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FLOOR BRUSH AND VACUUM CLEANER

(57)

The present invention relates to a floor brush, the floor brush comprising: a housing, the housing defining a dust suction cavity, and the housing comprising an end cover at one side thereof; a rolling brush assembly, the rolling brush assembly comprising a rolling brush, the rolling brush being able to pass through an opening of the end cover to be arranged in the dust suction cavity; a biasing assembly, the rolling brush assembly being mounted biasedly relative to the housing by means of the biasing assembly; and an automatic locking apparatus, the automatic locking apparatus having a release position and a locking position relative to the rolling brush assembly, wherein at the locking position, the automatic locking apparatus fixes the rolling brush assembly in position, and at the release position, the rolling brush assembly can be taken out axially outward from the housing under the effect of a biasing force. This floor brush avoids the need to use a tool to (dis)assemble the rolling brush, achieving the objects of simple structure and convenient (dis)assembly, improving the user experience. The present invention further relates to a vacuum cleaner comprising such a floor brush.

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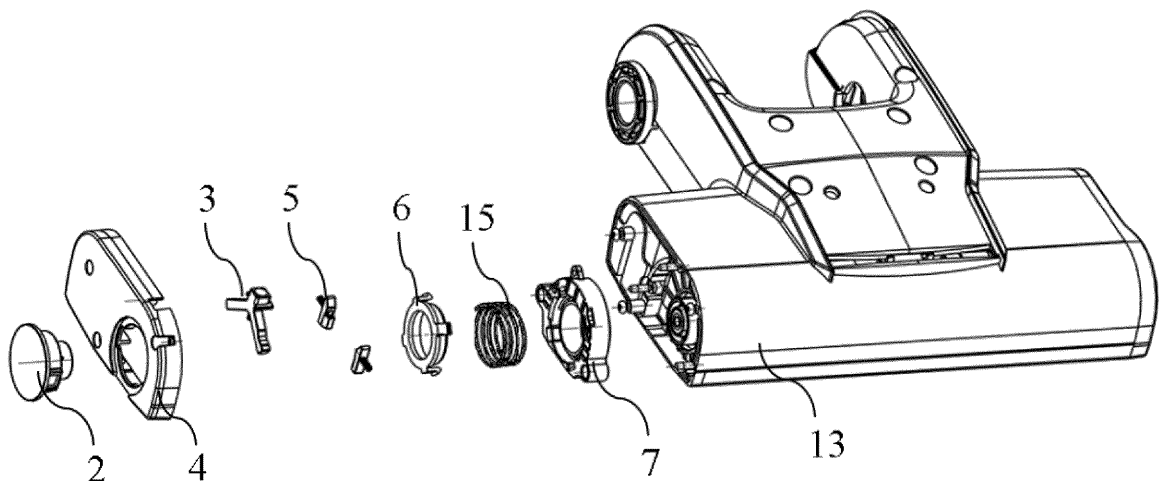


Fig. 3

Description

Technical Field

[0001] The present invention relates to the technical field of floor cleaning, in particular to a floor brush that has an automatic locking apparatus, and a vacuum cleaner.

Background Art

[0002] In floor cleaning devices of the prior art, such as sweeping machines and vacuum cleaners, a floor brush in the sweeping machine or vacuum cleaner is designed to have a rolling brush inside. After the rolling brush has been used for a period of time, a lot of dust and even hair become attached to the floor brush and the rolling brush, and it is then necessary to replace or clean the rolling brush. However, currently the steps for disassembling the rolling brush are overly complicated, and the user's hands are easily dirtied; the user experience is poor.

[0003] In addition, in a floor brush of the prior art, generally structures such as an unlocking slot are provided on a locking member of an outer part of the rolling brush, and these structures can only be disassembled with the aid of a suitable tool (such as a screwdriver); therefore, when disassembling and mounting the rolling brush, generally the aid of a suitable tool is required to be able to unlock the locking member, with the result that disassembling the rolling brush is inconvenient, and difficult to perform as needed without the aid of a tool. Such an arrangement in the prior art ensures that the floor brush is relatively stable, but results in many (dis)assembly steps, resulting in more time spent by the user and a cleaning experience that is not very pleasant.

[0004] Therefore, the present field still requires the provision of an improved floor brush and vacuum cleaner. Such a floor brush is provided with an automatic locking apparatus that can perform (dis)assembly without the aid of a tool, so that the floor brush can be disassembled and replaced with a new floor brush by means of a simple manual operation. A floor brush and a vacuum cleaner that have such an automatic locking apparatus greatly improve the user experience, and improve the convenience of using the floor brush and the vacuum cleaner.

Summary of the Invention

[0005] One of the objects of the present application is to provide a floor brush with a rolling brush that is convenient to (dis)assemble and replace, and a vacuum cleaner with such a floor brush.

[0006] To solve the above technical problem, one aspect of the present application provides a floor brush, the floor brush comprising:

a housing, the housing defining a dust suction cavity,

and the housing comprising an end cover at one side thereof;

a rolling brush assembly, the rolling brush assembly comprising a rolling brush, and the rolling brush being able to pass through an opening of the end cover to be arranged in the dust suction cavity;

a biasing assembly, the rolling brush assembly being biasedly mounted relative to the housing by means of the biasing assembly; and

an automatic locking apparatus, the automatic locking apparatus having a release position and a locking position relative to the rolling brush assembly, wherein at the locking position, the automatic locking apparatus fixes the rolling brush assembly in position, and at the release position, the rolling brush assembly can be taken out axially outward from the housing under the effect of a biasing force.

[0007] In an embodiment of one aspect of the present application, the rolling brush assembly further comprises a locking member that is connected to the rolling brush, and the locking member can engage with the automatic locking apparatus to fix the rolling brush assembly in position.

[0008] In an embodiment of one aspect of the present application, the biasing assembly comprises a compression spring and a pushing block, and the pushing block abuts the rolling brush assembly.

[0009] In an embodiment of one aspect of the present application, the biasing assembly further comprises a retaining frame, and the compression spring is compressed between the pushing block and the retaining frame.

[0010] In an embodiment of one aspect of the present application, the automatic locking apparatus comprises a trigger and a latch member, and the latch member can be biased to a locking position.

[0011] In an embodiment of one aspect of the present application, the latch member can enter a release position from the locking position in response to an action of the trigger, wherein in the locking position, the latch member is engaged with the locking member, so as to lock the rolling brush assembly, and in the release position, the latch member is disengaged from the locking member, so as to release the rolling brush assembly.

[0012] In an embodiment of one aspect of the present application, when the rolling brush assembly passes through the opening of the end cover and is mounted, the latch member is squeezed by the rolling brush assembly and leaves the locking position, until the latch member engages with the locking member.

[0013] In an embodiment of one aspect of the present application, the trigger comprises a pressing part and a branch part that extends from the pressing part, and when the trigger is pressed, the branch part causes the latch member to move, so as to cause the locking member to be in the release position.

[0014] In an embodiment of one aspect of the present application, the latch member comprises one of a lock

tongue and a locking slot, and the locking member comprises the other of the lock tongue and the locking slot, and when the locking member is in the locking position, the lock tongue is locked in the locking slot.

[0015] In an embodiment of one aspect of the present application, the latch member can move along a slide rail.

[0016] In an embodiment of one aspect of the present application, the trigger comprises two half parts that can be pivotally connected to each other at a pivot point, each half part comprising a branch part below the pivot point, and comprising a lock tongue at an inner side of each branch part, and the locking member comprising a locking slot for receiving the lock tongue.

[0017] In an embodiment of one aspect of the present application, a compression spring is provided pressed between upper ends of the half parts, above the pivot point.

[0018] In an embodiment of one aspect of the present application, each half part, above the pivot point, comprises a pressing part, and the two pressing parts being pressed toward each other causes the branch parts to move away from each other, so that the lock tongue moves out from the locking slot.

[0019] In an embodiment of one aspect of the present application, when the rolling brush assembly passes through the opening of the end cover and is mounted, the trigger is squeezed by the rolling brush assembly and leaves the locking position, until the lock tongue engages with the locking member.

[0020] In an embodiment of one aspect of the present application, the automatic locking apparatus comprises a trigger and a rotating locking block; the trigger is arranged to be axially movable, and the rotating locking block can switch between the release position and the locking position in response to triggering by the trigger, wherein in the locking position, the rotating locking block is locked on the end cover, and in the release position, the rotating locking block can be separated from the end cover.

[0021] In an embodiment of one aspect of the present application, the end cover comprises a stop part for engaging the rotating locking block; the rotating locking block can rotate circumferentially by a single position relative to the trigger by means of triggering by the trigger, the position being one of a release position and a locking position, and the release position and the locking position being adjacent to each other; the rotating locking block in the locking position is engaged with the stop part, and the rotating locking block in the release position can be separated from the stop part.

[0022] In an embodiment of one aspect of the present application, the automatic locking apparatus further comprises a locking member, a bearing seat that is fastened onto the locking member, and an elastic member that is compressed between the rotating locking block and the bearing seat.

[0023] In an embodiment of one aspect of the present application, the locking member comprises multiple

guide slots that extend axially on an inner periphery thereof, and the trigger moves axially along the guide slots.

[0024] In an embodiment of one aspect of the present application, the trigger comprises an upper tooth column, the rotating locking block is provided with a lower tooth column, and meshing of the upper tooth column and the lower tooth column is incomplete meshing.

[0025] In an embodiment of one aspect of the present application, the locking member is provided with a slanted face, and the lower tooth column can slide along the slanted face to cause the rotating locking block to rotate and switch between the release position and the locking position.

[0026] In another aspect of the present application, a vacuum cleaner is disclosed, comprising the floor brush according to the above aspects of the present application.

[0027] In embodiments of the present application, the floor brush and the vacuum cleaner of the present invention avoid the need to use a tool to (dis)assemble the rolling brush, achieving the objects of simple structure and convenient (dis)assembly, improving the user experience.

Brief Description of the Figures

[0028] Objects and features of the present invention will become apparent from the following detailed description in conjunction with the accompanying drawings. However, it should be understood that the drawings are designed for illustration only, and are not intended to limit the present invention.

Fig. 1 is a 3D view of a vacuum cleaner according to one embodiment of the present application;

Fig. 2 is a 3D view of a floor brush according to one embodiment of the present application, and shows the floor brush and a trigger;

Fig. 3 is an exploded 3D view of the floor brush of the present application shown in Fig. 2, and shows an automatic locking apparatus of a rolling brush of the floor brush;

Fig. 4 is a partial 3D view of a portion of the floor brush of the present application shown in Fig. 2, wherein an end cover and a locking member shown in Fig. 3 are removed to show the structure inside;

Fig. 5 is a partial 3D view of a portion of the floor brush of the present application shown in Fig. 2 seen from another angle, and shows a locking principle of the automatic locking apparatus;

Fig. 6 is an exploded 3D view of the end cover and the locking member of the floor brush of the present application shown in Fig. 2;

Fig. 7 is a top view and a cross-sectional view of the floor brush of the present application shown in Fig. 2, wherein the cross-sectional view is a section taken along the line A-A in the top view;

Fig. 8 is an enlarged view of the circled portion C in

Fig. 7;

Fig. 9 is a 3D view of a floor brush according to another embodiment of the present application, and shows the floor brush and a trigger;

Fig. 10 is an exploded 3D view of a portion of the floor brush of the present application shown in Fig. 9, and shows a rolling brush and an automatic locking apparatus thereof;

Fig. 11 is a 3D view of a floor brush according to another embodiment of the present application, and shows the floor brush and a trigger;

Fig. 12 is an exploded 3D view of a portion of the floor brush of the present application shown in Fig. 11, and shows a rolling brush and an automatic locking apparatus thereof;

Fig. 13 is an exploded 3D view of a portion of the floor brush of the present application shown in Fig. 11 seen from another angle, and shows the rolling brush and the automatic locking apparatus thereof;

Fig. 14 is a 3D view of a portion of the floor brush of the present application shown in Fig. 11, and shows the automatic locking apparatus and an end cover;

Fig. 15 is an exploded 3D view of a portion of the floor brush of the present application shown in Fig. 11, and shows the automatic locking apparatus; and

Fig. 16 is a 3D view of a rotating locking block of the automatic locking apparatus of an embodiment of the present application seen from another angle.

Detailed Description of the Invention

[0029] The technical solutions of the present invention are described clearly and completely below with reference to the drawings; obviously, the described embodiments are some rather than all of the embodiments of the present invention. All other embodiments obtained by those of ordinary skill in the art based on the embodiments in the present invention without creative effort shall fall within the scope of protection of the present invention.

[0030] In the description of the present invention, it must be explained that unless otherwise explicitly specified and defined, terms such as "connected" should be understood in a broad sense, e.g. may mean fixedly connected, removably connected or integrally connected, mechanically connected or electrically connected, directly connected or indirectly connected via an intermediary. To a person skilled in the art, the specific meaning of the above terms in the present invention may be understood according to the particular circumstances. Additionally, in the description of the present invention, unless otherwise stated, the meaning of "multiple" is two or more. It should also be understood that the orientation or positional relationship indicated by the terms "central", "longitudinal", "transverse", "upper", "lower", "front", "rear", "left", "right", "vertical", "horizontal", "top", "bottom", "inner", "outer", "axial", "radial", "circumferential", etc. is based on the orientation or positional relationship shown

in the accompanying drawings, which is merely for ease of description of the present invention and simplification of the description, and is not intended to indicate or imply that the device or component referred to must have a particular orientation or be constructed and operated in a particular orientation. Therefore, this should not be construed as limiting the present invention.

[0031] In the description of this specification, the description with reference to terms such as "an embodiment", "some embodiments", "an example", "a specific example" or "some examples" means that specific features, structures, materials or characteristics, described in conjunction with the embodiments or examples, are included in at least one embodiment or example of the present invention. In this specification, the schematic expressions of the described terms do not necessarily refer to the same embodiments or examples. Furthermore, the specific features, structures, materials or characteristics described may be combined in a suitable manner in any one or more embodiments or examples.

[0032] In order to facilitate those skilled in the art in understanding the technical solutions of the present invention, the technical solutions of the present invention will now be further described in conjunction with the accompanying drawings, in which the same reference numerals denote the same or similar elements.

[0033] The present application relates to a floor brush and a vacuum cleaner. Referring to the figures, Fig. 1 shows a 3D view of a vacuum cleaner 1000 according to one embodiment of the present application. In one embodiment of the present application, the vacuum cleaner 1000 comprises a floor brush 100, a rod member 1001, a recovery container 1002 and a vacuum generator 1003, etc. In one embodiment of the present application, the recovery container 1002 is detachably mounted on the rod member 1001 or a handle, and is in fluid communication with the dust suction flexible tube, used for storing refuse that has been conveyed into the recovery container by the dust suction flexible tube.

[0034] Fig. 2 is a 3D view of the floor brush 100 according to one embodiment of the present application. In one embodiment of the present application, the floor brush 100 comprises: a housing 1, the housing 1 comprising an upper housing 11 and a lower housing 12, and a front housing 13 located at the front, a dust suction opening 101 being provided at a position on the lower housing 12 corresponding to the front housing 13, and an end cover 4 being arranged at one side of the housing 1; a rolling brush assembly comprising a rolling brush 9, the rolling brush 9 being arranged below the front housing 13, and the rolling brush 9 being connected to the end cover 4 at one end, which is described in detail below; a biasing assembly, the rolling brush assembly being biasedly mounted relative to the housing 1 by means of the biasing assembly; and an automatic locking apparatus, the automatic locking apparatus being arranged on the end cover 4, and having a release position and a locking position relative to the rolling brush assembly,

wherein in the locking position, the automatic locking apparatus fixes the rolling brush assembly in position, and in the release position, with the aid of the automatic locking apparatus, the rolling brush 9 can be separated axially from the housing and a new rolling brush 9 can be mounted in the housing 1 from the end cover 4.

[0035] In one embodiment of the present application, a dust suction cavity is formed by the housing 1 in the floor brush 100, and the rolling brush 9 is provided in the dust suction cavity; the rolling brush 9 extends out from the lower housing 12 for rolling dust and other bits on the floor into the dust suction cavity, while negative pressure generated in the dust suction cavity then enables the dust and other bits to be sucked into the dust suction cavity through the dust suction opening 101. Referring to Fig. 8, bristles 91 that extend radially outward are provided on a main body of the rolling brush 9; in a natural state, the bristles 91 extend out beyond the floor contacted by the housing 1, and are thereby advantageous for cleaning the floor with the rolling brush 9.

[0036] Fig. 3 is an exploded 3D view of the floor brush 100 of the present application shown in Fig. 2, and shows the automatic locking apparatus of the rolling brush 9 of the floor brush. In one embodiment of the present application, the automatic locking apparatus comprises a trigger 3 and a latch member 5, which are described in more detail below in conjunction with Figs. 4 - 5. In one embodiment of the present application, the biasing assembly comprises a compression spring 15 (see Fig. 8) and a pushing block 6, and the pushing block 6 abuts the rolling brush assembly. As shown in Fig. 3, the floor brush 100 comprises a locking member 2; the locking member 2 is pushed from a side face into an opening 41 that is provided in a side face of the end cover 4 (see Fig. 6), and in response to triggering by the trigger 3, the locking member 2 can switch between the locking position and the release position; in the locking position, the locking member 2 is locked in the floor brush 100, and thus the rolling brush 9 cannot be separated from the floor brush 100, and in the release position, with the aid of the compression spring 15 (see Fig. 3 and Fig. 8) pushing the pushing block 6 outward, the pushing block 6 subsequently pushes the locking member 2 outward, and the locking member 2 can be separated from the end cover 4, thereby driving the rolling brush 9, together with the locking member 2, to separate from the end cover 4 (which is described in more detail below), and thus the rolling brush can be separated from the floor brush 100, and at this time, with the aid of an axial outward pulling force, disassembly of the rolling brush 9 can be completed.

[0037] As shown in Fig. 3, the floor brush 100 specifically comprises a locking member 2, an end cover 4, a trigger 3, a latch member 5, a pushing block 6, a compression spring 15, a retaining frame 7, a bearing 8 for the rolling brush 9, a front housing 13, etc. In an optional embodiment, the retaining frame 7 may be dispensed with, that is, a side face of the front housing 13, for ex-

ample, itself forms the retaining frame 7. In other words, the retaining frame 7 and the front housing 13 form an integral member.

[0038] Fig. 4 is a partial 3D view of a portion of the floor brush 100 of the present application shown in Fig. 2, wherein the end cover 4 and the locking member 2 shown in Fig. 3 are removed to show the structure inside. Fig. 5 is a partial 3D view of a portion of the floor brush 100 of the present application shown in Fig. 2 seen from another angle, and shows a locking principle of the automatic locking apparatus; Fig. 6 is an exploded 3D view of the end cover 4 and the locking member 2 of the floor brush 100 of the present application shown in Fig. 2.

[0039] Referring to Figs. 3 - 6, in one embodiment of the present application, the locking member 2 comprises two coaxial shaft ring parts 21 and 22 that extend inward from a round side face. In one embodiment of the present application, the locking member 2 comprises a locking slot 23 that is located on the larger shaft ring part 21, the locking slot being used for receiving a lock tongue 52 of the latch member 5 (see Fig. 5). In one embodiment of the present application, an opening 24 is formed on the inside of the shaft ring part 22, used for receiving the bearing 8 for supporting the rolling brush 9 (see Fig. 8). In one embodiment of the present application, the trigger 3 comprises an extending part 31 for an operator to manually press, and two branch parts 32 that part to the left and right from the extending part 31, and a compression spring 33 is arranged between the end cover 4 and the extending part 31, so that, after the operator has pressed down the trigger 3, the compression spring 33 can cause the trigger 3 to automatically spring back up. In one embodiment of the present application, two latch members 5 are further provided; referring to Fig. 4, the latch member 5 comprises a slanted face 51 and a lock tongue 52, the slanted face 51 contacting an extreme end of the branch part 32 of the trigger 3; when the operator presses down the trigger 3, the two branch parts 32 also obliquely apply a force downward to the slanted face 51 of the corresponding latch member 5, so as to push the latch member 5 to overcome an elastic force of a compression spring 53 and move away from the central axis of the rolling brush 9, and thus cause the lock tongue 52 to move out from the locking slot 23 of the locking member 2. After the lock tongue 52 of the latch member 5 moves out from the locking slot 23 of the locking member 2, the locking member 2 is in the release position, and the locking member 2 can be separated from the end cover 4, thereby driving the rolling brush 9, together with the locking member 2, to separate from the end cover 4, and thus the rolling brush can be separated from the floor brush 100, and at this time, with the aid of an axial outward pulling force, disassembly of the rolling brush 9 can be completed. Referring to Fig. 4, an inclined lock tongue structure is used for the lock tongue 52; when, for example, a wall part of the locking member 2 extends inward and contacts the lock tongue 52, continued pushing of the locking member 2 overcomes an elastic force of the

compression spring 53 such that the lock tongue 52 moves away from the central axis of the rolling brush 9, and thus the locking member 2 can continue to be pushed inward until in the locking position.

[0040] Referring to Fig. 6, the end cover 4 is shown in more detail. The end cover 4 comprises an opening 41 used for receiving the locking member 2, and comprises an opening 44 for receiving the trigger 3, particularly the extending part 31 of the trigger 3. In addition, in an embodiment of the present application, the end cover 4 further comprises a ledge 43; during assembly, a lower end of the latch member 5 is placed on the ledge 43, and the latch member can translate left and right on the ledge 43. In an embodiment of the present application, two sides (left and right) of the opening 41 are further respectively provided with breaks 42, for inserting wall parts of the locking member 2 which form the locking slots 23. Fig. 4 shows the automatic locking apparatus in a locking position state, wherein the lock tongue 52 of the latch member 5 is locked in the locking slot 23 of the locking member 2; Fig. 5 shows the automatic locking apparatus in the locking position state from another angle, wherein it can be clearly seen that the lock tongue 52 of the latch member 5 is locked in the locking slot 23 of the locking member 2 with the aid of an elastic force of the compression spring 53.

[0041] Fig. 7 is a top view and a cross-sectional view of the floor brush 100 of the present application shown in Fig. 2, wherein the cross-sectional view is a section taken along the line A-A in the top view; Fig. 8 is an enlarged view of the circled portion C in Fig. 7. In one embodiment of the present application, with reference to Figs. 3 and 7-8, the retaining frame 7 is fixed on a side face of the front housing 13; the pushing block 6 comprises a cylinder part 61 and a stop part 62 that extends radially outward from the cylinder part 61; the compression spring 15 is arranged between the retaining frame 7 and the pushing block 6, and more specifically is compressed between the retaining frame 7 and the stop part 62 of the pushing block 6. The retaining frame 7 and the stop part 62 of the pushing block 6 may be configured to be able to move relatively within a fixed range. When the pushing block 6 moves toward the retaining frame 7, the compression spring 15 is compressed; when the pushing block 6 moves away from the retaining frame 7, the compression spring 15 is released. When the locking member 2 is in the release position, the compression spring 15 pushes the pushing block 6 axially outward, thereby pushing the locking member 2 outward, and thus the locking member 2 is ejected from the end cover 4, thereby facilitating removal of the locking member 2, and then removal of the rolling brush 9. That is, in the present application, when the automatic locking apparatus sets the locking member 2 at the release position, the locking member 2, together with the rolling brush 9, is enabled to automatically eject without the aid of a tool; therefore, the rolling brush 9 is conveniently disassembled and mounted.

[0042] Fig. 8 further shows a support shaft 10; in one embodiment of the present application, one end of the support shaft 10 is press-fitted in the main body of the rolling brush 9, and in an example of the present application, the bearing 8 is press-fitted on the other end of the support shaft 10. In a mounted state, as shown in Fig. 8, the bearing 8 is received in an opening of the locking member 2. The support shaft 10 and the bearing 8 support rotation of the rolling brush 9 relative to the housing 1 and relative to the end cover 4. Therefore, the locking member 2, the bearing 8, the support shaft 10 and the rolling brush 9 can be connected together as an integral whole to form a rolling brush assembly; when at the release position, the compression spring 15 can integrally push this rolling brush assembly axially outward, and therefore the rolling brush 9 is conveniently automatically disassembled.

[0043] In conjunction with Figs. 3 and 8, in the present application, the steps of mounting the rolling brush 9 in the floor brush 100 and disassembling same therefrom are basically the opposite of each other. Firstly, the retaining frame 7 is mounted on a side face of the front housing 13; for example, by means of a fastener, such as a screw, the retaining frame 7 is fixed onto the front housing 13. Next, the compression spring 15 is fitted around the cylinder part 61 of the pushing block 6, and they are inserted together into the retaining frame 7. In addition, the latch member 5 is placed on the end cover 4, and specifically is placed on the ledge 43, wherein the compression spring 53 is compressed between this end cover 4 and the latch member 5. Next, the trigger 3 is placed on this end cover 4, wherein a compression spring 33 is compressed between this end cover 4 and the trigger 3. Next, the end cover 4 that is provided with the latch member 5 and the trigger 3 is fixed onto the front housing 13. Continuing to refer to Fig. 8, one end of the support shaft 10 is press-fitted in the main body of the rolling brush 9, and the bearing 8 is press-fitted on the other end of the support shaft 10, and then the bearing 8 is placed in an opening of the locking member 2; that is, the locking member 2, the bearing 8, the support shaft 10 and the rolling brush 9 may be connected together as an integral whole in advance to form the rolling brush assembly. Next, this rolling brush assembly is pushed into the front housing 13 from the opening 41 of the end cover 4. As the rolling brush assembly is pushed into the front housing 13, the rolling brush assembly contacts the pushing block 6 and overcomes an elastic force of the compression spring 15, and continues on; the locking member 2 overcomes an elastic force of the compression spring 53 and laterally pushes the lock tongue 52 outward, until the locking member 2 is pushed fully into the opening 41, and at this time, the lock tongue 52 is locked in the locking slot 23 of the locking member 2 under the effect of the compression spring 53. That is, in the present application, use of a dedicated tool is not required, and the rolling brush 9 can be simply mounted in the floor brush 100.

[0044] It must be explained that, in the embodiments of the present application, two lock tongues 52 that are adapted to the locking member 2 are arranged on the end cover 4, and of course, a structure on the automatic locking apparatus that cooperates with the locking member is not limited to the embodiments of the present invention; a lock tongue may also be arranged on the locking member 2 and a latch slot may be provided at a corresponding position on the latch member 5, with locking and release being achieved by the lock tongue of the locking member 2 with respect to the latch slot of the latch member 5. As is known to those skilled in the art, the structures of the lock tongue and latch slot are merely exemplary, and the numbers of lock tongues and latch slots are also merely exemplary. Of course, embodiments of the present invention are not limited to this; those skilled in the art may make choices flexibly according to requirements.

[0045] Fig. 9 is a 3D view of a floor brush 200 according to another embodiment of the present application, and shows the floor brush 200 and a trigger 203; Fig. 10 is an exploded 3D view of a portion of the floor brush 200 of the present application shown in Fig. 9, and shows a rolling brush 200 and an automatic locking apparatus thereof.

[0046] As another preferred embodiment of the present invention, continuing to refer to Figs. 9 - 10, the floor brush 200 comprises a locking member 202, an end cover 204, the trigger 203, a pushing block 206, a compression spring 215, a retaining frame 207, a rolling brush 209, etc. In an embodiment of the present application, the locking member 202 and the rolling brush 209, etc. form a portion of the rolling brush assembly. In this embodiment of the present application, the trigger 203 forms a portion of the automatic locking apparatus. In this embodiment of the present application, the pushing block 206, the compression spring 215 and the retaining frame 207 form a portion of a biasing assembly. Bristles 291 are helically provided on a main body of the rolling brush 209. In an optional embodiment, the retaining frame 207 may be dispensed with, that is, a side face of a front housing, for example, itself forms the retaining frame 207. In other words, the retaining frame 207 and the front housing form an integral member.

[0047] In this embodiment of the present invention, the trigger 203 takes the form of a clamp formed from two half parts, and these two half parts can be pivotally connected to each other at a pivot point 234. Similar to the trigger 3, the trigger 203 of this embodiment extends out of the end cover 204 at an upper end. Each half part comprises a pressing part above the pivot point, and the length of the pressing part is less than the length of the branch part, and thus, a relatively small extent of movement of the pressing part can be used to achieve a relatively large extent of movement of the branch part; the two pressing parts being pressed toward each other causes the branch parts to move away from each other, thereby causing the lock tongue to move out from the

locking slot. Each half part of the trigger 203 comprises a branch part 231, and comprises a lock tongue 232 at an inner side of each branch part 231. Above the pivot point 234, a compression spring 233 is provided pressed between upper ends of the half parts; the compression spring 233 pushes the upper ends of the half parts outward away from each other, so that the two branch parts 231 move toward each other, and thus the lock tongues 232 are kept locked in the locking slots 223 of the locking member 202; therefore, the locking member 202 is kept in the locking position. When it is necessary to disassemble the automatic locking apparatus to take out the rolling brush 209, an operator, for example, uses a thumb and index finger to press the upper ends of the trigger 203 toward each other, and the pressing overcomes an elastic force of the compression spring 233, such that the upper ends of the trigger 203 draw towards each other, with the result that the two branch parts 231 move away from each other, and thus the lock tongues 232 move out from the locking slots 223 of the locking member 202, therefore causing the locking member 202 to be in the release position. In this release position, the locking member 202 is no longer engaged by the lock tongues 232 of the trigger 203. At this time, similar to a preceding embodiment, the compression spring 215 that is compressed between the pushing block 206 and the retaining frame 207 pushes the pushing block 206 away from the retaining frame 207, so as to axially push the locking member 202 in the release position outward; therefore, the locking member 202, together with the rolling brush 209, is ejected from the end cover 204, thereby facilitating removal of the rolling brush 209. That is, in the present application, when the automatic locking apparatus sets the locking member 202 at the release position, the locking member 202, together with the rolling brush 209, is enabled to automatically eject without the aid of a tool; therefore, the rolling brush 209 is conveniently disassembled and mounted.

[0048] Fig. 11 is a 3D view of a floor brush 300 according to another embodiment of the present application, and shows the floor brush and a trigger 303. Fig. 12 is an exploded 3D view of a portion of the floor brush 300 of the present application shown in Fig. 11, and shows a rolling brush and an automatic locking apparatus thereof. Fig. 13 is an exploded 3D view of a portion of the floor brush 300 of the present application shown in Fig. 11, and shows the rolling brush and the automatic locking apparatus thereof. Fig. 14 is a 3D view of a portion of the floor brush 300 of the present application shown in Fig. 11, and shows the automatic locking apparatus and an end cover. Fig. 15 is an exploded 3D view of a portion of the floor brush of the present application shown in Fig. 11, and shows the automatic locking apparatus.

[0049] Referring to Figs. 11 - 12, in another embodiment of the present application, the floor brush 300 comprises a locking member 302, an end cover 304, a trigger 303, a compression spring 311, a rotating locking block

320, a bearing seat 305, a pushing block 306, a compression spring 312, a retaining frame 307, a bearing for a rolling brush 309, a front housing 313, etc. In an embodiment of the present application, the locking member 302 and the rolling brush 309, etc. form a portion of the rolling brush assembly. In this embodiment of the present application, the trigger 303 and the rotating locking block 320 form a portion of the automatic locking apparatus. In this embodiment of the present application, the pushing block 306, the compression spring 312 and the retaining frame 307 form a portion of a biasing assembly. In this embodiment of the present application, the trigger 303 is formed at the center of the locking member 302, and by means of pressing the trigger 303 axially inward, the locking member 302 switches between the locking position and the release position. The compression spring 311 is compressed between the rotating locking block 320 and the bearing seat 305.

[0050] Specifically, referring to Fig. 15, the automatic locking apparatus is shown in detail, comprising the trigger 303, and further comprising the rotating locking block 320. In this embodiment of the present application, the trigger 303 is arranged to be able to axially slide in the locking member 302, and is arranged concentrically with respect to the locking member 302. Specifically, the locking member 302 is provided at an inner periphery thereof with multiple guide slots 321 that extend axially, the trigger 303 is provided on an outer periphery thereof with multiple guide rails 331, and the number of guide rails 331 is the same as the number of guide slots 321. In an embodiment of the present application, the combination of the locking member 302, the trigger 303 and the rotating locking block 320 are operated by a pressing function similar to an automatic ballpoint pen.

[0051] When an operator presses the trigger 303 with a finger, the trigger 303 moves along the guide slots 321 which forces the rotating locking block 320 to move toward the rolling brush 309. The compression spring 311 pushes the rotating locking block 320, such that the rotating locking block 320 acts on a slanted face and rotates by a certain angle. When the trigger 303 disengages from the rotating locking block 320 at a meshing position, due to the effect of the compression spring 311, the rotating locking block 320 rotates by an angle, sliding to another side, and therefore is translocated by a single position with respect to a circumferential direction. Fig. 16 is a 3D view of a rotating locking block 320 of the automatic locking apparatus of an embodiment of the present application seen from another angle; the rotating locking block 320 comprises multiple, preferably six, lower tooth columns 322 that are evenly distributed circumferentially. In an embodiment of the present application, the lower tooth column 322 comprises two side faces 3221 and 3222 that are adjacent to each other, and further comprises an extreme end 3223 that extends radially outward relative to the side faces 3221 and 3222. Referring to Figs. 14 and 16, the end cover 304 is provided with stop parts 340 near an opening for inserting the locking mem-

ber 302 therein. As described below, when the rotating locking block 320 is at the locking position as shown in Fig. 14, the lower tooth columns 322 (specifically, the extreme ends 3223 of the lower tooth columns 322) of the rotating locking block 320 are engaged with the stop parts 340, to prevent the locking member 302 from separating from the end cover 304; that is, at this time, the rolling brush 309 is in the locking position and cannot be removed from the floor brush 300. When the rotating locking block 320 is rotated by a single position relative to the position shown in Fig. 14 to reach the release position, the lower tooth columns 322 (specifically, the extreme ends 3223 of the lower tooth columns 322) of the rotating locking block 320 no longer engage with the stop parts 340; at this time, the rotating locking block 320 can be ejected axially outward under the elastic force of the compression spring 311, so that the locking member 302 can be ejected from the end cover 304, to facilitate removal of the locking member 302, to then remove the rolling brush 309. That is, in the present application, when the automatic locking apparatus sets the locking member 302 to the release position, the locking member 302 is enabled to automatically eject without the aid of a tool; therefore, the rolling brush 309 is conveniently disassembled and mounted. More precisely, the locking member 302, the trigger 303, the rotating locking block 320, the compression spring 311 and the bearing seat 305 are ejected from the end cover 304 together as an integral whole, thereby further simplifying disassembly and mounting of the rolling brush 309.

[0052] Specifically, the trigger 303 is provided with an upper tooth column 332 on an end part thereof facing away from a pressing face, and the rotating locking block 320 is provided with a lower tooth column 322. Meshing of the upper tooth column 332 and the lower tooth column 322 is incomplete meshing; only tooth tip parts partially engage, and guide ribs of two tooth back faces that are engaged are designed to slide inside the same guide slot 321; when the lower tooth column 322 slides out of the guide slot 321 when pushed by the upper tooth column 332, due to the effect of the compression spring 311, the tooth of the lower tooth column 322 slides along the slanted face of the tooth of the mutually meshed upper tooth column 332, and thus, under the effect of the slanted face, the lower tooth column 322 rotates by an angle, for example, slides from one side face 3222 to another side face 3221; by repeating this, the rotating locking block 320 can switch between the locking position and the release position. This type of operation is similar to the operation of an automatic ballpoint pen. The rotating locking block 320 can rotate circumferentially by a single position relative to the trigger 303 by means of triggering by the trigger 303, the position being one of a release position and a locking position, and the release position and the locking position being adjacent to each other. That is, the rotating locking block 320 passes the locking position and the release position in sequence.

[0053] Continuing to refer to Figs. 12 - 13, same show

an exploded 3D view of a portion of the floor brush 300 according to another embodiment of the present application. The bearing seat 305, at the center of a side face that faces the locking member 302, comprises a recess, used for receiving one end of the compression spring 311. The bearing seat 305, at the other side face thereof, is used for receiving a bearing for supporting the rolling brush 309. As shown in Fig. 13, the bearing seat 305 is fixed onto the locking member 302 by means of a fastener such as a screw. In this embodiment of the present application, the trigger 303, the rotating locking block 320, the compression spring 311 and the bearing seat 305 together form an automatic locking apparatus, and they can be disassembled together from the end cover 304, thereby facilitating disassembly and mounting of the rolling brush 309.

[0054] In another aspect, the pushing block 306, the compression spring 312 and the retaining frame 307 are structurally and functionally similar to the pushing block 6, the compression spring 15 and the retaining frame 7 in the embodiments specified earlier, and are not detailed unnecessarily here. In addition, with reference to preceding embodiments, the bearing seat 305 can be connected together with the bearing, the support shaft and the rolling brush 309 as an integral whole to form a rolling brush assembly; when at the release position, the compression spring 312 can integrally push this rolling brush assembly axially outward, and therefore the rolling brush 309 is conveniently automatically disassembled. That is, simply pressing the trigger 303 causes the locking member 302 to be in the release position, and the compression spring 312 can integrally push the automatic locking apparatus and the rolling brushing assembly together axially outward, thereby conveniently disassembling the rolling brush 309. When in the release position, similar to a preceding embodiment, the compression spring 312 that is compressed between the pushing block 306 and the retaining frame 307 pushes the pushing block 306 away from the retaining frame 307, so as to axially push the locking member 302 in the release position outward together with the rolling brush 309; therefore, the locking member 302, together with the rolling brush 309, is ejected from the end cover 304, thereby facilitating removal of the rolling brush 309. That is, in the present application, when the automatic locking apparatus sets the locking member 302 to the release position, the locking member 302 is enabled to automatically eject without the aid of a tool; therefore, the rolling brush 309 is conveniently disassembled and mounted.

[0055] It must be explained that, in the embodiments of the present invention, the compression springs may all be elastic pads or another component having elasticity, abbreviated to "elastic member". The number of compression springs may be 1, but of course may also be 2, 3, 4, etc. without departing from the scope of protection of the present application.

[0056] Although the description herein is based on embodiments, it is by no means the case that each embod-

iment comprises only one independent technical solution. This manner of presentation is adopted herein purely for the sake of clarity. Those skilled in the art should consider the specification in its entirety; the technical solutions in different embodiments may also be suitably combined to form other embodiments understandable to those skilled in the art. The scope of the present invention is defined by the attached claims, rather than by the above description. Thus, it is intended that all modifications falling within the meaning and scope of equivalent key elements of the claims shall be included in the present invention.

[0057] To a person skilled in the art, the present invention is not limited to the details of the demonstrative embodiments above, and may be implemented in other specific forms without deviating from the spirit or basic features of the present invention. Therefore, the above embodiments should be regarded as demonstrative and non-limiting.

Claims

1. A floor brush, wherein the floor brush comprises:

a housing, the housing defining a dust suction cavity, and the housing comprising an end cover at one side thereof;

a rolling brush assembly, the rolling brush assembly comprising a rolling brush, and the rolling brush being able to pass through an opening of the end cover to be arranged in the dust suction cavity;

a biasing assembly, the rolling brush assembly being biasedly mounted relative to the housing by means of the biasing assembly; and

an automatic locking apparatus, the automatic locking apparatus having a release position and a locking position relative to the rolling brush assembly, wherein at the locking position, the automatic locking apparatus fixes the rolling brush assembly in position, and at the release position, the rolling brush assembly can be taken out axially outward from the housing under the effect of a biasing force.

2. The floor brush as claimed in claim 1, wherein the rolling brush assembly further comprises a locking member that is connected to the rolling brush, and the locking member can engage with the automatic locking apparatus to fix the rolling brush assembly in position.

3. The floor brush as claimed in claim 1, wherein the biasing assembly comprises a compression spring and a pushing block, and the pushing block abuts the rolling brush assembly.

4. The floor brush as claimed in claim 3, wherein the biasing assembly further comprises a retaining frame, and the compression spring is compressed between the pushing block and the retaining frame.
5. The floor brush as claimed in any one of claims 1-4, wherein the automatic locking apparatus comprises a trigger and a latch member, and the latch member can be biased to a locking position.
6. The floor brush as claimed in claim 5, wherein the latch member can enter a release position from the locking position in response to an action of the trigger, wherein in the locking position, the latch member is engaged with the locking member, so as to lock the rolling brush assembly, and in the release position, the latch member is disengaged from the locking member, so as to release the rolling brush assembly.
7. The floor brush as claimed in claim 5, wherein when the rolling brush assembly passes through the opening of the end cover and is mounted, the latch member is squeezed by the rolling brush assembly and leaves the locking position, until the latch member engages with the locking member.
8. The floor brush as claimed in claim 5, wherein the trigger comprises a pressing part and a branch part that extends from the pressing part, and when the trigger is pressed, the branch part causes the latch member to move, so as to cause the locking member to be in the release position.
9. The floor brush as claimed in claim 8, wherein the latch member comprises one of a lock tongue and a locking slot, and the locking member comprises the other of the lock tongue and the locking slot, and when the locking member is in the locking position, the lock tongue is locked in the locking slot, and preferably, the latch member can move along a slide rail.
10. The floor brush as claimed in any one of claims 1-4, wherein the trigger comprises two half parts that can be pivotally connected to each other at a pivot point, each half part comprising a branch part below the pivot point, and comprising a lock tongue at an inner side of each branch part, and the locking member comprising a locking slot for receiving the lock tongue;

preferably, a compression spring is provided pressed between upper ends of the half parts, above the pivot point;

preferably, each half part, above the pivot point, comprises a pressing part, and the two pressing parts being pressed toward each other causes the branch parts to move away from each other,

so that the lock tongue moves out from the locking slot;

preferably, when the rolling brush assembly passes through the opening of the end cover and is mounted, the trigger is squeezed by the rolling brush assembly and leaves the locking position, until the lock tongue engages with the locking member.

11. The floor brush as claimed in any one of claims 1-4, wherein the automatic locking apparatus comprises a trigger and a rotating locking block; the trigger is arranged to be axially movable, and the rotating locking block can switch between the release position and the locking position in response to triggering by the trigger, wherein in the locking position, the rotating locking block is locked on the end cover, and in the release position, the rotating locking block can be separated from the end cover;

preferably, the end cover comprises a stop part for engaging the rotating locking block; the rotating locking block can rotate circumferentially by a single position relative to the trigger by means of triggering by the trigger, the position being one of a release position and a locking position, and the release position and the locking position being adjacent to each other; the rotating locking block in the locking position is engaged with the stop part, and the rotating locking block in the release position can be separated from the stop part.
12. The floor brush as claimed in claim 11, wherein the automatic locking apparatus further comprises a locking member, a bearing seat that is fastened onto the locking member, and an elastic member that is compressed between the rotating locking block and the bearing seat;

preferably, the locking member comprises multiple guide slots that extend axially on an inner periphery thereof, and the trigger moves axially along the guide slots.
13. The floor brush as claimed in claim 12, wherein the trigger comprises an upper tooth column, the rotating locking block is provided with a lower tooth column, and meshing of the upper tooth column and the lower tooth column is incomplete meshing.
14. The floor brush as claimed in claim 13, wherein the locking member is provided with a slanted face, and the lower tooth column can slide along the slanted face to cause the rotating locking block to rotate and switch between the release position and the locking position.
15. A vacuum cleaner, wherein the vacuum cleaner comprises the floor brush as claimed in any one of claims 1-14.

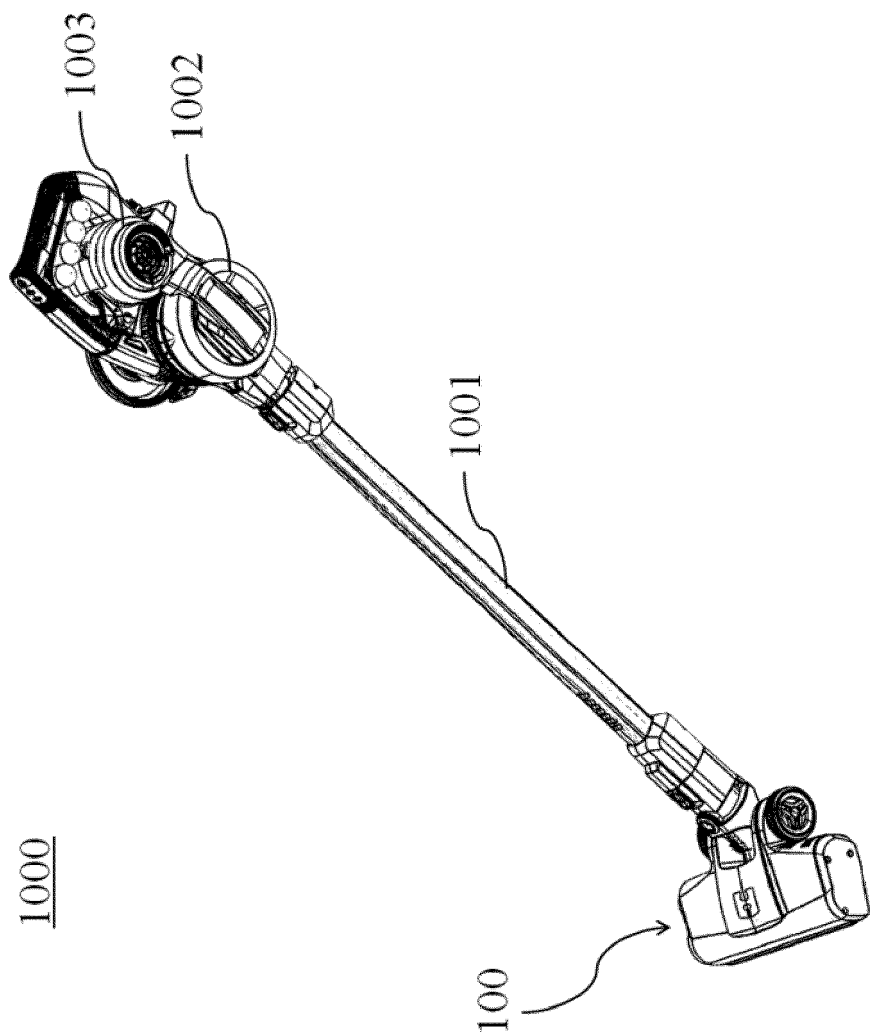


Fig. 1

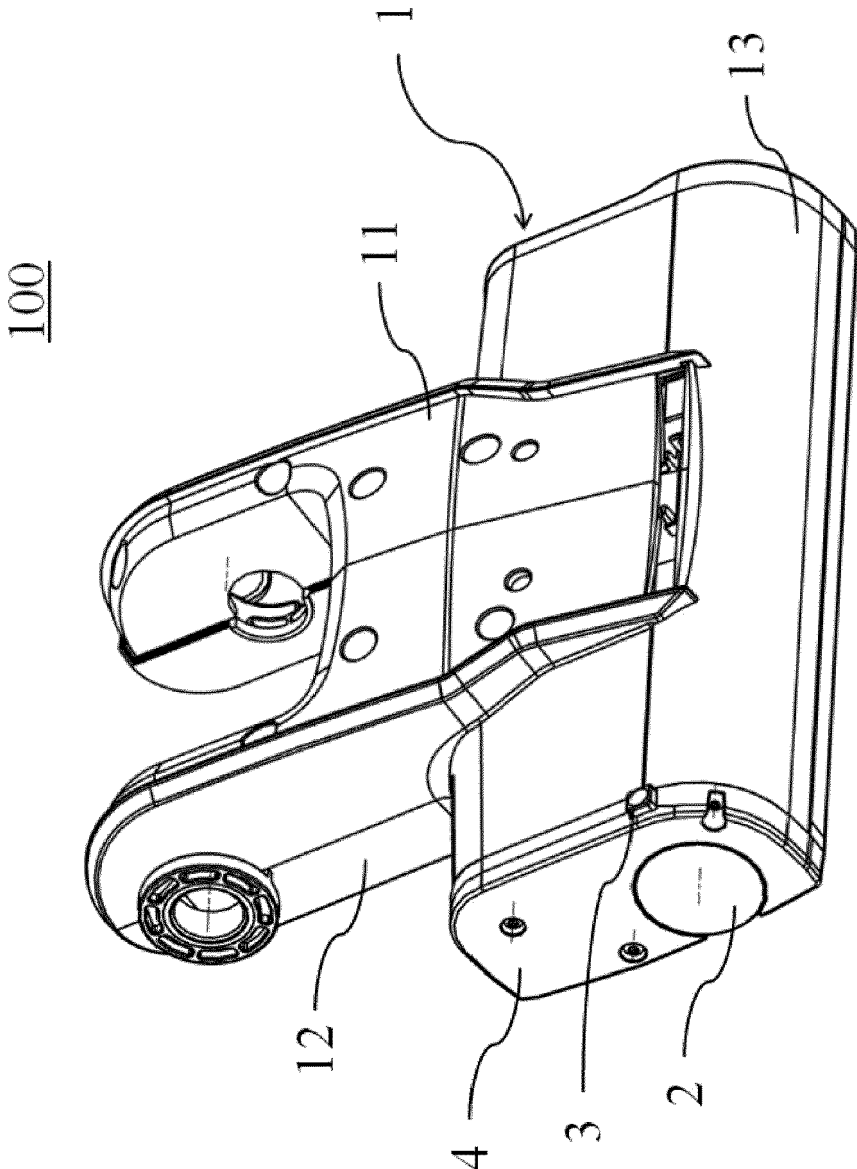


Fig. 2

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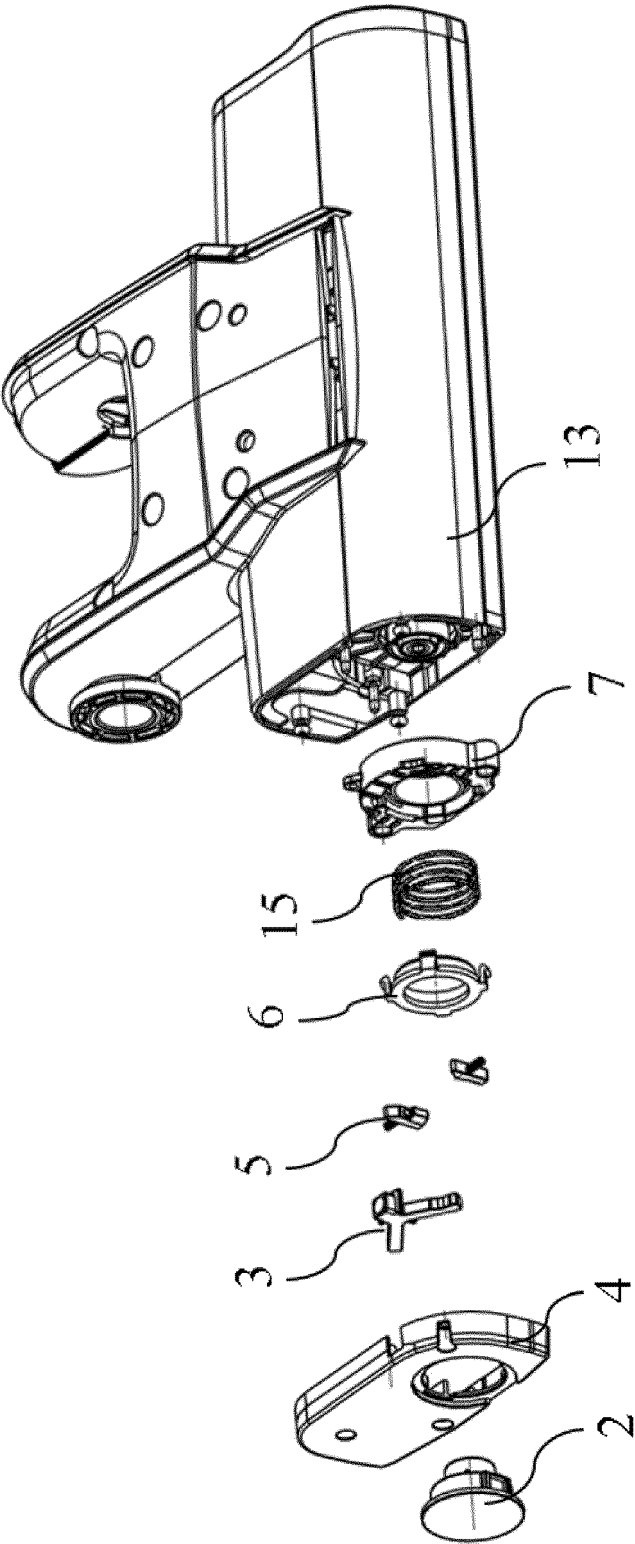


Fig. 3

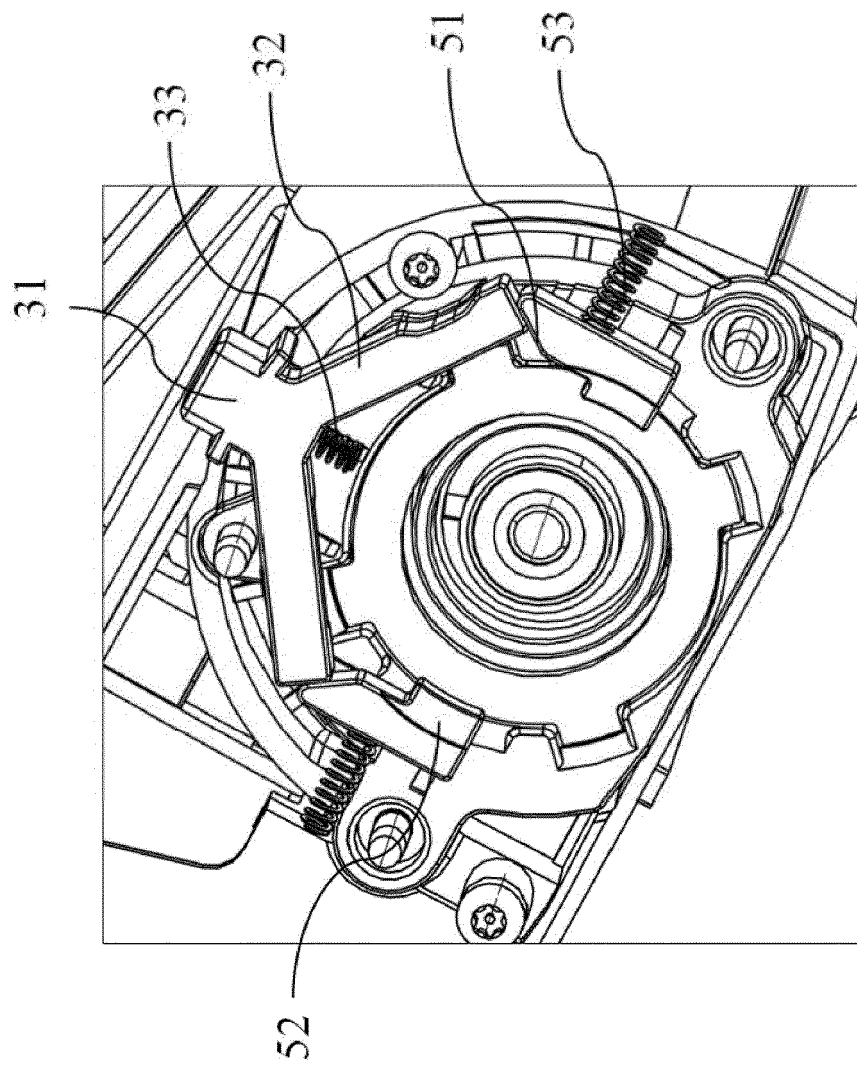


Fig. 4

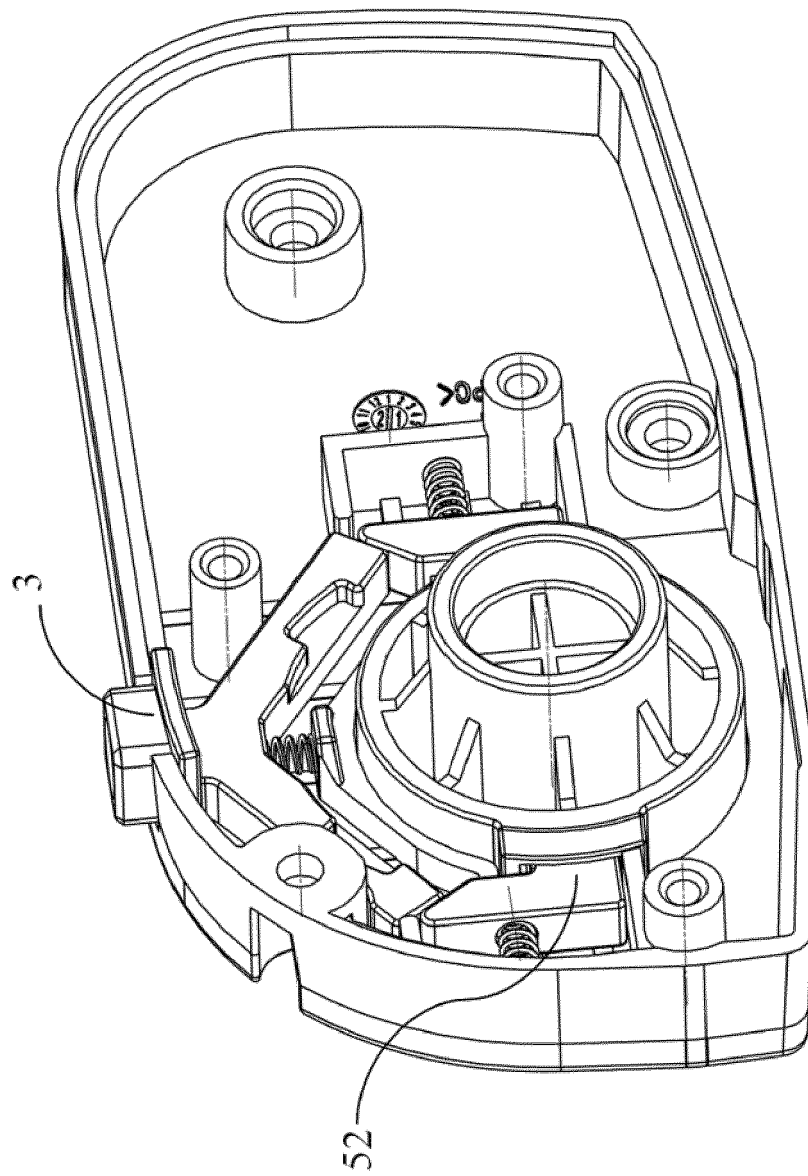


Fig. 5

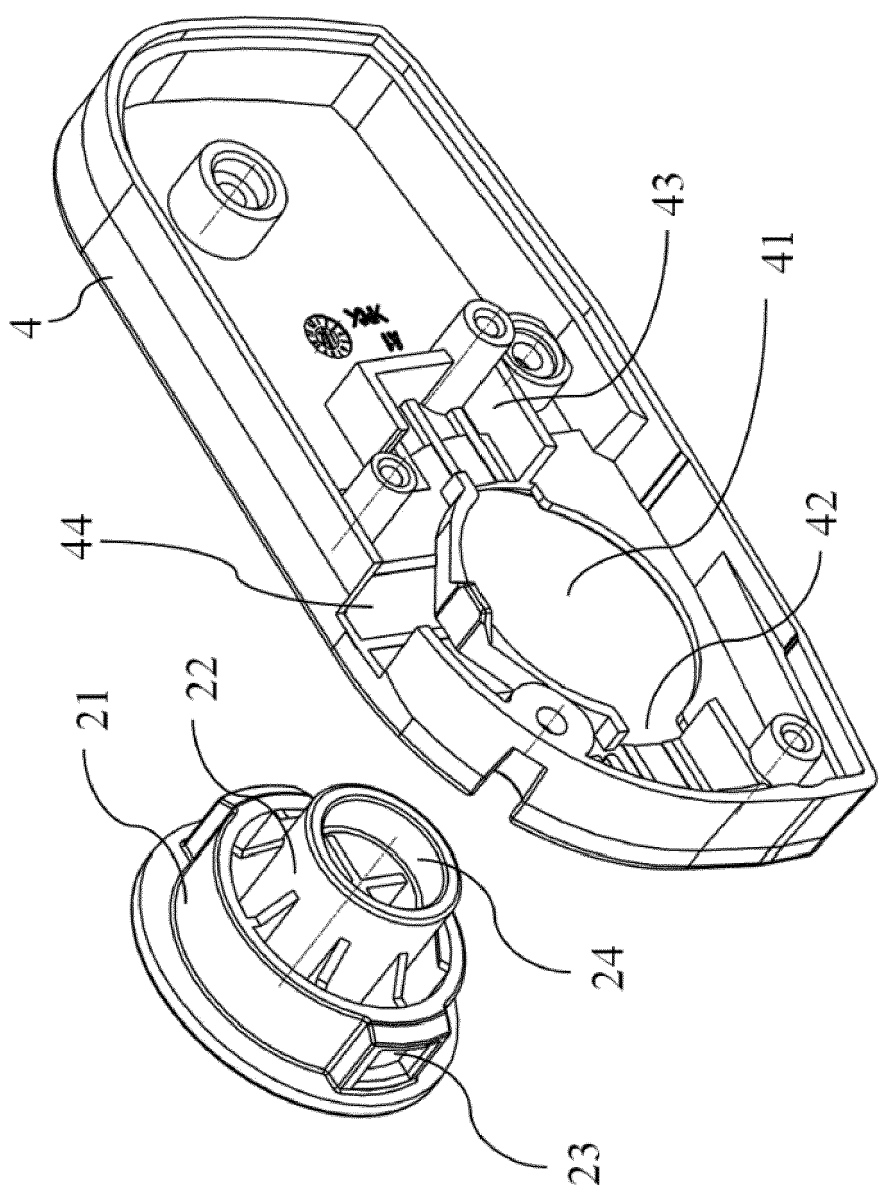


Fig. 6

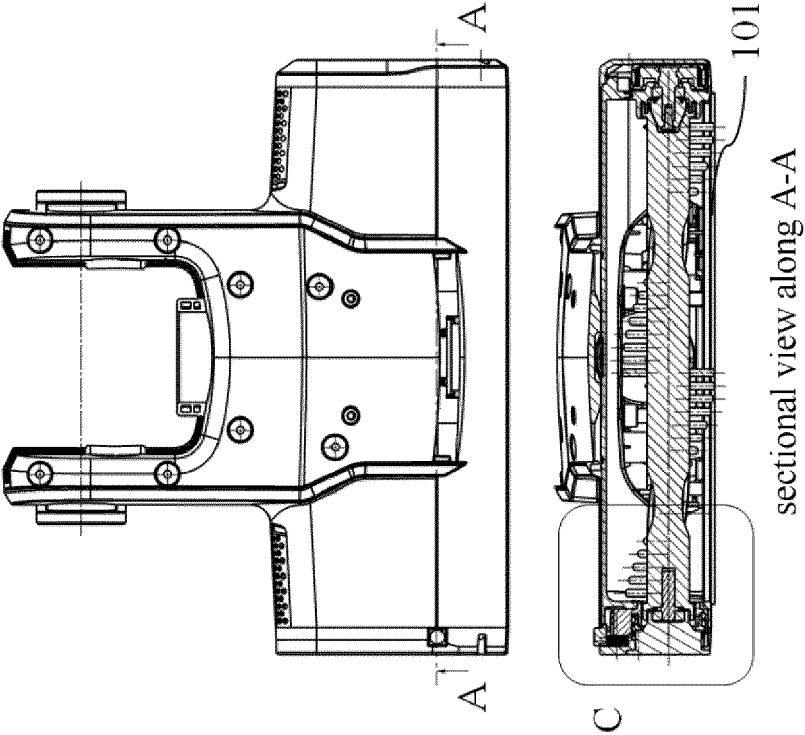


Fig. 7

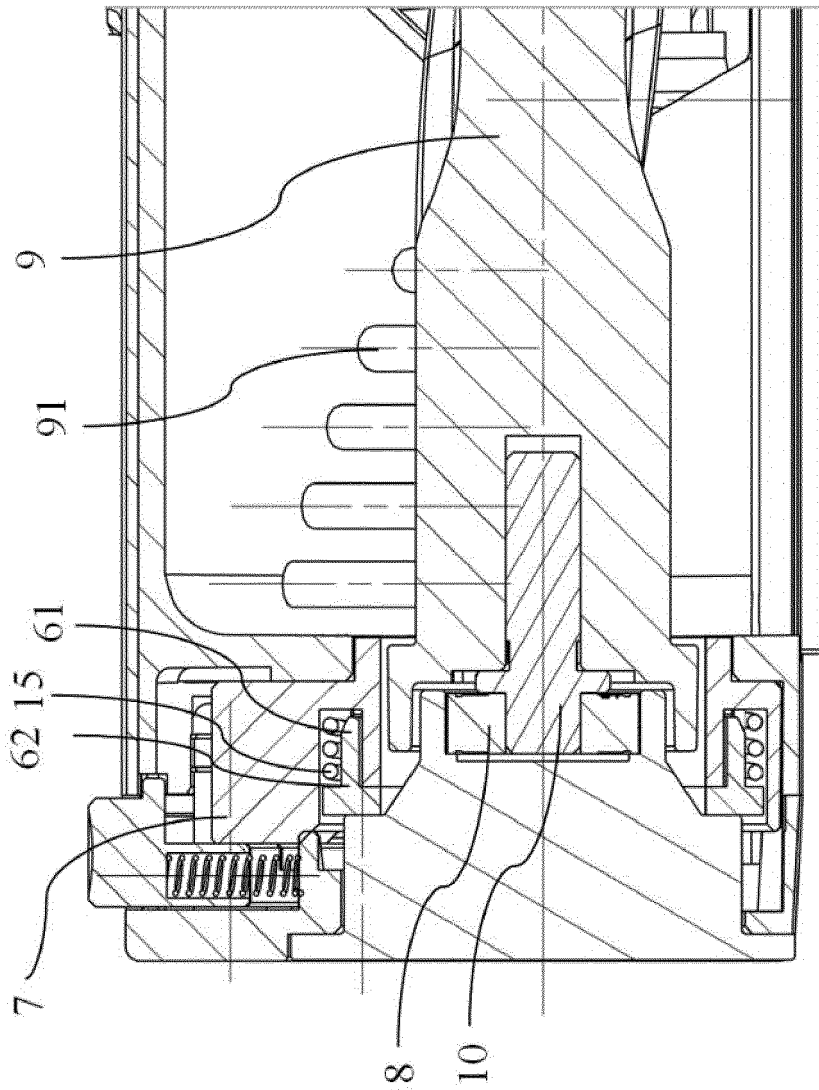


Fig. 8

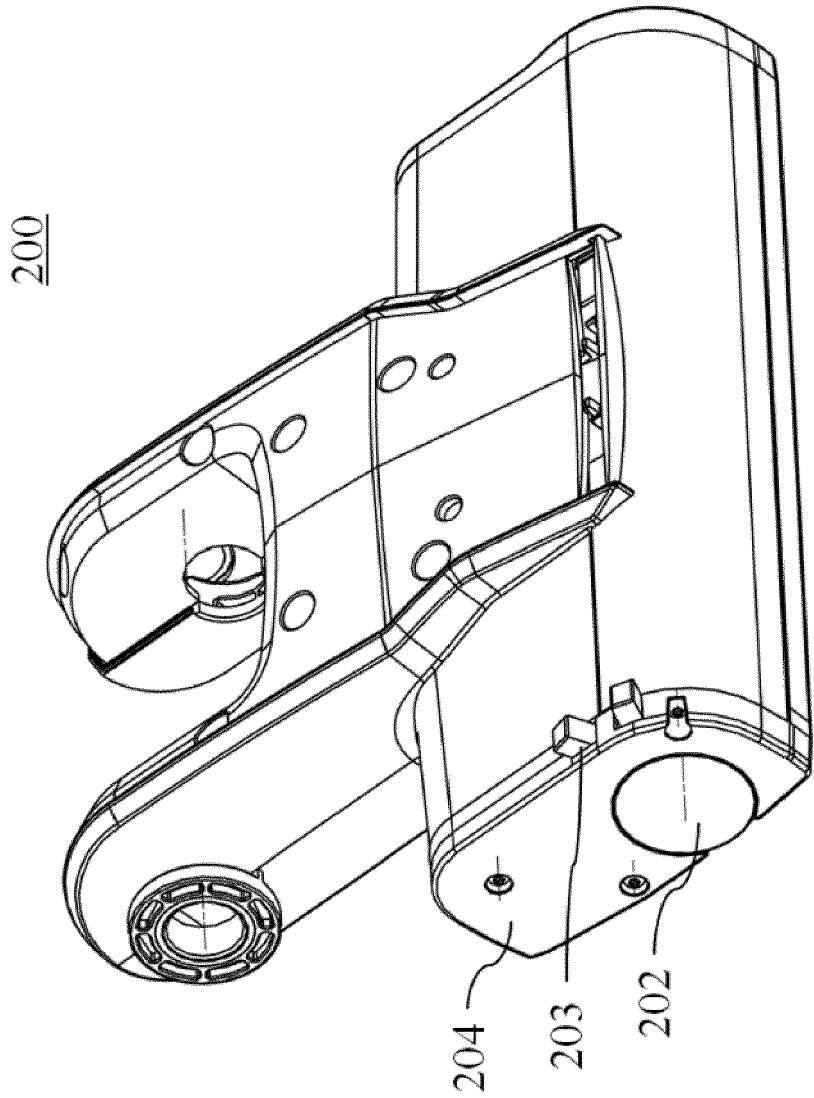


Fig. 9

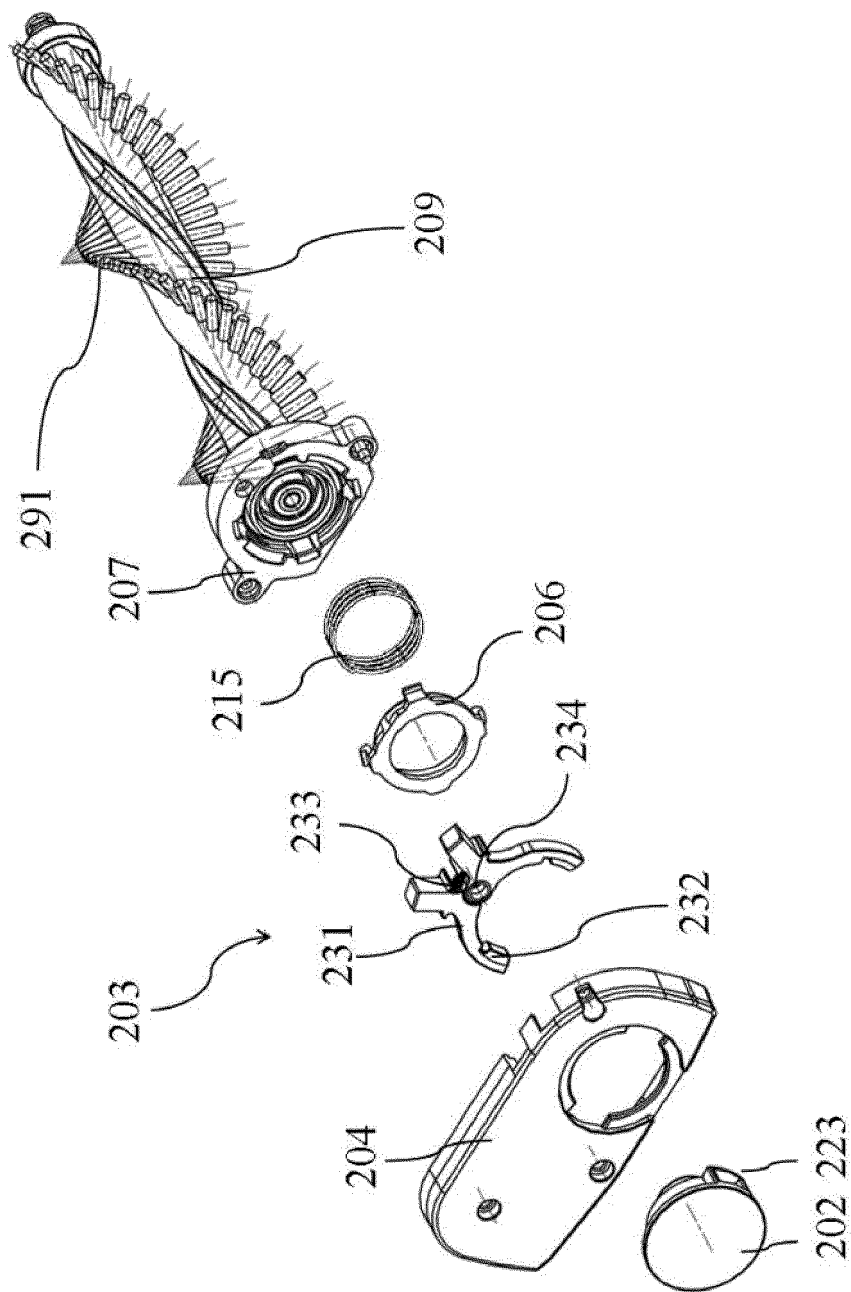


Fig. 10

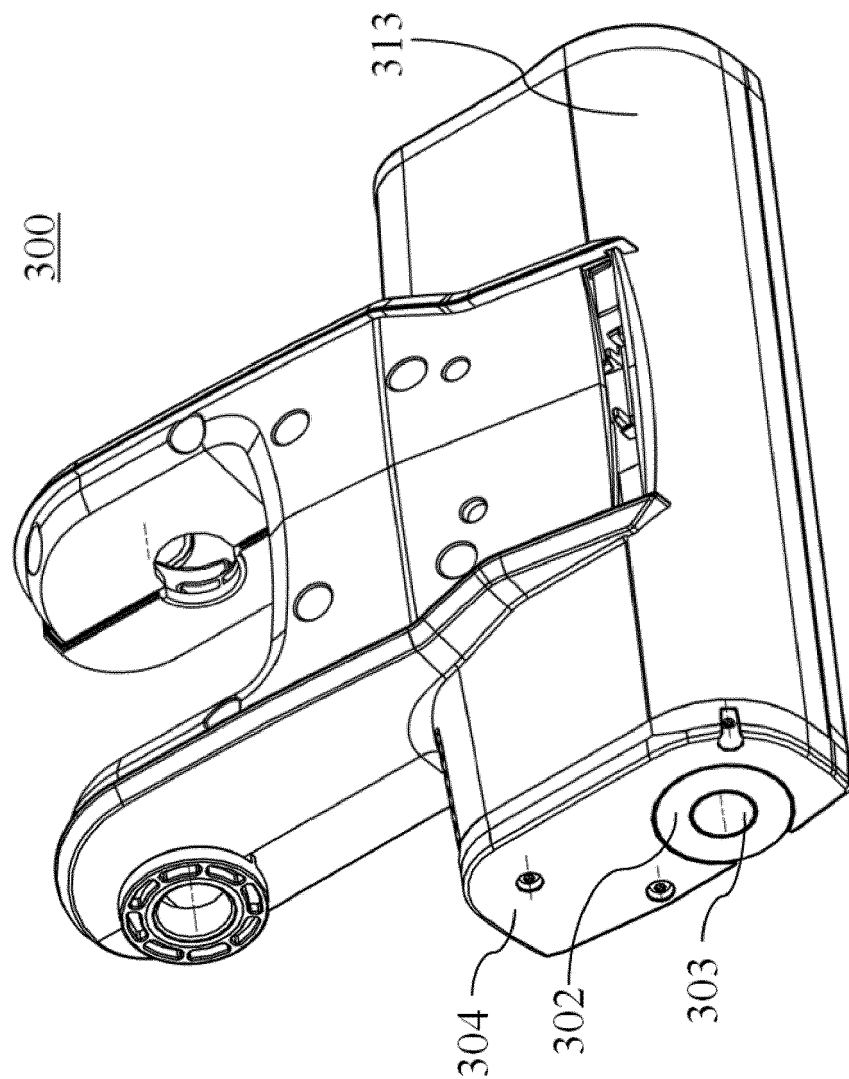


Fig. 11

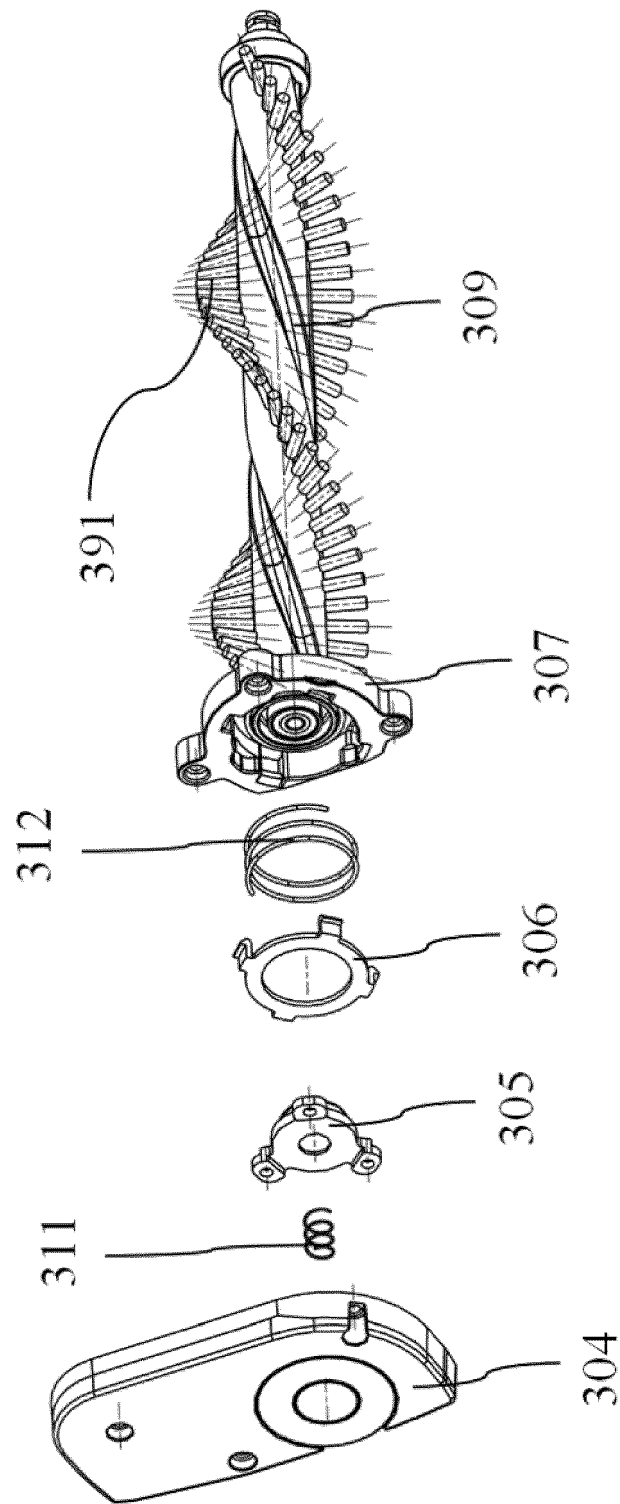


Fig. 12

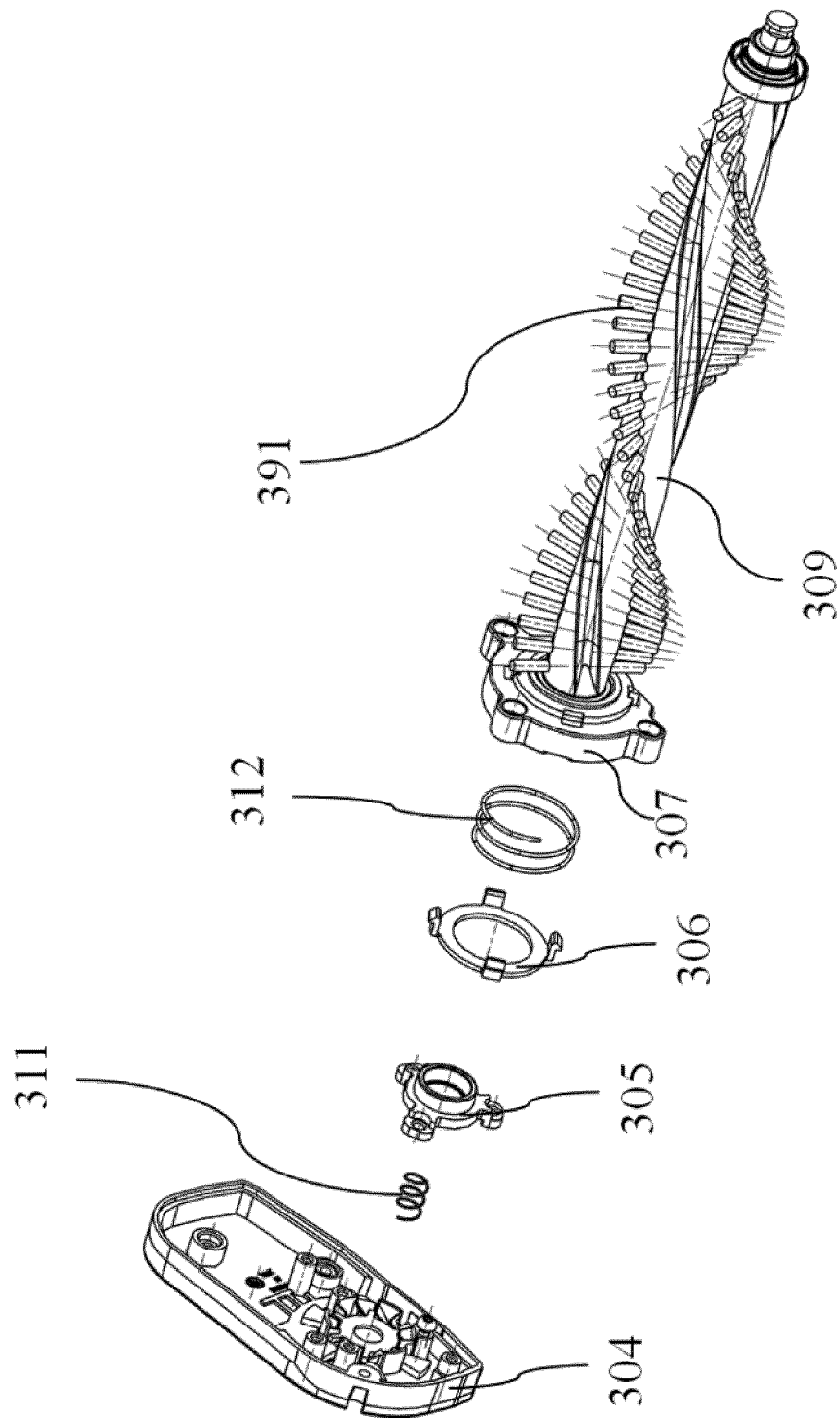


Fig. 13

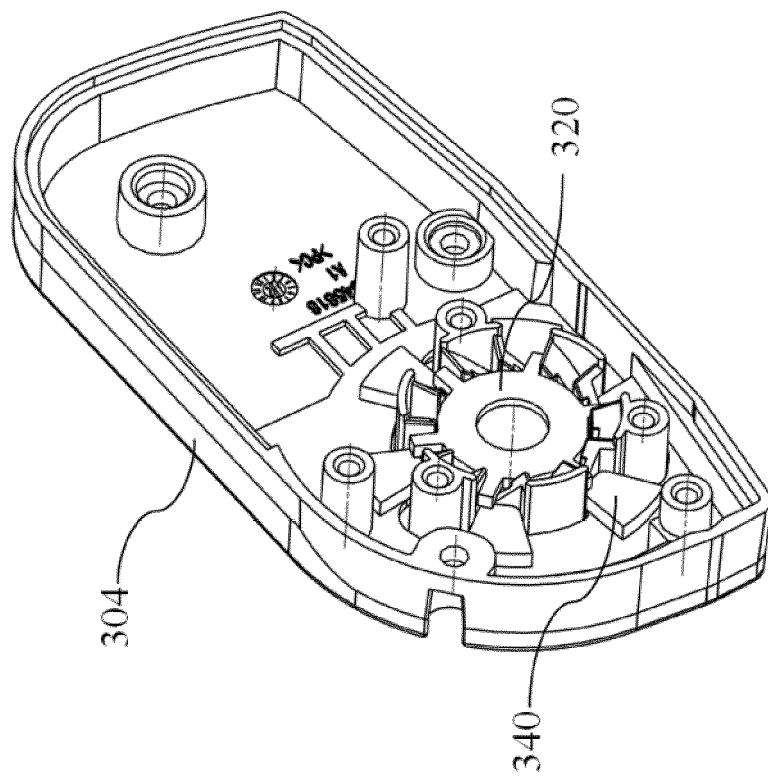


Fig. 14

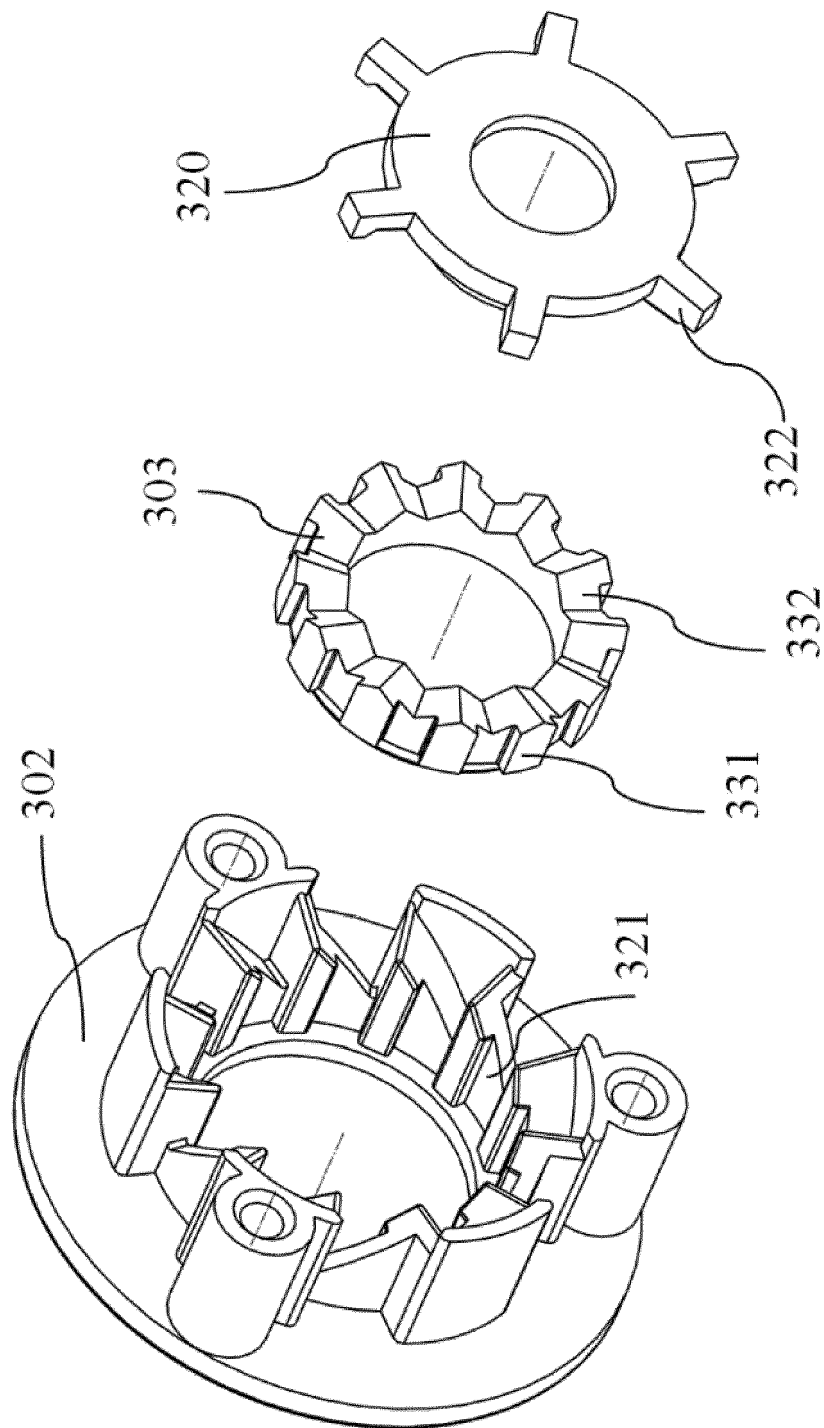


Fig. 15

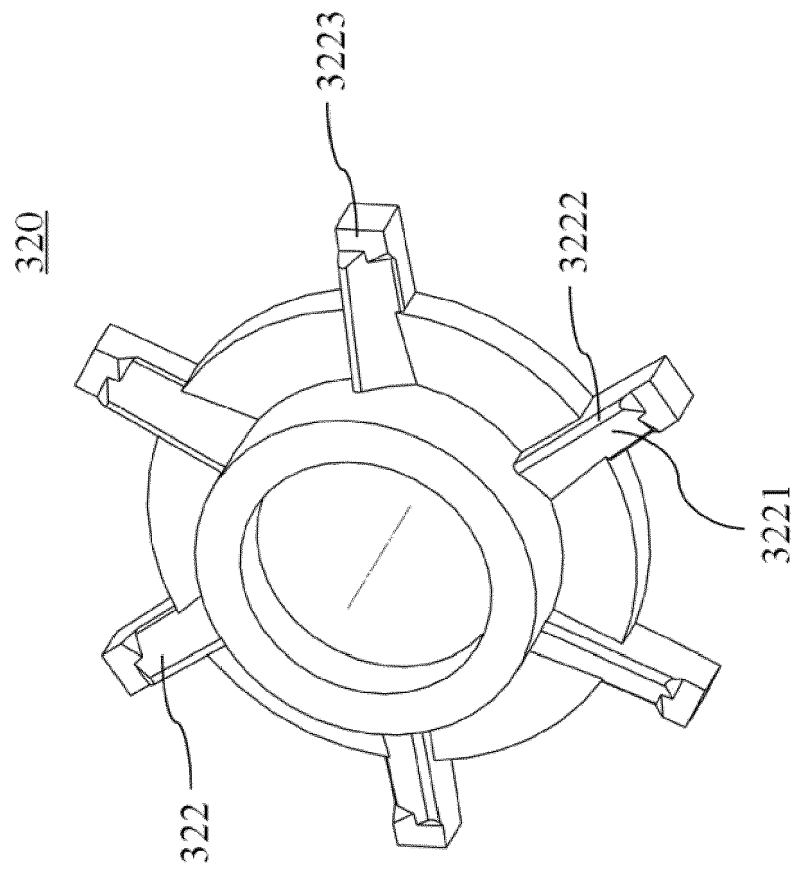


Fig. 16



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Application Number

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