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(54) **MOPPING APPARATUS FOR USE IN FLOOR CLEANING AND CLEANING DEVICE**

(57) A mopping apparatus and a cleaning device for floor cleaning are disclosed. The cleaning device comprises the mopping apparatus and a sewage tank (710). The sewage tank (710) collects water and/or dirt of the mopping apparatus. The mopping apparatus comprises a roller brush (1), a threaded conveying rod (21), and a sewage holding groove (62). The threaded conveying rod (21) is arranged at one side of the roller brush (1). The threaded conveying rod (21) is arranged in proximity to or attached to the roller brush (1). The threaded conveying rod (21) is rotatably mounted in the sewage holding groove (62). The threaded conveying rod (21) is arranged in proximity to or attached to an inner wall of the sewage holding groove (62). A sewage holding groove opening (622) is provided at one side of the sewage holding groove (62) facing the roller brush (1). Sewage on a surface of the roller brush (1) is squeezed and removed by the threaded conveying rod. This favors product miniaturization or diversified designs, provides an excellent sewage removal effect, has an ingenious design and a simple structure, and is simple to operate and convenient to use. The modularized design facilitates the assembly and the disassembly of the parts for replacement or maintenance. Sewage is conveyed from one end of the threaded conveying rod (21) to the other end. The protruding and recessed surface of the threaded conveying rod (21) kneads, pats, and squeezes the roller brush (1). A roller brush assembly is mounted and demounted in one piece.

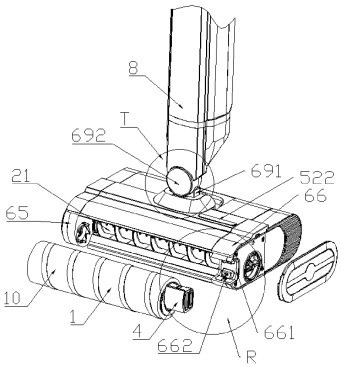

FIG. 2

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Description

FIELD OF THE INVENTION

[0001] The present invention relates to the field of floor cleaning, and in particular to a mopping apparatus for floor cleaning and a cleaning device.

BACKGROUND TECHNOLOGY

[0002] In a cleaning device, when a roller brush with a built-in drive motor is demounted for replacement or maintenance, water often spills onto the motor, which brings great potential risks to the device and may cause the motor to be damaged by water. In addition, the built-in motor also has the heat dissipation problem. The motor is prone to damage by high temperature due to prolonged operation.

[0003] The cleaning device usually has a plenty of plastic parts. Due to process limitations, it is impossible to produce plastic parts with complex structures. As a result, plastic parts must be assembled. On the one hand, the structure becomes complicated. On the other hand, the assembled structure is not stable and is easily damaged.

[0004] At present, common floor cleaning devices on the market comprise vacuum cleaners, robot cleaners, and mops. These devices can either sweep or mop the floor. Moreover, there are lots of water stains left on the floor that has been mopped, so that the users are prone to falling, and may make the floor dirty again, causing great inconvenience. The latest floor scrubbers on sale claim to have dry/wet sweeping and mopping functions. However, these functions are realized by using a scraper to remove water stains on the roller brush. These floor scrubbers cannot actually mop the floor without leaving water stains. Moreover, the scraper and the roller brush are easily damaged, and a high resistance is applied to the roller brush. In addition, the cleaning devices on the market are cumbersome and inflexible, and are inefficient in cleaning.

[0005] In view of the above technical problems, it is necessary to provide a new technical solution.

SUMMARY OF THE INVENTION

[0006] In order to solve the technical problems in the related art, the present invention aims to provide a mopping apparatus for floor cleaning and a cleaning device. This solution has an ingenious design and a simple structure. The modularized design facilitates the assembly and the disassembly of the parts for replacement or maintenance, and has good cleaning effect. The specific technical solutions are as follows.

[0007] One aspect of the present invention provides a mopping apparatus for floor cleaning. The mopping apparatus comprises a roller brush, a threaded conveying rod, and a sewage holding groove. The roller brush is a water-absorbent roller brush. The threaded conveying rod is a slender member with a spiral groove on a surface thereof. The sewage holding groove is provided with a semi-closed cavity. The threaded conveying rod is arranged at one side of the roller brush, and the threaded conveying rod is in contact with the roller brush. The threaded conveying rod is arranged in a semi-closed cavity of the sewage holding groove. The threaded conveying rod is rotatable in the sewage holding groove. The threaded conveying rod is arranged in proximity to or attached to an inner wall of the sewage holding groove. The sewage holding groove is provided with a sewage discharge port in a rotary pumping and conveying direction of the threaded conveying rod, and a sewage holding groove opening is provided at one side of the sewage holding groove facing the roller brush.

[0008] As a preferred embodiment of the mopping apparatus for floor cleaning of the present invention, a gap is provided between a lower edge of the sewage holding groove opening and the roller brush, and the gap facilitates the roller brush to drive wastewater and/or particulate dirt into the threaded conveying rod by way of rotation.

[0009] As a preferred embodiment of the mopping apparatus for floor cleaning of the present invention, the mopping apparatus for floor cleaning further comprises a pressure roller assembly. The pressure roller assembly presses against the roller brush and is arranged at an upper side of the threaded conveying rod.

[0010] As a preferred embodiment of the mopping apparatus for floor cleaning of the present invention, a slit or a hollowed hole is provided between an upper edge of the sewage holding groove opening and the roller brush, and the slit or the hollowed hole facilitates wastewater and/or particulate dirt squeezed by the pressure roller assembly to enter the threaded conveying rod.

[0011] As a preferred embodiment of the mopping apparatus for floor cleaning of the present invention, the mopping apparatus for floor cleaning further comprises an adjusting member. A tightness of contact between the pressure roller assembly and the roller brush is adjusted by the adjusting member; and/or a tightness of contact between the threaded conveying rod and the roller brush is adjusted by the adjusting member.

[0012] As a preferred embodiment of the mopping apparatus for floor cleaning of the present invention, the mopping apparatus for floor cleaning further comprises a driving structure. The roller brush is connected to the driving structure, and the driving structure drives the roller brush to rotate; and/or the driving structure is connected to the threaded conveying rod and drives the threaded conveying rod to rotate.

[0013] As a preferred embodiment of the mopping apparatus for floor cleaning of the present invention, the adjusting member is an elastic tensioning mechanism.

[0014] As a preferred embodiment of the mopping apparatus for floor cleaning of the present invention, the mopping apparatus for floor cleaning further comprises a support frame. The roller brush, the threaded conveying

rod, and the pressure roller assembly are all mounted in the support frame, and a part of a roller brush body of the roller brush is exposed outside the support frame.

[0015] As a preferred embodiment of the mopping apparatus for floor cleaning of the present invention, the support frame comprises an integrally formed support frame body, and the support frame body is provided with the sewage holding groove and a pressure roller groove. The threaded conveying rod is rotatably mounted in the sewage holding groove, and the pressure roller assembly is rotatably mounted in the pressure roller groove.

[0016] Another aspect of the present invention provides a cleaning device. The cleaning device comprises a sewage tank and the mopping apparatus as described in the above technical solution.

[0017] The sewage tank is detachably mounted at one side of the support frame away from the roller brush, and the mopping apparatus is connected to the sewage tank. The mopping apparatus is configured to clean water and/or dirt, and the sewage tank is configured to collect the water and/or dirt of the mopping apparatus.

[0018] As a preferred embodiment of the cleaning device of the present invention, the cleaning device further comprises an impeller member. The impeller member is arranged at one end of the threaded conveying rod along a conveying direction, and the impeller member comprises an impeller and an impeller housing.

[0019] The impeller is rotatably mounted in the impeller housing, and the impeller housing is provided with an impeller housing water inlet and an impeller housing water outlet. The impeller housing water inlet is arranged at one side of the impeller housing close to the threaded conveying rod, and the impeller housing water outlet is connected to the sewage tank. The threaded conveying rod is configured to convey the water and/or dirt to the impeller housing water inlet, and the impeller is configured to throw the water and/or dirt at the impeller housing water inlet into the sewage tank.

[0020] As a preferred embodiment of the cleaning device of the present invention, one side of the support frame away from the roller brush is fixedly provided with an extension plate. The extension plate extends away from the roller brush, and two sides of the extension plate are provided with elastic snap-fit protrusions.

[0021] The sewage tank is provided with a snap-fit groove. In a case that the sewage tank is detachably mounted to the support frame, the elastic snap-fit protrusions snap into the snap-fit groove.

[0022] As a preferred embodiment of the cleaning device of the present invention, a mounting/demounting button is rotatably connected to the support frame. The mounting/demounting button comprises a pressing plate and a pop-up plate perpendicularly connected to the pressing plate. In a case that the pressing plate is pulled, the pop-up plate pushes the sewage tank away from the roller brush until the sewage tank is demounted from the support frame.

[0023] As a preferred embodiment of the cleaning device of the present invention, the cleaning device further comprises an operating lever. The operating lever is rotatably mounted on the support frame.

[0024] The operating lever is rotatably mounted on the support frame through a first rotating member and a second rotating member. The first rotating member is configured to enable the operating lever to rotate along an x direction, and the second rotating member is configured to enable the operating lever to rotate along a y direction.

[0025] As a preferred embodiment of the cleaning device of the present invention, the cleaning device further comprises a clean water tank.

[0026] The clean water tank is arranged on the operating lever, and the operating lever is provided with a slidable snap-fit structure. The slidable snap-fit structure is configured to the lock clean water tank with different volume size to the operating lever.

[0027] As a preferred embodiment of the cleaning device of the present invention, the support frame comprises an integrally formed support frame body, and the support frame body is provided with a sewage holding groove and a pressure roller groove.

[0028] As a preferred embodiment of the cleaning device of the present invention, the cleaning device further comprises a water pump energy storage assembly. The support frame body is provided with an integrated assembly cavity, and the water pump energy storage assembly is detachably mounted in the integrated assembly cavity.

[0029] The water pump energy storage assembly comprises an integrated bracket, a water pump, a circuit board, and an energy storage member. The water pump, the circuit board, and the energy storage member are all detachably mounted on the integrated bracket. The water pump is electrically connected to the circuit board, and the energy storage member is electrically connected to the circuit board. The energy storage member provides electrical energy for the circuit board, and the circuit board provides electrical energy for the whole cleaning device.

[0030] Compared with the related art, the technical solution of the present invention at least has one or more of the following beneficial effects:

The cleaning device of the present invention has an ingenious design and a simple structure, and is simple to operate and convenient to use. The modularized design facilitates the assembly and the disassembly of the parts for replacement or maintenance.

[0031] The support frame is preferably an integrally stretched and formed metal support frame which functions to stably support the whole device. The common plastic support frame on the market is not integrally formed due to process limitations. If the plastic support frame is required to support the whole device, it needs to be thickened, which makes the device cumbersome and the structure complicated. In addition, the assembled structure is not stable and is easily damaged. This is not beneficial to simplifying the structure of the device or im-

proving the firmness of the device.

[0032] The threaded conveying rod is arranged in proximity to or attached to the roller brush and rotates oppositely relative to the roller brush. Compared with the technical solution in the related art which uses a scraper to remove water and waste on the roller brush, in the technical solution of the present invention, the threaded conveying rod and the roller brush are two cylinders that rotate oppositely and squeeze each other, so that a lower resistance is applied to the roller brush, which reduces the power loss of the roller brush and greatly reduces the forward rotation resistance of the roller brush. In this way, the loss of the driving power of the roller brush can be reduced, and surfaces of the roller brush and the threaded conveying rod are prevented from damage, which prolongs the service life of the product. When the threaded conveying rod squeezes the roller brush, the wastewater and the waste on the roller brush can be squeezed out, so that the roller brush is in a half-wet, slightly wet, or slightly dry state, which is beneficial to self-cleaning and automatic squeezing of the roller brush.

[0033] The spiral groove is formed on the threaded conveying rod, so that the threaded conveying rod can convey the wastewater and/or the particulate dirt squeezed out by the roller brush from one end of the threaded conveying rod to the sewage discharge port at the other end along the spiral groove. Thereby, a clean water inlet and the sewage discharge port may be preferably provided at two ends of the threaded conveying rod, which saves the space and is beneficial to miniaturization or diversified designs of the product. Of course, the clean water inlet and the sewage discharge port may also be provided at other positions. In addition, the spiral groove formed on the threaded conveying rod makes the surface of the threaded conveying rod protruding and recessed. When the threaded conveying rod presses against the roller brush and rotates, the protruding and recessed surface of the threaded conveying rod kneads, pats, and squeezes the roller brush, which makes the surface of the roller brush have a better scrubbing and drying effect.

[0034] The impeller member is provided. Under the action of a centrifugal force formed by the rotating impeller, the wastewater and/or the particulate dirt is thrown into the sewage tank, so that the wastewater and/or the particulate dirt can be discharged into the sewage tank without a suction device, or using a suction device which only needs little power, which is energy-saving, or using a pumping unit only as a spare part in order to ensure all the wastewater and/or the particulate dirt to be conveyed into the sewage tank. An impeller motor is provided, such that a rotational speed of the impeller can be adjusted. The rotational speed of the impeller may be the same as or different from a rotational speed of the threaded conveying rod. In general cases, the impeller motor drives the impeller to rotate at high speed, which can improve the efficiency of discharging the wastewater and/or the particulate dirt.

[0035] The pressure roller assembly is provided to further remove water and stop large particulate dirt. The pressure roller assembly is arranged in proximity to or attached to the roller brush and rotates oppositely relative to the roller brush. Compared with the frictional contact between the fixed scraper and the rotating roller brush in the related art, a lower resistance is applied to the roller brush, which can reduce the requirement for the driving power of the roller brush and avoid damaging the surfaces of the roller brush and the pressure roller assembly. Compared with the technical solution in the related art which uses a scraper to remove water and waste on the roller brush, according to the technical solution of the present invention in which the pressure roller assembly is provided, a lower resistance is applied to the roller brush, which reduces the power loss of the roller brush and greatly reduces forward rotation resistance of the roller brush. In this way, the loss of the driving power of the roller brush can be reduced, and the surfaces of the roller brush and the threaded conveying rod are prevented from damage, which prolongs the service life of the product.

[0036] The pressure roller assembly and the roller brush are two cylinders that rotate oppositely and squeeze each other, so that the roller brush can be further squeezed to a slightly wet, slightly dry, or even half-dry state. Both the pressure roller assembly and the threaded conveying rod may squeeze the roller brush, so that the wastewater and/or the particulate dirt can be further squeezed out of the roller brush, and the working efficiency of the roller brush can be improved, which further improves the cleaning effect of the roller brush and avoids leaving water stains and waste on the floor cleaned by the roller brush.

[0037] The sewage holding groove is provided, so that the wastewater, the clean water, and the waste can be led out from the sewage discharge port through a wastewater/waste drainage channel formed by the threaded conveying rod and the sewage holding groove, which solves the problem of incapability of effectively removing water and waste in the related art. On the surface of the sewage holding groove, an comprised angle Θ is formed between the upper edge and the lower edge of the sewage holding groove opening. The comprised angle Θ is preferably 180° to 270°. In this way, the sewage holding groove can completely surround the roller brush, so that all the wastewater and/or the particulate dirt on the roller brush can fall into the sewage holding groove, which prevents the wastewater and/or the particulate dirt from spillover. In addition, the larger the comprised angle Θ of the sewage holding groove, the better the conveying channel can be provided for the threaded conveying rod, and the more the wastewater and/or the particulate dirt can be conveyed by the threaded conveying rod to the impeller member or the sewage tank.

[0038] The adjustable adjusting member is provided, so that the distance or tightness between the threaded conveying rod and the roller brush, or between the pres-

sure roller assembly and the roller brush can be respectively adjusted according to the actual situation, the customer's own needs, or the use effect, so as to achieve the best cleaning effect.

[0039] A first toothed comb and/or a brush is provided. Teeth or bristles are in point-to-surface contact with the roller brush. In a case of surface-to-surface contact between a scraper or a pressure bar and a roller brush, soft waste such as hair or noodles adhering to the roller brush may not be removed by the acting force of the surface-to-surface contact, and the soft waste may even be squeezed and attached to the roller brush more firmly. In contrast, the teeth or the bristles on the first toothed comb and/or the brush in point-to-surface contact with the roller brush can remove the soft waste adhering to the roller brush, so that the waste on the roller brush can be removed more effectively and more thoroughly, which is beneficial to cleaning the floor more effectively. The pressure roller assembly and the roller brush rotate oppositely at high speed simultaneously and squeeze each other, so that a large amount of water may be accumulated below the pressure roller assembly. The first toothed comb and/or the brush may drain the accumulated water into the sewage holding groove, which prevents the accumulated water from splashing everywhere, causing water stains left on the floor.

[0040] A second toothed comb or a brush is provided. After the roller brush is squeezed by the pressure roller assembly to remove the wastewater and/or the particulate dirt, a flannel water-absorbent layer on the surface of the roller brush is tightly pressed to the roller. As the flannel water-absorbent layer continues rotating forward and contacts the floor again, since the flannel water-absorbent layer is pressed together, the ability of the roller brush to adsorb the wastewater and/or the particulate dirt obviously deteriorates. Therefore, after the roller brush is squeezed by the pressure roller assembly, teeth, or bristles on the second toothed comb and/or the brush in contact with the roller brush arranged on the surface of the roller brush may scratch the flannel water-absorbent layer to make the flannel water-absorbent layer more fluffy, and the fluffy flannel water-absorbent layer can effectively adsorb the wastewater and/or the particulate dirt on the floor.

[0041] The latest floor scrubbers in the related art claim to have dry/wet sweeping and mopping functions. However, these functions are realized by using a scraper to remove water stains on the roller brush. These floor scrubbers cannot actually mop the floor without leaving water stains, and cannot effectively remove waste and wastewater. Moreover, the products having these functions are expensive, complex in structural design, and easily damaged. For these products, if the scraper applies a high pressure to the roller brush, a high resistance will be produced, and the roller brush body may be damaged. Moreover, no matter how much pressure is applied by the scraper to the roller brush, it cannot completely remove the water and the waste. This is because the fixed scraper and the rotating roller brush body are in surface-to-surface contact, causing a high frictional resistance and low squeezing efficiency. Besides, the scraper and the roller brush are easily damaged, and a high resistance is applied to the roller brush. If the scraper applies a low pressure to the roller brush, the wastewater on the roller brush body cannot be removed effectively, making the roller brush body prone to form water stains on the floor. In the present invention, on the one hand, the spiral protrusion of the threaded conveying rod and the roller brush body rotate oppositely and squeeze each other, and the size of the squeezing force can be adjusted conveniently. The threaded conveying rod and the roller brush are two cylinders that rotate oppositely and squeeze each other, so that a lower resistance and a better squeezing effect are produced, which is beneficial to removing water and waste. Moreover, the rotary spiral groove of the threaded conveying rod is utilized ingeniously to form a wastewater/waste conveying channel, so that the wastewater and/or the particulate dirt can be led out. The cleaning device is further provided with the clean water tank and the water pump. Therefore, the clean water can be conveyed to the roller brush body, so that the roller brush body further has a self-cleaning function, which is beneficial to the design of the whole product. On the other hand, the pressure roller assembly and the roller brush are another two cylinders that rotate oppositely and squeeze each other, so that water is further squeezed out of the roller brush, and large particulate dirt can be kept back. Moreover, a low resistance is applied to the roller brush.

[0042] The driving structure is arranged in the roller brush, which makes the structure compact and saves the space, so that the volumes of the assembly and the device can be reduced. Therefore, the device is light, portable, and simpler, and the production cost can be reduced.

[0043] When the roller brush is demounted from the device, the built-in driving structure is demounted together with the roller brush in one piece, which is simple to operate and convenient to use, and prevents the wastewater and/or the particulate dirt falling off from the roller brush from soaking the driving structure and causing a short-circuit of the driving structure, thereby avoiding damaging the driving structure. The driving structure in the roller brush is electrically connected to the device body, which is simple in structure, convenient to mount, and ingenious in design, so that the roller brush can be mounted and demounted conveniently.

[0044] One end of the roller brush is provided with a mounting/demounting member, which facilitates mounting and demounting of the driving structure in the roller brush. In order to keep the driving structure from water, the mounting/demounting member is provided with a fool-proof button, so that the driving structure can be demounted only when necessary. Only by pressing a button and screwing the mounting/demounting member at the same time can the driving structure be moved out of the

roller brush. When the button is not pressed down, the driving structure cannot be demounted even if the mounting/demounting member is screwed, which prevents the driving structure from falling out of the roller brush due to accidental screwing of the mounting/demounting member. The mounting/demounting member also functions to support the driving structure. The mounting/demounting member is fixedly connected to the driving structure. The driving structure is fixedly connected to the mounting/demounting member, which makes both the driving structure and the mounting/demounting member not rotate together with the roller brush body.

[0045] A motor in the driving structure is electrically connected to the support frame through the mounting/demounting member. Wires of the motor run through a hollow bolt and extend into the mounting/demounting member. The mounting/demounting member is provided with a waterproof insertion structure. The support frame is provided with a waterproof locking structure. The mounting/demounting member is electrically connected to the support frame in a detachable and hermetical manner, which is convenient to mount and demount. This facilitates mounting and demounting of the roller brush assembly in one piece, and can prevent water from entering the driving structure or the mopping apparatus, causing damage to the device.

[0046] The roller brush is provided with an anti-locking structure. The anti-locking structure can help the driving structure continue to rotate when the roller brush is locked and unable to rotate, thereby protecting the motor.

[0047] A heat dissipation channel is provided for the built-in driving structure of the roller brush, so that heat generated by the built-in motor of the roller brush can be dissipated through the heat dissipation channel, so as to cool the motor. This can prevent the motor from burnout due to overheat. Moreover, cooling the motor is beneficial to increasing a rotational speed of a rotating shaft of the motor and improving the cleaning speed and efficiency of the roller brush, thereby improving the satisfaction of the user. In general cases, the built-in motor of the roller brush generates heat when working. Since the motor is arranged in the roller brush, the heat cannot be removed. To this end, the rotational speed of a conventional built-in motor of the roller brush is typically 200 to 400 rpm. If the rotational speed of the motor is too high, the temperature of the motor will be too high, and the motor will be prone to burnout. However, if the rotational speed of the motor is too low, the cleaning speed and efficiency will be low, which cannot meet the needs of the user. To increase the rotational speed of the motor, a method is to improve the quality of the motor. For example, a cleaning device on the market uses a roller brush with an external motor. This motor is a 7000 rpm motor, but runs adaptively at a rotational speed of 1000 rpm. For another example, a cleaning device uses a roller brush with a built-in motor. This motor is also a 7000 rpm motor, but runs adaptively at a rotational speed of 2400 rpm. These two roller brushes can meet the needs of the user, but the motors are too costly, which increases the economic burden of the user and is not suitable for the majority of users. The best method to increase the rotational speed of an ordinary motor without increasing the cost is to use the heat dissipation channel of the present invention to dissipate the heat generated by the motor and reduce the temperature rise speed of the motor.

[0048] A waterproof cover is provided to prevent water from entering an accommodating cavity of the roller brush, which minimizes the water falling onto the water blocking sponge. A height of the waterproof platform is greater than a height of a second end cover. No matter the roller brush is placed vertically or horizontally, the flushing water can be prevented from flowing into a through hole.

[0049] In actual use, the roller brush needs to be replaced frequently, and the mounting and demounting of the roller brush in one piece brings great convenience to the user to replace the roller brush. The roller brush is mounted to the device body in a snap-fit or magnetic manner, so that the mounting and demounting of the roller brush is simpler and more convenient to operate. The built-in driving structure can be demounted from the roller brush. When the roller brush is to be replaced, the built-in driving structure is removed from the accommodating cavity and mounted into an accommodating cavity of a new roller brush, and then the new roller brush with the built-in driving structure is mounted to the device body in one piece, thereby completing the replacement of the roller brush. That is, when the roller brush is to be replaced, only a roller with a flexible cleaning layer needs to be replaced, and the driving structure is reusable, which reduces the use cost for the user.

[0050] The operating lever provided can rotate freely, which is convenient for flexible operation. In addition, a limiting rib and a limiting slot are provided, so that the operating lever can be fixed vertically. In this way, the operating lever can be placed stably when it is not in use.

[0051] The sewage tank is locked to a fixed member of the support frame, which facilitates mounting. The mounting/demounting button is provided, so that when the mounting/demounting button is pressed, the sewage tank can be demounted easily. Further, the wastewater and the waste can be poured out, or the sewage tank can be cleaned. With the mounting/demounting button, the sewage tank can be demounted easily, which is simple and convenient to operate for women who are less strong but use the cleaning device more frequently.

[0052] The clean water tank is provided, so that when the roller brush is cleaning the wastewater and the waste, the roller brush itself is also cleaned, thereby realizing the self-cleaning function of the roller brush. In this way, the floor can be cleaned more efficiently. Moreover, the slidable snap-fit structure is provided, so that clean water tanks with different volume sizes can be mounted according to needs, which improves the flexibility of the device.

[0053] The additional aspects and advantages of the

present invention will be set forth in part in the description which follows, parts of which will become apparent from the description below, or will be understood by the practice of the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0054] To describe the technical solutions of the present invention more clearly, the following briefly introduces the accompanying drawings required for describing the embodiments or the related art. Apparently, the accompanying drawings in the following description show only some embodiments of the present invention, and a person of ordinary skill in the art may still derive other drawings from these accompanying drawings without creative efforts.

FIG. 1 is schematic three-dimensional structural view of a cleaning device according to this embodiment;

FIG. 2 is a schematic exploded structural view of the cleaning device from one perspective according to this embodiment;

FIG. 3 is a schematic local structural view of R in FIG. 2;

FIG. 4 is a schematic three-dimensional structural view of one example of a mopping apparatus and a sewage tank according to this embodiment;

FIG. 5 is a schematic three-dimensional sectional structural view of FIG. 4 taken along line A;

FIG. 6 is a schematic sectional structural view of FIG. 4 taken along line B;

FIG. 7 is a schematic exploded structural view of a roller brush assembly according to this embodiment;

FIG. 8 is a schematic three-dimensional structural view of the roller brush assembly from one perspective according to this embodiment;

FIG. 9 is a schematic three-dimensional structural view of the roller brush assembly from another perspective according to this embodiment;

FIG. 10 is a schematic three-dimensional sectional structural view of FIG. 9 taken along line C;

FIG. 11 is a schematic sectional structural view of FIG. 9 taken along line D;

FIG. 12 is a schematic three-dimensional structural view of a driving structure of the roller brush assembly in a demounted state according to this embodiment;

FIG. 13 is another schematic exploded structural view of the roller brush assembly according to this embodiment;

FIG. 14 is a schematic three-dimensional sectional structural view of a roller brush body, a motor housing, and a mounting/demounting member taken along an axial direction according to this embodiment;

FIG. 15 is a schematic three-dimensional sectional structural view of the roller brush body and the mounting/demounting member taken along the axial direction according to this embodiment;

FIG. 16 is a schematic three-dimensional structural view of a first end cover according to this embodiment;

FIG. 17 is a schematic three-dimensional structural view of a second end cover according to this embodiment;

FIG. 18 is a schematic exploded structural view of the driving structure according to this embodiment;

FIG. 19 is a schematic three-dimensional structural view of the mounting/demounting member according to this embodiment;

FIG. 20 is a schematic three-dimensional sectional structural view of FIG. 19 taken along line E;

FIG. 21 is a schematic planar structural view of a housing body according to this embodiment;

FIG. 22 is a schematic three-dimensional sectional structural view of FIG. 21 taken along line F-F from one perspective;

FIG. 23 is a schematic three-dimensional sectional structural view of FIG. 21 taken along line F-F from another perspective;

FIG. 24 is a schematic three-dimensional structural view of a button and a spring from one perspective according to this embodiment;

FIG. 25 is a schematic three-dimensional structural view of the button and the spring from one perspective according to this embodiment;

FIG. 26 is a schematic three-dimensional structural view of a threaded conveying rod and an impeller member according to this embodiment;

FIG. 27 is a schematic three-dimensional sectional structural view of the impeller member according to this embodiment;

FIG. 28 is a schematic exploded structural view of the impeller member according to this embodiment;

FIG. 29 is a schematic three-dimensional structural view of an impeller in FIG. 28;

FIG. 30 is a schematic three-dimensional structural view of a water pump energy storage assembly according to this embodiment;

FIG. 31 is a schematic three-dimensional sectional structural view of FIG. 30 taken along line G;

FIG. 32 is a schematic three-dimensional structural view of a support frame body according to this embodiment;

FIG. 33 is a schematic three-dimensional structural view of another example of the support frame body according to this embodiment;

FIG. 34 is a schematic three-dimensional structural view of a waterproof locking structure according to this embodiment;

FIG. 35 is a schematic exploded structural view of the waterproof locking structure according to this embodiment;

FIG. 36 is a schematic exploded structural view of the cleaning device from another perspective according to this embodiment;

FIG. 37 is a schematic local structural view of M in FIG. 36;

FIG. 38 is a schematic three-dimensional structural view of a sewage tank according to this embodiment;

FIG. 39 is a schematic three-dimensional structural view of a closing seam from one perspective according to this embodiment;

FIG. 40 is a schematic three-dimensional structural view of the closing seam from another perspective according to this embodiment;

FIG. 41 is a schematic local structural view of T in FIG. 2;

FIG. 42 is a schematic three-dimensional structural view of another example of the mopping apparatus from one perspective according to this embodiment;

FIG. 43 is a schematic three-dimensional structural view of another example of the mopping apparatus from another perspective according to this embodiment;

FIG. 44 is a schematic structural view of H in FIG. 40;

FIG. 45 is a schematic structural view of a threaded conveying rod and a sewage holding groove in FIG. 40;

FIG. 46 is a schematic structural view of the threaded conveying rod in FIG. 40; and

FIG. 47 is a schematic structural view of the sewage holding groove in FIG. 40.

[0055] In the figures, 10-roller brush assembly, 1-roller brush, 21-threaded conveying rod, 3-pressure roller assembly, 4-mounting/demounting member, 5-water pump energy storage assembly, 6-support frame, 71-sewage tank, 72-clean water tank, 73-water pump, 8-operating lever, 11-roller brush body, 111-accommodating cavity, 112-first end cover, 1120-first annular protrusion, 1121-clamping block, 1122-via, 1123-unlocking groove, 113-second end cover, 1131-through hole, 1132-hook, 1133-second annular protrusion, 1134-groove, 1135-waterproof platform, 114-inner cover, 1141-annular rib, 1142-column, 1143-lock pin, 1144-third annular protrusion, 1145-opening, 115-waterproof cover, 116-fixing piece, 1161-fixing hole, 12-driving structure, 121-rotating shaft, 122-ring gear, 123-motor, 1231-motor heat dissipation hole, 124-motor housing, 1241-first housing, 1242-second housing, 1243-heat dissipation hole, 125-bearing, 13-roller, 130-flexible cleaning layer, 131-fixed bracket, 1311-toothed groove, 1312-via hole, 132-limit slot, 133-first limit slot, 134-second limit slot, 14-gap, 15-water blocking sponge, 16-adjusting member, 20-impeller member, 211-main shaft, 212-spiral protrusion, 213-screw engagement teeth, 214-spiral groove, 215-threaded conveying rod connecting shaft, 22-impeller, 221-impeller body, 222-vane, 223-sleeving groove, 224-support column, 23-impeller housing, 231-impeller cavity, 2311-drive bin, 2312-drive cover, 2313-annular sealing groove, 232-impeller housing water inlet, 233-impeller housing water outlet, 234-impeller motor, 2341-driving shaft, 235-mounting port, 236-lid, 237-screw bin, 41-housing body, 411-button hole, 412-plug hole, 413-limit post, 414-stop groove, 415-snap-fit protrusion, 416-female plug, 417-insertion port, 418-elastic waterproof pad, 4181-closing seam, 4182-V-shaped port, 419-buckle groove, 42-button, 421-plug, 422-spring-back bin, 423-stop spring sheet, 4231-bump, 424-snap-fit slot, 43-spring, 51-integrated bracket, 511-water pump bracket, 512-energy storage bracket, 52-circuit board, 521-charging port, 522-display panel, 53-energy storage member, 61-support frame body, 62-sewage holding groove, 621-guide plate, 622-sewage holding groove opening, 623-

sewage discharge port, 624-clean water inlet, 63-pressure roller groove, 64-integrated assembly cavity, 65-first housing cover, 66-second housing cover, 660-waterproof locking structure, 661-receptacle bin, 662-male receptacle body, 6621-insertion slot, 6622-latch, 6623-latch groove, 6624-elastic sealing piece, 663-male plug, 67-first toothed comb, 68-second toothed comb, 69-fixed member, 691-first rotating member, 692-second rotating member, 6921-limiting rib, 693-extension plate, 6931-elastic snap-fit protrusion, 694-mounting/demounting button, 6941-pressing plate, 6942-pop-up plate, 6943-snap-fit block, 695-limiting slot, 712-snap-fit groove, 713-second snap-fit groove, 81-water tank connecting structure, and 82-slidable snap-fit structure.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0056] Embodiments of the present invention will be described in detail below. Examples of the embodiments are shown in the accompanying drawings. The same or similar reference numerals indicate the same or similar elements or elements with the same or similar functions. The embodiments described with reference to the accompanying drawings below are exemplary, and are intended to explain the present invention, but should not be construed as limiting the present invention. All other embodiments obtained by those of ordinary skill in the art based on the embodiments of the present invention without creative work are within the protection scope of the present invention.

[0057] In the description of the present invention, it should be understood that the orientation or position relationship indicated by the term "upper", "lower", "top", "bottom", "inner", "outer", "front end", "rear end", "two ends", "one end", "the other end" or the like is the orientation or position relationship based on the accompanying drawings. It is only for the convenience of describing the present invention and simplifying the description, rather than indicating or implying that the device or element referred to must have a specific orientation or be constructed and operated in a specific orientation, and therefore cannot be understood as a limitation to the present invention. In the description of the present invention, "a plurality of" means two or more than two, unless otherwise specifically defined. In addition, the terms "first" and "second" are only used for descriptive purposes, and cannot be understood as indicating or implying relative importance.

[0058] In the description of the present invention, the term "equipped with", "provided with", "connected to", "sleeved over", "fixed to" or the like should be understood broadly unless otherwise specified and defined. For example, two elements may be fixedly connected, detachably connected or integrally connected; or may be mechanically connected or electrically connected; or may be directly connected or indirectly connected through an intermediate medium; or may be in internal communication or interact with each other. For those of ordinary skill in the art, the specific meaning of the above terms in the present invention can be understood according to specific situations.

Embodiments

[0059] Referring to FIG. 1 to FIG. 47, as shown in FIG. 1 to FIG. 47, a cleaning device provided according to one embodiment comprises a mopping apparatus, a sewage tank 71, a clean water tank 72, and an operating lever 8.

[0060] In one embodiment, as shown in FIG. 1 to FIG. 37 and FIG. 39 to FIG. 41, the mopping apparatus comprises a roller brush 1, a scrubbing assembly, a pressure roller assembly 3, and a support frame 6. The roller brush 1, the scrubbing assembly, and the pressure roller assembly 3 are all detachably mounted to the support frame 6. A sewage tank is detachably mounted to one side of the support frame 6 away from the roller brush. The mopping apparatus is connected to the sewage tank. The mopping apparatus is configured to clean water and/or dirt. The sewage tank is configured to collect the water and/or dirt of the mopping apparatus. The support frame 6 is configured to prevent wastewater and/or particulate dirt in the mopping apparatus from spillover. The operating lever is rotatably mounted to the support frame. The clean water tank is detachably mounted to the operating lever, as shown in FIG. 4 and FIG. 6.

[0061] The support frame 6 comprises an integrally formed support frame body 61. As shown in FIG. 32 to FIG. 33, the support frame body 61 is arranged at one side of the roller brush 1 away from an advancing direction. The support frame body 61 is provided with a sewage holding groove 62, a pressure roller groove 63, and an integrated assembly cavity 64 with at least one opening. An axial direction of the sewage holding groove 62 is the same as that of the pressure roller groove 63. The pressure roller groove 63 is arranged above the sewage holding groove 62. Openings of both the sewage holding groove and the pressure roller groove 63 face the roller brush. Preferably, the integrated assembly cavity 64 is provided at one side of the sewage holding groove 62 away from the roller brush 1. The integrated assembly cavity 64 is a through cavity with openings at two ends. Both the sewage holding groove 62 and the pressure roller groove 63 are through bins along a length direction. The support frame body 61 is a metal support frame. Axial directions of the integrated assembly cavity 64, the sewage holding groove 62, and the pressure roller groove 63 are the same. A threaded conveying rod 21 is rotatably accommodated in the sewage holding groove 62. The pressure roller assembly 3 is rotatably mounted in the pressure roller groove 63. A water pump energy storage assembly is detachably mounted in the integrated assembly cavity 64. One end of the support frame body 61 is detachably provided with a first housing cover 65, and the other end of the support frame body 61 is

detachably provided with a second housing cover 66. The support frame functions to support the whole device. The metal support frame is integrally stretched and formed, and functions to stably support the whole device. The common plastic support frame on the market is not integrally formed due to process limitations. If the plastic support frame is required to support the whole device, it needs to be thickened, which makes the device cumbersome. This is not beneficial to simplifying the structure of the device or improving the firmness of the device. In an example, the second housing cover 66 is provided with a receptacle bin 661. A lower edge of the sewage holding groove opening is provided with an inclined guide plate 621. The guide plate 621 is configured to guide the wastewater and/or the particulate dirt into the sewage holding groove 62. In an example, a top and a bottom of the support frame body 61 are respectively covered with a decorative plate for aesthetic purposes.

[0062] Preferably, the support frame body 61 is fixedly provided with a first toothed comb 67. As shown in FIG. 33, the first toothed comb 67 is provided between the sewage holding groove 62 and the pressure roller groove 63. The first toothed comb 67 may be made of metals, plastic materials, or other materials. Of course, the support frame body 61 may further be provided with a first brush bin. The first brush bin is provided between the sewage holding groove 62 and the pressure roller groove 63. A brush is rotatably mounted in the first brush bin. One end of the brush is rotatably mounted to the first housing cover 65, and the other end of the brush is rotatably mounted to the second housing cover 66. In addition, it is not excluded that both the first toothed comb and the brush are provided. The first toothed comb and/or the brush is provided. Teeth or bristles are in point-to-surface contact with the roller brush. In a case of surface-to-surface contact between a scraper or a pressure bar and a roller brush, soft waste such as hair or noodles adhering to the roller brush may not be removed by the acting force of the surface-to-surface contact, and the soft waste may even be squeezed and attached to the roller brush more firmly. In contrast, the teeth or the bristles on the first toothed comb and/or the brush in point-to-surface contact with the roller brush can remove the soft waste adhering to the roller brush, so that the waste on the roller brush can be removed more effectively and more thoroughly, which is beneficial to cleaning the floor more effectively.

[0063] The pressure roller assembly and the roller brush rotate oppositely at high speed simultaneously and squeeze each other, so that a large amount of water may be accumulated below the pressure roller assembly. The first toothed comb and/or the brush may drain the accumulated water into the sewage holding groove, which prevents the accumulated water from splashing everywhere, causing water stains left on the floor.

[0064] Preferably, the support frame body is provided with a second toothed comb 68. As shown in FIG. 33, the second toothed comb 68 is located at one side of the pressure roller groove 63 away from the sewage holding groove 62. There may be one or a plurality of second toothed combs 68. When there are a plurality of second toothed combs 68, teeth on different second toothed combs 68 may be staggered. In an example, two second toothed combs 68 are provided. Of course, the support frame body 61 may further be provided with at least one second brush bin. The second brush bin is arranged at one side of the pressure roller groove 63 away from the sewage holding groove 62. At least one brush is rotatably mounted in the second brush bin. Alternatively, both the second toothed comb 68 and the brush are provided. Of course, the brush in the second brush bin may be the same as or different from the brush in the first brush bin.

[0065] After the roller brush is squeezed by the pressure roller assembly to remove the wastewater and/or the particulate dirt, a flannel water-absorbent layer on the surface of the roller brush is tightly pressed to the roller. As the flannel water-absorbent layer continues rotating forward and contacts the floor again, since the flannel water-absorbent layer is pressed together, the ability of the roller brush to adsorb the wastewater and/or the particulate dirt obviously deteriorates. Therefore, after the roller brush is squeezed by the pressure roller assembly, teeth, or bristles on the second toothed comb and/or the brush in contact with the roller brush arranged on the surface of the roller brush may scratch the flannel water-absorbent layer to make the flannel water-absorbent layer more fluffy, and the fluffy flannel water-absorbent layer can effectively adsorb the wastewater and/or the particulate dirt on the floor. Therefore, both the first toothed comb and the second toothed comb are beneficial to greatly improving the cleaning ability of the roller brush.

[0066] One side of the support frame body 61 away from the roller brush is fixedly provided with a fixed member 69. As shown in FIG. 1 to FIG. 2 and FIG. 36 to FIG. 37, the operating lever 8 is rotatably mounted to the fixed member 69 through a rotating structure. The rotational structure comprises a first rotating member 691 and a second rotating member 692. An advancing direction of the cleaning device is defined as an x direction, and an axial direction of the roller brush is defined as a y direction. The first rotating member 691 is configured to enable the operating lever 8 to rotate along the x direction, and the second rotating member 692 is configured to enable the operating lever 8 to rotate along the y direction. Preferably, a free end of the operating lever is capable of rotating freely, so that an operator can flexibly rotate the operating lever when in use. Preferably, the operating lever is provided with a limiting rib 6921. The fixed member 69 is provided with a limiting slot 695. As shown in FIG. 41, when the operating lever is vertically placed, the limiting rib 6921 is in the limiting slot 695. In an example, the limiting rib 6921 is arranged at one end of the second rotating member 692 facing the fixed member 69 and at one side close to the roller brush. The operating lever can be fixed vertically. The operating lever is restricted

from rotating forward, leftward, and rightward, so that the operator can leave temporarily during the operation.

[0067] The sewage tank 71 is detachably mounted to one side of the support frame body 61 away from the roller brush. As shown in FIG. 36 and FIG. 38, in an example, the sewage tank 71 is detachably mounted to the fixed member 69. The fixed member 69 is provided with an extension plate 693. The extension plate 693 extends away from the support frame body 61. Two sides of the extension plate 693 are provided with elastic snap-fit protrusions 6931. The sewage tank 71 is provided with snap-fit grooves 712 matched with the elastic snap-fit protrusions 6931. The elastic snap-fit protrusion 6931 snaps into the snap-fit groove 712. Preferably, a side wall at one side of the snap-fit groove close to the support frame is an inclined surface, and one end of the inclined surface close to an opening of the snap-fit groove is inclined toward the support frame. The side wall of the snap-fit groove is inclined, so that the elastic snap-fit protrusion can be mounted into the snap-fit groove or ejected from the snap-fit groove more easily. Of course, a filter structure may further be arranged in the sewage tank. The filter structure is configured to separate the wastewater from the particulate dirt, so that the waste can be cleaned. Besides, the filtered water may be put into the clean water tank for reuse, which saves water.

[0068] A mounting/demounting button 694 is further rotatably connected to the fixed member. As shown in FIG. 36 to FIG. 37, the mounting/demounting button 694 comprises a pressing plate 6941 and a pop-up plate 6942 perpendicularly connected to the pressing plate 6941. The pressing plate 6941 extends away from the support frame body 61. The pressing plate 6941 and the extension plate 693 are arranged in parallel to each other. The pop-up plate 6942 is located at one side of the sewage tank 71 close to the support frame body 61. Preferably, the pressing plate 6941 and the pop-up plate 6942 are designed integrally. In a case that the pressing plate 6941 is pulled up, the pop-up plate 6942 pushes the sewage tank 71 away from the support frame body, and pushes the sewage tank 71 out of the support frame body. Preferably, the pressing plate 6941 is provided with a snap-fit block 6943, and the sewage tank is provided with a second snap-fit groove 713 matched with the snap-fit block 6943. When the sewage tank is mounted to the support frame body, the snap-fit block 6943 snaps into the second snap-fit groove 713. In an example, the snap-fit groove 712 is arranged at a bottom of the sewage tank 71, and the second snap-fit groove 713 is arranged at a top of the sewage tank 71. Both the top and the bottom of the sewage tank are provided with snap-fit structures, so that the sewage tank is stably mounted to the support frame, which improves the firmness and durability of mounting of the sewage tank. The sewage tank is locked to a fixed member of the support frame, which facilitates mounting. The mounting/demounting button is provided, so that when the mounting/demounting button is pressed, the sewage tank can be demounted easily. Further, the wastewater and the waste can be poured out, or the sewage tank can be cleaned. With the mounting/demounting button, the sewage tank can be demounted easily, which is simple and convenient to operate for women who are less strong but use the cleaning device more frequently.

[0069] The cleaning device further comprises a clean water tank 72. As shown in FIG. 1, the clean water tank 72 is configured to provide clean water for cleaning the roller brush. The clean water tank comprises a clean water tank water outlet. The clean water tank water outlet is provided at a bottom of the clean water tank 72. Preferably, the clean water tank 72 is arranged on the operating lever 8. The operating lever 8 is provided with a water tank connecting structure 81 and a slidable snap-fit structure 82. The slidable snap-fit structure 82 is located above the water tank connecting structure 81. The slidable snap-fit structure 82 is slidable along the operating lever 8. The bottom of the clean water tank 72 is mounted on the water tank connecting structure. The slidable snap-fit structure 82 locks the clean water tank 72 to the operating lever 8. Since the slidable snap-fit structure is slidable along the operating lever 8, the slidable snap-fit structure can the lock clean water tank with different volume size to the operating lever. The water tank connecting structure 81 is provided with a water tank connection port. The water tank connection port communicates with a clean water tank water outlet. The clean water tank 72 conveys the clean water to the surface of the roller brush through the clean water tank water outlet, the water tank connection port, and a water inlet tube. One end of the clean water tank 72 close to the clean water tank water outlet is provided with a water outlet valve. When the clean water tank is demounted or mounted, the water outlet valve can prevent the clean water in the clean water tank from flowing out from the water tank water outlet. The clean water tank is provided, so that when the roller brush is cleaning the wastewater and the waste, the roller brush itself is also cleaned, thereby realizing the self-cleaning function of the roller brush. In this way, the floor can be cleaned more efficiently. Moreover, the slidable snap-fit structure is provided, so that clean water tanks with different volume sizes can be mounted according to needs, which improves the flexibility of the device.

[0070] Preferably, a water pump 73 is further comprised. As shown in FIG. 31, the water pump 73 is connected to the clean water tank 72 through the water inlet tube. The water pump 72 is configured to convey the clean water in the clean water tank 71 into the mopping apparatus, i.e., convey the clean water to the surface of the roller brush 1. In an example, the water pump 73 is mounted in the support frame 6.

[0071] Preferably, the water pump 73, the circuit board 52, and the energy storage member 53 are integrated in the water pump energy storage assembly 5. As shown in FIG. 30 to FIG. 31, the water pump energy storage assembly 5 is detachably mounted into the integrated assembly cavity 64 of the support frame 6. The water

pump energy storage assembly 5 comprises an integrated bracket 51, the water pump 73, the circuit board 52, and the energy storage member 53. The water pump, the circuit board 52, and the energy storage member are all detachably mounted to the integrated bracket 51. The water pump is electrically connected to the circuit board 52. The energy storage member is electrically connected to the circuit board 52. The energy storage member provides electrical energy for the circuit board 52. The circuit board 52 provides electrical energy for the whole cleaning device, for examples, the circuit board provides electrical energy for the water pump, the impeller motor, and the driving structure in the roller brush. In an example, the energy storage member comprises at least two energy storage batteries, and the at least two energy storage batteries are electrically connected in series or in parallel.

[0072] The integrated bracket 51 comprises a water pump bracket 511 and an energy storage bracket 512 detachably connected to the water pump bracket 511. The water pump is mounted in the water pump bracket. The energy storage bracket is provided with an energy storage bin. The energy storage member is electrically connected into the energy storage bin. In an example, the circuit board 52 is detachably mounted to the energy storage bracket, and the water pump bracket 511 is connected to the energy storage bracket 512 in a snap-fit manner.

[0073] The circuit board 52 is provided with a charging port 521, and an external power supply is configured to charge the energy storage member through the charging port. Preferably, the charging port is a Type-C port. In an example, the charging port 521 is arranged at one side of the circuit board 52 away from the water pump 73.

[0074] The circuit board 52 is provided with a water pump control module, an energy storage charging/discharging protection module, a fast charging module, and a complete device control module. The water pump control module is configured to control an on/off state and a flow rate of the water pump. The energy storage charging/discharging protection module is configured to prevent overcharge, overdischarge, overcurrent, or overvoltage when the energy storage member is charged or discharged. The charging port is configured to quickly charge the energy storage member through the fast charging module. The complete device control module is configured to control an on/off state and other functions of the cleaning device, so as to better protect the energy storage member, reduce the frequency of damage, and prolong the service life of the device. In an example, a position of the integrated assembly cavity 64 corresponding to the circuit board is provided with a display opening, and a display panel 522 is mounted in the display opening. As shown in FIG. 2, the display panel 522 is electrically connected to the circuit board 52. The display panel 522 is configured to display a working state, battery information, a cleaning mode, or remote control information of the device. The display panel 522 is preferably a touch panel.

[0075] The scrubbing assembly comprises the threaded conveying rod 21 and the sewage holding groove 62. As shown in FIG. 5 to FIG. 6, the threaded conveying rod 21 is arranged in proximity to or attached to the roller brush 1. The threaded conveying rod is provided with a spiral protrusion 212. When the threaded conveying rod 21 rotates, the spiral protrusion 212 is configured to convey the wastewater and/or the particulate dirt from one end to the other end of the threaded conveying rod 21. The spiral protrusion 212 is a flexible spiral protrusion or a rigid spiral protrusion.

[0076] Preferably, one end of the threaded conveying rod 21 along a conveying direction is provided with an impeller member 20. As shown in FIG. 26 to FIG. 29, the threaded conveying rod 21 is rotatably accommodated in the sewage holding groove 62. One end of the threaded conveying rod 21 is mounted to the first housing cover 65, and the other end of the threaded conveying rod 21 is rotatably mounted to the impeller member 20. The impeller member 20 is detachably mounted in the second housing cover 66. The impeller member 20 is connected to the sewage tank 72. The threaded conveying rod 21 is configured to convey the wastewater and/or the particulate dirt on the roller brush 1 to the impeller member. The impeller member is configured to throw the wastewater and/or the particulate dirt into the sewage tank.

[0077] The impeller member 20 comprises an impeller 22 and an impeller housing 23. The impeller 22 is rotatably mounted in the impeller housing 23. The impeller housing 23 is provided with an impeller cavity 231, an impeller housing water inlet 232, and an impeller housing water outlet 233. Both the impeller housing water inlet 232 and the impeller housing water outlet 233 communicate with the impeller cavity 231. The impeller housing water inlet 232 is provided at one side of the impeller housing 23 close to the threaded conveying rod 21. The impeller cavity 231 communicates with the sewage holding groove 62 through the impeller housing water inlet 232. The impeller housing water outlet 233 is connected to the sewage tank 72. The impeller 22 is configured to throw water and/or dirt at the impeller housing water inlet 232 from the impeller housing water outlet 233 into the sewage tank 72. In the impeller cavity, under the action of a centrifugal force formed by the rotating impeller, the wastewater and/or the particulate dirt is thrown into the sewage tank. In an example, the impeller cavity 231 is a cylindrical impeller cavity, and the impeller housing 23 is a cylindrical impeller housing. The impeller housing water outlet 233 is provided on a surface of the impeller housing 23 and extends out of the impeller housing 23.

[0078] The impeller 22 is provided with an impeller motor 234. The impeller motor 234 is configured to drive the impeller 22 to rotate. The impeller motor is provided, such that a rotational speed of the impeller can be adjusted. The rotational speed of the impeller may be the same as or different from a rotational speed of the threaded conveying rod. In general cases, the impeller motor drives

the impeller to rotate at high speed, which can improve the efficiency of discharging the wastewater and/or the particulate dirt.

[0079] The first housing cover 65 is provided with an annular engagement groove configured to rotate freely. One end of the threaded conveying rod 21 away from the impeller member 20 is provided with screw engagement teeth 213 matched with the annular engagement groove. An inclination direction of the annular engagement groove is the same as a rotation direction of the threaded conveying rod 21. When the threaded conveying rod 21 rotates, the threaded conveying rod 21 has a tendency to rotate toward the first housing cover 65, so there is no need to worry that the threaded conveying rod 21 will fall off from one side of the second housing cover when rotating. The second housing cover is a provided with a through impeller member hole. The threaded conveying rod and the impeller member are mounted through the impeller member hole. The threaded conveying rod is accommodated in the sewage holding groove. The impeller member is accommodated in the impeller member hole. Since when the threaded conveying rod 21 rotates, the threaded conveying rod 21 has a tendency to rotate toward the first housing cover 65, as long as the impeller member hole is closed with a hole cover, there is no need to worry that the threaded conveying rod and the impeller member will fall off through the impeller member hole.

[0080] The other end of the threaded conveying rod 21 is rotatably mounted to the impeller housing 23. The impeller housing 23 is provided with a screw bin 237. The other end of the threaded conveying rod 21 is rotatably accommodated in the screw bin through a bearing. The threaded conveying rod 21 and the impeller 22 may be coaxial or not coaxial.

[0081] In an example, both the impeller 22 and the impeller motor 234 are arranged in the impeller cavity 231. A bottom of the impeller cavity 231 is provided with a drive bin 2311. The impeller motor 234 is accommodated in the drive bin 2311. A drive cover 2312 hermetically covers the drive bin 2311. The impeller motor 234 has a driving shaft 2341. The driving shaft 2341 runs through the drive cover 2312 and extends into the impeller cavity 231. The impeller 22 is fixedly sleeved over the driving shaft 2341. Preferably, an annular sealing groove 2313 is sleeved over an outer wall of the drive bin 2311. The drive bin 2311 is coaxial with the annular sealing groove 2313. A second sealing ring is arranged in the annular sealing groove 2313. The drive cover 2312 is detachably and hermetically connected in the annular sealing groove 2313. The impeller motor 234 is sealed in the drive bin 2311, which prevents water in the impeller cavity from entering the impeller motor and causing damage to the impeller motor.

[0082] The impeller housing 23 is provided with a mounting port 235. A lid 236 hermetically covers the mounting port 235. A first sealing ring is sleeved over a side wall of the lid 236. The lid 236 hermetically covers the mounting port 235 through the first sealing ring. The impeller housing 23 is sealed, which prevents water in the impeller cavity 231 from leakage, thereby avoiding damaging the cleaning device.

[0083] The impeller 22 comprises an impeller body 221 and a plurality of vanes 222 provided around a surface of a shaft body. The impeller body 221 is provided with a sleeving groove 223. The impeller body 221 is rotatably sleeved over the annular sealing groove 2313 through the sleeving groove 223. The lid 236 is provided with a support bin. One side of the impeller 22 away from the sleeving groove 223 is provided with a support column 224. The support column 224 is rotatably accommodated in the support bin. In an example, the support column 224 is rotatably connected in the support bin through a bearing.

[0084] The threaded conveying rod 21 is rotatably accommodated in the sewage holding groove 62. The threaded conveying rod 21 and the sewage holding groove 62 are coaxial. The sewage holding groove 62 appears an arc-shaped groove structure. The threaded conveying rod 21 is arranged in proximity to or attached to the sewage holding groove. The sewage holding groove opening faces the roller brush. The threaded conveying rod 21 is arranged in proximity to or attached to the roller brush 1. The wastewater and/or the particulate dirt on the roller brush 1 falls into the sewage holding groove 62.

[0085] On the surface of the sewage holding groove 62, an comprised angle Θ is formed between the upper edge and the lower edge of the sewage holding groove opening, that is, the sewage holding groove forms the angle θ. The comprised angle θ is greater than 180°. The sewage holding groove 62 is arranged in proximity to or attached to the roller brush 1. Further preferably, the comprised angle θ is 180° to 270°. More preferably, the comprised angle θ is 270°. In this way, the sewage holding groove can completely surround the roller brush, so that all the wastewater and/or the particulate dirt on the roller brush can fall into the sewage holding groove, which prevents the wastewater and/or the particulate dirt from spillover. In addition, the larger the comprised angle θ of the sewage holding groove, the better the conveying channel can be provided for the threaded conveying rod, and the more the wastewater and/or the particulate dirt can be conveyed by the threaded conveying rod to the impeller member or the sewage tank.

[0086] The threaded conveying rod 21 comprises a rod-like main shaft 211 and a spiral protrusion 212 spirally provided around the main shaft 211. The spiral protrusion 212 is a flexible spiral protrusion or a rigid spiral protrusion. A spiral groove is formed between every two adjacent turns of the spiral protrusion 212. The spiral groove is configured to convey the wastewater and/or the particulate dirt. A spiral direction of the spiral protrusion 212 may be adaptively adjusted according to the rotation direction and the conveying direction of the threaded conveying rod 21.

[0087] The threaded conveying rod 21 is detachably mounted in the sewage holding groove 62. The threaded conveying rod 21 is arranged in proximity to or attached to an inner wall of the sewage holding groove, so that the threaded conveying rod 21 can effectively convey the wastewater and/or the particulate dirt. The threaded conveying rod 21 conveys the wastewater and/or the particulate dirt to the impeller member through the spiral groove 213. In an example, a distance between the threaded conveying rod 21 and the inner wall of the sewage holding groove 62 is not greater than 1 cm. Preferably, the distance between the threaded conveying rod 21 and the inner wall of the sewage holding groove 62 is not greater than 0.5 cm. Most preferably, the distance between the threaded conveying rod 21 and the inner wall of the sewage holding groove 62 is not greater than 0.2 cm.

[0088] The threaded conveying rod 21 is arranged in proximity to or attached to the roller brush 1. In one embodiment, the threaded conveying rod 21 is arranged in proximity to the roller brush 1. The threaded conveying rod 21 does not rotate together with the roller brush 1. The threaded conveying rod 21 is connected to a driving part. The driving part drives the threaded conveying rod 21 to rotate. The threaded conveying rod 21 only functions to convey the wastewater and/or the particulate dirt. The wastewater and/or the particulate dirt on the roller brush falls into the sewage holding groove 62. The threaded conveying rod 21 conveys the wastewater and/or the particulate dirt to the impeller member. The vanes rotate at high speed, so that the wastewater and/or the particulate dirt is thrown into the sewage tank 72. In another embodiment, the threaded conveying rod 21 is attached to the roller brush 1. The threaded conveying rod 21 can not only convey the wastewater and/or the particulate dirt to the impeller member of the threaded conveying rod 21, but also convey the clean water through the sewage holding groove 62. The clean water is conveyed by the rotating threaded conveying rod 21, so that the clean water contacts the surface of the roller brush 1 to clean the roller brush. At the same time, the threaded conveying rod is in pressure contact with the roller brush, which can effectively squeeze the water on the roller brush and remove the waste on the roller brush. In this case, the threaded conveying rod 21 can not only convey the wastewater and/or the particulate dirt through the spiral groove, but also squeeze the wastewater and/or the particulate dirt on the roller brush. Moreover, the threaded conveying rod 21 can convey the clean water to the surface of the roller brush to replace water on the roller brush and clean the roller brush, thereby realizing the self-cleaning function of the roller brush. The above functions may be combined flexibly and freely according to actual needs. Of course, if the threaded conveying rod 21 only functions to convey the wastewater and/or the particulate dirt, the support rod body may be provided with a clean water port facing the roller brush. The clean water in the clean water tank is conveyed to the surface of the roller brush through the water pump and the clean water port.

[0089] The threaded conveying rod is arranged in proximity to or attached to the roller brush and rotates oppositely relative to the roller brush, and the threaded conveying rod and the roller brush are two cylinders that rotate oppositely and squeeze each other, so that a low resistance is applied to the roller brush, which reduces the power loss of the roller brush. In this way, the loss of the driving power of the roller brush can be reduced, and the surfaces of the roller brush and the threaded conveying rod are prevented from damage, which prolongs the service life of the product.

[0090] In addition, the spiral groove formed on the threaded conveying rod makes the surface of the threaded conveying rod protruding and recessed. When the threaded conveying rod presses against the roller brush and rotates, the protruding and recessed surface of the threaded conveying rod kneads, pats, and squeezes a flexible cleaning layer on the surface of the roller brush, which makes the surface of the roller brush have a better scrubbing and drying effect. When the threaded conveying rod squeezes the roller brush, the wastewater and/or particulate dirt on the roller brush can be squeezed out, so that the roller brush is in a half-wet, slightly wet, or slightly dry state, which is beneficial to self-cleaning and automatic squeezing of the roller brush. The roller brush in a wet state sweeps and mops the floor so as to clean the floor. Then, through the threaded conveying rod 21 and the rotating roller brush, the wastewater is continuously replaced with the clean water, and the wastewater and/or the particulate dirt is thrown into the sewage tank. At the same time, the self-cleaning function of the roller brush is realized. The above structure is simple and compact, and is beneficial to simplifying the product structure and reducing the cost.

[0091] Preferably, the threaded conveying rod 21 is provided with a plurality of clusters of bristles. The clusters of bristles are arranged in the spiral groove and/or on the spiral protrusion 212. Preferably, the clusters of bristles are arranged on the spiral protrusion 212. The clusters of bristles can increase the friction between the threaded conveying rod 21 and the roller brush 1, and prevent the threaded conveying rod 21 from being unable to rotate together with the roller brush 1 due to skidding. More preferably, the threaded conveying rod 21 is a shaftless threaded conveying rod.

[0092] The roller brush 1 is mounted at one side of the support frame 6 close to the sewage holding groove. The roller brush 1 contacts the floor so as to clean the wastewater and/or the particulate dirt on the floor. One end of the support frame body 61 extends to above the roller brush 1. One end of the support frame body 61 extends to one side of the roller brush 1 close to the bottom. The support frame body 61 is configured to prevent the wastewater and/or the particulate dirt on the roller brush from spillover. In an example, one end of the roller brush 1 is rotatably mounted to the first housing cover.

[0093] The roller brush 1 is a roller brush with a built-

in driving structure. Preferably, one end of the roller brush 1 is provided with a mounting/demounting member 4, and the roller brush 1 and the mounting/demounting member 4 form a roller brush assembly 10. As shown in FIG. 7 to FIG. 25, the roller brush 1 comprise a roller brush body 11 and a driving structure 12. The roller brush body 11 is provided with an accommodating cavity 111 with an opening on at least one end. The driving structure 12 is accommodated in the accommodating cavity 111. The opening of the roller brush body 11 is hermetically covered with an end cover. Preferably, the driving structure 12 does not rotate together with the roller brush body 11.

[0094] The roller brush body 11 comprises a roller 13 and a flexible cleaning layer arranged on the roller. The accommodating cavity 111 is provided with in the roller 13. In an example, as shown in FIG. 7, two ends of the roller 13 are provided with openings, namely a first opening and a second opening. The roller brush body 11 further comprises a first end cover 112 and a second end cover 113. The first end cover 112 covers the first opening, and the second end cover 113 covers the second opening. Preferably, the first opening and the second opening are provided with sealing rings. The first end cover 112 hermetically covers the first opening, and the second end cover 113 hermetically covers the second opening. The first end cover and the second end cover seal the roller brush body, so as to prevent water outside the roller brush from entering the built-in driving structure.

[0095] The roller brush 1 is a rotatable water-absorbent roller brush. Typically, the roller brush may be a water-absorbent plush cotton roller brush or a water-absorbent sponge roller brush, such as polyvinyl alcohol sponge. The flexible cleaning layer is a flannel water-absorbent layer or a water-absorbent rubber layer. Of course, the flexible cleaning layer may also be made of other water-absorbent materials.

[0096] The driving structure 12 comprises a rotating shaft 121. As shown in FIG. 10, the driving structure 12 is configured to drive the rotating shaft 121 to rotate. The rotating shaft 121 is fixedly provided with a ring gear 122. A toothed groove 1311 is arranged in the roller. The toothed groove 1311 is matched with the ring gear 122. The ring gear 122 is engaged in the toothed groove 1311. The rotating shaft 121 is configured to drive the roller brush body 11 to rotate through the ring gear 122 and the toothed groove 1311. In an example, the toothed groove 1311 is arranged at a bottom of the accommodating cavity 111. In an example, as shown in FIG. 15, a fixed bracket 131 is fixedly arranged in the accommodating cavity 111. The fixed bracket 131 is fixedly connected to an inner wall of the roller 13. The toothed groove 1311 is provided on the fixed bracket 131. Preferably, the fixed bracket 131 is integrally connected to the roller 13.

[0097] As shown in FIG. 12, the first end cover 112 is fixedly locked to the inner wall of the roller 13. The first end cover 112 is provided with a first annular protrusion 1120. A surface of the first annular protrusion 1120 is provided with at least one clamping block 1121. The inner wall of the roller close to the second opening is provided with at least one limit slot 132. The limit slot 132 corresponds to the clamping block 1121. The clamping block 1121 can be locked in the limit slot 132. The limit slot 132 comprises a first limit slot 133 and a second limit slot 134. The first limit slot 133 communicates with the second limit slot 134. An axial direction of the first limit slot 133 is the same as an axial direction of the roller 13. An axial direction of the second limit slot 134 is perpendicular to the axial direction of the roller 13. The first limit slot 133 starts from the second opening and extends inward along the inner wall of the roller to the second limit slot 134 until it communicates with the second limit slot. When mounting the first end cover 112, the clamping block 1121 slides in along the first limit slot 133. When the clamping block 1121 slides to the second limit slot 134, the first end cover 112 is screwed, and the clamping block 1121 is locked in the second limit slot 134. The first end cover forms a detachable snap-fit with the roller, and must be demounted or mounted by the aid of a tool, which prevents the first end cover from being mistakenly demounted, causing the driving structure to fall off from the roller.

[0098] One end of the roller brush 1 is provided with the mounting/demounting member 4. By way of the mounting/demounting member 4, the first end cover can be demounted such that the driving structure 12 can be removed, which facilitates cleaning or replacement of the roller brush body. As shown in FIG. 12, the first opening of the roller brush body 11 is hermetically covered with the first end cover 112. The mounting/demounting member 4 runs through the first end cover 112 and is fixedly connected to the driving structure 12. By way of the mounting/demounting member 4, the first end cover 112 and the driving structure 12 can be demounted from the roller brush body 11. Preferably, the first end cover 112 is configured to rotate together with the roller brush body 11. The mounting/demounting member functions to support the driving structure. The mounting/demounting member is fixedly connected to the driving structure. The driving structure is fixedly connected to the mounting/demounting member, which makes both the driving structure and the mounting/demounting member not rotate together with the roller brush body.

[0099] In an example, the first end cover 112 is provided with a through via 1122. As shown in FIG. 16, the mounting/demounting member 4 is fixedly connected to the driving structure 12 through the via 1122. As shown in FIG. 10, the mounting/demounting member 4 is fixedly connected to the driving structure 12 through a bolt. Of course, the mounting/demounting member 4 and the driving structure 12 may also be fixedly connected in other manners. The mounting/demounting member 4 is capable of not rotating together with the roller brush body 11. In an example, the bolt is a hollow bolt.

[0100] The first end cover 112 is provided with an unlocking groove 1123. In an example, a plurality of unlock-

ing grooves 1123 are annularly provided around the surface of the first end cover 112. The plurality of unlocking grooves 1123 are annularly provided around the via 1122.

[0101] As shown in FIG. 7 and FIG. 10, the driving structure 12 is rotatably connected to the first end cover 112 through a bearing 125. Both the first end cover 112 and the driving structure 12 do not rotate together with the roller brush body 11.

[0102] The mounting/demounting member 4 comprises a housing body 41 and a button 42. As shown in FIG. 15 to FIG. 22, one end of the button 42 is provided with a plug 421. One end of the button 42 close to the plug 421 is provided with a spring-back bin 422. An axial direction of the spring-back bin 422 is the same as an axial direction of the plug 421. The spring-back bin 422 is configured to accommodate a spring-back structure.

[0103] The housing body 41 is provided with a button hole 411 along an axial direction. A bottom of the button hole 411 is provided with a through plug hole 412. An inner diameter of the plug hole 412 is smaller than an inner diameter of the button hole 411. An outer diameter of the plug 421 is not greater than the inner diameter of the plug hole 412. A height of the plug 421 is greater than a height of the plug hole 412. The plug 421 can run through the plug hole 412 and extend to the outside. The bottom of the button hole 411 is provided with a limit post 413. A height of the limit post 413 is smaller than a depth of the spring-back bin 422. In an example, the spring-back structure is a spring. One end of the spring 43 is sleeved over the limit post 413, and the other end of the spring 43 is accommodated in the spring-back bin 422. A position of the button that is not pressed in the button hole is set as an initial position, and a position of the button that has been pressed in the button hole is set as an unlocking position. By providing the spring-back structure, the button that is not pressed can be always kept at the initial position, or the button can return to the initial position after the pressing is completed.

[0104] The driving structure may be directly electrically connected to the cleaning device through a wire, or a conducting structure may be arranged on the mounting/demounting member, and the motor is powered by way of electrical connections in a snap-fit or magnetic manner. This manner facilitates demounting, and realizes modularization of the parts, so that the roller brush assembly can be mounted and demounted in one piece. In an example, the wire of the driving structure extends into the mounting/demounting member through the hollow bolt. The mounting/demounting member is provided with a waterproof insertion structure. The waterproof insertion structure is electrically connected to the circuit board of the support frame. The circuit board controls an on/off state and a rotational speed of the driving structure.

[0105] One end of the roller brush assembly is hermetically and electrically connected to the support frame through the waterproof receptacle. The waterproof receptacle comprises a waterproof insertion structure and a waterproof locking structure. The mounting/demounting member is provided with the waterproof insertion structure, and the support frame is provided with the waterproof locking structure. In an example, for the convenience of assembly, the housing body 41 is designed as a split structure. The housing body 41 is provided with the waterproof insertion structure. As shown in FIG. 20, the waterproof insertion structure comprises at least one connection terminal and at least one insertion port 417. The connection terminal is fixedly arranged in the housing body. In an example, the housing body 41 is provided with a connection cavity. The at least one connection terminal is fixedly arranged in the connection cavity. The housing body 41 is in a split structure, so that the connection terminal can be fixedly mounted into the connection cavity. The housing body is provided with at least one insertion port 417. The insertion port 417 corresponds to the connection terminal. Preferably, an elastic waterproof pad 418 is provided between the insertion port 417 and the connection terminal. The elastic waterproof pad 418 is hermetically arranged at the insertion port. The elastic waterproof pad 418 is provided with a closing seam 4181. As shown in FIG. 39 to FIG. 40, the insertion port 417, the closing seam 4181 and the connection terminal correspond to each other. In an example, the connection terminal is a female plug 416. Two female plugs 416 are provided. When a male plug is inserted into the female plug 416 through the insertion port 417 and the closing seam, the elastic waterproof pad is hermetically provided around the male plug through the closing seam, so as to prevent water from entering the female plug through the closing seam. When the male plug is not inserted into the female plug, the closing seam is closed, and water cannot enter the female plug, so that the elastic waterproof pad plays a sealing and waterproofing role. Preferably, one side of the closing seam 4181 close to the insertion port is provided with a V-shaped port. As shown in FIG. 39, a length direction of the V-shaped port is the same as a length direction of the closing seam, and a length of the V-shaped port is the same as a length of the closing seam. The V-shaped port is provided, so that the male plug can run through the closing seam smoothly, which prevents the male plug from squeezing the closing seam all the time and causing rupture of the closing seam.

[0106] Accordingly, a waterproof locking structure 660 is further comprised. As shown in FIG. 2 to FIG. 3 and FIG. 34 to FIG. 35, the waterproof locking structure comprises a male receptacle body 662 and a male plug 663. The second housing cover 66 of the support frame is provided with the receptacle bin 661. The male receptacle body 662 is fixedly arranged in the receptacle bin 661. In an example, the male receptacle body 662 is injected into the receptacle bin 661 of the second housing cover. The male receptacle body 662 is provided with an insertion slot 6621. A bottom of the insertion slot 6621 is fixedly provided with at least one male plug 663. The male plug 663 corresponds to the waterproof insertion structure.

The male plug 663 can be electrically inserted into the female plug through the insertion port 417, thereby providing electrical energy for the driving structure. In an example, two male plugs 663 are provided. The other end of the male plug 663 is electrically connected to the circuit board.

[0107] A side wall of the insertion slot 6621 is provided with a latch 6622 and a latch groove 6623. One end of the latch 6622 is fixedly arranged on the side wall of the insertion slot 6621. One end of the latch 6622 is a free end. The latch groove 6623 corresponds to the latch 6622. The latch 6622 that is pressed is accommodated in the latch groove 6623.

[0108] Preferably, an elastic sealing piece 6624 is hermetically arranged in the latch groove 6623. An initial position of the latch is a position when the latch 6622 is not pressed, that is, when the free end of the latch extends into the insertion slot. A pressed position of the latch is a position when the latch is pressed into the latch groove. When the latch is pressed, the latch can squeeze the elastic sealing piece to protrude away from the insertion slot. After the pressing of the latch is completed, the elastic sealing piece springs back such that the latch returns to its initial position.

[0109] The waterproof locking structure is provided with the latch, and the elastic sealing piece is arranged in the latch groove. The elastic sealing piece can prevent water from entering the cleaning device. Moreover, after the waterproof insertion structure is demounted, the elastic sealing piece can restore the latch to the initial position, which is helpful for continuous and effective use of the waterproof locking structure. In general cases, if there is no spring-back structure, the latch will be unable to return to its original position after long-term use, and will be unable to be used for a snap-fit connection any more. The elastic sealing piece can play a sealing role, and help the latch return to its initial position, so that the latch can be used for a long time.

[0110] The mounting/demounting member 4 is provided with an anti-falling structure. The anti-falling structure can prevent the button from falling off from the button hole. In an example, the surface of the button 42 is provided with a stop spring sheet 423. The stop spring sheet 423 is provided with a bump 4231. An inner wall of the button hole 411 is provided with a stop groove 414. The bump 4231 corresponds to the stop groove 414. When the button 42 is mounted in the button hole 411, the bump 4231 is accommodated in the stop groove 414, so that the button 42 is locked in the button hole 411, thereby preventing the button 42 from falling off from the button hole 411. Along an axial direction of the button 42, a length of the stop groove 414 is greater than a length of the bump 4231. In an example, a side wall at one side of the bump 4231 close to the plug 421 is an inclined wall, so that the bump 4231 can slide into the stop groove 414.

[0111] Additionally/alternatively, in another example, the surface of the button 42 is provided with a snap-fit slot 424. The inner wall of the button hole 411 is provided with a snap-fit protrusion 415. When the button 42 is mounted in the button hole 411, the snap-fit protrusion 415 snaps into the snap-fit slot 424. Preferably, the snap-fit slot 424 and the stop spring sheet 423 are oppositely arranged on two sides of the button 42, which can improve the stability of the snap-fit of the button 42 and help the button move into the button hole steadily and smoothly. In an example, an outer wall of the snap-fit slot 424 close to the plug is configured as an inclined surface, and a side wall at one side of the snap-fit protrusion 415 away from the plug hole is provided with an inclined side wall, so that the snap-fit protrusion 415 can slide into the snap-fit slot 424 conveniently.

[0112] Of course, the type of the snap-fit between the button 42 and the button hole 411 is not limited to the above, as long as the button will not fall off from the button hole 411 and the plug 421 can extend to the outside when the button is pushed into the button hole 411. The snap-fit may also be realized by providing stop spring sheets 423 on two sides of the button and stop grooves 414 on two sides of the button hole 411, or providing snap-fit slots 424 on two sides of the button and snap-fit protrusions 415 on two sides of the button hole 411.

[0113] When the button is to be mounted, one end of the spring 43 is sleeved over the limit post 413, and the button 42 is inserted into the button hole 411 and pushed into the button hole 411. While the button 42 is being pushed, the other end of the spring 43 is accommodated in the spring-back bin 422. As the button 42 is further pushed into the button hole, the bump 4231 is accommodated in the stop groove 414, and the snap-fit protrusion 415 snaps into the snap-fit slot 424. Moreover, under the spring-back action of the spring 43, the bump 4231 abuts against the side wall at one side of the stop groove 414 away from the plug hole 412, and the side wall at one side of the snap-fit slot 424 close to the plug 421 abuts against the snap-fit protrusion 415. The position of the button 42 at this time is defined as the initial position of the button 42.

[0114] When in use, the button 42 is pressed, so that the bump 4231 moves in the stop groove 414. The snap-fit protrusion 415 is still accommodated in the moving snap-fit slot 424. The plug 421 runs through the plug hole 412 and extends to the outside. At this time, the button 42 is at the unlocking position in the button hole 411. At this time, the plug 421 extends into the unlocking groove 1123. By pressing the button 42 and screwing the mounting/demounting member 4 at the same time, the first end cover 112 is demounted from the roller brush body 11. Since the mounting/demounting member 4 runs through the first end cover 112 and is fixedly connected to the driving structure 12, the mounting/demounting member 4, the first end cover 112, and the driving structure 12 are removed together from the roller brush body 11. FIG. 6 is a schematic view showing the state after the mounting/demounting member, the first end cover and the driving structure are demounted. The driving structure 12 is

removed from the accommodating cavity 111. The button 42 is released. Under the action of resilience of the spring 23, the button 42 returns to the initial position. In this embodiment, only by pressing the button 42 and screwing the mounting/demounting member 4 at the same time can the first end cover 112 be demounted, which is for fool-proof purposes. This prevents the button from being mistakenly pushed to the unlocking position, and further prevents the mounting/demounting member from being mistakenly screwed such that the driving structure is removed from the accommodating cavity. If there is water around the device, the driving structure will be damaged by water.

[0115] In another embodiment, the roller brush 1 is provided with a heat dissipation channel, as shown in FIG. 10, FIG. 13 to FIG. 15, and FIG. 17, which helps in cooling the motor and keeping the motor running at high speed and efficiency. The heat dissipation channel is provided for the built-in driving structure of the roller brush, so that heat generated by the built-in motor of the roller brush can be dissipated through the heat dissipation channel, so as to cool the motor. This can prevent the motor from burnout due to overheat. Moreover, cooling the motor is beneficial to increasing the rotational speed of the rotating shaft of the motor and improving the cleaning speed and efficiency of the roller brush, thereby improving the satisfaction of the user. In general cases, the built-in motor of the roller brush generates heat when working. Since the motor is arranged in the roller brush, the heat cannot be removed. To this end, the rotational speed of a conventional built-in motor of the roller brush is typically 200 to 400 rpm. If the rotational speed of the motor is too high, the temperature of the motor will be too high, and the motor will be prone to burnout. However, if the rotational speed of the motor is too low, the cleaning speed and efficiency will be low, which cannot meet the needs of the user. To increase the rotational speed of the motor, a method is to improve the quality of the motor. For example, a cleaning device on the market uses a roller brush with an external motor. This motor is a 7000 rpm motor, but runs adaptively at a rotational speed of 1000 rpm. For another example, a cleaning device uses a roller brush with a built-in motor. This motor is also a 7000 rpm motor, but runs adaptively at a rotational speed of 2400 rpm. These two roller brushes can meet the needs of the user, but the motors are too costly, which increases the economic burden of the user and is not suitable for the majority of users. The best method to increase the rotational speed of an ordinary motor without increasing the cost is to use the heat dissipation channel of the present invention to dissipate the heat generated by the motor and reduce the temperature rise speed of the motor.

[0116] The driving structure 12 comprises a motor 123 and a motor housing 124. As shown in FIG. 10 and FIG. 18, the rotating shaft 121 is fixedly connected to the motor 123. The motor 123 is accommodated in the motor housing 124. The motor housing 124 is accommodated in the accommodating cavity 111. The motor housing 124 does not rotate together with the rotating shaft 121 or the roller 13. The motor housing 124 is provided with an extension port at the position of the rotating shaft. The motor 123 is accommodated in the motor housing 124. The rotating shaft 121 runs through the extension port and extends out of the motor housing 124. A ring gear 122 is fixedly sleeved over the rotating shaft that extends out of the motor housing 124, and then the ring gear 122 is engaged in the toothed groove 1311. Preferably, the motor housing 124 comprises a first housing 1241 and a second housing 1242. The first housing 1241 is connected to the second housing 1242 by way of a snap-fit.

[0117] The driving structure 12 is fixedly accommodated in the accommodating cavity 111. The motor housing 124 is provided with at least one heat dissipation hole 1243. The heat dissipation hole 1243 communicates with the heat dissipation channel.

[0118] In an example, a gap 14 is provided between the side wall of the motor housing 124 and the inner wall of the roller 13. As shown in FIG. 10, the gap 14 is located in the accommodating cavity 111. The heat dissipation hole 1243 communicates with the gap 14. The fixed bracket 131 is provided with at least one through via hole 1312. As shown in FIG. 15, the via hole 1312 communicates with the gap 14. The second end cover 113 is provided with at least through hole 1131. As shown in FIG. 15 and FIG. 17, the through hole 1131 is configured to communicate with the via hole 1312. The heat dissipation channel comprises the gap 14 and the via hole 1312. A solid structure, or a part of the accommodating cavity may be arranged between the via hole 1312 and the through hole 1131. If the solid structure is arranged between the via hole 1312 and the through hole 1131, the solid structure may be provided with an exhaust channel, so that the via hole 1312 can communicate with the through hole 1131. In an example, the accommodating cavity 111 may be arranged between the via hole 1312 and through hole 1131, and the via hole 1312 communicates with the through hole 1131 through the accommodating cavity 111.

[0119] When in use, the motor rotates to generate heat. The heat generated by the motor is dissipated to the heat dissipation channel through the heat dissipation hole 1243. The heat is dissipated to the outside of the roller brush through the heat dissipation channel which sequentially comprises the gap 14, the via hole 1312 and the through hole 1131 in the first end cover 112.

[0120] Preferably, the driving structure 12 is provided with an exhaust apparatus. The exhaust apparatus is arranged in the motor housing 124. The exhaust apparatus can quickly dissipate the heat generated by the motor in the motor housing, so as to quickly cool the motor and further reduce the temperature rise speed of the built-in motor. The exhaust apparatus may be arranged inside or outside the motor; may be integrally or separately assembled with the motor; and may be arranged at one side of the motor away from the rotating shaft, or fixedly sleeved over the rotating shaft of the motor. The exhaust

apparatus may be an exhaust fan or an exhaust impeller. Preferably, the exhaust apparatus is arranged at a position in the motor housing 124 close to the heat dissipation hole 1243. In an example, the exhaust apparatus is integrally assembled in the motor. The position of the motor where the exhaust apparatus is located is annularly provided with a plurality of motor heat dissipation holes 1231. The motor heat dissipation holes 1231 correspond to the heat dissipation holes 1243.

[0121] Preferably, the roller brush body 11 is provided with a water blocking sponge 15. As shown in FIG. 7, FIG. 10, and FIG. 13 to FIG. 14, the water blocking sponge 15 corresponds to the through hole 1131. The water blocking sponge 15 is hermetically arranged in the through hole 1131. The water blocking sponge 15 is configured to prevent water from entering the accommodating cavity 111 through the through hole 1131. The water blocking sponge 15 may be arranged at one side of the second end cover 113 close to the accommodating cavity 111. The water blocking sponge 15 may also be arranged at one side of the second end cover 113 away from the accommodating cavity 111. In an example, the water blocking sponge 15 is arranged at one side of the second end cover 113 close to the accommodating cavity 111. The water blocking sponge is hermetically arranged in the heat dissipation channel. The water blocking sponge functions to resist water, and can prevent water outside the roller brush from entering the driving structure through the heat dissipation channel without preventing the heat of the driving structure from being dissipated to the outside of the roller brush through the water blocking sponge.

[0122] Preferably, an end surface of the second end cover 113 away from the accommodating cavity 111 is provided with a projecting waterproof platform 1135, that is, the waterproof platform 1135 is higher than the second end cover. As shown in FIG. 8, FIG. 10, and FIG. 13, the through hole 1131 is provided with in the waterproof platform 1135. Along a length direction of the roller brush body, a height of the waterproof platform 1135 is greater than a height of the second end cover 113. A waterproof cover 115 is arranged above the through hole. The waterproof cover 115 is detachably mounted to the second end cover 113. In an example, the waterproof cover 115 is an arc-shaped waterproof cover. The arc-shaped waterproof cover projects away from the roller brush. The waterproof cover 115 is fixed to the second end cover 113 through a bolt. In an example, an annular groove is sleeved outside the waterproof platform. A limiting rib is arranged in the annular groove. An edge of the waterproof cover is provided with an open groove. When the waterproof cover is fixed on the second end cover 113, the open groove is locked on the limiting rib, so that the waterproof cover and the second end cover rotate synchronously, which prevents the waterproof cover from rotating on the second end cover 113, causing the waterproof cover to fall off. The waterproof cover is provided so as to prevent water from entering the accommodating cavity through the through hole. The waterproof platform is higher than the second end cover. No matter the roller brush is placed vertically or horizontally, the flushing water can be prevented from flowing into the through hole. The triple waterproof structure comprising the waterproof cover, the water blocking sponge, and the waterproof platform greatly improves the waterproof effect of the roller brush.

[0123] In still another embodiment, one end of the roller 13 close to the first opening is fixedly provided with an inner cover 114. As shown in FIG. 15, the inner cover 114 is located at one end of the roller 13 close to the first opening, or the inner cover 114 is accommodated in the accommodating cavity 111 at one side close to the second end cover 113. The second end cover 113 is rotatably clamped in the inner wall of the roller 13 or the inner cover 114. The inner cover is detachably or undetachably fixed to one end of the roller 13 close to the first opening, and may be integrally arranged at one end of the roller 13 close to the first opening. In an example, the inner cover 114 is undetachably and hermetically fixed to one end of the roller 13 close to the first opening.

[0124] The second end cover 113 is rotatably clamped on the first opening. As shown in FIG. 13, the second end cover 113 is annularly provided with a plurality of hooks 1132. An axial direction of the hooks 1132 is the same as an axial direction of the roller brush 1. The plurality of hooks 1132 are spaced apart. The inner wall of the roller 13 is provided with an annular rib 1141. When the second end cover 113 is mounted to the first opening, the hooks 1132 are locked to the annular rib 1141. In an example, the inner cover 114 is in a tubular structure with an opening at one end. The opening of the inner cover 114 faces the second end cover 113. The annular rib 1141 is arranged on the inner wall of the inner cover 114.

[0125] The roller brush 1 is provided with an anti-locking structure. The anti-locking structure is arranged on the inner cover 114 and the second end cover. The anti-locking structure can help the driving structure continue to rotate when the roller brush is locked and unable to rotate, thereby protecting the motor. As shown in FIG. 11 and FIG. 13, the inner cover 114 is provided with lock pins 1143. The lock pins 1143 extend toward a radial direction of the roller 13. One side of the second end cover 113 near the hooks is provided with a second annular protrusion 1133. A plurality of grooves 1134 are provided around one end of the inner wall of the second annular protrusion 1133 close to the opening. The plurality of grooves 1134 are uniformly arranged on the inner wall of the second annular protrusion 1133. An axial direction of the grooves 1134 is the same as an axial direction of the second annular protrusion 1133. The through hole 1131 is arranged at a bottom of the second annular protrusion 1133. The lock pin 1143 is accommodated in the groove 1134. Of course, the plurality of grooves may also be annularly arranged in the inner cover 114, the lock pins may be arranged on the second end cover 113, and the lock pin is accommodated in the

groove. In an example, the lock pins 1143 are arranged on the inner cover 114, and the plurality of grooves 1134 are annularly arranged in the second annular protrusion 1133 of the second end cover 113.

[0126] The second annular protrusion 1133 is arranged in an area formed by the plurality of hooks 1132. The inner wall of the second annular protrusion 1133 is provided with the plurality of grooves 1134. One side of the inner cover 114 close to the second end cover 113 is provided with a column 1142. An axial direction of the column 1142 is the same as the axial direction of the roller 13. Preferably, the column 1142 and the roller 13 are coaxial. A surface of the column 1142 is provided with at least one lock pin 1143. The lock pin 1143 extends towards a radial direction of the column 1142. One end of the lock pin 1143 is fixedly connected to the column 1142, and the other end of the lock pin 1143 is a free end. The lock pin 1143 can be accommodated in the groove 1134. Preferably, the free end of the lock pin 1143 is inclined toward the column 1142, and the inclination direction of the lock pin 1143 is opposite to the rotation direction of the roller brush 1. Preferably, the free end of the lock pin 1143 is an arc-shaped free end. In an example, the inner cover 114 is further provided with a third annular protrusion 1144. The second annular protrusion is located in the third annular protrusion 1144. The second annular protrusion of the second end cover can be accommodated in the third annular protrusion 1144. The third annular protrusion 1144 can function to support the anti-locking structure.

[0127] When in use, the driving structure 12 drives the roller brush to rotate, and the lock pin 1143 is accommodated in the groove 1134, so the second end cover 113 rotates together with the roller brush. If the second end cover 113 or the roller brush body and even the first end cover are locked by hair or other waste and become unable to rotate, since the extending direction of the lock pin 1143 is opposite to the rotation direction of the roller brush, as the lock pin sequentially passes through the plurality of grooves 1134, the lock pin 1143 keeps rotating under the driving force of the driving structure. When the lock pin 1143 rotates to sequentially pass through the plurality of grooves, the lock pin is continuously squeezed and springs back to make a "dadada" sound, thereby protecting the motor from overcurrent and overheat, and preventing the motor and even the roller brush from burnout. Moreover, the "dadada" sound reminds the user that the roller brush is locked and needs to be dealt with in time, thereby preventing the roller brush from being locked for a long time, causing burnout, smoke, odor, or fire.

[0128] Of course, the inner cover 114 is provided with at least one opening 1145. The opening 1145 communicates with the through hole 1131. The opening 1145 can communicate with the via hole 1312 through the accommodating cavity 111 or the exhaust channel. In an example, a water blocking sponge 15 is provided between the opening 1145 and the through hole 1131. The opening 1145 can communicate with the via hole 1312 through the accommodating cavity 111. In this case, the motor 123 dissipates heat to the outside of the roller brush 1. The heat generated by the motor is dissipated to the outside of the roller brush 1 sequentially through the heat dissipation hole 1243, the gap 14, the via hole 1312, the accommodating cavity 111 or the exhaust channel, the opening 1145, and the through hole 1131.

[0129] In an example, an assembly process of the motor of the roller brush and the mounting/demounting member is as follows:

The first end cover is sleeved between the motor housing and the mounting/demounting member. The second housing is fixedly connected to the mounting/demounting member through the hollow bolt. The motor is accommodated in the first housing. The wires of the motor are led out through the hollow bolt. The second housing is locked to the first housing. The driving structure is extended into the accommodating cavity through the second opening. The ring gear is engaged in the toothed groove. The first end cover is rotated, so that the first end cover is locked in the second limit slot on the inner wall of the roller.

[0130] It should be noted that all the technical features of the roller brush assembly above can be freely combined in case of no conflict, and their free combinations or simple variations, changes, and modifications are all within the protection scope of the present invention.

[0131] The driving structure is arranged in the roller brush, which makes the structure compact and saves the space, so that the volumes of the assembly and the device can be reduced. Therefore, the device is light, portable, and simpler, and the production cost can be reduced.

[0132] When the roller brush is demounted from the device, the built-in driving structure is demounted together with the roller brush in one piece, which is simple to operate and convenient to use, and prevents the wastewater and/or the particulate dirt falling off from the roller brush from soaking the driving structure and causing a short-circuit of the driving structure, thereby avoiding damaging the driving structure. The driving structure in the roller brush is electrically connected to the device body, which is simple in structure, convenient to mount, and ingenious in design, so that the roller brush can be mounted and demounted conveniently.

[0133] In actual use, the roller brush needs to be replaced frequently, and the mounting and demounting of the roller brush in one piece brings great convenience to the user to replace the roller brush. The roller brush is mounted to the device body in a snap-fit or magnetic manner, so that the mounting and demounting of the roller brush is simpler and more convenient to operate. The built-in driving structure can be demounted from the roller brush. When the roller brush is to be replaced, the built-in driving structure is removed from the accommodating cavity and mounted into an accommodating cavity of a new roller brush, and then the new roller brush with the built-in driving structure is mounted to the device body in

one piece, thereby completing the replacement of the roller brush. That is, when the roller brush is to be replaced, only a roller with a flexible cleaning layer needs to be replaced, and the driving structure is reusable, which reduces the use cost for the user. In addition, if the driving structure is damaged, it is only necessary to demount and replace the driving structure, and there is no need to scrap the whole cleaning device or the whole roller brush assembly.

[0134] The pressure roller assembly 3 is mounted in the support frame 6. As shown in FIG. 6, the pressure roller assembly 3 is arranged at one side of the roller brush 1 close to the scrubbing assembly 2. The pressure roller assembly 3 is located above the scrubbing assembly 2. The pressure roller assembly 3 may be a conventional round rod-type pressure roller, or a pressure roller assembly with balls. The round rod-type pressure roller may be provided with concave and convex lines. There is a gap provided between every two adjacent balls, so that the pressure roller assembly can effectively remove the particulate dirt and sticky waste on the surface of the roller brush. An axial direction of the pressure roller assembly 3 is the same as the axial direction of the roller brush 1. The pressure roller assembly 3 is tightly pressed to the roller brush 1, so that the pressure roller assembly 3 can squeeze the wastewater and/or the particulate dirt on the roller brush 1. Of course, the pressure roller assembly 3 may further be connected to a driving part, and the driving part can drive the pressure roller assembly 3 to rotate. Preferably, a rotation direction of the pressure roller assembly 3 is opposite to the rotation direction of the roller brush 1. Preferably, a tightness between the pressure roller assembly 3 and the roller brush 1 is adjustable by a tension spring or a compression spring.

[0135] The pressure roller assembly is provided to squeeze the roller brush. The wastewater and/or the particulate dirt squeezed out of the roller brush flows into the sewage holding groove below the pressure roller assembly, which avoids or reduces water stains left on the floor that has been cleaned, and further prevents the particulate dirt from adhering to the surface of the roller brush. The balls squeeze the roller brush so as to remove the wastewater and prevent the large granular or sticky waste, so that the roller brush is squeezed to a half-wet, slightly wet, slightly dry, or even half-dry state, which improves the working efficiency and cleaning effect of the roller brush.

[0136] Another embodiment of the mopping apparatus is shown in FIG. 42 to FIG. 47. The mopping apparatus comprises a roller brush 1, a threaded conveying rod 21, an adjusting member 16, and a sewage holding groove 62.

[0137] The roller brush 1 is rotatably mounted to an apparatus housing, and the threaded conveying rod 21 is rotatably mounted to the apparatus housing.

[0138] The threaded conveying rod 21 is arranged at one side of the roller brush 1. The threaded conveying rod 21 is in pressure contact with the roller brush 1 through the adjusting member 16. The adjusting member 16 is configured to adjust a tightness of contact between the threaded conveying rod 21 and the roller brush 1. The adjusting member 16 is preferably an elastic tensioning mechanism with certain elasticity. The elastic tensioning mechanism may be a part with certain elasticity such as a spring. In an example, the adjusting member 16 is a spring. One end of the spring is rotatably connected to a threaded conveying rod connecting shaft 215, and the other end of the spring is rotatably connected to a roller 13. Preferably, a rotation direction of the threaded conveying rod 21 is opposite to a rotation direction of the roller brush 1 so as to reduce a rotational resistance of the roller brush.

[0139] The threaded conveying rod is in pressure contact with the roller brush so as to effectively squeeze water out of the roller brush and remove waste on the roller brush.

[0140] The threaded conveying rod 21 is a slender member with a spiral groove 214 on a surface thereof. The threaded conveying rod 21 comprises a main shaft 211 and the threaded conveying rod connecting shaft 215 respectively arranged at two ends of the main shaft. A surface of the main shaft 211 is provided with at least one spiral groove 214. The spiral groove is spirally provided from one end to the other end of the threaded conveying rod. A direction of the spiral groove provided may be adaptively adjusted according to the rotation direction and conveying direction of the threaded conveying rod 21. The main shaft 211 has a protruding and recessed surface. The surface of the main shaft 211 may also be provided with a plurality of spiral grooves 214, that is, a plurality of threads form the plurality of spiral grooves 214.

[0141] In an example, an outer diameter of the threaded conveying rod connecting shaft 215 is smaller than an outer diameter of the main shaft 211, and the main shaft 211 is integrally formed with the threaded conveying rod connecting shaft 215.

[0142] The roller brush 1 is a water-absorbent roller brush. Typically, the roller brush may be a water-absorbent plush cotton roller brush or a water-absorbent sponge roller brush, such as polyvinyl alcohol sponge. The roller brush 1 comprises the roller 13 and 112. A flexible cleaning layer 130 is detachably sleeved over the roller 13. Preferably, the flexible cleaning layer 130 is a plush layer or a water-absorbent rubber layer. Of course, the flexible cleaning layer 130 may also be made of other water-absorbent materials. All roller brushes or mops in the related art need to be cleaned manually. Even though some products claim to have the cleaning function, but actually they do not function effectively.

[0143] The roller brush in a wet state sweeps and mops the floor so as to clean the floor. Then, through the threaded conveying rod 21 and the rotating roller brush, the wastewater is continuously replaced with the clean water, and the wastewater and/or the particulate dirt is drained to a designated position. At the same time, the self-cleaning function of the roller brush is realized. The above

structure is simple and compact, and is beneficial to simplifying the product structure and reducing the cost.

[0144] Preferably, an outer diameter of the roller brush 1 is greater than an outer diameter of the threaded conveying rod 21.

[0145] Preferably, fixing pieces 116 are respectively sleeved over two ends of the roller 13. The fixing pieces 116 are fixedly connected to the apparatus housing. The fixing piece 116 is provided with a plurality of fixing holes 1161 along a radial direction. One end of the spring is fixed to the fixing hole 1161. By mounting the spring to different fixing holes 1161, a tightness of contact of the threaded conveying rod 21 or the pressure roller assembly 3 may be changed.

[0146] The sewage holding groove 62 is provided with a semi-closed cavity. The threaded conveying rod 21 is arranged in the semi-closed cavity of the sewage holding groove 62. The threaded conveying rod 21 can rotate in the sewage holding groove 62. The main shaft 211 is arranged in proximity to or attached to an inner wall of the sewage holding groove 62. The sewage holding groove 62 is provided with a through sewage discharge port 623 along a pumping and conveying direction of the threaded conveying rod 21. After the threaded conveying rod 21 conveys the wastewater and/or the particulate dirt from one end to the other end, the wastewater and/or the particulate dirt is discharged from the sewage discharge port 623. In an example, the other end of the sewage holding groove 62 away from the sewage discharge port 623 is further provided with a through clean water inlet 624. In an example, the sewage holding groove 62 is closed at two ends, and the sewage discharge port 122 is provided on a side wall of the sewage holding groove 62.

[0147] One side of the sewage holding groove 62 facing the roller brush 1 is provided with a sewage holding groove opening 622. A gap is provided between a lower edge of the sewage holding groove opening 622 and the roller brush 1, and through the gap, the roller brush 1 is configured to drive the wastewater and/or the particulate dirt into the threaded conveying rod 21 by way of rotation. Preferably, a length direction of the sewage holding groove opening 622 is the same as a length direction of the sewage holding groove 62, and a length of the sewage holding groove opening 622 is not smaller than a length of the roller brush 1. Of course, the length of the sewage holding groove opening 622 being smaller than the length of the roller brush 1 may be implemented as a non-preferred technical solution. In an example, the length of the sewage holding groove opening 622 is the same as the length of the roller brush 1.

[0148] The working principle of the threaded conveying rod 21 is as follows:

The threaded conveying rod 21 presses against or contacts the roller brush 1. The degree of squeezing of the threaded conveying rod to the roller brush is adjusted by the adjusting member. When the threaded conveying rod rotates, the protruding and recessed surface of the threaded conveying rod squeezes, kneads, and pats the flexible cleaning layer 130 on the surface of the roller brush, so that the wastewater and/or the particulate dirt on the roller brush 1 is squeezed into the spiral groove 214 of the threaded conveying rod 21. As the threaded conveying rod 21 rotates, the wastewater and/or the particulate dirt in the spiral groove 214 is spirally conveyed by the threaded conveying rod 21 from one end to the other end.

[0149] Moreover, clean water may also be conveyed from one end of the threaded conveying rod 21. When the threaded conveying rod 21 rotates and squeezes the roller brush, the clean water is conveyed to the roller brush which is in contact with the threaded conveying rod, so that the roller brush is cleaned. The wastewater and/or the particulate dirt on the roller brush is conveyed to the other end of the threaded conveying rod, thereby realizing the self-cleaning function of the roller brush.

[0150] In a preferred embodiment, the apparatus further comprises a pressure roller assembly 3. The pressure roller assembly is additionally provided to further squeeze the roller brush, so that the roller brush can be squeezed more effectively, which avoids or reduces water stains left on the floor that has been cleaned, and further prevents the particulate dirt from adhering to the surface of the roller brush.

[0151] The pressure roller assembly 3 is rotatably mounted to the apparatus housing or an extension portion of the sewage holding groove 62. The pressure roller assembly 3 presses against the roller brush 1, and is arranged at an upper side of the threaded conveying rod 21. Preferably, the outer diameter of the roller brush 1 is greater than an outer diameter of the pressure roller assembly 3.

[0152] The pressure roller assembly 3 is in pressure contact with the roller brush 1 through the adjusting member 16. The adjusting member 16 is configured to adjust a tightness of contact between the pressure roller assembly 3 and the roller brush 1. In an example, the adjusting member 16 for adjusting the tightness of contact between the pressure roller assembly 3 and the roller brush is a spring, which is connected in a like manner as the spring connected between the threaded conveying rod 21 and the roller brush 1.

[0153] When the pressure roller assembly 3 is additionally provided, a slit or a hollowed hole is provided between an upper edge of the sewage holding groove opening 622 and the roller brush 1, and through the slit or the hollowed hole, the wastewater and/or particulate dirt squeezed by the pressure roller assembly 3 enters the threaded conveying rod 21.

[0154] The working principle of the pressure roller assembly 3 of this application is as follows:

The pressure roller assembly 3 presses against the roller brush 1. The degree of squeezing of the pressure roller assembly 3 to the roller brush 1 is adjusted by the adjusting member. The pressure roller assembly 3 squeezes the roller brush 1 again, so that the wastewater and/or

the particulate dirt on the roller brush 1 is squeezed out. The squeezed wastewater and/or the particulate dirt flows into the spiral groove 214 of the threaded conveying rod 21 along the surface of the roller brush 1.

[0155] In this embodiment, the mopping apparatus further comprises the apparatus housing. The roller brush 1, the threaded conveying rod 21, the pressure roller assembly 3, and the sewage holding groove 62 are all accommodated in the apparatus housing. A part of a roller brush body of the roller brush 1 is exposed outside the apparatus housing.

[0156] In a case that there is no pressure roller assembly 3 provided, an upper side of the sewage holding groove is provided with a flow baffle closely matched with the roller brush.

[0157] In one embodiment, the mopping apparatus for floor cleaning further comprises a driving apparatus. The driving apparatus may be connected to the roller brush 1. The driving apparatus drives the roller brush 1 to rotate. The roller brush rotates so as to drive the threaded conveying rod 21 to rotate oppositely, so that the threaded conveying rod 21 can function to convey water and waste.

[0158] In one embodiment, the roller brush 1 is connected to one driving apparatus, and the threaded conveying rod 21 is connected to another driving apparatus. The roller brush and the threaded conveying rod are respectively driven by the respective driving apparatuses to rotate.

[0159] In one embodiment, there is no direct driving apparatus for the roller brush 1, the driving apparatus is directly connected to the threaded conveying rod 21, and the threaded conveying rod 21 rotates to drive the roller brush 1 to rotate oppositely.

[0160] In one embodiment, in the mopping apparatus for floor cleaning, neither the roller brush 1 nor the threaded conveying rod 21 is provided with the driving apparatus. When the users push the mopping apparatus forward, the roller brush is driven to rotate so as to drive the threaded conveying rod 21 to rotate oppositely, so that the threaded conveying rod 21 functions to convey water and waste.

[0161] In terms of the driving apparatus in the above four embodiments, in a case that there is a pressure roller provided, the mopping apparatus may additionally/alternatively further comprise yet another driving apparatus. The driving apparatus may be connected to the pressure roller assembly 3. The driving apparatus drives the pressure roller assembly 3 to rotate.

[0162] It should be noted that all the technical features of all the above parts can be freely combined in case of no conflict, and their free combinations or simple variations, changes, and modifications are all within the protection scope of the present invention.

[0163] In the description of the specification, the description with reference to the terms "one embodiment", "some embodiments", "another embodiment", "still another embodiment", "other embodiments", "example", "specific example", "some examples" or the like means that the specific features, structures, materials, or characteristics described in conjunction with the embodiments or examples are comprised in at least one embodiment or example of the present invention. In this specification, the schematic expression of the above terms is not necessarily directed to the same embodiment or example. Moreover, the particular features, structures, materials, or characteristics described may be combined in a suitable manner in any one or more embodiments or examples. In addition, those skilled in the art can join and combine different embodiments or examples described in this specification.

[0164] Although the embodiments of the present invention have been shown and described above, it can be understood that the above embodiments are exemplary and are not to be construed as limiting the present invention. Changes, modifications and variations of the above embodiments may be made by those skilled in the art within the scope of the present invention.

Claims

1. A mopping apparatus for floor cleaning, comprising:

a roller brush (1) being a water-absorbent roller brush;
a threaded conveying rod (21) being a slender member with a spiral groove on a surface thereof; and
a sewage holding groove (62) being provided with a semi-closed cavity,
wherein the threaded conveying rod (21) is arranged at one side of the roller brush (1) and is in contact with the roller brush (1); the threaded conveying rod (21) is arranged in the semi-closed cavity of the sewage holding groove (62) and is rotatable in the sewage holding groove (62); the threaded conveying rod (21) is arranged in proximity to or attached to an inner wall of the sewage holding groove (62); and
wherein the sewage holding groove (62) is provided with a sewage discharge port (623) in a rotary pumping and conveying direction of the threaded conveying rod (21), and a sewage holding groove opening (622) is provided at one side of the sewage holding groove (62) facing the roller brush (1).

2. The mopping apparatus for floor cleaning according to claim 1, wherein a gap is provided between a lower edge of the sewage holding groove opening (622) and the roller brush (1), and the gap facilitates the roller brush (1) to drive wastewater and/or particulate dirt into the threaded conveying rod (21) by way of rotation.

3. The mopping apparatus for floor cleaning according

to claim 1, further comprising a pressure roller assembly (3), wherein
the pressure roller assembly (3) presses against the roller brush and is arranged at an upper side of the threaded conveying rod (21).

4. The mopping apparatus for floor cleaning according to claim 1, wherein a slit or a hollowed hole is provided between an upper edge of the sewage holding groove opening (622) and the roller brush (1), and the slit or the hollowed hole facilitates wastewater and/or particulate dirt squeezed by the pressure roller assembly (3) to enter the threaded conveying rod (21).

5. The mopping apparatus for floor cleaning according to claim 1, further comprising an adjusting member (16), wherein a tightness of contact between the pressure roller assembly (3) and the roller brush (1) is adjusted by the adjusting member (16); or
a tightness of contact between the threaded conveying rod (21) and the roller brush (1) is adjusted by the adjusting member (16).

6. The mopping apparatus for floor cleaning according to claim 1, further comprising a driving structure, wherein
the roller brush (1) is connected to the driving structure, and the driving structure drives the roller brush (1) to rotate; and/or the driving structure is connected to the threaded conveying rod (21) and drives the threaded conveying rod (21) to rotate.

7. The mopping apparatus for floor cleaning according to claim 5, wherein the adjusting member is an elastic tensioning mechanism.

8. The mopping apparatus for floor cleaning according to claim 1, further comprising a support frame (6), wherein
the roller brush (1), the threaded conveying rod (21), and a pressure roller assembly (3) are all mounted in the support frame (6), and a part of a roller brush body of the roller brush (11) is exposed outside the support frame (6).

9. The mopping apparatus for floor cleaning according to claim 8, wherein the support frame (6) comprises an integrally formed support frame body (61), and the support frame body (61) is provided with the sewage holding groove (62) and a pressure roller groove (63), the threaded conveying rod (21) is rotatably mounted in the sewage holding groove (62), and the pressure roller assembly (3) is rotatably mounted in the pressure roller groove (63).

10. A cleaning device, comprising a sewage tank and a mopping apparatus according to any one of claims 1 to 9, wherein
the sewage tank is detachably mounted at one side of the support frame away from the roller brush, and the mopping apparatus is connected to the sewage tank, the mopping apparatus is configured to clean water and/or dirt, and the sewage tank is configured to collect the water and/or dirt of the mopping apparatus.

11. The cleaning device according to claim 10, further comprising an impeller member (20), wherein the impeller member is arranged at one end of the threaded conveying rod (21) along a conveying direction, and the impeller member (20) comprises an impeller (22) and an impeller housing (23);
the impeller (22) is rotatably mounted in the impeller housing (23), and the impeller housing (23) is provided with an impeller housing water inlet (232) and an impeller housing water outlet (233), the impeller housing water inlet (232) is arranged at one side of the impeller housing (23) close to the threaded conveying rod, and the impeller housing water outlet (233) is connected to the sewage tank; and the threaded conveying rod (21) is configured to convey the water and/or dirt to the impeller housing water inlet (232), and the impeller (22) is configured to throw the water and/or dirt at the impeller housing water inlet (232) into the sewage tank.

12. The cleaning device according to claim 10, wherein one side of the support frame (6) away from the roller brush (1) is fixedly provided with an extension plate (693), the extension plate (693) extends away from the roller brush (1), and two sides of the extension plate (693) are provided with elastic snap-fit protrusions (6931) respectively; and
the sewage tank (71) is provided with a snap-fit groove (712), and in a case that the sewage tank (71) is detachably mounted to the support frame (6), the elastic snap-fit protrusions (6931) snap into the snap-fit groove (712).

13. The cleaning device according to claim 10, wherein a mounting/demounting button (694) is rotatably connected to the support frame (6), and the mounting/demounting button (694) comprises a pressing plate (6941) and a pop-up plate (6942) perpendicularly connected to the pressing plate (6941); and in a case that the pressing plate (6941) is pulled, the pop-up plate (6942) pushes the sewage tank (71) away from the roller brush (1) until the sewage tank (71) is demounted from the support frame (6).

14. The cleaning device according to claim 10, further comprising an operating lever (8), wherein the operating lever (8) is rotatably mounted on the support frame (6); and the operating lever is rotatably mounted on the support frame through a first rotating mem-

ber (691) and a second rotating member (692), the first rotating member (691) is configured to enable the operating lever (8) to rotate along an x direction, and the second rotating member (692) is configured to enable the operating lever (8) to rotate along a y direction.

15. The cleaning device according to claim 14, further comprising a clean water tank (72), wherein the clean water tank (72) is arranged on the operating lever (8), and the operating lever is provided with a slidable snap-fit structure (81) configured to the lock clean water tank with different volume size to the operating lever (8).

16. The cleaning device according to claim 10, further comprising a water pump energy storage assembly (5), wherein the support frame body (61) is provided with an integrated assembly cavity (64), and the water pump energy storage assembly (5) is detachably mounted in the integrated assembly cavity (64);
the water pump energy storage assembly (5) comprises an integrated bracket (51), a water pump (73), a circuit board (52), and an energy storage member (53); the water pump (73), the circuit board (52), and the energy storage member (53) are all detachably mounted on the integrated bracket (51); the water pump (73) is electrically connected to the circuit board (52), and the energy storage member (53) is electrically connected to the circuit board (52); and the energy storage member provides electrical energy for the circuit board (52), and the circuit board (52) provides electrical energy for the whole cleaning device.

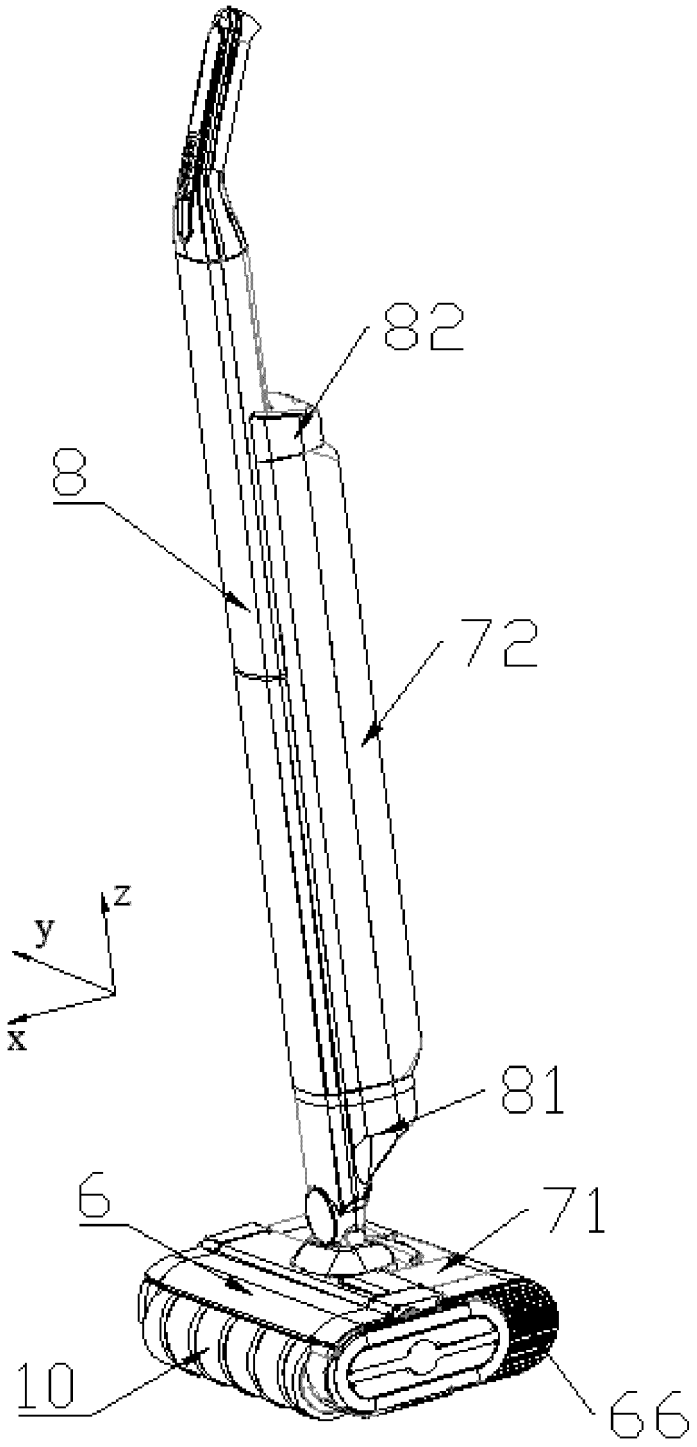

FIG. 1

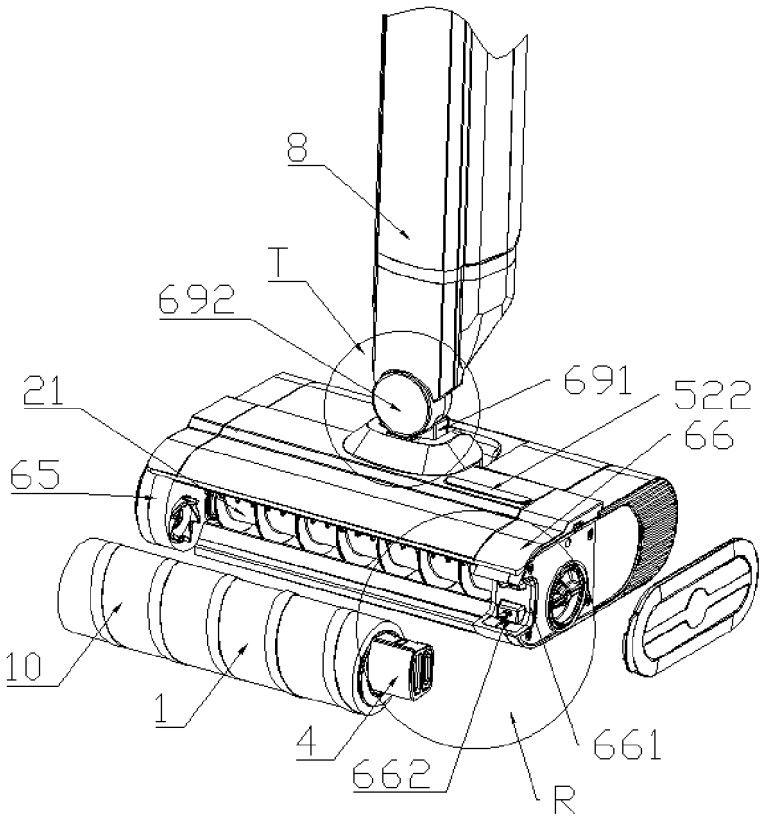

FIG. 2

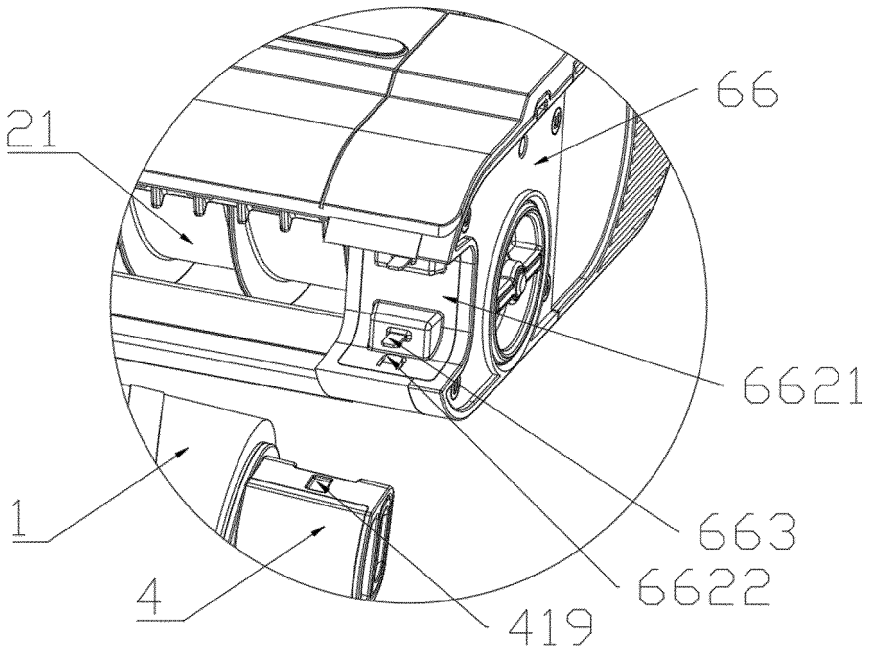

FIG. 3

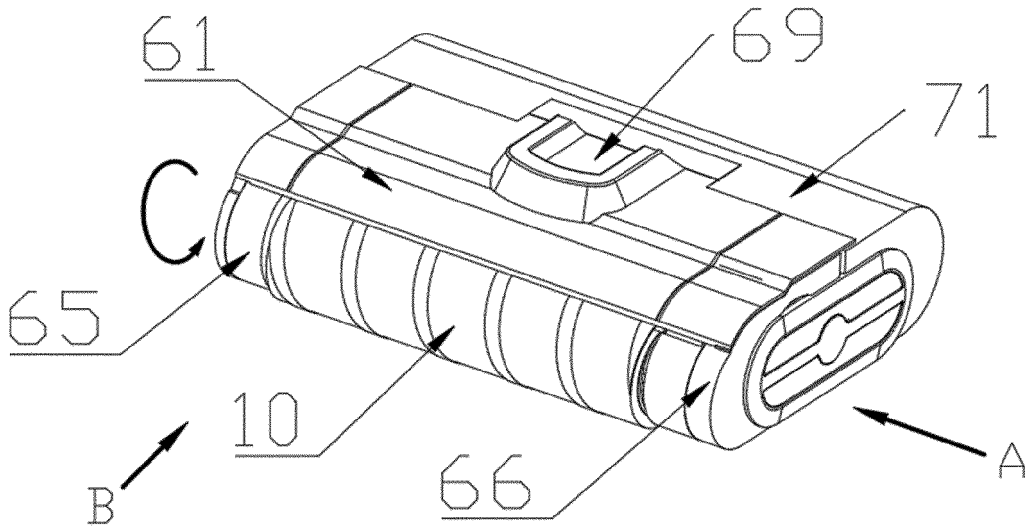

FIG. 4

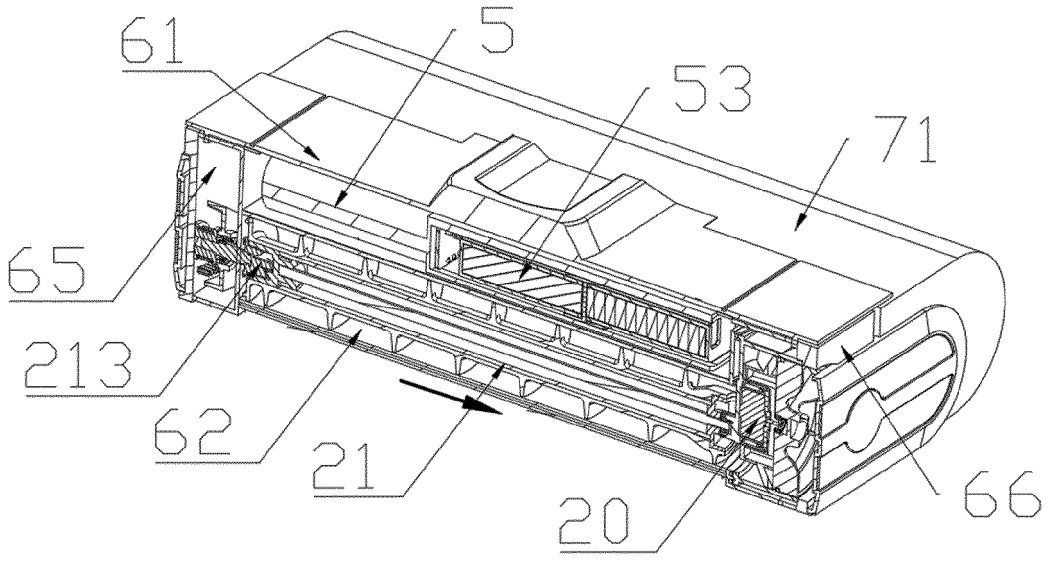

FIG. 5

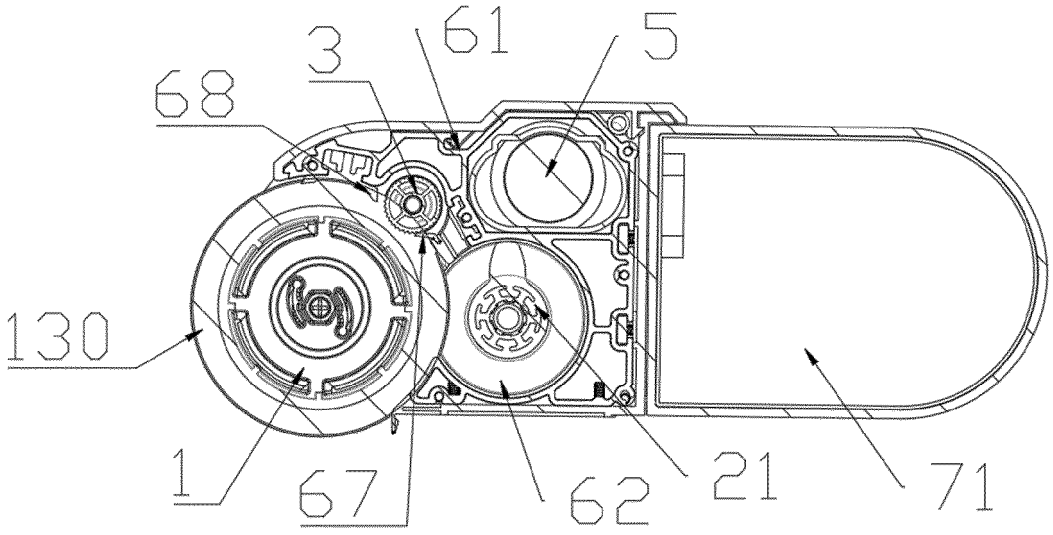
61
5
3
68
130
1
67
62
21
71

FIG. 6

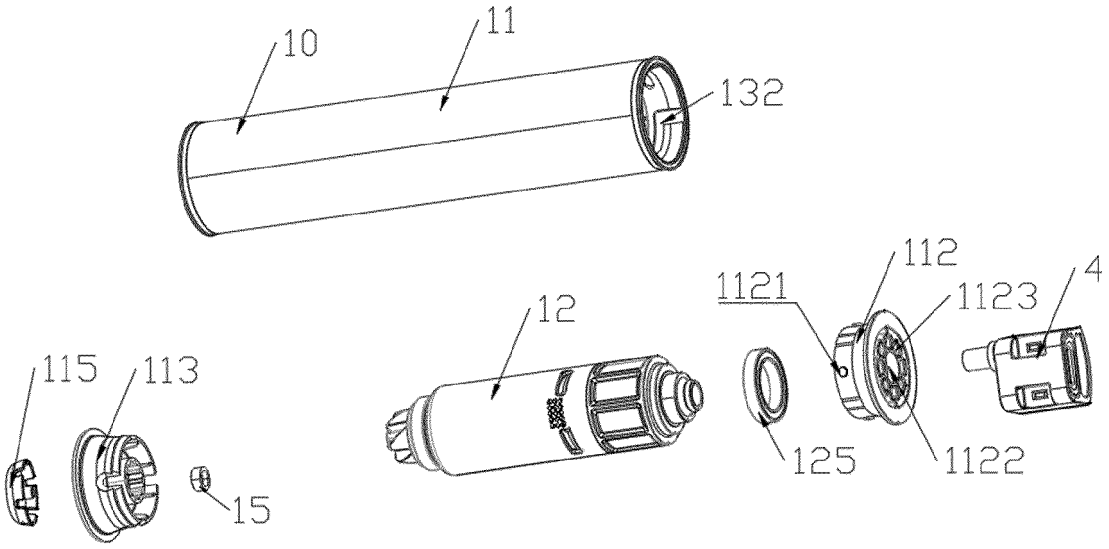
10
11
132
112
1121
1123
4
12
115
113
15
125
1122

FIG. 7

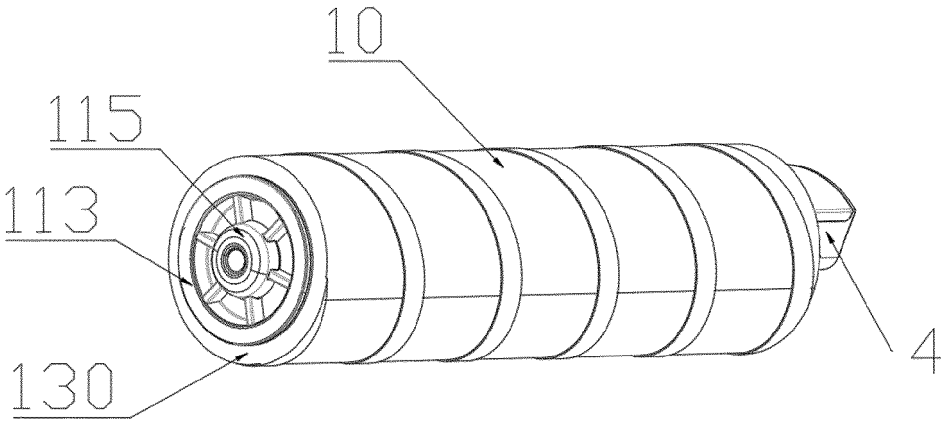

FIG. 8

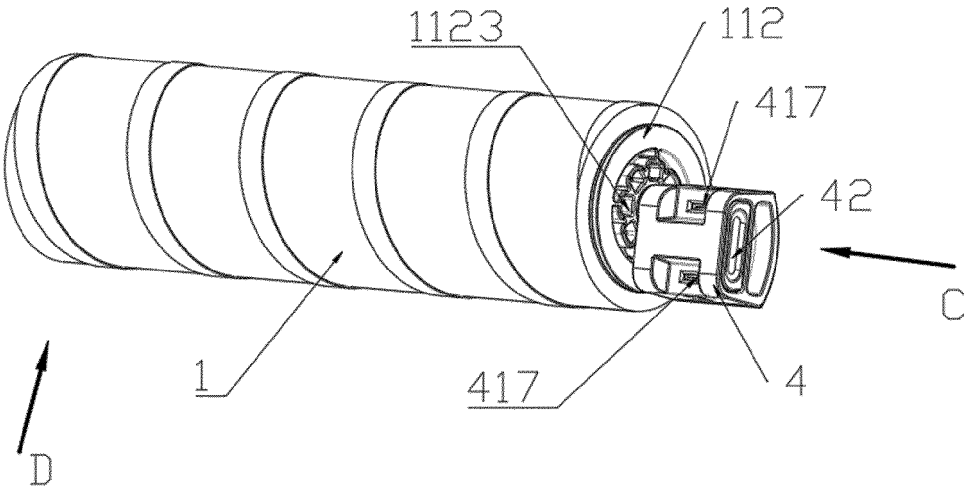

FIG. 9

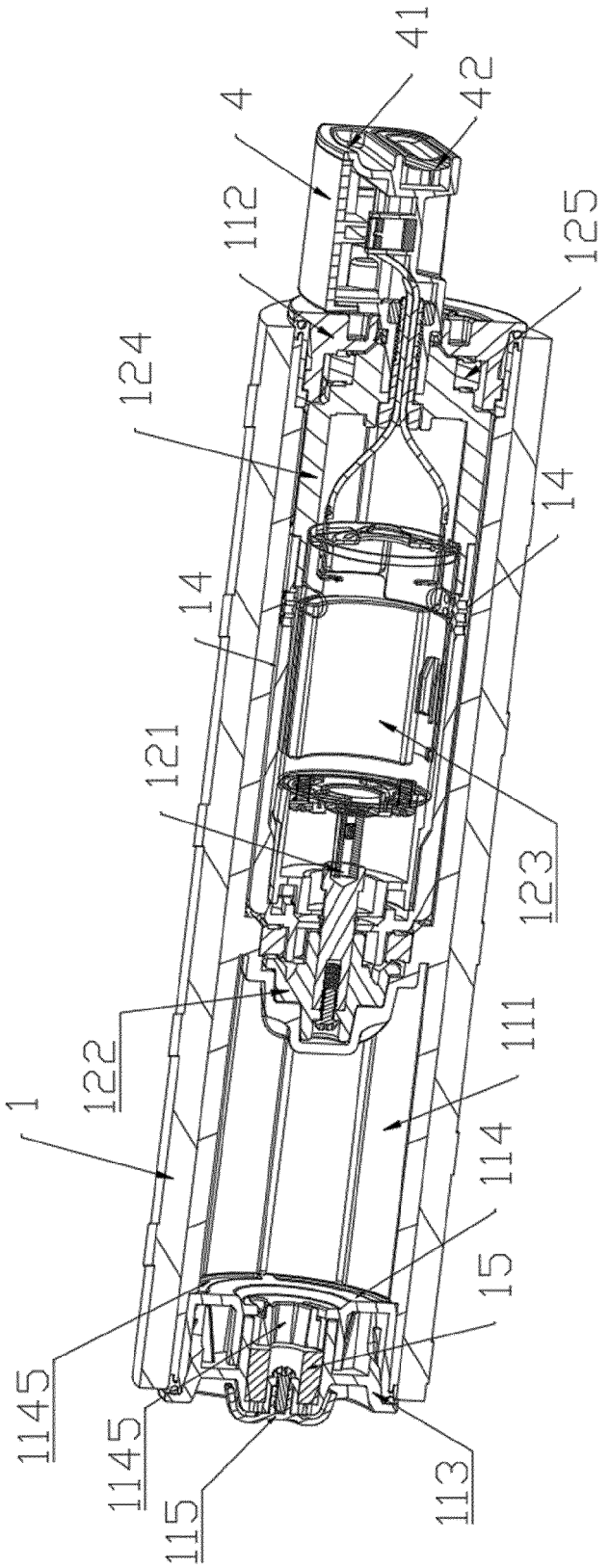
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FIG. 10

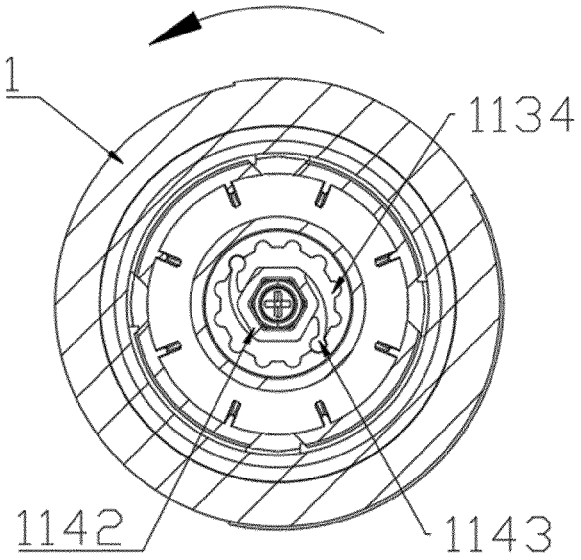

FIG. 11

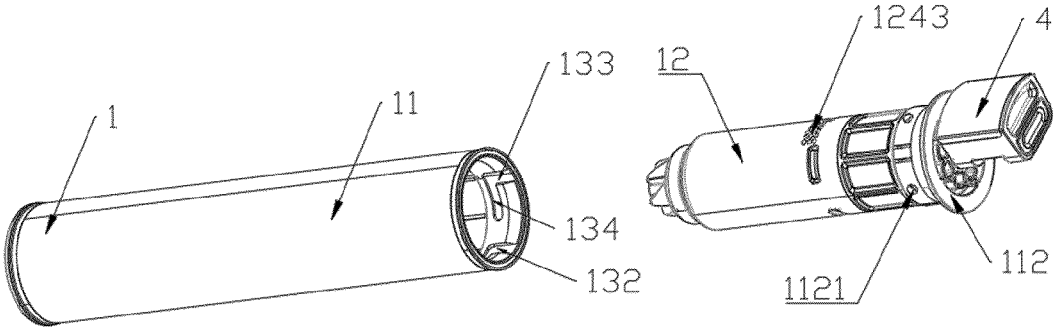

FIG. 12

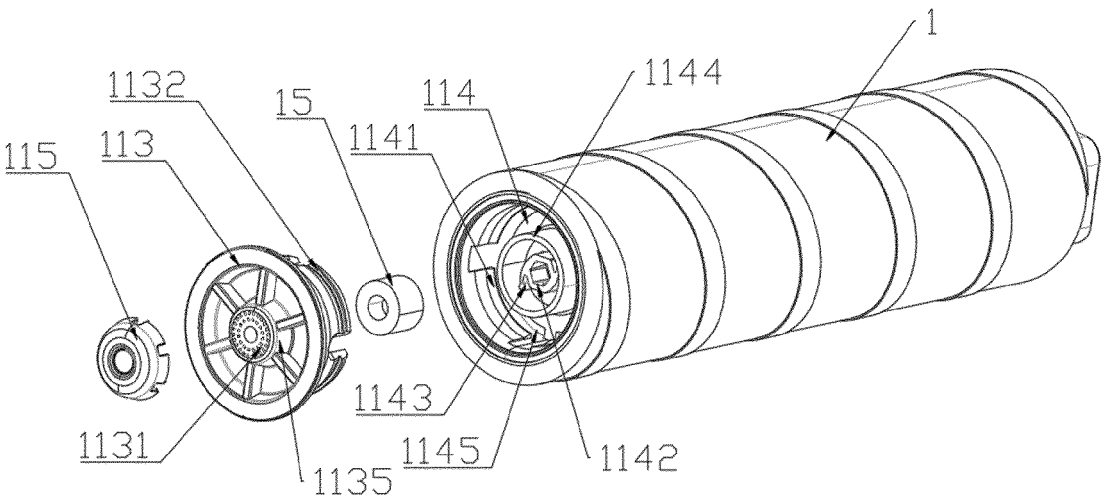

FIG. 13

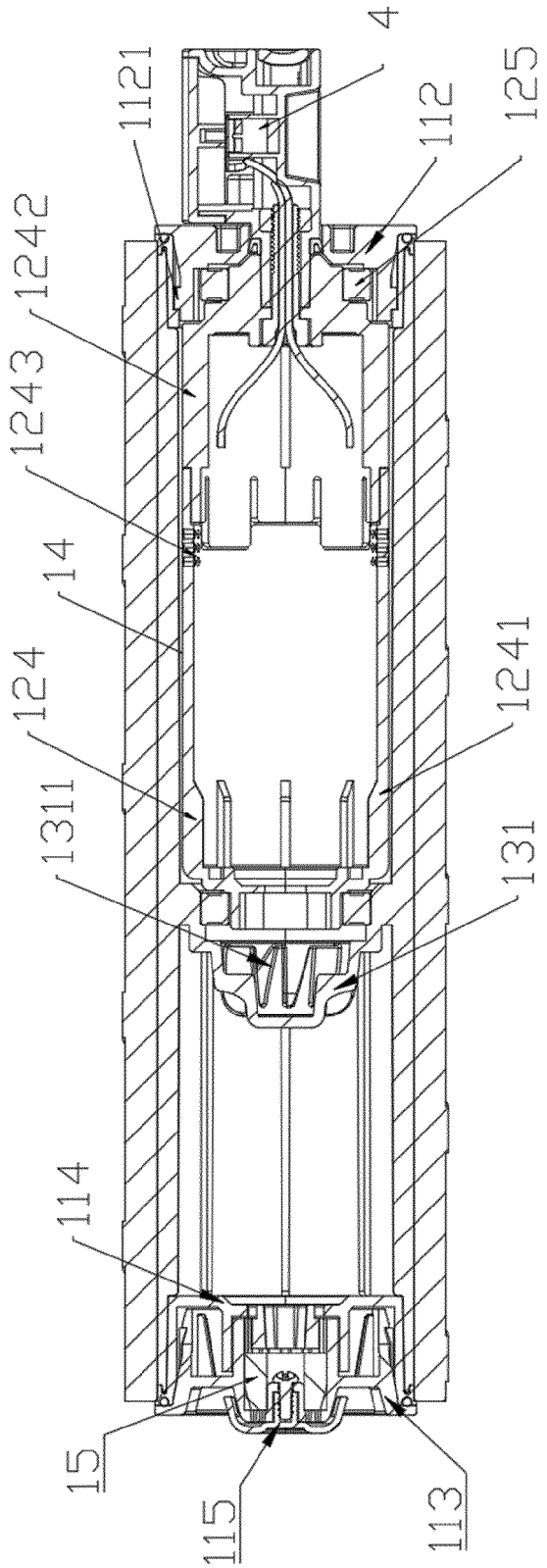

FIG. 14

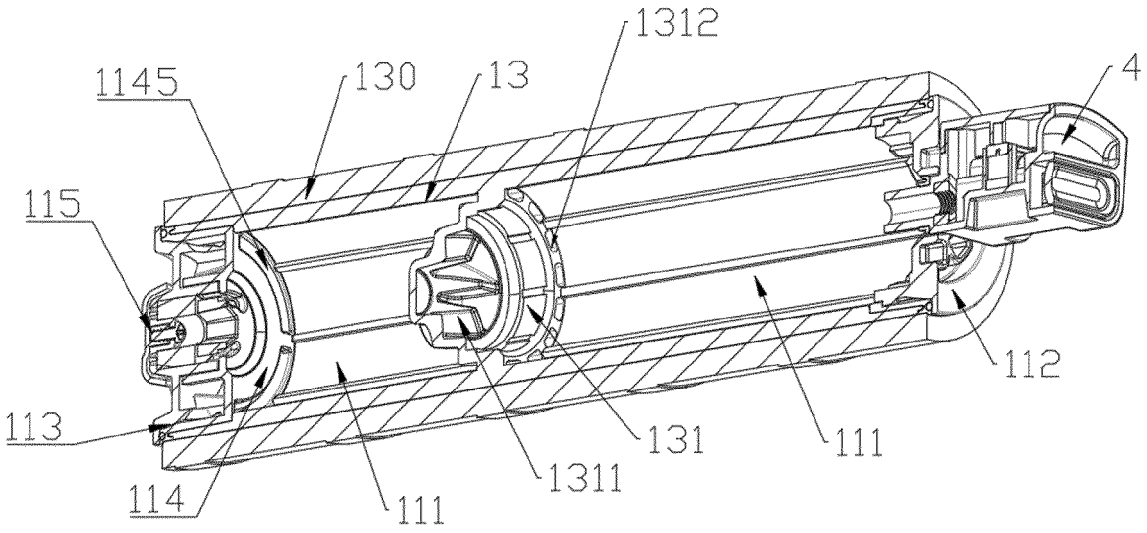
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FIG. 15

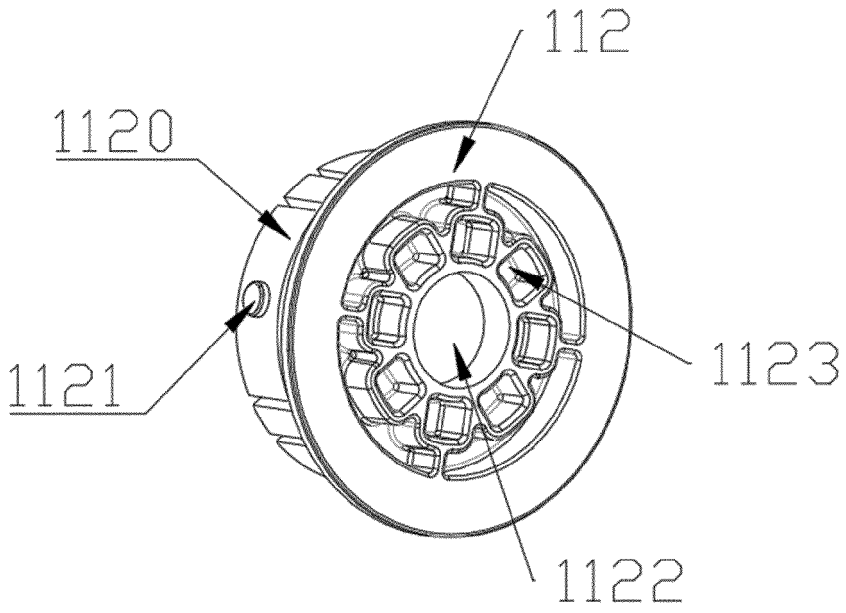
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FIG. 16

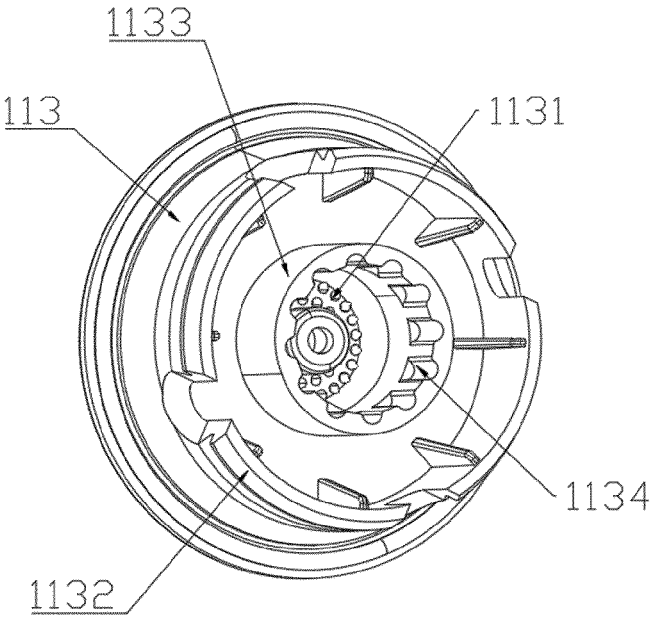

FIG. 17

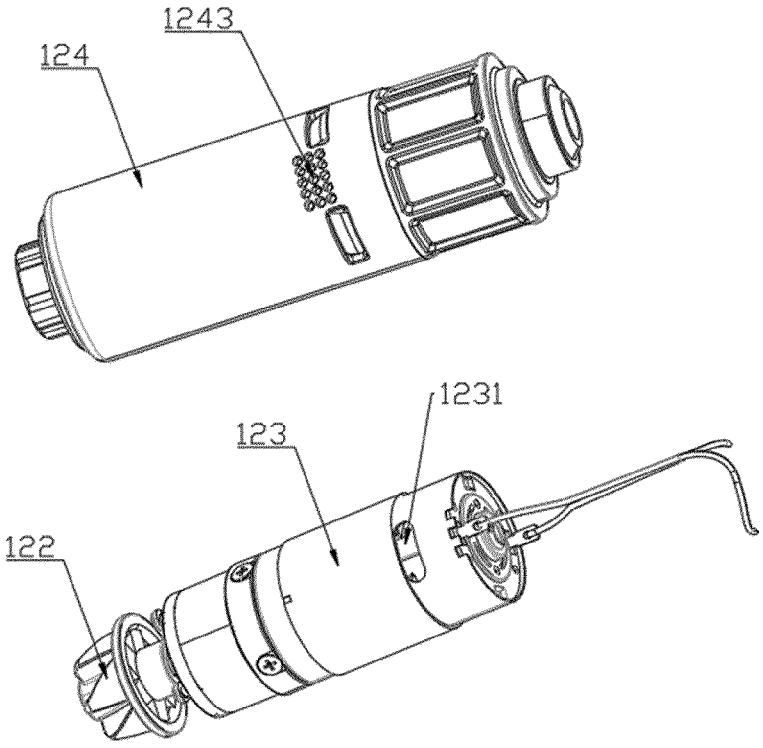

FIG. 18

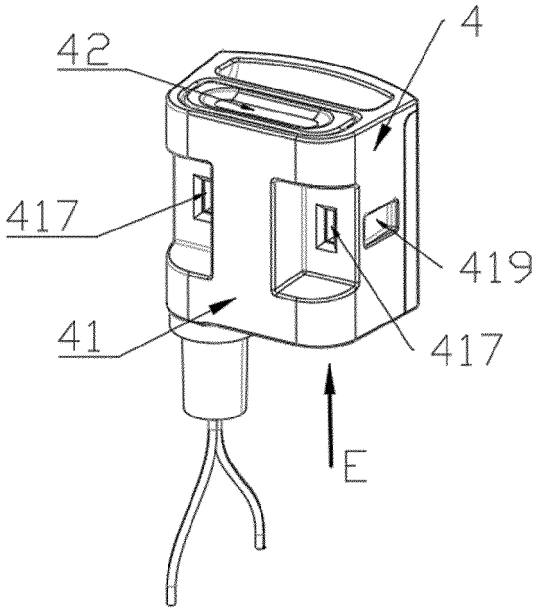

FIG. 19

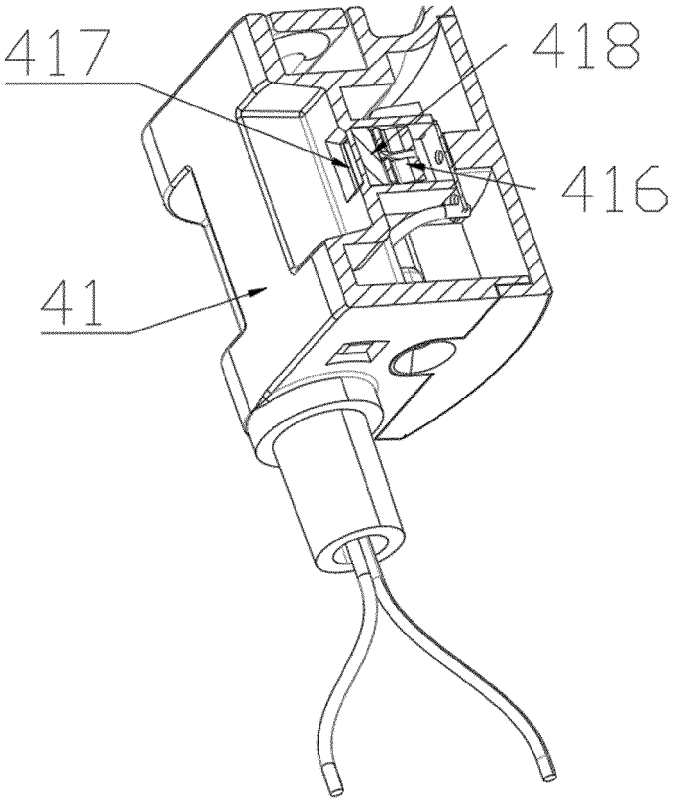

FIG. 20

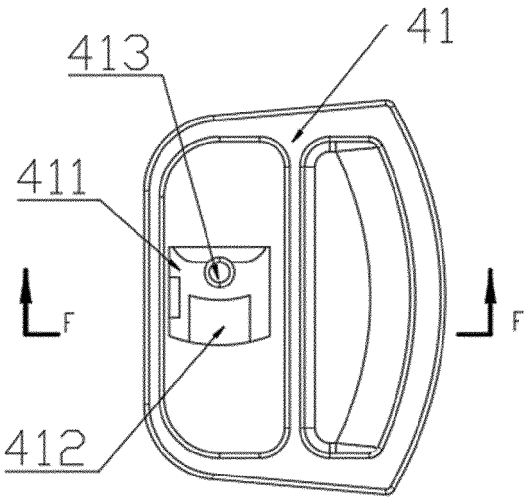

FIG. 21

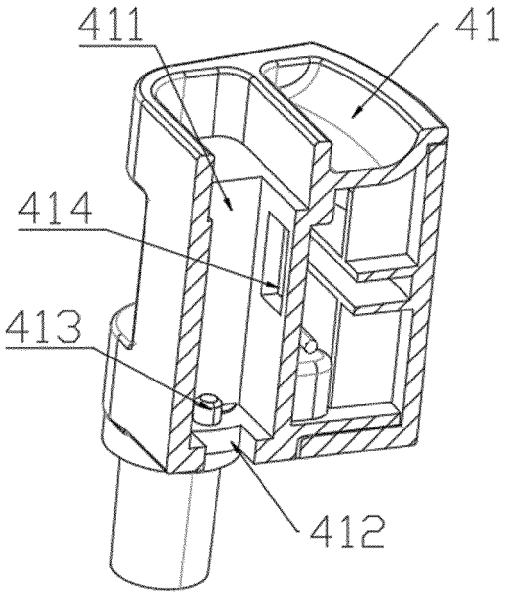

FIG. 22

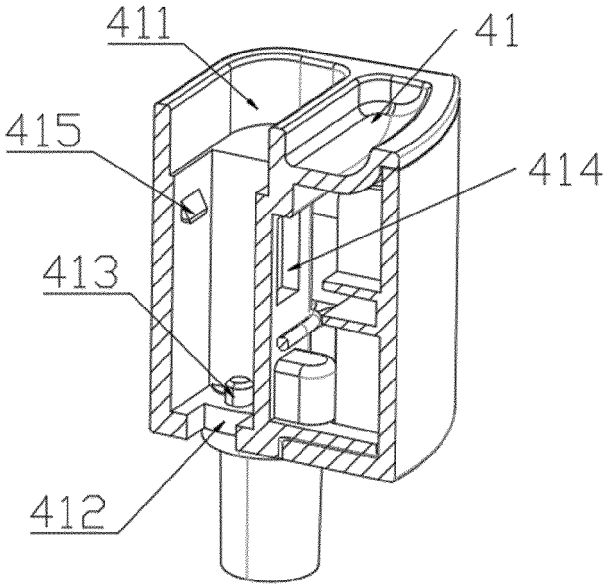

FIG. 23

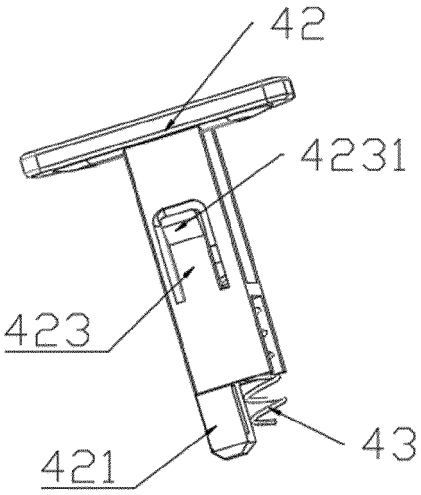

FIG. 24

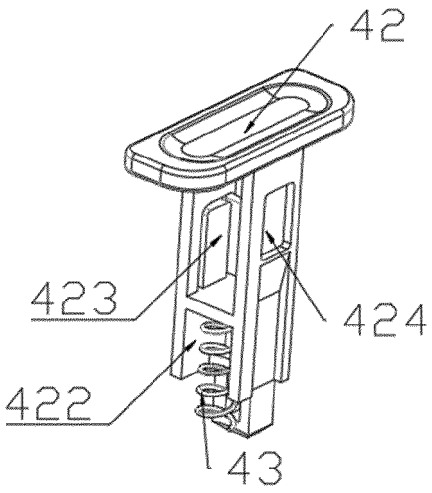

FIG. 25

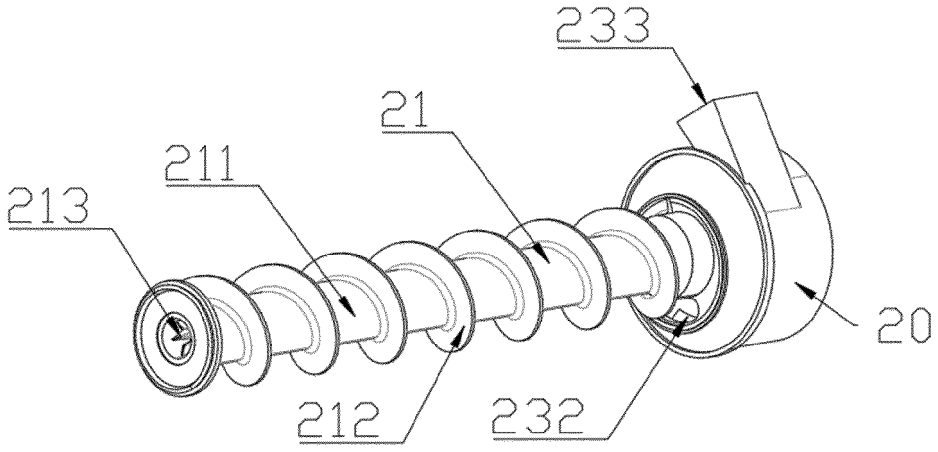

FIG. 26

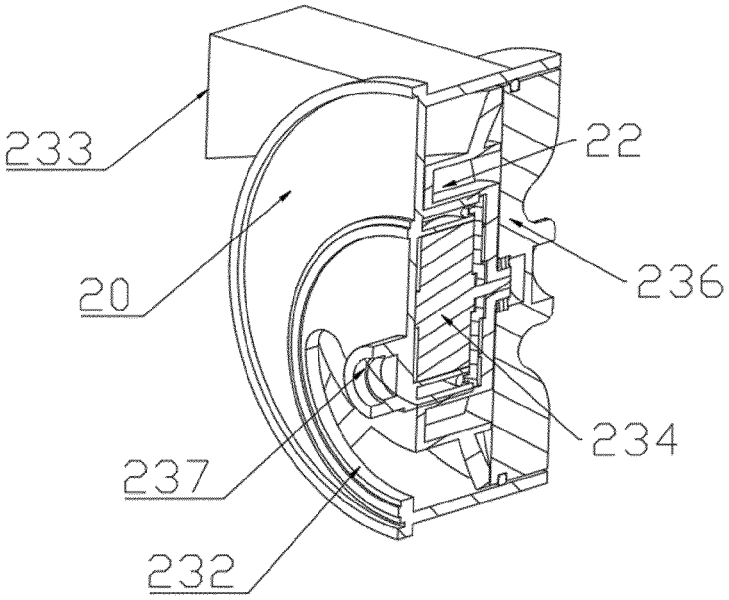
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FIG. 27

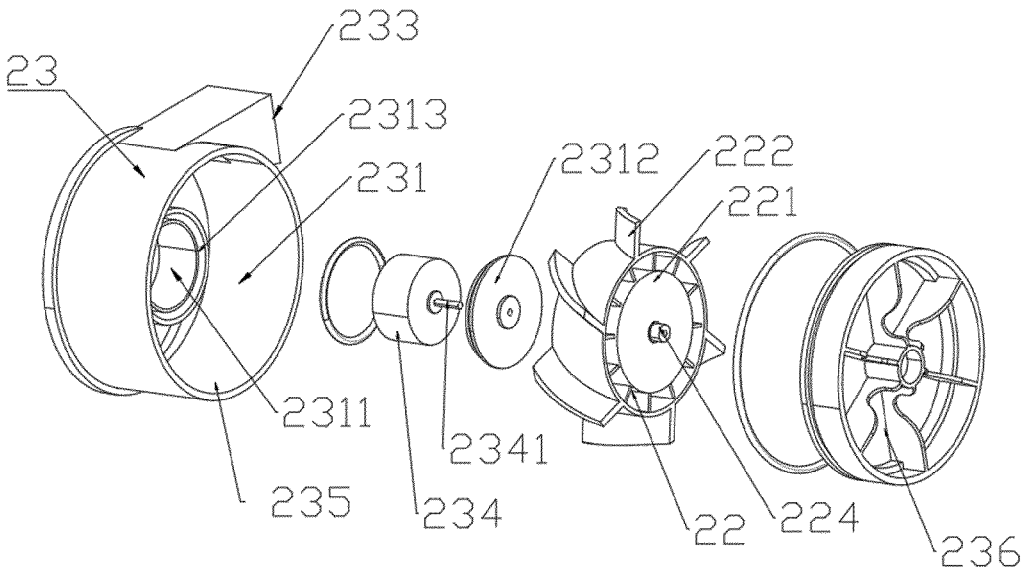
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FIG. 28

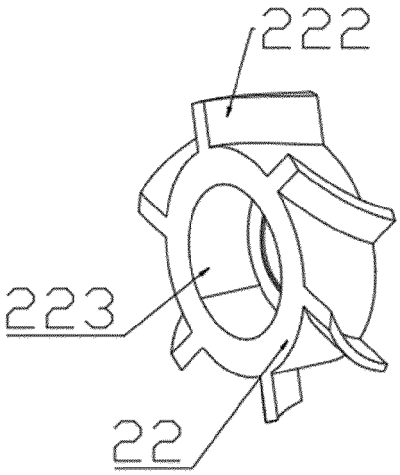

FIG. 29

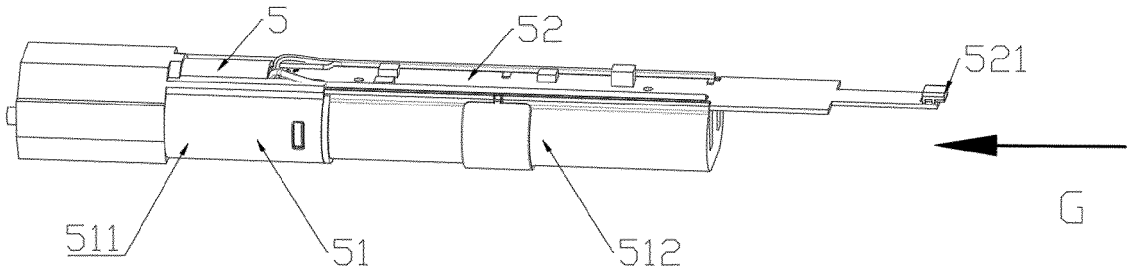

FIG. 30

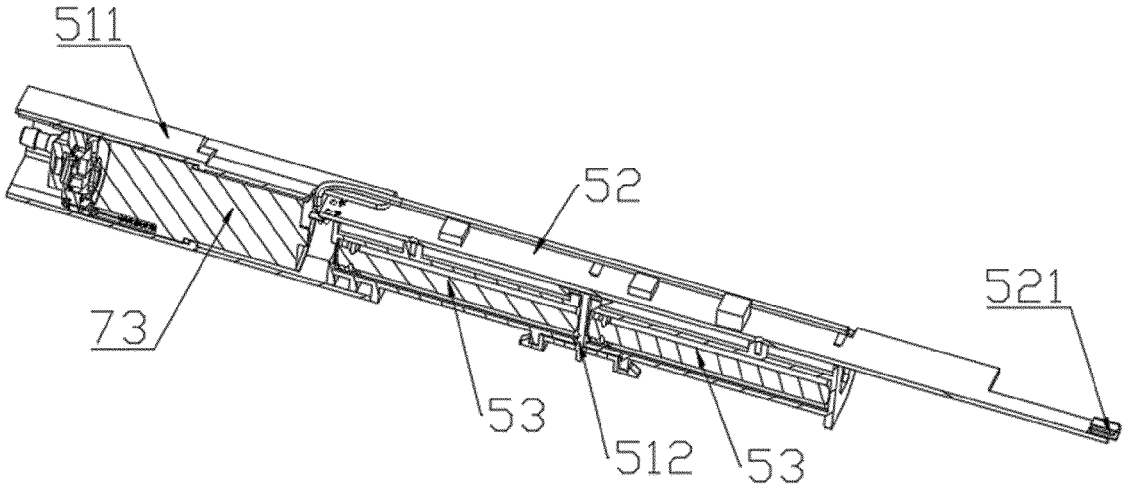

FIG. 31

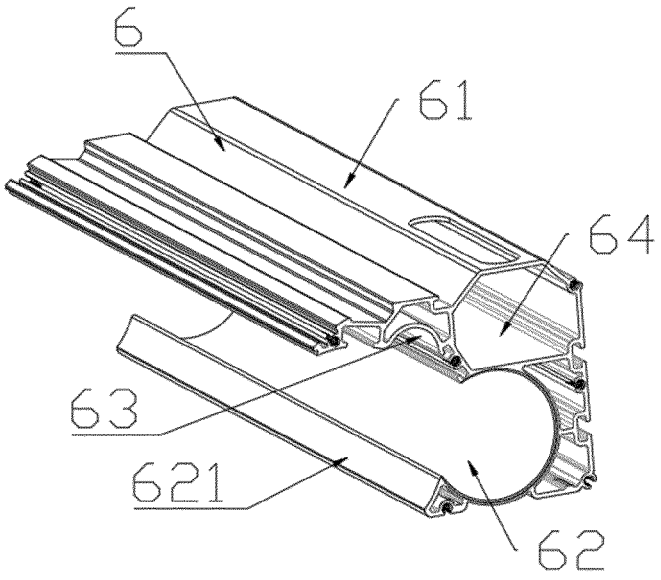

FIG. 32

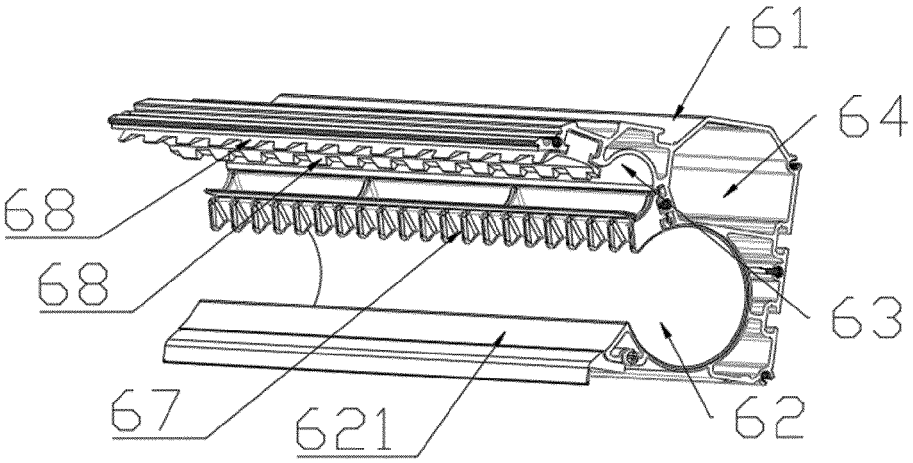

FIG. 33

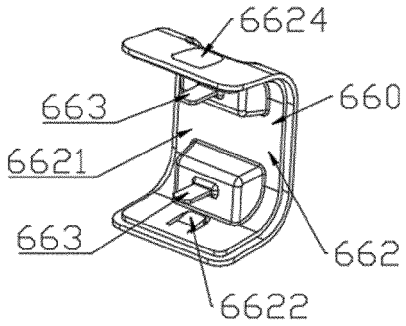

FIG. 34

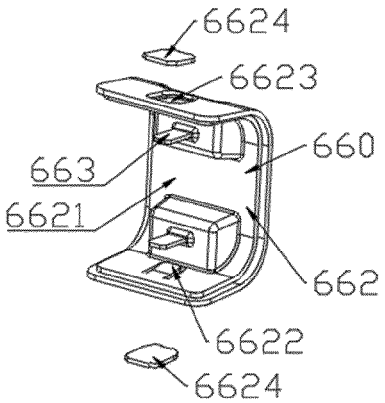

FIG. 35

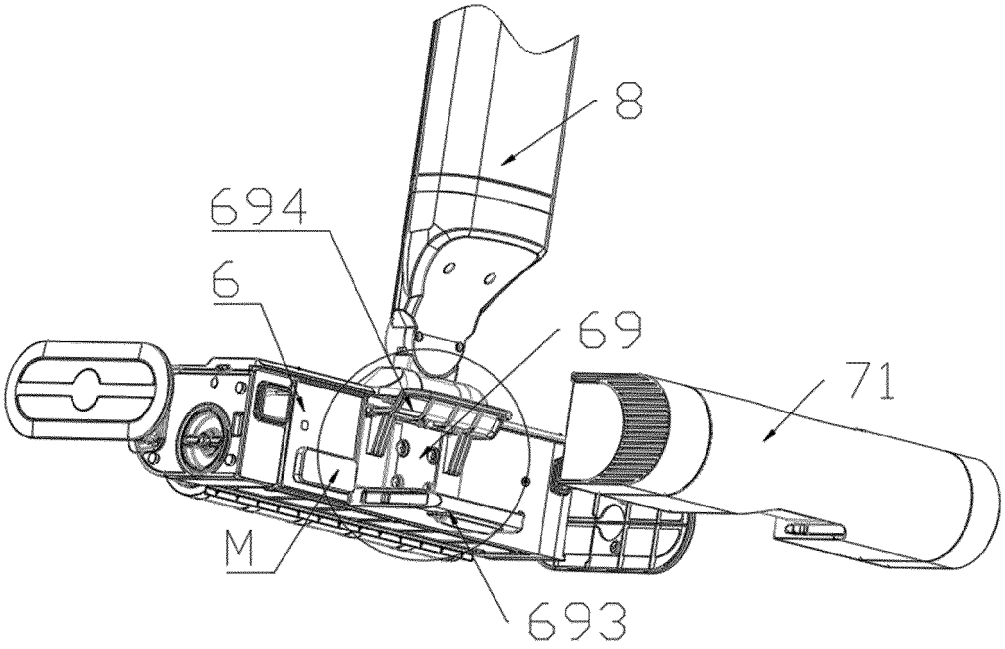

FIG. 36

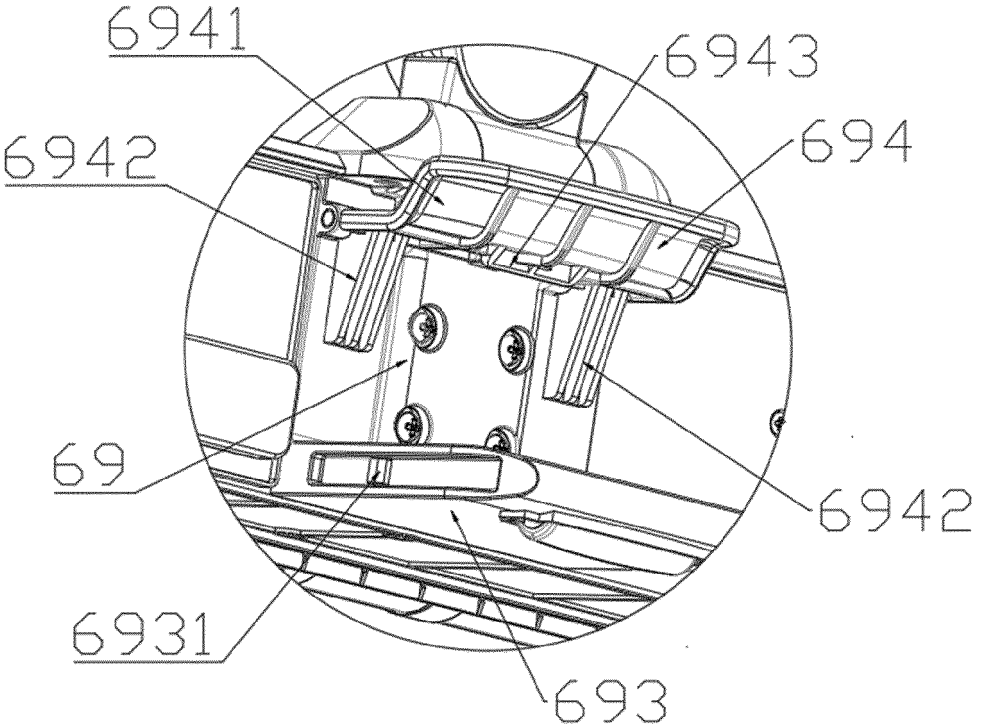

FIG. 37

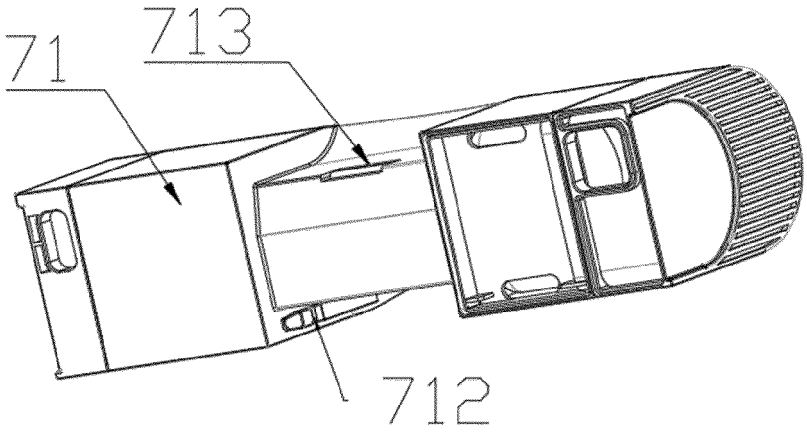

FIG. 38

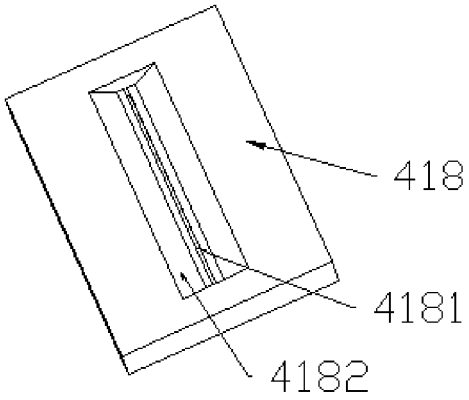

FIG. 39

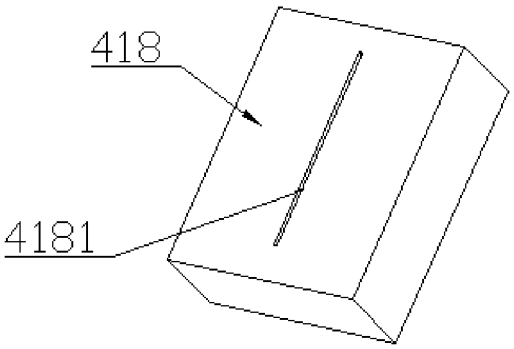

FIG. 40

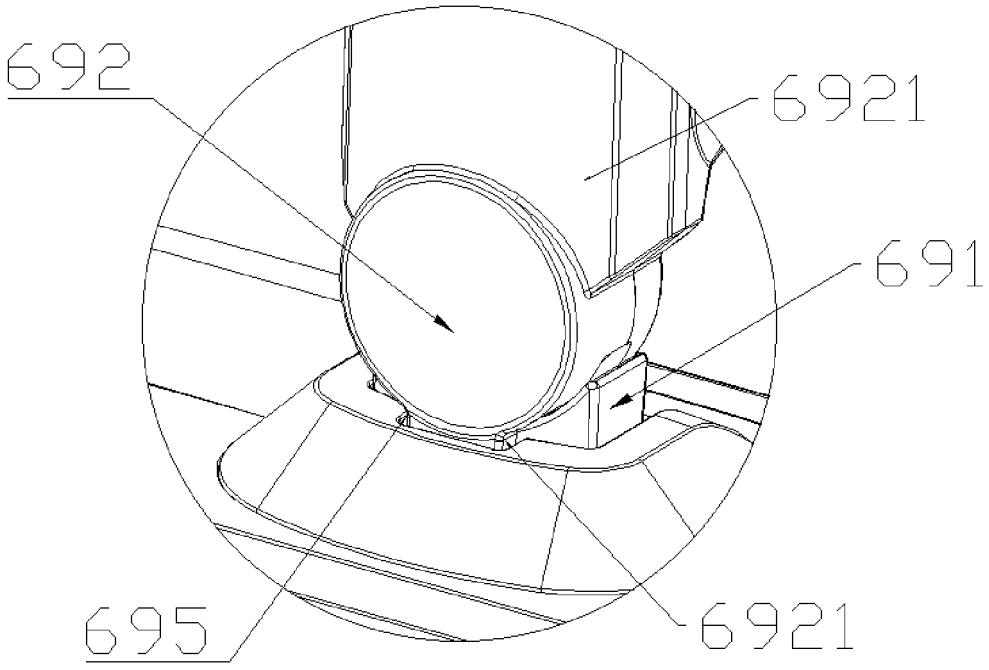

FIG. 41

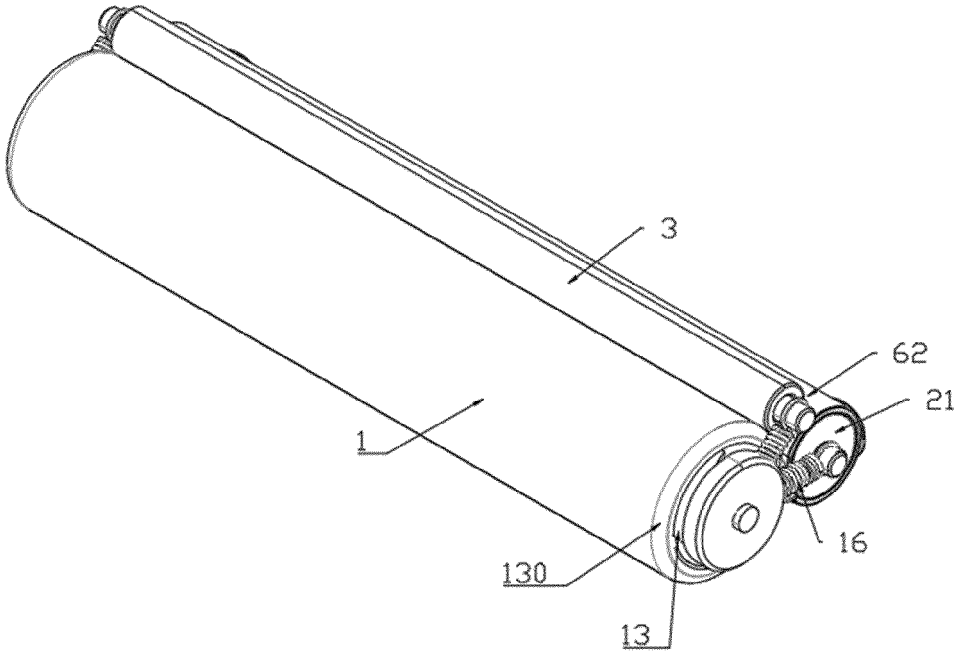

FIG. 42

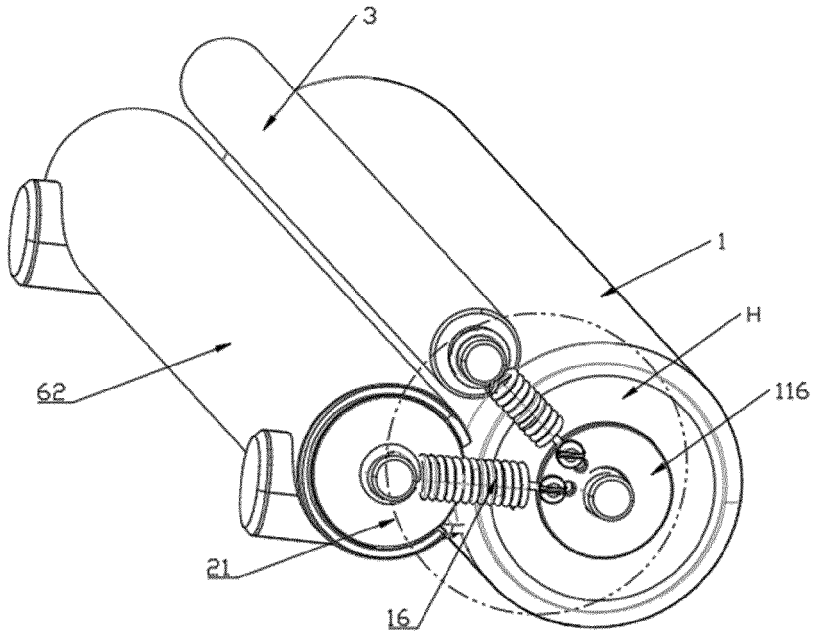

FIG. 43

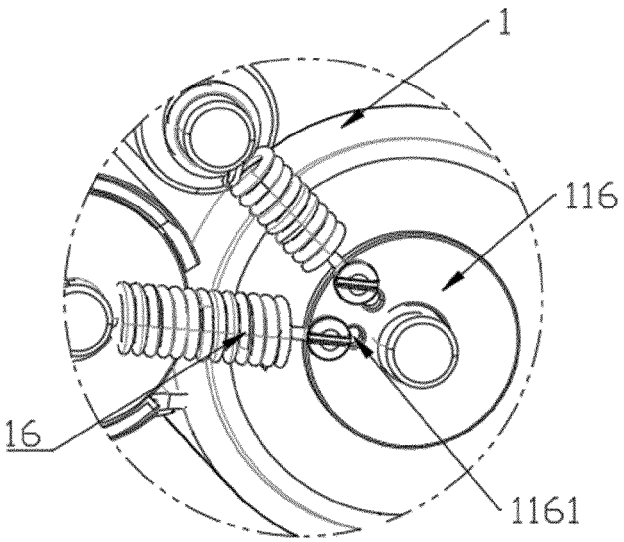

FIG. 44

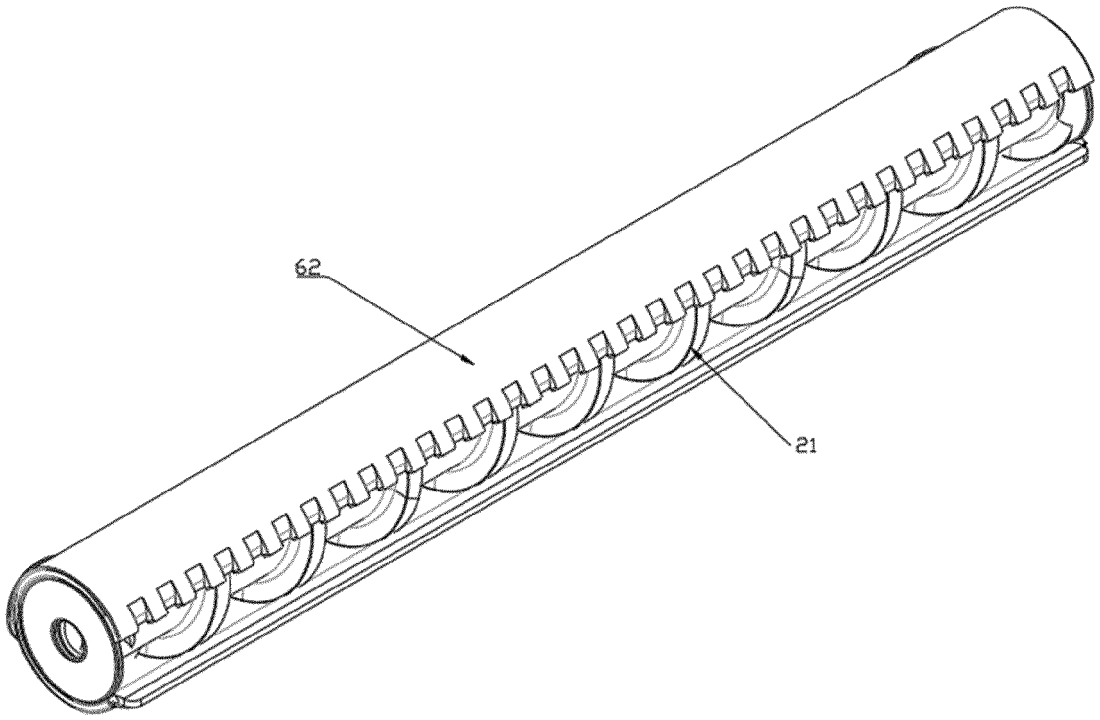

FIG. 45

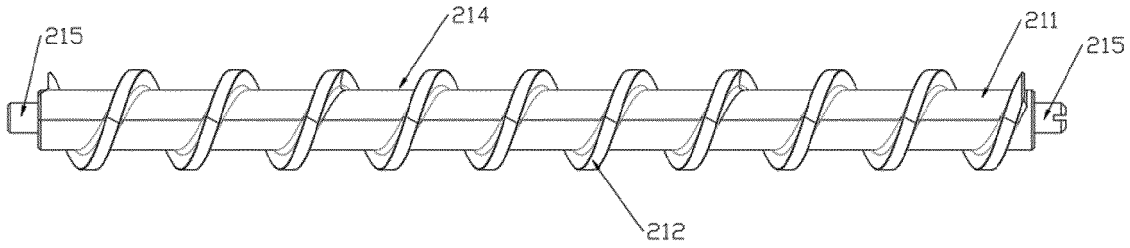

FIG. 46

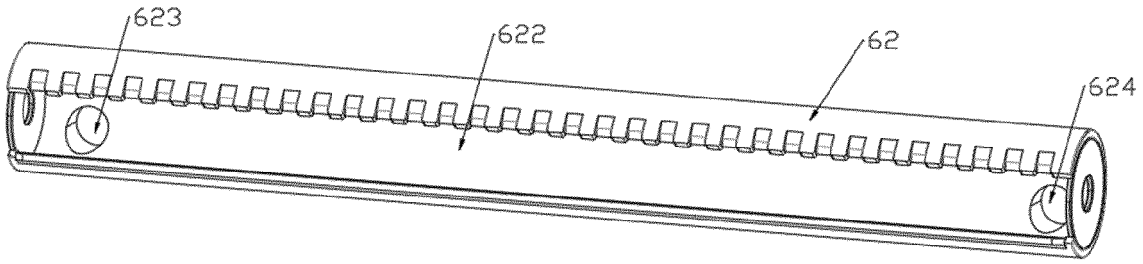

FIG. 47

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2022/079959

A. CLASSIFICATION OF SUBJECT MATTER

A47L 11/40(2006.01)i; A47L 11/292(2006.01)n; A47L 11/282(2006.01)n

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)

A47L9; A47L11; A47L13

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)

CNABS, CNTXT, VEN, ENTXT, USTXT: 滚筒, 滚刷, 圆筒, 圆刷, 挤压, 压杆, 压辊, 压轴, 压水, 挤水, 供水, 送水, 清水, 净化水, 污, 脏, 水槽, 收集槽, 水箱, 抽吸, 调节, 调整, 弹簧, 弹性, 叶轮, 可拆, 可移除, 拆卸 roller, squeez+, extrud+, press+, water, liquid, rod, dirt+, sewage, pump, adjust+, regulat+, spring, impeller, impellor, detach+

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	CN 211961939 U (JIANGSU MIDEA CLEAN ELECTRIC APPLIANCE CO., LTD. et al.) 20 November 2020 (2020-11-20) description, paragraphs 27-47, and figures 1-6	1-16
Y	CN 111150340 A (DISHE INTELLIGENT TECHNOLOGY (WUHAN) CO., LTD.) 15 May 2020 (2020-05-15) description, paragraphs 73-183, and figures 1, 2, 9 and 14-29	1-16
Y	CN 112401774 A (TINECO INTELLIGENT TECHNOLOGY CO., LTD.) 26 February 2021 (2021-02-26) description, paragraphs 73-78, and figure 5	5, 7
Y	CN 104127158 A (ZHANG, Zhouxin) 05 November 2014 (2014-11-05) description, paragraphs 16-17 and 23-24, and figures 1-5	11
Y	CN 208625590 U (SHENZHEN ZHIYI TECHNOLOGY CO., LTD.) 22 March 2019 (2019-03-22) description, paragraphs 33-46, and figures 1-9	12
A	JP 2003220000 A (IWAMURA, N.) 05 August 2003 (2003-08-05) entire document	1-20

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

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"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
31 May 2022	**14 June 2022**
Name and mailing address of the ISA/CN **China National Intellectual Property Administration (ISA/CN)** **No. 6, Xitucheng Road, Jimenqiao, Haidian District, Beijing 100088, China**	Authorized officer
Facsimile No. **(86-10)62019451**	Telephone No.

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

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2022/079959

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
CN 211961939 U	20 November 2020	None	
CN 111150340 A	15 May 2020	WO 2021147203 A1	29 July 2021
CN 112401774 A	26 February 2021	None	
CN 104127158 A	05 November 2014	WO 2016000588 A1	07 January 2016
		CN 104127158 B	15 February 2017
CN 208625590 U	22 March 2019	None	
JP 2003220000 A	05 August 2003	None	

Form PCT/ISA/210 (patent family annex) (January 2015)