIG. 1, the cleaning device 20 (for example, a floor scrubber) includes a device housing which includes a cleaning base 21, a device body 22, and a handle assembly 23. The device body 22 is disposed above the cleaning base 21, and is movably (for example, pivotally) connected to the cleaning base 21. The handle assembly 23 is connected to one end of the device body 22 away from the cleaning base 21 to allow operation and holding by a user. The user holds the handle assembly 23 to control the cleaning base 21 to perform a cleaning task on a surface to be cleaned, for example, on the floor.

[0025] For the convenience of description, the directions are defined as follows: the floor scrubber can be demarcated by defining the following three axes perpendicular to one another: a transverse axis Y, a longitudinal axis X and a vertical axis Z. A direction pointed along the arrow of the longitudinal axis X is indicated as "forward", and a direction opposite to the direction along the arrow of the longitudinal axis X is indicated as "backward". The transverse axis Y essentially indicates a direction along the width of the cleaning base 21. A direction along the arrow of the transverse axis Y is marked as "leftward", and a direction opposite to the arrow of the transverse axis Y is marked as "rightward". The vertical axis Z indicates a direction extending upward along the bottom surface of the cleaning base 21. As shown in FIG. 1, a direction extending from the handle assembly 23 to the device body 22 or extending from the device body 22 to the handle assembly 23 is defined as a first direction, and a direction perpendicular to the first direction is defined as a second direction. In general, when the cleaning device is in a received state, as shown in FIG. 1, the first direction is approximately a vertical direction, which is approximately parallel to the vertical axis Z with a smaller angle therebetween, for example, an angle of less than 15 degrees. For example, the first direction is vertically upward or downward. The second direction is substantially a horizontal direction, which is substantially parallel to the longitudinal axis X or the transverse axis Y. For example, the second direction is a laterally horizontal direction or a longitudinally horizontal direction.

[0026] In an embodiment of the present disclosure, "approximately perpendicular", for example, means that an angle between two directions is greater than or equal to 75 degrees, and less than or equal to 105 degrees, for example, 90 degrees. Extending approximately in one direction or "approximately parallel" means that two directions are approximately parallel, for example, with an angle of less than 30 degrees (optionally less than 15 degrees).

[0027] In some embodiments, the device body 22 refers to the part of the cleaning device disposed between the cleaning base 21 and the handle assembly 23. The

device body 22 extends longitudinally as a whole, that is, extends in the first direction. The handle assembly 23 is connected to the upper end of the device body 22. The cleaning base 21 is connected to the lower end of the device body 22, and the device body 22 and the cleaning base 21 are pivotally connected to the device body 22, such that the device body 22 is rotatable relative to the cleaning base 21, thereby changing an operation angle to flexibly adjust a cleaning posture. The cleaning base 21 includes a cleaning brushroll 211 located at the bottom thereof. Specifically, the number of the cleaning brushrolls 211 is for example one or more, for example, two. The cleaning brushroll 211 may rotate at a high speed to scrub the floor.

[0028] In some embodiments, the cleaning device 20 further includes a power source which is configured to generate a movable airflow in the cleaning device. The airflow brings wastewater (which may contain solid waste) from a cleaned surface into the cleaning device 20 for recycling. Therefore, the airflow is defined as a recycle airflow, also called a working airflow. An airflow path through which the recycle airflow flows in the cleaning device 20 is formed by a device air duct. The entire airflow path at least sequentially passes through the wastewater suction nozzle, a dirt collection portion (for example, the wastewater tank), and the power source of the cleaning device 20. That is, the device air duct at least includes the wastewater suction nozzle, the dirt collection portion (for example, the wastewater tank), and the power source. The wastewater suction nozzle is an inlet allowing entrance of the wastewater into the cleaning device 20, and is also an air inlet of the device air duct. The recycle airflow from the dirt collection portion does not carry wastewater, and an airflow path from the wastewater suction nozzle to the dirt collection portion is thus defined as the recycle path.

[0029] Specifically, the power source may be a suction source, for example, a fan, which is disposed in the device body 22 and configured to enable air to circulate in the device air duct to form the recycle airflow to provide suction power for wastewater recycling. The wastewater recycle pipeline communicates the wastewater suction nozzle to the wastewater tank 25, thereby forming part of the device air duct. Under the action of the suction power generated by the fan, the wastewater is sucked into the wastewater tank 25 through the wastewater recycle pipeline.

[0030] In some embodiments, the power source includes an air inlet and an air outlet, and produces the power to cause the recycle airflow to enter from the air inlet and to be discharged from the air outlet. When the power source is a suction source, taking the fan as an example, the fan refers to a set at least including relevant components of an impeller for moving the air. That is, the fan may be a fan product (which usually includes an impeller, a motor, a corresponding drive control circuit, and a housing containing the aforementioned apparatuses), or may be an impeller and a drive motor thereof, or may be just a specific impeller.

[0031] Referring to FIG. 1 and FIG. 2 together, as shown in FIG. 1, the cleaning device 20 (for example, a floor scrubber) includes a clean water tank 26, a wastewater tank 25, a fan 273, and a device air duct. The fan 273 sucks the air to form a recycle airflow in the device air duct to produce a negative pressure such that the wastewater (which contains garbage when there is garbage on the cleaned surface, and which is subsequently referred to as wastewater) on the cleaned surface is sucked into the wastewater tank.

[0032] The clean water tank 26 and the wastewater tank 25 are both disposed, for example, on the device body 22. In some embodiments, the two are detachably connected to the device body 22 and, in some embodiments, the clean water tank 26 and the wastewater tank 25 are arranged in the first direction. For example, the clean water tank 26 is disposed above the wastewater tank 25. The clean water tank 26 is configured to accommodate a cleaning liquid (for example, cleaning water), and can provide the cleaning liquid through a clean water pipeline to the cleaning brushroll 211 and/or the surface to be cleaned, such that the surface of the cleaning brushroll 211 is wetted, thereby allowing wet cleaning of the surface to be cleaned by the cleaning brushroll 211. The wastewater tank 25 is configured to accommodate the recycled wastewater. When the cleaning brushroll 211 performs wet cleaning, wastewater is produced on the cleaned surface, and the wastewater (which may contain garbage on the cleaned surface) may be recycled into the wastewater tank 25 through the wastewater recycle pipeline.

[0033] The fan 273 is disposed in the device body 22, and is configured to enable the recycle airflow to circulate in the device air duct to provide power for wastewater recycle. In some embodiments, the wastewater tank 25 is assembled on one side of the device body 22, and the fan 273 is assembled on the other side of the device body 22. In some embodiments, the fan 273 and the wastewater tank 25 are disposed approximately in the second direction. The fan 273 and the wastewater tank 25 are disposed opposite to each other approximately in the horizontal direction, such that when a user installs or removes the wastewater tank 25, his/her operation is not be affected by the fan 273 since the air inlet of the fan 273 and the air outlet of the wastewater tank 25 are not directly connected. Hence, there is no need to provide, on the periphery of the fan 273, a protective screen that protects the user, but at the same time affects the air volume.

[0034] In some embodiments, the device air duct further includes a first air duct and a second air duct. The first air duct communicates the wastewater tank to the air inlet of the fan, and the second air duct communicates the air outlet of the fan to the air outlet of the cleaning device. The length and shape of the first and second air ducts are not limited. The first and second air ducts may be either dedicated structural members or

assemblies designed to achieve the function of the air duct, or air ducts formed by the space between the components in the cleaning device.

[0035] In some embodiments, as shown in FIG. 2, the device air duct further includes a first air duct 241 and a second air duct 242. The first air duct 241 communicates the wastewater tank 25 to the air inlet 2731 of the fan 273, and the second air duct 242 extends approximately in the first direction of the device body 22 to communicate the air outlet 2732 of the fan 273 to the air outlet 221 of the cleaning device. The first air duct 241 is a bent air duct, which is bent to communicate the wastewater tank 25 to the air inlet 2731 of the fan 273. Specifically, the air inlet of the first air duct 241 is connected to the wastewater tank 25. The first air duct 241 extends substantially in the second direction at the air inlet thereof. After extending a certain distance in the second direction, the first air duct 241 is bent downward to substantially extend in the first direction, and the first air duct 241 extends in the first direction and is connected to the air inlet 2731 of the fan 273. In some embodiments, the first air duct 241 is arc-shaped at a bend where the first air duct 241 is transitioned from the first direction to the second direction. That is, the first air duct 241 has a smooth transition section at the bend in order to reduce the resistance of the recycle airflow in the first air duct 241, and prevent the formation of turbulences at the bend. The first air duct 241 is designed as a bent air duct to achieve the parallel arrangement of the wastewater tank and the fan such that the structural layout of the cleaning device is made more compact and space-saving, and at the same time, the center of gravity of the overall cleaning device is reduced, making the holding and operation more labor-saving. Furthermore, the bent air duct can also reduce the noise generated by the recycle airflow to a certain extent, thereby improving the use experience.

[0036] In some embodiments, the second air duct 242 is communicated to the air outlet 2732 of the fan 273, and the recycle airflow from the air outlet 2732 of the fan 273 is discharged from the cleaning device through the second air duct 242. Optionally, the second air duct may be formed by a gap between the components of the cleaning device, and the recycle airflow discharged through the air outlet 2732 of the fan 273 may be discharged from the cleaning device through the second air duct formed by the gap between the components of the cleaning device. As an example, the second air duct 242 is disposed between the fan 273 and the wastewater tank 25. A long and narrow gap extending in the first direction is present between the fan 273 and the wastewater tank 25. The second air duct 242 extends from top to bottom in the first direction to approach the cleaning base 21, and the recycle airflow is discharged from the outlet 222 at the bottom or lower part of the device body 22.

[0037] As another example, as shown in FIG. 2, the second air duct 242 is a bent air duct for communicating the air outlet 2732 of the fan 273 to the air outlet 221 of the cleaning device 20. The second air duct 242 is disposed between the fan 273 and the wastewater tank 25, and a long and narrow gap extending in the first direction is present between the fan 273 and the wastewater tank 25. After extending in the first direction to approach the cleaning base 21, the second air duct 242 bends in reverse for a preset distance, and is then communicated to the air outlet 221 of the cleaning device. The air outlet 221 of the cleaning device is disposed between the wastewater tank 25 and the fan 273. In some embodiments, the air outlet 221 of the cleaning device is provided with a plurality of through holes, which extend approximately in the first direction and are arranged on the side wall of the device body 22, for example, to form a mesh structure. The recycle airflow is discharged through the through holes in the mesh structure to the outside of the side wall of the cleaning device. The through holes in the mesh structure can disperse the discharged airflow, in order to prevent the cleaned surface from getting wet by the moist recycle airflow discharged downward concentratedly, and to prevent dust from entering the interior of the main body of the cleaning device. The second air duct 242 is designed to be bent in reverse beside the cleaning base 21, such that the structural layout of the cleaning device is made more compact, and the bent air duct can also reduce the noise generated by the recycle airflow to a certain extent, thereby improving the use experience.

[0038] In some embodiments, the device air duct (for example, the first air duct and/or the second air duct) is provided with a noise reduction component at least at one position such as an inlet of the air duct, an outlet of the air duct, or a side wall of the air duct.

[0039] For the flow path of the recycle airflow in the cleaning device 20, in particular in the first air duct 241 and the second air duct 242, a reference can be made to FIG. 7. After the fan 273 is turned on, the recycle airflow sequentially passes through the cleaning base 21, the wastewater tank 25, and the first air duct 241, enters the air inlet 2731 of the fan, and is discharged through the air outlet 2732 of the fan. The discharged recycle airflow is then discharged to the outside of the cleaning device 20 through the second air duct 242 and the air outlet 221 of the cleaning device 20. Thanks to the structural layout of the fan 273 and the wastewater tank 25, the overall flow direction of the recycle airflow changes (for example, to an opposite direction) after the recycle airflow is discharged from the air outlet of the wastewater tank 25. Here, the overall flow direction refers to the direction from a beginning end where the recycle airflow enters the device air duct, towards a termination end where the recycle airflow is discharged from the device air duct. For instance, a device channel through which the recycle airflow passes in the first half of the recycle path in the cleaning device 20 is called a front channel, and a device channel in the second half of the recycle path is called a rear channel. The beginning end of the front channel is the wastewater suction nozzle of the cleaning base 21, the termination end of the front channel is the air outlet of

the wastewater tank 25, and the direction of the wastewater suction nozzle facing the air outlet of the wastewater tank 25 is substantially the first direction that is away from the surface to be cleaned. The beginning end of the rear channel is the air inlet of the first air duct 241, the termination end of the rear channel is the air outlet 221 of the cleaning device 20, and the direction of the air inlet of the first air duct 241 facing the air outlet 221 is substantially the first direction facing the surface to be cleaned. That is, the overall flow direction of the recycle airflow in the front channel is opposite to the overall flow direction of the recycle airflow in the rear channel.

[0040] In some embodiments, under the action of the suction power produced by the fan 273, the recycle airflow enters the wastewater tank body 251 through the wastewater pipeline 2511, and then enters the first air duct 241 from the air outlet (corresponding to the filter assembly 2551 on the cover bracket 252) at the top end of the wastewater tank 25. In some embodiments, the first support frame 2521 is provided with a filter window 2528, in which, for example, gauze or other filter materials may be provided, and the recycle airflow passes through the filter window 2528 after entering the wastewater tank body 251, and then reaches the air outlet at the top end of the wastewater tank. Filtration through the filter window 2528 can reduce impurities carried by the recycle airflow, thereby reducing damage to the fan 273. In some embodiments, the end of the cover bracket 252 adjacent to the opening of the wastewater tank body is provided with a filter assembly 2551, via which the recycle airflow enters the first air duct 241. Filtration through the filter assembly 2551 can further reduce the impurities carried by the recycle airflow, thereby reducing damage to the fan 273.

[0041] According to the cleaning device provided by the embodiment of the present embodiment, the first air duct with the bending design can make the structural layout of the cleaning device more compact and space-saving, and at the same time, the center of gravity of the cleaning device can be reduced, such that the holding operation of the user is more labor-saving. Furthermore, the flow direction of the working airflow is changed several times inside the cleaning device, such that the noise generated during the flowing of the airflow can be reduced to a certain extent, thereby improving the use experience.

[0042] Referring to FIG. 3 to FIG. 5 together, as shown in FIG. 3, the wastewater tank 25 includes a wastewater tank body 251 and a cover bracket 252. The wastewater tank body 251 is configured to accommodate the recycled wastewater, and the wastewater tank body 251 sleeves at least on the lower half of the cover bracket 252, and is detachably connected to the cover bracket 252. The wastewater tank body 251 includes an opening 2513 of the wastewater tank body and a bottom surface 2514 of the wastewater tank body, as shown in FIG. 4.

[0043] As shown in FIG. 4, the wastewater tank body 251 includes a wastewater pipeline 2511 extending along the bottom surface 2514 of the wastewater tank body to the direction of the opening 2513 of the wastewater tank body. The wastewater pipeline 2511 is configured to allow the wastewater at the cleaning brushroll 211 to enter the wastewater tank body 251 from the wastewater pipeline 2511 under the action of the fan 273. The wastewater tank body 251 further includes a protruding handle 2512 to facilitate the operation during assembling or removal of the wastewater tank 25.

[0044] In some embodiments, as shown in FIG. 5, the cover bracket 252 includes: a first support frame 2521, a second support frame 2522 and a third support frame 2523. The first support frame 2521 extends in the longitudinal direction (first direction) of the wastewater tank body 251; the second support frame 2522 extends at a preset angle with the first support frame 2521, for example, in a substantially vertical direction (second direction); and the third support frame 2523 extends at a preset angle with the first support frame 2521, for example, in a substantially vertical direction (second direction). The third support frame 2523 and the second support frame 2522 may be of a symmetrical structure, for example, a symmetrical structure with the first support frame 2521 as the axis in the first direction. In some embodiments, the first support frame 2521, the second support frame 2522 and the third support frame 2523 are integrally formed, and a smooth curved surface or corner may be provided for transition between the first support frame 2521 and the second support frame 2522, and between the first support frame 2521 and the third support frame 2523. The first support frame 2521, the second support frame 2522 and the third support frame 2523 approximately form a U-shaped structure to improve the stability and strength of the cover bracket 252.

[0045] The cover bracket 252 further includes: a first float and a second float. The first float is disposed on one side of the cover bracket 252, the second float is symmetrical to the first float and is disposed on the other side of the cover bracket 252. Specifically, the first float is disposed on the second support frame 2522, the second float is disposed on the third support frame 2523, and the first float and the second float are each rotatable between the first position and the second position.

[0046] FIG. 6 mainly shows the relationships between the second float 2541 and the related assemblies thereof. It can be understood that the relationships between the first float and the related assemblies thereof are similar, which will not be repeated. Specifically, the first float and the second float 2541 can each move with the change of a water level. The illustration is made below by taking the second float 2541 as an example: when the water level is lower than the second float 2541, the second float 2541 is at the lowest position (i.e., the first position in FIG. 6) because it is not subject to buoyancy; when the water level rises and the water is in contact with the second float 2541, the second float 2541 begins to undergo buoyancy and can thus move with the change of the water level; and as the water level continues to rise, the second float

achieves the highest position (i.e., the second position in FIG. 6) to which it can move due to structural limitations. The first float and the second float 2541 work based on the same principle. Specifically, the two floats move in a pivoting manner. In some embodiments, small float balls are used as the first float and the second float 2541. The small float balls are small in occupied space and low in cost, such that the volume of wastewater that can be accommodated in the wastewater tank can be increased. Furthermore, due to the smaller volume of the small float ball, the volume of the small float ball immersed in the wastewater is very small, which has less influence on the volume of wastewater contained in the wastewater tank 25; and in combination with the laterally symmetrical structure, the differences in water volumes are relatively small when the small float is triggered in longitudinal or lateral direction. In addition, the small float ball can increase the rotation sensitivity of the float, thereby increasing the detection sensitivity.

[0047] In some embodiments, the first float and the second float 2541 are configured to work in cooperation with a first sensing assembly fixed to the device body 22 to monitor whether the wastewater tank 25 is assembled in place. Specifically, the first float includes a second sensing assembly, and the second float includes a third sensing assembly. As an embodiment, the first sensing assembly may include one, two or more components; and when the first sensing assembly includes two or more components, these components may be disposed at different positions of the device body, in order to produce induction signals respectively with the second and third sensing assemblies. When the wastewater tank 25 is assembled in the device body 22, the first float and the second float 2541 are at the first position, and the second sensing assembly and/or the third sensing assembly produce(s) an induction signal respectively with the first sensing assembly. The induction signal is configured to provide the information that the wastewater tank 25 is assembled in place. Conversely, when the wastewater tank 25 is not assembled on the device body 22 or is assembled on the device body 22 in a mismatching manner, the second sensing assembly and/or the third sensing assembly do(es) not produce the induction signal respectively with the first sensing assembly, thereby providing a warning message to remind the user to reassemble the wastewater tank 25.

[0048] In some embodiments, the first sensing assembly is disposed on the corresponding device body in the case that the first float and the second float are at the first position, and the first float and the second float are configured to work in cooperation with the first sensing assembly disposed on the device body 22 to monitor the water level in the wastewater tank body 251. As an embodiment, within a certain distance range, the first sensing assembly and the first float and/or the second float may produce induction signals of different strengths corresponding to different distances. For example, the strength of the induction signal decreases with the increase of the distance. For instance, within a distance range of 1-3 cm, the first sensing assembly can produce induction signals with decreasing strengths; with a distance range of less than 1 cm, the strength of the induction signal remains unchanged; and with a distance range of greater than 3 cm, the strength of the induction signal attenuates to 0. Therefore, different distance ranges can be designated as threshold ranges, the above distance ranges may be specific distance values, for example, 1 cm and 3 cm, and different distance ranges may be continuous or discontinuous. A specific example is given below by virtue of a continuous distance range. For example, the range of 1-3 cm is demarcated by 2 cm into two distance ranges, including 1-2 cm and 2-3 cm, which are used as detection threshold ranges respectively for monitoring two cases, i.e., whether the wastewater tank is assembled in place and whether the water is full. When the wastewater tank 25 is assembled in the device body 22, the first float and the second float 2541 are at the first position; the second sensing assembly and/or the third sensing assembly are/is at a first distance (for example, 2.5 cm, which is in the detection threshold range of 2-3 cm) from the first sensing assembly, respectively; and the information that the wastewater tank 25 is assembled in place is provided according to the strength of the induction signal produced by the first sensing assembly. When the wastewater tank 25 is full, the first float and the second float 2541 are at the second position; the second sensing assembly and/or the third sensing assembly are/is at a second distance (for example, 1.5 cm, which is in the detection threshold range of 1-2 cm) from the first sensing assembly, respectively; and the information that the wastewater tank 25 is full is provided according to the strength of the induction signal produced by the first sensing assembly. The procedures for the discontinuous distance range can be done in the same manner.

[0049] In some embodiments, the first sensing assembly includes two sets of sensing elements. The first set of sensing elements is disposed on the corresponding device body in the case that the first float and the second float are at the first position; the second set of sensing elements is disposed on the corresponding device body in the case that the first float and the second float are at the second position; and the two sets of sensing elements work in cooperation with the first float and/or the second float respectively to complete the full-water monitoring task. Specifically, the first float includes a second sensing assembly, and the second float includes a third sensing assembly. When the wastewater tank 25 is assembled in the device body 22, the first float and the second float 2541 are at the first position, and the second sensing assembly and/or the third sensing assembly produce(s) a first induction signal respectively with the first set of sensing elements. The first induction signal is configured to provide the information that the wastewater tank 25 is assembled in place. When the wastewater in the wastewater tank 25 reaches a preset position (for example, the

preset position being a full water position allowing the first float and/or the second float to reach the second position), the second sensing assembly and/or the third sensing assembly produce(s) a second induction signal respectively with the second set of sensing elements. The second induction signal is configured to provide the information that the wastewater tank 25 is full, and then prompt the user to deal with it.

[0050] In some embodiments, as long as one of the first and second floats provides a second induction signal, the wastewater tank 25 may be determined as full. For example, when one of the floats is blocked or stuck or undergoes other faults preventing it from floating, the other float floats normally, such that the alarm task of full water signal can be fulfilled, thereby avoiding the risk of wastewater overflow.

[0051] In some embodiments, the first float includes a second sensing assembly, and the second float includes a third sensing assembly. When the wastewater in the wastewater tank does not reach the preset position, the second sensing assembly and/or the third sensing assembly are/is at the first position, and in response to the wastewater tank assembled in the device body, at least one of the second and third sensing assemblies produces an induction signal with the first sensing assembly. Based on the first induction signal, the information that the wastewater tank is assembled in place is provided. When the wastewater in the wastewater tank reaches the preset position, at least one of the second sensing assembly and/or the third sensing assembly reaches the second position due to the buoyancy of the wastewater, and the distance between the second sensing assembly and/or the third sensing assembly and the first sensing assembly increases, resulting in the disappearance of the induction signal, based on which the information that the wastewater tank is full is provided. With such arrangement, the detection function for full water and in-place assembly can be achieved by providing only one detection position (corresponding to the first position), and there is no need to additionally improve a determination circuit of the Hall detection assembly, thereby simplifying the detection logic, improving the detection efficiency, and reducing the cost of the detection circuit.

[0052] In some embodiments, the detection of abnormal assembling of the wastewater tank can be achieved by comparing the two symmetrical floats, namely, the first float and the second float. Specifically, when the induction signal is produced at only one float, or the difference between the induction signals produced at the first and second floats exceeds a preset threshold, it can be determined that the wastewater tank has abnormal assembly and is not assembled in place, thereby prompting the user to deal with it.

[0053] In some embodiments, the detection of single-side float blockage can also be achieved by comparing the two symmetrical floats, namely the first float and the second float. Specifically, when the difference between the induction signals produced at the first and second floats exceeds a preset threshold, it can be determined that the float on one side is blocked, thereby prompting the user to deal with it.

[0054] In some embodiments, as an example, the first sensing assembly includes, but is not limited to, a Hall element, such as a Hall plate and a Hall sensing assembly; and the second sensing assembly and the third sensing assembly include, but are not limited to, a magnet.

[0055] In some embodiments, the cover bracket 252 further includes a first float cover body 2533 and a second float cover body 2543. The first float cover body 2533 may be pivotally disposed on one side of the cover bracket 252, and the second float cover body 2543 may be pivotally disposed on the other side of the cover bracket 252. When the first float cover body 2533 and the second float cover body 2543 are buckled to the cover bracket 252, the first float cover body 2533 covers the first float, and the second float cover body 2543 covers the second float 2541. The float cover bodies arranged outside the floats can protect the floats, thereby preventing debris in the wastewater from blocking the floats or affecting the responses of the floats to changes in the water level. In some embodiments, as shown in FIG. 6, the edge of each of the first float cover body 2533 and the second float cover body 2543 is provided with at least one locking member 2534, for example, a buckle; and the cover bracket 252 is provided with at least one lock-up member 2524 (for example, a clamping groove) at the corresponding position. By the cooperation of the locking member 2534 with the lock-up member 2524, the first float cover body 2533 and the second float cover body 2543 can be buckled with the cover bracket 252, thereby enhancing the protection to the first float and the second float.

[0056] In some embodiments, the surface of each of the first float cover body 2533 and the second float cover body 2543 is provided with a plurality of first through holes 2544. The wastewater in the wastewater tank 25 may flow in or out through the first through hole 2544, such that the first float and the second float may respond quickly to the wastewater level.

[0057] In some embodiments, the second float 2541 includes a second rotating shaft 2542, and the second float 2541 may rotate around the second rotating shaft 2542 between the first position and the second position. Similarly, the first float includes a first rotating shaft, and the first float may rotate freely around the first rotating shaft between the first position and the second position.

[0058] In some embodiments, the cover bracket 252 further includes a filter screen 2525, which extends approximately in the same direction as the extension direction of the first support frame 2521. In some embodiments, the filter screen 2525 and the first support frame 2521 are integrally formed. Integral formation can increase the structural strength and durability of the cover bracket 252 on the whole. The filter screen 2525 may also be detachably connected to the first support frame 2521

to facilitate its cleaning by a user, and may also be replaced as a consumable. The filter screen 2525 may also be integrally formed with the first support frame 2521, the second support frame 2522 and the third support frame 2523, thereby further increasing the strength and durability of the cover bracket 252.

[0059] The filter screen 2525 is disposed at the first end of the cover bracket 252 facing the bottom surface of the wastewater tank body 251, and the filter screen 2525 extends approximately from the bottom surface of the cover bracket 252 to the bottom surface of the wastewater tank body 251. The filter screen is configured in a way that when the wastewater tank 25 is at the assembly position, the filter screen 2525 extends approximately in the first direction, and when wastewater enters the wastewater tank body 251, the filter screen 2525 is in the direction approximately the same as the flow direction of the wastewater, such that the resistance to the wastewater entering the wastewater tank body 251 can be reduced, and at the same time, the impurities in the wastewater hung and left in the filter screen 2525 can be reduced. When the wastewater tank 25 is removed to dump the wastewater, the user may choose whether to use the filter screen 2525 to filter the wastewater according to the specific use environment. Specifically, when using the filter screen 2525 to filter the wastewater, the user may hold the second end 255 of the cover bracket 252 to allow the receiving face of the filter screen 2525 to face the direction of dumping the wastewater. For example, the filter screen 2525 may filter the wastewater in the range of a preset angle with the horizontal direction. For example, the preset angle between the extension surface of the filter screen 2525 and the horizontal direction is in the range of 0-90 degrees. Thus, the filtration operation is facilitated when the user wants to filter the wastewater.

[0060] In some embodiments, as shown in FIG. 5, the filter screen 2525 further includes a recess 2526, which has an opening direction opposite to the extension direction of the second support frame 2522. In the assembly position, the recess 2526 of the filter screen 2525 faces the outside of the device body 22 for ease of use. Optionally, the filter screen is made of a hard material, for example, hard plastics, hard organic materials, metals, or the like, in order to enhance the rigidity of the filter screen 2525 during filtration.

[0061] In some embodiments, the filter screen 2525 further includes a plurality of second through holes 2527. In some embodiments, the opening size of the second through hole 2527 is larger than the opening size of the first through hole 2544. The selection of different opening sizes makes it possible to filter different sizes of debris in the wastewater. The second through hole 2527 has a larger opening size, facilitating the rapid filtration and flow of the wastewater, while the first through hole 2544 has a smaller opening size, only allowing water to enter the float cover bodies.

[0062] After the wastewater tank 25 is full, the user removes the wastewater tank from the cleaning device body 22, and takes the cover bracket 252 out of the wastewater tank body 251. If the user considers necessary filtration of the wastewater during dumping, one way is to place the cover bracket 252 horizontally to dispose the filter screen 2525 below the wastewater outlet of the wastewater tank body 251, such that the wastewater can pass through the recess 2526 of the filter screen 2525 after flowing out of the wastewater tank body 251, and is then discharged through the second through holes 2527, thereby filtering most of the debris in the wastewater, and preventing a drainage position from blockage caused by large-size debris that are directly dumped to the drainage position (for example, a sewer or a close stool).

[0063] The filter screen 2525 extends in the same overall direction as the cover bracket 252, and the recess 2526 is shallower with a smooth concave shape and has a certain angle with respect to the holding portion and the filtration portion, such that the user can dump the filtered debris and garbage more conveniently to achieve better use experience. Similarly, the subsequent cleaning process is easier.

[0064] With the filter screen extending longitudinally along the wastewater tank body, the space occupied in the wastewater tank body is reduced during assembling, and it is unlikely to hang and leave debris. During dumping of the wastewater, the filtration function can be selected, and the operation is simple and flexible, which improves the practicality of the filter bracket.

[0065] In some embodiments, the cover bracket 252 may further include a filter window 2528, in which, for example, gauze or other filter materials may be provided. The filter window 2528 is disposed on the first support frame 2521 and is configured to filter the air. The air may pass through the first support frame 2521 via the filter window 2528, and when the airflow flows through the filter window, particles carried in the air may be blocked by the filter window 2528 to achieve coarse filtration of the air. The filter window 2528 is disposed on the first support frame 2521. During dumping of the wastewater, the first support frame 2521 needs to be taken out of the wastewater tank body. Here, it is easy for the user to see (i.e., to perceive) the position of the filter window 2528 disposed on the first support frame 2521, so as to achieve the effect of reminding the user to clear the dirt attached to the filter window 2528 in time. Furthermore, the position of the filter window 2528 is close to the filter screen 2525, such that the user may wash the filter window 2528 and the filter screen 2525 together during cleaning. Optionally, the filter window 2528 may have a single structure, or a two-flap structure or other multi-flap structures, which is not limited. In some embodiments, the cleaning device 20 further includes a power source, which is configured to generate airflows moving in the same direction in the cleaning device. The airflows bring wastewater (which contains solid waste) from a cleaned surface into the cleaning device 20 for recycle. Therefore, the airflows are defined as recycle airflows. An airflow path through which the recycle airflows flow in the cleaning device 20 is

formed by a device air duct. The entire airflow path at least sequentially passes through the wastewater suction nozzle, a dirt collection portion (i.e., a wastewater bucket) and the power source of the cleaning device 20. That is, the device air duct includes at least the wastewater suction nozzle, the dirt collection portion (i.e., the wastewater bucket) and the power source. The recycle airflows from the dirt collection portion do not carry wastewater, and an airflow path from the wastewater suction nozzle to the dirt collection portion is thus defined as the recycle path.

[0066] Specifically, the power source may be a suction source, for example a fan disposed in the device body 22 and configured to enable air circulate in the device air duct to form the recycle airflow, providing suction power for wastewater recycle. The wastewater recycle pipeline communicates the wastewater suction nozzle to the wastewater tank 25, thereby forming part of the device air duct. Under the action of the suction power generated by the fan, the wastewater is sucked into the wastewater tank 25 through the wastewater recycle pipeline.

[0067] In some embodiments, as shown in FIG. 5, the cover bracket 252 further includes a second end 255 opposite to the first end. The second end 255 is adjacent to the opening side of the wastewater tank body 251. The cover bracket 252 further includes a filter assembly 2551 disposed on the second end 255, and the filter assembly 2551 is configured to allow the recycle airflow to circulate through the wastewater pipeline 2511, the filter window 2528 and the filter assembly 2551. A recycle airflow first passes through the filter window 2528 for first filtration, then passes through the filter assembly 2551 for second filtration, and then enters the fan, so as to ensure that the air entering the fan is free of impurities and to reduce the damage to the fan. Optionally, the filter assembly 2551 is composed of multi-layer filter cotton and multi-layer gauze. One of the filter window 2528 and the filter assembly 2551 may be selectively provided with the gauze. Without doubt, both the filter window 2528 and the filter assembly 2551 may also be provided with the gauze to enhance the filtration performance. In some embodiments, the cover bracket further includes an assembly portion 2552 of the wastewater tank body, and the assembly portion is disposed on the second end 255 in a circumferential extension manner, and is configured to be clamped and assembled with the opening of the wastewater tank body 251.

[0068] In the related art, due to improper installation, high water level or other reasons, the liquid in the clean water tank and/or wastewater tank of the cleaning device often leaks, which causes secondary pollution to the cleaned ground, and also leads to potential safety hazards.

[0069] To this end, a cleaning device is provided according to the present embodiment, and is provided with a water receiving structure such that, when the liquid in the clean water tank placed on a first chassis leaks, the liquid may be guided to a wastewater suction channel by means of the first chassis and a first liquid leakage port thereof; or the liquid leaking from the wastewater tank may also be guided to the wastewater suction channel by means of a second chassis and a second liquid leakage port thereof. Therefore, the risk that the leaked liquid is spilled outside the cleaning device is reduced, and meanwhile, the potential safety hazard is also reduced.

[0070] Specifically, as shown in FIG. 8, a cleaning device is provided according to the present embodiment. A reference can be made to the above embodiments for the same structure, which will not be repeated here. The cleaning device includes a device body 22, which extends longitudinally in the first direction. The device body 22 includes a clean water tank accommodation portion 224 and a wastewater tank accommodation portion 225; the clean water tank accommodation portion 224 is configured to accommodate a clean water tank 26; and the wastewater tank accommodation portion 225 is configured to accommodate a wastewater tank 25. The clean water tank accommodation portion 224 includes: a first chassis 2211, which is configured to bear the clean water tank 26. The first chassis 2211 includes at least one first liquid leakage port 22111 and a first protrusion border 22112. As shown in FIG. 9, the first protrusion border 22112 is disposed around the first chassis 2211, and is configured to enable the clean water tank 26 to be stuck to prevent the clean water tank 26 from shaking or dislocation and simultaneously to prevent the liquid leaking from the clean water tank 26 from flowing out of the first chassis 2211. The number of the first liquid leakage ports 22111 is at least 1, for example 2, 3, 4 or more, and when the number is an even number, the first liquid leakage ports may be symmetrically arranged on two sides of the first chassis 2211. The shape of the first liquid leakage port is not limited, and may be for example, a round or square or strip shape. The wastewater tank accommodation portion 225 includes a side wall 2221 of the wastewater tank accommodation portion. The side wall 2221 of the wastewater tank accommodation portion extends in the first direction from the top end to the bottom end of the wastewater tank accommodation portion. The top end of the side wall 2221 of the wastewater tank accommodation portion is fluidically communicated to the first liquid leakage port 22111, and is configured to allow the liquid leaking from the clean water tank 26 to flow out from the first liquid leakage port 22111 and then flow downwards along the side wall 2221 of the wastewater tank accommodation portion. As shown in FIG. 11, beveled borders 22212 are provided on two side edges (in the first direction) of the side wall 2221 of the wastewater tank accommodation portion facing the inner side surface of the wastewater tank 25, and a right angle or an obtuse angle is formed between the beveled border 22212 and the inner side surface, such that the liquid can be prevented from flowing to the outside of the wastewater tank accommodation portion.

[0071] In other embodiments, the edge of the side wall 2221 of the wastewater tank accommodation portion is

provided with a liquid guide groove 22211, which extends in the first direction on the side wall 2221 of the wastewater tank accommodation portion towards the outer side of the wastewater tank 25 or away from the inner side of the wastewater tank 25. The liquid guide groove may be disposed on the edge or in the middle of the side wall 2221 of the wastewater tank accommodation portion, or may be of a structure integrally formed on the side wall 2221 of the wastewater tank accommodation portion, or may be a component disposed separately. Schematically, as shown in FIG. 10, the liquid guide groove 22211 may be disposed on one or two sides of the edge of the side wall 2221 of the wastewater tank accommodation portion; and the liquid guide groove 22211 may be a vertically run-through groove formed by inward depression and disposed along the side wall 2221 of the wastewater tank accommodation portion, or a vertically run-through tubular liquid guide groove 22211 disposed in the side wall 2221 of the wastewater tank accommodation portion. The first liquid leakage port 22111 and the liquid guide groove 22211 are communicated, and configured to discharge, through the first liquid leakage port 22111 and the liquid guide groove 22211, the liquid leaking from the clean water tank 26.

[0072] In some embodiments, understood in conjunction with FIG. 11 and FIG. 10, the device body 22 may further include a water receiving structure 223, which connects the first chassis 2211 with the side wall 2221 of the wastewater tank accommodation portion; the liquid leaking from the clean water tank 26 is discharged through the first liquid leakage port 22111, the water receiving structure 223 and the side wall 2221 of the wastewater tank accommodation portion; and the water receiving structure 223 and the first chassis 2211 as well as the side wall 2221 of the wastewater tank accommodation portion may be integrally formed or detachably connected.

[0073] In some embodiments, the water receiving structure 223 includes a water receiving structure body 2231, a water receiving groove 2232 and an air duct port 2234. The water receiving structure body 2231 has a beveled structure in the assembly state. That is, the water receiving structure body is inclinedly arranged in the assembly state so as to dock with the filter assembly 2551 of the wastewater tank. The air duct port 2234 is communicated to the fan 273 for engagement with the air outlet of the wastewater tank 25, thereby allowing the recycle airflow to pass through. A pair of water receiving grooves 2232 is symmetrically disposed on two sides of the water receiving structure body 2231, and the liquid leaking from the clean water tank flows into the water receiving groove 2232 through the first liquid leakage port 22111.

[0074] In some embodiments, the section of the water receiving groove 2232 in the first direction approximately has a triangular structure to match the beveled structure of the water receiving structure body 2231, such that the top end of the water receiving groove 2232 is approximately horizontal, thereby stably bearing the clean water tank. The water receiving groove 2232 includes a side wall, an inclined bottom surface 2233, and a water receiving groove hole 22321, and the water receiving groove hole 22321 is disposed on the inclined bottom surface 2233. Optionally, the water receiving groove hole 22321 is disposed at the lowest position of the inclined bottom surface 2233 to facilitate the discharge of the liquid. The water receiving groove hole 22321 is communicated to the liquid guide groove 22211 of the side wall 2221 of the wastewater tank accommodation portion, and the liquid flowing into the water receiving groove 2232 flows into the liquid guide groove 22211 through the inclined bottom surface 2233 and the water receiving groove hole 22321.

[0075] In some embodiments, as shown in FIG. 12, the wastewater tank accommodation portion 225 further includes a second chassis 2222. The second chassis 2222 is integrally or detachably connected to the side wall 2221 of the wastewater tank accommodation portion, is configured to bear the wastewater tank 25, and includes at least one second liquid leakage port 22221 and a second protrusion border 2225. The second protrusion border 2225 is configured to enable the wastewater tank 25 to be stuck, so as to prevent the wastewater tank 25 from shaking or dislocation, and to simultaneously prevent the liquid leaking from the wastewater tank 25 from flowing out of the second chassis 2222. The shape and number of the second liquid leakage port 22221 are not limited. For example, the second liquid leakage port may be shaped as a round or square or strip-type hole.

[0076] In some embodiments, as shown in FIG. 13, the cleaning device 20 further includes a wastewater suction channel 2223, which passes through the second chassis 2222 and is communicated to the wastewater tank 25. The wastewater suction channel 2223 is configured to fluidically communicate the wastewater suction nozzle to the wastewater tank 25, such that the wastewater enters the wastewater suction port and then enters the wastewater tank 25 through the wastewater suction channel 2223. The cleaning device 20 further includes a flow guide channel 2224, which communicates the liquid guide groove 22211 to the second liquid leakage port 22221 and the wastewater suction channel 2223. The flow guide channel 2224 allows the liquid flowing from the liquid guide groove 22211 and the liquid flowing from the second liquid leakage port 22221 to flow into the wastewater suction channel 2223 through the flow guide channel 2224, such that the liquid leaking from the clean water tank and the liquid leaking from the wastewater tank are both guided to the wastewater suction channel 2223, and then sucked into the wastewater tank 25 through the wastewater suction channel 2223.

[0077] In some embodiments, the liquid guide groove 22211 drain the liquid flowing from the first chassis 2211 to the second chassis 2222 or directly into the flow guide channel 2224, and the liquid at the second chassis 2222

flows into the flow guide channel 2224 through the second liquid leakage port 22221.

[0078] In some embodiments, the flow guide channel 2224 refers to any channel structure capable of fluidically communicating the wastewater suction channel 2223, and may be an independent structural element or assembly, or may be formed by using the space between the components. For example, the flow guide channel 2224 may be a pipeline having one end directly connected to the wastewater suction channel 2223 and having the other end directly connected to the second liquid leakage port 22221 and/or the liquid guide groove 22211. The flow guide channel 2224 may also be implemented as follows (not shown in the figure): the liquid flowing from the second liquid leakage port 22221 and/or the liquid guide groove 22211 is collected into a liquid collection device; a pipeline communicating the liquid collection device and the wastewater suction channel 2223 is arranged therebetween; and the negative pressure in the wastewater suction channel 2223 allows the liquid in the liquid collection device to be recycled into the wastewater suction channel 2223.

[0079] In some embodiments, as shown in FIG. 14, the clean water tank accommodation portion 221 is provided with a handle disassembly structure, which is disposed on the inner side wall of the clean water tank accommodation portion 221 and is configured to disassemble the handle 23 of the cleaning device after being pressed. When the clean water tank 26 is assembled to the clean water tank accommodation portion 221, the handle disassembly structure is covered by a shield, in order to avoid the handle falling off due to misoperation. Specifically, the handle disassembly structure includes a pressing chamber 2213, which is integrally formed in the inner side wall of the clean water tank accommodation portion 221. For example, the inner side wall of the clean water tank accommodation portion 221 recesses inward to form a groove, which forms the pressing chamber 2213. The handle disassembly structure further includes a pressing portion 2212, which is disposed to fit the inner side wall of the clean water tank accommodation portion 221 and substantially covers the pressing chamber 2213. The pressing portion 2212 may be made of a material having pressing elasticity. The handle disassembly structure further includes a butting portion 2214 connected to the pressing portion 2212. The pressing portion 2212 and the butting portion 2214 may be formed integrally or in split. Under the pressing of the pressing portion 2212, one end of the butting portion 2214 butts against a sticking protrusion 2215 of the handle of the cleaning device, thereby unlocking the handle 23 of the cleaning device from the device body 22, and allowing the handle to be detached by the user. Compared with the common method for providing a jack in the main body and triggering the detachment by using a tool (such as a pin) of a specific shape, the detachment above can be achieved directly by pressing, which is easy to operate. Moreover, the pressing portion 2212 is disposed on the back of the clean water tank, such that false triggering can be prevented during use. Optionally, a return spring 2216 for elastic return may be provided between the butting portion 2214 and the bottom of the pressing chamber 2213.

[0080] In the related art, when the cleaning device is working, water in the clean water tank is pumped by a water pump and then dispensed to a brush head or a surface to be cleaned. Ideally, water needs to be evenly distributed on the brush head or the surface to be cleaned. However, due to different water pressures, existing waterway structures cannot not evenly distribute the water on the brush heads or the surfaces to be cleaned. As a result, some brush heads or surfaces to be cleaned have partially excessive water, leading to waste of water resources; or some brush heads or surfaces to be cleaned have partially insufficient water, making it impossible to ensure the cleanliness of the floor.

[0081] In some embodiments of the present disclosure, a cleaning device is provided. In the cleaning device, a liquid dispensing connector is configured in the structure of a liquid supply pipeline of a cleaning base and is provided with a plurality of liquid outlets, and the closer the liquid outlets to the liquid inlet are, the larger the calibers of the liquid outlets are, such that the flow rate of water flowing from the plurality of liquid outlets is as uniform as possible, and the liquid is uniformly dispensed to the brush heads or the surfaces to be cleaned.

[0082] Specifically, as shown in FIG. 15, the cleaning device includes a device housing, which includes a cleaning base 21 and a device body 22. The cleaning base 21 and the device body 22 are pivotally connected; the cleaning base 21 is internally provided with the cleaning brushroll 211, which rotate to clean the floor. The cleaning brushroll may be installed by rotatable clamping. Specifically, an end cover is provided at the end of the cleaning brushroll. When the cleaning brushroll is fully inserted into a drive end, the end cover may be rotated in a clamping direction to achieve the clamped connection between the cleaning brushroll and the cleaning base 21; and the end cover may be rotated in a release direction opposite to the clamping direction to release the clamped connection between the cleaning brushroll and the cleaning base 21. When the cleaning device performs cleaning work, if the rotation direction of the cleaning brushroll is opposite to the clamping direction of the end covers thereof, it is likely to release the cleaning brushroll during the cleaning work, bringing the risk of fall-off of the cleaning brushroll. Therefore, the clamping direction of the cleaning brushroll may be configured as the rotation direction during the cleaning work, so as to prevent the cleaning brushroll from being released and falling off in the routine work.

[0083] The cleaning device further includes a liquid supply system, which includes a liquid storage apparatus, a liquid supply pipeline, a liquid supply power source and a liquid distributor. The liquid storage apparatus is configured to store a cleaning liquid, and may be implemented by means of 1, 2 or more containers, or by means

of a container having 2 or more chambers therein, or by means of a combinational solution of the aforementioned containers. The liquid supply power source is an apparatus that supplies power to the flow of the cleaning liquid, for example, a water pump. The liquid distributer is an apparatus that dispenses the cleaning liquid to the cleaning brushroll and/or a surface to be cleaned. The liquid supply pipeline is a pipeline allowing the cleaning liquid to flow from the liquid storage apparatus to the liquid distributer under the action of power supplied by the liquid supply power source.

[0084] In some embodiments, the liquid storage apparatus has 2 or more containers or chambers, with at least one container or chamber configured to accommodate clean water, and with the remaining containers or chambers configured to accommodate a cleaning agent or a solvent that enhances the cleaning effect. Specifically, as shown in FIG. 1, the clean water tank 26 is disposed on the device body 22 and is configured to accommodate clean water. As shown in FIG. 16, the cleaning base 21 is internally provided with a cleaning agent box 214 and is configured to accommodate the cleaning agent. The clean water and the cleaning agent are mixed in the liquid supply pipeline and then distributed to the cleaning brushroll 211 and/or the surface to be cleaned through the liquid distributer. Since the structure of the liquid distributer needs to correspond to the cleaning brushroll 211 to ensure uniform water distribution, the liquid distributer includes 4 liquid inlets. Specific to the liquid inlet structure of the liquid distributer, the liquid supply pipeline in the cleaning base 21 includes a liquid dispensing connector 215, which is configured to dispense the cleaning liquid obtained by mixing the clean water and the cleaning agent. The liquid dispensing connector 215 includes a liquid inlet 21511 allowing the inflow of the mixed cleaning liquid, and at least two liquid outlets. The closer the liquid outlet in the at least two liquid outlets to the liquid inlet is, the larger the caliber of the liquid outlet is.

[0085] In some embodiments, as shown in FIG. 17, the liquid dispensing connector 215 includes: a main liquid pipe 2151. The first end of the main liquid pipe is provided with the liquid inlet 21511 allowing the inflow of the mixed cleaning liquid, and the second end of the main liquid pipe is of a closed structure 21512. Branched liquid pipes 2152 are approximately perpendicularly communicated to the main liquid pipe 2151, and each of the branched liquid pipes 2152 includes one liquid outlet. In some embodiments, the branched liquid pipes 2152 have substantially the same outer diameter and different inner diameters. "Substantially the same", for example, means that the difference between two values is less than or equal to 15% (for example, the larger of the two values is taken as a reference value), for example, 5%. In some embodiments, the branched liquid pipes 2152 include a first branched liquid pipe 21521, a second branched liquid pipe 21522, a third branched liquid pipe 21523, and a fourth branched liquid pipe 21524, which are arranged sequentially in a direction from the first end to the second end of the main liquid pipe 2151. The first branched liquid pipe 21521 is for delivery to a first brushroll through a second liquid pipe 2142; the second branched liquid pipe 21522 is for delivery to a second brushroll through a third liquid pipe 2143; the third branched liquid pipe 21523 is for delivery to a third brushroll through a fourth liquid pipe 2144; and the fourth branched liquid pipe 21524 is for delivery to the first brushroll through a fifth liquid pipe 2145. The first branched liquid pipe 21521, the second branched liquid pipe 21522, the third branched liquid pipe 21523, and the fourth branched liquid pipe 21524 are arranged in an order of decreasing inner diameters. In some embodiments, the inner diameter of the first branched liquid pipe 21521 is 1.35-1.45 mm; the inner diameter of the second branched liquid pipe 21522 is 1.25-1.35 mm; the inner diameter of the third branched liquid pipe 21523 is 1.15-1.25 mm; and the inner diameter of the fourth branched liquid pipe 21524 is 1.05-1.15 mm. Since the second end of the main liquid pipe 2151 has the closed structure, the hydraulic pressure in the main liquid pipe 2151 increases in a direction from the first end to the second end. With the design that the first branched liquid pipe 21521, the second branched liquid pipe 21522, the third branched liquid pipe 21523, and the fourth branched liquid pipe 21524 are arranged in an order of decreasing inner diameters, the uniform volumes of liquid flowing from the first branched liquid pipe 21521, the second branched liquid pipe 21522, the third branched liquid pipe 21523, and the fourth branched liquid pipe 21524 can be ensured, thereby guaranteeing that the volumes of the liquid acquired by the first brushroll, the second brushroll, and the third brushroll are substantially equivalent, such that higher uniformness is achieved when the brushroll scrub the floor, and the dirt does not remain due to excessive liquid.

[0086] In some embodiments, as shown in FIG. 18, the cleaning base 21 further includes a first brushroll accommodation portion 216 configured for assembling of the first brushroll, a second brushroll accommodation portion 217 configured for assembling of the second brushroll, and a third brushroll accommodation portion 218 configured for assembling of the third brushroll. The liquid outlets of the liquid dispensing connector 215 dispense the cleaning liquid through the liquid pipes to the first brushroll, the second brushroll, and the third brushroll. For example, the first branched liquid pipe 21521 is for delivery to the first brushroll through the second liquid pipe 2142; the second branched liquid pipe 21522 is for delivery to the second brushroll through the third liquid pipe 2143; the third branched liquid pipe 21523 is for delivery to the third brushroll through the fourth liquid pipe 2144; and the fourth branched liquid pipe 21524 is for delivery to the first brushroll through the fifth liquid pipe 2145. As an example, the first brushroll is independently disposed in the width direction of the cleaning base 21, and the second brushroll and the third brushroll are

disposed adjacent to each other in the width direction of the cleaning base 21. That is, the lengths of the second and third brushrolls are approximately equivalent to the length of the first brushroll. Under the drive of a motor, the first brushroll, the second brushroll and the third brushroll rotate to clean the floor.

[0087] In some embodiments, as shown in FIG. 18 to FIG. 19, the first brushroll accommodation portion 216 includes a first scraper 2161 and a second scraper 2162. The first scraper extends in the length direction of the first brushroll, and approximately matches the length of the first brushroll. That is, the first scraper 2161 extends from one end to the other end of the first brushroll in a direction parallel to the first brushroll. The first scraper 2161 is configured to scrape dirty substances on the first brushroll. Similarly, the second and third brushrolls are also provided with scrapers with the same effect at the corresponding positions near the inlet of the wastewater suction channel. The second scraper 2162 extends in the length direction of the first brushroll, and partially matches the first brushroll. Optionally, the second scraper 2162 is approximately located in the center position of the first brushroll in the length direction. The drive device for the second and third brushrolls is located in the center position, resulting in more water marks remained on the center position of the cleaned surface covered by the brushrolls when the cleaning device 20 is pulled backward (i.e., in a direction opposite to the X-direction); and while, by providing the second scraper 2162, the water marks remained on the weak position (center position) of the cleaned surface covered by the brushrolls can be reduced. The second brushroll accommodation portion 217 includes a third scraper 2171, which extends in the length direction of the second brushroll and partially matches the second brushroll. Optionally, the third scraper 2171 is disposed at the outer edge of the second brushroll accommodation portion 217. The third brushroll accommodation portion 218 includes a fourth scraper 2181, which extends in the length direction of the third brushroll and partially matches the third brushroll. Optionally, the fourth scraper 2181 is disposed at the outer edge of the third brushroll accommodation portion 218 to reduce the water marks remained on a position (an edge position) where the brushroll insufficiently covers the cleaned surface. The drive device for the first brushroll is located at the edge of the first brushroll, resulting in more water marks remained on the edge position of the cleaned surface covered by the brushroll when the cleaning device 20 is pulled backward (i.e., the X-direction), and while, by providing the third scraper 2171 and the fourth scraper 2181, the water marks remained on the position (the edge position) where the brushroll insufficiently covers the cleaned surface can be reduced.

[0088] The first scraper 2161 approximately matches the length of the first brushroll. For example, the difference between the length of the first scraper 2161 and the length of the first brushroll is less than or equal to 15% (for example, the larger of the two length values is taken as the reference value), for example, 5%.

[0089] In some embodiments, the bottom surface of the cleaning base 21 is further provided with a wiper (not shown in the figure) that interferes with and wipes the surface to be cleaned. The wiper is located near the rear side (in the X direction) of the first brushroll, and may be fixedly or movably (for example, pivotally, elastically or highly adjustably) connected to the cleaning base 21. The length of the wiper may correspond to the length of the first brushroll. For example, the wiper and the first brushroll have the same length.

[0090] In some embodiments, as shown in FIG. 20, the cleaning base 21 further includes a wastewater suction channel 2223, which is configured to convey wastewater drawn from among the first brushroll, the second brushroll and the third brushroll, to the wastewater tank 25. The inlet of the wastewater suction channel is disposed between the first brushroll and the second and third brushrolls (as shown by the arrow in FIG. 20), extends to the tops of the brushrolls, then bends backward (i.e., towards the device body 22, and opposite to the X-direction) for approximately 90 degrees, extends to the device body, bends upward for about 90 degrees, and then enters the wastewater tank. With the running direction design of the wastewater suction channel, the positional relationship with an angle of slightly less than 90 degrees can be achieved in the X-direction between the device body 22 and the cleaning base 21, such that the upright locking function of the cleaning device can be achieved.

[0091] In some embodiments, as shown in FIG. 15, the cleaning base 21 further includes freely rotatable front bumper rollers 212 located on two sides of the front edge of the cleaning base 21. During the cleaning operation, if the cleaning base 21 collides an obstacle, for example, furniture or a wall, the rollers rotate for cushioning to reduce the collision force, thereby avoiding damage to the cleaning device and the object being collided.

[0092] In the embodiment of the present disclosure, the liquid dispensing connector is configured in the structure of the liquid supply pipeline of the cleaning base and is provided with a plurality of liquid outlets, and the closer the liquid outlet to the liquid inlet is, the larger the caliber of the liquid outlet is, such that the flow rate of liquid flowing from the plurality of liquid outlets is as uniform as possible, and the volumes of liquid dispensed to the brush heads or the surface to be cleaned is as uniform as possible. In addition, the scrapers are provided on positions where the covering by the brushroll is relatively insufficient, so as to scrape the wastewater on the surface of the brushroll, thereby avoiding excessive water marks remained on these positions.

[0093] As shown in FIG. 21, a cleaning system 100 is further provided by the present disclosure, and includes: a station 10 and the cleaning device 20 in the foregoing embodiments. The station 10 is configured to support the cleaning device 20.

[0094] FIG. 22 is a schematic explosive structural diagram of the station 10 according to some embodiments of

the present disclosure. As shown in FIG. 22, in some embodiments of the present disclosure, a station 10 is provided, and is configured to support the cleaning device and dry the cleaning parts of the cleaning device. The cleaning device is, for example, a floor scrubber, and the cleaning parts are, for example, cleaning brushrolls of the floor scrubber. The floor scrubber may be put back into the station 10 for support after the cleaning work is down, and various operations (including charging, self-cleaning, drying cycle or the like) may be performed on the station.

[0095] As shown in FIG. 22, the station 10 includes a housing 12, which has an accommodation space 13. For example, the housing 12 includes a bottom plate 11 and an upper shell buckled on the bottom plate 11, and the bottom plate 11 and the upper shell define the accommodation space 13. The bottom plate 11 and the upper shell may be detachable assembled parts, or may be integrally formed. The station 10 further includes a fan 14 of the station. The fan is disposed in the accommodation space 13, and is configured to produce dry air in the accommodation space 13. The housing 12 is provided with an air outlet 123 of the station. The air outlet is configured to dock with the air outlet at the bottom of the device body 22 of the cleaning device, for example, the floor scrubber.

[0096] The device air duct of the cleaning device is configured to allow the wastewater to flow into the wastewater tank and transport moist air, when the cleaning device performs the cleaning operation. When the cleaning device is put back to the station, the air outlet of the station may dock with the air outlet of the device air duct of the cleaning device. Under the action of the fan of the station, dry air enters the cleaning device from the air outlet of the cleaning device, and reaches the cleaning brushroll of the cleaning device along the device air duct of the cleaning device, to dry the cleaning brushroll of the cleaning device. Meanwhile, since the device air duct passes the wastewater tank of the cleaning device, the dry air can flow through the wastewater tank of the cleaning device to dry the inner wall of the wastewater tank, thereby avoiding long-term moistening and fouling of the wastewater tank and the device air duct.

[0097] In some embodiments of the present disclosure, a cleaning device is provided. The cleaning device includes:

a cleaning base configured to be applicable to moving on a surface to be cleaned; and
a device body extending longitudinally in a first direction and pivotally connected to the cleaning base, the device body including:

a wastewater tank detachably assembled on one side of the device body;
a power source assembled on another side of the device body, a direction from one side to the another side of the device body being approximately perpendicular to the first direction;
a first air duct communicating the wastewater tank to an air inlet of the power source; and
a second air duct communicating an air outlet of the power source to an air outlet of the cleaning device,

wherein in response to the turn-on of the power source, a working airflow sequentially flows through the cleaning base, the wastewater tank, the first air duct, the power source, the second air duct and the air outlet of the cleaning device for discharge.

[0098] In an optional embodiment, the air inlet of the power source is above the air outlet of the power source.

[0099] In an optional embodiment, the wastewater tank includes:

a wastewater tank body, including: a wastewater pipeline extending along a bottom surface of the wastewater tank body towards an opening of the wastewater tank body; and
a cover bracket detachably connected to the wastewater tank body and extending in the first direction, wherein the cleaning device is configured to enable the working airflow to enter the wastewater tank body through the wastewater pipeline, then pass through the cover bracket, and then enter the first air duct through a top end of the wastewater tank.

[0100] In an optional embodiment, the cover bracket includes:
a first support frame extending in a longitudinal direction of the wastewater tank body, wherein the first support frame is provided with a filter window, and the cleaning device is configured to enable the working airflow to pass through the filter window after entering the wastewater tank body, and then enter the first air duct through the top end of the wastewater tank.

[0101] In an optional embodiment, the cover bracket further includes:
a filter assembly disposed at an end of the cover bracket adjacent to the opening of the wastewater tank body, the filter assembly being configured to enable the working airflow to enter the first air duct through the wastewater pipeline, the filter window, and the filter assembly.

[0102] In an optional embodiment, the second air duct is disposed between the power source and the wastewater tank.

[0103] In an optional embodiment, the second air duct extends in the first direction of the device body to approach the cleaning base, bends in reverse and is then communicated to the air outlet of the cleaning device.

[0104] In an optional embodiment, the cover bracket further includes:
a filter screen extending approximately in an extension direction of the first support frame.

[0105] In an optional embodiment, the air outlet of the

cleaning device includes a plurality of through holes.

[0106] In some embodiments of the present disclosure, a cleaning device is provided. The cleaning device includes:

a device housing, including:

a cleaning base configured to be applicable to moving on a surface to be cleaned, and

a device body extending longitudinally in a first direction and pivotally connected to the cleaning base; and

a device air duct configured to form a flow path for a working airflow,

wherein the device air duct is at least composed of a wastewater suction nozzle, a wastewater tank and a power source, and when the power source is turned on, the working airflow sequentially flows through the wastewater suction nozzle, the wastewater tank and the power source; and

the device air duct includes a front air duct and a rear air duct, which are disposed in front of and behind an air outlet of the wastewater tank, respectively, and an overall flow direction of the working airflow in the front air duct is opposite to that of the working airflow in the rear air duct.

[0107] In an optional embodiment, the rear air duct includes:

a first air duct communicating an air outlet of the wastewater tank to an air inlet of the power source; and

a second air duct communicating an air outlet of the power source to an air outlet of the cleaning device, wherein in response to the turn-on of the power source, the working airflow sequentially flows through the first air duct, the power source and the second air duct approximately from the top down.

[0108] In an optional embodiment, the front air duct includes:

a wastewater pipeline extending longitudinally in the first direction,

wherein in response to the turn-on of the power source, the working airflow flows along the wastewater pipeline approximately from the bottom up.

[0109] In an optional embodiment, the front air duct further includes:

a filter window, wherein the working airflow flows along the wastewater pipeline, the filter window and the air outlet of the wastewater tank approximately from the bottom up.

[0110] In an optional embodiment, the front air duct further includes:

a filter assembly disposed on the air outlet of the wastewater tank, wherein the working airflow flows along the wastewater pipeline, the filter window and the filter assembly approximately from the bottom up.

[0111] In an optional embodiment, the working airflow flows in the second air duct in a direction approximately from the top down.

[0112] In an embodiment of the present disclosure, a cleaning device is further provided. The cleaning device includes:

a cleaning base configured to be applicable to moving on a surface to be cleaned, the cleaning base including a wastewater suction nozzle; and

a device body extending longitudinally in a first direction and pivotally connected to the cleaning base, the device body including:

a power source configured to generate a movable working airflow after turn-on, and

a wastewater tank configured to accommodate wastewater recycled from a cleaned surface,

wherein a flow path of the working airflow sequentially passes through the wastewater suction nozzle, the wastewater tank and the power source, and the working airflow contains the wastewater, which is collected and accommodated by the wastewater tank; and

the power source includes an air inlet and an air outlet, and the working airflow enters the power source from the air inlet which is in the first direction and faces a direction away from the cleaning base.

[0113] In an optional embodiment, the device body further includes:

a first air duct communicating the wastewater tank to an air inlet of the power source; and

a second air duct communicating an air outlet of the power source to an air outlet of the cleaning device, wherein in response to the turn-on of the power source, a working airflow sequentially flows through the cleaning base, the wastewater tank, the first air duct, the power source and the second air duct, and is discharged from the air outlet of the cleaning device.

[0114] In an optional embodiment, the wastewater tank includes:

a wastewater tank body, including: a wastewater pipeline extending along a bottom surface of the wastewater tank body towards an opening of the wastewater tank body; and

a cover bracket detachably connected to the wastewater tank body,

wherein the working airflow enters the wastewater tank body through the wastewater pipeline, then passes through the cover bracket and then enters

the first air duct through the air outlet of the wastewater tank.

[0115] In an optional embodiment, the cover bracket includes:
a first support frame extending in a longitudinal length direction of the wastewater tank body, wherein the first support frame is provided with a filter window, and the working airflow passes through the filter window after entering the wastewater tank body, and then enters the first air duct through the air outlet of the wastewater tank.
[0116] In an optional embodiment, the cover bracket further includes:
a filter assembly disposed at an end of the cover bracket adjacent to the opening of the wastewater tank body, the filter assembly being configured to enable the working airflow to enter the first air duct through the wastewater pipeline, the filter window, and the filter assembly.
[0117] In an optional embodiment, the second air duct is formed from a space among the components in the cleaning device.
[0118] In some embodiments of the present disclosure, a washing system is provided. The washing system includes:

a station; and
a cleaning device described in any of the above embodiments, the station being configured to support the cleaning device.

[0119] In some embodiments of the present disclosure, a cleaning device is provided. The cleaning device includes:

a device body extending longitudinally in a first direction, the device body including:

a clean water tank accommodation portion configured to accommodate a clean water tank, the clean water tank accommodation portion including:
a first chassis configured to bear the clean water tank, wherein the first chassis includes at least one first liquid leakage port; and
a wastewater tank accommodation portion configured to accommodate a wastewater tank, the wastewater tank accommodation portion including:
a side wall of the wastewater tank accommodation portion, the side wall extending in the first direction,

wherein the first liquid leakage port and the side wall of the wastewater tank accommodation portion are fluidically communicated, and configured to discharge a liquid in the first chassis via the first liquid leakage port and the side wall of the wastewater tank accommodation portion.

[0120] In an optional embodiment, the side wall of the wastewater tank accommodation portion is provided with a liquid guide groove, and the first liquid leakage port and the liquid guide groove are fluidically communicated, and configured to discharge a liquid in the first chassis via the first liquid leakage port and the liquid guide groove.
[0121] In an optional embodiment, the device body further includes:
a water receiving structure connected to the first chassis and the side wall of the wastewater tank accommodation portion, wherein the water receiving structure is configured to discharge a liquid in the first chassis via the first liquid leakage port, the water receiving structure and the side wall of the wastewater tank accommodation portion.
[0122] In an optional embodiment, the water receiving structure includes:

a water receiving structure body; and
water receiving grooves disposed on two sides of the water receiving structure body, wherein the water receiving grooves are configured to enable the liquid in the first chassis to flow into the water receiving grooves via the first liquid leakage port.

[0123] In an optional embodiment, the water receiving groove includes:
a water receiving groove hole communicated to the side wall of the wastewater tank accommodation portion, wherein the water receiving groove hole is configured to enable the liquid flowing into the water receiving groove to flow out via the water receiving groove hole.
[0124] In an optional embodiment, the water receiving groove further includes:
an inclined bottom surface, in which the water receiving groove hole is disposed, wherein the inclined bottom surface is configured to enable the liquid flowing into the water receiving groove to flow out via the inclined bottom surface and the water receiving groove hole.
[0125] In an optional embodiment, the wastewater tank accommodation portion includes:
a second chassis connected to the side wall of the wastewater tank accommodation portion and configured to bear the wastewater water tank, wherein the second chassis includes at least one second liquid leakage port.
[0126] In an optional embodiment, the device body further includes:

a wastewater suction channel passing through the second chassis and communicated to the wastewater tank, the wastewater suction channel being configured to enable the sucked wastewater to enter the wastewater tank through the wastewater suction channel;
a flow guide channel communicating the second liquid leakage port to the wastewater suction channel, the flow guide channel being configured to enable the inflow liquid from the second liquid leakage port to flow into the wastewater suction channel

through the flow guide channel.

[0127] In an optional embodiment, the clean water tank accommodation portion includes:
a handle disassembly structure disposed on the side wall of the clean water tank accommodation portion, the handle disassembly structure being configured to release the handle of the cleaning device after being pressed.

[0128] In an optional embodiment, the handle disassembly structure includes:

a pressing portion disposed to fit the side wall of the clean water tank accommodation portion;
a butting portion connected to the pressing portion, the butting portion being configured to butt against a sticking protrusion of the handle of the cleaning device under the pressing of the pressing portion to release the handle of the cleaning device from the device body.

[0129] In some embodiments of the present disclosure, a cleaning device is provided. The cleaning device includes:

a device body extending longitudinally in a first direction, the device body including:

a clean water tank accommodation portion configured to accommodate a clean water tank, and
a wastewater tank accommodation portion configured to accommodate a wastewater tank;

a wastewater suction nozzle configured to enable wastewater from a cleaned surface to be sucked into an inlet of the cleaning device; and
a wastewater suction channel configured to fluidically communicated to the wastewater suction nozzle and the wastewater tank,
wherein the clean water tank accommodation portion and the wastewater tank accommodation portion are both fluidically communicated to the wastewater suction channel, such that a liquid accumulated in the clean water tank accommodation portion and in the wastewater tank accommodation portion is diverted to the wastewater suction channel to be recycled into the wastewater tank.

[0130] In an optional embodiment, the clean water tank accommodation portion includes:

a first chassis configured to bear the clean water tank, wherein the first chassis includes at least one first liquid leakage port; and
the wastewater tank accommodation portion, including:

a side wall of the wastewater tank accommodation portion, the side wall extending in the first direction,
wherein the first liquid leakage port and the side wall of the wastewater tank accommodation portion are connected, and configured to discharge a liquid to the wastewater suction channel through the first liquid leakage port and the side wall of the wastewater tank accommodation portion.

[0131] In an optional embodiment, the edge of the side wall of the wastewater tank accommodation portion is provided with a liquid guide groove, and the first liquid leakage port and the liquid guide groove are connected, and configured to discharge the liquid through the first liquid leakage port and the liquid guide groove.

[0132] In an optional embodiment, the device body further includes:
a water receiving structure connected to the first chassis and the side wall of the wastewater tank accommodation portion, the water receiving structure being configured to enable the liquid to be discharged through the first liquid leakage port, the water receiving structure and the side wall of the wastewater tank accommodation portion sequentially.

[0133] In an optional embodiment, the wastewater tank accommodation portion includes:
a second chassis connected to the side wall of the wastewater tank accommodation portion and configured to bear the wastewater water tank, wherein the second chassis includes at least one second liquid leakage port.

[0134] In an optional embodiment, the device body further includes:
a flow guide channel configured to communicate the second liquid leakage port, the side wall of the wastewater tank accommodation portion, and the wastewater suction channel, such that the liquid flows into the wastewater suction channel through the flow guide channel.

[0135] In an optional embodiment, the flow guide channel includes a liquid collection device.

[0136] In an optional embodiment, the device body further includes:
a flow guide channel, which is a pipeline structure connecting the second liquid leakage port with the wastewater suction channel.

[0137] In some embodiments of the present disclosure, a cleaning system is provided. The cleaning system includes:

a station; and
a cleaning device described in any of the above embodiments, the station being configured to support the cleaning device.

[0138] In some embodiments of the present disclosure, a cleaning device is provided. The cleaning device includes:

a device housing, including:

a device body extending longitudinally in a first direction, and
a cleaning base pivotally connected to the device body; and

a liquid supply system configured to supply a cleaning liquid to a cleaning brushroll and/or a surface to be cleaned, the liquid supply system including:

a liquid storage apparatus configured to store the cleaning liquid, and
a liquid supply pipeline, including:
a liquid dispensing connector configured to dispense the cleaning liquid, the liquid dispensing connector including:

a liquid inlet configured as an inlet for the cleaning liquid, and
at least two liquid outlets, wherein the closer the liquid outlet in the at least two liquid outlets to the liquid inlet is, the larger the caliber of the liquid outlet is.

[0139] In an optional embodiment, the liquid dispensing connector includes:

a main liquid pipe, a first end of which is an open liquid inlet, and the second end of which is of a closed structure; and
at least two branched liquid pipes, which are approximately perpendicularly communicated to the main liquid pipe, and each of which includes one liquid outlet.

[0140] In an optional embodiment, the at least two branched liquid pipes have substantially the same outer diameter and different inner diameters.

[0141] In an optional embodiment, the at least two branched liquid pipes include:
a first branched liquid pipe, a second branched liquid pipe, a third branched liquid pipe and a fourth branched liquid pipe, which are sequentially arranged in a direction from the first end to the second end of the main liquid pipe.

[0142] In an optional embodiment, the inner diameter of the first branched liquid pipe is 1.35-1.45 mm; the inner diameter of the second branched liquid pipe is 1.25-1.35 mm; the inner diameter of the third branched liquid pipe is 1.15-1.25 mm; and the inner diameter of the fourth branched liquid pipe is 1.05-1.15 mm.

[0143] In an optional embodiment, the cleaning base includes:

a first brushroll accommodation portion configured for assembling of a first brushroll;
a second brushroll accommodation portion configured for assembling of a second brushroll; and
a third brushroll accommodation portion configured for assembling of a third brushroll,
wherein the liquid outlet of the liquid dispensing connector dispenses the cleaning liquid to the first brushroll, the second brushroll and the third brushroll through the liquid pipe.

[0144] In an optional embodiment, the first brushroll accommodation portion includes:

a first scraper extending in the length direction of the first brushroll and approximately matching the length of the first brushroll; and
a second scraper extending in the length direction of the first brushroll and partially matching the first brushroll.

[0145] In an optional embodiment, the second brushroll accommodation portion includes:

a third scraper extending in the length direction of the second brushroll and partially matching the second brushroll; and/or
the third brushroll accommodation portion includes:
a fourth scraper extending in the length direction of the third brushroll and partially matching the third brushroll.

[0146] In an optional embodiment, the cleaning base further includes:
a wastewater suction channel configured to convey wastewater drawn from among the first brushroll, the second brushroll and the third brushroll.

[0147] In an optional embodiment, the cleaning base includes:
front bumper rollers arranged on two sides of the cleaning base.

[0148] In some embodiments of the present disclosure, a cleaning system is provided. The cleaning system includes:

a station; and
the cleaning device described in any of the above, the station being configured to support the cleaning device.

[0149] Finally, it should be noted that the embodiments in the Description are described in a progressive manner, each embodiment focuses on a feature that distinguishes it from other embodiments, and cross reference can be made for the same or similar parts between these embodiments. For the system or apparatus disclosed in the embodiments, it is described in a relatively simple manner since the system or apparatus corresponds to the method disclosed in the embodiments, and a reference can be made to the description in the method section for the relevant content.

[0150] The foregoing description provides exemplary

embodiments of the present disclosure, and the scope of the present disclosure cannot be limited thereby. That is, any equivalent changes and modifications made under the teaching of the present disclosure should remain within the scope covered by the present disclosure. Other embodiments of the present disclosure will become conceivable to those skilled in the art from consideration of the Description and practice of the present disclosure. The present disclosure is intended to cover any variations, uses, or adaptive changes of the present disclosure. These variations, uses, or adaptive changes follow the general principle of the present disclosure and include common general knowledge or conventional technical means in the technical field, which is not disclosed in the present disclosure. The Description and embodiments are considered to be illustrative only, and the scope and spirit of the present disclosure are defined by the claims.

Claims

1. A cleaning device, comprising:

a cleaning base, configured to be applicable to moving on a surface to be cleaned; and
a device body, extending longitudinally in a first direction and pivotally connected to the cleaning base, wherein the device body comprises:

a wastewater tank, detachably assembled on one side of the device body;
a power source, assembled on another side of the device body, wherein a direction from the one side to the another side of the device body is approximately perpendicular to the first direction;
a first air duct, communicating the wastewater tank to an air inlet of the power source; and
a second air duct, communicating an air outlet of the power source to an air outlet of the cleaning device,
wherein in response to turn-on of the power source, a working airflow sequentially flows through the cleaning base, the wastewater tank, the first air duct, the power source, the second air duct, and the air outlet of the cleaning device for discharge.

2. The cleaning device according to claim 1, wherein the air inlet of the power source is above the air outlet of the power source.

3. The cleaning device according to claim 1, wherein the wastewater tank comprises:

a wastewater tank body, comprising a wastewater pipeline extending along a bottom surface of the wastewater tank body towards an opening of the wastewater tank body; and
a cover bracket, detachably connected to the wastewater tank body and extending in the first direction,
wherein the working airflow enters the wastewater tank body through the wastewater pipeline, then passes through the cover bracket, and then enters the first air duct through a top end of the wastewater tank.

4. The cleaning device according to claim 3, wherein the cover bracket comprises:
a first support frame, extending in a longitudinal length direction of the wastewater tank body, wherein the first support frame is provided with a filter window, and the working airflow passes through the filter window after entering the wastewater tank body, and then enters the first air duct through the top end of the wastewater tank.

5. The cleaning device according to claim 4, wherein the cover bracket further comprises:
a filter assembly, disposed at an end of the cover bracket adjacent to the opening of the wastewater tank body, and configured to enable the working airflow to enter the first air duct through the wastewater pipeline, the filter window, and the filter assembly.

6. The cleaning device according to claim 1, wherein the second air duct is disposed between the power source and the wastewater tank.

7. The cleaning device according to claim 6, wherein the second air duct extends in the first direction of the device body to approach the cleaning base, bends in reverse and is then communicated to the air outlet of the cleaning device.

8. The cleaning device according to claim 4, wherein the cover bracket further comprises:
a filter screen, extending approximately in an extension direction of the first support frame.

9. The cleaning device according to claim 1, wherein the air outlet of the cleaning device is a plurality of through holes.

10. A cleaning system, comprising:

a station; and
the cleaning device of any one of claims 1 to 9, wherein the station is configured to support the cleaning device.

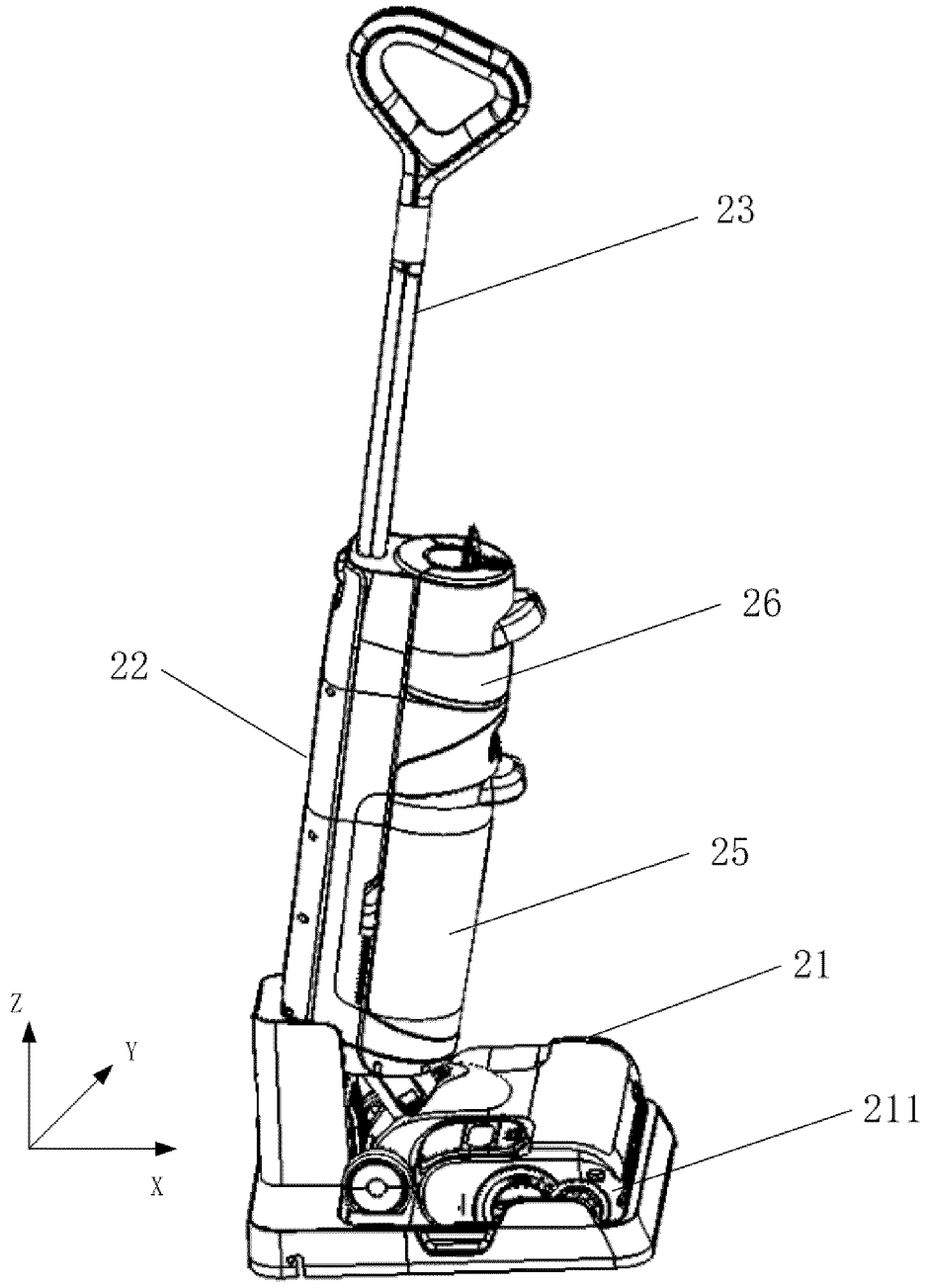


FIG. 1

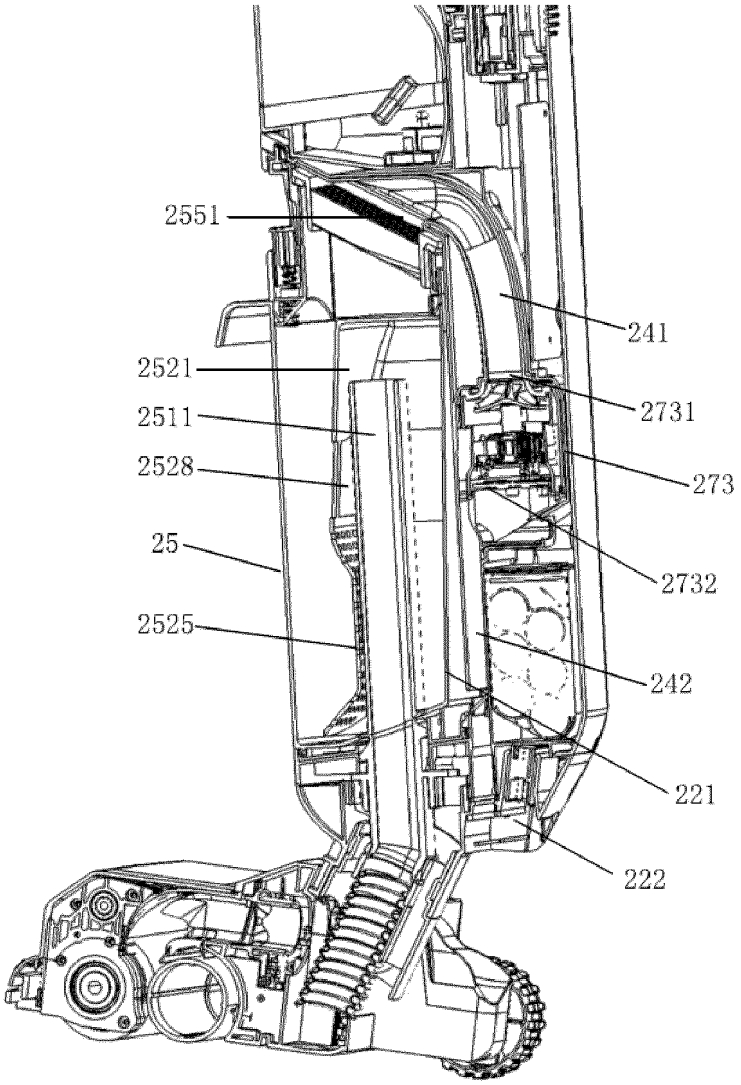


FIG. 2

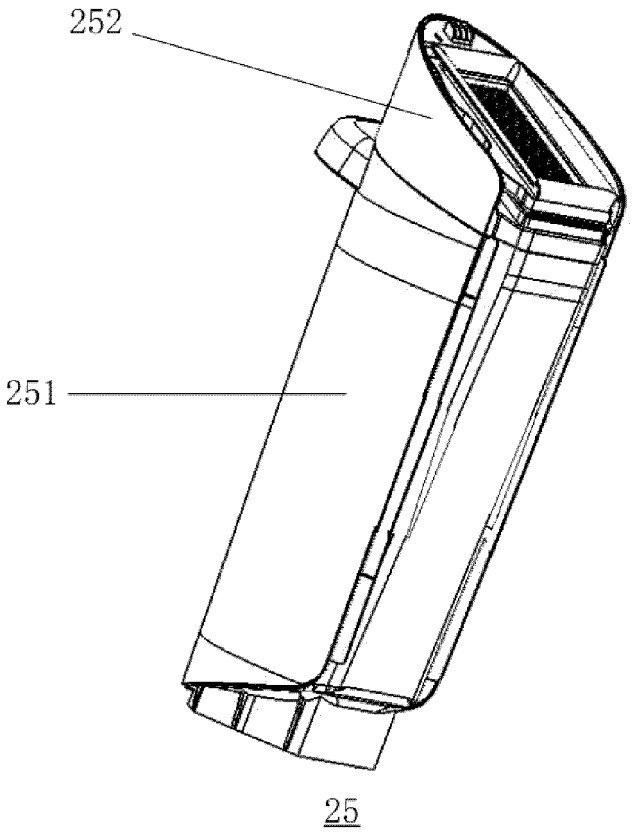


FIG. 3

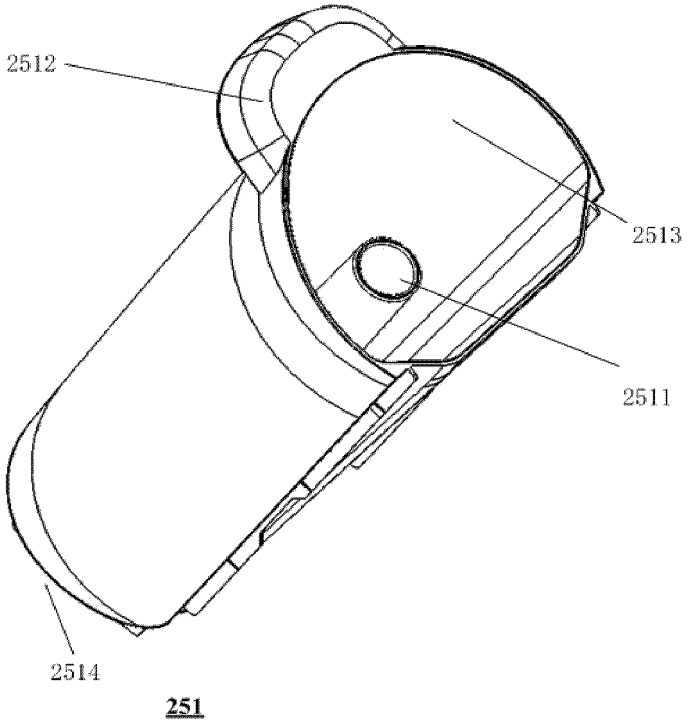
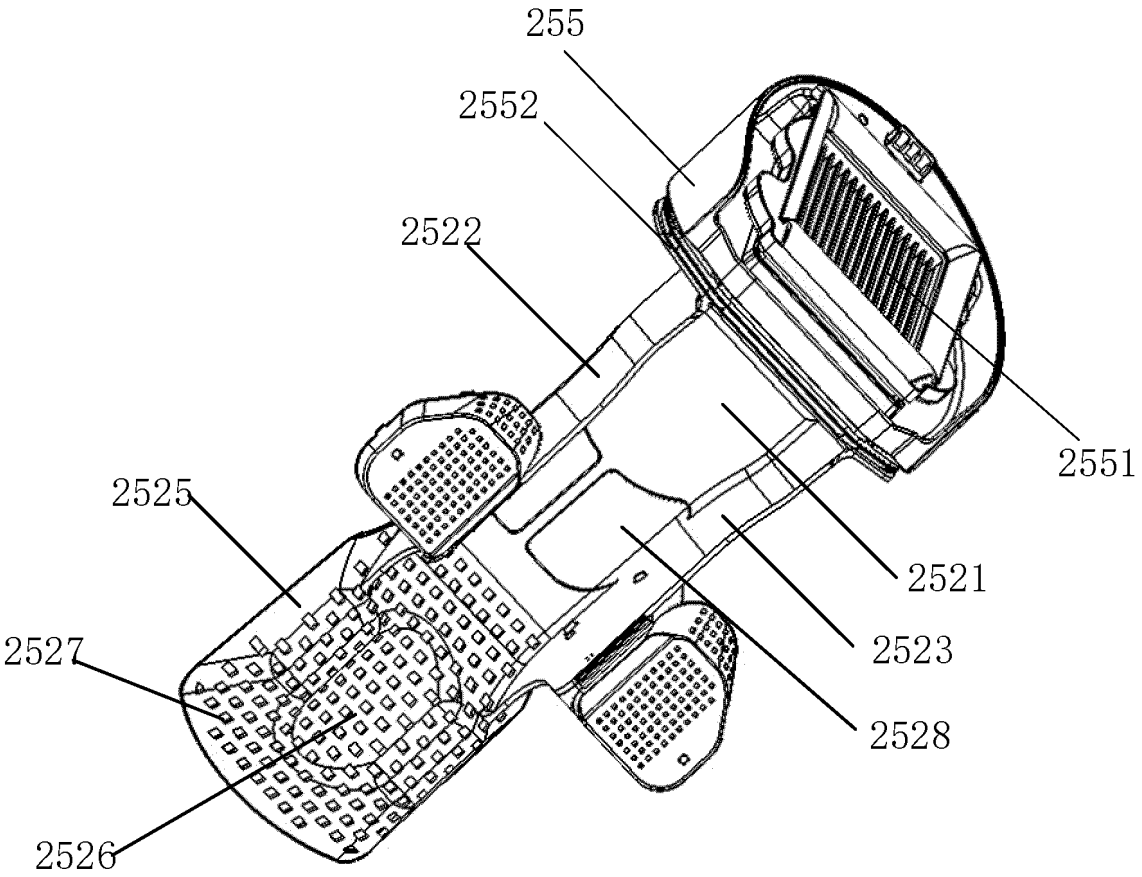


FIG. 4



252

FIG. 5

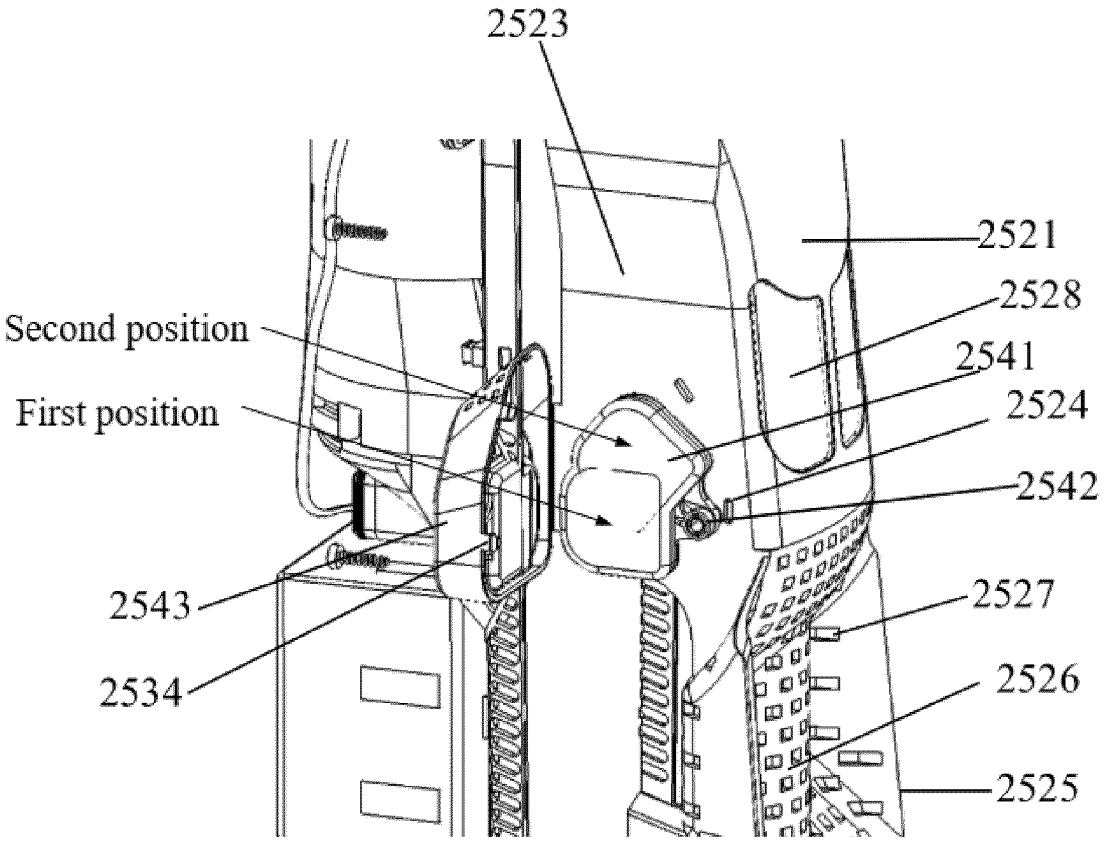

2523
2521
2528
2541
2524
2542
Second position
First position
2543
2534
2527
2526
2525

FIG. 6

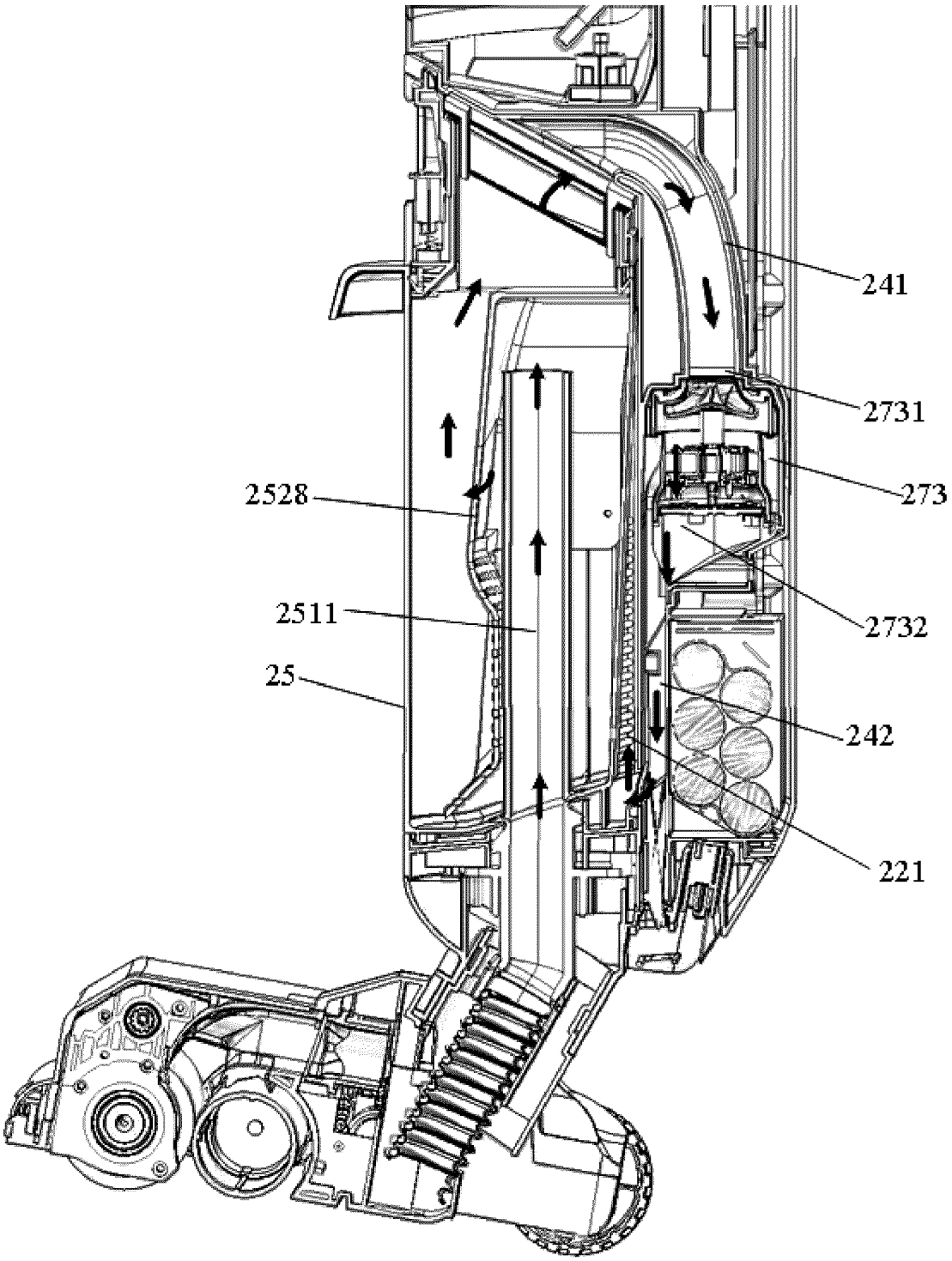


FIG. 7

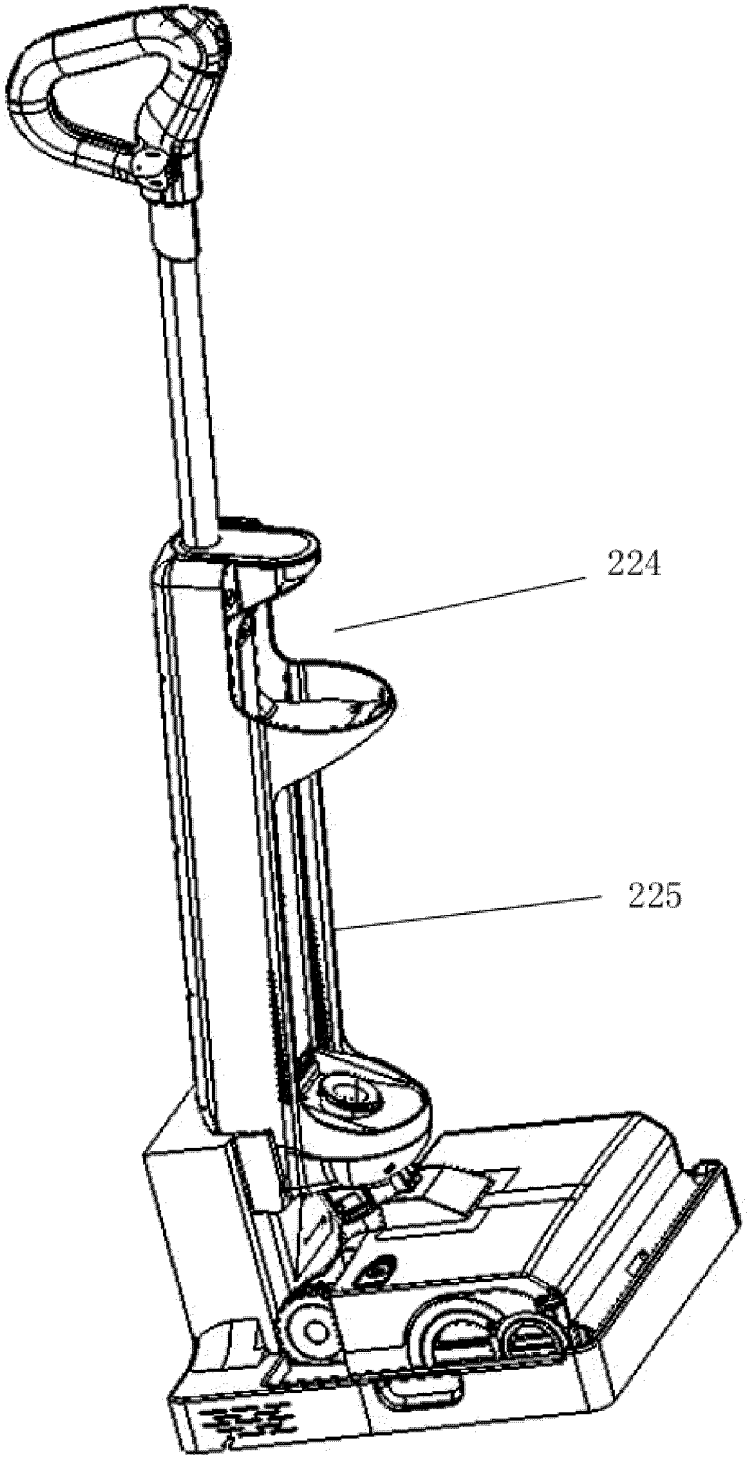


FIG. 8

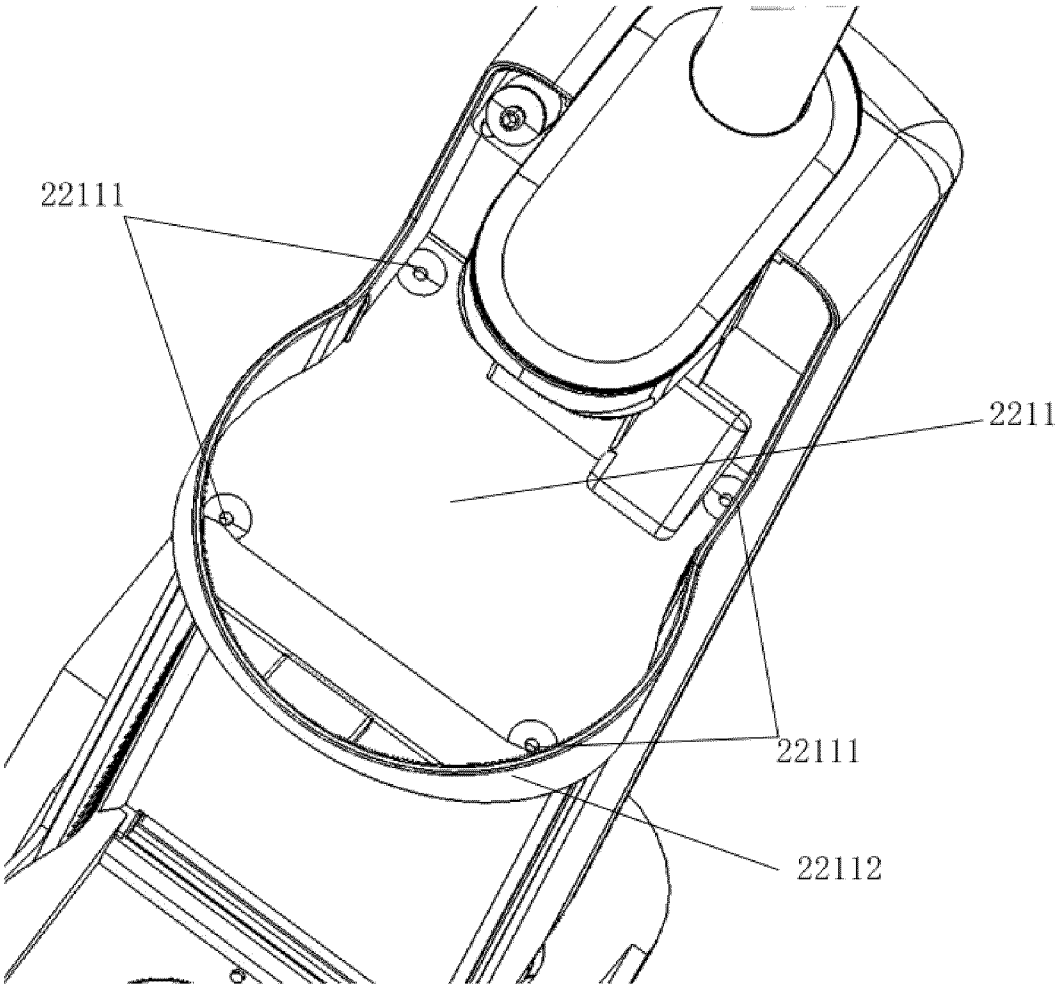


FIG. 9

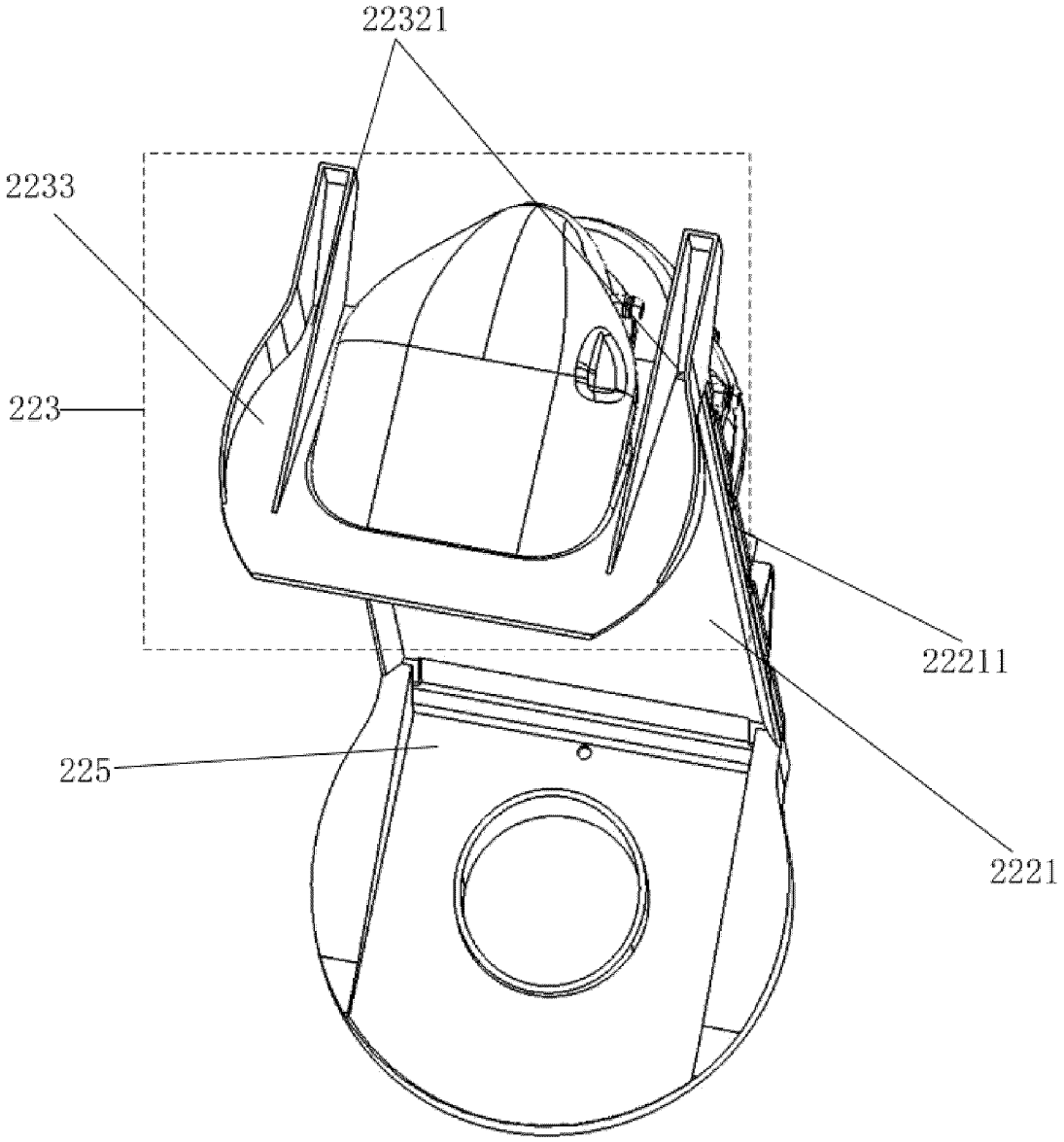


FIG. 10

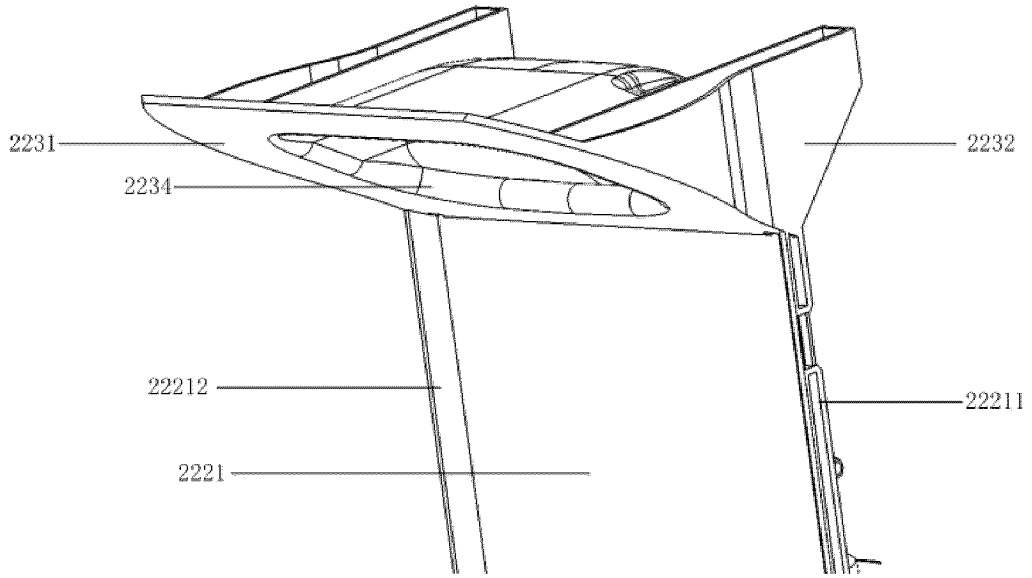

2231
2234
2232
22212
22211
2221

FIG. 11

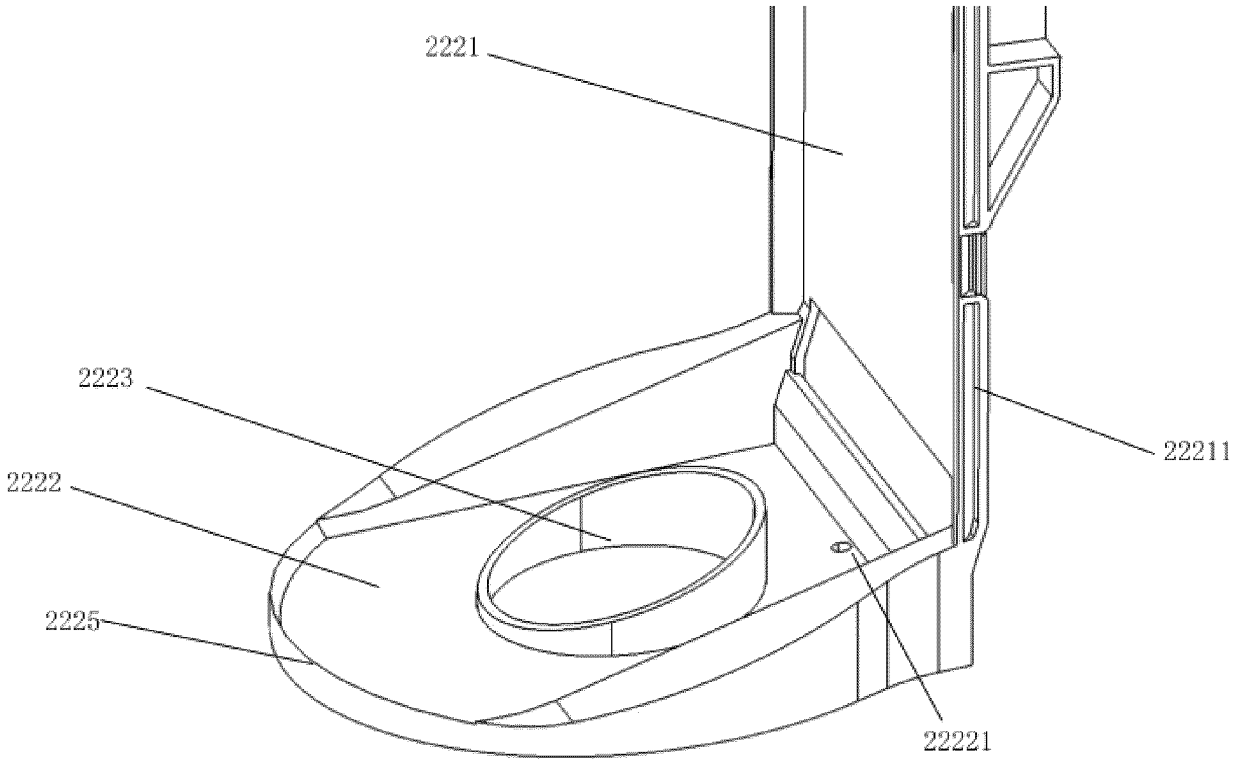

2221
2223
22211
2222
2225
22221

FIG. 12

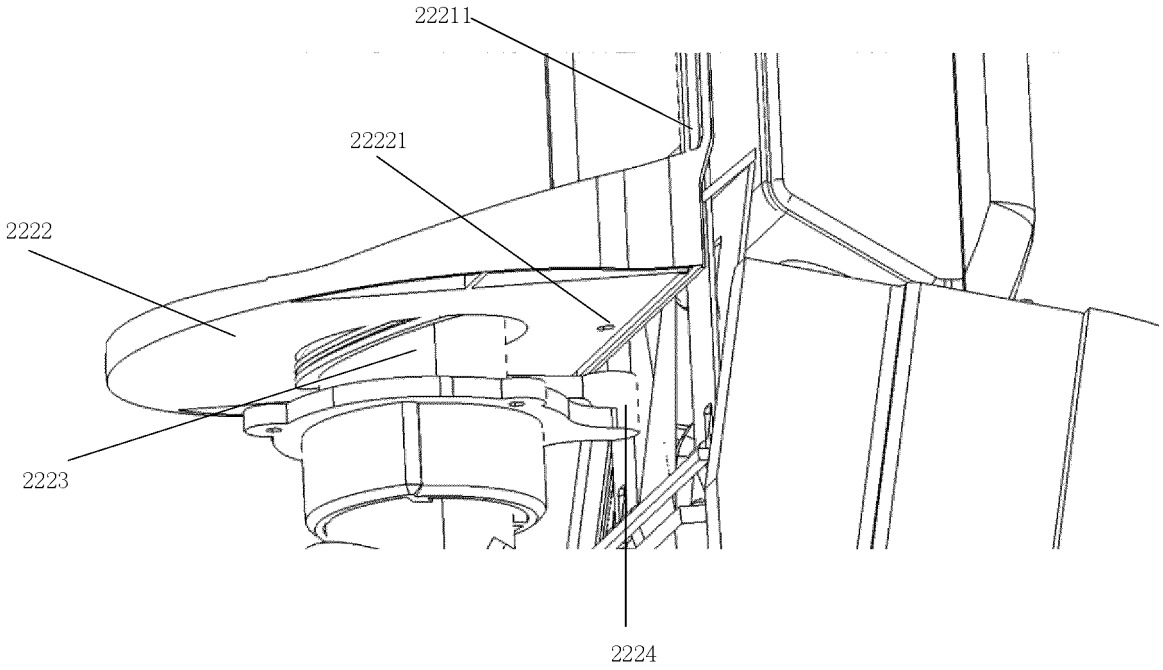


FIG. 13

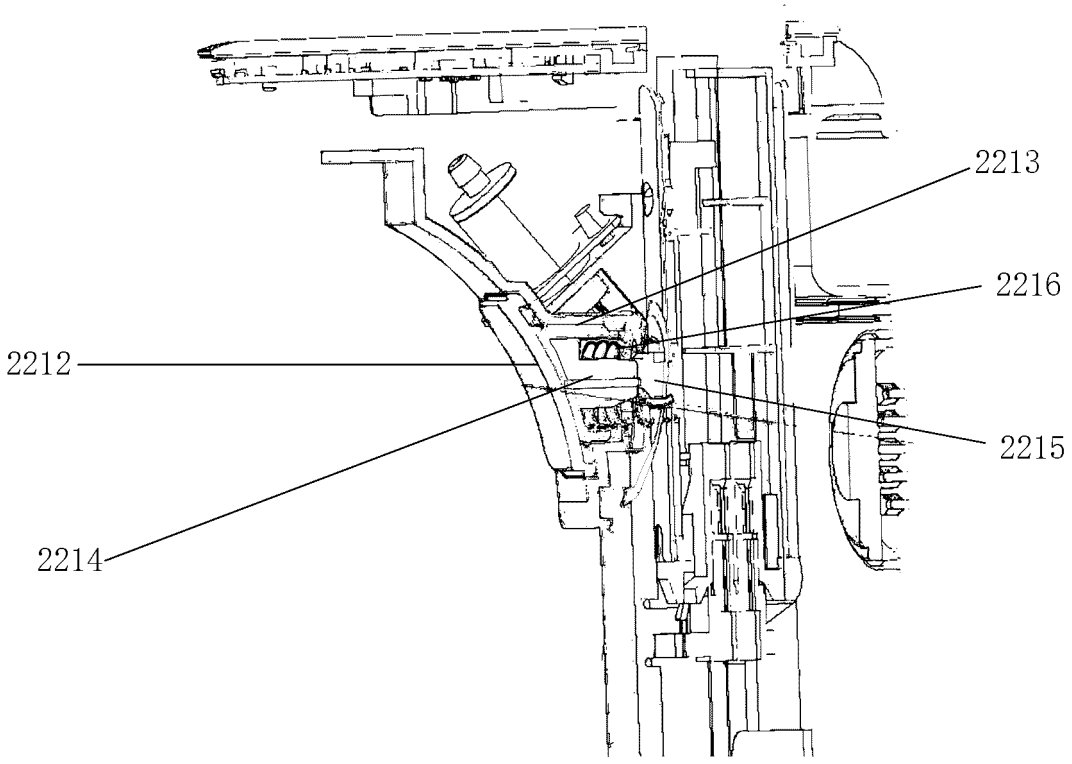


FIG. 14

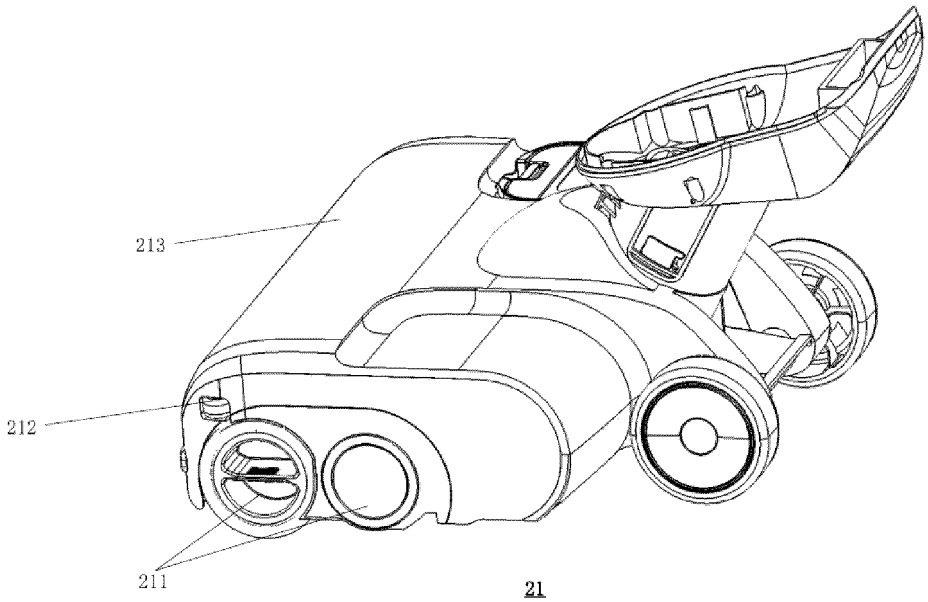


FIG. 15

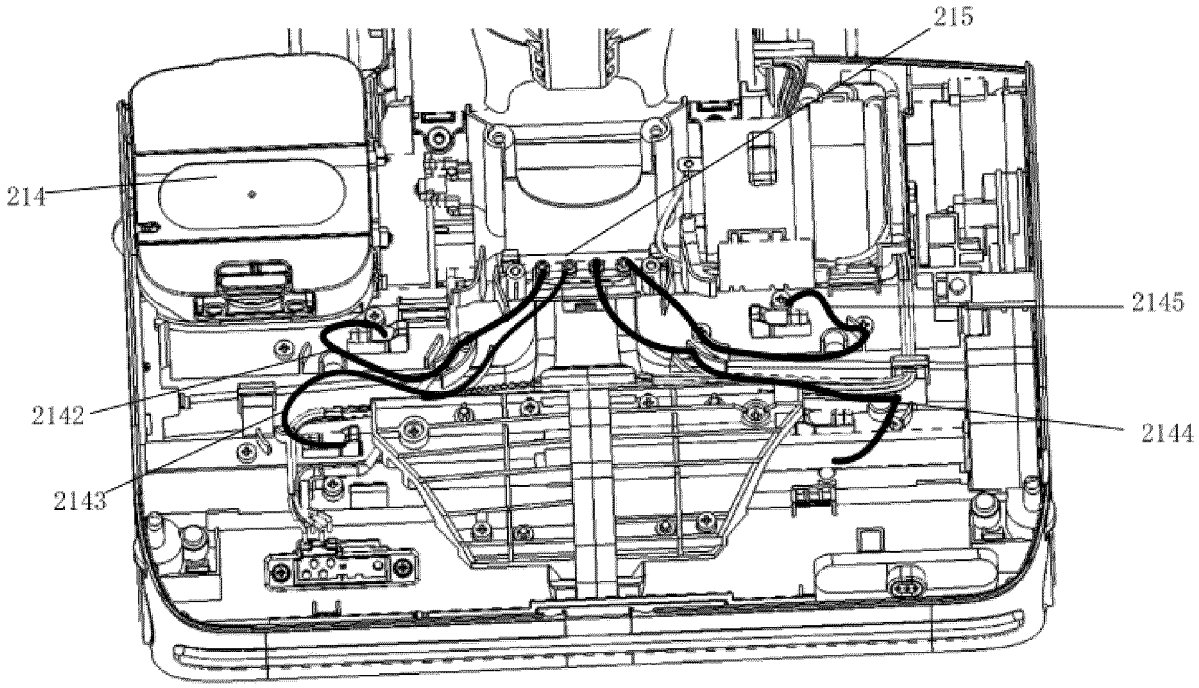


FIG. 16

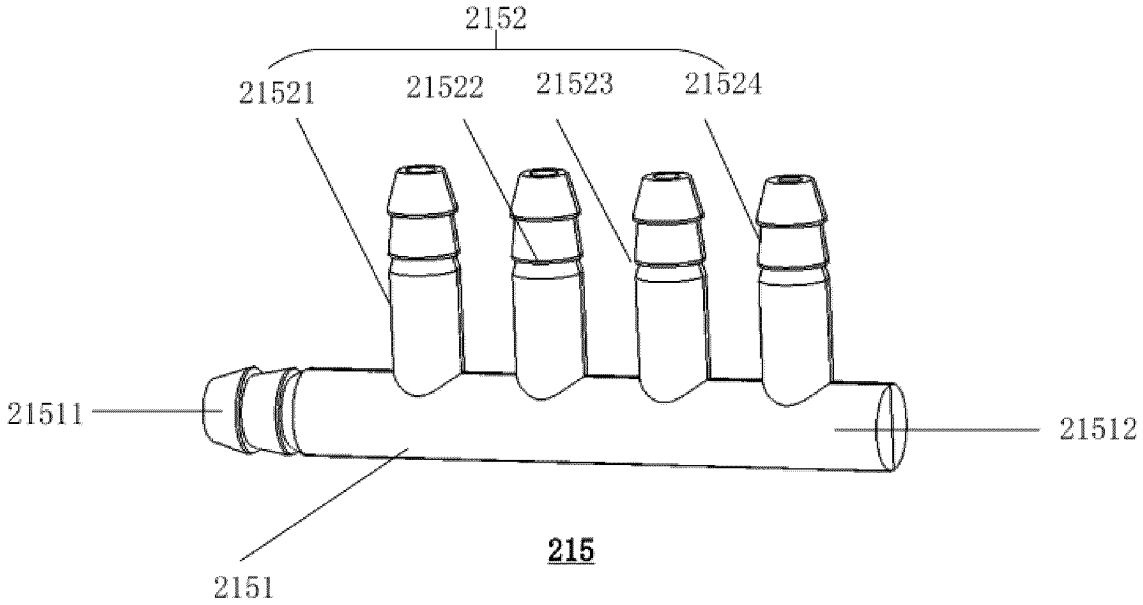

2152
21521
21522
21523
21524
21511
21512
215
2151

FIG. 17

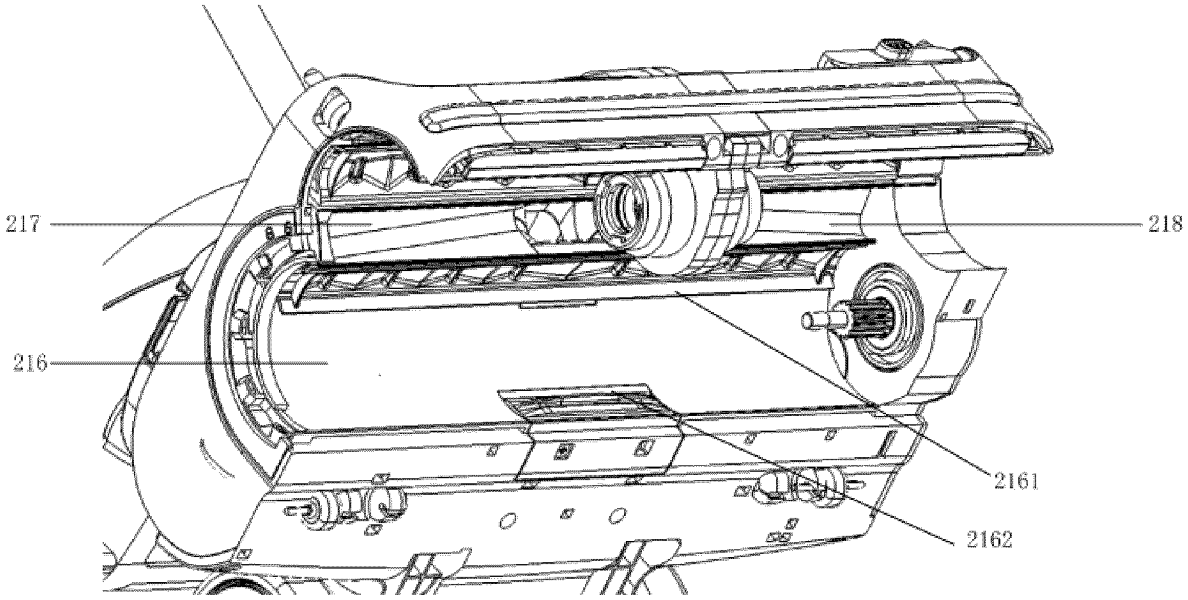

217
218
216
2161
2162

FIG. 18

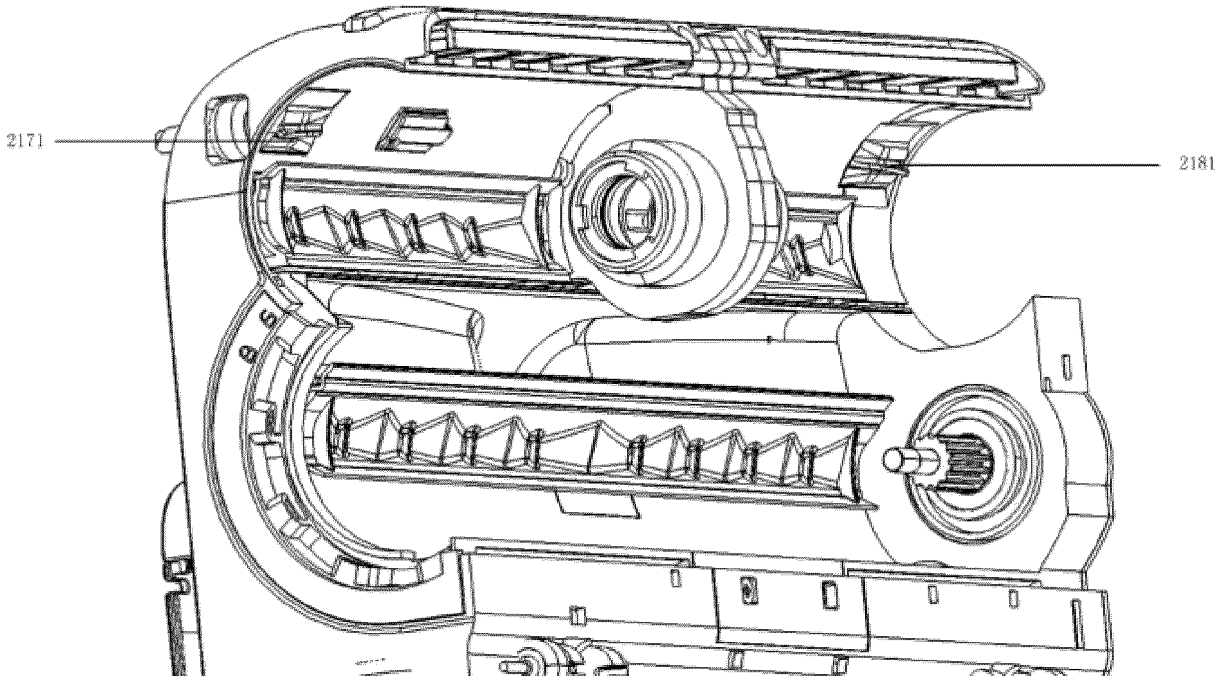


FIG. 19

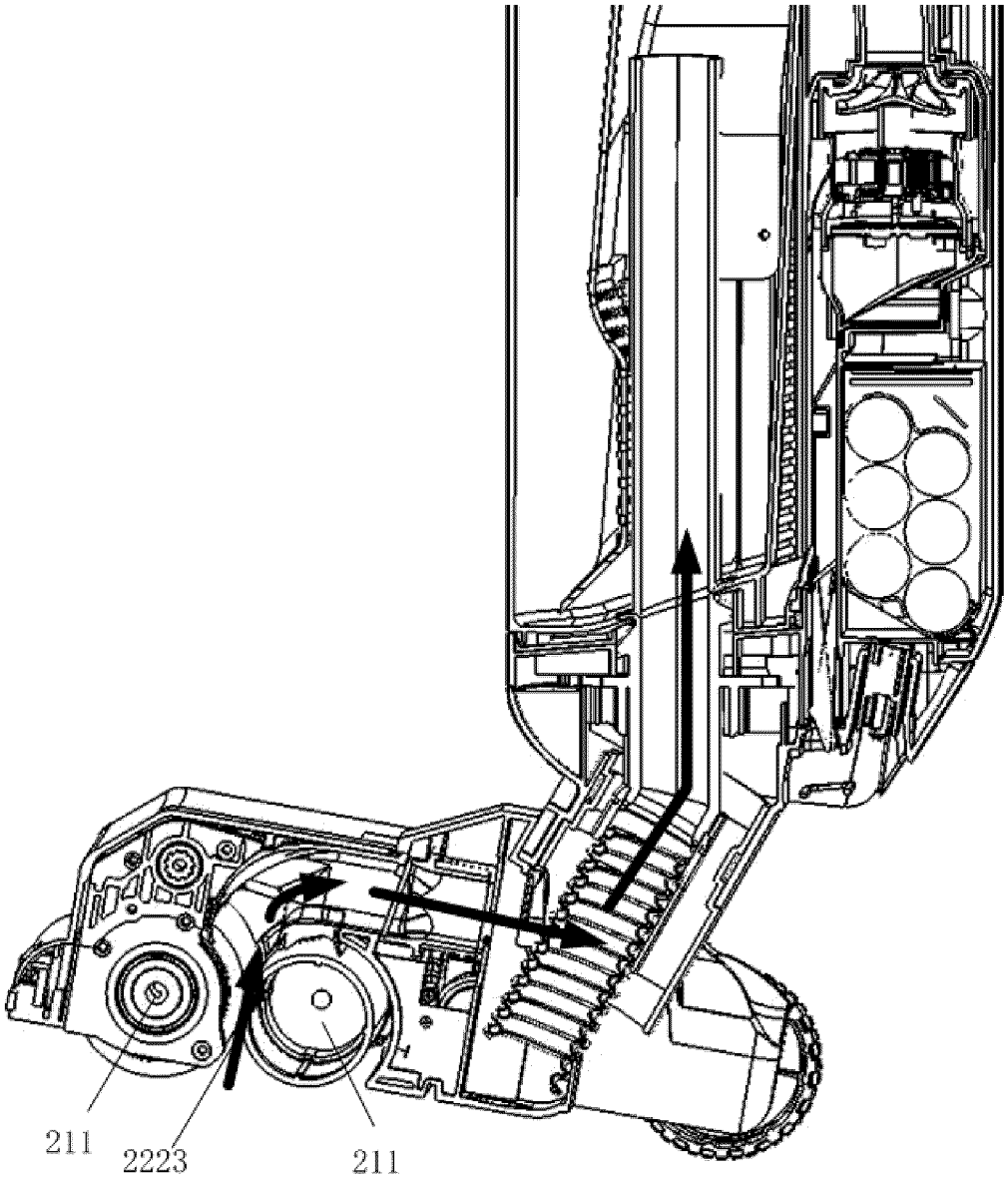


FIG. 20

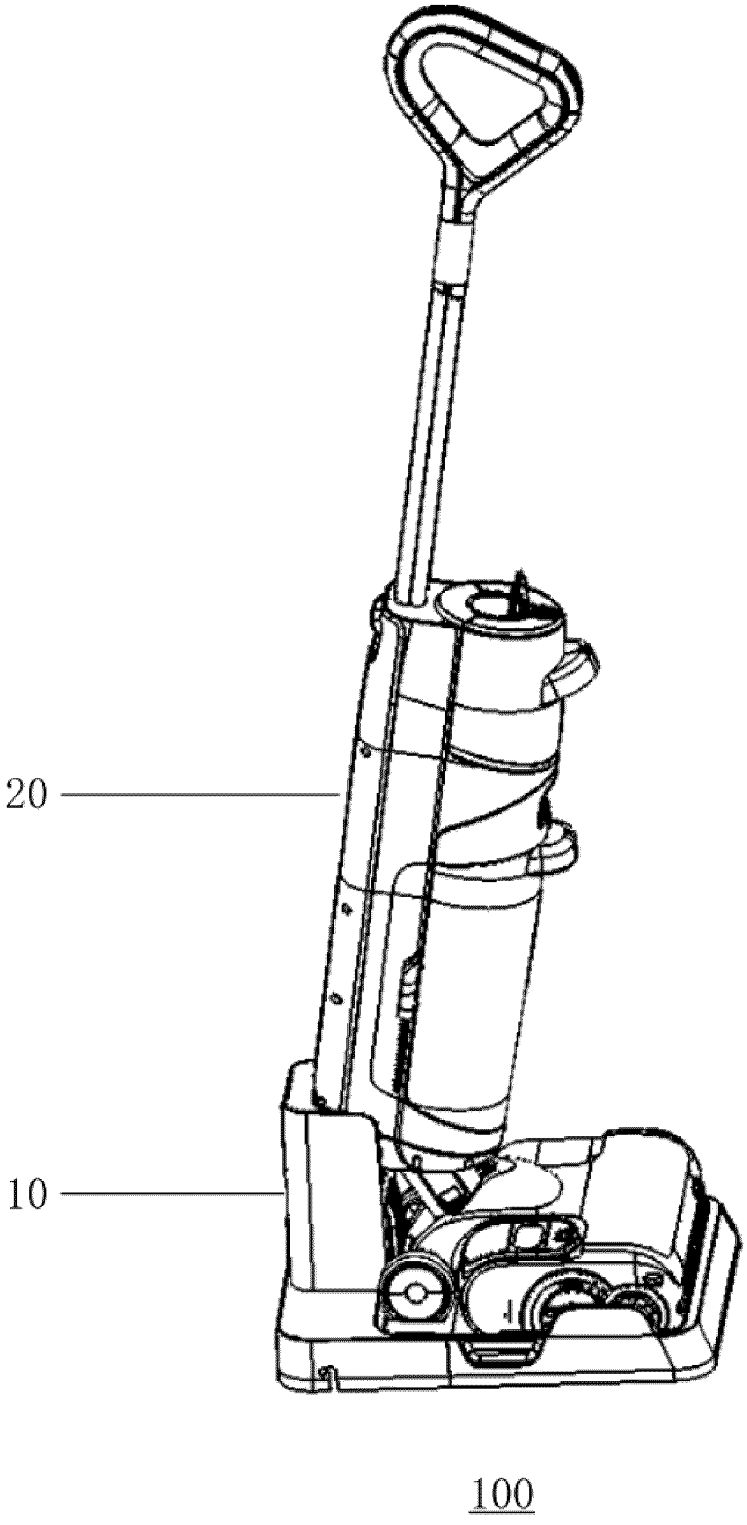


FIG. 21

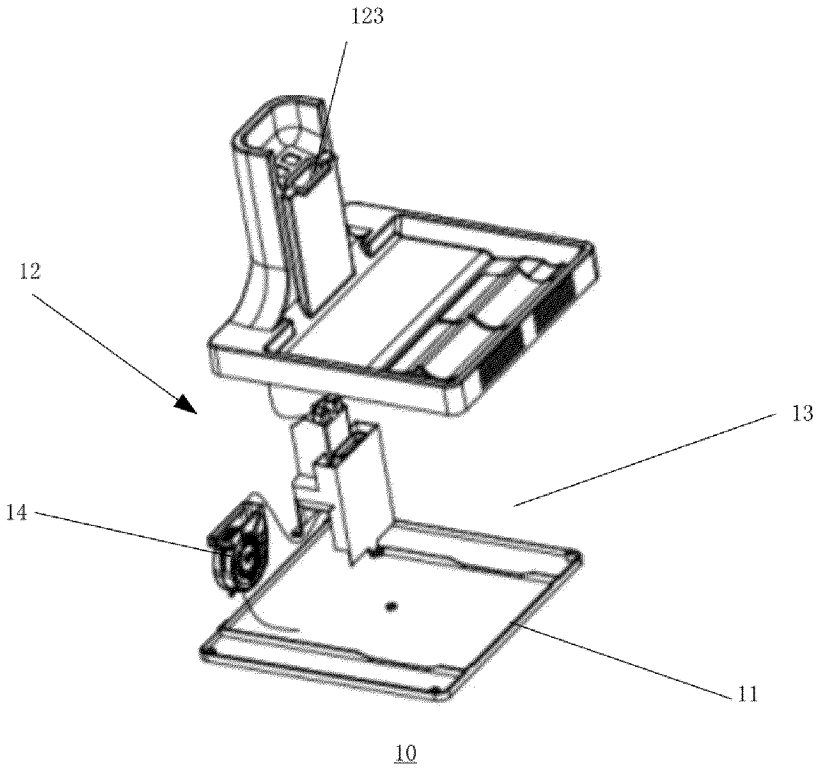


FIG. 22

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2023/080348

A. CLASSIFICATION OF SUBJECT MATTER

A47L11/40(2006.01)i; A47L11/30(2006.01)i

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: A47L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

CNTXT, ENTXTC, WPABSC, VEN: 石头, 周永飞, 李行, 李祥, 朱明阳, 米长, 罗光忠, 欧阳大林, 清洗, 清洁, 洗地, 擦地, 污水, 废水, 脏水, 污液, 回收, 箱, 腔, 风机, 风扇, 马达, 电机, 抽吸, 抽力, 吸力, 并列, 并排, 水平, 横向, 对侧, 对齐, 重力, 重心, 手柄, 主体, 本体, 弯曲, 弯折, 气道, 通道, 气路, 风道, clean+, scrubber, wash+, waste 2w water, cavity, bucket, motor, fan, blower, level, parallel+, gravity

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	CN 214760924 U (SUZHOU WOMOW INTELLIGENT TECHNOLOGY CO., LTD.) 19 November 2021 (2021-11-19) description, paragraphs [0006]-[0042], and figures 1-5	1-6, 8-10
Y	CN 113892874 A (WAYZ ROBOTICS (SHENZHEN) CO., LTD.) 07 January 2022 (2022-01-07) description, paragraphs [0101]-[0116], and figures 14-15	1-6, 8-10
A	CN 112043212 A (PUPPY ELECTRONIC APPLIANCES INTERNET TECHNOLOGY (BEIJING) CO., LTD.) 08 December 2020 (2020-12-08) entire document	1-10
A	CN 113440053 A (TINECO INTELLIGENT TECHNOLOGY CO., LTD.) 28 September 2021 (2021-09-28) entire document	1-10

☑ Further documents are listed in the continuation of Box C. ☑ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"D" document cited by the applicant in the international application
"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
20 June 2023	**28 June 2023**
Name and mailing address of the ISA/CN **China National Intellectual Property Administration (ISA/CN)** **China No. 6, Xitucheng Road, Jimenqiao, Haidian District, Beijing 100088**	Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (July 2022)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2023/080348

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CN 114569020 A (SHARKNINJA (CHINA) TECHNOLOGY CO., LTD.) 03 June 2022 (2022-06-03) entire document	1-10
A	CN 113117401 A (TINECO INTELLIGENT TECHNOLOGY CO., LTD.) 16 July 2021 (2021-07-16) entire document	1-10
A	CN 1623488 A (THE HOOVER COMPANY) 08 June 2005 (2005-06-08) entire document	1-10
A	US 2021315432 A1 (TECHTRONIC CORDLESS GP) 14 October 2021 (2021-10-14) entire document	1-10

Form PCT/ISA/210 (second sheet) (July 2022)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2023/080348

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
CN 214760924 U	19 November 2021	WO 2022228245 A1	03 November 2022
CN 113892874 A	07 January 2022	CN 216602755 U	27 May 2022
CN 112043212 A	08 December 2020	CN 212234331 U	29 December 2020
CN 113440053 A	28 September 2021	CN 113440053 B	05 July 2022
CN 114569020 A	03 June 2022	None	
CN 113117401 A	16 July 2021	WO 2021135423 A1	08 July 2021
CN 1623488 A	08 June 2005	US 2005120507 A1	09 June 2005
		US 7240394 B2	10 July 2007
		CA 2465010 A1	06 June 2005
		GB 2408674 A	08 June 2005
		GB 2408674 B	23 May 2007
		CA 2575914 A1	06 June 2005
		CA 2465010 C	29 January 2008
US 2021315432 A1	14 October 2021	AU 2021251178 A1	01 December 2022
		WO 2021207424 A1	14 October 2021
		EP 4132335 A1	15 February 2023

Form PCT/ISA/210 (patent family annex) (July 2022)

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- CN 202210901598 **[0001]**
- CN 202210899744 **[0001]**
- CN 202221975551 **[0001]**