

(19)



(11)

**EP 4 578 353 A1**

(12)

**EUROPEAN PATENT APPLICATION**

(43) Date of publication:  
**02.07.2025 Bulletin 2025/27**

(51) International Patent Classification (IPC):  
**A47L 5/24<sup>(2006.01)</sup> A47L 5/28<sup>(2006.01)</sup>**

(21) Application number: **24196559.9**

(52) Cooperative Patent Classification (CPC):  
**A47L 5/28; A47L 5/24**

(22) Date of filing: **27.08.2024**

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

(71) Applicant: **Zhejiang Shaoxing Supor Domestic Electrical Appliance Co., Ltd**  
**Shaoxing, Zhejiang 312017 (CN)**

(72) Inventor: **PAN, Hongfang**  
**Shaoxing 312071 (CN)**

(74) Representative: **LLR**  
**2, rue Jean Lantier**  
**75001 Paris (FR)**

(30) Priority: **28.12.2023 CN 202311844512**  
**28.12.2023 CN 202323628625 U**

(54) **CLEANING DEVICE**

(57) Provided is a a cleaning device comprising a device body (100) and a handheld structure (200) comprising a handheld body (210) and an operating handle (220) arranged on the handheld body (210), wherein a side face of the device body (100) is provided with a positioning groove (110), and a supporting groove (120) in communication with the positioning groove (110) is provided in the device body (100), and wherein the handheld body (210) has an inserting end (211) opposite to the operating handle (220) and inserted in the supporting groove (120), the supporting groove (120) envelops the inserting end (211), and a part of a side face of the handheld body (210) and at least a part of the operating handle (220) are located in the positioning groove (110).

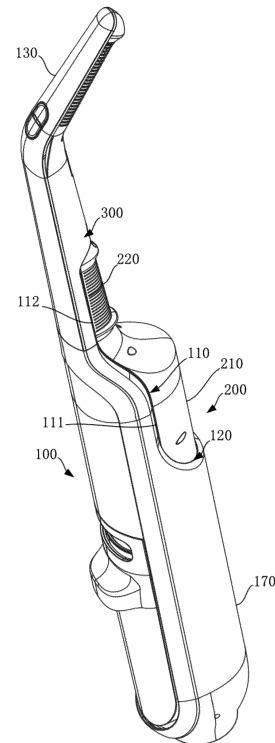


FIG. 1

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## Description

**[0001]** The present application relates to the technical field of electrical cleaning devices for household use, and in particular, to a cleaning device.

**[0002]** As technology keeps developing and people's quality of life improves, cleaning devices (such as vacuum cleaners and floor scrubbers) appear more and more in people's life. A floor scrubber can scrub a floor while sucking up dirty water produced after the scrubbing so as to keep the floor clean and dry.

**[0003]** In relevant art, a cleaning device comprises a device body and a handheld structure removably connected to the device body. The handheld structure is used for providing a suction force and can be used separately after being removed. The device body has a loading slot used for loading the handheld structure, and the handheld structure has a connecting end inserted in the loading slot so as to connect the handheld structure to the device body.

**[0004]** However, after the existing handheld structure is connected to the device body, other parts of the handheld structure are clearly exposed, and appear abrupt relative to the device body, making the cleaning device complex in structure and poor in aesthetics.

**[0005]** In view of this, the present application provides a cleaning device that solves the following problem: after an existing handheld structure is connected to a device body, the handheld structure appears abrupt relative to the device body, making the cleaning device complex in structure and poor in aesthetics.

**[0006]** The present application provides a cleaning device comprising a device body and a handheld structure comprising a handheld body and an operating handle arranged on the handheld body, wherein a side face of the device body is provided with a positioning groove, and a supporting groove in communication with the positioning groove is provided in the device body, and wherein the handheld body has an inserting end opposite to the operating handle and inserted in the supporting groove, the supporting groove envelops the inserting end, and a part of a side face of the handheld body and at least a part of the operating handle are located in the positioning groove.

**[0007]** With the cleaning device provided by the present application, when the handheld structure is inserted in the device body, the inserting end of the handheld body is completely enveloped by the supporting groove of the device body, a part of a side face of the handheld body is located in the positioning groove, and at least a part of the operating handle is also located in the positioning groove. Thus, the supporting groove can guide the insertion of the inserting end and protect the connection between the inserting end and the device body. The partial structure of the handheld structure exposed outside the positioning groove and the supporting groove can smoothly transition to an outer surface of the supporting groove and an outer surface of the positioning groove, enabling the

handheld structure to be stably mounted in the device body in a hidden way, so that the cleaning device has a smooth overall styling, a compact structure, and improved aesthetics.

5 **[0008]** In a possible mode of realization, in the cleaning device provided by the present application, the device body has a handheld part tilting towards the positioning groove.

10 **[0009]** Thus, by tilting the handheld part of the device body towards the positioning groove, the handheld part and the handheld structure can be located at the same side of the device body, so as to facilitate a user performing operations of mounting, removing, and holding the handheld structure from the same side of the handheld part during use, which further facilitates use of the cleaning device and improves user experience.

15 **[0010]** In a possible mode of realization, the cleaning device provided by the present application further comprises a locking assembly comprising a pressing element and a locking element, the pressing element being inserted in the device body having inside a mounting chamber in communication with the positioning groove, the locking element being partially located in the mounting chamber and partially located outside the mounting chamber and snap-fit with the operating handle; the pressing element is configured to, when being pressed, drive the locking element to move away from the operating handle so as to disengage the locking element from being snap-fit with the operating handle.

20 **[0011]** Thus, by providing the locking assembly, under the effect of the snap-fit between the locking element and the operating handle, combined with the insertion connection between the inserting end and the supporting groove, the handheld structure and the device body are reliably fixed together; when the handheld structure needs to be removed, by applying a pressing force on the pressing element, the pressing element can drive the locking element to disengage from being snap-fit with the operating handle, which facilitates improving user experience and the efficiency in removing the handheld structure.

25 **[0012]** In a possible mode of realization, the cleaning device provided by the present application further comprises at least one elastic assembly located in the device body and partially protruding into the positioning groove so as to abut against the operating handle; the elastic assembly is configured to, when the operating handle disengages from being snap-fit with the device body, drive the part of the operating handle in the positioning groove to disengage from the positioning groove.

30 **[0013]** Thus, when removing the handheld structure, by disengaging the operating handle from being snap-fit from the device body, the elastic assembly will drive the part of the operating handle in contact with it to shift from a prior position so as to disengage from the positioning groove, thus further facilitating holding of the operating handle fully by a user, allowing it to be removed from the positioning groove easily, and helping improve the effi-

ciency in removing the handheld structure.

**[0014]** In a possible mode of realization, in the cleaning device provided by the present application, an end face of the inserting end has a first electrical connector, and a bottom of the supporting groove has a second electrical connector, the first electrical connector being configured to, when the inserting end is inserted in the supporting groove, be electrically connected to the second electrical connector.

**[0015]** Thus, when the inserting end is inserted in the supporting groove, an electrical connection between the handheld structure and the device body can be realized by means of the first electrical connector and the second electrical connector, so as to facilitate electrical control of the handheld structure's operating state by the device body when the handheld structure is inserted in the device body, so that the cleaning device is more flexible and convenient to use.

**[0016]** In a possible mode of realization, in the cleaning device provided by the present application, an end face of the inserting end has at least one first positioning element, and a bottom of the supporting groove has at least one second positioning element, the first positioning element being configured to, when the inserting end is inserted in the supporting groove, be inserted to the second positioning element.

**[0017]** Thus, stability of the relative position and relative orientation between the inserting end and the supporting groove can be ensured by the insertion connection between the first positioning element and the second positioning element when the inserting end and the supporting groove are connected by insertion with each other, improving accuracy in mounting the handheld structure.

**[0018]** In a possible mode of realization, in the cleaning device provided by the present application, among the first positioning element and the second positioning element, one is a positioning slot, and the other is a positioning block that matches the positioning slot.

**[0019]** Thus, by providing a positioning slot and a positioning block that matches the positioning slot to form respectively the first positioning element and the second positioning element, the structure of the first positioning element and the second positioning element can be rendered simple and compact in structure, and positioning by insertion connection can be rendered more efficient.

**[0020]** In a possible mode of realization, in the cleaning device provided by the present application, there is an air passage in the handheld body, two ends of which form respectively an air inlet located in the center of an end face of the inserting end, and an air outlet located in a side face of the inserting end;

the device body has an air admission passage and an air discharge passage, an air outlet of the air admission passage being located in the center of the supporting groove and correspondingly in communication with the air inlet, an air inlet of the air discharge passage being

located in a side wall of the supporting groove and correspondingly in communication with the air outlet.

**[0021]** Thus, when the device body and the handheld structure are used in combination, air enters the handheld structure via the air inlet from the device body's air admission passage, passes through the air passage, flows out of the air outlet, and then enters the air discharge passage of the device body, and finally, is blown out of the air discharge passage. As the air outlet is located in a side face of the handheld structure, the air inlet and the air outlet of the handheld structure are not located at the same end. With the air discharge passage being correspondingly in communication with the air outlet, the air discharge passage need not be arranged at an opposite side of the end of the handheld structure that has the air inlet. Thus, not too much inner space of the device body is occupied, which facilitates the design and mounting of other structures of the body.

**[0022]** In a possible mode of realization, the cleaning device provided by the present application further comprises a first sealing element arranged between the air admission passage and the air inlet, a second sealing element arranged between a side wall of the supporting groove and a side face of the inserting end, and a connector;

the first sealing element and the second sealing element are connected by means of the connector, the first sealing element and the connector are located in the same plane, and the first sealing element, the second sealing element, and the connector are formed integrally.

**[0023]** Thus, sealing between the air admission passage and the air inlet is improved by means of the first sealing element, and sealing between the side wall of the supporting groove and the side face of the inserting end is improved by the second sealing element. Finally, by connecting the first sealing element and the second sealing element by means of the connector, with the first sealing element, the second sealing element, and the connector formed integrally, mounting and manufacturing of the first sealing element, the second sealing element, and the connector are facilitated.

**[0024]** In a possible mode of realization, in the cleaning device provided by the present application, the handheld body comprises a housing, a support, and a driving element used for providing a suction force; the support is partially inserted into the housing and provided inside with a chamber in which the driving element is arranged, at least part of the support and the housing adjacent to the support forming the inserting end.

**[0025]** Thus, on one hand, the support provides a mounting position for the driving element, and on the other hand, part of the support and the housing adjacent to the support form the inserting end, putting it to multiple uses, which helps reduce costs while causing the overall structure to have a high stability.

**[0026]** In a possible mode of realization, in the cleaning device provided by the present application, a part of the

chamber forms the air passage, an end face of the support facing the device body forms the end face of the inserting end, the air inlet corresponds to a suction opening of the driving element, and the air outlet is located in a side face of the support.

**[0027]** Thus, by forming the chamber mounted with the driving element and serving as the air passage by means of the support, and with the support being processed to form the air inlet and the air outlet, and the air outlet being located in a side face, the overall structure is simple and compact, resulting in a high space utilization rate.

**[0028]** In a possible mode of realization, in the cleaning device provided by the present application, a side face of the support has a slot, an opening of the slot facing a side wall of the supporting groove and forming the air outlet, the slot having a first side wall and a second side wall that are opposite to each other, the first side wall facing the handheld body; the second side wall is provided with at least one through hole that puts the air passage and the slot in communication.

**[0029]** Thus, air is blown out of the air outlet via the through hole from the air passage. With the opening of the slot facing the side wall of the supporting groove, by making a slot in the side face of the support to form the air outlet, the structure is further rendered compact, and full use is made of space.

**[0030]** In a possible mode of realization, in the cleaning device provided by the present application, the first side wall is provided with a notch in communication with an end face of the support facing the device body, so as to cause the opening to have an inclined form.

**[0031]** Thus, by causing the opening to have an inclined form by means of the notch, the direction of air blown out of the air outlet is axially inclined outwards relative to the handheld body, which reduces wind resistance while at the same time fully making use of the structure's space, and is equivalent to blowing towards the air discharge passage at an angle.

**[0032]** In a possible mode of realization, the cleaning device provided by the present application further comprises an outer connection structure configured to, when the handheld structure detaches from the device body, be connected to the handheld structure and form, together with the handheld structure, a cleaning executing device.

**[0033]** Thus, by providing the outer connection structure that can be connected to the separate handheld structure to form a cleaning executing device, the functions of the handheld structure can be completed when it is used separately, which increases the utilization scenarios of the handheld structure and improves the handheld structure's functionality and applicability so as to improve user experience when separately using the handheld structure.

**[0034]** In a possible mode of realization, in the cleaning device provided by the present application, the outer connection structure is a dust cup structure.

**[0035]** Thus, by providing a dust cup structure as the outer connection structure, the dust cup structure can be

used to receive dust and dirt sucked in by the handheld structure, which improves the handheld structure's cleaning efficiency, renders it convenient and practical, and improves a user's utilization experience.

**[0036]** In addition to the technical problems solved by the embodiments of the present application, the technical features that constitute the technical solutions, and the beneficial effects brought about by the technical features of these technical solutions that have been described above, other technical problems that can be solved by the cleaning device provided by the present application, other technical features included in the technical solutions, and the beneficial effects brought about by these technical features will be further described in detail in the detailed description of the invention.

### Description of the drawings

**[0037]** In order to more clearly illustrate the technical solutions of embodiments of the present application or the prior art, the drawings to be used in describing the embodiments or the prior art will be briefly introduced below. Obviously, the drawings described below are some embodiments of the present application. For those skilled in the art, other drawings can be obtained based on these drawings without spending any creative labor.

Fig. 1 is a schematic structural view of a cleaning device provided by an embodiment of the present application;

Fig. 2 is a schematic structural view wherein the device body in Fig. 1 is disengaged from the handheld structure;

Fig. 3 is schematic view of the inner structure of a cleaning device provided by an embodiment of the present application;

Fig. 4 is a schematic structural view of a device body provided by an embodiment of the present application;

Fig. 5 is a schematic structural view at the slot bottom of the supporting groove shown in Fig. 4;

Fig. 6 is a schematic structural view of a handheld structure provided by an embodiment of the present application;

Fig. 7 is a schematic structural view of the handheld structure of Fig. 6 from another observation angle;

Fig. 8 is a schematic structural view of the support in Fig. 7;

Fig. 9 is a schematic structural view of part A in Fig. 3 wherein the locking assembly is snap fitted with the

operating handle;

Fig. 10 is a schematic structural view of part A in Fig. 3 wherein the locking assembly is disengaged from the operating handle;

Fig. 11 is a partial, enlarged view of part B in Fig. 3.

list of reference numerals

**[0038]**

100: device body;

110: positioning groove; 111: receiving section; 112: abutting section;

120: supporting groove; 121: second electrical connector; 122: second positioning element;

130: handheld part;

140: mounting chamber; 141: first mounting hole; 142: second mounting hole; 143: guiding part;

150: air admission passage of the body;

160: air discharge passage of the body;

170: first mounting part;

200: handheld structure;

210: handheld body; 211: inserting end; 2111: first electrical connector; 2112: first positioning element; 212: air inlet; 213: air outlet; 214: housing; 215: support; 216: driving element;

220: operating handle; 221: snap-fit slot;

230: first sealing element; 231: second sealing element; 232: connector;

240: slot; 241: first side wall; 2411: notch; 242: second side wall; 2421: first through hole;

2422: second through hole; 2423: snap-fit part;

300: locking assembly;

310: pressing element; 311: insertion block; 3111: second slope;

320: locking element; 321: snap-fit tab; 322: insertion slot; 3221: first slope;

330: reset element;

400: elastic assembly;

410: push pin; 411: passage hole;

5 420: elastic element.

**Detailed Description of the Embodiments**

**[0039]** In order to make the objectives, technical solutions and advantages of the present application clearer, the technical solutions in the embodiments of the present application will be described in more detail below in conjunction with the accompanying drawings in preferred embodiments of the present application. Throughout the accompanying drawings, the same or similar references represent the same or similar parts or parts with the same or similar functions. The described embodiments are some of the embodiments of the present application, not all of the embodiments. The embodiments described below with reference to the accompanying drawings are exemplary and are intended to be used to explain the present application, and should not be construed as limiting the present application. Based on the embodiments in the present application, all other embodiments obtained by a person of ordinary skills in the art without creative labor are within the scope of protection of the present application. Embodiments of the present application are described in detail below in conjunction with the accompanying drawings.

**[0040]** It should be noted that in the description of the present application, unless otherwise clearly specified and limited, the terms "mounted," "connected," and "connect" should be understood in a broad sense. For example, it can be a fixed connection, or it can be an indirect connection through an intermediary, or it can be internal communication between two elements or an interaction relationship between two elements. For those skilled in the art, the specific meanings of the above terms in the present application can be understood according to specific circumstances.

**[0041]** It should also be noted that, in the description of the present application, the terms indicating an orientation or position relationship, such as "upper," "lower," "front," "back," "vertical," "horizontal," "top," "bottom," "inner," and "outside", are based on the orientation or position relationships shown in the drawings, and are only for the convenience of describing the present application and simplifying the description, instead of indicating or implying that the referred means or element must have a specific orientation, be constructed and operated in a specific orientation, and therefore cannot be understood as a limitation on the present application.

**[0042]** The terms such as "first," "second," "third," and "fourth" in the specification, claims, and the above-described accompanying drawings of the present application are used for distinguishing between similar objects and are not necessarily used for describing a particular order or sequence. It should be understood that data thus

used can be interchanged in appropriate circumstances so that the embodiments of the present application described herein can be realized in an order other than what is illustrated or described.

**[0043]** In addition, the terms "comprise" and "have" and any variations thereof are intended to cover a non-exclusive inclusion. For example, a process, method, system, product, or device comprising a series of steps or elements is not necessarily limited to those steps or elements explicitly listed, but may include other steps or elements not explicitly listed or inherent to such process, method, product, or device.

**[0044]** In relevant art, a cleaning device comprises a device body and a handheld structure removably connected to the device body. The handheld structure is used for providing a suction force and can be used separately after being removed.

**[0045]** The device body has a mounting part, an upper part of which is provided with a handheld part for being held, and a lower part of which is provided with a cleaning element, such as a roller brush or scrubber disc, forming a floor scrubber part. Between the handheld part and the floor scrubber part, the mounting part is further removably mounted with a dust cup assembly, a water tank assembly, etc. in addition to a handheld structure.

**[0046]** To realize the connection between the handheld structure and the device body, a side of the device body is provided with a loading slot used for loading the handheld structure. The loading slot is generally adapted to the structure and size of a part of the handheld structure. The handheld structure has a connecting end inserted in the loading slot so as to connect the handheld structure to the device body.

**[0047]** However, after the existing handheld structure is connected to the device body, other parts of the handheld structure that are not adapted to the structure and size of the loading slot are clearly exposed and appear abrupt relative to the device body's overall configuration, easily making the cleaning device have a complex overall structure and a low shape smoothness, resulting in poor aesthetics of the cleaning device.

**[0048]** In view of the above-described problems, the present application provides a cleaning device comprising a device body and a handheld structure. When the handheld structure is inserted in the device body, an inserting end of the handheld body is completely enveloped by a supporting groove of the device body, a part of a side face of the handheld body is located in a positioning groove, and at least a part of the operating handle is also located in the positioning groove. Thus, the supporting groove can guide the insertion of the inserting end and protect a part of the inserting end connected to the device body. The partial structure of the handheld structure exposed outside the positioning groove and the supporting groove can smoothly transition to an outer surface of the supporting groove and an outer surface of the positioning groove, enabling the handheld structure to be stably mounted in the device body in a hidden way, so

that the cleaning device has a smooth overall configuration, a compact structure, and improved aesthetics.

**[0049]** Specific modes of realization of the cleaning device provided by embodiments of the present application are described in detail below in conjunction with the accompanying drawings.

**[0050]** It should be noted that Figs. 1 to 11 show schematically simplified schematic views of various parts of a cleaning device. The specific structure of other parts of the cleaning device is not limited to what is shown in Figs. 1 to 11 by way of example.

**[0051]** In reference to Figs. 1 to 4 and Fig. 6, a cleaning device provided by the present application comprises a device body 100 and a handheld structure 200. The handheld structure 200 comprises a handheld body 210 and an operating handle 220 arranged on the handheld body 210. A side face of the device body 100 is provided with a positioning groove 110. There is a supporting groove 120 in communication with the positioning groove 110 in the device body 100. The handheld body 210 has an inserting end 211 opposite to the operating handle 220. The inserting end 211 is inserted in the supporting groove 120, and the supporting groove 120 envelops the inserting end 211. A part of a side face of the handheld body 210 and at least a part of the operating handle 220 are located in the positioning groove 110.

**[0052]** It can be understood that, in order to render the handheld structure 200 more convenient for a user to hold when being used separately from the device body 100, the operating handle 220 is arranged on the handheld body 210 of the handheld structure 200. The operating handle 200 is arranged at only one end of the handheld body 210 with its extension direction consistent with that of the handheld body 210, its projection towards the handheld body 210 being within the handheld body 210, an end of the handheld structure 200 opposite the operating handle 220 being the inserting end 211. Thus, various parts of the handheld structure 200 can be arranged in the same direction, resulting in an overall styling that is smooth, aesthetic, simple, and compact. In addition, when the handheld structure 200 is connected to the device body 100, mounting of the handheld structure 200 in the length direction of the device body 100 is facilitated, which reduces radial space of the device body 100 occupied by the handheld structure 200 so that the cleaning device is more elongated as a whole, improving the cleaning device's aesthetics.

**[0053]** In addition, the device body 100 can comprise a first mounting part 170 and a handheld part 130 removably connected to the first mounting part 170. In this embodiment, the handheld part 130 is configured to be held by a user to facilitate control of the device body 100's position. By way of example, partial structures of the handheld part 130 and the first mounting part 170 can be configured together as groove-shaped structures, forming the positioning groove 110 and the supporting groove 120 that match the handheld structure 200. The positioning groove 110 is arranged at a side face of the

device body 100 and comprises a receiving section 111 and an abutting section 112 in communication with each other. The abutting section 112 is located above the receiving section 111. When the operating handle 220 and part of the handheld body 210 are arranged in the positioning groove 110, the receiving section 111 and the abutting section 112 support the handheld structure 200 together, which helps improve the stability of the handheld structure 200 and thus can ensure the structural stability of the cleaning device. In addition, by providing the supporting groove 120 in communication with the positioning groove 110, when mounting the handheld structure 200, the inserting end 211 can be inserted into the supporting groove 120 and enveloped by the supporting groove 120 so as to limit the inserting end 211's movement. Thus, a mounting space that opens sideways can be formed by the positioning groove 110 and the supporting groove 120, which facilitates mounting and removal of the handheld structure 200 from one side of the device body 100.

**[0054]** As the operating handle 220 is located at one end of the handheld body 210, when the handheld structure 200 is inserted into the mounting space formed by the positioning groove 110 and the supporting groove 120, the mounting space can partially envelope the handheld structure 200 to hide it, resulting in a smooth and sleek exterior styling. In addition, as the handheld structure 200 itself does not have structural parts that must protrude prominently from the mounting space, the partial structure of the handheld structure 200 located outside the mounting space can be configured to transition smoothly to the exterior structure of the positioning groove 110 and the supporting groove 120, so as to render the overall styling of the cleaning device more smooth and aesthetic.

**[0055]** Thus, when the handheld structure 200 is inserted in the device body 100, the inserting end 211 of the handheld body 210 is completely enveloped by the supporting groove 120 of the device body 100, a part of a side face of the handheld body 210 is located in the positioning groove 110, and at least a part of the operating handle 220 is also located in the positioning groove 110. The partial structure of the handheld structure 200 exposed outside the positioning groove 110 and the supporting groove 120 can smoothly transition to an outer surface of the supporting groove 120 and an outer surface of the positioning groove 110, enabling the handheld structure 200 to be stably mounted in the device body 100 in a hidden way, so that the cleaning device has a smooth overall styling, a compact structure, and improved aesthetics.

**[0056]** With the above-described arrangement, a cleaning tool such as a brush can be further provided on the first mounting part 170. Under the effect of the suction force provided by the handheld structure 200, the brush is made to enter into contact with a surface to be cleaned, so that the cleaning device can be used as a dust removal device capable of removing dust from a

surface to be cleaned such as a floor.

**[0057]** Even further, a dirty water tank and a clean water tank can be arranged in the first mounting part 170, wherein the clean water tank is configured for distributing water to a cleaning tool such as a brush to clean a surface to be cleaned, so that the cleaning device is used as a floor scrubber and performs cleaning while removing dust from a floor.

**[0058]** In some embodiments, in reference to Figs. 1 to 3, the device body 100 has a handheld part 130 tilting towards the positioning groove 110.

**[0059]** It can be easily understood that by tilting the handheld part 130 towards the positioning groove 110, the position of a user when using the cleaning device is always at the side towards which the handheld part 130 tilts. Specifically, when using the cleaning device, the handheld structure 200 and the user can both be located at the same side of the device body 100, so as to facilitate a user's performing operations of mounting, removing, and holding the handheld structure 200 from the same side of the handheld part 130 when using the cleaning device, without the need to repeatedly adjusting his or her position, which further facilitates use of the cleaning device and improvement of user experience.

**[0060]** In some embodiments, in reference to Figs. 1 to 3 and Figs. 9 and 10, the cleaning device further comprises a locking assembly 300 comprising a pressing element 310 and a locking element 320. The pressing element 310 is inserted in the device body 100. There is a mounting chamber 140 in communication with the positioning groove 110 in the device body 100. The locking element 320 is located in the mounting chamber 140. The locking element 320 is partially located outside the mounting chamber 140 and snap-fit with the operating handle 220. The pressing element 310 is configured to, when being pressed, drive the locking element 320 to move away from the operating handle 220 so as to disengage the locking element 320 from being snap-fit with the operating handle 220.

**[0061]** It can be understood that, the positioning groove 110 is located at a side face of the device body 100, and the mounting chamber 140 is located above the positioning groove 110 so that the mounting chamber 140 is close to the handheld part 130, facilitating operation by a user. Thus, the handheld part 130 can be provided with a first mounting hole 141 and a second mounting hole 142 in communication with the mounting chamber 140. The pressing element 310 is inserted in the handheld part 130 via the first mounting hole 141, and the locking element 320 is placed in the mounting chamber 140 at a side corresponding to the operating handle 220. In this embodiment, to ensure that the pressing element 310's movement is guided stably, a guiding part 143 can be provided in the mounting chamber 140. The guiding part 143 is arranged to surround the periphery of the first mounting hole 141. The pressing element 310 is slidably connected to the guiding part 143.

**[0062]** In order to allow the operating handle 220 to be

snap-fit with the positioning groove 110 stably, the operating handle 220 is provided with a snap-fit slot 221, and the locking element 320 has a snap-fit tab 321 matching the snap-fit slot 221. By snap-fitting the snap-fit tab 321 into the snap-fit slot 221, movement of the operating handle 220 away from the positioning groove 110 can be limited. In a normal state, the snap-fit tab 321 of the locking element 320 will partially extend into the positioning groove 110 via the second mounting hole 142 and be snap-fit with the operating handle 220. Thus, under the effect of the snap-fit between the locking element 320 and the operating handle 220, in combination with the insertion connection between the inserting end 211 and the supporting groove 120, the handheld structure 200 and the device body 100 are fixed together reliably, which increases the reliability of the connection between the handheld structure 200 and the device body 100 and improves user experience.

**[0063]** Specifically, regarding the transmission structure between the pressing element 310 and the locking element 320, the pressing element 310 can be provided with an insertion block 311, and a face of the locking element 320 facing the insertion block 311 can be provided with an insertion slot 322. There is a first slope 3221 in the insertion slot 322. An end face of the insertion block 311 facing the insertion slot 322 has a second slope 3111 that matches the first slope 3221. The first slope 3221 is slidably connected to the second slope 3111.

**[0064]** Further, the locking assembly 300 further comprises a reset element 330 located in the mounting chamber 140. Specifically, the reset element 330 abuts between the locking element 320 and an inner wall of the mounting chamber 140 and maintains an extended state.

**[0065]** Thus, when the pressing element 310 is pressed, it moves towards the receiving chamber via the first mounting hole 141, and under the interaction of the first slope 3221 of the insertion slot 322 and the second slope 3111 of the insertion block 311, drives the locking element 320 to move away from the positioning groove 110 and return into the receiving chamber, so as to disengage from being snap-fit with the operating handle 220, while at the same time compressing the reset element 330 so that the reset element 330 undergoes elastic deformation. When the pressing force on the pressing element 310 is canceled, the reset element 330 extends to restore its shape and drives the locking element 320 to move in the opposite direction until extending into the positioning groove 110 via the second mounting hole 142 and, when the handheld structure 200 is inserted in the positioning groove 110, being snap-fit with the operating handle 220, while at the same time driving the pressing element 310 to return to position by the interaction between the first slope 3221 and the second slope 3111. Thus, it can be achieved that, each time a user mounts or removes the handheld structure 200, the pressing element 310 and the locking element 320 timely return to position after releasing the pressing element 310 so as to

facilitate the next operation, which results in convenient operation and good practicality.

**[0066]** Here, it should be noted that a spring has a simple manufacturing process, a low cost, and a long life, as well as good elastic performance. Therefore, the reset element 330 can be arranged to be a spring.

**[0067]** In addition, in some embodiments, in reference to Figs. 1 to 4 and Figs. 9 and 10, the cleaning device further comprises at least one elastic assembly 400 located in the device body 100 and partially protruding into the positioning groove 110 so as to abut against the operating handle 220. The elastic assembly 400 is configured to, when the operating handle 220 disengages from being snap-fit with the device body 100, drive the part of the operating handle 220 in the positioning groove 110 to disengage from the positioning groove 110.

**[0068]** It can be understood that, the elastic assembly 400 located in the device body 100 is configured to cooperate with a user to accomplish mounting and removal of the handheld structure 200. Specifically, the elastic assembly 400 comprises a push pin 410 and an elastic element 420 connected to the push pin 410. Similarly, the elastic element 420 can be a spring element. A wall of the positioning groove 110 is provided with a passage hole 411 corresponding to the push pin 410. Thus, the push pin 410 can protrude into the positioning groove 110 via the passage hole 411 so as to abut against the operating handle 220. When the operating handle 220 is snap-fit with the locking element 320, the operating handle 220 pushes the push pin 410 into the device body 100 and drives the elastic element 420 to be compressed. When the operating handle 220 disengages from being snap-fit with the locking element 320, the elastic element 420 extends and drives the push pin 410 to extend into the positioning groove 110, pushing the operating handle 220 to detach from the positioning groove 110.

**[0069]** Thus, when the handheld structure 200 needs to be removed, the push pin 410 can push the operating handle 220 to be exposed at an angle relative to the positioning groove 110 so as to facilitate full holding by a user and render it effortless to remove it from inside the positioning groove 110, resulting in a simple structure and convenient removal.

**[0070]** It should be noted that, the specific position of the elastic assembly 400 in the device body 100 need ensure the movement direction of the elastic assembly 400 is consistent with the direction in which the operating handle 220 detaches from the positioning groove 110.

**[0071]** In addition, in reference to Fig. 1 and Figs. 4 to 7, an end face of the inserting end 211 of the cleaning device provided by the present application has a first electrical connector 2111. A bottom of the supporting groove 120 has a second electrical connector 121. The first electrical connector 2111 is configured to, when the inserting end 211 is inserted into the supporting groove 120, be electrically connected to the second electrical connector 121.

**[0072]** Specifically, the first electrical connector 2111 is a female mating element arranged at the side of an end

face of the inserting end 211, and the second electrical connector 121 is a male mating element arranged at the same side as the bottom of the supporting groove 120. As the female mating element is depressed relative to the end face, and the male mating element protrudes relative to the bottom, insertion connection and positioning of the inserting end 211 can be facilitated, and structural protrusion of the inserting end 211 when the handheld structure 200 is used separately can be reduced, so as to render the overall structure compact and reliable. In other embodiments, the male and female mating elements can be reversed. This is not limited by the present application.

**[0073]** Thus, by providing the first electrical connector 2111 and the second electrical connector 121, when the inserting end 211 is inserted in the supporting groove 120, an electrical connection between the handheld structure 200 and the device body 100 can be realized by means of the first electrical connector 2111 and the second electrical connector 121. Thus, electrical control of the handheld structure 200's operating state can be realized by means of an operating panel arranged on the device body 100 when the handheld structure 200 is connected to the device body 100 for use, without the need to control the cleaning device's operation from the handheld structure 200, so that the cleaning device is more flexible and convenient to use.

**[0074]** Further, still in reference to Fig. 1 and Figs. 4 to 7, in some embodiments, an end face of the insertion end 211 has at least one first positioning element 2112. The bottom of the supporting groove 120 has at least one second positioning element 122. The first positioning element 2112 is configured to, when the inserting end 211 is inserted in the supporting groove 120, be inserted to the second positioning element 122.

**[0075]** Thus, stability of the relative position and relative orientation between the inserting end 211 and the supporting groove 120 can be ensured by the insertion connection between the first positioning element 2112 and the second positioning element 122 when the inserting end 211 and the supporting groove 120 are connected by insertion with each other, improving accuracy in mounting the handheld structure 200.

**[0076]** In this embodiment, among the first positioning element 2112 and the second positioning element 122, one is a positioning slot, and the other is a positioning block that matches the positioning slot. By providing the positioning slot and the positioning block that matches the positioning slot to form respectively the first positioning element 2112 and the second positioning element 122, the structure of the first positioning element 2112 and the second positioning element 122 can be rendered simple and compact, and positioning by insertion can be rendered more efficient.

**[0077]** In addition, in the embodiment of the cleaning device provided by the present application, in reference to Figs. 3 to 5 and Fig. 7 and Fig. 11, there is an air passage in the handheld body 210, two ends of which

form respectively an air inlet 212 located in the center of an end face of the inserting end 211, and an air outlet 213 located in a side face of the inserting end 211.

**[0078]** The device body 100 has an air admission passage 150 and an air discharge passage 160. An air outlet of the air admission passage 150 is located in the center of the supporting groove 120 and correspondingly in communication with the air inlet 212. An air inlet of the air discharge passage 160 is located in a side wall of the supporting groove 120 and correspondingly in communication with the air outlet 213.

**[0079]** In reference to the schematic direction shown by the arrow in Fig. 11, when the device body 100 and the handheld structure 200 of the cleaning device are used in combination, air enters the handheld structure 200 via the air inlet 212 from the device body 100's air admission passage 150, passes through the air passage, flows out of the air outlet 213, and then enters the air discharge passage 160 of the device body 100, and finally, is blown out of the air discharge passage 160.

**[0080]** In this embodiment, as the air outlet 213 is located in a side face of the handheld body 210, the air inlet 212 and the air outlet 213 are not located at the same end. With the air discharge passage 160 being correspondingly in communication with the air outlet 213, the air discharge passage 160 need not be arranged at an opposite side of the end of the handheld structure 200 that has the air inlet 212. Thus, not too much inner space of the device body 100 is occupied, which facilitates the design and mounting of other structures of the body, provides more designable structural space, and can also avoid an excessive size of the device body 100 while satisfying an internal part structural design, facilitating the device body 100's use.

**[0081]** In addition, not providing the air inlet of the air discharge passage 160 in the end face of the supporting groove 120 means the integrity of the end face of the supporting groove 120 is not damaged too much, which can improve the supporting strength of the end face of the supporting groove 120.

**[0082]** In some embodiments, in reference to Figs. 4 to 7, the cleaning device further comprises a first sealing element 230 arranged between the air admission passage 150 and the air inlet 212, a second sealing element 231 arranged between a side wall of the supporting groove 120 and a side face of the inserting end 211, and a connector 232.

**[0083]** The first sealing element 230 and the second sealing element 231 are connected by means of the connector 232. The first sealing element 230 and the connector 232 are located in the same plane. The first sealing element 230, the second sealing element 231, and the connector 232 are formed integrally.

**[0084]** Specifically, the first sealing element 230 can be a rubber sealing ring, and the second sealing element 231 can be a rubber sealing stripe. The rubber sealing ring is glued to the inserting end 211 in a circumferential direction of the air inlet 212. The rubber sealing stripe is

glued to a side face of the inserting end 211 in a circumferential direction of the air outlet 213. Thus, sealing between the air admission passage 150 and the air inlet 212 can be improved by means of the first sealing element 230, and sealing between the side wall of the supporting groove 120 and the side face of the inserting end 211 can be improved by the second sealing element 231.

**[0085]** Further, the connector 232 can be two rubber stripes, which can be glued to the inserting end 211. In addition, one end is connected to the first sealing element 230, and another end is respectively connected to two opposite ends of the second sealing element 231, so that the first sealing element 230, the second sealing element 231, and the connector 232 are formed integrally, which facilitates the mounting and manufacturing of the first sealing element 230, the second sealing element 231, and the connector 232.

**[0086]** In addition, in some embodiments, in reference to Figs. 6 to 8 and Fig. 11, the handheld body 210 comprises a housing 214, a support 215, and a driving element 216 used for providing a suction force. The support 215 is partially inserted into the housing 214. The support 215 has a chamber inside. The driving element 216 is arranged in the chamber. At least part of the support 215 and the housing 214 adjacent to the support 215 form the inserting end 211.

**[0087]** Specifically, the driving element 216 is a relevant technology in the art and need only be able to provide a suction force. Its structure is not unduly limited here.

**[0088]** On one hand, the support 215 provides a mounting position for the driving element 216, and on the other hand, part of the support 215 and the housing 214 adjacent to the support 215 form the inserting end 211, putting it to multiple uses, which helps reduce costs while causing the overall structure to have a high stability.

**[0089]** Further, still in reference to Figs. 6 to 8 and Fig. 11, a part of the chamber forms the air passage. An end face of the support 215 facing an end face of the device body 100 forms the end face of the inserting end 211. The air inlet 212 corresponds to a suction opening of the driving element 216. The air outlet 213 is located in a side face of the support 215.

**[0090]** Thus, by forming the chamber mounted with the driving element 216 and serving as the air passage by means of the support 215, with the air inlet 212 and the air outlet 213 formed in the support 215, and with the air outlet 213 provided in a side face, the overall structure is simple and compact, resulting in a high space utilization rate.

**[0091]** In some embodiments, in reference to Figs. 6 to 8 and Fig. 11, a side face of the support 215 has a slot 240. An opening of the slot 240 faces a side wall of the supporting groove 120 and forms the air outlet 213. The slot 240 has a first side wall 241 and a second side wall 242 that are opposite to each other. The first side wall 241 faces the handheld body 210. The second side wall

242 is provided with at least one through hole that puts the air passage and the slot 240 in communication.

**[0092]** Specifically, the second side wall 242 is provided with two first through holes 2421 that put the air passage and the slot 240 in communication. Air is blown out of the air outlet 213 via the first through holes 2421. The opening of the slot 240 faces a side wall of the supporting groove 120. By making a slot 240 in a side wall of the support 215 to form the air outlet 213, the structure is further rendered compact, and full use is made of space.

**[0093]** In order to increase air flow, a snap-fit part 2423 is arranged in the slot 240. A face of the snap-fit part 2423 facing the notch 2411 is provided with a second through hole 2422, which also puts the air passage and the slot 240 in communication, so as to increase the air flow surface of the slot 240, increasing air flow.

**[0094]** In addition, the snap-fit part 2423 is connected to the first side wall 241. Connecting the snap-fit part 2423 with the first side wall 241 is equivalent to forming a reinforcing rib at two side walls of the second through holes 2422, which, on one hand, guides air in the second through hole 2422, and on the other hand, increases the snap-fit part 2423's stability.

**[0095]** Here, it should be noted that, the slot 240 is an arc-shaped slot. The center of the slot 240 coincides with the center of the end face of the inserting end 211. The center angle of the slot 240 is smaller than 90°. Specifically, the center angle of the slot 240 is larger than 30°. If the center angle of the slot 240 is too small, air flow will be reduced. If it is too large, the overall strength of the support 215 will be damaged. In addition, an arc-shaped slot has a reduced wind resistance, which helps air circulate.

**[0096]** In addition, in some embodiments, in reference to Fig. 11, the first side wall 241 is provided with a notch 2411 in communication with an end face of the support 215 facing the device body 100, so that the opening is inclined.

**[0097]** Thus, by causing the opening to be inclined by means of the notch 2411, the direction of air blown out of the air outlet 213 is inclined axially outwards relative to the handheld body 210, which reduces wind resistance while at the same time fully making use of the structure's space, and is equivalent to blowing towards the air discharge passage 160 at an angle.

**[0098]** In other embodiments, the cleaning device further comprises an outer connection structure (not illustrated) configured to, when the handheld structure 200 detaches from the device body 100, be connected to the handheld structure 200 and form, together with the handheld structure 200, a cleaning executing device.

**[0099]** Thus, by providing the outer connection structure to connect with the separate handheld structure 200 to form a cleaning executing device, the functions of the handheld structure 200 can be completed when using the handheld structure 200 separately, so as to improve user experience when separately using the handheld struc-

ture 200. The outer connection structure is configured to, when the handheld structure 200 detaches from the device body 100, be connected to the handheld structure 200, and form, together with the handheld structure 200, a cleaning executing device.

**[0100]** When the handheld structure 200 is used separately, it is connected to the outer connection structure and forms a cleaning executing device, which puts it to multiple uses, increases the utilization scenarios of the handheld structure 200, and improves the handheld structure 200's functionality and applicability.

**[0101]** Further, the outer connection structure is a dust cup structure. Specifically, the dust cup structure is snap-fit with the snap-fit part 2423. In this embodiment, the dust cup structure is a relevant technology in the art. Its structure is not limited here. Removable connection between the dust cup structure and the handheld structure 200 is achieved by means of the snap-fit part 2423, which facilitates utilization.

**[0102]** Thus, by providing a dust cup structure as the outer connection structure, the dust cup structure can be used to receive dust and dirt sucked in by the handheld structure 200, which improves the handheld structure 200's cleaning efficiency and optimizes a user's utilization experience.

**[0103]** With the cleaning device provided by the present application, when the handheld structure 200 is inserted in the device body 100, the inserting end 211 of the handheld body 210 is completely enveloped by the supporting groove 120 of the device body 100, a part of a side face of the handheld body 210 is located in the positioning groove 110, and at least a part of the operating handle 220 is also located in the positioning groove 110. Thus, the supporting groove 120 can guide the insertion of the inserting end 211 and protect the connection between the inserting end 211 and the device body 100. The partial structure of the handheld structure 200 exposed outside the positioning groove 110 and the supporting groove 120 can smoothly transition to an outer surface of the supporting groove 120 and an outer surface of the positioning groove 110, enabling the handheld structure 200 to be stably mounted in the device body 100 in a hidden way, so that the cleaning device has a smooth overall styling, a compact structure, and improved aesthetics.

**[0104]** Further, by providing the locking assembly 300 and its structure, it is further ensured that the handheld structure 200 and the device body 100 are connected stably. And by providing the elastic assembly 400, holding of the handheld structure 200 after being unlocked is facilitated. Moreover, by appropriately arranging the opposite positions of the air inlet 212 and the air outlet 213 of the inserting end 211, the relative position and structure of the air admission passage 150 and the air discharge passage 160 of the device body 100 is changed so as to increase available space in the device body 100, rendering the cleaning device more compact as a whole.

**[0105]** Finally, it should be noted that, the various

embodiments above are merely used to describe the technical solutions of the present application, instead of limiting it. Although the present application has been described in detail with reference to the above-described embodiments, a person of ordinary skill in the art should understand that it is still possible to modify the technical solutions described in the above-described embodiments, or to make equivalent replacements for some or all of the technical features therein; and these modifications or replacements do not cause the essence of the corresponding technical solutions to deviate from the scope of the technical solutions of the embodiments of the present application.

## Claims

1. A cleaning device **characterized in that** it comprises a device body (100) and a handheld structure (200) comprising a handheld body (210) and an operating handle (220) arranged on the handheld body (210), wherein a side face of the device body (100) is provided with a positioning groove (110), and a supporting groove (120) in communication with the positioning groove (110) is provided in the device body (100), and wherein the handheld body (210) has an inserting end (211) opposite to the operating handle (220) and inserted in the supporting groove (120), the supporting groove (120) envelops the inserting end (211), and a part of a side face of the handheld body (210) and at least a part of the operating handle (220) are located in the positioning groove (110).
2. The cleaning device of claim 1, wherein the device body (100) has a handheld part (130) tilting towards the positioning groove (110).
3. The cleaning device of claim 1 or 2, further comprising a locking assembly (300) comprising a pressing element (310) and a locking element (320), wherein the pressing element (310) is inserted in the device body (100) having inside a mounting chamber (140) in communication with the positioning groove (110), the locking element (320) is partially located in the mounting chamber (140) and is partially located outside the mounting chamber (140) and snap-fit with the operating handle (220); and in that the pressing element (310) is configured to, when being pressed, drive the locking element (320) to move away from the operating handle (220) so as to disengage the locking element (320) from being snap-fit with the operating handle (220).
4. The cleaning device of any one of preceding claims, further comprising at least one elastic assembly (400) located in the device body (100) and partially protruding into the positioning groove (110) so as to abut against the operating handle (220); and

- wherein the elastic assembly (400) is configured to, when the operating handle (220) disengages from being snap-fit with the device body (100), drive the part of the operating handle (220) in the positioning groove (110) to disengage from the positioning groove (110). 5
5. The cleaning device of any one of preceding claims, wherein an end face of the inserting end (211) has a first electrical connector (2111), and a bottom of the supporting groove (120) has a second electrical connector (121), the first electrical connector (2111) being configured to, when the inserting end (211) is inserted in the supporting groove (120), be electrically connected to the second electrical connector (121). 10
  6. The cleaning device of any one of claims 1 to 5, wherein an end face of the inserting end (211) has at least one first positioning element (2112), and a bottom of the supporting groove (120) has at least one second positioning element (122), the first positioning element (2112) being configured to, when the inserting end (211) is inserted in the supporting groove (120), be inserted to the second positioning element (122). 20
  7. The cleaning device of claim 6, wherein among the first positioning element (2112) and the second positioning element (122), one is a positioning slot, and the other is a positioning block that matches the positioning slot. 25
  8. The cleaning device of any one of preceding claims, wherein there is an air passage in the handheld body (210), two ends of which form respectively an air inlet (212) located in the center of an end face of the inserting end (211), and an air outlet (213) located in a side face of the inserting end (211); and wherein the device body (100) has an air admission passage (150) and an air discharge passage (160), an air outlet of the air admission passage (150) being located in the center of the supporting groove (120) and correspondingly in communication with the air inlet (212), an air inlet of the air discharge passage (160) being located in a side wall of the supporting groove (120) and correspondingly in communication with the air outlet (213). 30
  9. The cleaning device of claim 8, further comprising a first sealing element (230) arranged between the air admission passage (150) and the air inlet (212), a second sealing element (231) arranged between a side wall of the supporting groove (120) and a side face of the inserting end (211), and a connector (232); and wherein the first sealing element (230) and the second sealing element (231) are connected by means 35
- of the connector (231), the first sealing element (230) and the connector (232) are located in a same plane, and the first sealing element (230), the second sealing element (231), and the connector (232) are formed integrally. 40
10. The cleaning device of claim 8 or 9, wherein the handheld body (210) comprises a housing (214), a support (215), and a driving element (216) used for providing a suction force; and wherein the support (215) is partially inserted into the housing (214) and provided inside with a chamber in which the driving element (216) is arranged, at least part of the support (215) and the housing (214) adjacent to the support (215) forming the inserting end (211). 45
  11. The cleaning device of claim 10, wherein a part of the chamber forms the air passage, an end face of the support (215) facing the device body (100) forms an end face of the inserting end (211), the air inlet (212) corresponds to a suction opening of the driving element (216), and the air outlet (213) is located in a side face of the support (215). 50
  12. The cleaning device of claim 10 or 11, wherein a side face of the support (215) has a slot (240), an opening of the slot (240) faces a side wall of the supporting groove (120) of the housing (214) and forms the air outlet (213), the slot (240) having a first side wall (241) and a second side wall (242) that are opposite to each other, the first side wall (241) facing the handheld body (210); and wherein the second side wall (242) is provided with at least one through hole that puts the air passage and the slot (240) in communication. 55
  13. The cleaning device of claim 12, wherein the first side wall (241) is provided with a notch (2411) in communication with an end face of the support (215) facing the device body (100), so as to cause the opening to have an inclined form.
  14. The cleaning device of any one of preceding claims, further comprising an outer connection structure configured to, when the handheld structure (200) detaches from the device body (100), be connected to the handheld structure (200) and form, together with the handheld structure (200), a cleaning executing device.
  15. The cleaning device of claim 14, wherein the outer connection structure is a dust cup structure.

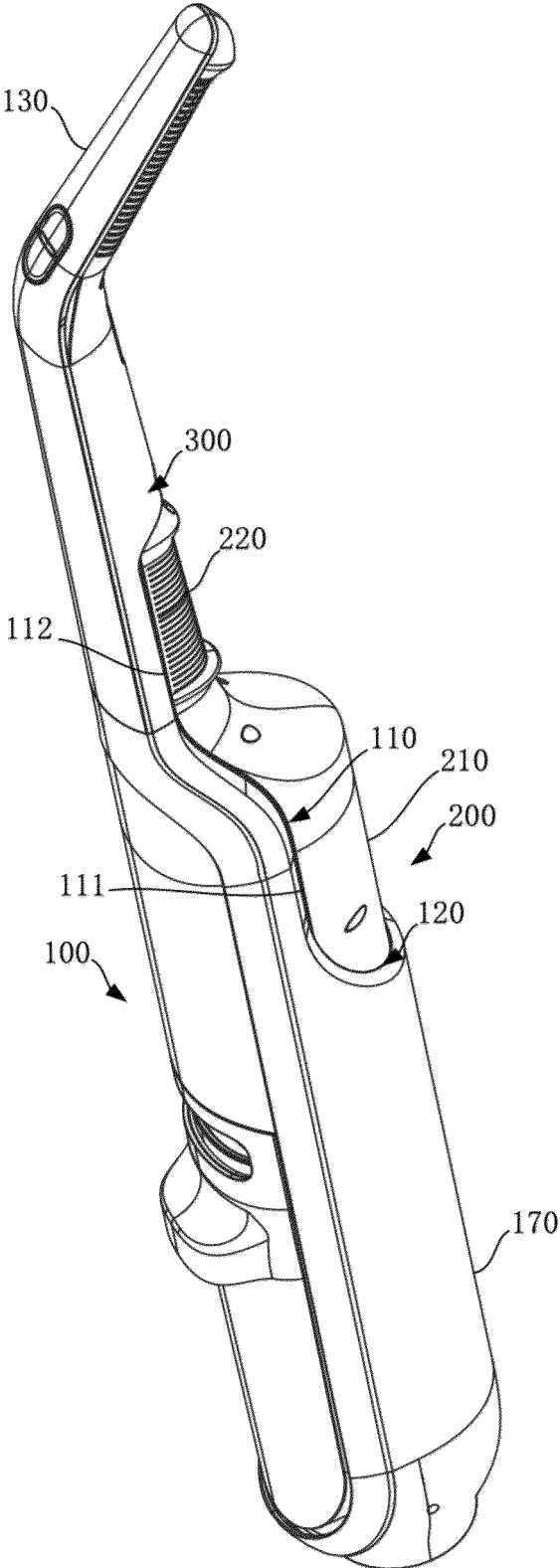


FIG. 1

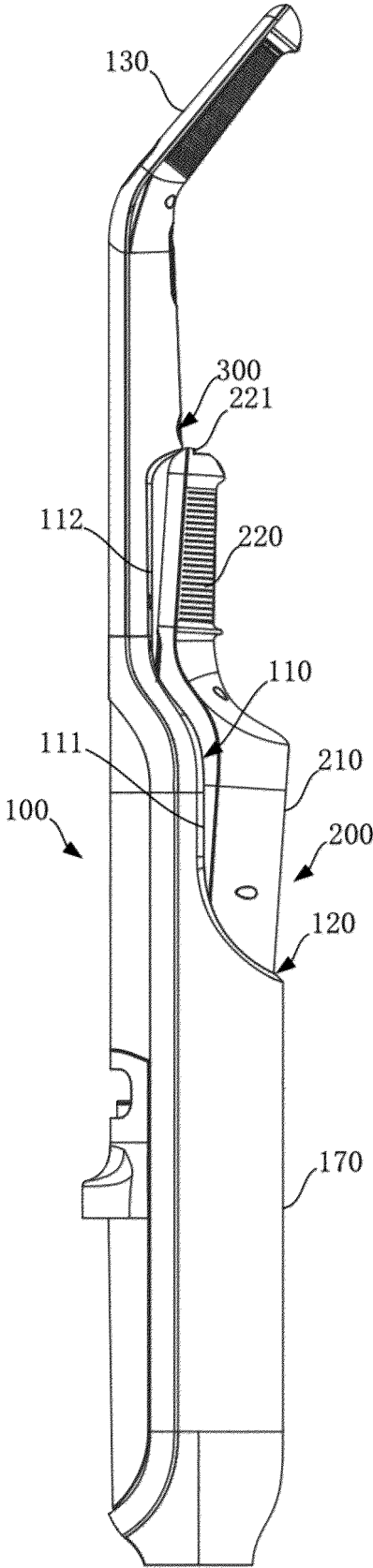


FIG. 2

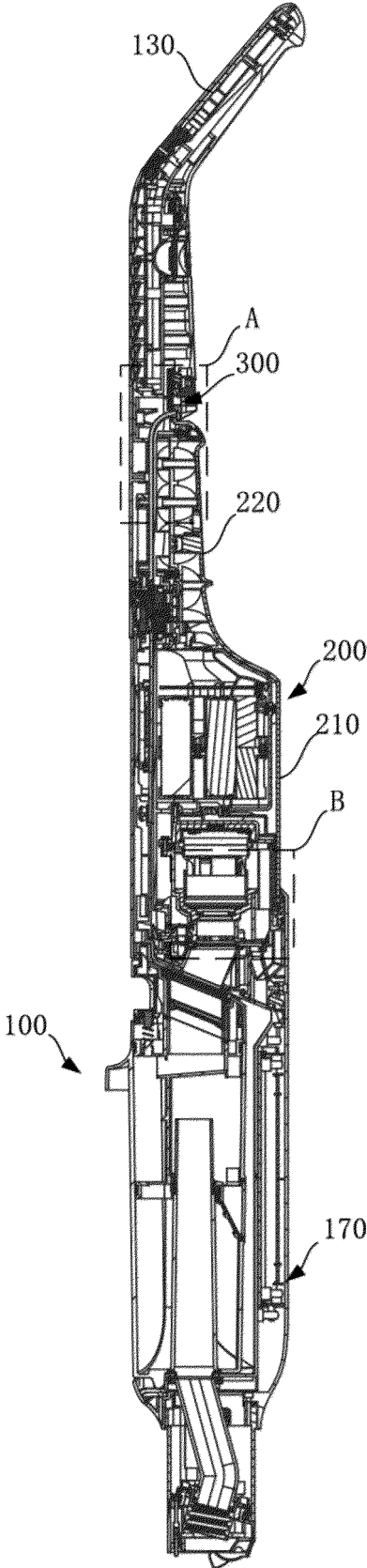


FIG. 3

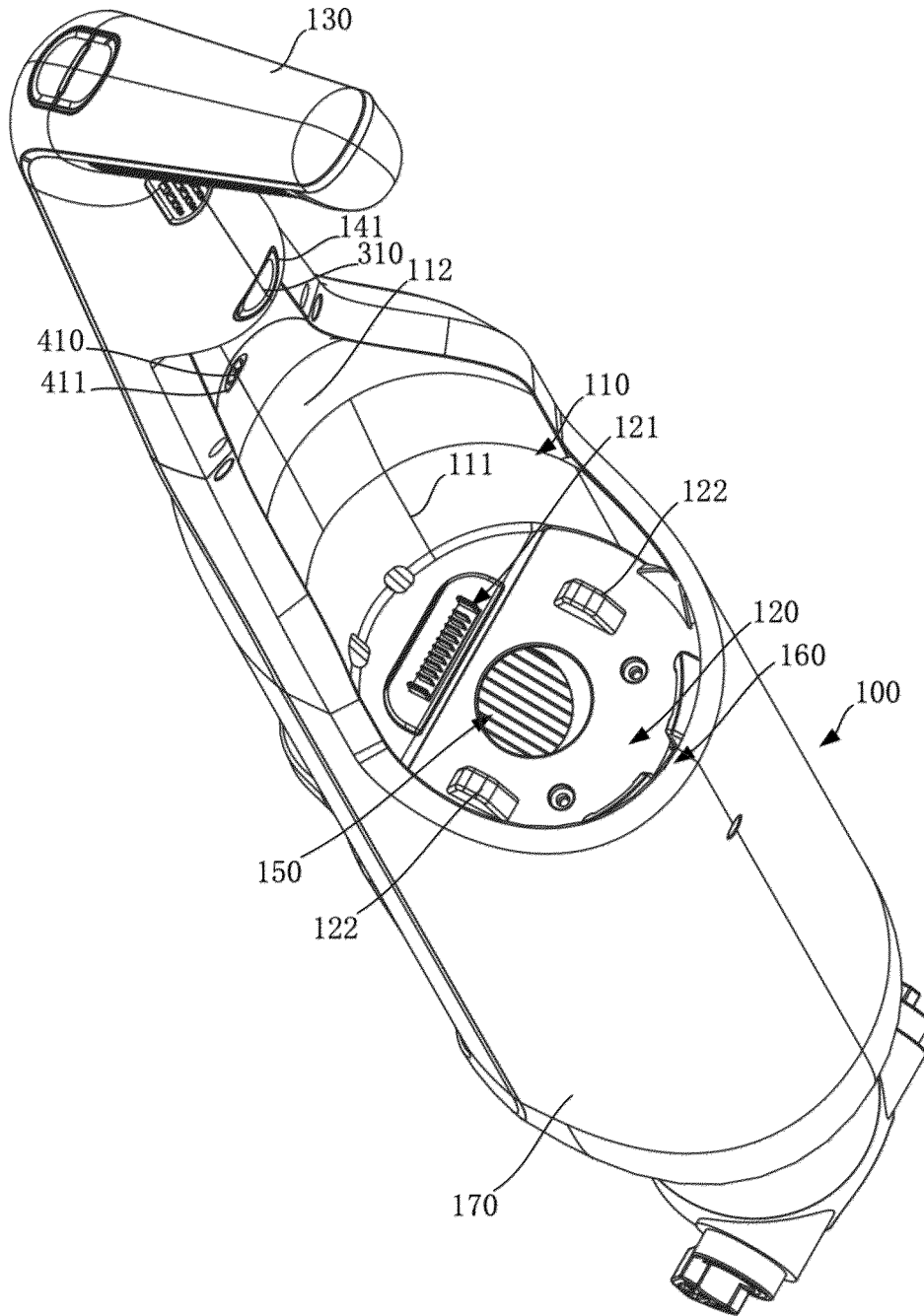


FIG. 4

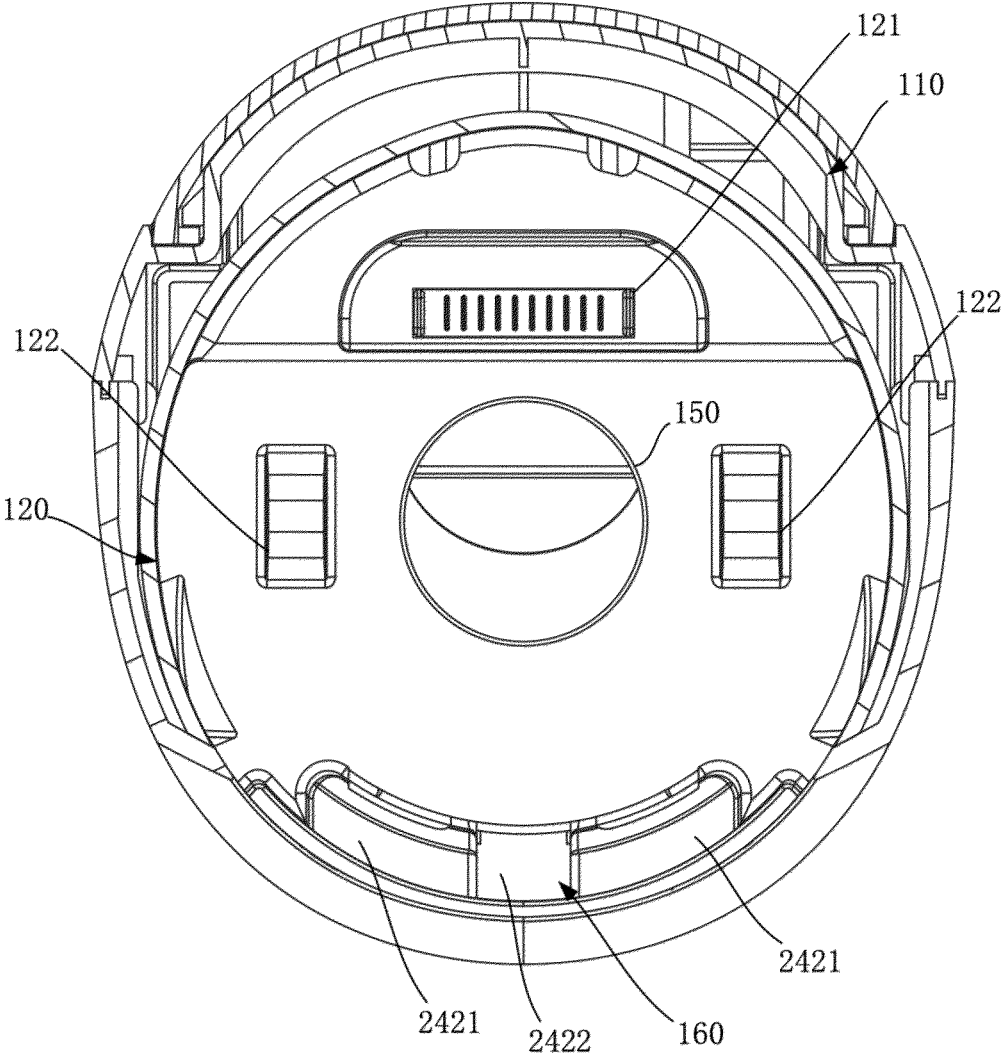


FIG. 5

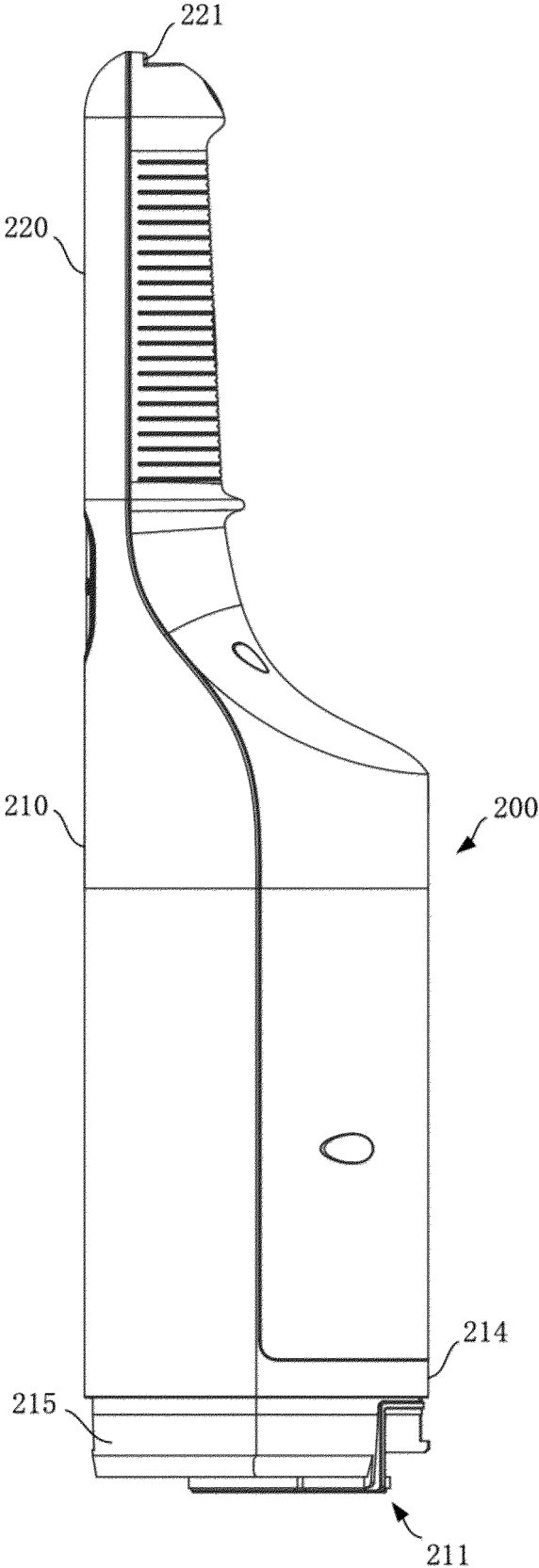


FIG. 6

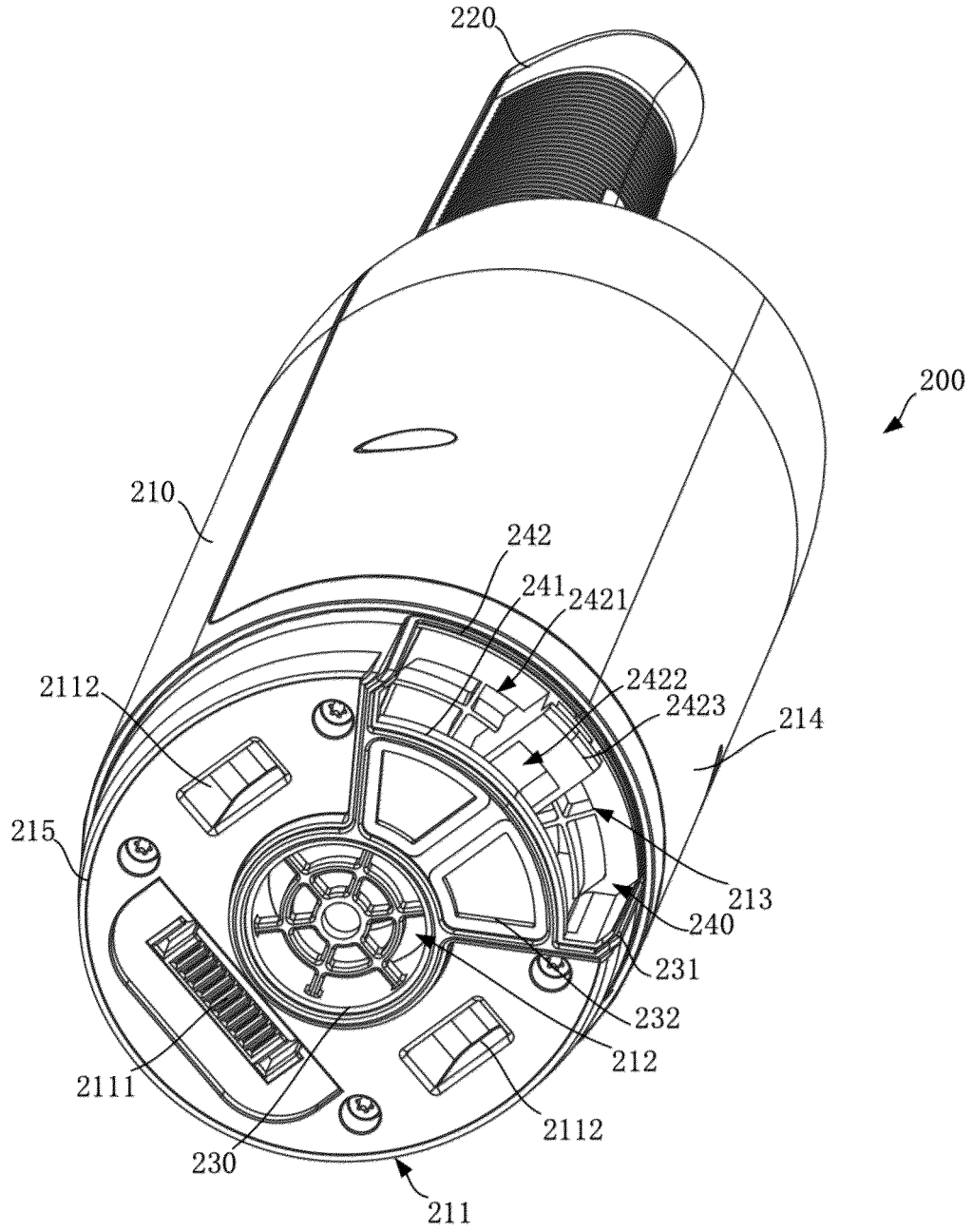


FIG. 7

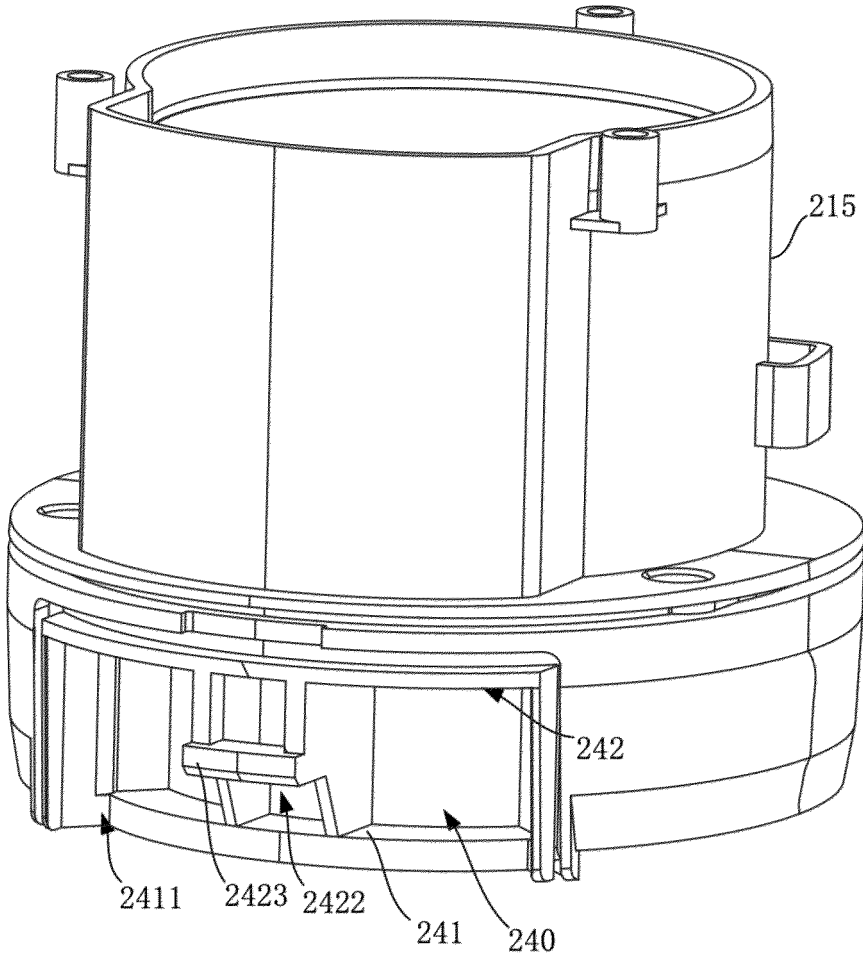


FIG. 8

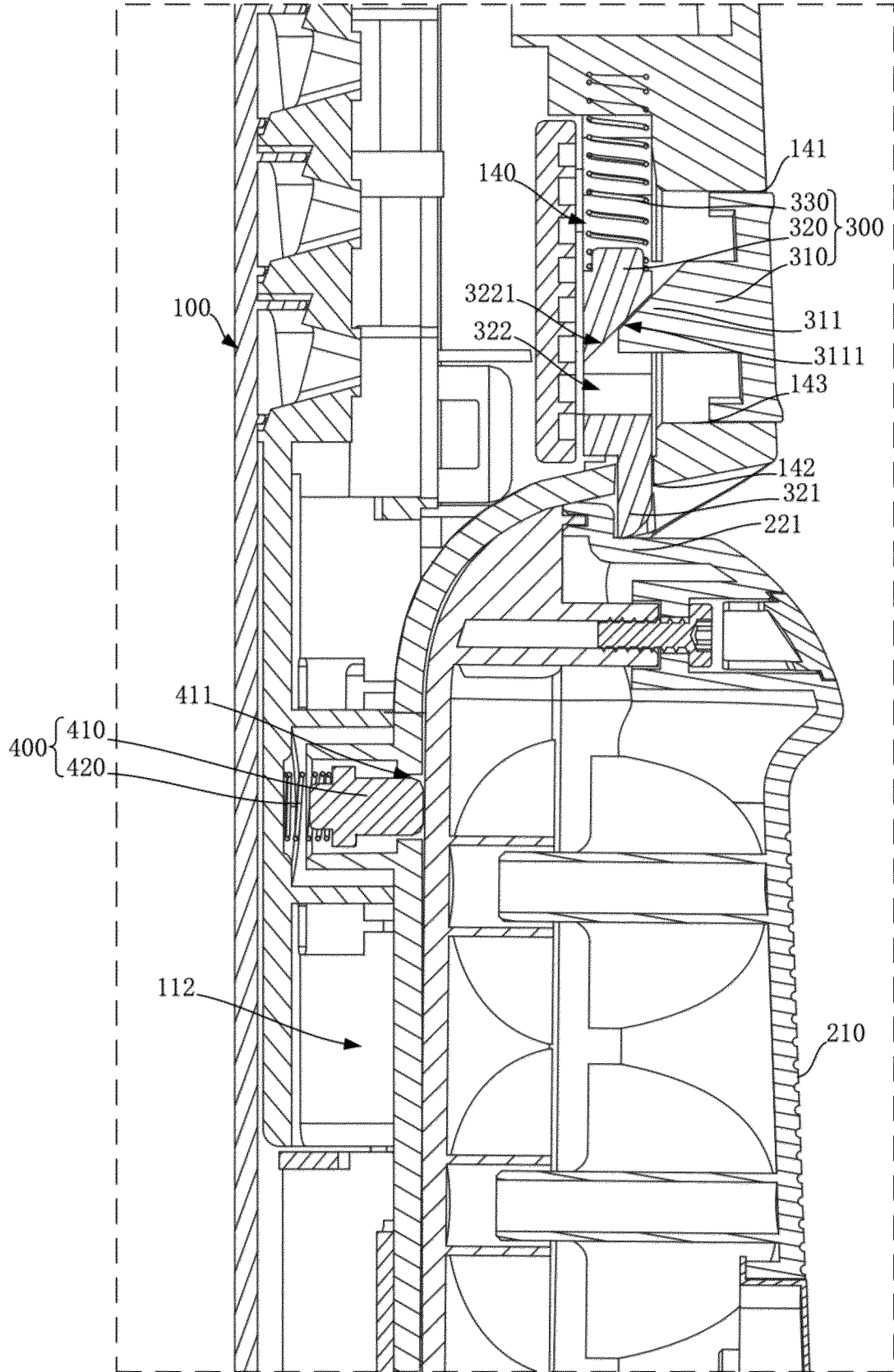


FIG. 9

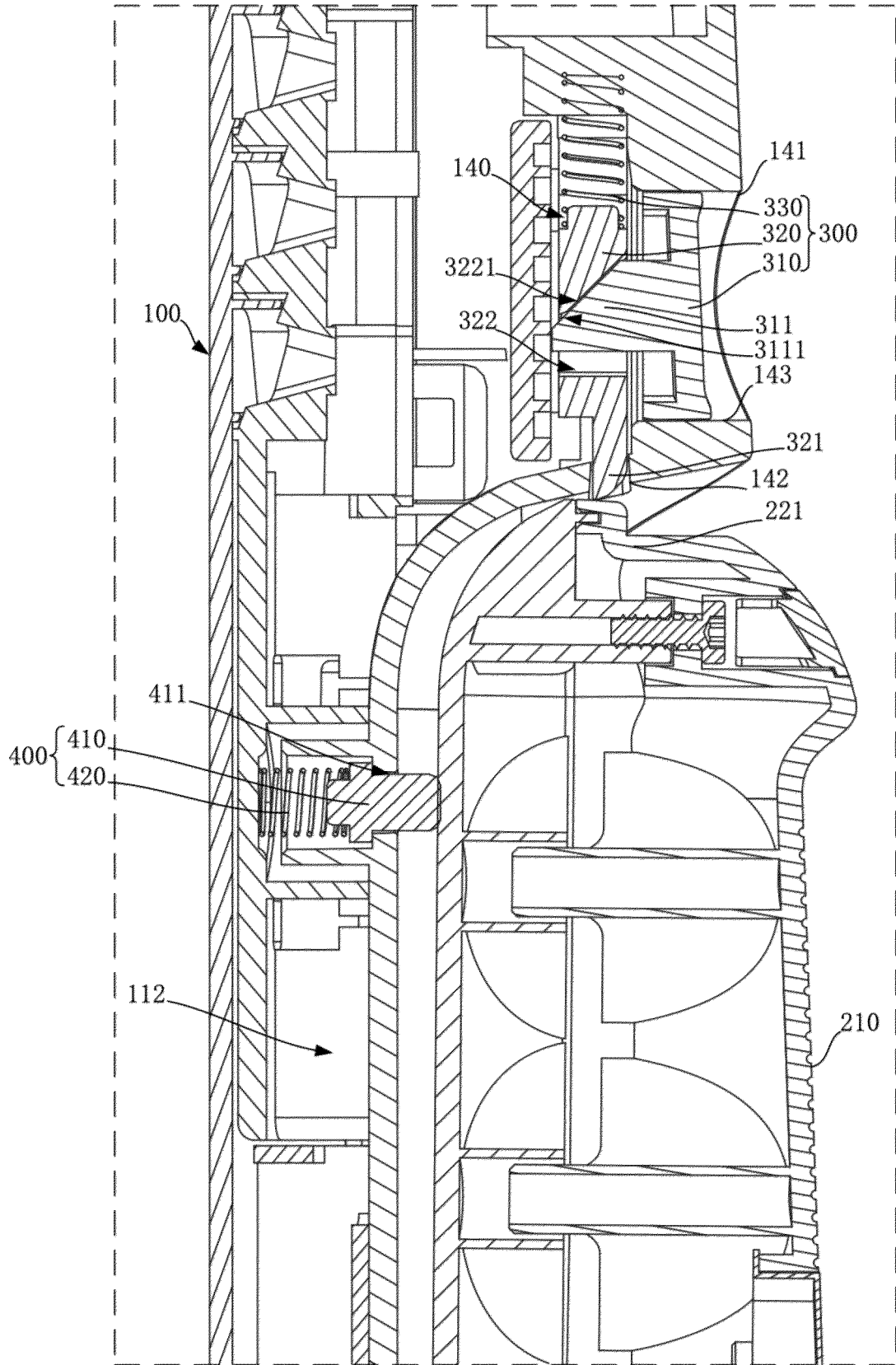


FIG. 10

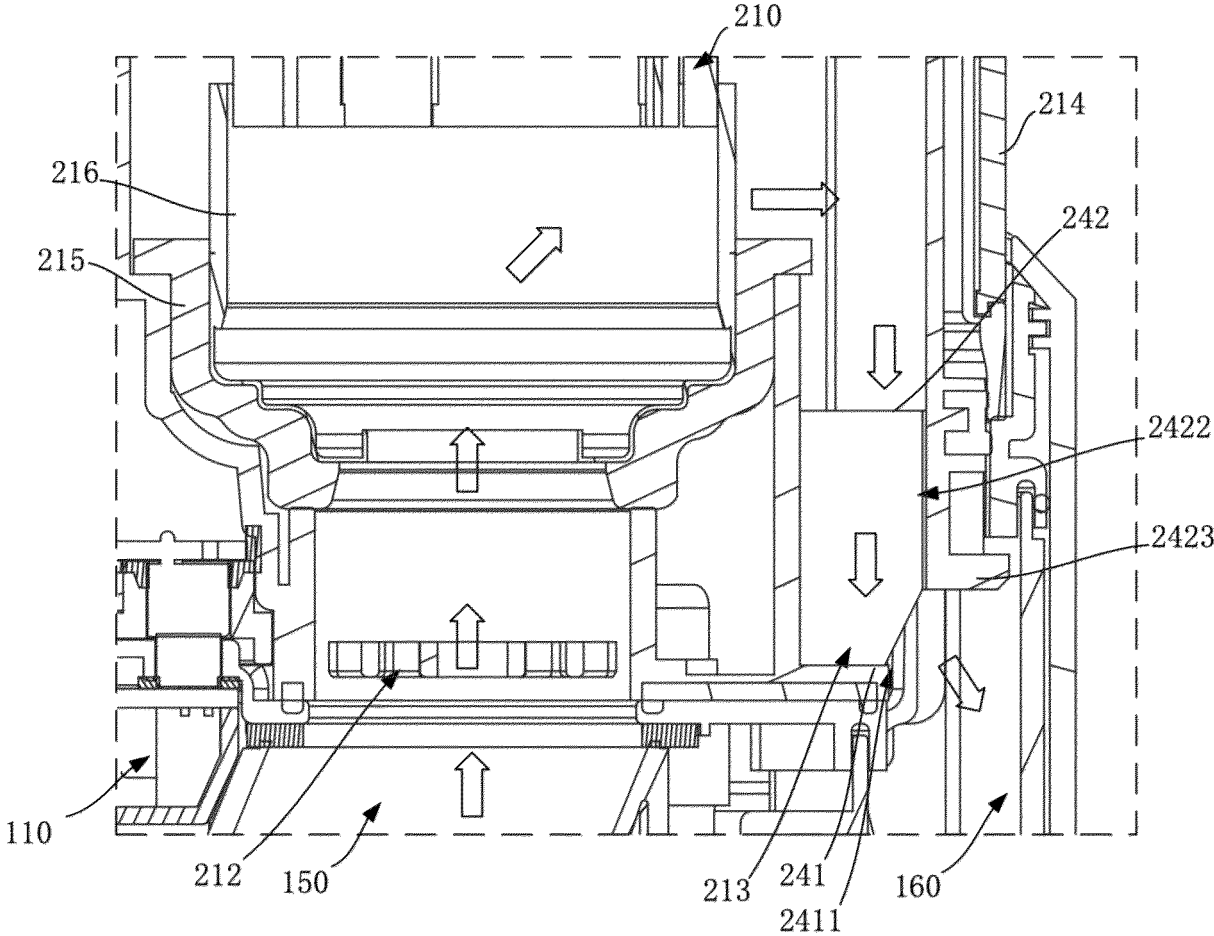


FIG. 11



EUROPEAN SEARCH REPORT

Application Number

EP 24 19 6559

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A	* column 4, line 8 - column 5, line 10; figures 1-5 *	4-7,9, 11-13,15	
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X	US 9 757 001 B2 (LG ELECTRONICS INC [KR]) 12 September 2017 (2017-09-12) * column 3, line 41 - column 5, line 27; figures 1,2 *	1,3,8, 10,14	
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			A47L
The present search report has been drawn up for all claims			
Place of search <b>Munich</b>		Date of completion of the search <b>10 February 2025</b>	Examiner <b>Masset, Markus</b>
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ..... & : member of the same patent family, corresponding document	

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ON EUROPEAN PATENT APPLICATION NO.**

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