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(54) **FLOOR BRUSH, CLEANING DEVICE, AND ROLLER BRUSH DISASSEMBLY/ASSEMBLY METHOD**

(57) A floor brush, a cleaning device and a roller brush disassembly/assembly method; wherein the floor brush (100) includes: a floor brush body (10), one end of the floor brush body (10) being provided with a driving means (11); a roller brush (20), and one end of the roller brush (20) is drivably-connected to the driving means (11); a driving shaft (111) of the driving means (11) is capable of rotating in a first direction of rotation, causing

the roller brush (20) to move relatively to the driving shaft (111) and be off the preset mounting position; the first direction of rotation is opposite to the direction of rotation of the roller brush (20) when performing cleaning. Roller brush (20) is driven to move by means of the driving means (11), and can be quickly disassembled from the floor brush body (10).

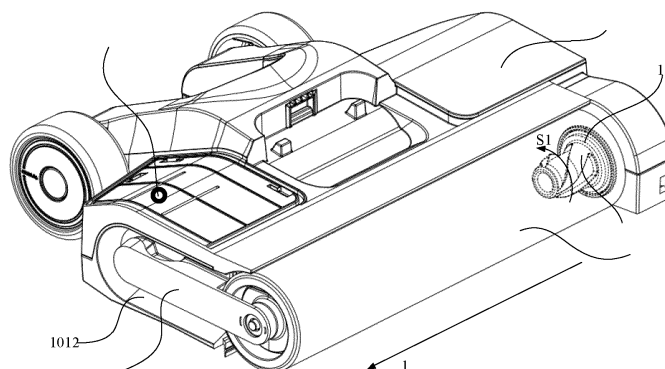


FIG. 1

Description

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the priority of a Chinese Patent Application No. 2020112190089, filed on November 4th, 2020, entitled "Floor brush, cleaning device and roller brush disassembly/assembly method", which is hereby incorporated by reference in its entirety.

TECHNICAL FIELD

[0002] The present disclosure relates to the field of designing mechanical structure, and particularly relates to a floor brush, a cleaning device and a roller brush disassembly/assembly method.

BACKGROUND

[0003] Nowadays, household cleaning device has been in a trend of functionalization, diversification and specialization under development in years. The floor cleaning machine becomes popular among consumers for its powerful capability of cleaning floor and characteristics for dry-and-wet usage. As an example of the cleaning machine, the cleaning machine contains a floor brush, and when cleaning the floor, the roller brush of the floor brush is used to continuously wipe the floor to achieve the effect of cleaning the floor.

[0004] Since the roller brush is constantly in contact with dirt, the user needs to remove the roller brush from the floor brush to make it clean. Thus, the convenience of disassembling the roller brush is particularly important.

BRIEF SUMMARY

[0005] In view of the above, the present disclosure provides a floor brush, a cleaning device and a roller brush disassembly/assembly method, so that to solve the above problems or at least partially solve the above problems.

[0006] A first aspect of an embodiment of the present disclosure provides a floor brush, which includes:

a floor brush body; and
a roller brush, provided in the floor brush body;
the floor brush body is provided with an open end for movement of the roller brush so that the roller brush is shiftable axially;
the floor brush body is provided with a connecting part, the roller brush is provided with a connecting piece, one end of the connecting piece is rotatably connected to the roller brush, and the other end of the connecting piece is magnetically connected with the connecting part.

[0007] In some embodiments, a disassembling direction of the connecting piece from the connecting part is

parallel to an axial direction.

[0008] In some embodiments, the connecting part is provided with a first magnetic piece, and the connecting piece is provided with a second magnetic piece;

at least one of the connecting piece and the connecting part is provided with a protrusion, and the other one of the connecting piece and the connecting part is provided with a groove engagable with the protrusion; and
when the protrusion and the groove are in a preset engaging position, the first magnetic piece is fitted with the second magnetic piece.

[0009] In some embodiments, the open end is provided with a concave portion, and the connecting part is disposed in the concave portion;
in a state in which the connecting part is connected to the connecting piece, an outer surface of the connecting piece is lower than the concave portion, or the outer surface of the connecting piece is flush with a top surface of the concave portion, in the axial direction of the roller brush.

[0010] The second aspect of an embodiment of the present disclosure provides a floor brush, which includes:

a floor brush body, one end of which is provided with a driving means; and
a roller brush, one end of which is drivably-connected to the driving means;
a driving shaft of the driving means is configured to rotate in a first rotating direction, so that the roller brush moves relatively to the driving shaft to leave a preset mounting position; and the first rotating direction is opposite to the rotating direction in which the roller brush performs cleaning.

[0011] In some embodiments, the driving shaft of the driving means is configured to rotate in a second rotating direction, so that the roller brush moves relatively to the driving shaft to the preset mounting position; and the second rotating direction is the rotating direction in which the roller brush performs cleaning.

[0012] In some embodiments, when the driving shaft of the driving means rotates in the first rotating direction, the roller brush is driven to move axially in a first direction; and

when the driving shaft of the driving means rotates in the second rotating direction, the roller brush is driven to move axially in a second direction;
wherein the first direction is a direction in which the roller brush moves away from the driving means, and the second direction is a direction in which the roller brush moves closely to the driving means.

[0013] In some embodiments, the driving means includes a driving shaft, one end of the roller brush is pro-

vided with a hollow portion, the driving shaft is inserted into the hollow portion, and the driving shaft is helically engagable with an inner wall of the hollow portion.

[0014] In some embodiments, one end of the roller brush is provided with a hollow portion, a tension structure is provided between the driving shaft and the roller brush, and the tension structure includes:

a ratchet, sleeved on the driving shaft; and
a roller holder, provided with a plurality of rollers which are movable thereon, each of the rollers is provided to be floatable in a radial direction, and rotatable on the roller holder, the roller holder is sleeved outside the ratchet, and the roller brush is configured to sleeve outside the roller holder;
when the driving shaft rotates in the first rotating direction, the ratchet is driven to rotate to a lowest point of the ratchet to contact the rollers, the rollers are disengaged from an inner wall of the hollow portion of the roller brush, and the roller brush is disengaged from the preset mounting position; and
when the driving shaft rotates in the second rotating direction, the ratchet is driven to rotate to a highest point of the ratchet to contact the rollers and the inner wall of the hollow portion of the roller brush, and the roller brush is in the preset mounting position.

[0015] In some embodiments, the other end of the floor brush body is provided with an avoiding space for movement of the roller brush so that the roller brush is shiftable axially.

[0016] In some embodiments, the other end of the floor brush body is an open end to form the avoiding space;

alternatively, the other end of the floor brush body is provided with a penetration hole for movement of the roller brush, and the penetration hole forms the avoiding space. In some embodiments, the other end of the floor brush body is provided with a connecting part, the roller brush is provided with a connecting piece, and the connecting part is detachably connected to the connecting piece; and
the disassembling direction of the connecting piece from the connecting part is parallel to the axial direction.

[0017] In some embodiments, the connecting part is in the shape of a boss, and the edge of the connecting piece is provided with a positioning wall which is engagable with the side wall of the boss to position the connecting part with respect to the connecting piece.

[0018] In some embodiments, one end of the connecting piece is rotatably connected to the roller brush, and the other end of the connecting piece is magnetically connected with the connecting part.

[0019] In some embodiments, the connecting part is provided with a first magnetic piece, and the connecting piece is provided with a second magnetic piece;

at least one of the connecting piece and the connecting part is provided with a protrusion, and the other one of the connecting piece and the connecting part is provided with a groove engagable with the protrusion; and

when the protrusion and the groove are in a preset engaging position, the first magnetic piece is fitted with the second magnetic piece.

[0020] In some embodiments, the first magnetic piece is disposed in the groove, and at least part of the protrusion forms the second magnetic piece.

[0021] In some embodiments, the open end is provided with a concave portion, and the connecting part is disposed in the concave portion;
in a state in which the connecting part is connected to the connecting piece, an outer surface of the connecting piece is lower than the concave portion, or, the outer surface of the connecting piece is flush with the top surface of the concave portion, in the axial direction of the roller brush.

[0022] In some embodiments, the floor brush further includes an operation switch, which electrically connects to the driving means, and in a state in which the operation switch is on, the driving means drives the roller brush to rotate in the first rotating direction. The third aspect of an embodiment of the present disclosure provides a roller brush disassembly/assembly method, which includes:

controlling a driving shaft of a driving means located at one end of a floor brush body to rotate in a first rotating direction so that the roller brush moves relatively to the driving shaft to be off a preset mounting position;

wherein the first rotating direction is opposite to the rotating direction in which the roller brush performs cleaning.

[0023] The fourth aspect of an embodiment of the present disclosure provides a cleaning device, including a body and a floor brush, and the floor brush includes:

a floor brush body, one end of which is provided with a driving means; and

a roller brush, one end of which is drivably-connected to the driving means;

a driving shaft of the driving means is rotatable in a first rotating direction, so that the roller brush moves relatively to the driving shaft to be off a preset mounting position, and the first rotating direction is opposite to the rotating direction in which the roller brush performs cleaning.

[0024] In view of the foregoing, a driving means is provided on the floor brush body in an embodiment of the present disclosure, the driving means is rotatable in different directions, when the driving shaft of the driving means rotates in the first rotating direction, the roller

brush moves to be off the preset mounting position, and the first rotating direction is opposite to the rotating direction in which the roller brush performs cleaning. The driving means drives the roller brush to be off the preset mounting position, thereby the roller brush may be automatically and rapidly removed, the operating efficiency is improved and the difficulty of user operation is reduced.

[0025] The fifth aspect of an embodiment of the present disclosure provides another floor brush, which includes:

a floor brush body, one end of which is provided with a driving means; and
a roller brush, one end of which is drivably-connected to the driving means, one end of the roller brush is provided with a hollow portion; the driving shaft is inserted into the hollow portion, and the driving shaft is helically engagable with the inner wall of the hollow portion.

[0026] The sixth aspect of an embodiment of the present disclosure provides another cleaning device, including a body and a floor brush, and the floor brush includes:

a floor brush body, one end of which is provided with a driving means; and
a roller brush, one end of which is drivably-connected to the driving means, one end of the roller brush is provided with a hollow portion; the driving shaft is inserted into the hollow portion, and the driving shaft is helically engagable with the inner wall of the hollow portion. In view of the foregoing, the driving shaft of the driving means on the floor brush body is spirally engaged with the hollow portion of the roller brush, due to the spiral engagement, the roller brush moves axially relatively to the driving shaft to drive the driving shaft to rotate, so that the roller brush is directly driven into the preset mounting position of the driving shaft axially, and can be directly pulled out of the driving shaft axially to be disassembled, and the disassembling operation process is simple and convenient.

BRIEF DESCRIPTION OF THE DRAWINGS

[0027] In order to better clarify the technical solution of the embodiments of the present disclosure or the prior art, brief description will be made below on the drawings required in the describing the embodiments or the prior art. Obviously, the drawings described below are some embodiments of the present disclosure, for those ordinarily skilled in the art, other drawings are obtainable according to these drawings, without making creative efforts.

FIG. 1 is a schematic diagram of the state in which a roller brush is ready to be engaged from a floor brush body provided by an embodiment of the

present disclosure;

FIG. 2 is a schematic diagram of the state in which a roller brush is mounted to a floor brush body provided by an embodiment of the present disclosure; FIG. 3 is a schematic structure diagram of a roller brush provided by an embodiment of the present disclosure;

FIG. 4 is a schematic view of the state in which a roller brush is disengaged from a driving shaft provided by another embodiment of the present disclosure;

FIG. 5 is a schematic diagram of the state in which a roller brush and a driving shaft are tightly engaged by a tension structure, and the roller brush is in a preset mounting position relatively to the driving shaft, provided by another embodiment of the present disclosure; and

FIG. 6 is a schematic structure diagram of a cleaning device provided by an embodiment of the present disclosure.

DETAILED DESCRIPTION

[0028] For the purpose of making objectives, technical schemes and advantages of the present application more clear, clear and complete description will be made to the technical schemes of the present application in conjunction with specific embodiments and corresponding drawings. Obviously, the described embodiments are merely a part of the embodiments of the present application and not all the embodiments. Based on the embodiments of the present application, all other embodiments obtained by those ordinarily skilled in the art without paying creative work fall within the protection scope of the present application.

[0029] The term of "including" throughout the description and claims is an open term and should be interpreted as "including but not limited to". "Approximately" means in an acceptable range of errors, those skilled in the art can solve the technical problem within a certain range of errors, and basically achieve the technical effect.

[0030] In addition, the term "connect" herein includes any direct and indirect means of connection. Therefore, if a first device is described as being connected to a second device, it means that the first device may be directly connected to the second device, or indirectly connected to the second device through other devices. The following description of the specification is a preferred embodiment of the present disclosure, but the description is intended to illustrate the general principles of the present disclosure and is not intended to limit the scope of the present disclosure. The scope of protection of the present disclosure shall be subject to the definition of the attached claims.

[0031] With creative efforts, the inventor found that in the prior art, focusing on the roller brush on the floor brush of the cleaning device, because the roller brush and the floor brush body are usually connected by a clamp struc-

ture, when it is needed to assemble the roller brush to the floor brush body, or disassemble it from the floor brush body, it is usually necessary for the user to manually clamp the roller brush into the floor brush body, or unclamp the roller brush off the floor brush body. The whole operation process is complicated, and not labor-saving enough, which results in poor user experience.

Embodiment 1

[0032] FIG. 1 is a schematic diagram of the state in which a roller brush is ready to be disengaged from a floor brush body provided by an embodiment of the present disclosure; FIG. 2 is a schematic diagram of the state in which a roller brush is assembled to a floor brush body provided by an embodiment of the present disclosure; FIG. 3 is a schematic structure diagram of a roller brush provided by an embodiment of the present disclosure. With reference to FIG. 1 ~ FIG. 3, the floor brush 100 includes a floor brush body 10, and a roller brush 20.

[0033] One end of the floor brush body 10 is provided with a driving means 11, and one end of the roller brush 20 is drivably-connected to the driving means 11. The driving means 11 may include a motor, the driving means 11 may be provided with a driving shaft 111, and the roller brush 20 may be specifically drivably-connected to the driving shaft 111, so that the driving means 11 can drive the roller brush 20 to rotate.

[0034] In the present embodiment, the driving shaft 111 of the driving means 11 is configured to rotate in a first rotating direction S1, so that the roller brush 20 moves relatively to the driving shaft 111 and is off a preset mounting position, and the first rotating direction S1 is opposite to the rotating direction in which the roller brush 20 performs cleaning.

[0035] The preset mounting position refers to the preset fastening position where the roller brush 20 is fastened on the driving shaft 111 when the cleaning device is performing cleaning.

[0036] In the embodiment of the present disclosure, the floor brush may be applied to cleaning devices, including but not limited to cleaning machines, sweeping robots, vacuum cleaners etc.. FIG. 6 is a schematic structure diagram of a cleaning device provided by an embodiment of the present disclosure. As shown in FIG. 6, in the present embodiment, taking the cleaning machine as an example of the cleaning device, the cleaning device includes a floor brush 100, and a body 200. In order to facilitate the rotation and movement of the floor brush 100, and user operation, the floor brush 100 and the body 200 may be rotatably connected through an elastic part, or the floor brush 100 and the body 200 may be hinged together, but the present embodiment is not limited thereby. In addition, the floor brush body 10 is further provided with one or more traveling wheels. The body 200 is equipped with a cleaning liquid bucket 200a, a recycling bucket 200b, a water spray system and a sucking system. When performing cleaning, the cleaning liquid in the

cleaning liquid bucket 200a is sprayed to the floor or the roller brush by the water spray system. The roller brush 20 continuously rolls to wipe the floor to clean the floor. At the same time, when the sucking system works, it forms a negative pressure to provide sucking power, so that dirt and sewage on the floor can be sucked through the sucking passage of the floor brush body 10. It can be understood that the body 200 may be further equipped with a main motor, which may be configured to provide the sucking power of the sucking system. It is obvious that the body 200 may be further equipped with a control system to control other functions of the cleaning device, which will not be omitted herein to avoid redundancy.

[0037] The floor brush provided by the embodiment of the present disclosure provides the driving means on the floor brush body, the driving means can rotate in different directions. When the driving shaft of the driving means rotates in the first rotating direction, the roller brush may be off the preset mounting position, and the first rotating direction is opposite to the rotating direction in which the roller brush performs cleaning. The driving means drives the roller brush to be off the preset mounting position, thereby the roller brush may be automatically and rapidly removed, and operational efficiency is improved and the difficulty of user operation is lowered. Furthermore, as shown in FIG. 2, the driving shaft 111 of the driving means 11 is configured to rotate in a second rotating direction S2, so that the roller brush 20 moves relatively to the driving shaft 111 to the preset mounting position, and the second rotating direction S2 is the rotating direction in which the roller brush 20 performs cleaning.

[0038] The rotating direction of the driving shaft 111 is the second rotating direction S2 when the roller brush 20 is assembled, and the rotating direction of the roller brush 20 is also the second rotating direction S2 when the cleaning device is performing cleaning, and thus the driving shaft 111 rotates in a tightening direction with respect to the roller brush 20 during the use of the cleaning device, and the roller brush 20 will not be disengaged from the floor brush body 10, so that safety and reliability may be ensured in use. When the roller brush 20 is needed to be disassembled, the driving shaft 111 of the driving means 11 rotates in the second rotating direction S2, so that the roller brush 20 moves to be off the preset mounting position.

[0039] In order that the rotation of the driving means 11 drives the roller brush 20 to move to the preset mounting position or be off the preset mounting position, a preferred embodiment is given below:

Specifically, as shown in FIG. 1 and FIG. 2, when the driving shaft 111 of the driving means 11 rotates in the first rotating direction S1, the roller brush 20 is driven to move axially in a first direction A1. When the driving shaft 111 of the driving means 11 rotates in the second rotating direction S2, the roller brush 20 is driven to move axially in a second direction A2. More particularly, the first direction A1 is the direction in which the roller brush 20 is away from the driving means 11, and the second direction

A2 is the direction in which the roller brush 20 moves to the driving means 11. That is to say, the rotation of the driving shaft 111 drives the roller brush 20 to move axially so as to switch between the preset mounting position and a position other than the reset mounting position.

[0040] More specifically, as shown in FIG. 3, one end of the roller brush 20 is provided with a hollow portion 21, the driving shaft 111 is inserted into the hollow portion 21, and the driving shaft 111 is helically engagable with the inner wall of the hollow portion 21. Specifically, a through-hole or blind hole may be provided in the axial direction of the roller brush 20 to form the hollow portion 21. A spiral rib may be provided on one of the side wall of the hollow portion 21 and the outer wall of the driving shaft 111, and a spiral groove matched with the spiral rib may be provided on the other one of the side wall of the hollow portion 21 and the outer wall of the driving shaft 111. The engagement between the roller brush 20 and the driving shaft 111 enables the driving shaft 111 to generate an axial force during rotating due to the cooperation of the spiral groove and the spiral rib, which drives the roller brush 20 to move axially.

[0041] Therefore, when the driving shaft 111 rotates in the first rotating direction S1, the roller brush 20 may be driven to move axially away from the driving means 11 (in the first direction A1) to be off the preset mounting position, and when the driving shaft 111 rotates in the second rotating direction S2, the roller brush 20 may be driven to move axially to the driving means 11 (in the second direction A2) to the preset mounting position.

[0042] It can be understood that in the present embodiment, when the rotating speed of the driving means 11 is enough, the roller brush 20 may move from the initial position (the position where the roller brush 20 just contact the driving shaft 111) to the preset mounting position with inertia, or, rotate from the preset mounting position to be completely off the driving shaft 111. The entire process only needs the user to place the roller brush 20 in the initial position where it is contacted with the driving shaft 111, and thus the difficulty of user operation is lowered a lot, and assembling and disassembling would be convenient and labor-saving.

[0043] In addition, it should be noted that, on the premise that the rotating speed of the driving means 11 meets the rotating speed requirements for the roller brush 20 to move from the initial position to the preset mounting position, the rotating speed of the driving means 11 should not be too large, in order to avoid the roller brush 20 suddenly moving in the axial direction at an excessively large speed to collide with the floor brush body 10, causing damage to the components. Those skilled in the art may specifically determine the rotating speed of the driving means 11 according to actual situations.

Embodiment 2

[0044] The present embodiment is substantially the same as Eobiment 1, except the structure between the

driving shaft 111 and the roller brush 20, to provide another structure to drive the driving shaft 111 of the driving means 11 rotate to drive the roller brush 20 to move relatively to the driving shaft 111 to the preset mounting position, and to be off the preset mounting position.

[0045] FIG. 4 is a schematic view of the state in which a roller brush disengages from a driving shaft provided by another embodiment of the present disclosure; and FIG. 5 is a schematic diagram of the state in which a roller brush and a driving shaft are tightly engaged by a tensioning structure, and the roller brush is in a preset mounting position with respect to the driving shaft, provided by another embodiment of the present disclosure. In some alternative embodiments, a tensioning structure may be provided between the driving shaft 111 and the hollow portion 21 of the roller brush 20, and the tensioning structure 30 may include a ratchet 31 and a roller holder 32, a plurality of rollers 33 is movably provided on the roller holder 32, each of the rollers 33 may float in the radial direction, and is rotatable on the roller holder 32. The ratchet 31 may be sleeved on the driving shaft 111, and the roller holder 32 is sleeved outside of the ratchet 31.

[0046] When the driving shaft 111 of the driving means 11 rotates in the second rotating direction S2, the ratchet 31 is driven to rotate to the highest point of the ratchet 31 to contact the rollers 33 and the inner wall of the hollow portion 21 of the roller brush 20, and the roller brush 20 is in the preset mounting position. As shown in FIG. 5, when the driving shaft 111 rotates clockwise, the ratchet 31 fixed on the driving shaft 111 rotates clockwise, so that the rollers 33 on the roller holder 32 to be clamped between the high point of the ratchet 31 and the inner wall of the hollow portion 21 of the roller brush 20. When the roller brush 20 performs normal cleaning, the rotational directions of the driving shaft 111 and the roller brush 20 are also the second rotating direction S2 (clockwise direction as shown in FIG. 5), and thus, during the normal operation of the cleaning device, the clamping power among the roller brush 20, the roller holder 32 and the driving shaft 111 is increasing, enabling them to be reliably fixed.

[0047] Further, in order to facilitate the assembly of the roller brush 20 and further reduce the difficulty of assembling the roller brush 20, an elastic recovery part may be provided between the roller holder 32 and the ratchet 31, so that when the roller brush 20, the roller holder 32 and the ratchet 31 are in a unclamped state, the rollers 33 on the roller holder 32 may always be at the lowest point of the ratchet 31, to avoid the assembling restriction of the roller brush 20 when the roller brush 20 is initially assembled. During the assembling of the roller brush 20 onto the driving shaft 111, the user may directly insert the roller brush 20 axially onto the driving shaft 111, and sleeve it outside the roller holder 32 (as shown in FIG. 5, at this time, there is a gap between the rollers 33 on the roller holder 32 and the roller brush 20), and then actuate the driving means 11 to drive the driving shaft 111 to rotate

clockwisely (in the second rotating direction S2), so that the driving shaft 111, the roller holder 32 and the roller brush 20 are clamped together, and the roller brush 20 is firmly assembled at the preset mounting position.

[0048] When the cleaning with the cleaning device is completed, the roller brush 20, rollers 33 and ratchet 31 are still in a clamped state, and when it is time to disassemble the roller brush 20 from the driving shaft 111, the driving means 11 may be actuated, as shown in FIG. 4, so that when the driving shaft 111 rotates in the first rotating direction S 1, the ratchet 31 is driven to rotate to the lowest point of the ratchet 31 and contact with the rollers 33. The rollers 33 is disengaged from the inner wall of the hollow portion 21 of the roller brush 20, and the roller brush 20 is off the preset mounting position, and at this time, the roller brush 20 may be removed axially from the driving means 11 (in the second direction A1).

[0049] With the technical solution provided by the present embodiment, it is possible to assemble or disassemble the roller brush 20 quickly by controlling the driving shaft 111 to rotate in different directions, which only needs users to move the roller brush 20 axially, without applying a large force. It can effectively achieve the purpose of labor-saving operation and rapid disassembly/assembly.

[0050] On the basis of any embodiment described above, the other end of the floor brush body 10 may be provided with a avoiding space for the movement of the roller brush 20, so that the roller brush 20 may be shifted axially. With the avoiding space, no influences would be applied on the axial translation of the roller brush 20, and it is convenient for users to operate.

[0051] Specifically, as shown in FIG. 2, it is preferred that the end of the floor brush body 10 away from the driving means 11 may be an open end, the open end forms the avoiding space described above. That is to say, there is no shelding by a shell part of the floor brush body 10 at the open end, so as to provide a space for the roller brush 20 to move axially.

[0052] In some alternative embodiments, it is obvious that, the end of the floor brush body 10 away from the driving means 11 may be a close end, but there may be a penetration hole (not shown in the figures) capable of providing free penetration of the roller brush 20. The cross-section of the penetration hole may be greater than or equal to the cross-section of the roller brush 20, so that the roller brush 20 can move axially in the penetration hole.

[0053] In order to further improve the stability of the connection between the roller brush 20 and the floor brush body 10, as shown in FIG. 1 and FIG.2, the other end of the floor brush body 10 is provided with a connecting part 101, the roller brush 20 is provided with a connecting piece 201, and the connecting part 101 is detachably connected to the connecting piece 201. In particular, when the end of the floor brush body 10 away from the driving means 11 is an open end, the thickness

of the connecting piece 201 on the roller brush 20 may be as thin as possible as long as it meets the strength requirements. Therefore, the distance between the end of the roller brush 20 and the side wall parallel to the movement direction of the floor brush body 10 may be as small as possible, when the roller brush 20 is in the assembled state and the cleaning device is performing the cleaning. And thus the roller brush 20 can clean the area on a side of the roller brush 20, to reduce the dead corners in cleaning, and improve the cleaning effect.

[0054] The disassembly direction of the connecting part 101 and the connecting piece 201 is parallel to the axial direction. In this way, while the roller brush 20 moves in the axial direction, the assembly or disassembly between the connecting part 101 and the connecting piece 201 may be implemented. To Users, it is only necessary to operate the roller brush 20 to move axially, without other operations required, and thus the disassembly and assembly of the roller brush 20 are extremely simple, and the user experience is greatly improved.

[0055] As shown in FIG. 2 and FIG. 3, the connecting part 101 may be in a shape of a boss, the edge of the connecting piece 201 has a positioning wall 2011, and the positioning wall 2011 cooperates with the side wall 1011 of the boss to position the connecting part 101 with respect to the connecting piece 201. With the cooperation of the positioning wall 2011 of the connecting piece 201 and the side wall 1011 of the connecting part 101, the fixing between the connecting part 101 and the connecting piece 201 is more stable. The connecting part 101 and the connecting piece 201 are not only constrained in the direction parallel to the axial direction, but also difficult to be shaken in other directions. Even if the roller brush 20 vibrates during use, affects would be hardly applied to the stability of the connection between the connecting part 101 and the connecting piece 201.

[0056] In one preferred embodiment, one end of the connecting piece 201 may be rotatably connected to the roller brush 20, and the other end of the connecting piece 201 may be magnetically connected with the connecting part 101. One end of the connecting piece 201 is rotatably connected to the roller brush 20. Specifically, a bearing may be provided between the connecting piece 201 and the roller brush 20. The rotation of the roller brush 20 will apply no influence on the position of the connecting piece 201, during normal working. Thus, a stable connection can be also maintained between the connecting piece 201 and the connecting part 101. The magnetic connection between the other end of the connecting piece 201 and the connecting part 101 makes the connection therebetween simple and easy to disassemble and assemble. Further, before the connecting piece 201 arrives at the magnetic connection position of the connecting part 101, due to the fact that magnetic power is effective within a certain range, with the application of the magnetic power, the connecting piece 201 tends to move towards the connecting part 101, so that the connecting piece 201 can be quickly positioned and connected with the con-

necting part 101.

[0057] Herein, it should be noted that the "one end" and "other end" of the connecting piece 201 are only used to define the position of the connection point of the connecting piece 201, and should not be understood as limitation on the shape of the connecting piece 201 to be in a long structure. In the present embodiment, the structural shape of the connecting piece 201 may be any shape, for example, it may be a long bar, a circle, a square, an oval, a triangle, etc.. There is no limitation thereon in the present embodiment.

[0058] It is obvious that, in order to save cost and space, in the preferred embodiments of the present disclosure, as shown in FIG. 1 ~ FIG. 3, the connecting piece 201 is in a shape of a long bar.

[0059] Regarding the structure of magnetic connection between the connecting part 101 and the connecting piece 201, specifically, as shown in FIG. 1 ~ FIG. 3, the connecting part 101 is provided with a first magnetic piece, and the connecting piece 201 is provided with a second magnetic piece; at least one of the connecting piece 201 and the connecting part 101 is provided with a protrusion 2012, and the other one of the connecting piece 201 and the connecting part 101 is provided with a groove 1011 matched with the protrusion 2012. When the protrusion 2012 and groove 1011 are in a preset engaging position, the first magnetic piece is connected to the second magnetic piece. In the present embodiment, preferably, the connecting piece 201 is provided with a protrusion 2012, and the groove 1011 is provided on the connecting part 101. When the connecting piece 201 and the connecting part 101 is contacted, the protrusion 2012 of the connecting piece 201 is inserted into the groove 1011 so that the relative positioning between the connecting piece 201 and the connecting part 101 is more accurate. When the protrusion 2012 and the groove 1011 are in the preset engaging position (when the protrusion 2012 arrives at the bottom of the groove 1011), the first magnetic piece and the second magnetic piece are just contacted and connected with each other, and at this time, the connecting piece 201 and the connecting part 101 arrive at the final and most stable fixed position.

[0060] In one preferred embodiment, the first magnetic piece is disposed in the groove 1011, and at least part of the protrusion 2012 forms the second magnetic piece. Specifically, the first magnetic piece may be located at the bottom end of the groove 1011, and part of the protrusion 2012 may be made of magnetic material, so that the part of the protrusion 2012 forms the second magnetic piece. Alternatively, the protrusion 2012 may be the second magnetic piece as a whole, or even the entire connecting piece 201 may be the second magnetic piece. More particularly, the first magnetic piece may be a magnet, the second magnetic piece may be a metal material attractable by the magnet, and the connecting piece 201 may be made of materials such as stainless steel, iron, nickel, cobalt, etc. as a whole. It is obvious that, in some other embodiments, the first magnetic piece may be a

metal material attractable by a magnet, and the second magnetic piece may be a magnet.

[0061] Furthermore, as shown in FIG. 1, the open end may be provided with a concave portion 1012, and the connecting part 101 may be disposed in the concave portion 1012. In a state that the connecting part 101 is connected to the connecting piece 201, the outer surface of the connecting part 101 may be lower than the concave portion 1012, or, the outer surface of the connecting part 201 is flush with the top surface of the concave portion 1012, in the axial direction of the roller brush 20. More particularly, the outer surface of the connecting piece 201 herein refers to a side of the connecting piece 201 away from the roller brush 20. In a state that the connecting part 101 is connected to the connecting piece 201, that is to say, in a state that the roller brush 20 is assembled, the outer surface of the connecting part 101 is lower than the concave portion 1012, or flush with the top surface of the concave portion 1012. Thus, in the axial direction, the connecting part 101 will not protrude from the concave portion 1012, so that the overall structure may be more compact, the side size is reduced, and the overall appearance of the floor brush body 10 looks more flat and beautiful.

[0062] Furthermore, in order to facilitate operation, the floor brush body 10 may be provided with an operation switch 102, which is electrically connected to the driving means 11, and in a state that the operation switch 102 is turned on, the driving means 11 drives the roller brush 20 to rotate in the second rotating direction S2. Specifically, the operation switch 102 may be a button, and the driving means 11 drives the roller brush 20 off the preset mounting position as long as the user triggers the operation switch 102.

[0063] It should be noted that when the driving shaft 111 and the roller brush 20 are in the helically-engaging structure and the rotating speed of the driving means 11 meets the requirements, the driving shaft 111 may fully drive the roller brush 20 to be automatically assembled in place in the axial direction, or drive the roller brush 20 to be automatically and completely off the driving shaft 111, as long as the user release the roller brush 20 once the roller brush 20 contacts with the driving shaft 111. The entire assembly and disassembly process may be completely automatic, and the difficulty of operation is greatly reduced, and assembly and disassembly may be quick and convenient.

Embodiment 3

[0064] The present disclosure further provides a roller brush disassembly/assembly method, including the following steps:

controlling a driving shaft of a driving means to rotate in a first rotating direction so that the roller brush moves relatively to the driving shaft to be off a preset mounting position.

[0065] More particularly, the first rotating direction is

opposite to the rotating direction in which the roller brush performs cleaning.

[0066] Further, the method further includes: controlling the driving means to rotate in a second rotating direction S2 so that the roller brush moves relatively to the driving shaft to a preset mounting position, and the second rotating direction S2 is the rotating direction in which the roller brush performs cleaning.

[0067] The main body implementing the roller brush disassembly/assembly method provided in the present embodiment may be a control device, which may be electrically connected to the driving means 11 to control the speed and steering of the driving shaft 111 of the driving means 11. Under the control by the control device for the driving shaft 111 to rotate in different directions, the roller brush 20 may be automatically assembled to the driving shaft 111, or the roller brush 20 is released from the driving shaft 111, so that the roller brush 20 may be taken out axially.

Embodiment 4

[0068] In an embodiment of the present disclosure, the floor brush may be applied to cleaning devices, including but not limited to cleaning machines, sweeping robots, vacuum cleaners etc.. Accordingly, embodiments of the present disclosure further provide a cleaning device. With reference to FIG. 6, the cleaning device provided by the present embodiment includes a body 200, and the floor brush 100 provided in the above embodiments. The floor brush 100 and the body 200 may be rotatably connected. The floor brush 100 includes a floor brush body 10 and a roller brush 20. One end of the floor brush body 10 is provided with a driving means 11, and one end of the roller brush 20 is drivable-connected to the driving means 11. The driving means 11 may include a motor, the driving means 11 may be provided with a driving shaft 111, and the roller brush 20 may be drivable-connected to the driving shaft 111, so that the driving means 11 may drive the roller brush 20 to rotate.

[0069] In the present embodiment, the driving shaft 111 of the driving means 11 may rotate in a first rotating direction S 1, so that the roller brush 20 moves relatively to the driving shaft 111 and is off a preset mounting position, and the first rotating direction S is opposite to the rotating direction in which the roller brush 20 performs cleaning. The driving shaft 111 of the driving means 11 may rotate in a second direction S2, so that the roller brush 20 moves relatively to the driving shaft 111 to the preset mounting position. The second rotating direction S2 is the rotating direction in which the roller brush 20 performs cleaning.

[0070] Reference could be made to the description on the floor brush in the above embodiment for structure and function of the floor brush in the cleaning device provided by the present embodiment and thus the description would be omitted in the present embodiment to avoid redundancy.

Embodiment 5

[0071] The present embodiment provides a floor brush for manually assembling and disassembling the roller brush 20, the assembling and disassembling process thereof does not require the driving by the driving means 11, but the roller brush 20 may be quickly disassembled and assembled with labor-saving. Specifically, as shown in FIG.1 ~ FIG. 3, the floor brush of the present embodiment includes:

a floor brush body 10, one end of which is provided with a driving means 11; and a roller brush 20, one end of which is drivable-connected to the driving means 11. One end of the roller brush 20 is provided with a hollow portion 21; a driving shaft 111 is inserted into the hollow portion 21, and the driving shaft 11 is helically engagable with the inner wall of the hollow portion 21.

[0072] In the present embodiment, the roller brush 20 and the driving shaft 111 are helically engagable, the driving shaft 111 may rotate under the application of external force, thus, when the user pushes the roller brush 20 to the direction of the driving means 11 axially, the roller brush 20 may drive the driving shaft 111 to rotate in a second rotating direction S2, so that the roller brush 20 finally arrives at the preset mounting position with respect to the driving shaft 111. And, when the user pulls the roller brush 20 away from the driving means 11 axially, the driving shaft 111 may rotate in a first rotating direction S 1, so that the roller brush 20 is finally off the preset mounting position relatively to the driving shaft 111. The whole process only requires the user to push or pull the roller brush 20 axially, without too many operations, and the operation is simple and not cumbersome, which greatly improves the user experience.

[0073] It should be noted that, structure and function of the floor brush in the present embodiment are the same as the above Embodiment 1 and Embodiment 2, except the way of the driving means 11 driving the roller brush 20 to rotate to make the roller brush 20 to move axially, description could refer to the above embodiments, and will be omitted herein to avoid redundancy.

Embodiment 6

[0074] Embodiments of the present disclosure further provide another cleaning device, with reference to FIG. 6, the cleaning device provided by the present embodiment includes a body 200, and the floor brush 100 provided in the above embodiments. The floor brush 100 and the body 200 may be rotatably connected. The floor brush 100 includes a floor brush body 10 and a roller brush 20. The floor brush body 10, one end of the floor brush body 10 is provided with a driving means 11; the roller brush 20, one end of the roller brush 20 is drive-connected to the driving means 11. One end of the roller brush 20 is provided with a hollow portion 21; a driving shaft 111 is inserted into the hollow portion 21, and the driving shaft 11 is helically engagable with the inner wall

of the hollow portion 21.

[0075] Reference could be made to the description of the floor brush in the above embodiments for the structure and function of the floor brush in the cleaning device provided by the present embodiment, description thereof will be omitted herein to avoid redundancy.

[0076] In connection with specific application scenarios, explanation would be made below on the technical solution adopted by the present disclosure for better understanding.

Application scenario 1

[0077] When the cleaning machine completes the cleaning, there are much stains and dirt on the roller brush 20, and the user wants to clean the roller brush 20.

[0078] First, the user places the floor brush 100 on the floor or a plate, and then presses the operation switch 102 on the floor brush body 10, the driving means 11 (motor) is turned on, and the driving shaft 111 rotates rapidly in the first rotating direction, the roller brush 20 is pushed out away from the driving means 11 axially, under the action of the helically engaged structure on the driving shaft 111, and the roller brush 20 automatically disengages from the driving shaft 111.

[0079] At the same time, during the roller brush 20 disengages from the driving shaft 111, the connecting piece 201 on the roller brush 20 overcomes the magnetic suction power applied by the connecting part 101 of the floor brush body 10 and disengages from the floor brush body 10, so that the user may take away the roller brush 20 to clean and maintain the roller brush 20 separately.

[0080] When the roller brush 20 is cleaned, the user puts the hollow portion 21 of the roller brush 20 to be engaged with the driving shaft 111, and then turns the cleaning device on, the driving shaft 111 of the driving means 11 rotates in the second rotating direction, under the action of the helically engaged structure between the driving shaft 111 and the roller brush 20, the roller brush 20 is automatically sucked to the side where the driving means 11 is located, and is firmly fixed in the preset mounting position.

[0081] At the same time, the connecting piece 201 on the roller brush 20 is engaged to the preset mounting position quickly, under the action of the magnetic suction of the connecting part 101 of the floor brush body 10. During the normal cleaning of the roller brush 20, the driving means 11 is still rotating in the second rotating direction, the tension between the roller brush 20 and the driving shaft 111 is increasing, and the cooperation between the two is getting tighter and tighter to ensure that the roller brush 20 is always connected to the driving means 11 when it works normally.

Application scenario 2

[0082] When the cleaning machine completes the cleaning, there are much stains and dirt on the roller

brush 20, and the user wants to clean the roller brush 20.

[0083] First, the user places the floor brush 100 on the floor or a plate, and then presses the operation switch 102 on the floor brush body 10, the driving means 11 (motor) is turned on, the driving shaft 111 rotates rapidly in the first rotating direction, the ratchet 31 on the driving shaft 111 rotates, until the rollers 33 is in contact with the lowest position of the ratchet 31, a gap is formed between the rollers 33 and the inner wall of the hollow portion 21 of the roller brush 20, and then the user may directly take out the roller brush 20 axially away from the driving means 11.

[0084] At the same time, during the roller brush 20 is removed axially, the connecting piece 201 on the roller brush 20 overcomes the magnetic suction power applied by the connecting part 101 of the floor brush body 10 and disengages from the floor brush body 10, so that the user may take away the roller brush 20 to clean and maintain the roller brush 20 separately.

[0085] When the roller brush 20 is cleaned, the user sleeves the hollow portion 21 of the roller brush 20 outside the roller holder 32 of the driving shaft 111, and then turns the cleaning device on, the driving shaft 111 of the driving means 11 rotates in the second rotating direction, and the ratchet 31 on the driving shaft 111 rotates in the second rotating direction, so that the ratchet 31 is clamped with the rollers 33 and the inner wall of the hollow portion 21 of the roller brush 20 at the highest point thereof, and the roller brush 20 is firmly fixed in the preset mounting position. At the same time, the connecting piece 201 on the roller brush 20 is quickly sucked to reach the preset mounting position, under the magnetic suction of the connecting part 101 of the floor brush body 10. During the normal cleaning of the roller brush 20, the driving means 11 is still rotating in the second rotating direction, the tension between the roller brush 20 and the driving shaft 111 is increasing, and the cooperation between the two is getting tighter and tighter to ensure that the roller brush 20 is always connected to the driving means 11 when it works normally.

Application scenario 3

[0086] When the cleaning machine completes the cleaning, there are much stains and dirt on the roller brush 20, and the user wants to clean the roller brush 20.

[0087] First, it should be ensured that the cleaning machine is in a shutdown state. The user places the floor brush 100 on a pallet or the floor, grasps the roller brush 20 or holds the connecting piece on the roller brush 20, and directly pulls the roller brush 20 out of the driving means 11 axially. During the pull-out process, the driving shaft 111 rotates in the first rotating direction under the action of the roller brush 20 to provide a space for the roller brush 20 to be taken out. At the same time, during the roller brush 20 is removed axially, the connecting piece 201 on the roller brush 20 overcomes the magnetic suction power applied by the connecting part 101 of the

floor brush body 10 and disengages from the floor brush body 10, so that the user may take away the roller brush 20 to clean and maintain the roller brush 20 separately.

[0088] When the roller brush 20 is cleaned, the user directly moves the roller brush 20 axially in the direction close to the driving means 11, the hollow portion 21 of the roller brush 20 is sleeved outside the driving shaft 111, under the action of the helically engaged structure between the driving shaft 111 and the roller brush 20, the roller brush 20 drives the driving shaft 111 to rotate in the second rotating direction, and the roller brush 20 moves in a straight line to the preset mounting position to be engaged with the driving shaft 111.

[0089] At the same time, the connecting piece 201 on the roller brush 20 is sucked to reach the preset mounting position quickly, under the magnetic suction of the connecting part 101 of the floor brush body 10. During the normal cleaning of the roller brush 20, the driving means 11 is still rotating in the second rotating direction, the tension between the roller brush 20 and the driving shaft 111 is increasing, and the cooperation between the two is getting tighter and tighter to ensure that the roller brush 20 is always connected to the driving means 11 when it works normally.

[0090] It should be understood that the term "and/or" as used herein is only an association relationship to describe the associated object, indicating that there can be three kinds of relationships, for example, A and / or B, which can mean: A alone, A and B at the same time, and B alone. In addition, the character "/" in this specification generally indicates that the associated object therebefore or thereafter has an "or" relationship therewith.

[0091] Without contradictory, those skilled in the art may combine the features of different embodiments or examples described in the present specification and different embodiments or examples.

[0092] Finally, it should be noted that the above embodiments are only used to illustrate the technical solution of the present disclosure, not to limit it. Although the present disclosure is described in detail with reference to the foregoing embodiments, those of ordinary skill in the art should understand: it may still modify the technical solutions described in the foregoing embodiments, or replace some of the technical features equivalently. And these modifications or replacements do not depart the essence of the corresponding technical solutions from the spirit and scope of the technical solutions of each embodiment of the present disclosure.

Claims

1. A floor brush, comprising:

a floor brush body; and
a roller brush, provided in the floor brush body;
wherein the floor brush body is provided with an open end for movement of the roller brush so

that the roller brush is shiftable axially;

the floor brush body is provided with a connecting part, the roller brush is provided with a connecting piece, one end of the connecting piece is rotatably connected to the roller brush, and the other end of the connecting piece is magnetically connected with the connecting part.

2. The floor brush according to claim 1, wherein a disassembling direction of the connecting piece from the connecting part is parallel to an axial direction.

3. The floor brush according to claim 1, wherein the connecting part is provided with a first magnetic piece, and the connecting piece is provided with a second magnetic piece;

at least one of the connecting piece and the connecting part is provided with a protrusion, and the other one of the connecting piece and the connecting part is provided with a groove engageable with the protrusion; and
when the protrusion and the groove are at a preset engaging position, the first magnetic piece is stuck with the second magnetic piece.

4. The floor brush according to claim 3, wherein the open end is provided with a concave portion, and the connecting part is disposed in the concave portion;
in a state in which the connecting part is connected to the connecting piece, an outer surface of the connecting piece is lower than the concave portion, or the outer surface of the connecting piece is flush with a top surface of the concave portion, in the axial direction of the roller brush.

5. A floor brush, comprising:

a floor brush body, one end of which is provided with a driving means; and
a roller brush, one end of which is drivably-connected to the driving means;
a driving shaft of the driving means is configured to rotate in a first rotating direction, so that the roller brush moves relatively to the driving shaft to be off a preset mounting position; and the first rotating direction is opposite to the rotating direction in which the roller brush performs cleaning.

6. The floor brush according to claim 5, wherein the driving shaft of the driving means is configured to rotate in a second rotating direction, so that the roller brush moves relatively to the driving shaft to the preset mounting position; and
the second rotating direction is the rotating direction in which the roller brush performs cleaning.

7. The floor brush according to claim 5, wherein when the driving shaft of the driving means rotates in the first rotating direction, the roller brush is driven to move axially in a first direction; and

when the driving shaft of the driving means rotates in the second rotating direction, the roller brush is driven to move axially in a second direction;
wherein the first direction is a direction in which the roller brush moves away from the driving means, and the second direction is a direction in which the roller brush moves closely to the driving means.

8. The floor brush according to claim 7, wherein one end of the roller brush is provided with a hollow portion, the driving shaft is inserted into the hollow portion, and the driving shaft is helically engagable with an inner wall of the hollow portion.

9. The floor brush according to claim 6, wherein one end of the roller brush is provided with a hollow portion, a tension structure is provided between the driving shaft and the roller brush, and the tension structure includes:

a ratchet, sleeved on the driving shaft; and
a roller holder, provided with a plurality of rollers which are movable thereon, each of the rollers is provided to be floatable in a radial direction, and rotatable on the roller holder, the roller holder is sleeved outside the ratchet, and the roller brush is configured to sleeve outside the roller holder;
when the driving shaft rotates in the first rotating direction, the ratchet is driven to rotate to a lowest point of the ratchet to contact the rollers, the rollers are disengaged from an inner wall of the hollow portion of the roller brush, and the roller brush is off the preset mounting position; and
when the driving shaft rotates in the second rotating direction, the ratchet is driven to rotate to a highest point of the ratchet to contact the rollers and the inner wall of the hollow portion of the roller brush, and the roller brush at in the preset mounting position.

10. The floor brush according to claim 6, wherein the other end of the floor brush body is provided with an avoiding space for movement of the roller brush so that the roller brush is shiftable axially.

11. The floor brush according to claim 10, wherein the other end of the floor brush body is an open end to form the avoiding space;
or, the other end of the floor brush body is provided with a penetration hole for movement of the roller

brush, and the penetration hole forms the avoiding space.

12. The floor brush according to claim 11, wherein the other end of the floor brush body is provided with a connecting part, the roller brush is provided with a connecting piece, and the connecting part is detachably connected to the connecting piece; and the disassembling direction of the connecting piece from the connecting part is parallel to the axial direction.

13. The floor brush according to claim 12, wherein one end of the connecting piece is rotatably connected to the roller brush, and the other end of the connecting piece is magnetically stuck with the connecting part.

14. The floor brush according to claim 13, wherein the connecting part is provided with a first magnetic piece, and the connecting piece is provided with a second magnetic piece;

at least one of the connecting piece and the connecting part is provided with a protrusion, and the other one of the connecting piece and the connecting part is provided with a groove engagable with the protrusion; and
when the protrusion and the groove are in a preset engaging position, the first magnetic piece is stuck with the second magnetic piece.

15. The floor brush according to claim 12, wherein the open end is provided with a concave portion, and the connecting part is disposed in the concave portion;
in a state in which the connecting part is connected to the connecting piece, an outer surface of the connecting piece is lower than the concave portion, or, the outer surface of the connecting piece is flush with the top surface of the concave portion, in the axial direction of the roller brush.

16. The floor brush according to any one of claims 1 to 15, wherein the floor brush further comprises an operation switch, which electrically connects to the driving means, and in a state in which the operation switch is on, the driving means drives the roller brush to rotate in the first rotating direction.

17. A roller brush disassembly/assembly method, comprising:

controlling a driving shaft of a driving means located at one end of a floor brush body to rotate in a first rotating direction so that the roller brush moves relatively to the driving shaft to be off a preset mounting position;

wherein the first rotating direction is opposite to the rotating direction in which the roller brush performs cleaning.

18. A cleaning device, comprising a body and a floor brush, wherein the floor brush comprises:

a floor brush body, one end of which is provided with a driving means; and
a roller brush, one end of which is drivably-connected to the driving means;
a driving shaft of the driving means is rotatable in a first rotating direction, so that the roller brush moves relatively to the driving shaft to be off a preset mounting position, and the first rotating direction is opposite to the rotating direction in which the roller brush performs cleaning.

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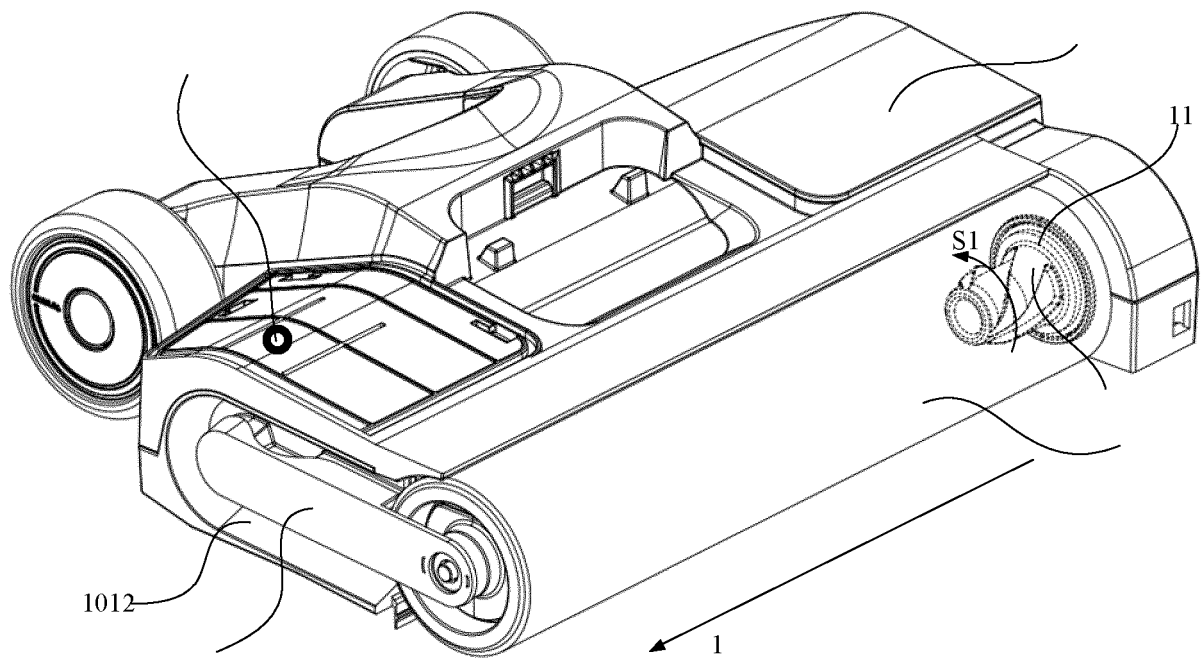


FIG. 1

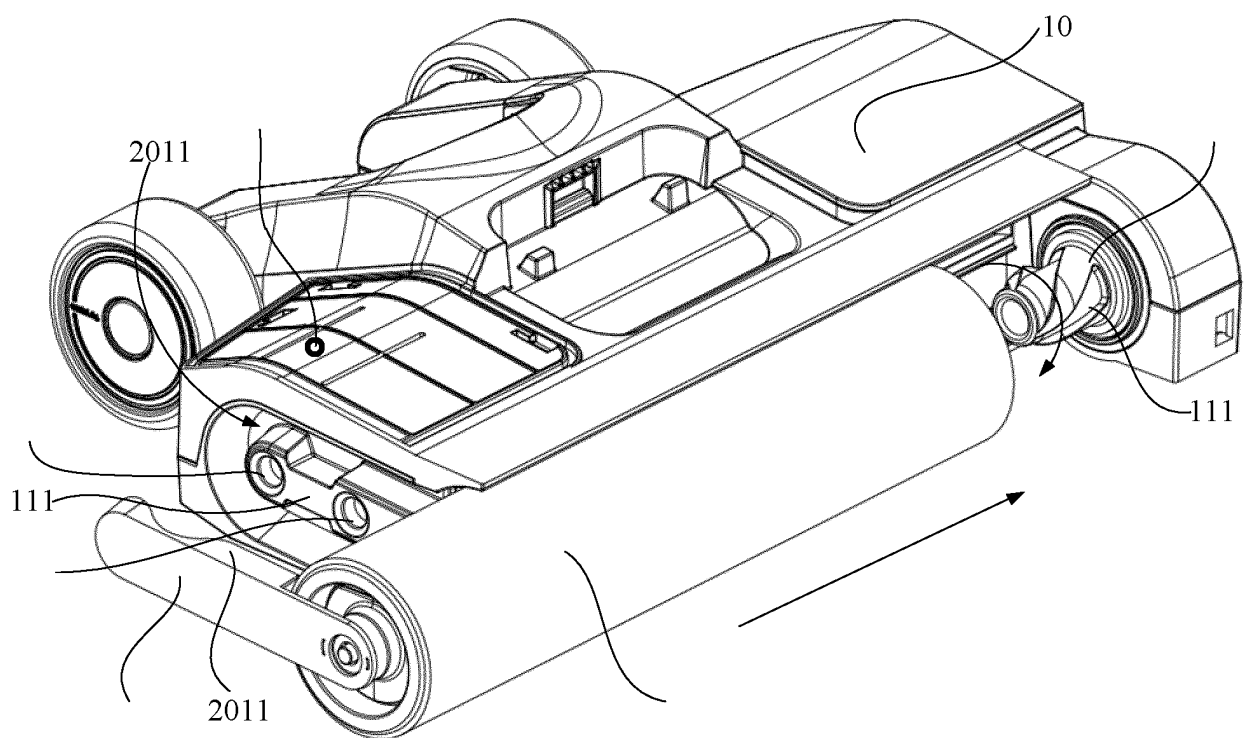


FIG. 2

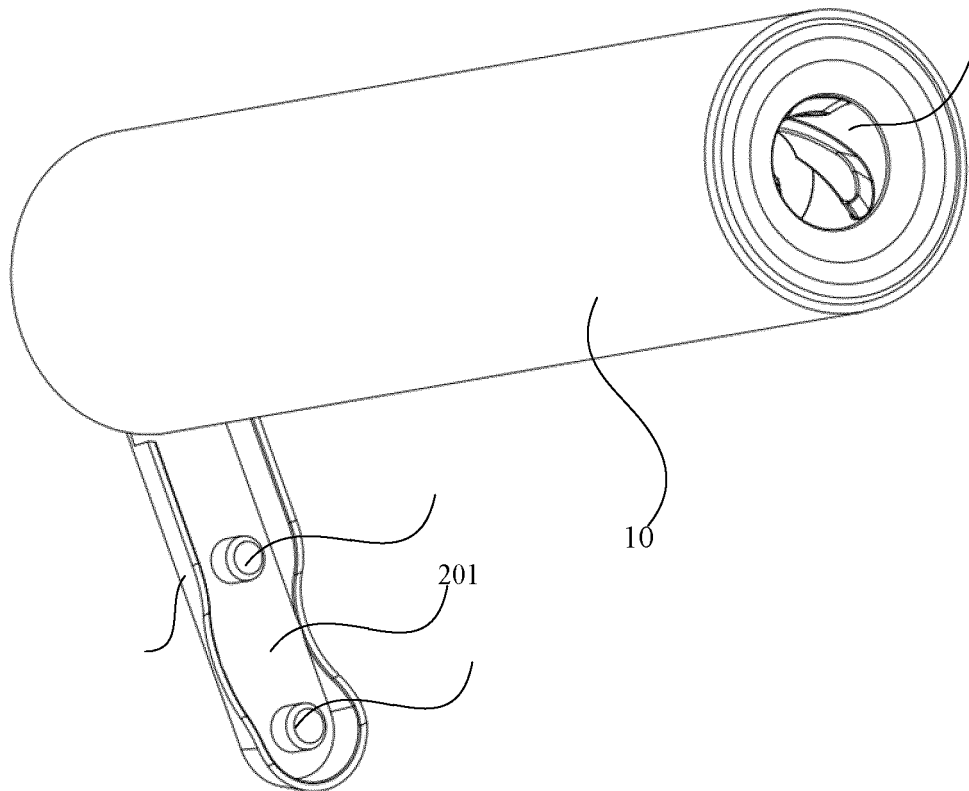


FIG. 3

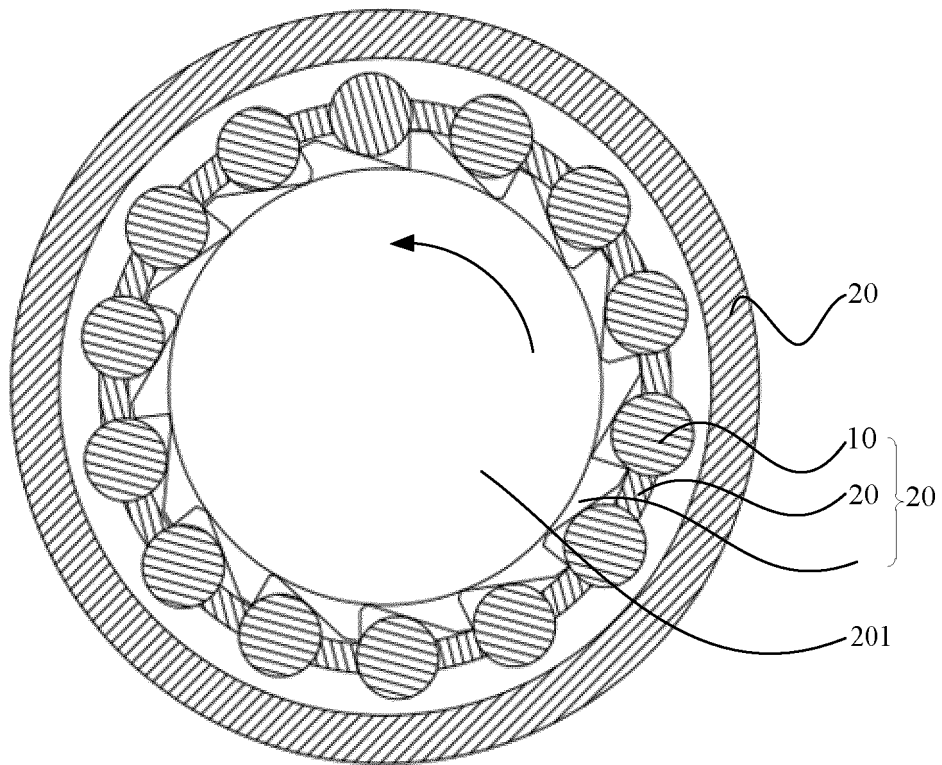


FIG. 4

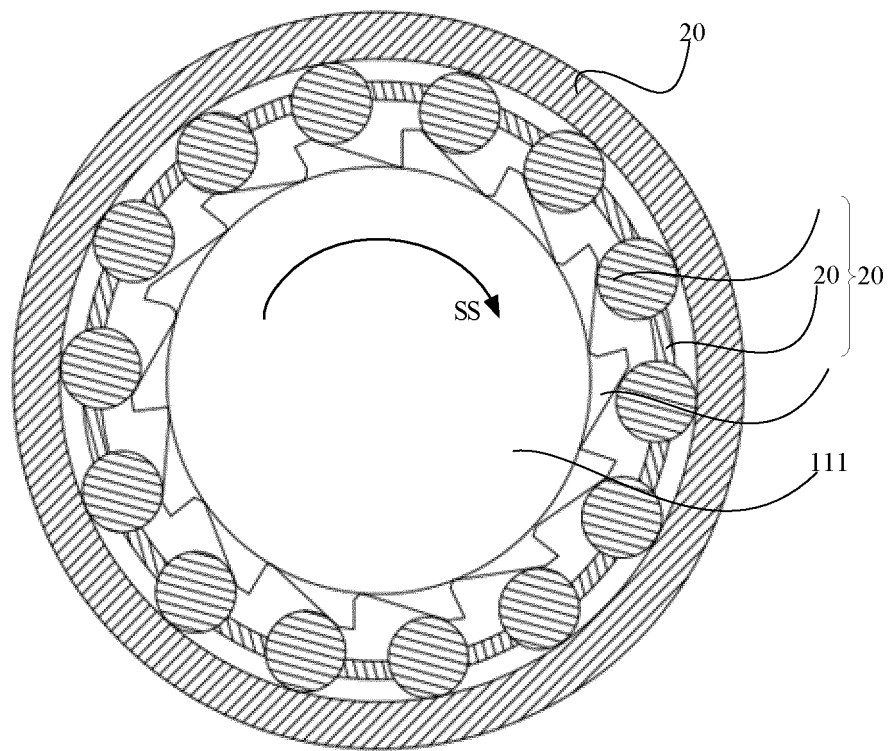


FIG. 5

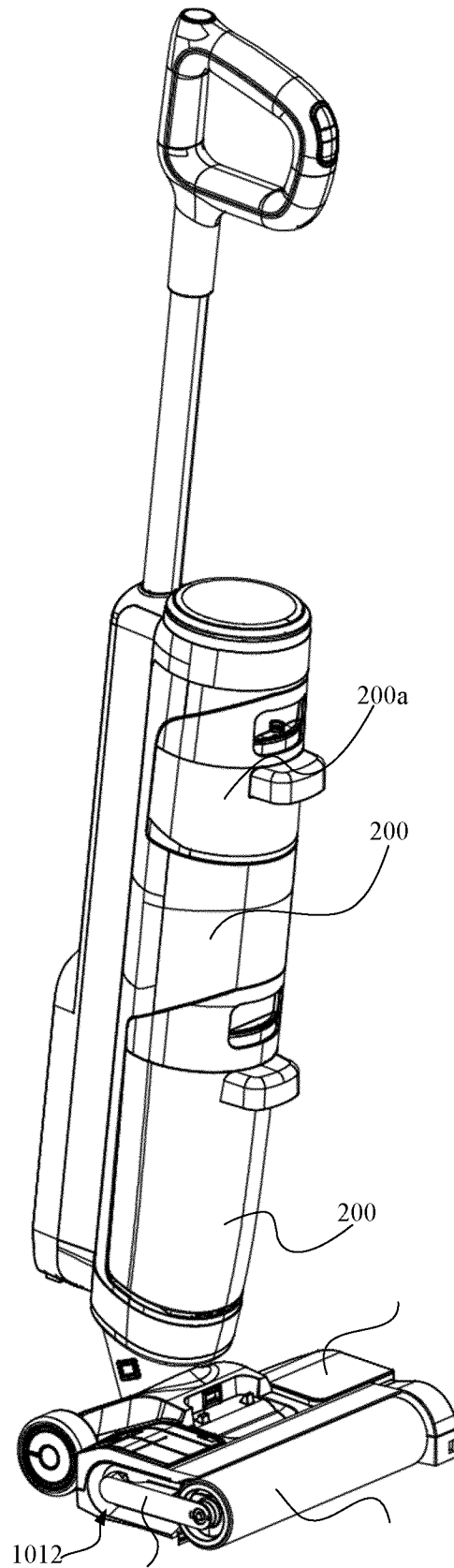


FIG. 6

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2021/128757

A. CLASSIFICATION OF SUBJECT MATTER

A47L 11/40(2006.01)i

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A47L11; A47L9

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

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

CNTXT, ENTXT, VEN, USTXT, WOTXT, EPTXT, CNKI: 地刷, 滚刷, 辊刷, 刷辊, 拆, 更换, 轴向, 横向, 平行, 端盖, 盖子, 旋转, 转动, 方向, 磁, 吸合, 凹部, 凹槽, 凸, 突起, brush??, roller ?, cover, cap, direction, rotat+, lock+, axial, horizontal, magnet, groove, bulge

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
PX	CN 112401769 A (TIANKE INTELLIGENT TECHNOLOGY CO., LTD.) 26 February 2021 (2021-02-26) description, paragraphs 60-115, and figures 1-6	1-18
X	CN 208573584 U (XIAOGOU ELECTRICAL APPLIANCE INTERNET TECHNOLOGY BEIJING CO., LTD.) 05 March 2019 (2019-03-05) description, paragraphs 40-44, and figures 1-12	1-4
X	CN 111759223 A (TIANKE INTELLIGENT TECHNOLOGY CO., LTD.) 13 October 2020 (2020-10-13) description, paragraphs 53-87, and figures 1-10	1-4
X	CN 209059041 U (JIANGSU MIDEA CLEANING APPLIANCES CO., LTD. et al.) 05 July 2019 (2019-07-05) description, paragraph 81 - paragraph 95, figures 34-38	5-11, 16-18
Y	CN 209059041 U (JIANGSU MIDEA CLEANING APPLIANCES CO., LTD. et al.) 05 July 2019 (2019-07-05) description, paragraph 81 to paragraph 95, figures 34-38	12-15

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

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"P" document published prior to the international filing date but later than the priority date claimed

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

30 December 2021

Date of mailing of the international search report

20 January 2022

Name and mailing address of the ISA/CN

China National Intellectual Property Administration (ISA/
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100088, China

Facsimile No. (86-10)62019451

Authorized officer

Telephone No.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2021/128757

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	CN 208573584 U (XIAOGOU ELECTRICAL APPLIANCE INTERNET TECHNOLOGY BEIJING CO., LTD.) 05 March 2019 (2019-03-05) description, paragraphs 40-44, and figures 1-12	12-15
A	US 2020253438 A1 (RAYCOP KOREA INC.) 13 August 2020 (2020-08-13) entire document	1-18
A	JP 2013031508 A (MITSUBISHI ELECTRIC CORP. et al.) 14 February 2013 (2013-02-14) entire document	1-18

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/CN2021/128757

Patent document cited in search report			Publication date (day/month/year)	Patent family member(s)			Publication date (day/month/year)
CN	112401769	A	26 February 2021	None			
CN	208573584	U	05 March 2019	None			
CN	111759223	A	13 October 2020	None			
CN	209059041	U	05 July 2019	None			
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				JP	2020127699	A	27 August 2020
JP	2013031508	A	14 February 2013	JP	5673419	B2	18 February 2015

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

REFERENCES CITED IN THE DESCRIPTION

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