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(54) FLOOR BRUSH ASSEMBLLY AND CLEANING EQUIPMENT THEREOF

(57) A floor brush assembly and cleaning equipment with the floor brush assembly for cleaning surfaces to be cleaned. The forward direction of the floor brush assembly is the front and the opposite direction is the back. The floor brush assembly comprises a floor brush base, a roller brush (110) with a roller being arranged on the floor brush base, and a second scraping piece (300) which is arranged on the bottom of the floor brush base and in front of the roller brush and is provided with at least two second bumps (310) distributed at intervals along its length direction. At least the roller brush abuts on the surface to be cleaned when the roller brush abuts on the surface to be cleaned, with a second channel (H2) for dirt passing through being formed between the adjacent second bumps to make dirt reach the suction inlet of the floor brush base.

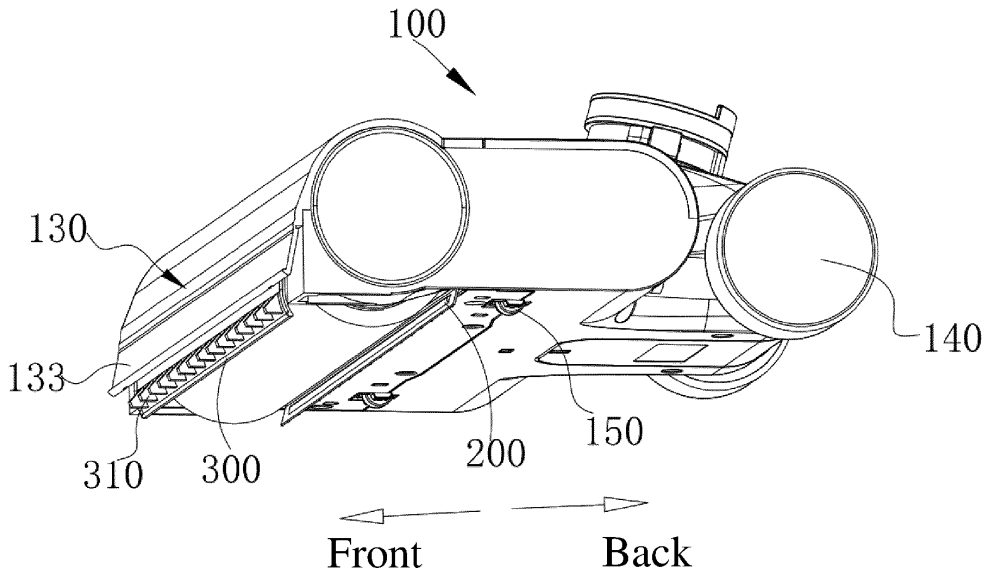

FIG. 1

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Description

BACKGROUND OF THE INVENTION

1. Field of the invention

[0001] The present invention generally relates to a floor washing machine and more particularly to a cleaning device with a brush assembly.

2. Description of Related Art

[0002] As people have higher requirements on cleaning and cleaning technologies improve constantly, various scrubbers come up with specific functions for floors covered by tiles, marbles and other hard materials. Typically, the scrubbers work with a motor which drives rotation of the roller brush to clean the floor. When the roller brush rotates, clean water flows out from the roller brush. In this way, the scrubbers wash and brush the floor at the same time and any dirty, grease and impurity will be cleared away. Then the brush bar and the vacuum suction inlet will suck in the sewage after cleaning.

[0003] However, for the existing floor scrubbers, when they move forward, it is required to turn up or lift up the floor brush assembly until the scraping bar on front of the floor brush assembly moves across the rubbish on the floor in the front to make the rubbish reach the front of the roller brush and be cleared away. The floor scrubbers have disadvantages in inconvenient use and unsatisfactory cleaning performance. Therefore, it is necessary to improve the existing technology and overcome the shortcomings therein.

[0004] So, an improved cleaning device is needed.

SUMMARY OF THE INVENTION

[0005] The technical issue to be solved by the present invention is to provide a floor brush assembly with satisfactory cleaning performance and convenient use, and cleaning equipment with the assembly.

[0006] A floor brush assembly for cleaning surfaces to be cleaned, with the forward direction of the floor brush assembly being the front and the opposite direction being the back. The floor brush assembly comprises a floor brush base, a roller brush with a roller being arranged on the floor brush base, and a second scraping piece which is arranged on the bottom of the floor brush base and in front of the roller brush and is provided with at least two second bumps distributed at intervals along its length direction. At least the roller brush abuts on the surface to be cleaned when the floor brush assembly moves forward and the interval between the adjacent second bumps forms a second channel for dirt passing through so that dirt reaches the suction inlet of the floor brush base.

[0007] Preferably, the bottom surface of the second bumps abuts on the surface to be cleaned when the floor brush assembly moves forward.

[0008] Preferably, the second scraping piece comprises the second scraping piece body arranged on the bottom of the floor brush base and the second bumps distributed at intervals on the second scraping piece body which is provided with a second mounting part on the side away from the surface to be cleaned to connect with the floor brush base and a second abutting part to abut on the surface to be cleaned, with the second abutting part and the second mounting part being distributed oppositely; wherein the second scraping piece body swings backward under external force so that the second bumps abut on the surface to be cleaned and the second scraping piece is in the fourth state at the moment when the floor brush assembly moves forward; wherein the second scraping piece body swings forward under external force so that the second abutting part abuts on the surface to be cleaned and the second scraping piece is in the third state at the moment when the floor brush assembly moves backward.

[0009] Preferably, the second scraping piece body is sheet-shaped and is provided with the third face close to the roller brush and the fourth face away from the roller brush, with the second bumps being arranged on the fourth face; wherein the second abutting part is provided with an abutting face to abut on the surface to be cleaned and the abutting face of the second abutting part can be either the third face or the face adjacent to the bottom between the third face and the fourth face.

[0010] Preferably, the second scraping piece is made from deformable materials, wherein the external force is the friction between the second scraping piece body and the surface to be cleaned; or, the second scraping piece is made from hard materials, wherein the external force is from the driver on the floor brush base, which is configured to facilitate switching of the second scraping piece between the third state and the fourth state.

[0011] Preferably, when the second scraping piece is made from deformable materials, the floor brush base is provided with an extension baffle on front of the second scraping piece, wherein the bottom edge of the extension baffle is lower than the second mounting part; when the floor brush assembly moves backward, the second bumps abut on the bottom edge of the extension baffle; wherein the extension baffle is configured to exert pressure down to the second scraping piece in the third state so as to make the second scraping piece abut on the surface to be cleaned tightly.

[0012] Preferably, when the second scraping piece is made from hard materials, the second scraping piece is hinged to the bottom of the floor brush base through the second mounting part.

[0013] Preferably, the floor brush base is provided with stop blocks to limit the swing angle of the second scraping piece; wherein the stop blocks are one pair, with one of the stop blocks being arranged on the floor brush base and on the side of the second mounting part away from the roller brush to limit the swing angle when the second

scraping piece swings forward and the other stop block being arranged on the floor brush base and on the side of the second mounting part close to the roller brush to limit the swing angle when the second scraping piece swings backward; or, wherein the number of the stop block is one which is provided with the second limitation face close to the roller brush and the first limitation face away from the roller brush; when the second scraping piece swings forward, the second scraping piece abutting on the first limitation face; when the second scraping piece swings backward, the second scraping piece abutting on the second limitation face.

[0014] Preferably, the floor brush assembly comprises the first scraping piece which is arranged on the bottom of the floor brush base, with a suction inlet being formed between the first scraping piece and the roller brush; wherein the first scraping piece abuts on the surface to be cleaned to scrape off dirt when the floor brush assembly moves forward and/or backward.

[0015] Preferably, the floor brush assembly comprises the first scraping piece which is arranged on the bottom of the floor brush base and behind the roller brush, with a suction inlet being formed between the first scraping piece and the roller brush and with at least two first bumps being arranged on the face away from the roller brush and distributed at intervals on the length direction of the first scraping piece; wherein the second scraping piece abuts on the surface to be cleaned and the first bump abuts on the surface to be cleaned when the floor brush assembly moves backward, with a first channel for dirt passing through being formed between the adjacent first bumps to make dirt reach the suction inlet.

[0016] Preferably, the first and auxiliary rollers are arranged on the bottom of the floor brush base and the second scraping piece and first scraping piece remain suspended in natural state; wherein the bottom edges of the second scraping piece and the first scraping piece are lower than the lowest side of the first and auxiliary rollers when the second scraping piece and the first scraping piece are in natural state.

[0017] Preferably, the floor brush base comprises the main base and the detachable roller brush cover on the main base, which form a roller brush cavity to hold the roller brush; the sealing element is arranged between the roller brush cover and the main base, on the top of the roller brush cover and/or the main base and on the top of the roller brush cavity for reducing or eliminating the gap between the main base and the roller brush cover so as to enhance the sealing performance of the top of the roller brush cavity.

[0018] Preferably, the first scraping piece and the second scraping piece abut on the surface to be cleaned when the floor brush assembly moves backward, with a seal structure being formed jointly by the first scraping piece, the second scraping piece and the sealing component to improve the vacuum degree of the roller brush cavity.

[0019] Preferably, the sealing component is arranged on the inner side of the roller brush cover and close to the roller brush; wherein the sealing component extends along the circumferential direction of the roller brush.

[0020] Preferably, the second scraping piece is arranged on the inner side of the roller brush cover and comprises a second mounting part which is arranged on the side of the second scraping piece body away from the surface to be cleaned; with an insertion part being arranged on the inner side of the roller brush cover to match with the second mounting part and the second scraping piece being installed on the inner side of the roller brush cover by the second mounting part matching with the abutting part.

[0021] The present invention provides a cleaning equipment, comprising the said floor brush assemblies.

[0022] The technical solution provided by the present invention has the following advantages:

A second channel for dirt passing through is formed between multiple second bumps provided in the present invention, through which the dirt in front of the floor brush assembly can be wiped out by the roller brush and sucked into the suction inlet, to avoid the dirt being moved forward by the floor brush assembly to form a line of dirt, which has the advantage of good cleaning effect; meanwhile, the floor brush assembly can be prevented from being lifted up repeatedly, which has the advantage of convenient use; When the floor brush assembly moves forward, the first scraping piece is designed to scrape the floor on which the water stain can be sucked into the suction inlet, thus obviously reducing water stain on the floor, which has the advantage of good cleaning performance.

[0023] Other objects, advantages and novel features of the present invention will become more apparent from the following detailed description of the present embodiment when taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0024]

FIG. 1 is a schematic diagram of the floor brush assembly according to the invention;

FIG. 2 a schematic diagram of the breakdown structure as shown in FIG. 1;

FIG. 3 is a schematic diagram of the second scraping piece under the first viewing angle according to the invention;

FIG. 4 is an enlarged view of part C as shown in FIG. 3;

FIG. 5 is a schematic diagram of the position relation between the roller brush cover and the second scraping piece according to the invention;

FIG. 6 is a schematic diagram of the second scraping piece under the second viewing angle according to the invention;

FIG. 7 is a schematic diagram of the first scraping

piece under the first viewing angle according to the invention;

FIG. 8 is a schematic diagram of the first scraping piece under the second viewing angle according to the invention;

FIG. 9 is an enlarged view of part A as shown in FIG. 8;

FIG. 10 is a schematic diagram of the first scraping piece under the third viewing angle according to the invention;

FIG. 11 is an enlarged view of part B as shown in FIG. 10;

FIG. 12 is a schematic diagram of the position relation between the roller brush cavity and the suction inlet according to the invention;

FIG. 13 is a schematic diagram with one pair of stop blocks according to the invention;

FIG. 14 is a schematic diagram with one stop block according to the invention.

DETAILED DESCRIPTION OF THE INVENTION

[0025] Reference will now be made to the drawing figures to describe the preferred embodiment of the present invention in detail.

[0026] Referring to Figure 1 to Figure 14, a floor brush assembly 100 is provided for cleaning surfaces to be cleaned according to the present invention, with the forward direction of the floor brush assembly 100 being the front and the opposite direction being the back, comprising a floor brush base, a roller brush 110 and a second scraping piece 300; wherein the second scraping piece 300 is arranged on the bottom of the floor brush base and in front of the roller brush 110 with a roller being arranged on the floor brush base.

[0027] In a reference scenario, the floor brush assembly 100 can be applied to floor scrubbers for floor cleaning. It should be noted that the application of the floor brush assembly 100 in scrubbers in the scenario is a feasible applicable scenario for the floor brush assembly 100. In other feasible and unclear scenarios, the floor brush assembly 100 can be applied to handheld vacuum cleaners.

[0028] The following describes the application of the floor brush assembly 100 in scrubbers. The surface to be cleaned is the floor. However, based on the above description, no limitation on the scope of protection of the embodiment of the invention is constituted.

[0029] In the embodiment, the floor brush base comprises the main base 120 and the detachable roller brush cover 130 on the main base 120, which form a roller brush cavity 160 to hold the roller brush 110. A detergent feeding unit (not shown in the Figures) for moisturizing the roller brush 110 and a fluid scraping unit with an outer circular face for squeezing the roller brush 110 to make the sewage absorbed by the roller brush 110 drop down and be sucked into the suction inlet (not shown in the Figures) are arranged on the main base 120. Specifically, when the floor brush assembly 100 is working, the roller brush 110 will rotate in a high speed under the drive of the motor built in the floor brush assembly 100 and take the dirt on the floor below the roller brush 110 into the suction inlet; meanwhile, after being moisturized by the detergent feeding unit, the roller brush 110 will brush the floor to complete the cleaning task.

[0030] Referring to Figure 3 and Figure 4, the second scraping piece 300 extends axially along the roller brush 110 is provided with at least two second bumps 310 distributed at intervals along its length direction; wherein the number of the second bumps 310 can be two, three or more according to the size of the floor brush base.

[0031] In the embodiment, at least the roller brush 110 abuts on the floor when the floor brush assembly moves forward, with the second channel H2 for dirt passing through being formed between the adjacent second bumps 310 to make dirt reach the suction inlet of the floor brush base without turning up the front of or lifting up the floor brush assembly. Therefore, a line of dirt will not appear along the front of the second scraping piece 300 when the floor brush assembly 100 moves forward.

[0032] Wherein the description, "at least the roller brush 110 abuts on the floor when the floor brush assembly moves forward", means that the roller brush 110 abuts on the floor and the second bumps 310 do not abut on the floor, or the roller brush 110 and the second bumps 310 abut on the floor.

[0033] Preferably, the bottom surface of the second bumps 310 abuts on the surface to be cleaned when the floor brush assembly moves forward. In other words, the roller brush 110 and the second bumps 310 abut on the floor. Therefore, when the second channel H2 formed by the second scraping piece 300 allows dirt to pass through, the dirt on the floor can be scraped off on the bottom surface of the second bumps 310, with good cleaning performance.

[0034] Referring to Figure 3 and Figure 6, the second scraping piece 300 comprises the second scraping piece body 301 on the bottom of the floor brush base and the second bumps 310 distributed at intervals on the second scraping piece body 301; wherein the second bumps 310 are distributed at intervals along the length direction of the second scraping piece body 301. "Interval" refers to equal interval, random interval or regular interval.

[0035] Additionally, the second scraping piece body 301 is provided with the second mounting part 320 for connecting with the floor brush base on the top (away from the floor) of the second scraping piece body 301 and the second abutting part to abut on the floor, with the second abutting part and the second mounting part 320 being distributed oppositely.

[0036] In the embodiment, the second scraping piece body 301 swings backward under external force so that the second bumps 310 abut on the floor and the second scraping piece 300 is in the fourth state at the moment when the floor brush assembly moves forward; the second scraping piece body 301 swings forward under ex-

ternal force so that the second abutting part abuts on the floor and the second scraping piece 300 is in the third state at the moment when the floor brush assembly moves backward. As can be seen from the above description, under external force, the second scraping piece 300 can switch between the third state and the fourth state.

[0037] In the embodiment, materials of the second scraping piece 300 have an impact on the type of the external force. Specifically, when the second scraping piece 300 is made from deformable materials, the external force is the friction between the second scraping piece body 301 and the floor. When the floor brush assembly moves forward, the second scraping piece body 301 swings backward with the second mounting part 320 as the pivot under the impact of the friction; when the floor brush assembly moves backward, the second scraping piece body 301 swings forward with the second mounting part 320 as the pivot under the impact of the friction.

[0038] When the second scraping piece 300 is made from hard materials, the external force is from the driver on the floor brush base (not shown in the Figures), which is configured to facilitate switching of the second scraping piece 300 between the third state and the fourth state.

[0039] It should be noted that the hard materials refer to the materials that cannot be deformed by external force. The deformable materials refer to the materials that can be deformed by external force.

[0040] In the embodiment, preferably, the second scraping piece 300 is made from deformable materials; wherein "the second scraping piece 301 is made from deformable materials" means that the second scraping piece body 301 and the second bumps 310 are made from deformable materials. The deformable materials can be rubber and silicone, which can be deformed under the impact of friction.

[0041] Specifically, to produce deformation, the deformable materials are adopted for the second scraping piece body 301; to avoid the floor being scraped and damaged, the deformable materials are adopted for the second bumps 310. Additionally, the second scraping piece body 301 and the second bumps 310 are made from the same materials for production and manufacturing convenience. Understandably, the second scraping piece body 301 and the second bumps 310 can be made from different deformable materials. For example, the scraping piece 200 is made from rubber while the second bumps 310 are made from silicone. However, no limitation on the scope of protection of the embodiment of the invention is constituted.

[0042] Additionally, the second scraping piece body 301 is sheet-shaped and is provided with the third face 3011 close to the roller brush 110 and the fourth face 3012 away from the roller brush 110, with the second bumps 310 being arranged on the fourth face 3012. In other words, the third face 3011 and the fourth face 3012 are on the opposite side and the second bumps 310 are on the face away from the roller brush 110.

[0043] In the embodiment, the second abutting part is provided with an abutting face to abut on the floor and the abutting face of the second abutting part can be either the third face 3011 or the face adjacent to the bottom between the third face 3011 and the fourth face 3012; wherein the preferred abutting face of the second abutting part is the third face 3011 for the reason that when the abutting face with the second connection part is the third face 3011, the second scraping piece body 301 can touch the floor more tightly. When the floor brush assembly 100 moves backward, the water stain and dirt on the floor can be pushed towards the roller brush 110 more effectively. In other words, when the floor brush assembly 100 moves backward, the water stain and dirt on the floor can be effectively reduced.

[0044] Referring to Figure 1 and Figure 5, to further improve the cleaning ability of the second scraping piece 300 when the floor brush assembly 100 moves backward, the extension baffle 133 is arranged on the floor brush base. In the embodiment, the extension baffle 133 is arranged on the bottom of the roller brush cover 130, which is configured to exert pressure down to the second scraping piece 300 in the third state so as to make the second scraping piece 300 abut on the floor tightly.

[0045] Specifically, the extension baffle 133 is in front of the second scraping piece 300, with the bottom edge of the extension baffle 133 lower than the second mounting part 320. When the floor brush assembly 100 moves backward (in the third state), the second bumps 310 of the second scraping piece 300 abut on the bottom edge of the extension baffle 133 under which the second scraping piece body 301 can't swing forward; meanwhile, the extension baffle 133 exerts pressure down to the second scraping piece body 301 and can make the second scraping piece body 301 tightly abut on the floor and effectively enhance the scraping force of the second scraping piece body 301 to the floor, thus scraping the water stain and dirt on the floor and improve the sealing performance of the roller brush 110 to some extents.

[0046] In the embodiment, the second bumps 310 are block-shaped, with the second friction face 311 on the side away from the second scraping piece body 301. When the second scraping piece 300 is in the fourth state, the second friction face 311 is the bottom surface of the second bumps 310 and abuts on the floor; wherein the second friction face 311 can be either flat, cambered, polygonal or curved.

[0047] In the embodiment, the distance between the second friction face 311 and the second scraping piece body 301 is defined as L2 which determines the height of the second channel H2. The height of the second channel H2 determines the size of dirt which passes through the second channel H2, especially the height of the dirt.

[0048] Specifically, L2 should be no shorter than 3mm and no longer than 10mm, wherein L2 can be any value like 3mm, 4mm, 5mm, 6mm, 7mm, 8mm, 9mm and 10mm or any value between 3mm and 10mm with an increment of 0.1 mm, 0.2mm, 0.3mm, 0.4mm, 0.5mm, 0.6mm,

0.7mm, 0.8mm or 0.9mm.

[0049] Additionally, the second bumps 310 is provided with an adjacent face that overlaps with the fourth face 3012 and the side enclosure face 312 that connects the second friction face 311 and the adjacent face; wherein the adjacent face is the topside of the second bumps 310 when the second scraping piece 300 is in the fourth state; the side enclosure face 312 abuts on the extension baffle 133 when the second scraping piece 300 is in the third state.

[0050] Referring to Figure 4, the area of the adjacent face is larger than the area of the second friction face 311. It is designed to make the second bumps 310 narrow at the bottom and wide on the top so that dirt can pass through easily when the second scraping piece 300 is in the fourth state. Additionally, if the area of the second friction face 311 is larger and the second scraping piece 300 is in the fourth state, the friction between the second friction face 311 and the floor is large, giving larger resistance against the forward movement of the floor brush assembly 100, which is not good for operation of the floor brush assembly 100. The adjacent face is the face that connects the second scraping piece body 301. If the area of the adjacent face is larger, the connection intensity between the second bumps 310 and the second scraping piece body 301 can be enhanced, making the connection more stable and secured.

[0051] When the second scraping piece 300 is made from deformable materials, the second mounting part 320 is fixed to the floor brush base. The methods for fixing include screws, buckles, glue, or welding.

[0052] Specifically, in the embodiment, the second scraping piece 300 is arranged on the inner side of the roller brush cover 130; wherein an insertion part is arranged on the inner side of the roller brush cover 130 to match with the second mounting part 320 and the second scraping piece 300 is installed on the inner side of the roller brush cover 130 by the second mounting part 320 matching with the abutting part; wherein the insertion part 320 and the matching part are a fixture block and a slot; wherein the second mounting part 320 is integrate with the second scraping piece body 301, which reduces the quantity of parts, streamlines processing and brings advantages in simple and compact structure.

[0053] In the embodiment, when the second scraping piece 300 is made from hard materials, the second scraping piece 300 is hinged to the floor brush base through the second mounting part 320; wherein the driver connects with the second scraping piece body 301, and the second scraping piece body 301 can rotate around the hinge axis under the drive of the driver; wherein the driver can be air cylinder or any other structure that moves repeatedly in linear.

[0054] Specifically, when the floor brush assembly 100 moves forward, the second scraping piece body 301 swings backward with the hinge axis of the second scraping piece 300 as the rotational pivot under the force of the driver; when the floor brush assembly 100 moves backward, the second scraping piece body 301 swings forward with the hinge axis of the second scraping piece 300 as the rotational pivot under the force of the driver.

[0055] To limit the swing angle of the second scraping piece 300, the stop block 400 is arranged on the floor brush base. Referring to Figure 13 and Figure 14, the number of the stop block 400 can be one pair or one. When the stop blocks 400 are one pair, as shown in Figure 13, one stop block 400 is arranged on the floor brush base and on the side of the second mounting part 320 away from the roller brush 110 to limit the swing angle when the second scraping piece 300 swings forward and the other stop block is arranged on the floor brush base and on the side of the second mounting part 320 close to the roller brush 110 to limit the swing angle when the second scraping piece 300 swings backward.

[0056] When the number of the stop block 400 is one, by referring to Figure14, the stop block 400 is provided with the second limitation face 420 close to the roller brush 110 and the first limitation face 410 away from the roller brush 110. When the second scraping piece 300 swings forward, the second scraping piece 300 abuts on the first limitation face 410; when the second scraping piece 300 swings backward, the second scraping piece 300 abuts on the second limitation face 420.

[0057] When the second scraping piece 300 is hinged to the bottom of the floor brush base through the second installation part 320, the two setting solutions for the second mounting part 320 are as below.

[0058] In one setting solution, by referring to Figure 14, the second mounting part 320 is a slot, with the axis body 500 being arranged on the bottom of the floor brush assembly 100 to match with the slot of which the circumferential slot wall is provided with an opening for the axis body 500. Wherein the axis of the axis body 500 extends along the length direction of the second scraping piece 300 and the center line of the slot extends along the length direction of the second scraping piece 300, with coaxial distribution of the axis of the axis body 500 and the center line of the slot.

[0059] In the other setting solution, the second mounting part 320 is a pin shaft, with a pin shaft hole being arranged on the bottom of the floor brush assembly 100 to match with the pin shaft (not shown in the Figures).

[0060] Understandably, the setting solutions of the second mounting part 320 include but not limited to the two setting solutions and include other structures that enable the second scraping piece 300 rotate on the floor brush assembly 100, and are repeated here.

[0061] In the embodiment, by referring to Figure 1 and Figure 12, the floor brush assembly 100 includes the first scraping piece 200 that extends along the axial direction of the roller brush 110 and is arranged on the bottom of the floor brush base and behind the roller brush 110. The suction inlet 170 of the floor brush base is formed between the first scraping piece 200 and the roller brush 110. When the floor brush assembly 100 is working, the first scraping piece 200 abuts on to scrape off the dirt.

The working process includes forward movement, backward movement and forward and backward movement.

[0062] In the embodiment, the first scraping piece 200 has two structures: For the first structure, the first scraping piece 200 is sheet-shaped. When the floor brush assembly 100 moves forward or backward, the first scraping piece 200 abuts on the floor to scrape off the dirt.; for the second structure, by referring to Figure 6 to Figure 11, at least two first bumps 210 are distributed at intervals on the side of the first scraping piece 200 away from the roller brush 11 and along the length direction of the first scraping piece 200 and the interval between the adjacent first bumps 210 forms the first channel H1 for dirt passing through so that dirt reaches the suction inlet 170.

[0063] The difference between the first structure and the second structure is the first bumps 210. Specifically, in the first structure, no first bumps 210 is arranged on the first scraping piece 200; in the second structure, the first bumps 210 is arranged on the first scraping piece 200. By setting the first bumps 210, when the floor brush assembly 100 moves backward, dirt on the side of the first scraping piece 200 away from the suction inlet 170 can pass through the first scraping piece 200 and be sucked into the suction inlet to avoid a line of dirt on the side of the first scraping piece 200 away from the suction inlet 170.

[0064] The following describes the situation where the first bumps 210 is arranged on the first scraping piece 200. Referring to Figure 10 and Figure 11, the first scraping piece 200 comprises the first scraping piece body 201 on the floor brush base and the first bumps 210 on the first scraping piece body 201. Wherein the first scraping piece body 201 is sheet-shaped along which the first bumps 210 are distributed at intervals.

[0065] [The first scraping piece body 201 is provided with the first mounting part 230 on the top of the first scraping piece body 201 (away from the floor) to connect with the floor brush base and a first abutting part to abut on the floor, with the first abutting part and the first mounting part 230 being distributed oppositely.

[0066] In the embodiment, the first scraping piece body 201 swings forward under external force so that the first bumps 210 abut on the floor and the first scraping piece 200 is in the second state at the moment when the floor brush assembly 100 moves backward; the first scraping piece body 201 swings backward under external force so that the first abutting part abuts on the floor and the first scraping piece 200 is in the first state at the moment when the floor brush assembly 100 moves forward. As can be seen from the above description, under external force, the first scraping piece 200 can switch between the first state and the second state.

[0067] In the embodiment, materials of the first scraping piece 200 have an impact on the type of the external force. When the first scraping piece 200 is made from deformable materials, the external force is the friction between the first scraping piece body 201 and the floor; when the first scraping piece 200 is made from hard materials, the external force is from the driver on the floor brush base (not shown in the Figures), which is configured to facilitate switching of the first scraping piece 200 between the first state and the second state.

[0068] When the first scraping piece 200 is made from deformable materials, the first mounting part 230 is fixed to the floor brush base. The methods for fixing include screws, buckles, glue, or welding. When the first scraping piece 200 is made from hard materials, the first mounting part 230 is hinged to the floor brush base. With the external force from the driver, the first scraping piece 200 can rotate round the hinge axle. When the first scraping piece 200 is made from hard materials, refer to the structure of the second mounting part 320 for the structure of the first mounting part 230.

[0069] In the embodiment, preferably, the first scraping piece 200 is made from deformable materials. Wherein "the first scraping piece 201 is made from deformable materials" means that the first scraping piece body 201 and the first bumps 210 are made from deformable materials. The deformable materials can be rubber and silicone, which can be deformed under the impact of friction. The description below is based on the situation where the first scraping piece 200 is made from deformable materials.

[0070] Referring to Figure 7, the first scraping piece body 201 is provided with the first face 2011 close to the roller brush 110 and the second face 2012 away from the roller brush 110. In other words, the first face 2011 and the second face 2012 are on the opposite side and the first bumps 210 are on the second face 2012.

[0071] Additionally, the first abutting part is provided with an abutting face to abut on the floor and the abutting face of the first abutting part can be either the first face 2011 or the face adjacent to the bottom between the first face 2011 and the second face 2012.

[0072] Preferably, the abutting face of the first abutting part is the first face 2011. When the first face 2011 abuts on the floor, the first scraping piece body 201 has large deformation so that the first scraping piece body 201 can touch the floor more tightly, so that the water stain and dirt on the floor can be pushed towards the suction inlet and the roller brush 110 more effectively, thus reducing the water stain and dirt on the floor to the greatest extent.

[0073] Referring to Figure 7, Figure 8 and Figure 9, when the abutting face of the first abutting part is the first face 2011, the scraping bar 220 is arranged along the length direction of the first face 2011 and bulges out on the first face 2011 for the purpose of scrappaging off stubborn dirt on the floor. Setting the scraping bar 220 can enhance the structural intensity of the first scraping piece body 201 on the scraping bar 220. Therefore, compared with other areas, the area where the first scraping piece body 201 is on the scraping bar 220 will not deform easily so that the scraping bar 220 can touch the floor more tightly to scrape off the stubborn dirt on the floor.

[0074] Specifically, the outer surfaces of the scraping bar 220 comprise the third friction face 221 and the ex-

tension face 222 and are faces which don't overlap with the first face 2011. In the embodiment, the extension faces 222 is on a position farther away from the bottom edge of the scraping bar 220 than the third friction face 221. In the first state, the third friction face 221 of the scraping bar 220 abuts on the floor while the extension faces 222 is away from the floor.

[0075] Wherein the third friction face 221 abuts on the floor for floor scraping; a space is formed with the extension face 222 gradually away from the floor to help the dirt be sucked into the suction inlet.

[0076] In the embodiment, when the first scraping piece 200 is in the first state and the abutting face of the first abutting part is the first face 2011, at least the scraping bar 220 abuts on the floor. Understandably, there are two scenarios. In the first scenario, when the first scraping piece 200 is in the first state and the abutting face of the first abutting part is the first face 2011, the scraping bar 220 abuts on the floor; in the second scenario, when the first scraping piece 200 is in the first state and the abutting face of the first abutting part is the first face 2011, the scraping bar 220 and the first face 2011 abut on the floor.

[0077] In the embodiment, by referring to Figure 11, the first bump 210 has the first friction face 211 on the side away from the first scraping piece body 201. When the first scraping piece 200 is in the second deformation state, the first friction faces 211 abuts on the floor. Wherein the distance between the first friction face 211 and the first scraping piece body 201 is defined as L1 which determines the height of the first channel H1.

[0078] When the floor brush assembly 100 moves forward, the dirt on the floor reach the roller brush 110 through the second channel H2, is pushed by the roller brush 110 and sucked into the suction inlet 170; meanwhile, the first abutting part of the first scraping piece 200 abuts on the floor so as to scrape off water stain and dirt on the floor behind the roller brush 110. In the process, the first scraping piece 200 is mainly used to scrape off the water stain on the floor. "The first scraping piece 200 is mainly used to scrape off the water stain on the floor means that when the floor brush assembly 100 moves forward, most of the dirt are sucked into the suction inlet and only few minor dirt is left on the floor. Therefore, the first scraping piece 200 is mainly used to scrape off and reduce the water stain on the floor.

[0079] Specifically, when the floor brush assembly 100 moves forward, the first scraping piece 200 can push the water stain on the floor forward. Therefore, the water stain will be either sucked into the suction inlet or absorbed by the roller brush 110, thus reducing water stain on the floor and effectively improving the cleaning performance.

[0080] When the floor brush assembly 100 moves backward, the second abutting part of the second scraping piece 300 abuts on the floor to scrape off any dirt on the floor. The first bump 210 abuts on the floor and the first channel H1 allows the dirt (mainly water stain) to pass through. In the process, the first channel H1 is mainly used for water stain passing through for the reason that when the floor brush assembly 100 moves backward, the floor has been cleaned and mainly water stain is on the floor.

[0081] The first channel H1 is mainly used for water stain passing through, the height L1 of the first channel H1 should be lower than the height L2 of the second channel H2. In the embodiment, the height L1 of the first channel H1 should be no larger than 1 mm. In the embodiment, L1 (height of the first channel H1) can be any value like 0.5mm or 1mm, or any value between 0.1 mm and 1mm with an increment of 0.1mm, 0.2mm, 0.3mm, 0.4mm, 0.5mm, 0.6mm, 0.7mm, 0.8mm or 0.9mm.

[0082] In the embodiment, the second bumps 310 are distributed along the bottom edge of the second scraping piece body 301 and the first bumps 210 are distributed along the bottom edge of the first scraping piece body 201. To be more clearly, the description below will take the second bumps 310 as an example. When the second bumps 310 are distributed along the bottom edge of the second scraping piece body 301, in the fourth state, an enough gap between the bottom edge of the second scraping piece body 301 and the floor is provided for dirt passing through.

[0083] Oppositely, when the second bumps 310 are not distributed along the bottom edge of the second scraping piece body 301, in the fourth state, the bottom edge of the second scraping piece body 301 will be close to the floor. In the case, the gap between the bottom edge of the second scraping piece body 301 and the floor becomes smaller, influencing dirt passing through.

[0084] The first roller 140 and the auxiliary roller 150 are arranged on the bottom of the floor brush base. When the floor brush assembly 100 is pushed forward, the floor brush assembly 100 will move forward with the help of the first roller 140 and the auxiliary roller 150.

[0085] When the floor brush assembly 100 is lifted up, the second scraping piece 300 and the first scraping piece 200 are suspended; meanwhile, the second scraping piece 300 and the first scraping piece 200 are in the natural state.

[0086] When the second scraping piece 300 and first scraping piece 200 are in the natural state, the bottom edges of the second scraping piece 300 and first scraping piece 200 will be lower than the lowest side of the first roller 140 and the auxiliary roller 150 to ensure the first scraping piece 200 and the second scraping piece 300 can abut on the floor tightly.

[0087] The roller brush cavity of the floor brush assembly 100, the sealing component 131 is arranged between the roller brush 130 and the main base 120. The sealing component 131 is above the first scraping piece 200 and the second scraping piece 300 and on the top of the roller brush cavity 160 to reduce or eliminate the gap between the main base 120 and the roller brush cover 130 and improve the sealing performance on the top of the roller brush cavity 160, thus improving the vacuum degree of the roller brush cavity 160. Wherein the gap refers to the gap between the roller brush cavity and the outside.

[0088] In the embodiment, the first scraping piece 200 and the second scraping piece 300 abut on the floor when the floor brush assembly 100 moves backward, with a seal structure being formed jointly by the first scraping piece 200, the second scraping piece 300 and the sealing component 131 to improve the vacuum degree of the roller brush cavity 160, thus improving the dirt collecting performance of the suction inlet 170 and the cleaning performance.

[0089] Specifically, when the first bumps 210 are arranged on the first scraping piece 200 and the floor brush assembly 100 moves on a carpet, particularly when the floor brush assembly 100 moves backward, as the height of the first channel H1 between the first bumps 210 is small, the first channel H1 can be filled up with the fluff of the carpet, making high vacuum degree in the roller brush cavity 160.

[0090] Understandably, if no first bumps 210 on the first scraping piece 200, the vacuum degree of the roller brush cavity 160 is higher than the situation where the first bumps 210 are provided.

[0091] Referring to FIG. 2, the roller brush 110 is on the main base 120 and on the front side to which the floor brush assembly 100 moves forward. The main base 120 has two supporting ends 121. The two ends of the roller brush 110 are supported on the two supporting ends 121. One end is the active end and connects with the motor built in the floor brush assembly 100 which powers rotation of the roller brush 110. The other end is the passive end and supports the roller brush 110.

[0092] The mounting positions for the sealing component 131 include the inner side of the roller brush cover 130, the main base 120 and the roller brush cover 130 and the main base 120.

[0093] In the embodiment, by referring to Figure 5, preferably, the sealing component is on the inner side of the roller brush cover 130 and distributed on the end close to the roller brush 110. The sealing component 131 is distributed symmetrically and extends along the circumferential direction of the roller brush 110. The inner side of the roller brush cover 130 is provided with a pair of bearing parts 132 with a slot through which the sealing component 131 is arranged on the bearing parts 132. The bearing part 132 is rib plate-shaped.

[0094] The structure of the floor brush assembly 100 has been described in detail. Technicians in this field should understand the working process as below:

When the floor brush assembly 100 moves forward, the second bumps 310 of the second scraping piece 300 abut on the floor and the first face 2011 of the first scraping piece body 201 abuts on the floor; meanwhile, the gap between the second bumps 310 allow water stain and/or dirt to pass through and be sucked into the suction inlet. The first scraping piece body 201 can push the water stain and/or dirt on the floor to the suction inlet (the water stain being pushed to the suction inlet).

When the floor brush assembly 100 moves backward, the third face of the second scraping piece 300 abuts on the floor and the first bumps 210 abut on the floor; meanwhile, the second scraping piece 300 can push the water stain on the floor to the roller brush 110 to make the water stain be sucked into the suction inlet, and the gap between the dirt bumps 210 can allow the water stain on the floor to pass through and be sucked into the suction inlet.

[0095] Therefore, the solutions can effectively avoid a line of dirt on the floor as the dirt can't be fully cleared by the floor brush assembly 100. At the same time, the solutions can reduce residual water stain on the floor and provide good cleaning performance.

[0096] The present invention provides a cleaning equipment (not shown in the Figures) which includes the floor brush assembly.

[0097] Obviously, the embodiments are some embodiments of the present invention, not covering embodiments. According to the embodiments of the present invention, the common technicians in the field can make other forms of changes or modifications without doing any creative works. The changes and modifications should be in the scope of protection of the invention

[0098] It is to be understood, however, that even though numerous characteristics and advantages of the present invention have been set forth in the foregoing description, together with details of the structure and function of the invention, the disclosure is illustrative only, and changes may be made in detail, especially in matters of shape, size, and arrangement of parts within the principles of the invention to the full extent indicated by the broad general meaning of the terms in which the appended claims are expressed.

Claims

1. A floor brush assembly for cleaning surfaces to be cleaned, with the forward direction of the floor brush assembly being the front and the opposite direction being the back; comprising:

   a floor brush base;
   a roller brush with a roller being arranged on the floor brush base; and
   the second scraping piece which is arranged on the bottom of the floor brush base and in front of the roller brush and has at least two second bumps distributed at intervals along its length direction;
   wherein at least the roller brush abuts on the surface to be cleaned when the floor brush assembly moves forward, with a second channel for dirt passing through being formed between the adjacent second bumps to make dirt reach the suction inlet of the floor brush base.

2. The floor brush assembly as claimed in claim 1, wherein the bottom of the second bumps abuts on the surface to be cleaned when the floor brush assembly moves forward.

3. The floor brush assembly as claimed in claim 2, wherein the second scraping piece comprises a second scraping piece body on the bottom of the floor brush base and the second bumps distributed at intervals on the second scraping piece body;

the second scraping piece body is provided with a second mounting part on the side away from the surface to be cleaned to connect with the floor brush base and a second abutting part to abut on the surface to be cleaned, with the second abutting part and the second mounting part being distributed oppositely;
wherein the second scraping piece body swings backward under external force so that the second bumps abut on the surface to be cleaned and the second scraping piece is in the fourth state at the moment when the floor brush assembly moves forward;
wherein the second scraping piece body swings forward under external force so that the second abutting part abuts on the surface to be cleaned and the second scraping piece is in the third state at the moment when the floor brush assembly moves backward.

4. The floor brush assembly as claimed in claim 3, wherein the second scraping piece body is sheet-shaped and is provided with the third face close to the roller brush and the fourth face away from the roller brush, with the second bumps being arranged on the fourth face; wherein the second abutting part is provided with an abutting face to abut on the surface to be cleaned and the abutting face of the second abutting part can be either the third face or the face adjacent to the bottom between the third face and the fourth face.

5. The floor brush assembly as claimed in claim 3, wherein the second scraping piece is made from deformable materials, wherein the external force is the friction between the second scraping piece body and the surface to be cleaned; or the second scraping piece is made from hard materials, wherein the external force is from the driver on the floor brush base, which is configured to facilitate switching of the second scraping piece between the third state and the fourth state.

6. The floor brush assembly as in claim 3, wherein when the second scraping piece is made from deformable materials, the floor brush base is provided with an extension baffle on front of the second scraping piece, wherein the bottom edge of the extension baffle is lower than the second mounting part;

when the floor brush assembly moves backward, the second bumps abut on the bottom edge of the extension baffle;
wherein the extension baffle is configured to exert pressure down to the second scraping piece in the third state so as to make the second scraping piece abut on the surface to be cleaned tightly.

7. The floor brush assembly as claimed in claim 5, wherein when the second scraping piece is made from hard materials, the second scraping piece is hinged to the bottom of the floor brush base through the second mounting part.

8. The floor brush assembly as claimed in claim 7, the floor brush base is provided with stop blocks to limit the swing angle of the second scraping piece;

wherein the stop blocks are one pair, with one of the stop blocks being arranged on the floor brush base and on the side of the second mounting part away from the roller brush to limit the swing angle when the second scraping piece swings forward and the other stop block being arranged on the floor brush base and on the side of the second mounting part close to the roller brush to limit the swing angle when the second scraping piece swings backward; or,
wherein the number of the stop block is one which is provided with the second limitation face close to the roller brush and the first limitation face away from the roller brush;
when the second scraping piece swings forward, the second scraping piece abutting on the first limitation face; when the second scraping piece swings backward, the second scraping piece abutting on the second limitation face.

9. The floor brush assembly as claimed in claim 1, wherein the first scraping assembly is arranged on the bottom of the floor brush base and behind the roller brush, with a suction inlet being formed between the first scraping piece and the roller brush;
wherein the first scraping piece abuts on the surface to be cleaned to scrape off dirt when the floor brush assembly moves forward and/or backward.

10. The floor brush assembly as claimed in claim 5, wherein the first scraping assembly is arranged on the bottom of the floor brush base and behind the roller brush, with a suction inlet being formed between the first scraping piece and the roller brush;

with at least two first bumps being arranged on

the face away from the roller brush and distributed at intervals on the length direction of the first scraping piece;
wherein the second scraping piece abuts on the surface to be cleaned and the first bump abuts on the surface to be cleaned when the floor brush assembly moves backward, with a first channel for dirt passing through being formed between the adjacent first bumps to make dirt reach the suction inlet.

11. The floor brush assembly as claimed in claim 9, wherein the first and auxiliary rollers are arranged on the bottom of the floor brush base and the second scraping piece and first scraping piece remain suspended in natural state;
wherein the bottom edges of the second scraping piece and the first scraping piece are lower than the lowest side of the first and auxiliary rollers when the second scraping piece and the first scraping piece are in natural state.

12. The floor brush assembly as claimed in claim 9, wherein the floor brush base comprises the main base and the detachable roller brush cover on the main base, which form a roller brush cavity to hold the roller brush;
the sealing element is arranged between the roller brush cover and the main base, on the top of the roller brush cover and/or the main base and on the top of the roller brush cavity for reducing or eliminating the gap between the main base and the roller brush cover so as to enhance the sealing performance of the top of the roller brush cavity.

13. The floor brush assembly as claimed in claim 12, wherein the first scraping piece and the second scraping piece abut on the surface to be cleaned when the floor brush assembly moves backward component, with a seal structure being formed jointly by the first scraping piece, the second scraping piece and the sealing to improve the vacuum degree of the roller brush cavity.

14. The floor brush assembly as claimed in claim 12, wherein the sealing component is arranged on the inner side of the roller brush cover and close to the end of the roller brush; wherein the sealing component extends along the circumferential direction of the roller brush.

15. The floor brush assembly as claimed in claim 12, wherein the second scraping piece is arranged on the inner side of the roller brush cover and comprises a second mounting part which is arranged on the side of the second scraping piece body away from the surface to be cleaned; with an insertion part being arranged on the inner side of the roller brush cover to match with the second mounting part and the second scraping piece being installed on the inner side of the roller brush cover by the second mounting part matching with the abutting part.

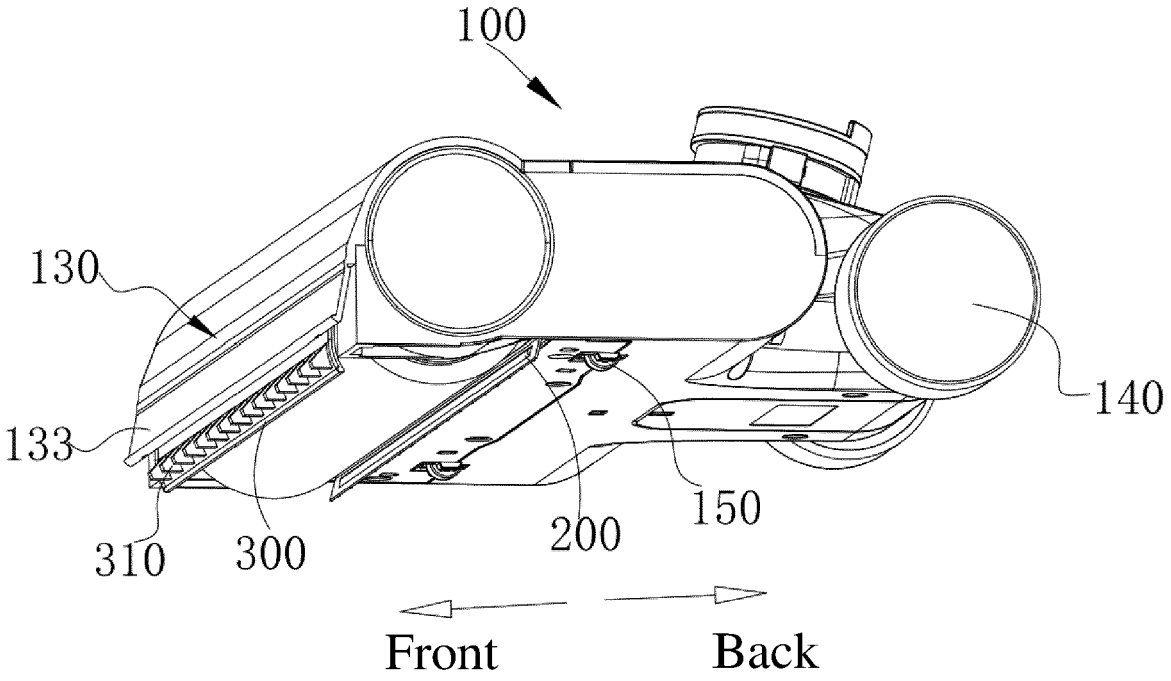
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FIG. 1

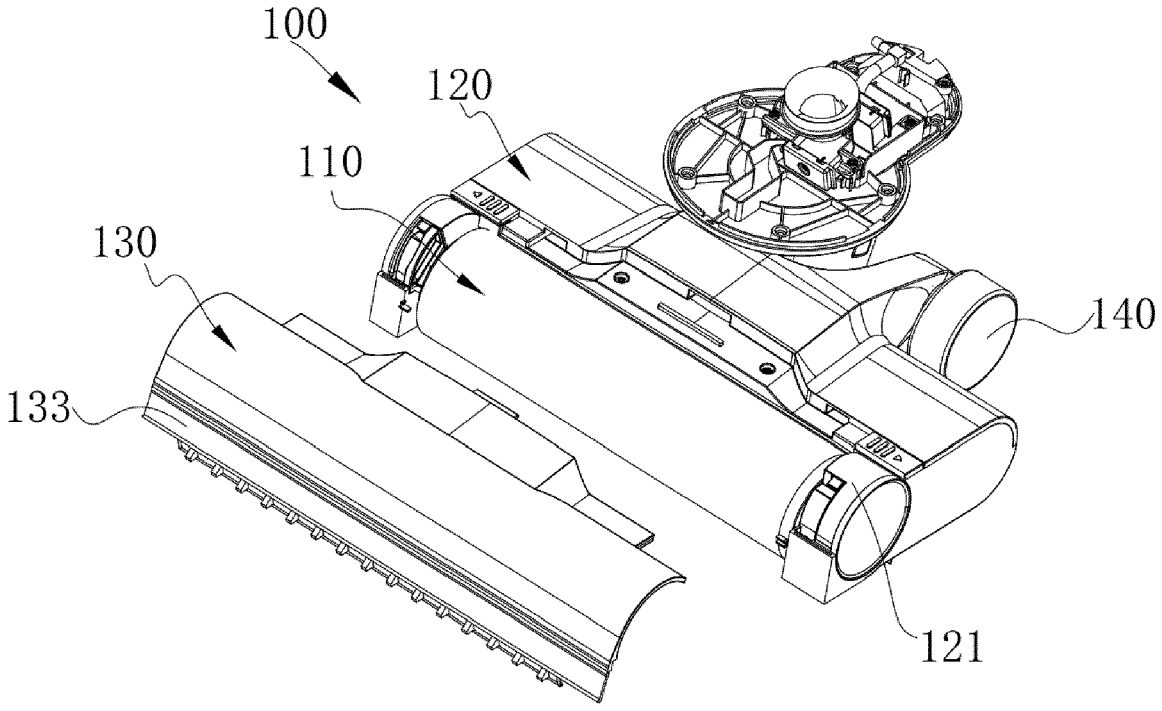
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FIG. 2

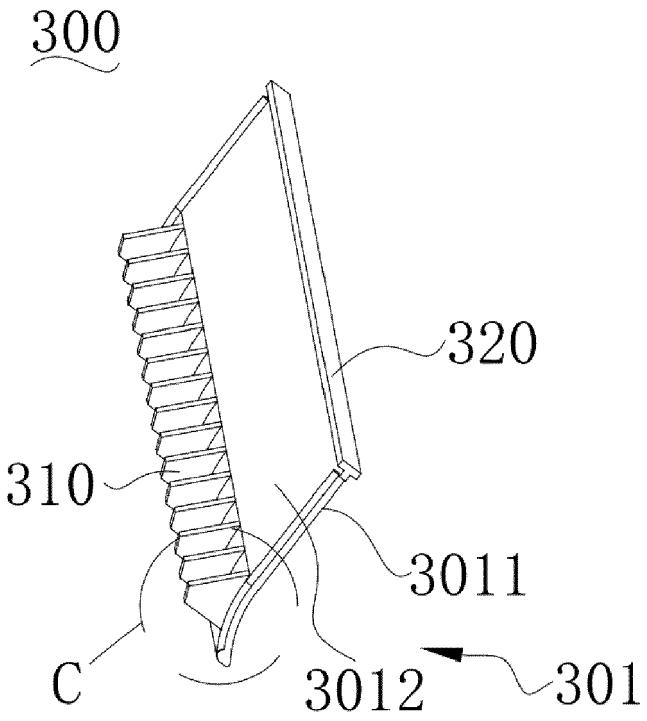

FIG. 3

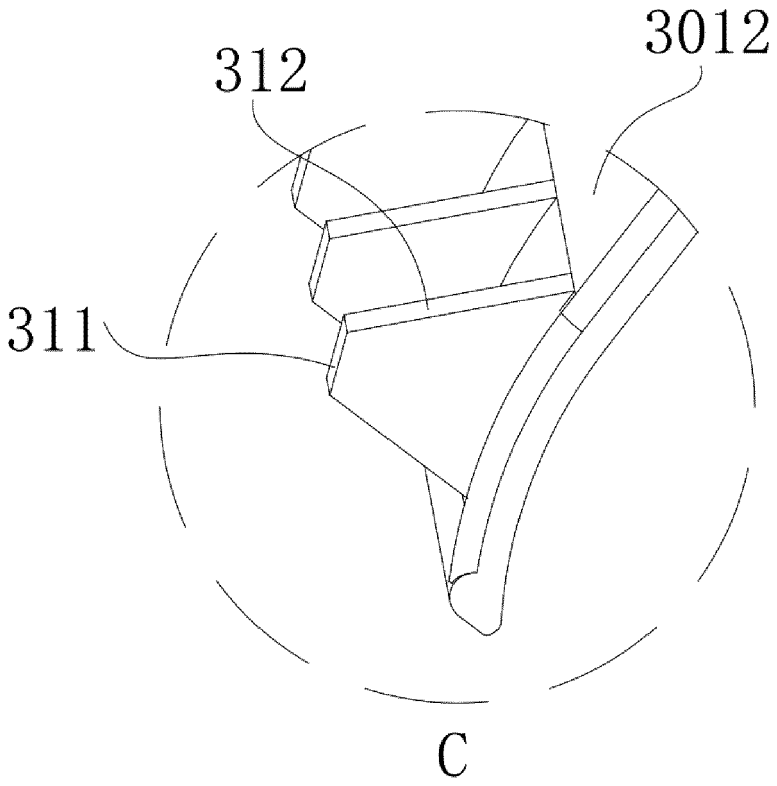

FIG. 4

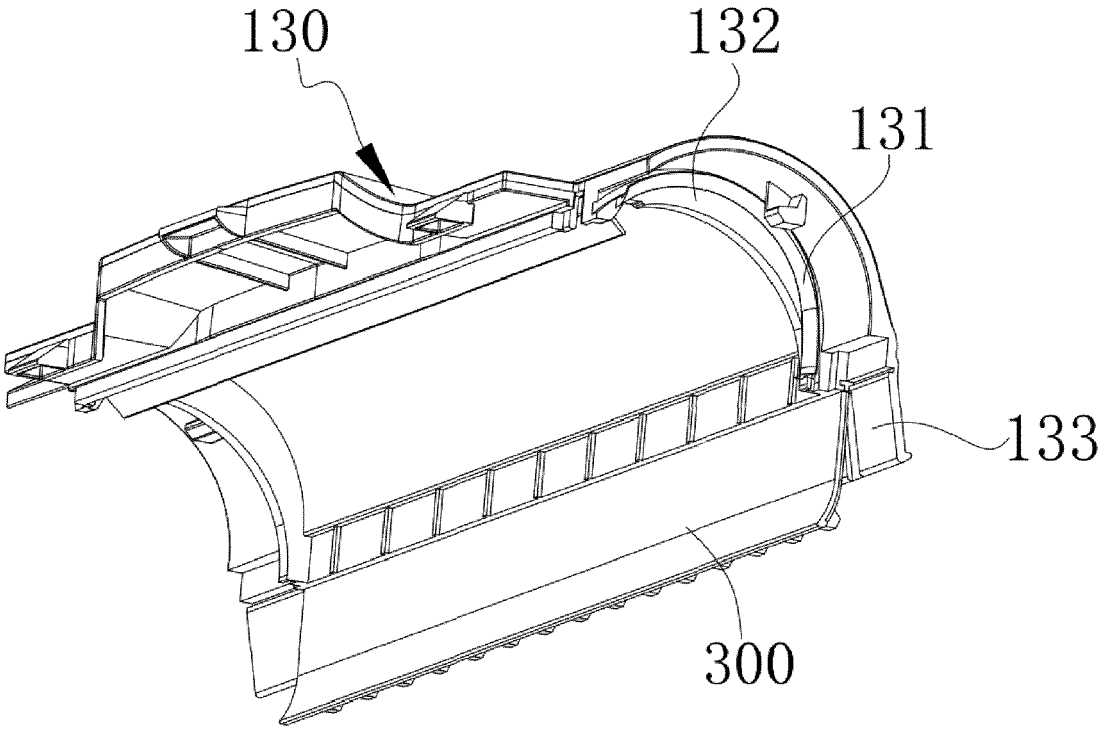

FIG. 5

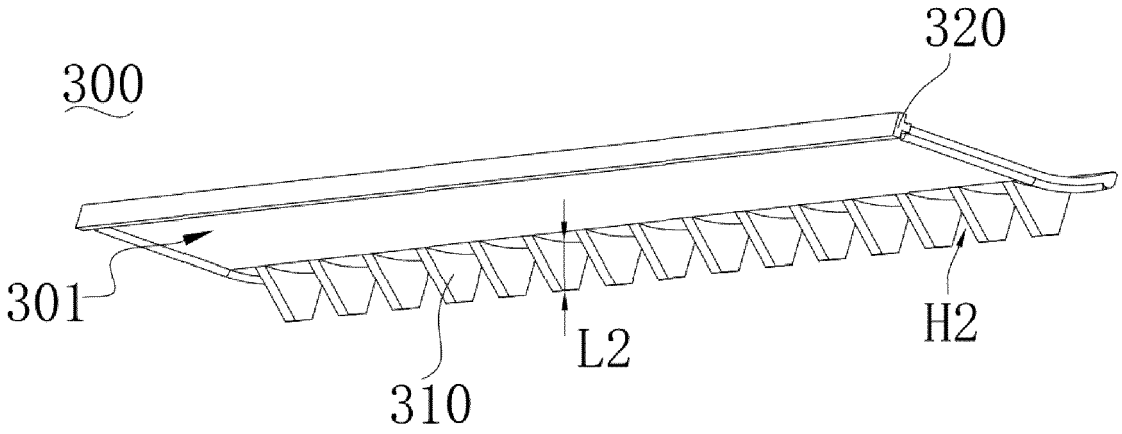

FIG. 6

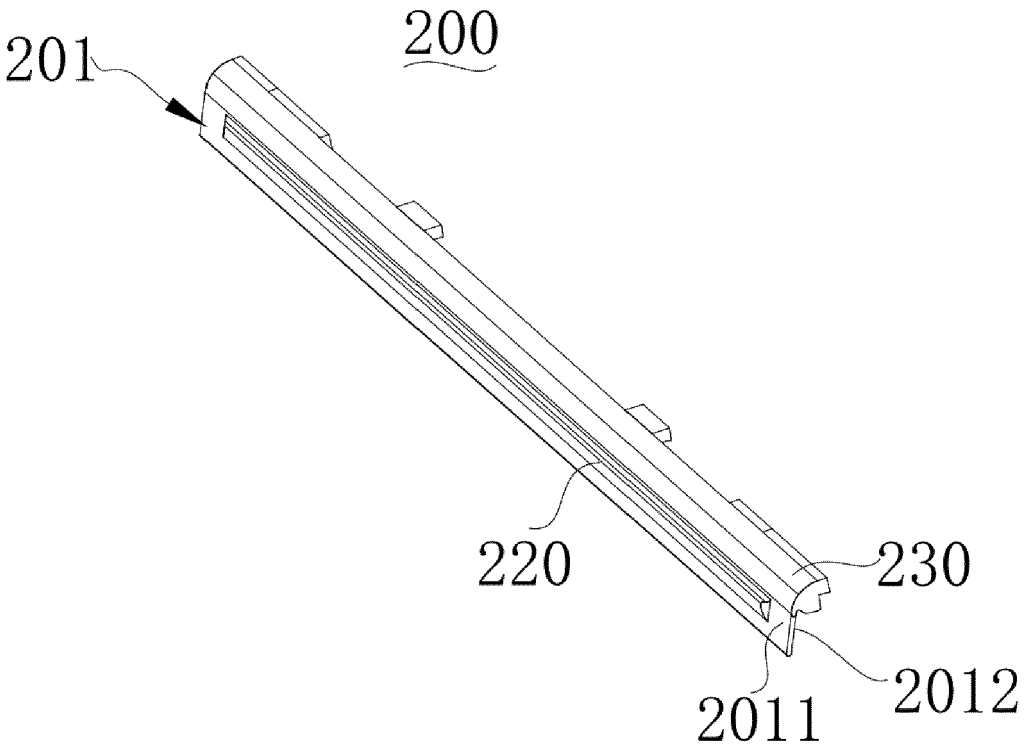

FIG. 7

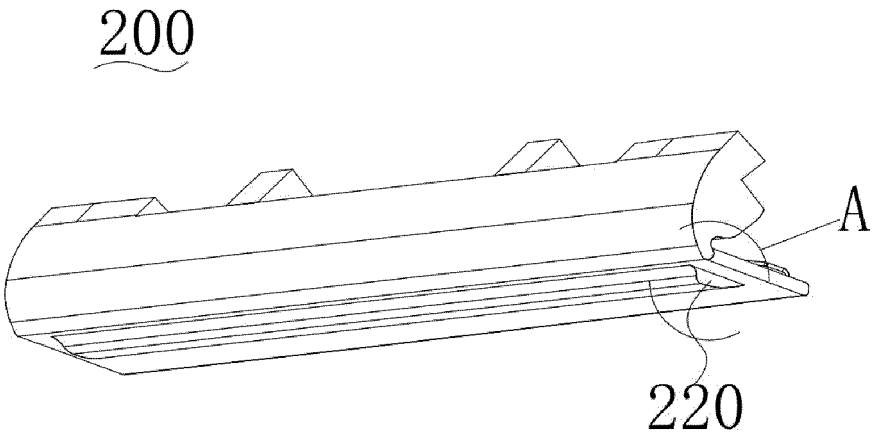

FIG. 8

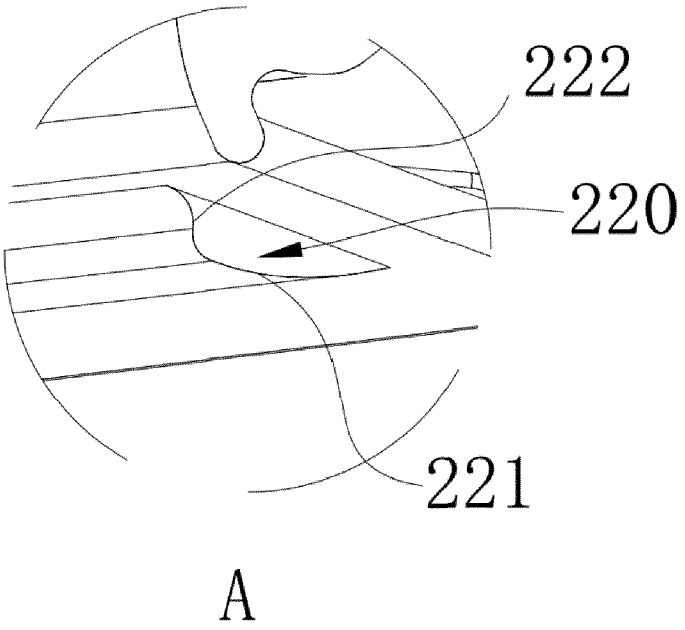

FIG. 9

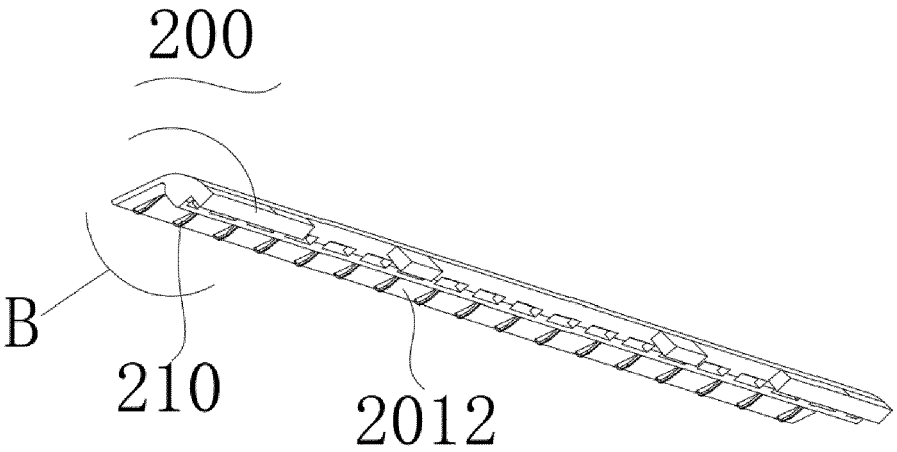

FIG. 10

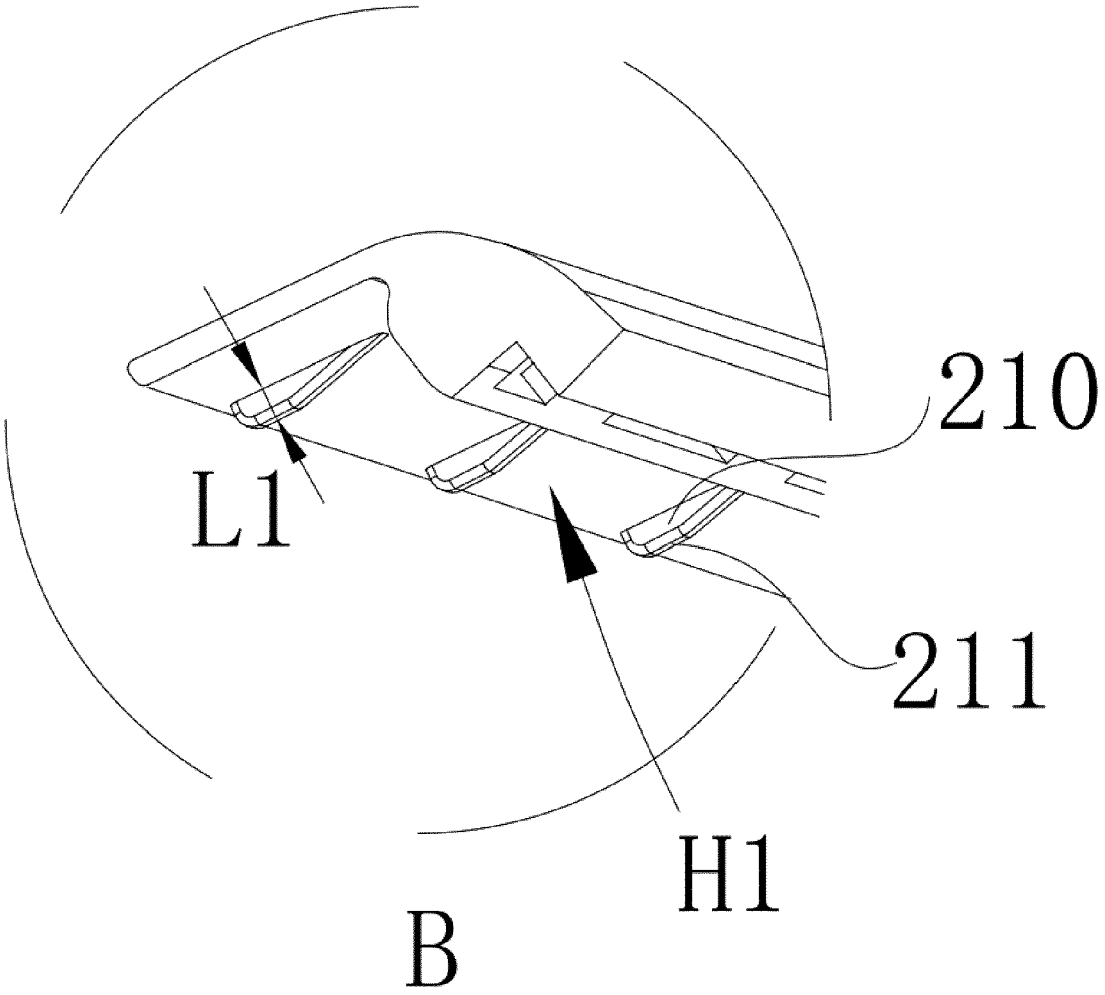

FIG. 11

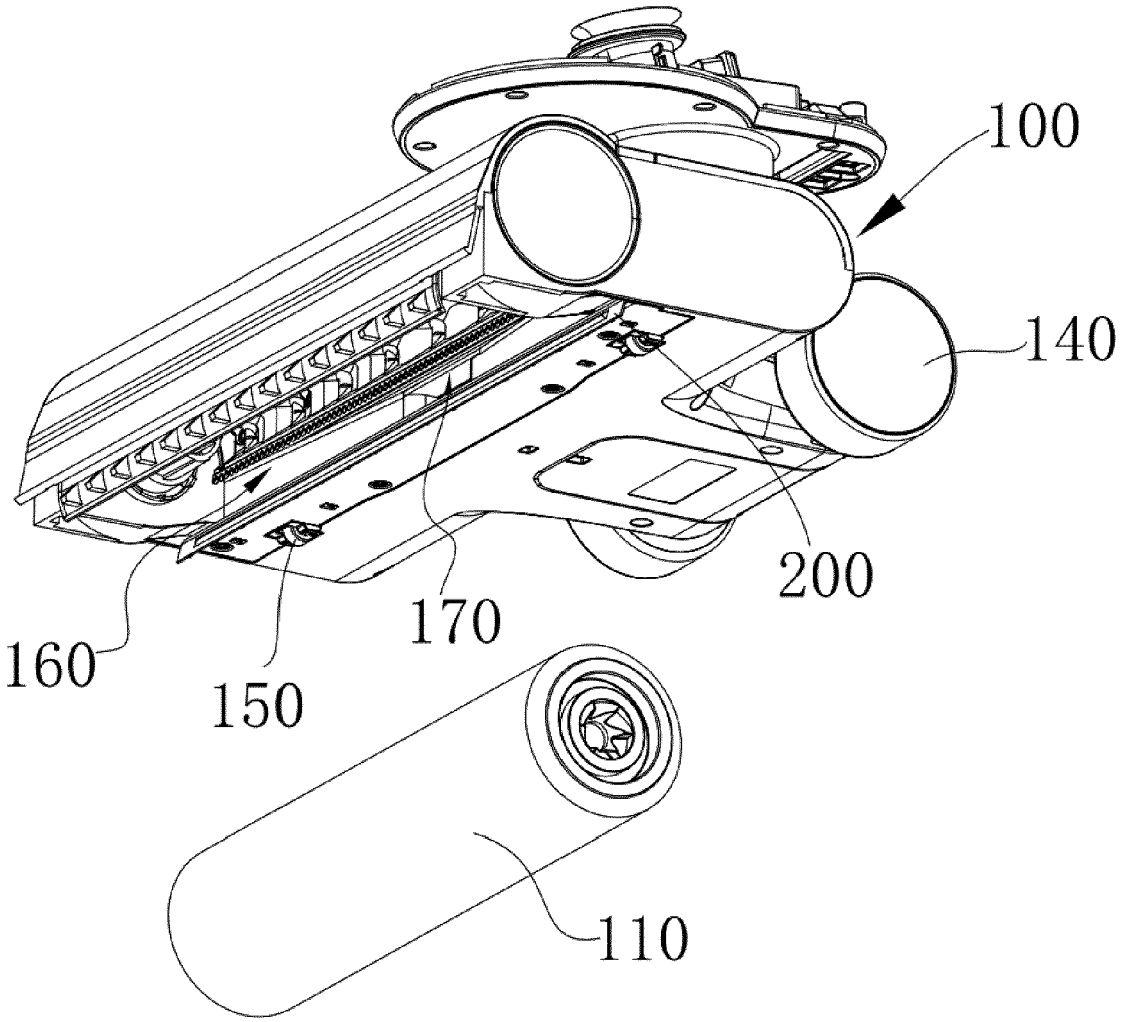

FIG. 12

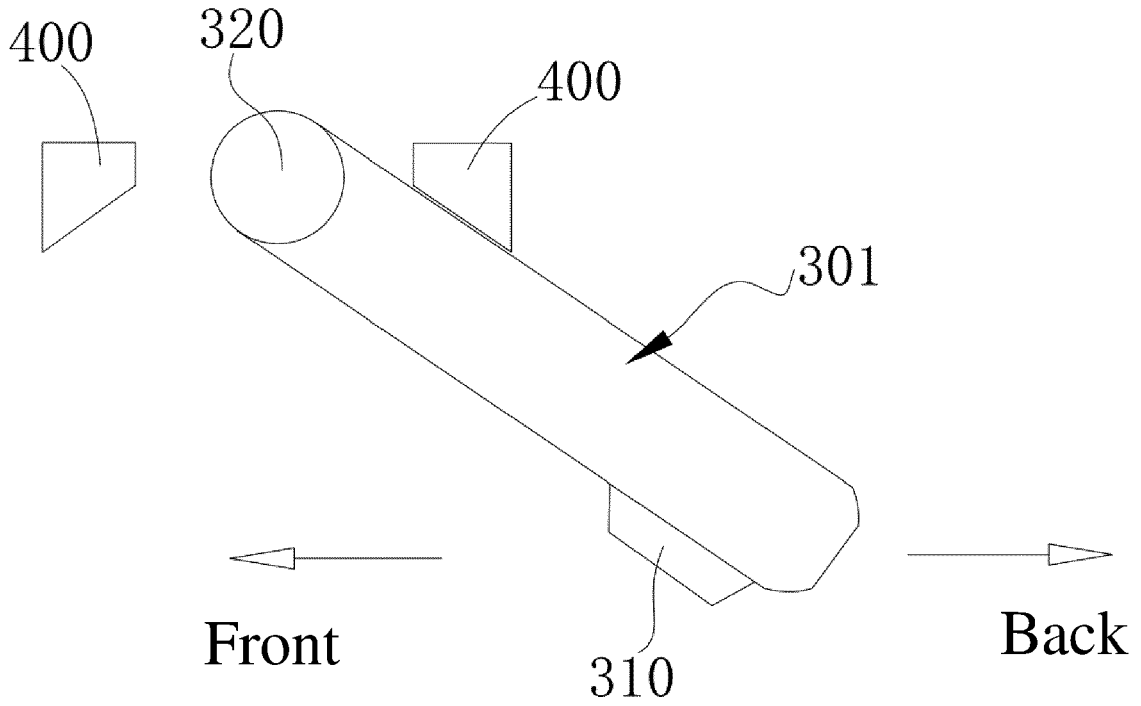
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FIG. 13

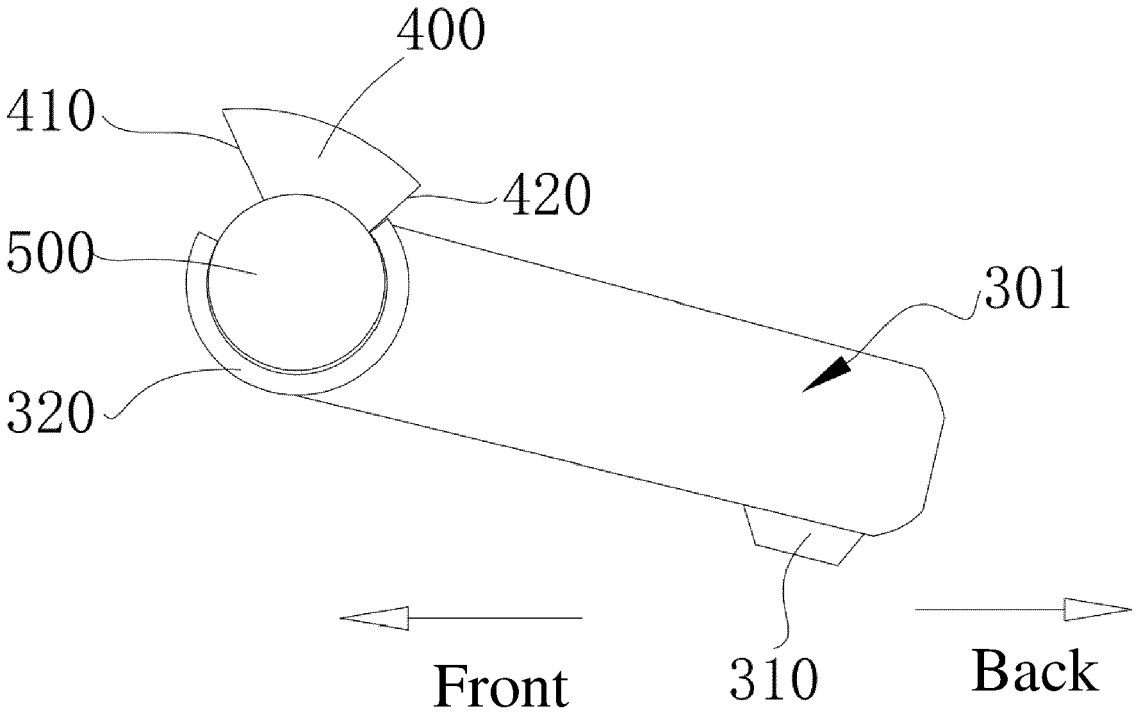
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FIG. 14

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EUROPEAN SEARCH REPORT

Application Number
EP 23 15 9820

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X A	EP 2 892 411 A1 (KONINKL PHILIPS NV [NL]) 15 July 2015 (2015-07-15) * paragraph [0001] - paragraph [0003] * * paragraph [0064] - paragraph [0120] * -----	1-5,7,9, 10 6,8, 11-15	INV. A47L11/30 A47L11/40
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A47L

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	28 June 2023	Jezierski, Krzysztof

CATEGORY OF CITED DOCUMENTS

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28-06-2023

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