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(54) CLEANING DEVICE AND WATER TANK THEREOF

(57) A cleaning apparatus includes a chassis, a main body, a first chamber, a second chamber, a first suction device, and a second suction device. The main body is rotatably connected to the chassis, the first chamber is arranged on the main body, and the second chamber is communicated to the first chamber. The first suction device is communicated with the first chamber to provide power to drive external liquid into the first chamber, and the second suction device provides power to drive the liquid in the first chamber entering the second chamber.

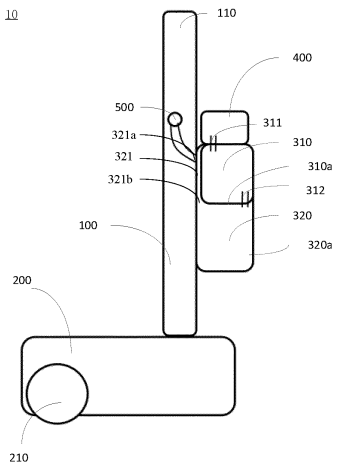

Fig. 6

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Description

TECHNICAL FIELD

[0001] The present disclosure relates to the technical field of cleaning apparatus, in particular to a cleaning apparatus and a water tank thereof.

BACKGROUND

[0002] With the continuous increasing cleaning demands and the continuous improvement of the cleaning technology, various floor washers have been provided to clean hard surfaces such as floors, tiles, marbles, etc. Generally, the floor washer cleans the ground by rotating its roller brush located at the front end of its cleaning assembly, clean water may flow to the ground from the roller brush when the roller brush is rotated to clean the stains, oil stains, and impurities. Then, the dirt is suctioned and stored in the cleaning apparatus through a negative pressure device.

[0003] However, when the floor washer is in use or when user maintains the floor washer, liquid in a sewage tank or a clean water tank of the floor washer may flow back or be suctioned into the negative pressure device as a main body of the floor washer is lying down, tilting, or shaking. The liquid entering the negative pressure device may affect the reliability of the floor washer; also, the liquid entering the negative pressure device may probably leak through a gap of the housing of the floor washer, causing secondary pollution. A solution for the problem in related art is to limit a lying angle of the main body of the floor washer, so as to reduce the risk of water entering the negative pressure device. However, this will limit the working angle of the floor washer.

SUMMARY

[0004] The embodiments of the present disclosure provides a cleaning apparatus and a water tank thereof, which can suction external liquid into a first chamber through a first suction device, and then suction the liquid in the first chamber into a second chamber through a second suction device, so as to prevent the liquid in the first chamber from flowing back into the first suction device, especially when the cleaning apparatus is shaking, tilting, or when a main body of the cleaning apparatus is in a lying down state relative to a chassis of the cleaning apparatus.

[0005] A first aspect of the embodiments of the present disclosure provides a cleaning apparatus including a chassis, a main body, a first chamber, a second chamber, a first suction device, and a second suction device. The main body is rotatably connected to the chassis, the first chamber is arranged on the main body, and the second chamber is communicated with the first chamber. The first suction device is communicated with the first chamber to provide power to drive an external liquid into the first chamber, and the second suction device is communicated with the second chamber to provide power to drive liquid in the first chamber entering the second chamber.

[0006] A second aspect of the present disclosure provides a cleaning apparatus including a chassis, a main body, a first chamber, a second chamber, and a first suction device. The main body is rotatably connected with the chassis, the first chamber is arranged on the main body, and the second chamber is communicated with the first chamber. The first suction device is communicated with the first chamber through a first suction channel, the first suction device provides power to drive external liquid into the first chamber; the first suction device is also communicated with the second chamber through a second suction channel, and the first suction device provides power to drive liquid in the first chamber entering the second chamber.

[0007] A third aspect of the present disclosure provides a water tank, the water tank is configured to be installed on the main body of the cleaning apparatus, and the main body is rotatably connected with the chassis of the cleaning apparatus. The water tank includes: a first chamber arranged on the main body and capable of communicating with the first suction device, and a second chamber communicated with the first chamber and capable of communicating with a second suction device. The first suction device provides power to drive external liquid into the first chamber, and the second suction device provides power to drive liquid in the first chamber entering the second chamber.

[0008] A fourth aspect of the present disclosure provides a water tank, the water tank is configured to be installed on the main body of the cleaning apparatus, and the main body is rotatably connected with the chassis of the cleaning apparatus. The water tank includes: a first chamber arranged on the main body, a second chamber communicated with the first chamber, and a first suction device. The first suction device is communicated with the first chamber through a first suction channel, the first suction device provides power to drive external liquid into the first chamber; the first suction device is also communicated with the second chamber through a second suction channel, the first suction device provides power to drive liquid in the first chamber entering the second chamber.

[0009] The embodiments of the present disclosure provide a cleaning apparatus and a water tank thereof. The cleaning apparatus includes a chassis, a main body, a first chamber, a second chamber, a first suction device, and a second suction device. The first chamber is arranged on the main body, the first suction device is capable of suctioning external liquid into the first chamber, and then the first suction device or a second suction device suctions the liquid in the first chamber into the second chamber, so as to prevent the liquid in the first chamber from flowing back into the first suction device which may affect the use reliability of the first suction device,

especially when the cleaning apparatus is shaking, tilting, or when the main body of the cleaning apparatus is lying down relative to the chassis.

[0010] It should be understood that the above general description and the detailed description of the following are only exemplary and explanatory, which is not to limit the disclosure.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] In order to explain the technical solutions of the embodiments of the present disclosure more clearly, the following accompanying drawings are briefly described. Obviously, the accompanying drawings are only some embodiments of the present disclosure, for those skilled in the field, other drawings can be obtained based on these drawings without any creative effort.

Fig. 1 shows a structural schematic diagram of a cleaning apparatus at up-straight state according to an embodiment of the present disclosure;

Fig. 2 shows a structural schematic diagram of the cleaning apparatus at a tilting state according to an embodiment of the present disclosure;

Fig. 3 shows a structural schematic diagram of the cleaning apparatus at a lying-down state according to an embodiment of the present disclosure;

Fig. 4 shows an overall structure of the cleaning apparatus according to an embodiment of the present disclosure;

Fig. 5 shows an overall structure of the cleaning apparatus according to another embodiment of the present disclosure;

Fig. 6 shows an overall structure of the cleaning apparatus according to a further embodiment of the present disclosure;

Fig. 7 shows a formation of a first chamber and a second chamber when the first housing and the second housing are nested structure according to an embodiment of the present disclosure;

Fig. 8 shows a formation of the first chamber and the second chamber when the first housing and the second housing are nested structure according to another embodiment of the present disclosure;

Fig. 9 shows a formation of the first chamber and the second chamber when the first housing and the second housing are nested structure according to a further embodiment of the present disclosure;

Fig. 10 shows a formation of the first chamber and the second chamber when the first housing and the second housing are nested structure according to a further embodiment of the present disclosure;

Fig. 11 shows a cross-sectional view of a water tank of the cleaning apparatus;

Fig. 12 shows a comparison of a liquid level of the cleaning apparatus in lying-down state;

Fig. 13 shows a second suction channel according to an embodiment of the present disclosure;

Fig. 14 shows the second suction channel according to another embodiment of the present disclosure;

Fig. 15 shows a formation of the second suction channel when the first housing is nested in the second housing according to an embodiment of the present disclosure;

Fig. 16 shows a formation of the second suction channel when the first housing is nested in the second housing according to another embodiment of the present disclosure;

Fig. 17 shows a formation of the second suction channel when the first housing is nested in the second housing according to a further embodiment of the present disclosure;

Fig. 18 shows a gas leakage section of the first housing according to an embodiment of the present disclosure;

Fig. 19 shows a gas leakage section of the first housing according to another embodiment of the present disclosure;

Fig. 20 shows a gas leakage section of the first housing according to a further embodiment of the present disclosure;

Fig. 21 shows a liquid leakage channel according to an embodiment of the present disclosure;

Fig. 22 shows a liquid leakage channel according to another embodiment of the present disclosure;

Fig. 23 shows the cleaning apparatus using a liquid suction device according to an embodiment of the present disclosure;

Fig. 24 shows the cleaning apparatus using a liquid suction device according to another embodiment of the present disclosure;

Fig. 25 shows the cleaning apparatus using a liquid suction device according to a further embodiment of the present disclosure;

Fig. 26 shows a schematic diagram of taking or placing the first housing;

Fig. 27 shows a filter screen according to an embodiment of the present disclosure;

Fig. 28 shows a schematic diagram of a sewage suction pipeline;

Fig. 29 shows a schematic diagram of a first suction channel;

Fig. 30 shows another schematic diagram of the first suction channel;

Fig. 31 shows a sixth sealing member according to an embodiment of the present disclosure;

Fig. 32 shows the sixth sealing member according to another embodiment of the present disclosure;

Fig. 33 shows the sixth sealing member according to a further embodiment of the present disclosure;

Fig. 34 shows a schematic diagram of the first suction device providing suction power for the second chamber;

Fig. 35 shows another schematic diagram of the first suction device providing suction power for the second chamber;

Fig. 36 shows a principle diagram of the first suction device providing suction power for the second chamber;

Fig. 37(a) shows a structural schematic diagram of a cleaning device using a pneumatic member according to an embodiment of the present disclosure; and

Fig. 37(b) shows a structural schematic diagram of the cleaning device using a hydrodynamic member according to an embodiment of the present disclosure.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0012] The following is a clear and complete description of the technical solutions of the embodiments in combination with the accompanying drawings. Obviously, the described embodiments only a part of the embodiments of the present disclosure, rather than all of the embodiments. Based on the embodiments, all other embodiments obtained by a person of ordinary skill in the art without creative labor will fall within the protection scope of the present disclosure.

[0013] Without conflict, the following embodiments and features in the embodiments may be combined with each other.

[0014] Referring to Fig. 1 to Fig. 3, in some embodiments of the present disclosure, a cleaning apparatus 10 includes a main body 100 and a chassis 200. The main body 100 is rotatably arranged on the chassis 200, and includes a handle 110 for users to hold. During the cleaning apparatus 10 being used, user holds the handle 110 and uses the main body 100 to push the chassis 200, so as to control the cleaning apparatus 10 to move forward, backward, or turn, so as to clean the surface to be cleaned through a cleaning member 210 on the chassis 200. Generally, the cleaning apparatus 10 includes a clean water tank and a sewage tank. The clean water tank supplies water to the cleaning member 210 or the ground to wet the surface to be cleaned, making the cleaning member 210 clean the ground better. During cleaning process, a first suction device 400 (such as a negative pressure source, e.g., a fan) may be used by the cleaning apparatus 10 to take back the dirt into the sewage tank. The first suction device 400 is communicated with the sewage tank. However, in case the sewage tank or part of the sewage tank is arranged on the main body 100 which may shake, tilt (compared with the horizontal plane), or get level (compared with the horizontal plane) during the cleaning process, water or water vapor in the sewage tank may enter the first suction device 400 and even cause damage to the first suction device 400. In particular, the smaller the angle between the main body 100 and the horizontal plane, the greater the probability that water enters the first suction device 400. In related art, in order to ensure that water does not enter the first suction device 400, the angle of the main body 100 rotating with respect to the chassis 200 is commonly limited. As a result, the cleaning apparatus 10 cannot clean the low areas such as the bed bottom and the sofa bottom. Based on this, the embodiments of the present disclosure propose solutions as follows.

[0015] Referring to Fig. 1 to Fig. 3, a first aspect of the embodiments of the present disclosure provides a cleaning apparatus 10 including a chassis 200, a main body 100, a first chamber 310, a second chamber 320, a first suction device 400, and a second suction device 500, and the main body 100 is rotatably connected with the chassis 200.

[0016] It should be noted that the main body 100 is rotatably connected with the chassis 200, so that the main body 100 can switch among an up-straight state (as shown in Fig. 1), a tilting state (as shown in Fig. 2), and a lying-down state (as shown in Fig. 3). When a length direction of the main body 100 (referring to the dotted line as shown in Fig. 1) is approximately (such as $\pm$ 10° to the vertical direction) in perpendicular to the chassis 200 (or the horizontal plane), the cleaning apparatus 10 is in the up-straight state, which is usually the placement posture of the cleaning apparatus 10; when an angle between the length direction of the main body 100 and the chassis 200 (or the horizontal plane) is an acute angle, the cleaning apparatus 10 is in the tilting state, which is usually the normal working posture of the cleaning apparatus 10; when the length direction of the main body 100 is roughly parallel (for example, $\pm$ 10° to the horizontal direction) to the chassis 200 (or the horizontal plane), the cleaning apparatus 10 is in the lying-down state, which is usually the extreme working posture of the cleaning apparatus 10 for cleaning low areas, such as bed bottom, sofa bottom, etc..

[0017] It should be noted that, the front side, the rear side, the left side, and the right side of the cleaning apparatus 10 are defined in the embodiments of the present disclosure to clearly indicate the orientation. As shown in Fig. 1, the front side refers to the forward side of the cleaning apparatus 10 in non-turning situation; the rear side is the opposite side to the front side, that is, the side that deviates from the forward direction of the cleaning apparatus 10 in non-turning situation; the left side is the left-hand side when a user stands facing the front side; the right side is the right-hand side when a user stands facing the front side. As to the main body 100, the front side refers to the side of the main body 100 pivoting forward, and the rear side refers to the side of the main body 100 pivoting backward. The main body 100 may change its pivoting angle, when the main body 100 is in the up-straight state (as shown in Fig. 1), the front side of the main body 100 is the forward side of the cleaning apparatus 10 in non-turning situation; when the main body 100 is in the lying-down state (as shown in Fig. 3), the front side of the main body 100 is the upper side of the main body 100, and the rear side of the main body 100 is the lower side of the main body 100.

[0018] Referring to Fig. 4, in some embodiments, the first chamber 310 is arranged on the main body 100, and

the second chamber 320 is arranged on the chassis 200. In some other embodiments, as shown in Fig. 5 and Fig. 6, both the first chamber 310 and the second chamber 320 are arranged on the main body 100. The first suction device 400 and the second suction device 500 may be both arranged on the main body 100; or the first suction device 400 is arranged on the main body 100 and the second suction device 500 is arranged on the chassis 200; or the first suction device 400 and the second suction device 500 are arranged outside of the cleaning apparatus 10, which is not limited here.

[0019] With regard to how to form the first chamber 310 and the second chamber 320, as shown in Fig. 4 to Fig. 6, in some embodiments, the cleaning apparatus 10 may include a first housing 310a and a second housing 320a, the first housing 310a defines the above-mentioned first chamber 310, the second housing 320a defines the above-mentioned second chamber 320, and the first housing 310a is fixed to the outside of the second housing 320a by assembly (as shown in Fig. 5); or, the first housing 310a is arranged on the main body 100, and the second housing 320a is arranged on the chassis 200 (as shown in Fig. 4). Since the first housing 310a and the second housing 320 are independent of each other, they may be respectively assembled and fixed to the main body 100, as shown in Fig. 4, and the assembly herein means to be installed and fixed together by means of clasps, fastening, etc. As shown in Fig. 4, the first housing 310a and the second housing 320 may also be separated and arranged on the main body 100 and the chassis 200 respectively. Or, as shown in Fig. 6, the cleaning apparatus 10 includes a first housing 310a and a second housing 320a, at least part of the first housing 310a is nested into the second housing 320a. Typically, referring to Fig. 7 to Fig. 10, a portion of the inner wall of the second housing 320a and a portion of the outer wall of the first housing 310a define the second chamber 320; the first housing 310a defines the first chamber 310 (as shown in Fig. 7 and Fig. 8); or, a portion of the inner wall of the first housing 310a and a portion of the inner wall of the second housing 320 define the first chamber 310 (as shown in Fig. 9 and Fig. 10).

[0020] It should be noted that "external liquid" described in the embodiments of the present disclosure may be dirt (including solid-liquid mixture and sewage), or clean water. The first suction device 400 in the embodiments of the present disclosure is configured to mainly provide power to drive the external liquid entering the first chamber 310. And, the "external" herein refers to the outside of the first chamber 310 and the second chamber 320.

[0021] In case the liquid need to be suctioned is sewage or solid-liquid mixture, the water tank 300 may be a sewage tank, and the first suction device 400 can suction the dirt generated during the cleaning process of the cleaning apparatus 10 to the sewage tank, to facilitate a subsequent operation for users.

[0022] In case the liquid need to be suctioned is clean water, the first suction device 400 may suction the external clean water into the first chamber 310. In case the first chamber 310 and the second chamber 320 define a sewage tank, the clean water can clean the first chamber 310 and/or the second chamber 320 to maintain the water tank.

[0023] External liquid being solid-liquid mixture or sewage will be described in detail as an example.

[0024] Referring to Fig. 4 to Fig. 6, the first suction device 400 is configured to suction the external dirt (including solid-liquid dirt, sewage, etc.) during the cleaning process of the cleaning apparatus 10 into the first chamber 310, to take back stains, oil stains, or impurities on the ground. Also, the cleaning apparatus 10 is capable of suctioning a mixture of external solid dirt and sewage into the first chamber 310, which is not limited here. The chassis 200 of the cleaning apparatus 10 is provided with a cleaning member 210 for cleaning surfaces which needs to be cleaned. The cleaning member 210 may be a roller brush. One end of the main body 100 is provided with a handle 110 for user to hold, user holds the handle 110 to drive the main body 100 to push the chassis 200 forward, backward, or turn. The first chamber 310 is arranged on the main body 100, the second chamber 320 is communicated with the first chamber 310, and the first suction device 400 is communicated with the first chamber 310, so that the first suction device 400 is capable of providing power to drive external liquid entering into the first chamber 310. Typically, the first suction device 400 is a high-flow negative pressure source capable of providing negative pressure, such as a fan or the like, which is able to suction external liquid into the first chamber 310. The second chamber 320 is communicated with the first chamber 310, it may be understood that the second chamber 320 is indirectly communicated with the first suction device 400 through the first chamber 310, in case the communication between the first chamber 310 and the second chamber 320 is cut off, the first suction device 400 is merely communicated with the first chamber 310.

[0025] As shown in Fig. 4 to Fig. 10, a partitioning member is provided between the first chamber 310 and the second chamber 320, so as to make the first chamber 310 and the second chamber 320 be independent with each other, and the partitioning member can further prevent the liquid in the second chamber 320 from flowing back to the first chamber 310. The communication between the first chamber 310 and the second chamber 320 herein means that there is a channel between the two chambers for liquid flowing through, wherein, the "channel" includes but is not limited to, a hole, a pipe, a gap, etc., the channel is configured to allow liquid in the first chamber 310 to enter the second chamber 320.

[0026] The second suction device 500 is communicated with the second chamber 320, and the second suction device 500 is capable of providing power to drive the liquid in the first chamber 310 into the second chamber 320, which may further prevent the liquid in the second chamber 320 from flowing back to the first chamber 310.

[0027] The second suction device 500 introduced by the embodiments of the present disclosure can drive the liquid in the first chamber 310 into the second chamber 320, so liquid in the first chamber 310 can be reduced or removed, as such, the risk of liquid entering the first suction device 400 is reduced. It should be noted that the first suction device 400 is configured to drive external liquid into the first chamber 310, it has a long suction path, requiring a larger flow rate; while the second suction device 500 is configured to drive the liquid in the first chamber 310 into the second chamber 320, thus the required flow rate can be slight smaller. In case the second suction device 500 is a gas suction device, there is also a liquid intake risk for the second suction device 500. However, it should be understood that when facing a same amount of liquid to be suctioned, the larger the flow rate, the greater the risk of liquid entering the suction device. Since a smaller flow rate is required to drive the liquid in the first chamber 310 into the second chamber 320, the second suction device 500 can be a suction device with smaller flow rate, thus the risk of liquid entering the second suction device 500 is reduced. Since the flow rate required to drive the liquid in the first chamber 310 into the second chamber 320 may be small, the wind resistance of the suction channel which is communicated with the second suction device 500 can be increased, for example, by adding some blocking structures which can prevent water and/or water vapor entering the second suction device 500, to further reduce the risk of liquid intake of the second suction device 500. In addition, the risk of liquid intake of the first suction device 400 can also be reduced by adding blocking structures. The blocking structures for the first suction device 400 may be simple to provide an appropriate wind resistance for the first suction device 400, since it is necessary to ensure that the first suction device 400 can always provide a larger suction flow rate to ensure the external liquid being suctioned into the first chamber 310, such that the risk of liquid intake is reduced and impact on the first suction device 400 to always provide a large suction flow rate is minimized.

[0028] In some embodiments, the second suction device 500 includes a gas suction device, the first chamber 310 is communicated to the second chamber 320 through a liquid leakage structure 312, and a cross-sectional area of a suction port of the gas suction device 500 is similar to a cross-sectional area of the liquid leakage structure. "Similar" means that the area difference between the two is relatively small. For example, it could be less than 20 square millimeters. The cross-sectional areas of the two are arranged to be similar to each other, so that "suction force" of the second suction device 500 can effectively act on the liquid leakage structure 312 at a ratio close to 1:1, so the liquid in the first chamber 310 can smoothly enter the second chamber 320 through the liquid leakage structure 312.

[0029] In the embodiments of the present disclosure, during the cleaning apparatus 10 is used, liquid in the first chamber 310 come from the outside is prone to enter the first suction device 400 since the first suction device 400 is directly communicated with the first chamber 310, especially when the first chamber 310 is full filled with the liquid or the main body 100 is tilted or lying down. However, the provided second suction device 500 is communicated with the second chamber 320 and provides power to drive the liquid in the first chamber 310 into the second chamber 320, as such, there is always a relatively small amount of liquid in the first chamber 310, thus minimizing the risk of the liquid entering the first suction device 400 even though the main body 100 is shaking, tilted, or lying down, which can cause secondary pollution and even damage to the first suction device 400. In addition, the second suction device 500 can effectively prevent the liquid in the second chamber 320 flowing back to the first chamber 310, which may cause failure of the first suction device 400.

[0030] It should be noted that the first suction device 400 and the second suction device 500 are independent suction sources, and the suction power of both can be controlled independently.

[0031] Typically, suction power of the first suction device 400 may be adjusted based on environmental factors during the first suction device 400 provides power to drive the solid-liquid mixture, sewage, or clean water entering the first chamber 310, while the second suction device 500 may maintain a greater power in any case to ensure that liquid is suctioned into the second chamber 320 from the first chamber 310.

[0032] In some embodiments, as shown in Fig. 1, the cleaning apparatus 10 includes a water tank 300, and the first chamber 310 and the second chamber 320 are defined in the water tank 300. If dirt is collected, the water tank 300 is served as a sewage tank. In case the cleaning apparatus 10 is in the up-straight state, the first chamber 310 is located upon the second chamber 320. The water tank 300 may be detachably mounted on the main body 100, the first suction device 400 and the second suction device 500 are arranged on the main body 100, allowing the first suction device 400 to suction external liquid into the first chamber 310 of the sewage tank 300, and the second suction device 500 to suction the liquid in the first chamber 310 into the second chamber 320.

[0033] In some embodiments, as shown in Fig. 7, the cleaning apparatus 10 may further include a first detection assembly 361, and the first detection assembly 361 is arranged in the first chamber 310 and configured to detect the information of content accommodated in the first chamber. Typically, as shown in Fig, a filter screen 352 is arranged in the first chamber 310 to allow the first chamber 310 defining separated solid and liquid chambers, in this case, the information of content accommodated in the first chamber may indicate the amount of solid waste that can be accommodated.

[0034] In some embodiments, referring to Fig. 4 to Fig. 10 and Fig. 20 to Fig. 22, the first chamber 310 and the second chamber 320 are communicated through the liq-

uid leakage structure 312, such that liquid within the first chamber 310 is capable of entering the second chamber 320. The liquid leakage structure 312 may be a leakage hole, a leakage passage, or a leakage gap disposed between the first chamber 310 and the second chamber 320, which is not limited here. It should be noted that the liquid leakage area formed by the liquid leakage structure 312 may be minimized, so that the rest of the bottom wall of the first housing 310a can isolate the first chamber 310 and the second chamber 320, and the second suction device 500 is allowed to concentrate its suction force on the small liquid leakage structure 312, such that liquid in the first chamber 310 can be quickly suctioned into the second chamber 320. As such, the possibility of liquid flowing back to the first chamber 310 from the second chamber 320, or swaying liquid flowing back to the first chamber 310 when the cleaning apparatus 10 is shook will be reduced. That is, most of the liquid remains in the second chamber 320 and the amount of liquid retained in the first chamber 310 is less, which reduces the risk of liquid entering the first suction device 400.

[0035] It should be noted that when the first chamber 310 is located above the second chamber 320, both the gravity of the liquid and the suction force provided by the second suction device 500 may drive the liquid in the first chamber 310 entering the second chamber 320.

[0036] In some embodiments, as shown in Fig 20 to Fig. 22, the liquid leakage structure 312 may be set at the rear side of the first chamber 310. In this way, when the main body 100 is tilted backward or lying down, the liquid leakage structure 312 can be at the lowest point of the first chamber 310, to facilitate flow of the liquid from the first chamber 310 into the second chamber 320 when the main body 100 is tilted backward or lying down during use.

[0037] In some embodiments, the liquid leakage structure 312 may be arranged at a lower portion of the first chamber 310. The lower portion of the first chamber 310 refers to the bottom wall of the first chamber 310 or a side wall 310c of the first chamber 310 which is closer to the chassis 200. By positioning the liquid leakage structure 312 at the lower portion, when the main body 100 is tilted or up straight, the liquid leakage structure 312 is positioned at the lowest point of the first chamber 310, so that all the liquid in the first chamber 310 can flow into the second chamber 320 through the liquid leakage structure 312.

[0038] In some embodiments, the liquid leakage structure 312 is arranged at a lower rear portion of the first chamber 310. In this case, regardless of whether the main body 100 is tilted, up straight, or lying down, it can ensure that the liquid leakage structure 312 is located at the lowest point of the first chamber 310 in its current state, so that all the liquid in the first chamber 310 can flow into the second chamber 320 through the liquid leakage structure 312.

[0039] In one embodiment, referring to Fig. 11, the maximum size of the liquid leakage structure 312 along the front-rear direction is smaller than the minimum size of the liquid leakage structure 312 along the left-right direction, such that the liquid leakage structure 312 can be closer to the rear side while ensuring efficient liquid flow. Typically, the liquid leakage structure 312 may have a flat shape.

[0040] In the embodiments of the present disclosure, the second suction device 500 may be a gas suction device such as a vacuum pump, a fan; or a liquid suction device such as a water pump, a peristaltic pump, which is not limited here, as long as it can provide power to drive the liquid in the first chamber 310 entering the second chamber 320. The following is an example of the second suction device 500 as a gas suction device.

[0041] In some embodiments, the second suction device 500 includes a gas suction device 500, and the gas suction device 500 is communicated with the second chamber 320, so the gas suction device 500 can suction the gas in the second chamber 320 to allow a negative pressure generating in the second chamber 320. In this case, in addition to the liquid in the first chamber 310 flowing into the second chamber 320 under the influence of gravity, the negative pressure generated by the gas suction device 500 can also provide a certain auxiliary force to drive the liquid in the first chamber 310 entering the second chamber 320. The gas suction device 500 may be a vacuum pump, an air pump, a fan or the like which is capable of suctioning gas.

[0042] Referring to Fig. 4 to Fig. 6, the first suction device 400 is communicated with the first chamber 310 through a first suction channel 311, and the second suction device 500 is communicated with the second chamber 320 through a second suction channel 321. The first chamber 310 may generate a negative pressure by virtue of the first suction device 400 to allow external liquid entering the first chamber 310 and then being suctioned into the second chamber 320 by virtue of the second suction device 500. Illustratively, as shown in Fig. 4 and Fig. 5, the second suction channel 321 is a suction interface; or, as shown in Fig. 6, the second suction channel 321 is a gas channel.

[0043] It should be understood that, during the first suction device 400 and the gas suction device 500 are working, the negative pressure of the first chamber 310 at the connection between the first chamber 310 and the second chamber 320 may be smaller than the negative pressure of the second chamber 320 at the connection between the first chamber 310 and the second chamber 320, so that the liquid in the first chamber 310 can flow into the second chamber 320 smoothly; due to the negative pressure difference, the dirt in the first chamber 310 can easily enter the second chamber 320, and since the liquid has fluidity, the liquid in the second chamber 320 would not return to the first chamber 310 in case the cleaning apparatus 10 is tilted, lying down, or shaking, which effectively protects the first suction device 400.

[0044] In some embodiments, a filtering member may be provided in the first chamber 310 to filter the dirt, al-

lowing the solid waste to retained in the first chamber 310 and the liquid in the dirt to enter the second chamber 320 under its own gravity and the negative pressure generated by the gas suction device. With regard how to design the filtering member in the first chamber 310 and the specific structures of the filtering member will be described in detail in subsequent embodiments.

[0045] Compared with the related art, the cleaning apparatus 10 in the embodiments of the present disclosure is additionally provided with the second suction device 500. In case the second suction device 500 is a gas suction device 500, similar to the first suction device 400, the gas suction device 500 also faces the risk of damage caused by liquid intake. In order to further reduce the risk of liquid intake of the gas suction device 500 (the second suction device 500), the embodiments of the present disclosure propose solutions as follows.

[0046] In some embodiments, referring to Fig. 4 to Fig. 10, the second suction channel 321 includes a gas inlet 321b and a gas outlet 321a, the gas inlet 321b is communicated with the second chamber 320, and the gas outlet 321a is communicated with the gas suction device 500 (the second suction device 500). The shape of the second suction channel 321 is not limited herein.

[0047] As shown in Fig. 4 to Fig. 10, the gas inlet 321b of the second suction channel 321 may be located at the front side of the second chamber 320, in case the cleaning apparatus 10 is lying down, the gas inlet 321b can be kept as far away from the liquid level in the second chamber 320 as possible, so as to reduce the probability that the liquid in the second chamber 320 is suctioned into the gas inlet 321b. Further, when the cleaning apparatus 10 is lying down, the farther the gas inlet 321b is from the liquid level of the second chamber 320, the larger the volume of the second chamber 320 can be utilized. For example, as the gas inlet 321b is arranged at the front side of the second chamber 320, in case the cleaning apparatus 10 is lying down, the liquid level in the second chamber 320 may approach the front side of the second chamber 320, while if the gas inlet 321b is arranged at the middle of the second chamber 320, in order to reduce the liquid intake probability of the first suction device 400 from the gas inlet 321b, the liquid level in the second chamber 320 should be controlled to be lower than the middle portion of the second chamber 320. Therefore, the liquid level of the former is higher than that of the latter, namely, the liquid storage capacity of the second chamber 320 with the gas inlet 321b locating at the middle is not as good as that of when the gas inlet 321b being arranged at the front side of the second chamber 320. Therefore, arranging the gas inlet 321b at the front side of the second chamber 320 may increase the effective utilization volume of the second chamber 320.

[0048] In some embodiments, as shown in Fig. 4 to Fig. 10, the gas inlet 321b of the second suction channel 321 is located at the top of the second chamber 320, the "top" herein means at the top of the whole second chamber 320, such an arrangement allows the gas inlet 321b being away from the liquid level of the second chamber 320, thus the probability of the liquid in the second chamber 320 being suctioned into the second suction channel 321 is reduced.

[0049] In some embodiments, as shown in Fig. 11 and Fig. 12, the maximum size of the gas inlet 321b along the front-rear direction of the main body 100 is smaller than the minimum size of the gas inlet 321b along the left-right direction of the main body 100; typically, the gas inlet 321 may have a flat shape. In the case the position of the gas inlet 321b is fixed, in a lying down state, the flat shape of the gas inlet 321b makes the lowest point of the opening of the gas inlet 321b be as high as possible. In this way, at the same liquid level, the lower part of the gas inlet 321b can be further away from the liquid level in the second chamber 320, thus the probability of the liquid in the second chamber 320 entering the second suction channel 321 is reduced. In the case the cleaning apparatus 10 is lying down, the further the gas inlet 321b is from the liquid level of the second chamber 320, the larger the effective volume of the second chamber 320 can be utilized. For example, as shown in Fig. 12, in the case the cleaning apparatus 10 is lying down and the gas inlet 321b has a flat shape, the liquid level in the second chamber 320 is allowed to be closer to the front side of the second chamber 320; however, if the gas inlet 321b is not flat but is set to increase its thickness in the front-to-back direction, that is, in a lying down state, the opening of the gas inlet 321b is lowered in the height direction, in this case, the liquid level in the second chamber 320 need to be controlled to be lower than the opening to reduce the probability of liquid entering the second suction device 500 from the gas inlet 321b, correspondingly, the effective volume of the second chamber 320 is reduced. Therefore, the gas inlet 321b having a flat shape can also increase the effective volume of the second chamber 320.

[0050] It should be noted that the whole second suction channel 321 may have a flat shape.

[0051] In addition, the gas inlet 321b and/or the second suction channel 321 being both located at the front side and/or top of the second chamber 320 can further reduce the probability of liquid entering the gas inlet 321b and increase the effective volume of the second chamber 320.

[0052] In one embodiment, as shown in Fig. 13, the cross-sectional area of the second suction channel 321 can gradually decrease in the direction from the gas inlet 321b to the gas outlet 321a, such an arrangement allows the gas inlet 321b to be as large or wide as possible in a limited space, so as to reduce the probability of the gas inlet 321b being completely blocked by the liquid. In this way, even if the gas inlet 321b is partially blocked by liquid, the gas suction device can still perform suction through the part of the gas inlet 321b which is not blocked by the liquid, due to the greater flowability of gases compared to liquids. As such, the second suction device 500

can continue to work in such a situation, so the possibility of a failure of the second suction device 500 caused by partial water intake of the gas inlet 321b is reduced. Further, the cross-sectional area of the second suction channel 321 gradually decreases along a suction direction, even if there is liquid entering the second suction channel 321 through the gas inlet 321b, the liquid that is shaken into the second suction channel 321 is prone to hit the inner wall of the second suction channel 321, thus being blocked by the inner wall from directly entering the gas suction device through the gas outlet 321a.

[0053] In one embodiment, as shown in Fig. 13, the second suction channel 321 includes at least one guiding wall 321h which is configured to guide airflow in the second suction channel 321 to flow from the gas inlet321b to the gas outlet 321a along a curved path. The guiding wall 321h assists to define a curved path in the second suction channel 321, even if there is water vapor entering the second suction channel 321 through the gas inlet 321b, the water vapor needs to traverse the curved path to reach the gas outlet 321a, that is, it prolongs the path of the water vapor from the gas inlet 321b to the gas outlet 321a, which undoubtedly increases the difficulty of the water vapor entering the second suction device 500 from the gas outlet 321a. In addition, during the water vapor passes along the guiding wall 321h, water vapor can be separated and blocked by the guiding wall 321h, so that the water vapor can be prevented from being directly drawn into the second suction device 500 through the second suction channel 321.

[0054] In some other embodiments, the side wall of the second suction channel 321 is curved, forming the guiding wall 321h; or, the second suction channel 321 may be provided with one or more curved side walls, and the one or more curved side walls define the guiding wall 321h.

[0055] In some embodiments, as shown in Fig. 13 and Fig. 14, the cleaning apparatus 10 may be provided with a third detection assembly 363 which is configured to detect whether there is water entering the second suction channel 321, so as to reduce the failure risk of the gas suction device 500 caused by liquid intake. In case it is detected that water has entered the second suction channel 321, the gas suction device may be controlled to be shut down or reduce the power, so as to prevent the liquid in the second suction channel 321 from entering the gas suction device. Optionally, the third detection assembly 363 may be an electrode type sensor or a photoelectric type sensor. Optionally, the third detection assembly 363 is arranged in the second suction channel 321.

[0056] In one embodiment, as shown in Fig. 7, a second detection assembly 362 is arranged in the second chamber 320 to detect liquid level information in the second chamber 320. In this embodiment, the second detection assembly 362 is a liquid level sensor, or a liquid presence sensor. The liquid level information includes the liquid level information in the second chamber 320, and the information of whether there is liquid reaching to the second detection assembly 362 instantly under the situation of shaking and tilting.

[0057] Typically, the second detection assembly 362 may be installed below the gas inlet 321b of the second suction channel 321, and/or behind the gas inlet 321b. The second detection assembly 362 may trigger a liquid presence signal when it detects the liquid or liquid level reaching the installation position of the second detection assembly 362. As such, regardless of whether the second detection assembly 362 is in an up-straight state, a tilting state, or a lying down state, the second detection assembly 362 is closer to the liquid level than the gas inlet 321b, so that an alarm can be triggered before the liquid enters the gas inlet 321b, which reduces the liquid intake probability of the gas suction device.

[0058] The following is a detailed description of how to form the first chamber 310, the second chamber 320, and the second suction channel 321.

[0059] In some embodiments, as shown in Fig. 4 and Fig. 5, the cleaning apparatus 10 includes a first housing 310a and a second housing 320a, the first housing 310a defines the above-mentioned first chamber 310, the second housing 320a defines the above-mentioned second chamber 320. The first housing 310a is fixed to the outside of the second housing 320a (as shown in Fig. 5) through assembling, and the first housing 310a and the second housing 320a may be assembled together by means of fasteners, buckles, clasps, and the like; or, the first housing 310a is arranged on the main body 100, and the second housing 320a is arranged on the chassis 200 (as shown in Fig. 4), such an arrangement may reduce the weight of the main body 100, which may facilitate the operations such as pushing or twisting of the main body 100 by users.

[0060] In this way, the first chamber 310 and the second chamber 320 are independent of each other, and the gas outlet 321a of the second suction channel 321 is defined on the second housing 320 and located at the top of the second chamber 320 to communicate with the interface of the second suction device 500.

[0061] In some embodiments, referring to Fig. 6 to Fig. 10, the cleaning apparatus 10 includes a first housing 310a and a second housing 320a, at least part of the first housing 310a is nested in the second housing 320a. The second chamber 320 is defined by part of the inner wall of the second housing 320a and part of the first housing 310a (as shown in Fig. 6 to Fig. 10). The first chamber 310 may be defined in two different ways, for example, the first chamber 310 is defined in the first housing 310a (as shown in Fig. 7 and Fig. 8), or a partial inner wall of the first housing 310a and a partial inner wall of the second housing 320a co-enclose the first chamber 310 (as shown in Fig. 9 and Fig. 10).

[0062] In this way, the first chamber 310 and the second chamber 320 are both installed on the main body 100, and defined by the nesting of the first housing 310a and the second housing 320a. The second suction channel 321 may be all defined in a wall surface of the first

housing 310a (as shown in Fig. 19 and Fig. 20) or a wall surface of the second housing 320, namely, the second suction channel 321 is defined inside a solid structure. Or, part of the second suction channel 321 is defined in the wall surface of the first housing 310a and isolated from the first chamber 310, and the other part of the second suction channel 321 is cooperatively defined by a portion of an outer wall of the first housing 310a and a portion of an inner wall of the second housing 320 (as shown in Fig. 21), wherein the portion of the inner wall of the second housing 320 defining the first chamber 310 is different from the portion of the inner wall of the second housing 320 defining the second suction channel 321.

[0063] In some embodiments, as shown in Fig. 14 to Fig. 16, the first housing 310a is nested in the second housing 320a, and the outer wall of the first housing 310a is slotted and enclosed with the inner wall of the second housing 320a to form the second suction channel 321.

[0064] In some embodiments, the gas outlet 321a of the second suction channel 321 is arranged on a wall surface of the second housing 320a.

[0065] Typically, as shown in Fig. 6 to Fig. 10 and Fig. 15 to Fig. 17, the first housing 310a is nested in the second housing 320, the first housing 310a defines the first chamber 310, the bottom of the first housing 310a and a part of the inner wall of the second housing 320 define the second chamber 320, the upper part of the first housing 310a is sealed with the upper part of the second housing 320. The gas outlet 321a may be arranged at the top of the second chamber 320 and at the middle part of the second housing 320a, so as to allow the suction to be performed directly at the top of the second chamber 320; or the gas outlet 321a may be provided at the upper part of the second housing 320a, allowing the suction to be performed at the top of the second chamber 320 through the second suction channel 321 formed by an outer wall of the first housing 310a and an inner wall of the second housing 320, and the gas outlet 321a is configured to dock with the interface of the second suction device 500.

[0066] In some embodiments, as shown in Fig. 15 to Fig. 17, the first housing 310a is partially nested in the second housing 320a, and the gas outlet 321a is arranged on a wall surface of the first housing 310a and located at a portion of the first housing 310a exposed from the second housing 320a.

[0067] Typically, as shown in Fig. 15 to Fig. 17, compared with the Fig. 7 to Fig. 10, the upper part of the first housing 310a is not completely nested in the second housing 320a, and the gas outlet 321a is defined on the upper part of the first housing 310a which is exposed from the second housing 320a. In this case, the second suction channel 321 is at least partially defined inside the solid structure of the first housing 310a, a communication port for the second suction channel 321 and the second chamber 320 is defined at a lower portion of the first housing 310a, and the second suction channel 321 in the first housing 310a is isolated from the first chamber 310a. In this embodiment, there's no need to process the gas outlet 321a on the second housing 320a, which ensures the integrity of the second housing 320. Since the second housing 320 is mostly configured to store liquid, the integrity of the side wall of the second housing 320 may reduce an occurrence of liquid leakage, thereby improving the stability of the second housing 320 in containing liquids.

[0068] In one embodiment, the first housing 310a or the second housing 320a is detachably connected with the main body 100. When the first housing 310a or the second housing 320 is full of liquid or dirt, it is convenient for users to remove the first housing 310a and/or the second housing 320 to dispose the liquid or dirt. The gas outlet 321a is sealed and coupled with the suction port of the gas suction device 500 arranged on the main body 100.

[0069] In some other embodiments, as shown in Fig. 17, the second suction channel 321 includes a channel 3211 and a channel 3212, the channel 3211 is arranged in the wall of the first housing 310a, and the channel 3212 is defined by the outer wall of the first housing 310a and the inner wall of the second housing 320a cooperatively.

[0070] Further, as shown in Fig. 11 and Fig. 13, the cleaning apparatus 10 may include a first sealing portion 340a for sealing the channel 3212 defined by the outer wall of the first housing 310a and the inner wall of the second housing 320a as shown in Fig. 11 and Fig. 17. Since the channel 3212 is enclosed by the outer wall of the first housing 310a and the inner wall of the second housing 320a, there are gaps around the periphery of the channel 3212, liquid from the rear side of the second chamber 320 or liquid at the gap between the first housing 310a and the second housing 320a is prone to enter the suction channel 321. Therefore, the first sealing portion 340a is provided to concentrate the suction force of the second suction channel 321 at the gas inlet 321b, which facilitates the control of the liquid source, and further facilitates the arrangement of the position of the gas inlet 321b, so that there is less risk of liquid intake whatever the cleaning apparatus 10 is in the lying-down state, the up-straight state, or the tilting state.

[0071] When part of the first housing 310a is nested in the second housing 320, in order to ensure that the first chamber 310 and the second chamber 320 are independent of each other (communicating with each other through only the liquid leakage structure) and are sealed, the following design is proposed.

[0072] In some embodiments, referring to Fig. 7 and Fig. 8, a first sealing member 330 is arranged between the first housing 310a and the second housing 320a, the first sealing member 330 is squeezed between the first housing 310a and the second housing 320a to provide circumferential sealing between the first housing 310a and the second housing 320a. In this case, the side wall 310c of the first housing 310a is an integrated side wall, the first sealing member 330 is configured to seal the gap between the first housing 310a and the second housing 320a, allowing the second chamber 320 to be defined

between portion of the outer wall of the first housing 310a and portion of the inner wall of the second housing 320a, and the liquid in the second chamber 320 can be ensured to not flow out to cause a leakage. Simultaneously, the suction force of the gas suction device 500 is allowed to act on the liquid leakage structure 312.

[0073] In some embodiments, referring to Fig. 15 and Fig. 17, the side wall 310c of the first housing 310a is not an integrated side wall, that is, the side wall 310c of the first housing 310a defines a gas leakage section 310d. A second sealing member 340 is also provided between the first housing 310a and the second housing 320a, the first sealing member 330 and the second sealing member 340 are spaced apart along a height direction of the first housing 310a, and the first sealing member 330 is located above the second sealing member 340. The gas leakage section 310d is located between the first sealing member 330 and the second sealing member 340. Due to the presence of the gas leakage section 310d defined on the side wall 310c of the first housing 310a, it is impossible to form an airtight first chamber 310. Therefore, the sealing members are used to isolate the first chamber 310 and second chamber 320 from each other and the outside world to ensure that they can independently form airtight first chamber 310 and second chamber 320, so as to ensure that a negative pressure can be formed in the first chamber 310 and the second chamber 320.

[0074] In some embodiments, referring to Fig. 9, Fig. 15, Fig. 17, and Fig. 26, an opening 325 of the first housing 310a defines the above-described gas leakage section 310d. It should be understood that the opening 325 of the first housing 310a facilitates pouring out of the dirt in the first chamber 310 when the first housing 310a is taken out from the second housing 320, which improves the using experience.

[0075] In some other embodiments, as shown in Fig. 18, the side wall 310c of the first housing 310a is provided with filtering holes 352, the filtering holes 352 define the above-mentioned gas leakage section 310d. Solid and liquid in the first chamber 310 can be separated through the filtering holes 352, allowing the solid waste to remain in the first chamber 310 while the liquid to enter into the second chamber 320. Compared with the opening 325, the filtering holes 352 can prevent the dirt in the first chamber 310 from falling out when the first housing 310a is taken out from the second housing 320a.

[0076] In some embodiments, referring to Fig. 18 to Fig. 20, the first housing 310a includes at least one movable member 310e, and the movable member 310e at least forms the side wall 310c of the first housing 310a. A gap is defined between the movable members 310e, or between the movable member 310e and the side wall 310c of the first housing 310a. The gap is located at the side wall 310c of the first housing 310a, and the gap defines the gas leakage section 310d. Since the movable member 310e forms the side surface of the first housing 310a, dirt is not prone to fall out during the first housing 310a is taken out from the second housing 320. Further, in order to facilitate the processing of the dirt in the first chamber 310, the side wall is set as the movable member 310e, so as to facilitate the user's operation when dirt needs to be poured out. In addition, filtering holes 352 can also be defined on the movable member 310e to further facilitate the solid-liquid separation.

[0077] Typically, the first housing 310a may include at least one movable member 310e that is movable with respect to the first housing 310a. The movable member 310e is slidably connected or rotatably connected (as shown in Fig. 18 to Fig. 20). The gap between the movable members 310e defines the above-mentioned gas leakage section 310d.

[0078] In one embodiment, as shown in Fig. 7 and Fig. 8, the first housing 310a includes a first body 310f and a second body 310g. The first body 310f is movably assembled on an upper portion of the second body 310g, namely, the first body 310f is detachably mounted on the second body 310g. Generally, a HEPA for protecting the first suction device 400 is installed above the first body 310f. A third sealing member 390 is arranged between the first body 310f and the second body 310g, and the third sealing member 390 is configured to provide circumferential sealing between the first body 310f and the second body 310g. Alternatively, as shown in Fig. 10, the first main body 310f and the second main body 310g are spaced apart in the second housing 320a to define the first chamber 310, a fourth sealing member 910 is provided for circumferential sealing between the first body 310f and the second housing 320a, and a fifth sealing member 920 is provided for circumferential sealing between the second body 310g and the second housing 320a.

[0079] In some embodiments, as shown in Fig. 13 and Fig. 17, a portion of the outer wall of the first housing 310a and a portion of the inner wall of the second housing 320a cooperatively define at least a portion of the second suction channel 321, namely, the channel 3212. The second sealing member 340 includes a first sealing portion 340a and a second sealing portion 340b, the first sealing portion 340a surrounds the outside of the second suction channel 321, the second sealing portion 340b surrounds the first housing 310a along a circumferential direction of the first housing 310a, and the first sealing portion 340a and the second sealing portion 340b are connected with each other. The second sealing member 340 herein serves both to form the shape of the second suction channel 321 and to isolate the first chamber 310 from the second chamber 320.

[0080] In one embodiment, as shown in Fig. 21, a liquid leakage notch 312a is provided on the outside of the side wall 310c of the first housing 310a, and the liquid leakage notch 312a defines the above-mentioned liquid leakage structure 312 with the interior of the second housing 320a. The liquid leakage notch 312a may be arranged on the outside of the bottom wall of the first housing 310a, the second sealing member 340 is provided with a sealing strip notch, and the position of the sealing strip notch

corresponds to the position of the liquid leakage notch 312a, so that when the main body 100 is tilted or lying down, the liquid leakage structure 312 is arranged at the rear side of the main body 100, so the liquid leakage notch 312a can be closer to the rear side and located at a lower water level, as such, it is more convenient for the liquid in the first chamber 310 to flow into the second chamber 320 to prevent a liquid accumulating in the first chamber 310 which may cause a safety hazard to the first suction device 400; further, by such an arrangement, after the first housing 310a is removed from the second housing 320a, the liquid leakage structure 312 remains only the liquid leakage notch 312a, such that the cleaning of the liquid leakage notch 312a is facilitated.

[0081] In some embodiments, as shown in Fig. 22, the liquid leakage structure 312 is disposed on the bottom wall of the first housing 310a, and the second sealing member 340 surrounds the liquid leakage structure 312.

[0082] In order to prevent users from accidentally pouring out the dirt inside the first housing 310a in the process of taking out the first housing 310a, the following design is proposed.

[0083] As shown in Fig. 26, in the embodiment in which the first housing 310a is nested in the second housing 320a, in order to facilitate the taking out of the first housing 310a from the second housing 320a, the outer wall of the second housing 320a may be provided with a holder 327, and the side wall 310c of the first housing 310a has the opening 325 which is arranged towards the holder 327. The holder 327 is configured for users to hold the water tank 300. The opening 325 toward the holder 327 is provided to facilitate that, after the sewage tank 300 is removed, the user holds the holder 327 of the second housing 320a with one hand (as shown in Fig. 26, such as the right hand) and holds the first housing 310a with the other hand (as shown in Fig. 26, the left hand) to take the first housing 310a out from the second housing 320a along a substantially horizontal direction. At this time, the opening of the first chamber 310 is roughly upward, the dirt in the first chamber 310 can be blocked by the non-opened side wall 310c of the first housing 310a, which effectively prevents the dirt in the first chamber 310 from falling out.

[0084] The second suction device 500 described in the above embodiments is a gas suction device, so there is a certain risk of water intake of the gas suction device. In order to solve the problem of water intake, the second suction channel 321a is designed as being capable of separating gas and liquid, for example, a partitioning member structure is provided. In some other embodiments of the present disclosure, the second suction device 500 may be a liquid suction device, the liquid suction device itself may allow liquid to pass through, so there is no need to solve the problem of water intake.

[0085] In some embodiments, referring to Fig. 23 to Fig. 25, the second suction device 500 includes a liquid suction device 500 which is located in the second suction channel 321. The second suction channel 321 includes a liquid inlet and a liquid outlet, the liquid inlet is communicated with a liquid suction end of the liquid suction device, and the liquid outlet is communicated with a liquid outlet end of the liquid suction device. In this way, the second suction channel 321 and a channel of the liquid leakage structure 312 are the same channel, and the liquid suction device is configured to drive the sewage in the first chamber 310 entering into the second chamber 320. By this arrangement, there is no need to worry about the damage to the liquid suction device caused by water intake. In order to make the liquid suction device work better, a filter screen 350 can be arranged in the first chamber 310 to separate the solid waste from the sewage in the first chamber 310, such that only the separated sewage needs to be driven into the second chamber 320 by the liquid suction device. By this arrangement, it can effectively prevent the liquid in the second chamber 320 from flowing back to the first chamber 310, regardless of whether the cleaning apparatus 10 is tilted, lying down, shaking, or up straight; it can also ensure that the liquid in the first chamber 310 is discharged in time to prevent water entering the first suction device 400.

[0086] In the embodiments of the present disclosure, the dirt collected by the cleaning apparatus 10 is a solid-liquid mixture which is not easy for users to handle, for example, if the solid-liquid mixture is poured into the sewer, the sewer may be blocked; if the solid-liquid mixture is poured into a garbage can, the garbage bag may be damaged to cause a liquid leakage. So, the embodiments of the present disclosure provide the following solutions with regard the above-mentioned specific technical problems.

[0087] In one embodiment, the cleaning apparatus 10 further includes a sewage suction pipeline 112, and an outlet 112c of the sewage suction pipeline is communicated with the first chamber 310. As shown in Fig. 4 and Fig. 5, in case the first housing 310a and the second housing 320 are independent of each other, the outlet 112c of the sewage suction pipeline is directly communicated with the first chamber 310. As shown in Fig. 6 to Fig. 10 and Fig. 44, in case the first housing 310a is at least partially nested in the second housing 320, the sewage suction pipeline 112 includes a sewage suction pipe 112a and a sewage inlet pipe 112b. The sewage suction pipe 112a is arranged on the chassis 200 and the main body 100 of the cleaning apparatus 10, namely, the outside of the first chamber 310 and the second chamber 320; while the sewage inlet pipe 112b is arranged inside the water tank, and the outlet of the sewage inlet pipe 112b is the outlet 112c of the sewage suction pipeline 112, to drive the dirt outside entering the first chamber 310. The first suction device 400 is capable of sequentially suctioning gas from the first suction channel 311, the first chamber 310, and the first suction channel 311 to generate a negative pressure to suction external dirt into the first chamber 310.

[0088] In some embodiments, typically, as shown in Fig. 18, Fig. 20, and Fig. 28, a filter screen 350 is provided in the first chamber 310, and the filter screen 350 is ar-

ranged between the liquid leakage structure 312 of the first chamber 310 and the second chamber 320 and the outlet 112c of the sewage suction pipeline. The first chamber 310 defines a solid waste chamber 316 located on a side of the outlet end for receiving the solid waste, such that when the first suction device 400 suctions external dirt into the first chamber 310 through the sewage suction pipeline 112, the solid waste can be accumulated in the solid waste chamber 316, and the liquid flows into the second chamber 320 through the liquid leakage structure 312 or is suctioned into the second chamber 320 by the second suction device 500, to achieve a solid-liquid separation.

[0089] The filter screen 350 is capable of separating solid waste and liquid, allowing the solid waste to be stored in the first chamber 310, and the liquid to be stored in the second chamber 320, which facilitates the dirt separation for users. As such, the probability of sewer blocking or liquid pouring to the ground may be reduced. Further, the separated liquid is driven to enter the second chamber 320 by the second suction device 500 (including the gas suction device and the liquid suction device), so the dryness in the first chamber 310 is improved, which reduces the probability that water or water vapor in the first chamber 310 enters the first suction device 400. In addition, the dryness of the solid-liquid dirt can also be improved, when users handle the solid-liquid dirt, the probability of water dripping to the ground which may cause a bad experience may be reduced. In one embodiment, as shown in Fig. 20, the filter screen 350 is located at the bottom of the first chamber 310, that is, the filter screen 350 is arranged above the bottom wall of the first housing 310a, the liquid leakage structure is arranged below the filter screen 350, such that the solid waste and liquid in the dirt can also be separated by the filter screen 350 under the dirt's own gravity, allowing the solid waste to be accumulated in the solid waste chamber 316 which is defined above the filter screen 350, and the liquid to flow to the second chamber 320 through the liquid leakage structure 312 which is arranged below the filter screen 350.

[0090] The first suction device 400 may be a device capable of generating negative pressure in the cleaning apparatus 10, such as a fan. The first suction device 400 is communicated with the first chamber 310 through the first suction channel 311, and is configured to provide power to suction the dirt collected by the cleaning apparatus 10 to the first chamber 310. However, the dirt commonly contains water or water vapor, and the water or water vapor is prone to enter the first suction device 400 through the first suction channel 311, this in turn may cause a damage to the first suction device 400 or a liquid leakage. Therefore, the embodiments of the present disclosure propose the following improvement.

[0091] In one embodiment, as shown in Fig. 29 and Fig. 30, the first housing 310a is provided with a gas suction port 317, the gas suction port 317 is configured to communicate the first suction device 400 and the first chamber 310, and the gas suction port 317 defines a passage which forms a part of the first suction channel 311. The first suction device 400 provides suction power to the first chamber 310 through the gas suction port 317 so that external dirt can be suctioned into the first chamber 310.

[0092] In the embodiments of the present disclosure, in case the first housing 310a is nested in the second housing 320, the first chamber 310 and the second chamber 320 need to be independent of each other to ensure that the gas suction device can concentrate its suction force on the liquid leakage structure 312 as much as possible, so there need be the least gaps between the first housing 310a and the second housing 320 as much as possible. However, a gap is inevitably defined between the sewage suction pipeline 112 and the first housing 310a, since the sewage suction pipeline 112 which is configured to collect the dirt generated by the cleaning apparatus needs to pass through the second housing first and then communicate to the first chamber 310, and the first housing 310a needs to be detachably arranged to facilitate the disposal of dirt. In order to reduce the influence of the gap, the embodiments of the present disclosure propose the following solutions.

[0093] In one embodiment, as shown in Fig. 28 to Fig. 33, the sewage suction pipeline 112 further includes a sewage inlet pipe 112b arranged in the second housing 320a and a sewage suction pipe 112a connected with the sewage inlet pipe 112b, the sewage suction pipe 112a is configured to suction the dirt and sewage on the ground into the sewage inlet pipe 112b, the sewage inlet pipe 112b is communicated with the first chamber 310, and a sealing member is arranged at the joints of the sewage inlet pipe 112b and the first housing 310a, so the gap between the first housing 310a and the sewage inlet pipe 112b is filled to ensure that the second suction device 500 can apply and concentrate its suction force on the liquid leakage structure 312.

[0094] In one embodiment, the first housing 310a is provided with a dirt anti-leakage pipe 319, and the sewage inlet pipe 112b passes through the dirt anti-leakage pipe 319. In case the first housing 310a is removed, the dirt anti-leakage pipe 319 can prevent the dirt in the first chamber 310 from falling out from the opening which is communicated with the sewage inlet pipe 112b. Further, a sixth sealing member 930 may be provided between the dirt anti-leakage pipe 319 and the sewage inlet pipe 112b to isolate the sewage inlet pipe 112b from the second chamber 320. The sixth sealing member 930 may be disposed at the top of the dirt anti-leakage pipe 319 or the upper part of the inner side wall of the dirt anti-leakage pipe 319, which can reduce the friction force between the sewage inlet pipe 112b and the dirt anti-leakage pipe 319 brought by the sealing member during picking or placing the first housing 310a, allowing the picking and placing of the first housing 310a being smoother. The sixth sealing member 930 may also be arranged at the bottom of the dirt anti-leakage pipe 319,

such that the sixth sealing member 930 can be installed from the opening of the dirt anti-leakage pipe 319 located at the bottom of the first housing 310a, which facilitates the assembly of the sixth sealing member 930.

[0095] In one embodiment, as shown in Fig. 32, the inner wall of the dirt anti-leakage pipe 319 is provided with a convex edge 319a along the circumference of the dirt anti-leakage pipe 319, the end surface of the sewage inlet pipe 112b is abutted with the convex edge 319a, and the sixth sealing member 930 is located between the end surface of the sewage inlet pipe 112b and the convex edge 319a. In case the sewage inlet pipe 112b is inserted into the dirt anti-leakage pipe 319 and is in place, the two will apply axial pressure to the sixth sealing member 930. During loading and disassembly of the two, the sixth sealing member 930 is not in contact with the other, which eliminates the frictional resistance brought by the sealing member, allowing the loading or disassembly of the first housing 310a being smoother. Further, since the first housing 310a and the second housing 320 are interference fit, the relative position between the first housing 310a and the second housing 320 is stabilized, which may further ensure the sealing performance of the sealing member.

[0096] In one embodiment, the first housing 310a is provided with a sewage inlet pipe hole 310n, the sewage inlet pipe 112b is inserted into the sewage inlet pipe hole 310n, and the sixth sealing member 930 is arranged on an outside of the sewage inlet pipe 112b or on an inner wall of the sewage inlet pipe hole 310n. When the sewage inlet pipe 112b is inserted into the sewage inlet pipe hole 310n, the sewage inlet pipe 112b is sealed with the sewage inlet pipe hole 310n by way of the circumferential surfaces of the both. Compared with the end face sealing in which the sealing effect may be reduced brought by the sewage inlet pipe 112b not installing in place, there is less possibility of affecting to the sealing effect in this embodiment.

[0097] Illustratively, in the present disclosure, the first to the sixth sealing members may all be sealing rings.

[0098] As shown in Fig. 34 to Fig. 36, according to a second aspect of the present disclosure, a cleaning apparatus 10 is provided. The cleaning apparatus 10 includes a chassis 200, a main body 100, a first chamber 310, a second chamber 320, and a first suction device 400. The main body 100 is rotatably connected with the chassis 200, the first chamber 310 is arranged on the main body 100, the second chamber 320 is communicated with the first chamber 310. The first suction device 400 is communicated with the first chamber 310 through a first suction channel 311 to provide power to drive external liquid to enter the first chamber 310. The first suction device 400 is also communicated with the second chamber 320 through a second suction channel 321 to provide power to drive liquid in the first chamber 310 to enter the second chamber 320. As such, a first suction device 400 is shared to provide power to drive the external liquid into the first chamber 310 and to provide power to drive the liquid in the first chamber 310 into the second chamber 320. The first suction device 400 performs suction to the first chamber 310 and the second chamber 320 through respective the independent first suction channel 311 and the second suction channel 321. In case external liquid is suctioned into the first chamber 310, gas in the first chamber 310 is pumped out through the first suction channel 311, and the liquid is then pumped into the second chamber 320 through the liquid leakage structure 312 which is communicated with the first chamber 310 and the second chamber 320. As such, liquid in the first chamber 310 is always less, so the first chamber 310 would not be full filled with liquid, and the liquid in the first chamber 310 would not enter the first suction device 400 when the cleaning apparatus 10 is shaking, tilting, or lying down. Further, the first suction device 400 can also perform suction to the liquid leakage structure 312, so liquid in the second chamber 320 may be prevented from flowing back into the first chamber 310. The whole structure is simple and utility. Compared with the solutions as shown in Fig. 4 to Fig. 6, this exemplary embodiment uses only the first suction device 400 as a power source to realize suction and collecting of the external liquid, and the first suction device 400 simultaneously has a lower probability of water intake, which is cost saving.

[0099] In one embodiment, the cleaning apparatus 10 includes a sewage suction pipeline 311, the sewage suction pipeline 311 is communicated with the first chamber 310 and the outside. The first suction channel 311 includes a gas suction port 317 arranged in the first chamber 310, and the first suction device 400 is communicated with the first chamber 310 through the gas suction port 317 to allow negative pressure being generated in the first chamber 310, such that external liquid is suctioned to enter the first chamber 310 through the sewage suction pipeline 311.

[0100] In one embodiment, the second suction channel 321 is provided wholly or partially on a side wall 310c of the first housing 310a, the first suction device 400 is communicated with the second chamber 320 through the second suction channel 321 to allow negative pressure be generated in the second chamber 320. This can enable the liquid in the first chamber 310 to not only enter the second chamber 320 under gravity, but also utilize the suction power of the first suction device 400 to assist the liquid in the first chamber 310 in accelerating its entry into the second chamber 320.

[0101] In one embodiment, the cross-sectional area of the first suction channel 311 is smaller than the cross-sectional area of the second suction channel 321, so that a negative pressure difference may be formed between the first chamber 310 and the second chamber 320 by way of only one suction device, which facilitates the liquid in the first chamber 310 entering the second chamber 320.

[0102] In one embodiment, the negative pressure in the second chamber 320 is greater than the negative

pressure in the first chamber 310, which facilitates the liquid in the first chamber 310 entering the second chamber 320.

[0103] Referring to Fig. 1 to Fig. 36, according to a third aspect of the present disclosure, a water tank 300 is provided. The water tank 300 is configured to be installed on the main body 100 of the cleaning apparatus 10, and the main body 100 is rotatably connected with the chassis 200 of the cleaning apparatus 10. The water tank 300 includes a first chamber 310 and a second chamber 320, the first chamber 310 is arranged on the main body 100, the first chamber 310 is capable of communicating with the first suction device 400, and the first suction device 400 provides power to drive external liquid entering into the first chamber 310. The second chamber 320 is communicated with the first chamber 310 and is capable of communicating with the second suction device 500, and the second suction device 500 provides power to drive the liquid in the first chamber 310 entering into the second chamber 320.

[0104] Referring to Fig. 1 to Fig. 36, according to a fourth aspect of the present disclosure, a water tank 300 is provided. The water tank 300 is configured to be installed on the main body 100 of the cleaning apparatus 10, and the main body 100 is rotatably connected to the chassis 200 of the cleaning apparatus 10. The water tank 300 includes a first chamber 310 and a second chamber 320, the first chamber 310 is arranged on the main body 100, and the second chamber 320 is communicated with the first chamber 310. The cleaning apparatus 10 includes a first suction device 400, the first suction device 400 is communicated with the first chamber 310 through the first suction channel 311, and the first suction device 400 provides power to drive external liquid entering into the first chamber 310. The first suction device 400 is also communicated with the second chamber 320 through the second suction channel 321, and the first suction device 400 provides power to drive liquid in the first chamber 310 to enter into the second chamber 320.

[0105] The embodiments of the present disclosure reduce the probability of water intake into the first suction device 400 in communication with the first chamber 310 by providing two independent first chamber 310 and second chamber 320 for the cleaning apparatus 10 or the water tank 300, and by providing the second chamber 320 with an additional power to drive the liquid in the first chamber 310 to enter into the second chamber 320.

[0106] Referring to Fig. 37(a) and Fig. 37 (b) which show a cleaning device. In an exemplary embodiment, the cleaning device may be a hand-held floor washer. The hand-held floor washer can wipe the ground, absorb the mixture of sewage and solid dirt and store it in the hand-held floor washer.

[0107] In some embodiments, the cleaning device includes a base 10, a handle 20, a sewage chamber 22, a suction assembly 40, and a power member.

[0108] The base 10 is defined with a sewage suction port 103. The handle 20 is rotatably arranged on the base 10, and the handle 20 is provided with a solid-liquid separation chamber 21 which is communicated with the sewage suction port 103. The sewage chamber 22 is communicated with the solid-liquid separation chamber 21. The suction assembly 40 is defined with a suction port (not shown) communicated with the solid-liquid separation chamber 21. The suction assembly 40 is configured to provide power to drive sewage at the sewage suction port 103 to enter the solid-liquid separation chamber 21. The power member is communicated with the sewage chamber to provide power to drive sewage in the solid-liquid separation chamber 21 to enter the sewage chamber 22.

[0109] The handle 20 is provided with the solid-liquid separation chamber 21, and the solid-liquid separation chamber 21 is communicated with the sewage suction port 103, therefore, the solid-liquid mixture can flow from the sewage suction port 103 to the solid-liquid separation chamber 21 of the handle 20 through a first pipe 30 and is temporarily stored in the solid-liquid separation chamber 21 during the hand-held floor washer cleans floor.

[0110] It should be noted that the solid-liquid separation chamber 21 can be defined inside the handle 20, and can also be a separable component installed on the handle 20. For example, the solid-liquid separation chamber 21 is connected to a side wall of the handle 20.

[0111] The suction assembly 40 defines a suction port which is communicated with the solid-liquid separation chamber 21, the suction assembly 40 serves as a negative pressure source which may reduce the pressure in the solid-liquid separation chamber 21 during a roller 12 performs cleaning work, so the solid-liquid mixture entered through the sewage suction port 103 can be guided to the solid-liquid separation chamber 21. The solid-liquid mixture is separated into solid waste and sewage in the solid-liquid separation chamber 21.

[0112] It should be understood that the suction assembly 40 may be a fan. The fan rotates to allow gas in the solid-liquid separation chamber 21 to be pumped out to the outside, causing the pressure in the solid-liquid separation chamber 21 to be lower than the pressure in a roller accommodating chamber 102. Under the pressure difference, the sewage, solid waste, or a mixture of the two at the sewage suction port 103 is driven to enter the solid-liquid separation chamber 21.

[0113] The sewage chamber 22 may be a closed chamber and is configured to store the separated sewage, so as to reduce the liquid amount in the solid-liquid separation chamber 21 which is directly communicated with the suction port. In turn, the probability that liquid in the solid-liquid separation chamber 21 enters the suction assembly 40 through the suction port and flows back to the suction port will be reduced.

[0114] The power member is configured to suction the liquid in the solid-liquid separation chamber 21 into the sewage chamber 22. It should be understood that, the liquid in the solid-liquid separation chamber 21 is driven to enter the sewage chamber 22 by an external force to

not accumulate in the solid-liquid separation chamber 21. The liquid in the solid-liquid separation chamber 21 can be suctioned into the sewage chamber 22 by the power member, even if the solid-liquid separation chamber 21 is located lower than the sewage chamber 22, it is difficult to overcome the power of the power member for driving the liquid. Further, due to the power member, the channel between the solid-liquid separation chamber and the sewage chamber defines a negative pressure channel, so that it is difficult for the sewage in the sewage chamber to flow back to the solid-liquid separation chamber.

[0115] By way of the power member communicating with the sewage chamber, the sewage separated from the dirt in the solid-liquid separation chamber is suctioned by the suction assembly to enter and store in the sewage chamber, such that the sewage would not retain in the solid-liquid separation chamber but enter and store in the sewage chamber in time, so the probability that water accumulates in the solid-liquid separation chamber and enter the suction assembly is reduced when the handle is lying down, and the probability that water flows back to the sewage suction port is also reduced when the handle is swinging. That is, the swing angle and swing range of the handle of the cleaning device are not limited. For example, in case the handle 20 is lying down or swings to a large angle, the power provided by the power member still overcomes the gravitational force of the accumulated sewage to keep it in the sewage chamber, thus improving the low possibility of the cleaning device, that is, the cleaning device is given the ability to pass through low areas.

[0116] Typically, the power member includes pneumatic member 60a and hydrodynamic member 60b.

[0117] In some embodiments, a suction end of the pneumatic member 60a is communicated with the sewage chamber 22, and the pneumatic member 60a is configured to provide power to drive the sewage in the solid-liquid separation chamber 21 to enter the sewage chamber 22.

[0118] The working principle of the pneumatic member 60a is described in detail as follows.

[0119] Referring to Fig. 37(a), the handle is provided with a gas outlet which is communicated with the waste chamber 22. The suction end of the pneumatic member 60a is communicated with the gas outlet to allow the pneumatic member 60a to communicate with the sewage chamber 22. The pneumatic member 60a suctions out the gas in the sewage chamber 22 to cause a negative pressure generating in the sewage chamber 22, so the solid-liquid separation in the solid-liquid separation chamber 21 can be more thoroughly by way of the pneumatic member 60a, and, the sewage in the solid-liquid separation chamber 21 is facilitated to enter the sewage chamber 22.

[0120] It should be understood that the pneumatic member 60a may be arranged in the handle 20 to allow the overall shape of the handle 20 being neater and the handle 20 being easily to be held.

[0121] The pneumatic member 60a may be a fan or a vacuum pump, a diaphragm pump or the like.

[0122] In some embodiments, a liquid suction end of the hydrodynamic member 60b is communicated to the sewage chamber 22 and a liquid outlet end of the hydrodynamic member is communicated to the sewage chamber 22, and the hydrodynamic member 60b is configured to provide power to drive the dirt in the solid-liquid separation chamber 21 to enter the sewage chamber 22.

[0123] The following is a detailed description of the working principle of the hydrodynamic member.

[0124] Referring to Fig. 37(b), the hydrodynamic member 60b is arranged between the solid-liquid separation chamber 21 and the sewage chamber 22, a suction port of the hydrodynamic member 60b is communicated with the solid-liquid separation chamber 21 and a liquid discharge port is communicated with the sewage chamber 22. The solid-liquid separation in the solid-liquid separation chamber 21 can be more thoroughly by way of the hydrodynamic member 60b, and the hydrodynamic member 60b can also facilitate the sewage in the solid-liquid separation chamber 21 entering the sewage chamber 22.

[0125] The hydrodynamic member 60b can also be disposed in a liquid chamber 211.

[0126] The hydrodynamic member 60b may be a liquid pump or the like.

[0127] The above are only embodiments of the present disclosure but are not to limit the protection scope of the present disclosure. One person skilled in the art can easily think of various equivalent modifications or replacements within the scope disclosed in the present disclosure, and these modifications or replacements all fall within the protection scope of the present disclosure. Therefore, the protection scope of the present disclosure should be based on the protection scope of the claims.

Claims

1. A cleaning apparatus comprising:

a chassis;
a main body rotatably connected to the chassis;
a first chamber arranged on the main body;
a second chamber communicated with the first chamber;
a first suction device communicated with the first chamber, the first suction device being configured to provide power to drive external liquid into the first chamber; and
a second suction device communicated with the second chamber, the second suction device being configured to provide power to drive liquid in the first chamber entering the second chamber.

2. The cleaning apparatus according to claim 1, further

comprising:
a posture detection device, the posture detection device being configured to detect a current motion state parameter of the cleaning apparatus.

3. The cleaning apparatus according to claim 1, further comprising:
a first detection assembly arranged in the first chamber, the first detection assembly being configured to detect information of content accommodated in the first chamber.

4. The cleaning apparatus according to claim 1, wherein
the first suction device is configured to suction dirt outside the cleaning apparatus into the first chamber.

5. The cleaning apparatus according to claim 1, wherein
the second chamber is arranged on the main body; or, the second chamber is arranged on the chassis.

6. The cleaning apparatus according to claim 1, wherein
the first chamber and the second chamber are communicated through a liquid leakage structure, allowing liquid in the first chamber to be discharged into the second chamber.

7. The cleaning apparatus according to claim 6, wherein

the liquid leakage structure is arranged at a rear side of the first chamber; and/or,
the liquid leakage structure is arranged at a lower portion of the first chamber; and/or
a maximum size of the liquid leakage structure in a front-rear direction is smaller than a minimum size of the liquid leakage structure in a left-right direction.

8. The cleaning apparatus according to claim 1, wherein
the first suction device is communicated to the first chamber through a first suction channel, and the second suction device is communicated to the second chamber through a second suction channel.

9. The cleaning apparatus according to claim 8, wherein

the second suction device comprises a gas suction device;
the gas suction device is configured to suction gas in the second chamber to allow a negative pressure generating in the second chamber; and/or,
a flow rate of the gas suction device is less than a flow rate of the first suction device; and/or,
the first chamber and the second chamber are communicated through a liquid leakage structure, and a cross-sectional area of a suction port of the gas suction device is similar to a cross-sectional area of the liquid leakage structure.

10. The cleaning apparatus according to claim 9, wherein
a negative pressure of the first chamber is smaller than a negative pressure of the second chamber during the first suction device and the gas suction device are working.

11. The cleaning apparatus according to claim 9, wherein
the second suction channel comprises a gas inlet communicated with the second chamber and a gas outlet communicated with the gas suction device.

12. The cleaning apparatus according to claim 11, wherein
the second chamber is arranged on the main body, and the gas inlet of the second suction channel is located at a front side of the second chamber.

13. The cleaning apparatus according to claim 11, wherein the gas inlet of the second suction channel is located at a top of the second chamber.

14. The cleaning apparatus according to claim 11, wherein the second chamber is arranged on the main body, and a maximum size of the gas inlet and/or the second suction channel in a front-rear direction of the main body is smaller than a minimum size of the gas inlet and/or the second suction channel in a left-right direction of the main body.

15. The cleaning apparatus according to claim 11, wherein a cross-sectional area of the second suction channel gradually decreases in a direction from the gas inlet to the gas outlet.

16. The cleaning apparatus according to claim 11, wherein the second suction channel comprises at least one guiding wall, the guiding wall is configured to guide air flow in the second suction channel to flow from the gas inlet to the gas outlet along a curved path.

17. The cleaning apparatus according to claim 11, wherein the cleaning apparatus comprises a third detection assembly for detecting whether water enters the second suction channel.

18. The cleaning apparatus according to claim 11, wherein a second detection assembly is provided in the second chamber for detecting a liquid level in the

second chamber.

19. The cleaning apparatus according to claim 18, wherein

an installation position of the second detection assembly is lower than the gas inlet of the second suction channel; and/or,
an installation position of the second detection assembly is located behind the gas inlet of the second suction channel.

20. The cleaning apparatus according to claim 8, wherein

the cleaning apparatus comprises a first housing and a second housing, the first housing defines the first chamber, and the second housing defines the second chamber;
the first housing is fixed to an outside of the second housing by means of assembly; or,
the first housing is arranged on the main body, and the second housing is arranged on the chassis;
the second suction channel is arranged on a wall surface of the second housing.

21. The cleaning apparatus according to claim 8, wherein

the cleaning apparatus comprises a first housing and a second housing, at least part of the first housing is nested in the second housing; part of an inner wall of the second housing and part of an outer wall of the first housing define the second chamber;
the first housing defines the first chamber,
or, part of an inner wall of the first housing and part of an inner wall of the second housing together define the first chamber;
the second suction channel is arranged on a wall surface of the first housing or a wall surface of the second housing, or, a part of the second suction channel is arranged on a wall surface of the first housing and is isolated from the first chamber, and the other part of the second suction channel is defined by a part of an outer wall of the first housing and a part of an inner wall of the second housing.

22. The cleaning apparatus according to claim 21, wherein a gas outlet of the second suction channel is provided on a wall surface of the second housing.

23. The cleaning apparatus according to claim 22, wherein

the gas outlet of the second suction channel is arranged on the wall surface of the second housing; or,
the first housing is partially nested in the second housing, and the gas outlet is provided on a wall surface of the first housing and is located at a portion of the first housing exposed from the second housing.

24. The cleaning apparatus according to claim 22 or 23, wherein the first housing or the second housing is detachably connected to the main body, and the gas outlet is sealingly coupled to a suction port of a gas suction device arranged on the main body.

25. The cleaning apparatus according to claim 21, further comprising a first sealing portion for sealing the other part of the second suction channel which is defined by the outer wall of the first housing and the inner wall of the second housing.

26. The cleaning apparatus according to claim 8, wherein

the second suction device comprises a liquid suction device located in the second suction channel;
the second suction channel comprises a liquid inlet and a liquid outlet, the liquid inlet is communicated with a liquid suction end of the liquid suction device, and the liquid outlet is communicated with a liquid outlet of the liquid suction device.

27. The cleaning apparatus according to claim 1, wherein

the cleaning apparatus comprises a first housing and a second housing, the first housing defines the first chamber, and the second housing defines the second chamber;
the first housing is fixed to an outside of the second housing by means of assembly; or,
the first housing is arranged on the main body, and the second housing is arranged on the chassis.

28. The cleaning apparatus according to claim 1, wherein

the cleaning apparatus comprises a first housing and a second housing, at least part of the first housing is nested in the second housing; part of an inner wall of the second housing and part of an outer wall of the first housing define the second chamber;
the first housing defines the first chamber,
or, partial inner wall of the first housing and partial inner wall of the second housing together

define the first chamber.

29. The cleaning apparatus according to claim 28, wherein

an outer wall of the second housing is provided with a holder, and a side wall of the first housing is provided with an opening;
the opening is arranged towards the holder.

30. The cleaning apparatus according to claim 28, wherein a first sealing member is provided between the first housing and the second housing, and the first sealing member is squeezed between the first housing and the second housing to provide circumferential sealing between the first housing and the second housing.

31. The cleaning apparatus according to claim 30, wherein

the side wall of the first housing is defined with a gas leakage section;
a second sealing member is further provided between the first housing and the second housing;
the first sealing member and the second sealing member are arranged at intervals along a height direction of the first housing, and the first sealing member is located above the second sealing member;
the gas leakage section is located between the first sealing member and the second sealing member.

32. The cleaning apparatus according to claim 31, wherein

the opening of the first housing defines the gas leakage section;
and/or, filtering holes provided on the side wall of the first housing defines the gas leakage section;
and/or, the first housing comprises at least one movable member, the movable member at least forms a side wall of the first housing, a gap is defined between the movable members or defined between the movable member and the side wall of the first housing, the gap is located on the side wall of the first housing, and the gap defines the gas leakage section.

33. The cleaning apparatus according to claim 32, wherein the first housing comprises at least one movable member movable with each other, and the movable members are slidably or rotatably connected with each other, or the movable member is slidably or rotatably connected with the side wall of the first housing.

34. The cleaning apparatus according to claim 31, wherein

a part of the outer wall of the first housing and a part of the inner wall of the second housing co-enclose at least part of the second suction channel;
the second sealing member comprises a first sealing portion and a second sealing portion, the first sealing portion surrounds the outside of the second suction channel, the second sealing portion surrounds the first housing in a circumferential direction of the first housing, and the first sealing portion and the second sealing portion are connected.

35. The cleaning apparatus according to claim 30, wherein

the first housing comprises a first body and a second body, the first body is moveably assembled on an upper part of the second body, a third sealing member is arranged between the first body and the second body, and the third sealing member is configured for circumferential sealing between the first body and the second body;
or, the first body and the second body are arranged in the second housing at intervals, a fourth sealing member is provided for circumferential sealing between the first body and the second housing, and a fifth sealing member is provided for circumferential sealing between the second body and the second housing.

36. The cleaning apparatus according to claim 31, wherein

the liquid leakage structure is arranged on a bottom wall of the first housing, and the second sealing member is arranged around the liquid leakage structure; or
an outer side wall of the first housing is provided with a liquid leakage notch, the liquid leakage notch defines the liquid leakage structure with the interior of the second housing, the second sealing member is provided with a sealing strip notch, and the position of the sealing strip notch corresponds to the position of the liquid leakage notch.

37. The cleaning apparatus according to claim 27 or 28, further comprising a sewage suction pipeline, wherein the sewage suction pipeline is configured to suction dirt on a surface to be cleaned into the first chamber, and an outlet of the sewage suction pipeline is communicated with the first chamber.

38. The cleaning apparatus according to claim 37,

wherein

a filter screen is arranged in the first chamber, and the filter screen is arranged between the liquid leakage structure and the outlet of the sewage suction pipeline;
a space between the outlet of the sewage suction pipeline and the filter screen in the first chamber defines a solid waste chamber for receiving solid waste.

39. The cleaning apparatus according to claim 37, wherein

the sewage suction pipeline further comprises a sewage inlet pipe arranged on the second housing and a sewage suction pipe connected to the sewage inlet pipe, and the sewage suction pipe is configured to suction dirt on the ground into the sewage inlet pipe;
the sewage inlet pipe is communicated with the first chamber; a sixth sealing member is provided at a connection between the sewage inlet pipe and the first housing for filling a gap between the first housing and the sewage inlet pipe.

40. The cleaning apparatus according to claim 39, wherein

the first housing is provided with a dirt anti-leakage pipe, and the sewage suction pipeline is penetrated in the dirt anti-leakage pipe; the sixth sealing member is arranged on a top or an inner side wall of the dirt anti-leakage pipe; and/or,
an inner wall of the dirt anti-leakage pipe is provided with a convex edge along a circumference of the dirt anti-leakage pipe, an end surface of the sewage inlet pipe is abutted against the convex edge, and the sixth sealing member is provided between the end surface of the sewage suction pipeline and the convex edge.

41. The cleaning apparatus according to claim 39, wherein the first housing is provided with a sewage suction pipe hole, the sewage inlet pipe is penetrated in the sewage suction pipe hole, and the sixth sealing member is arranged on an outside of the sewage inlet pipe or on an inner wall of the sewage suction pipe hole.

42. A cleaning apparatus, comprising:

a chassis;
a main body rotatably connected to the chassis;
a first chamber arranged on the main body;
a second chamber communicated to the first chamber;
a first suction device communicated with the first chamber through a first suction channel, the first suction device being configured to provide power to drive external liquid into the first chamber, the first suction device also being communicated with the second chamber through a second suction channel, the first suction device being configured to provide power to drive liquid in the first chamber entering the second chamber.

43. The cleaning apparatus according to claim 42, wherein

the cleaning apparatus comprises a sewage suction pipeline configured to communicate the first chamber and the outside;
the first suction channel comprises a gas suction port arranged in the first chamber, and the first suction device is communicated with the first chamber through the gas suction port to provide negative pressure for the first chamber; and/or,
the second suction channel is all or part arranged on a side wall of the first chamber, and the first suction device is communicated with the second chamber through the second suction channel to provide negative pressure for the second chamber.

44. The cleaning apparatus according to claim 43, wherein a cross-sectional area of the first suction channel is smaller than a cross-sectional area of the second suction channel.

45. The cleaning apparatus according to claim 43, wherein a negative pressure of the second chamber is greater than a negative pressure of the first chamber.

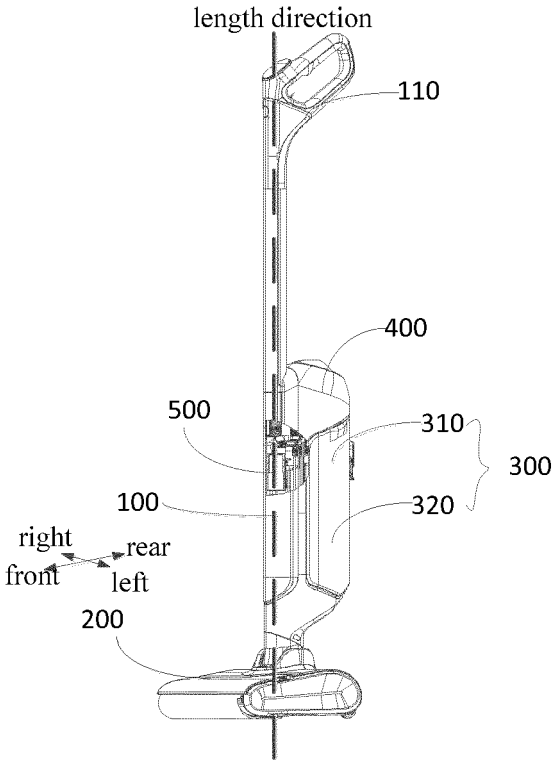
46. A water tank, configured to be installed on a main body of a cleaning apparatus, the main body being rotatably connected to a chassis of the cleaning apparatus, wherein the water tank comprises:

a first chamber arranged on the main body, the first chamber being capable of communicating with a first suction device, the first suction device being configured to provide power to drive external liquid into the first chamber;
a second chamber communicated with the first chamber; the second chamber being capable of communicating with a second suction device, the second suction device being configured to provide power to drive liquid in the first chamber entering the second chamber.

47. A water tank, configured to be installed on a main body of a cleaning apparatus, the main body being rotatably connected to a chassis of the cleaning ap-

paratus, wherein the water tank comprises:

a first chamber arranged on the main body;
a second chamber communicated to the first chamber;
a first suction device communicated with the first chamber through a first suction channel, the first suction device providing power to drive external liquid into the first chamber, the first suction device also communicating with the second chamber through a second suction channel, the first suction device providing power to drive liquid in the first chamber entering the second chamber.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310
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100
320
right
rear
front
left
200

Fig. 1

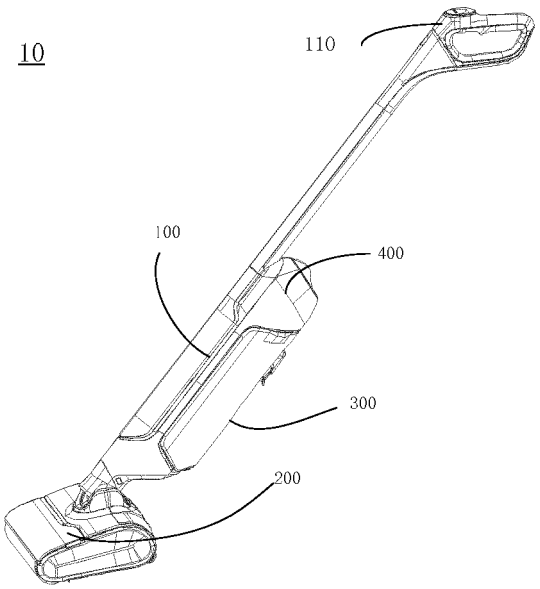
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Fig. 2

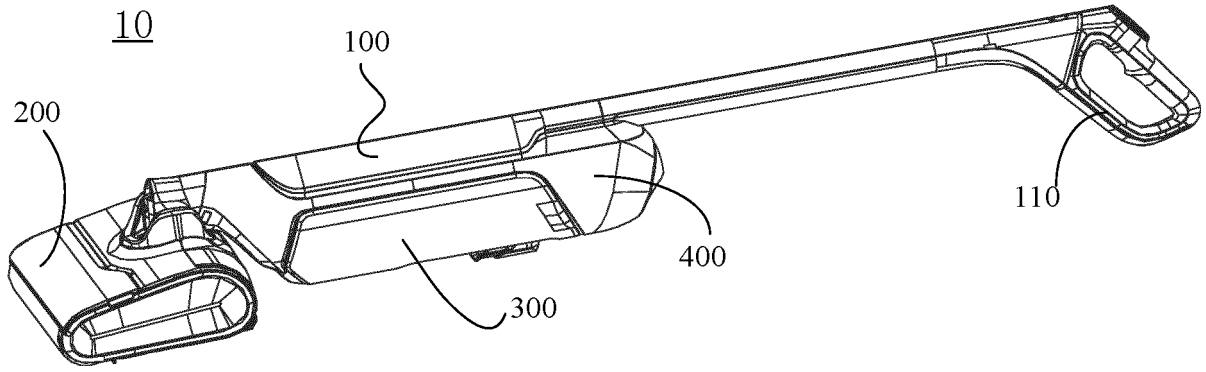

Fig. 3

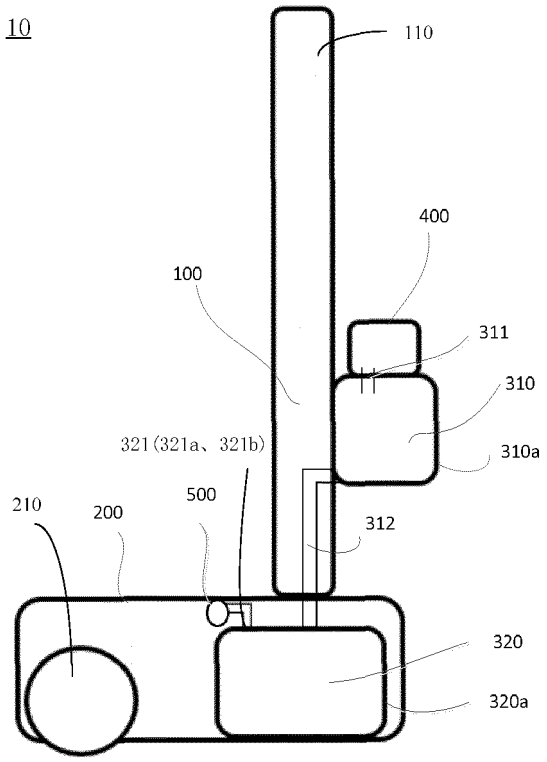
10
110
400
100
311
310
321(321a、321b)
310a
210
200
500
312
320
320a

Fig. 4

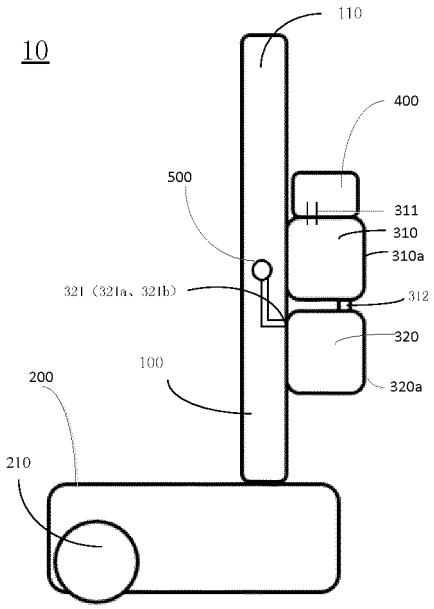
10
110
400
500
311
310
310a
321 (321a、321b)
312
320
100
320a
200
210

Fig. 5

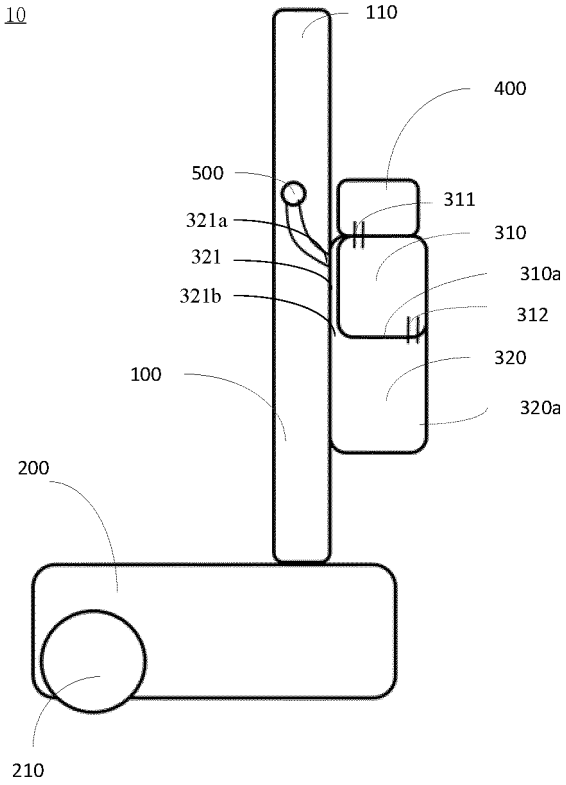
10
110
400
500
311
321a
310
321
310a
321b
312
320
100
320a
200
210

Fig. 6

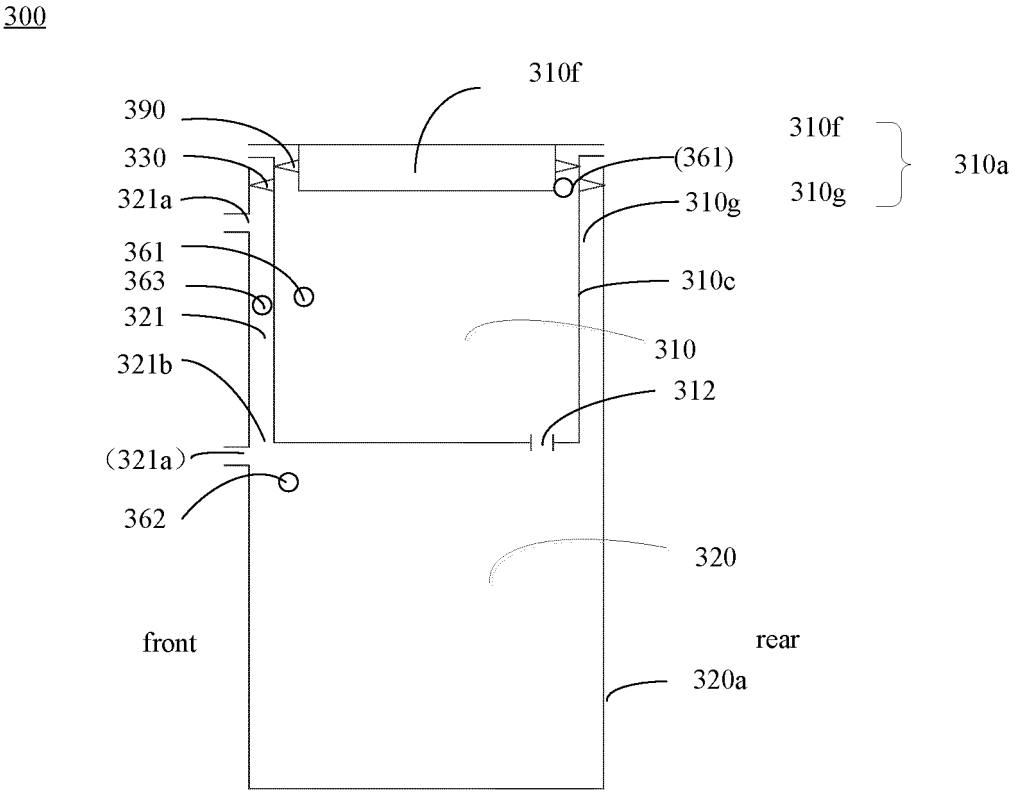
300
310f
390
330
321a
361
363
321
321b
(321a)
362
(361)
310g
310c
310
312
320
front
rear
320a
310f
310g
310a

Fig. 7

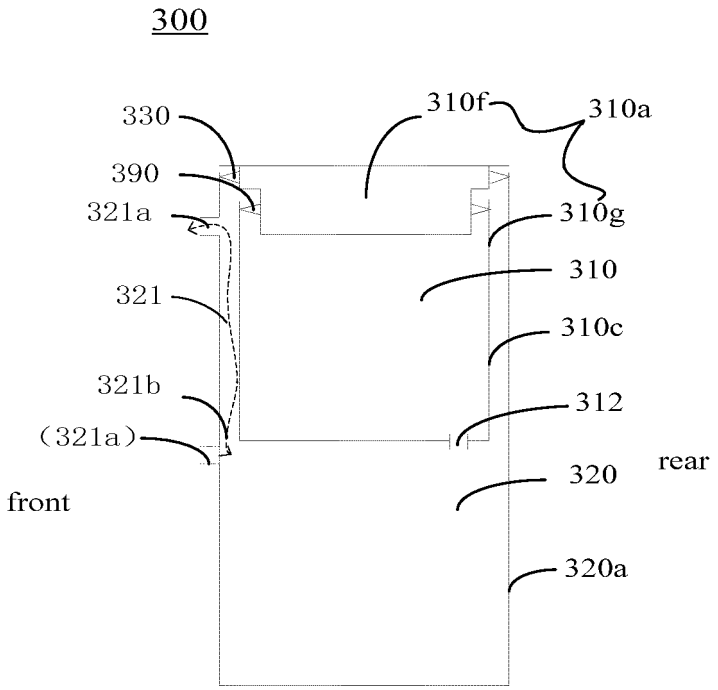
300
330
390
321a
321
321b
(321a)
front
310f
310a
310g
310
310c
312
320
rear
320a

Fig. 8

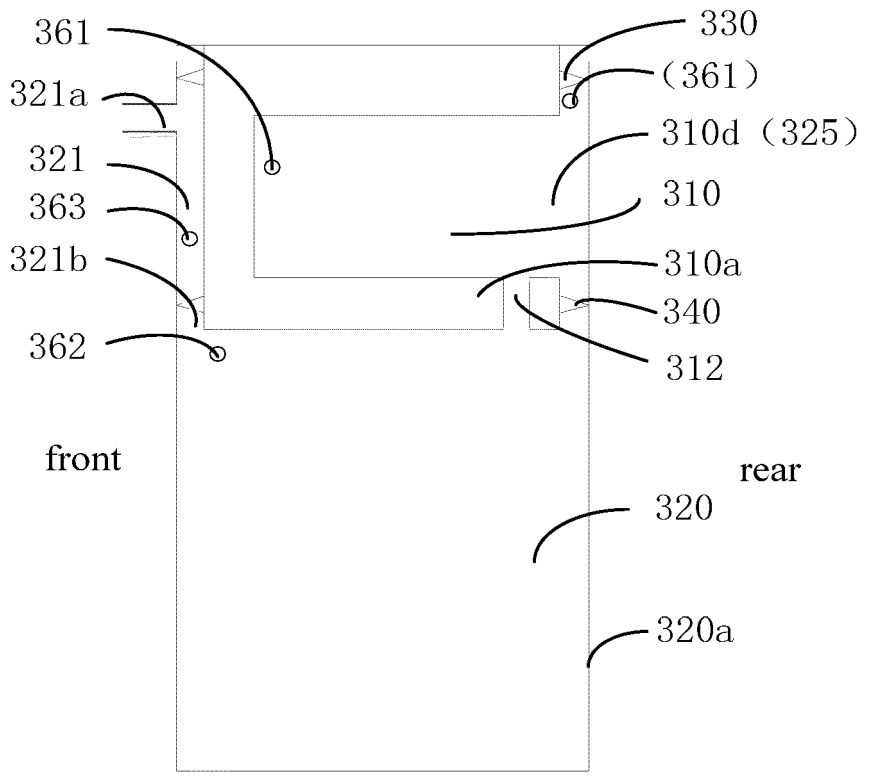
361
321a
321
363
321b
362
330
(361)
310d (325)
310
310a
340
312
front
rear
320
320a

Fig. 9

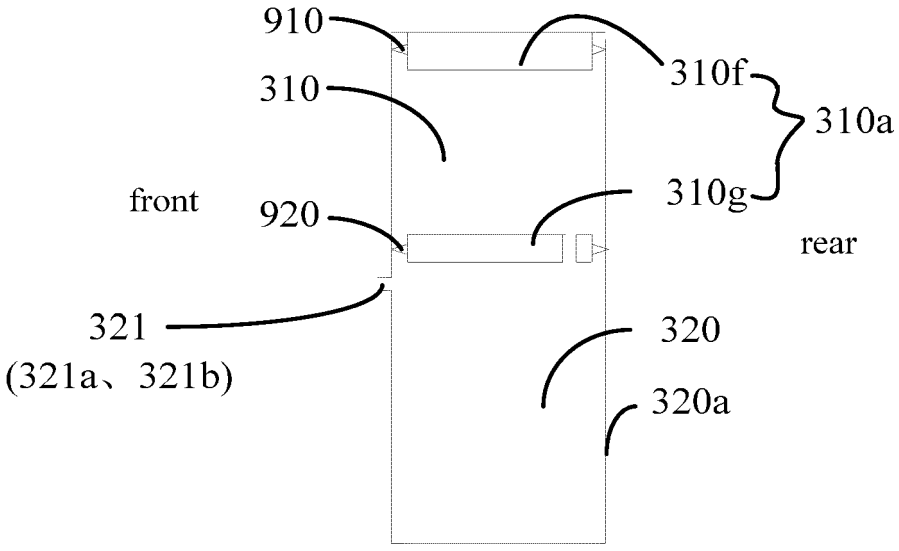
910
310
front
920
321
(321a、321b)
310f
310a
310g
rear
320
320a

Fig. 10

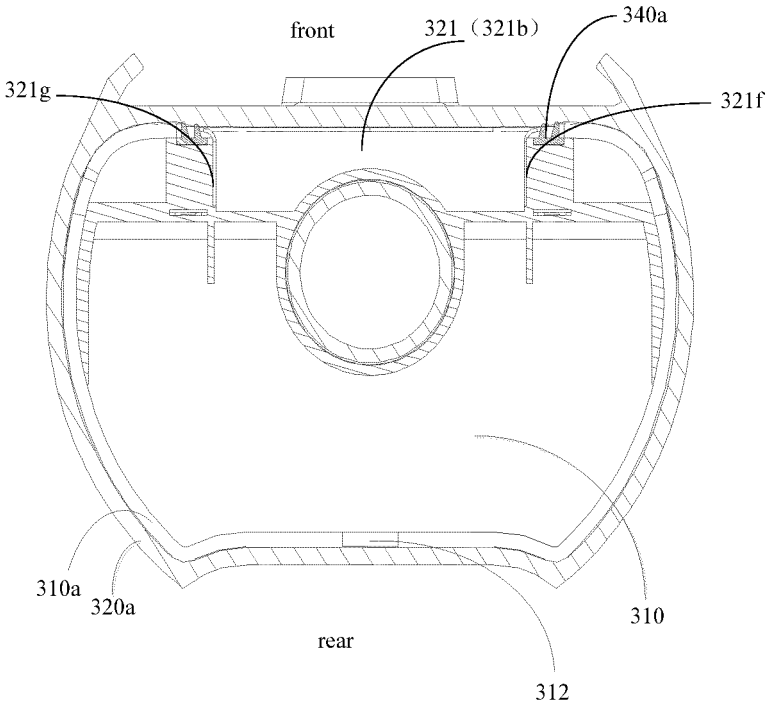
front
321 (321b)
340a
321g
321f
310a
320a
310
rear
312

Fig. 11

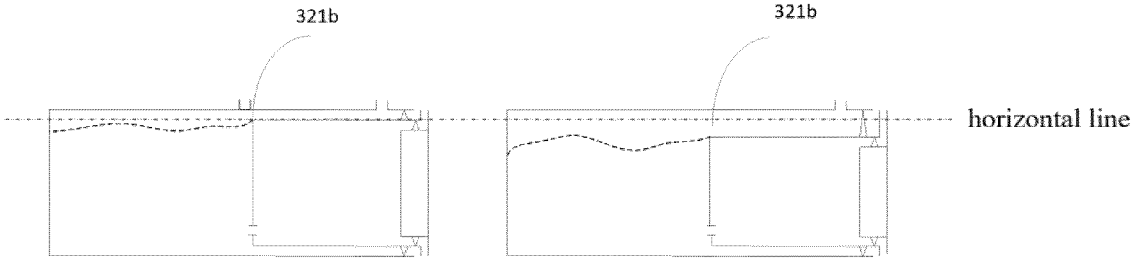
321b
321b
horizontal line

Fig. 12

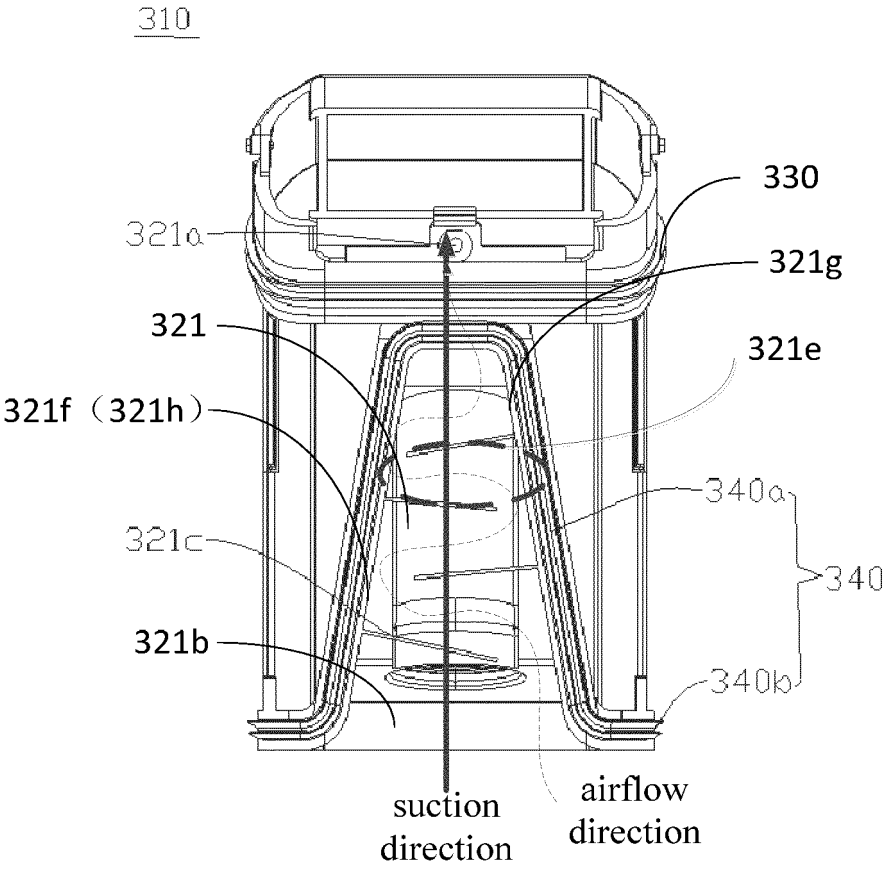
310
330
321a
321g
321
321e
321f（321h）
340a
340
321c
321b
340b
suction direction
airflow direction

Fig. 13

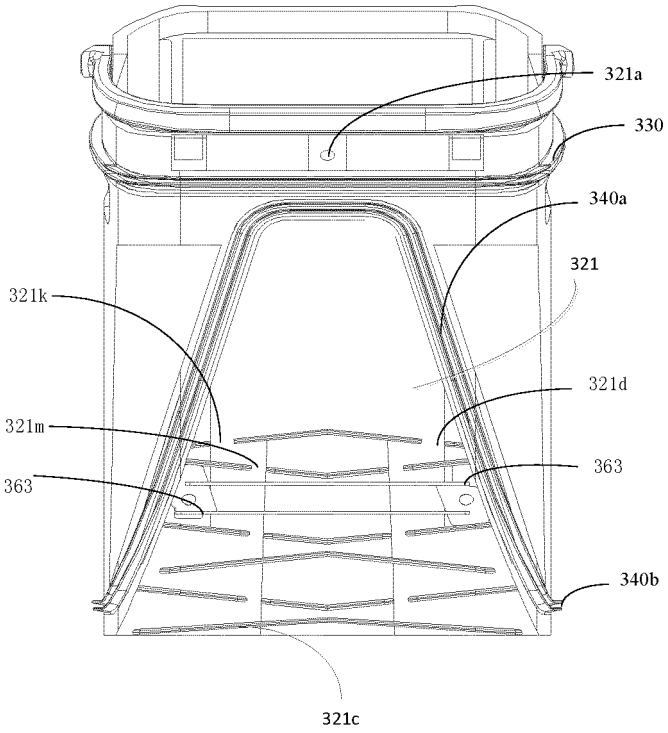
321a
330
340a
321
321k
321d
321m
363
363
340b
321c

Fig. 14

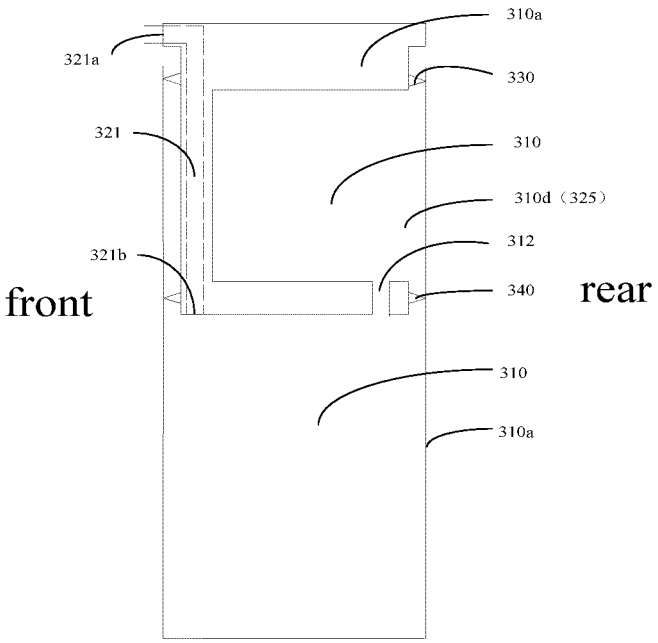
310a
321a
330
321
310
310d（325）
312
321b
front
340
rear
310
310a

Fig. 15

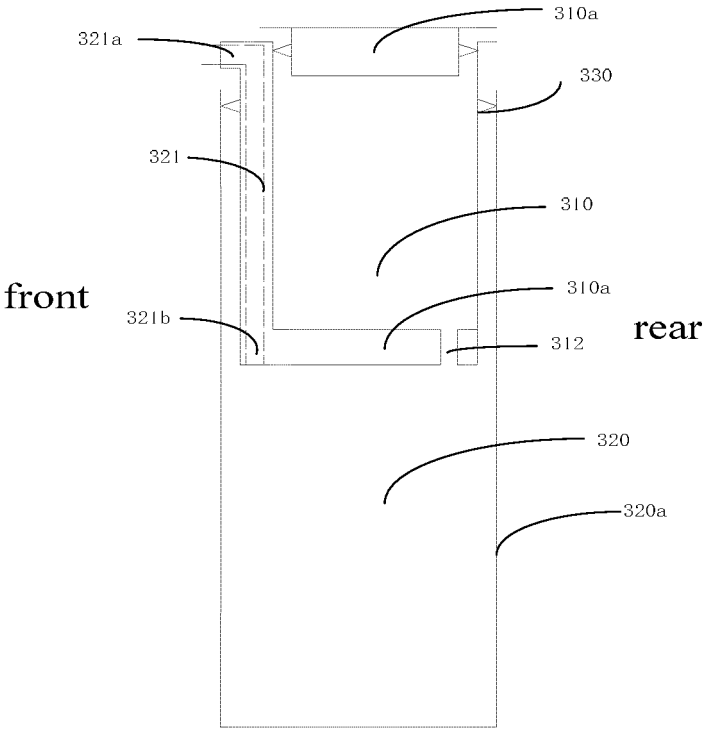
310a
321a
330
321
310
front
310a
321b
312
rear
320
320a

Fig. 16

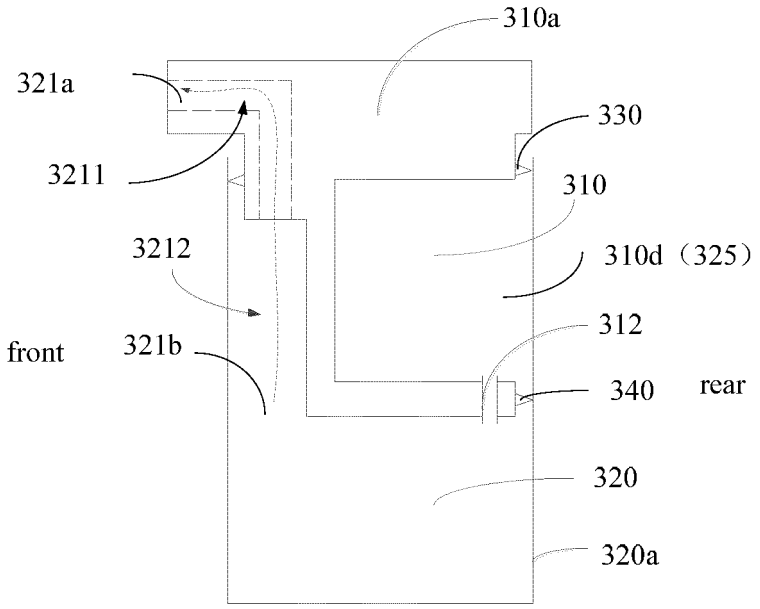
310a
321a
330
3211
310
3212
310d（325）
312
front
321b
340
rear
320
320a

Fig. 17

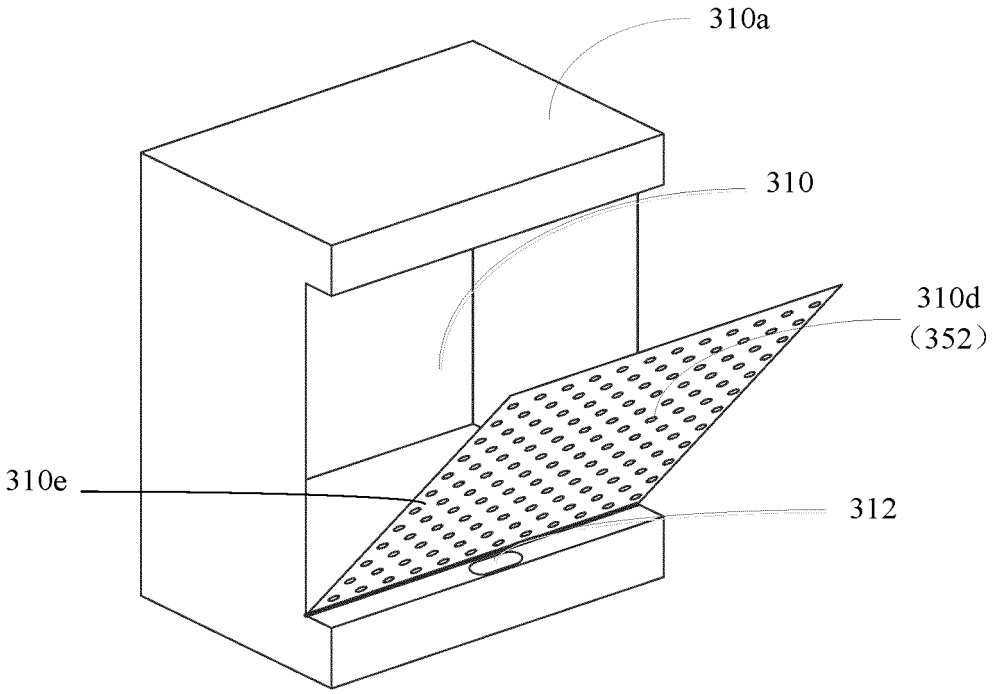
310a
310
310d
（352）
310e
312

Fig. 18

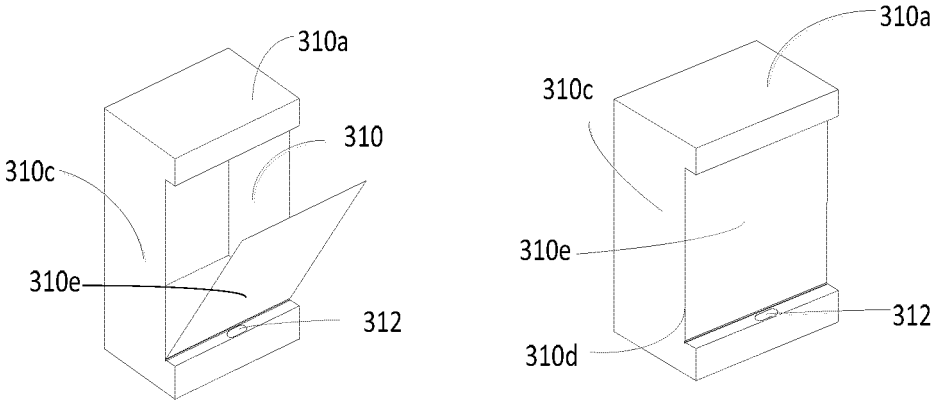
310a
310
310c
310e
312
310a
310c
310e
312
310d

Fig. 19

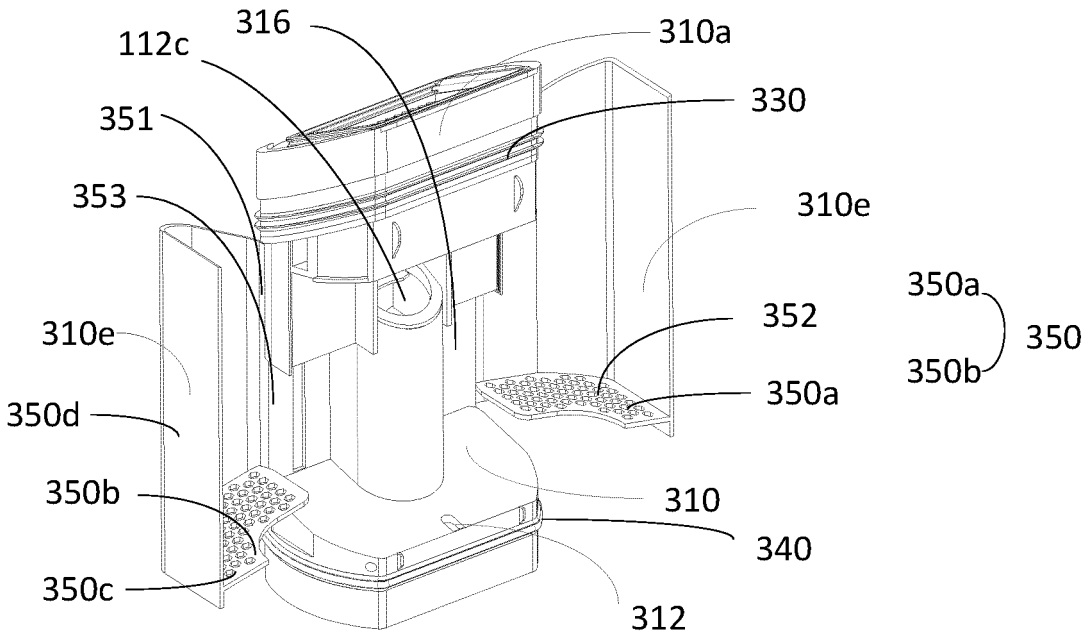
316
112c
310a
330
351
353
310e
350a
352
350
350b
310e
350a
350d
310
350b
340
350c
312

Fig. 20

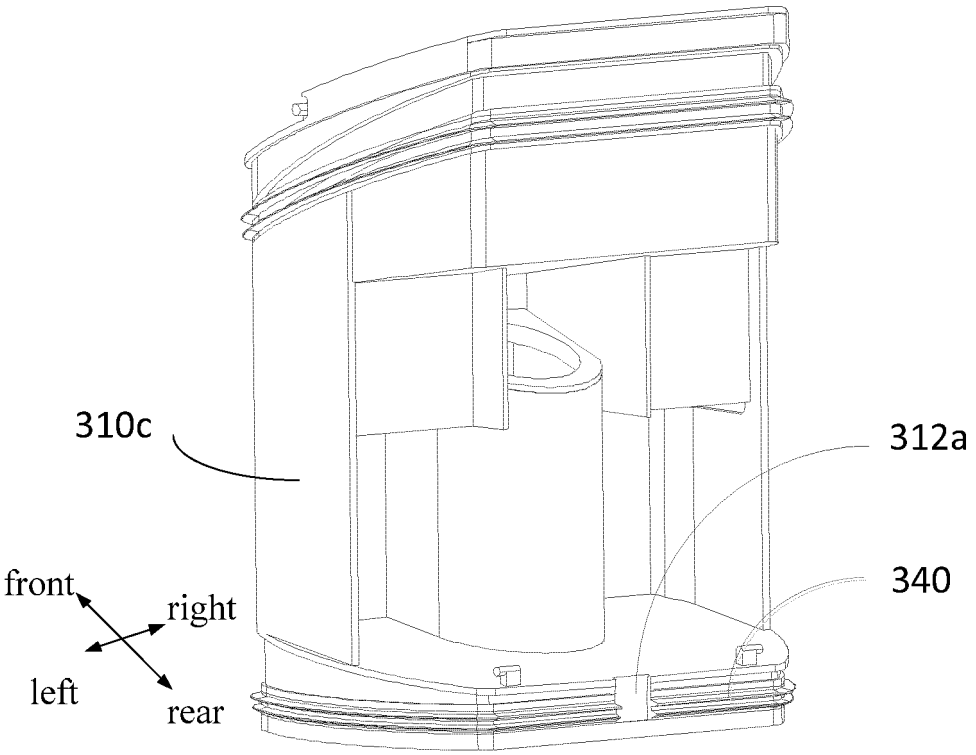

Fig. 21

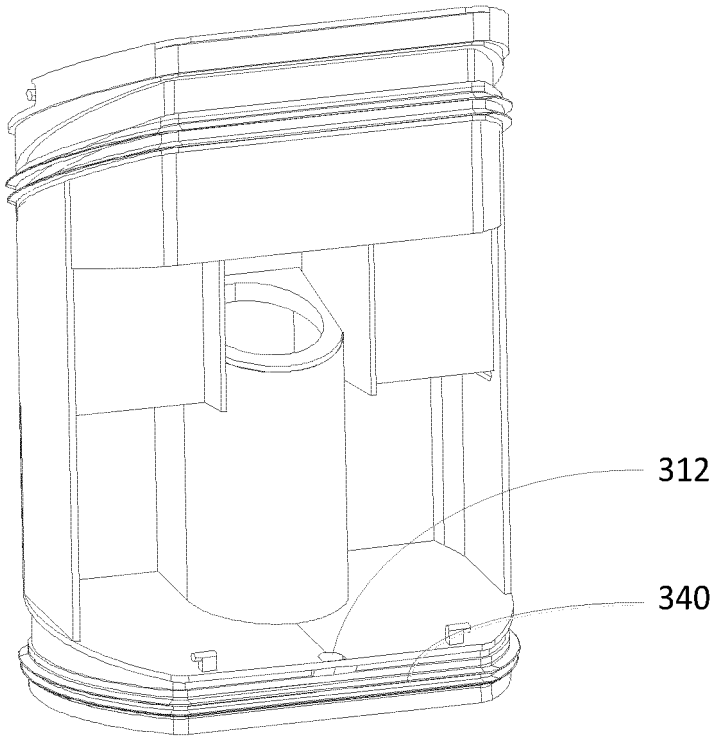

Fig. 22

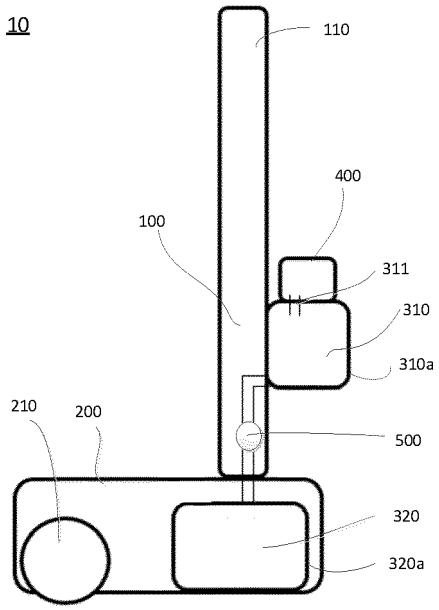
10
110
400
100
311
310
310a
210
200
500
320
320a

Fig. 23

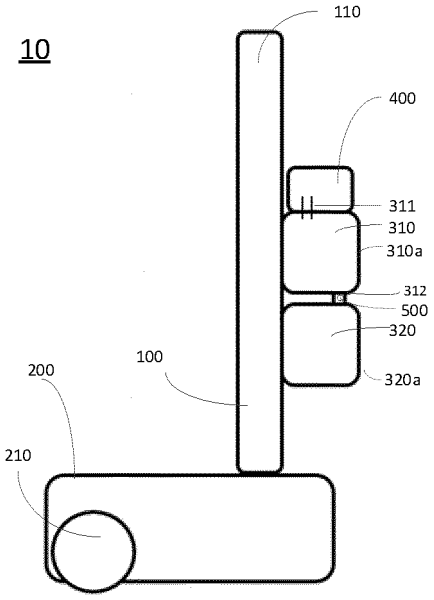
10
110
400
311
310
310a
312
500
320
320a
100
200
210

Fig. 24

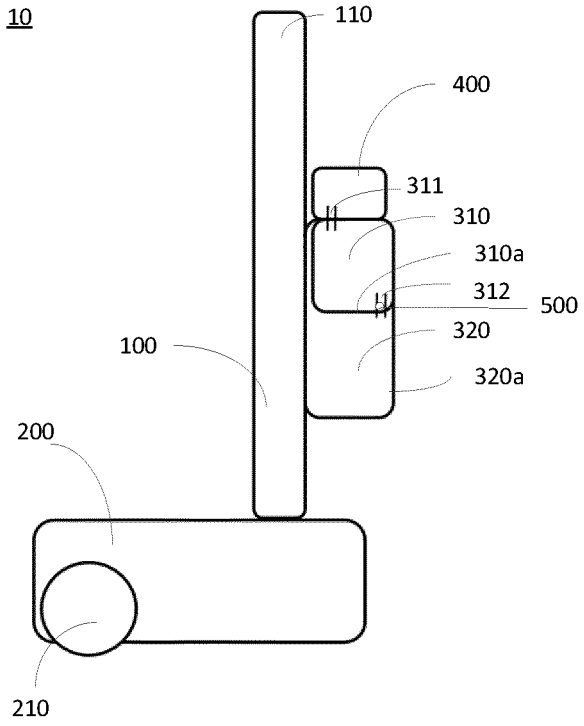
10
110
400
311
310
310a
312
500
320
320a
100
200
210

Fig. 25

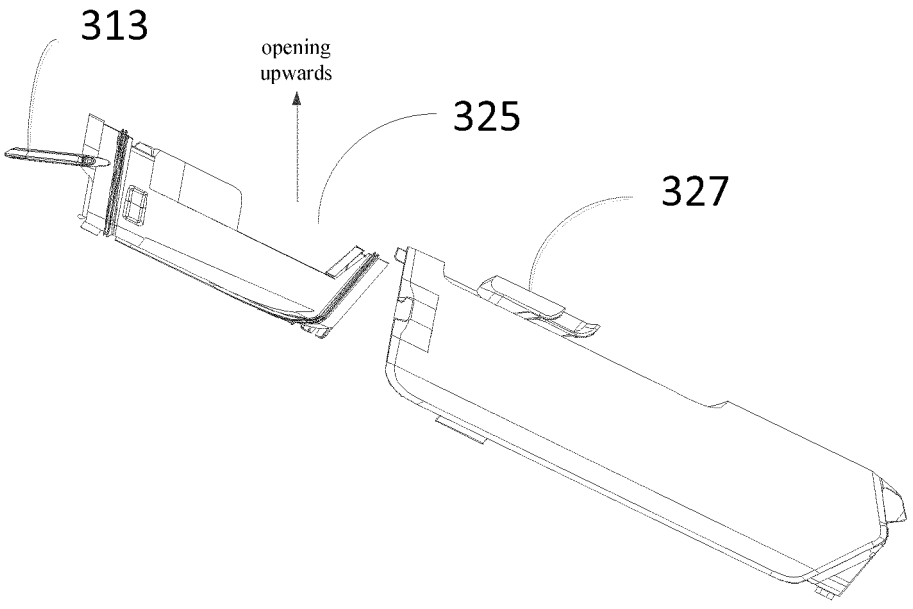
313
opening
upwards
325
327

Fig. 26

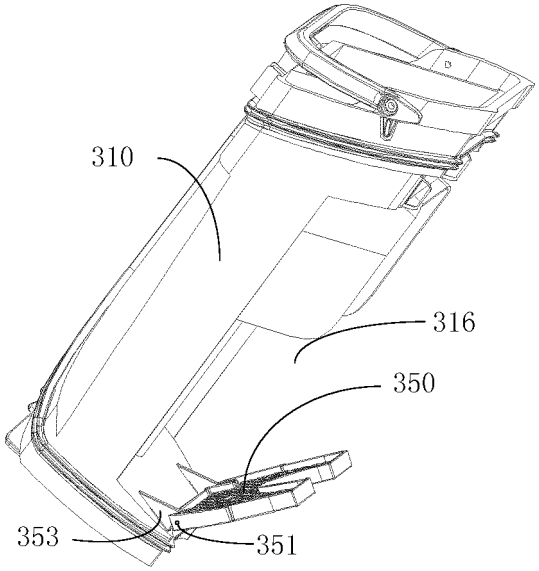

Fig. 27

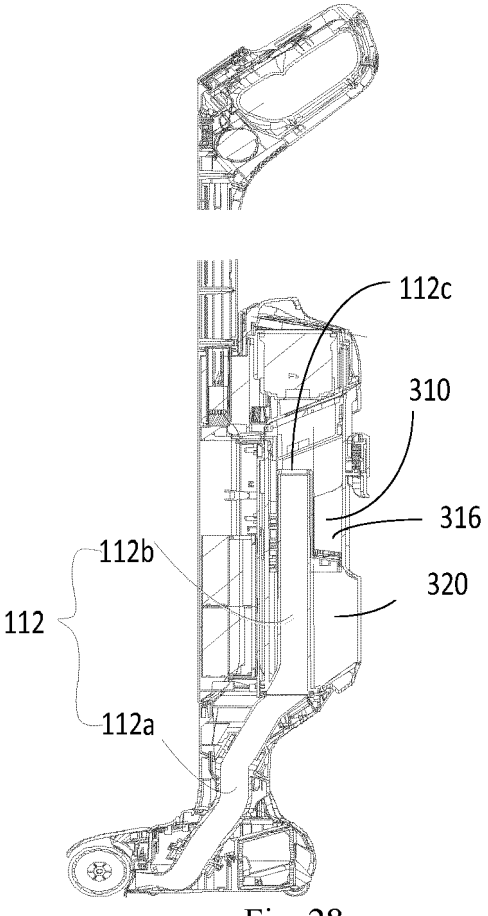

Fig. 28

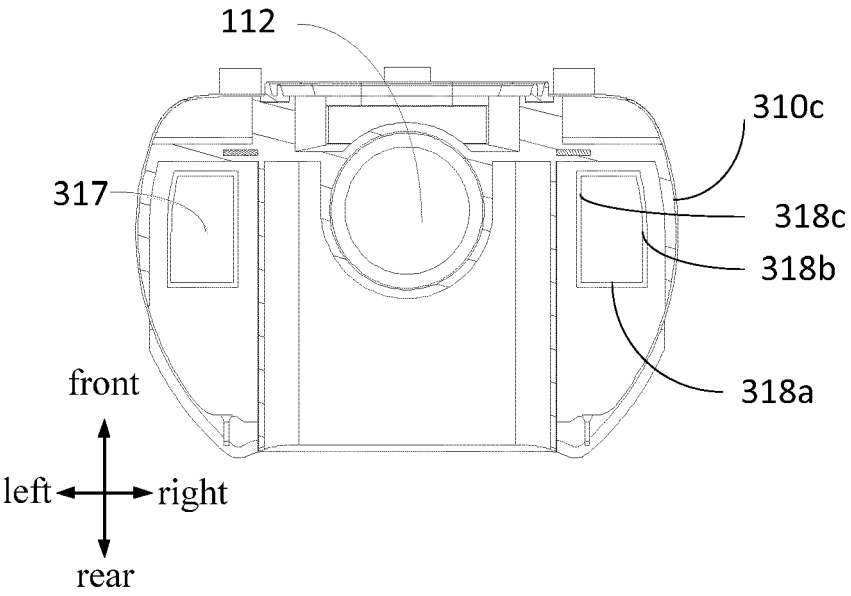
112
310c
317
318c
318b
318a
front
left
right
rear

Fig. 29

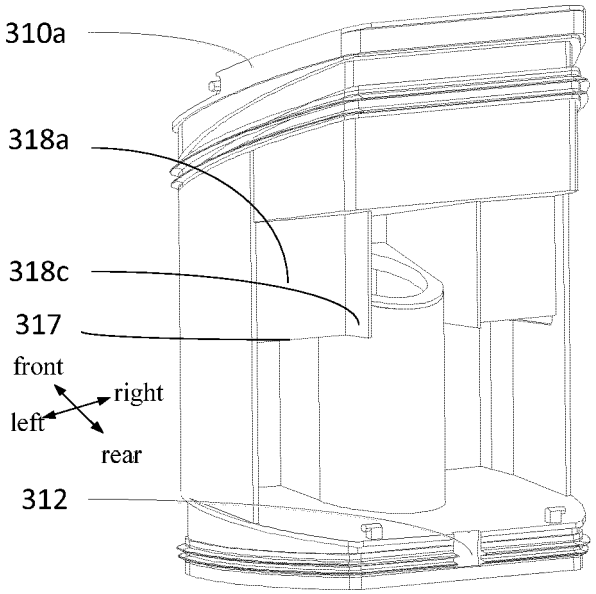
310a
318a
318c
317
front
right
left
rear
312

Fig. 30

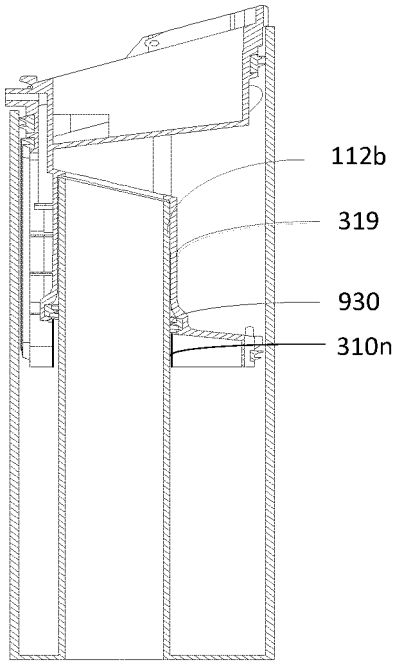

Fig. 31

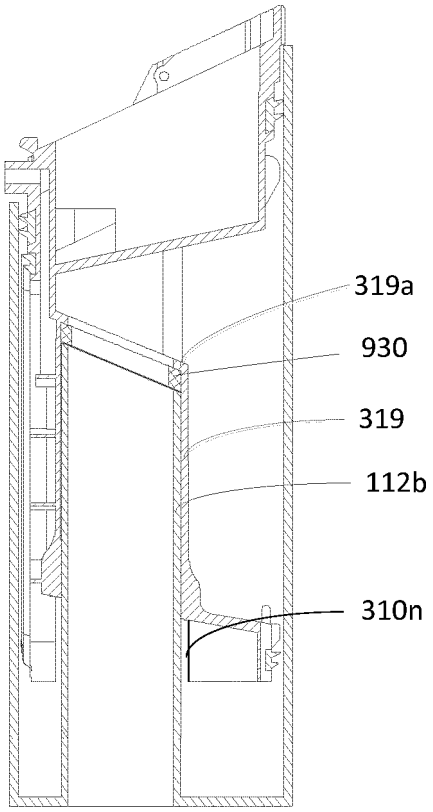

Fig. 32

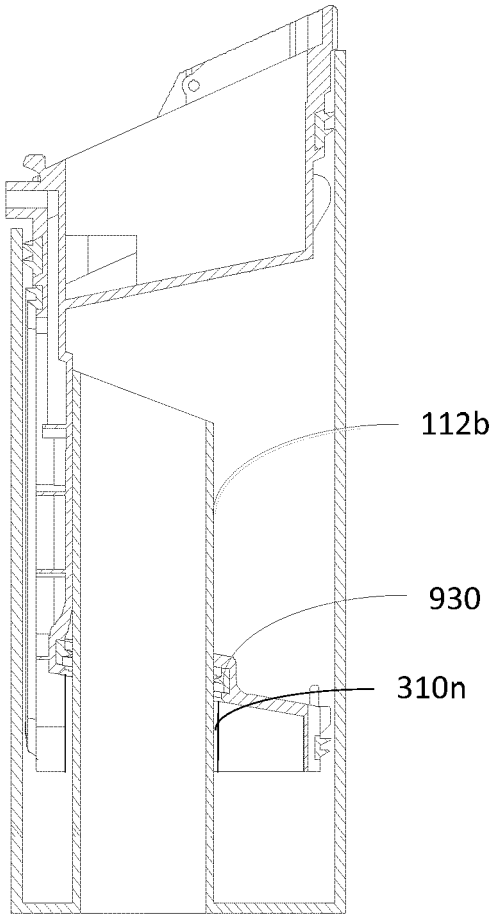

Fig. 33

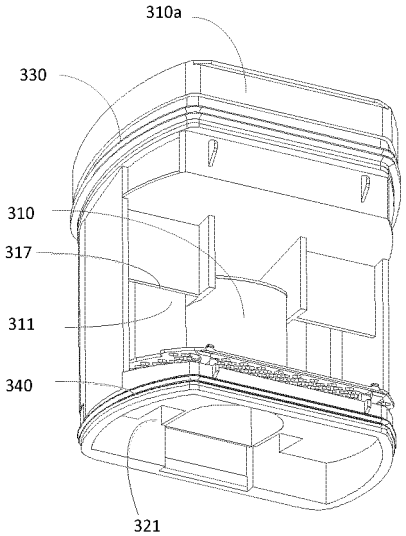

Fig. 34

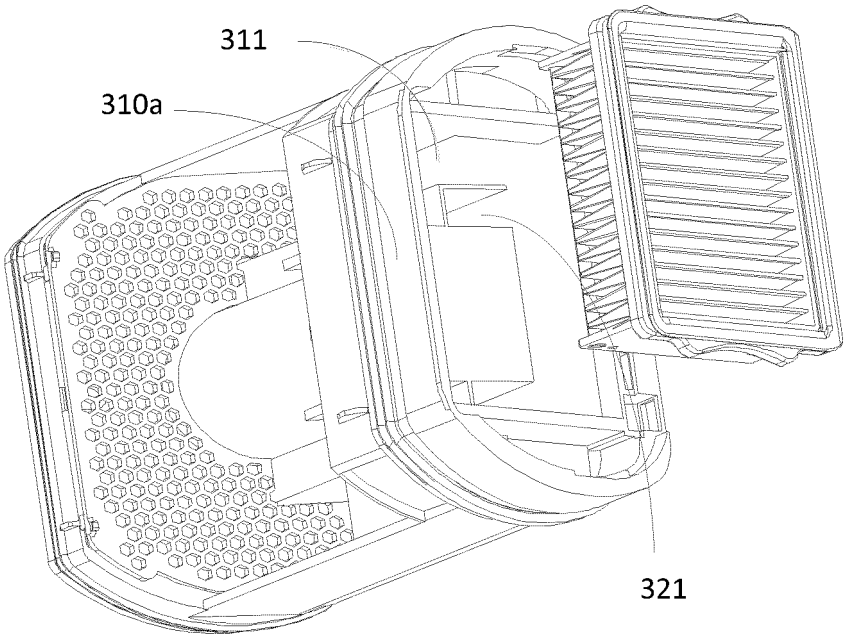

Fig. 35

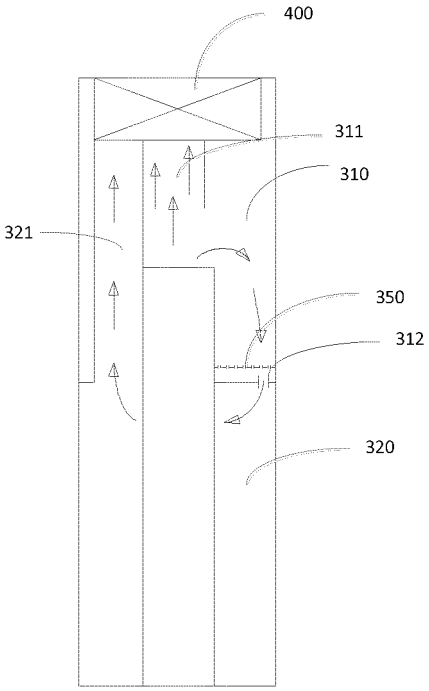

Fig. 36

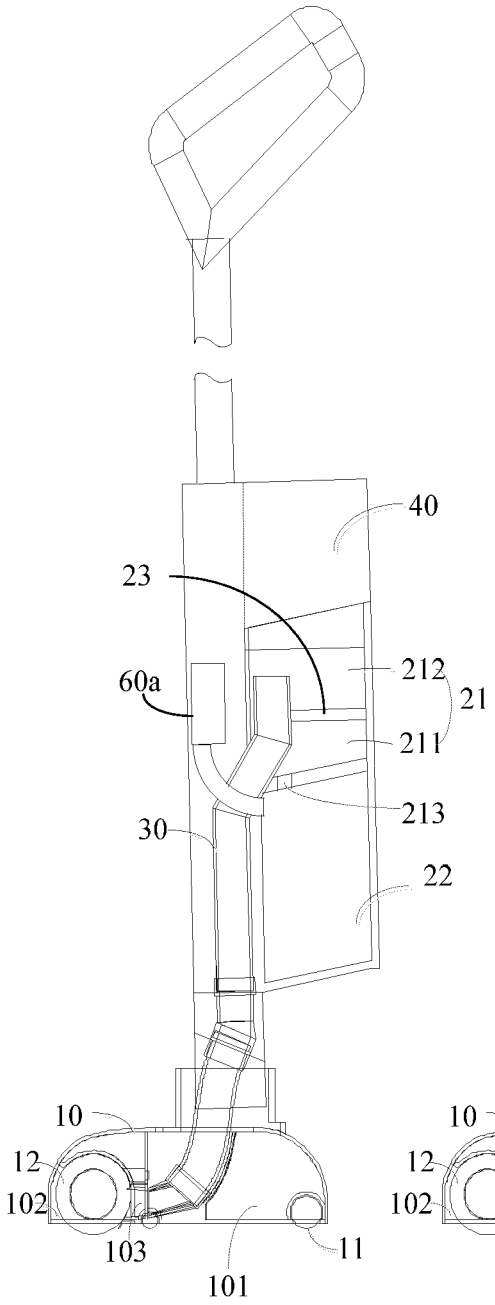

Fig. 37(a)

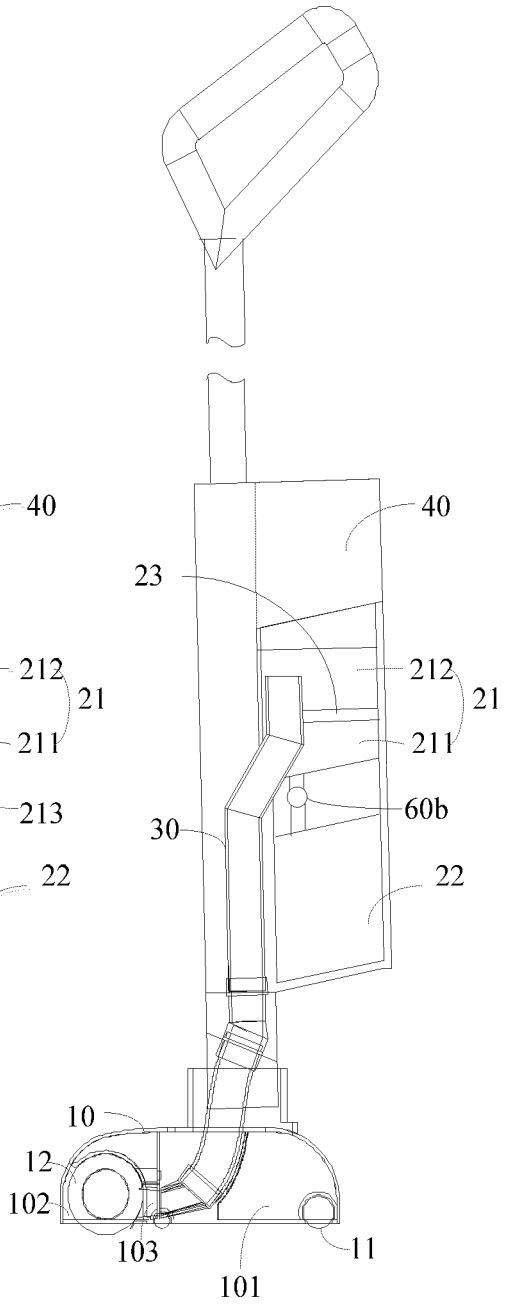

Fig. 37(b)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2022/133554

A. CLASSIFICATION OF SUBJECT MATTER

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

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A47L

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

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

CNTXT, CNABS, ENTXTC, ENTXT, VEN: 抽吸, 泵, 负压, 风机, 污水, 污物, 垃圾, 污液, 第二, 中转, 缓冲, 收集箱, 污水箱, 固液分离, 水汽分离, 气液分离, suction, pump, absorb, negative pressure, fan, sewage, dirt, garbage, second+, buffer, solid, liquid, water, vapor, separate+

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN 113117401 A (TINECO INTELLIGENT TECHNOLOGY CO., LTD.) 16 July 2021 (2021-07-16) description, paragraphs 32-96, and figures 1-7	1-47
A	CN 213696753 U (PUPPY ELECTRONIC APPLIANCES INTERNET TECHNOLOGY (BEIJING) CO., LTD.) 16 July 2021 (2021-07-16) entire document	1-47
A	CN 214048671 U (SHENZHEN SILVER STAR INTELLIGENT TECHNOLOGY CO., LTD.) 27 August 2021 (2021-08-27) entire document	1-47
A	CN 214632024 U (GUANGDONG MOFEI TECHNOLOGY CO., LTD.) 09 November 2021 (2021-11-09) entire document	1-47
A	DE 202016105301 U1 (HIZERO TECHNOLOGIES CO., LTD.) 19 October 2016 (2016-10-19) entire document	1-47

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

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"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
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"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
15 February 2023	**20 February 2023**
Name and mailing address of the ISA/CN **China National Intellectual Property Administration (ISA/CN)** **China No. 6, Xitucheng Road, Jimenqiao, Haidian District, Beijing 100088** Facsimile No. **(86-10)62019451**	Authorized officer Telephone No.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2022/133554

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2016174791 A1 (OMACHRON INTELLECTUAL PROPERTY INC.) 23 June 2016 (2016-06-23) entire document	1-47
PX	CN 217162003 U (NARWEL INTELLIGENT TECHNOLOGY (DONGGUAN) CO., LTD.; YUNJING (SHENZHEN) CO., LTD.) 12 August 2022 (2022-08-12) description, paragraphs 39-94, and figures 1-5	1, 4-9, 26, 42-43, 46-47
PX	CN 217162004 U (NARWEL INTELLIGENT TECHNOLOGY (DONGGUAN) CO., LTD.; YUNJING (SHENZHEN) CO., LTD.) 12 August 2022 (2022-08-12) description, paragraphs 50-119, and figures 1-5	1, 4-9, 26, 42-43, 46-47

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2022/133554

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
CN 113117401 A	16 July 2021	None	
CN 213696753 U	16 July 2021	None	
CN 214048671 U	27 August 2021	None	
CN 214632024 U	09 November 2021	None	
DE 202016105301 U1	19 October 2016	None	
US 2016174791 A1	23 June 2016	US 9668630 B2	06 June 2017
CN 217162003 U	12 August 2022	None	
CN 217162004 U	12 August 2022	None	

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