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(54) SELF-PROPELLED FLOOR TREATMENT DEVICE AND SUCTION NOZZLE

(57) Provided is a self-moving ground processing apparatus and a suction nozzle. The self-moving ground processing apparatus includes at least an apparatus main body and a suction nozzle (1000) coupled to the apparatus main body, where, a suction port (100) is formed on the bottom of the suction nozzle, an advancing direction of the suction nozzle during the operation process is set as a forward direction, a front sealing strip (1003) is arranged on the front side of the suction port, the front sealing strip and includes a fixed end (10031) and a free end (10032) extending toward a working surface (B). The front sealing strip is made of a flexible material, and the front sealing strip is arranged to deviate from the forward direction, so that a projection of the fixed end on the working surface is positioned before a projection of the free end on the working surface. In the present disclosure, the perimeter of the suction port on the suction nozzle is sealed, so that the vacuum suction force in the suction port is improved, and the dust removal capacity of the self-moving ground processing apparatus is improved thereby. Particularly, the arrangement direction, shape and material of the front sealing strip ensure that large-particle dust can be effectively sucked, the vacuum degree of the suction port can be maintained, and the dust removal efficiency is high.

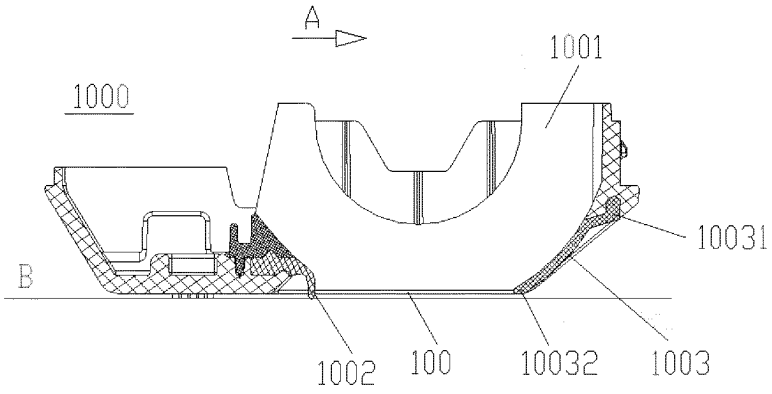

FIG. 5

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Description

FIELD

[0001] The present disclosure relates to a self-moving ground processing apparatus and a suction nozzle, and belongs to the technical field of manufacture of small household appliances.

BACKGROUND

[0002] A cleaning apparatus or a system for removing dust on the ground by means of vacuum suction is widely used due to its easy operation and high efficiency. The magnitude of the vacuum suction force of a suction port of the suction nozzle during the operation process plays a vital role in the quality of the dust removal effect, and the magnitude of the vacuum suction force of the suction port depends on the arrangement mode of a suction port sealing structure. FIG. 1 and FIG. 2 are the first and the second schematic diagrams of a bottom structure of a suction nozzle in an existing cleaning system respectively. As shown in FIG. 1 and FIG. 2, the suction port sealing structure in the existing cleaning system mainly includes two types. Specifically, if an advancing direction of the cleaning system during the operation process is set as a forward direction, i.e., the direction A in FIG. 1, then it can be seen from FIG. 1 that the rear, left and right sides of the suction port 100 are sealed by soft rubber strips 200, and the front end of the suction port 100 is open. For the suction port having this structure, the vacuum suction loss is large, and the dust removal effect is poor. It can be seen from FIG. 2 that in another sealing structure of the suction port, the perimeter of the suction port is sealed, and a hard material is used to seal the front end of the suction port, on which a notch 300 is formed for sucking coarse particles. The apparatus having this structure has a large movement resistance and cannot suck large particles. In short, sealing strips are often arranged around the suction port on the bottom of the existing cleaning system for improving the vacuum degree of the suction port. However, if the front side of the suction port is completely sealed with the sealing strip, then the front sealing strip will also push large-particle dust in front of the suction port forward along with the forward movement of the suction port, which will also affect the working efficiency of the cleaning system. FIG. 3 is a schematic diagram of the overall structure of the cleaner disclosed in CN 101522459B. As shown in FIG. 3, disclosed is a suction nozzle with a suction port on its bottom, the sealing strip on the front side of the suction port is provided with an opening 15 which can be completely or partially closed. Under normal working conditions, the opening 15 is closed, a large vacuum degree at the suction opening is maintained. When large-particle dust needs to be sucked, the opening 15 is opened, thereby sucking coarse dirt. However, the suction port has two major disadvantages. Firstly, an adjustment apparatus is necessary for adjusting the opening or closing of the opening on the front sealing strip. Secondly, when the opening on the front sealing strip is opened, the vacuum degree of the suction port is reduced, and the dust suction efficiency is reduced.

[0003] Therefore, in view of the above-described deficiencies of the prior art, there is a need for a cleaner capable of sucking coarse-particle dust while maintaining the suction port vacuum.

SUMMARY

[0004] In view of the deficiencies of the prior art, the technical problem to be solved by the present disclosure is to provide a self-moving ground processing apparatus and a suction nozzle, where, the perimeter of a suction port on the suction nozzle is sealed, so that the vacuum suction force in the suction port is improved, and the dust removal capacity of the self-moving ground processing apparatus is improved thereby. Particularly, the arrangement direction, shape and material of the front sealing strip ensure that large-particle dust can be effectively sucked, the vacuum degree of the suction port is maintained, and the dust removal efficiency is high.

[0005] The technical problem to be solved by the present disclosure is achieved by the following technical solution:

A self-moving ground processing apparatus includes at least an apparatus main body and a suction nozzle coupled to the apparatus main body, where, a suction port is formed on the bottom of the suction nozzle, an advancing direction of the suction nozzle during the operation process is set as a forward direction, a front sealing strip is arranged on the front side of the suction port, the front sealing strip includes a fixed end and a free end, the front sealing strip is made of a flexible material, and the front sealing strip is arranged to deviate from the forward direction, so that a projection of the fixed end on a working surface is positioned before a projection of the free end on the working surface.

[0006] Specifically, the front sealing strip is arranged on the front side of the suction port through the fixed end. To improve the deformation capability of the front sealing strip, a thickness of the fixed end is less than a thickness of the free end. Preferably, the thickness of the front sealing strip is less than or equal to 1.8 mm.

[0007] The front sealing strip may be arc-shaped as desired. Particularly, when a rolling brush is mounted at the suction port of the suction nozzle, to ensure the dust removal effect and the compact structure of the suction nozzle, and make the front sealing strip and the rolling brush not interfere with each other, the front sealing strip and the rolling brush are concentrically arranged.

[0008] Furthermore, a suction port cover plate is mounted on the bottom of the suction nozzle, the suction port is formed in the middle of the suction port cover plate, which includes a left side cover and a right side cover arranged on the left side and the right side respectively,

each cover includes a inclined portion on the front side and a planar portion on the rear side. A contact point of the free end of the front sealing strip with the working surface is located at or behind the foremost end of the planar portion.

[0009] In addition, the left side cover and the right side cover of the suction port cover plate are cover with a soft cushion is covered on.

[0010] To improve the deformation capability of the front sealing strip, a plurality of gaps are formed on the front sealing strip at intervals.

[0011] To ensure airtightness, the width of the gaps is less than or equal to 5 mm.

[0012] To improve the deformation capability of the front sealing strip, when the longitudinal length of the front sealing strip is not extremely large, for example, less than 10 mm, the length of the gaps is the same as the longitudinal length of the front sealing strip. Alternatively, the length of the gaps is set to be greater than 3 mm, so that the front sealing strip can roll over most large-particle dust, for example, rice grains or the like. Also, to improve the deformation capability of the front sealing strip, a plurality of notches can be formed on the front sealing strip at intervals.

[0013] To improve the vacuum degree of the suction port, the length of the front sealing strip is greater than the height of the fixed end from the working surface, so that when the suction nozzle works, the free end of the front sealing strip abuts against the working surface.

[0014] When works on a working surface such as a floor, to prevent the generation of noise when the front sealing strip scrubs the floor for walking, a certain clearance is provided between the free end of the front sealing strip and the working surface. Meanwhile, in order not to influence the sealing performance of the front sealing strip, the height of the free end of the front sealing strip from the working surface is less than or equal to 1.5 mm.

[0015] The present disclosure further provides a suction nozzle with a suction port formed on its bottom, where, an advancing direction of the suction nozzle during the operation process is set as a forward direction, a front sealing strip is arranged on the front side of the suction port, the front sealing strip includes a fixed end and a free end, the front sealing strip is made of a flexible material, and the front sealing strip is arranged to deviate from the forward direction, so that a projection of the fixed end on a working surface is positioned before a projection of the free end on the working surface.

[0016] In conclusion, the present disclosure provides a self-moving ground processing apparatus and a suction nozzle, where the perimeter of the suction port on the suction nozzle is sealed, so that the vacuum suction in the suction port is improved, and the dust removal capability of the self-moving ground processing apparatus is improved thereby. Due to the arrangement mode of the front sealing strip, the projection of the fixed end of the front sealing strip on the working surface is positioned before the projection of the free end on the working surface, and the front sealing strip is made of a flexible material, when the front sealing strip comes into contact with large-particle dirt during the operation process, the front sealing strip is easier to bend to roll over the large-particle dirt. Consequently, the large-particle dirt can quickly pass over the front sealing strip and enter the suction port and be brought into a dust box under the action of the rolling brush and/or the vacuum suction force, so that the dust removal operation is completed. Therefore, in the present disclosure, large-particle dust can be effectively sucked, the vacuum degree of the suction port can be maintained, and the dust removal efficiency is high.

[0017] Hereinafter, the technical solution of the present disclosure will be described in detail below in connection with the accompanying drawings and specific embodiments.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018]

FIG. 1 is a first schematic diagram of a bottom structure of a suction nozzle in an existing cleaning system;

FIG. 2 is a second schematic diagram of the bottom structure of the suction nozzle in an existing cleaning system;

FIG. 3 is a schematic diagram of an overall structure of the cleaner disclosed in CN 101522459B;

FIG. 4 is a schematic diagram of a bottom structure of a suction nozzle according to Embodiment 1 of the present disclosure;

FIG. 5 is a schematic diagram of a side structure of the suction nozzle according to Embodiment 1 of the present disclosure;

FIG. 6 is a schematic diagram of a bottom structure of a suction nozzle according to Embodiment 2 of the present disclosure;

FIG. 7 is a schematic diagram of a front structure of the suction nozzle according to Embodiment 2 of the present disclosure;

FIG. 8 is a schematic diagram of a bottom structure of a suction nozzle according to Embodiment 3 of the present disclosure; and

FIG. 9 is a schematic structure diagram of a front sealing strip according to the present disclosure.

DETAILED DESCRIPTION OF EXAMPLE EMBODIMENTS

Embodiment 1

[0019] FIG. 4 is a schematic diagram of a bottom structure of a suction nozzle according to Embodiment 1 of the present disclosure, and FIG. 5 is a schematic diagram of a side structure of the suction nozzle according to Embodiment 1 of the present disclosure. As shown in FIG. 4 and in combination with FIG. 5, the present disclosure

provides a self-moving ground processing apparatus, including at least an apparatus main body (not shown) and a suction nozzle 1000 coupled to it. A suction port 100 is formed on the bottom of the suction nozzle 1000. The direction A in FIG. 4 and FIG. 5 is an advancing direction of the suction nozzle 1000 during the operation process, and the advancing direction is set as a forward direction. A front sealing strip 1003 and a rear scraping strip 1002 are arranged on the front side and the rear side of the suction port 100 respectively. As shown in FIG. 5, the front sealing strip 1003 is arc-shaped and includes a fixed end 10031 and a free end 10032. The front sealing strip 1003 is arranged on the front side of the suction port 100 through the fixed end 10031. The front sealing strip 1003 is made of a flexible material, and is made of TPU, TPE, silica gel, PUC or other materials, so that a good elastic deformation capability of the front sealing strip is ensured. Meanwhile, the front sealing strip 1003 is arranged to deviate from the forward direction, so that the projection of the fixed end 10031 on a working surface B is positioned before the projection of the free end 10032 on the working surface B. Specifically, as shown in FIG. 5, the front sealing strip 1003 is designed to be arc-shaped, with its free end 1032 being deviated toward the suction port 100. Of course, it is also possible to design the front sealing strip as an inclined plane. If it is assumed that the front sealing strip 1003 is a straight inclined plane, that is, the arrangement direction of the formed inclined plane is inclined with respect to the working surface B, and the included angle between the inclined plane and the working surface B is about 30° to 45°. When the self-moving ground processing apparatus travels forward, due to the fact that the front sealing strip itself is arranged backward, for example, the arc shape or the inclined plane, when the free end of the front sealing strip comes into contact with large-particle dust (such as a cigarette end), the front sealing strip is easily lifted up to roll over the large-particle dust, facilitating the large-particle dust entering the suction port, and then entering a dust box under the action of the rolling brush and/or vacuum suction force and being stored therein.

[0020] To improve the deformation capability of the front sealing strip when it comes into contact with large-particle dust, the thickness of the front sealing strip should not be too large. The thickness is less than or equal to 1.8 mm. If the thickness of the front sealing strip is too large, the front sealing strip cannot deform when coming into contact with large-particle dust, and will in turn push the large-particle dust forward which prevents the large-particle dust from entering the suction port. Of course, if the fixed end 10031 is made even thinner, for example, the fixed end 10031 is thinned, the front sealing strip is easier to deform. FIG. 9 is a schematic structure diagram of a front sealing strip according to the present disclosure. In the embodiment shown in FIG. 9, the thickness of the fixed end 10031 is 0.6 mm to 0.8 mm, and the thickness of the front sealing strip 1003 elsewhere is 0.8 mm to 1.8 mm. Meanwhile, the fixed end 10031 is thinned slightly (for example, forming a small groove at the fixed end), so other locations of the front sealing strip 1003 may be thicker slightly, greatly increasing the range of materials selected for the front sealing strip.

[0021] To facilitate disassembly of the rolling brush, a suction port cover plate 1001 is generally mounted on the bottom of the suction nozzle 1000, the suction port 100 is formed in the middle of the suction port cover plate 1001, and the suction port cover plate 1001 includes a left side cover and a right side cover (not shown) arranged on the left side and the right side respectively. As shown in FIG. 4, each cover includes an inclined portion 10011 on the front side and a planar portion 10012 on the rear side. Preferably, as shown in FIG. 5, a contact point of the free end 10032 of the front sealing strip 1003 with the working surface B is located at or behind the foremost end of the planar portion 10012, that is, there is a small clearance between the front sealing strip and the planar portion, so that the vacuum degree at the suction port is improved. In addition, to prevent the suction port cover plate from scratching and damaging the working surface, the left side cover and the right side cover of the suction port cover plate 1001 are covered with a soft cushion. To improve the sealing effect, the longitudinal length of the front sealing strip 1003 (the cleaning width direction of the front sealing strip along the suction port is set as a transverse direction and the cleaning width direction of the suction port is perpendicular to the advancing direction A) is greater than the height of the fixed end 10031 from the working surface B, so that when the suction nozzle 1000 is in operation, the free end 10032 of the front sealing strip 1003 abuts against the working surface B. Meanwhile, when the tip of the free end is abraded by friction with the working surface in the long-term operation process, the free end still possesses an enough reserved length for maintaining the sealing, and the service life of the front sealing strip is obviously prolonged.

[0022] However, when the front sealing strip abuts against the working surface, it is also disadvantageous that, particularly when the front sealing strip comes into contact with the floor and other working surfaces, high noise will be generated. Therefore, in the actual arrangement of the front sealing strip, if working surfaces such as floor is taken into consideration, a certain clearance is provided between the front sealing strip and the working surface. For example, a clearance is provided between the free end 10032 of the front sealing strip 1003 and the working surface B, and the height of the clearance is 0-1.5 mm.

[0023] As shown in FIG. 4 and in combination with FIG. 5, the operation process of the suction nozzle 1000 provided by the present disclosure is as follows: during the operation process of the self-moving ground processing apparatus with the suction nozzle 1000, the suction port cover plate 1001 abuts against the working surface B and walks along with the self-moving ground processing apparatus, the rear of the suction port 100 is sealed by the rear scraping strip 1002 abutting against the ground,

the left side and the right side are sealed by the hard plane of the suction port cover plate 1001, i.e., the planar portion 10012, or by the soft cushion (not shown) on the left side cover and right side cover of the suction port cover plate 1001, and the front end of the suction port 100 is sealed by the front sealing strip 1003. Through the sealing arranged around the suction port 100, the vacuum degree at the suction opening is improved, and the dust removal capability of the self-moving ground processing apparatus is improved thereby. Due to the facts that the front sealing strip 1003 is arranged backward, and the front sealing strip 1003 is made of a flexible material and the front sealing strip 1003 is arc-shaped, during the operation process, when the front sealing strip 1003 comes into contact with large-particle dirt, the front sealing strip 1003 is deformed due to the mutual extrusion. Meanwhile, the arc shape is easier to bend to roll over large-particle dirt under extrusion, and the large-particle dirt can pass over the front sealing strip 1003 and enter the suction port 100. Under the action of the rolling brush and/or the vacuum suction force, the large-particle dirt is brought into the dust box, and the self-moving ground processing apparatus completes the dust removal operation. In other words, the present disclosure can effectively suck large-particle dust and maintain the vacuum degree of the suction port. In addition, to improve the dust removing effect, a rolling brush (not shown) is arranged in the suction port. Furthermore, to ensure the dust removal effect and the compact structure of the suction nozzle, the rolling brush can be concentrically arranged with the front sealing strip 1003, so that the rolling brush and the front sealing strip 1003 will not interfere with each other during the operation process.

Embodiment 2

[0024] FIG. 6 is a schematic diagram of a bottom structure of a suction nozzle according to Embodiment 2 of the present disclosure, and FIG. 7 is a schematic diagram of a front structure of the suction nozzle according to Embodiment 2 of the present disclosure. As shown in FIG. 6 and in combination with FIG. 7, this embodiment is an improvement on the basis of Embodiment 1, where the deformation capability of the front sealing strip can be adjusted by adjusting the arrangement mode of the front sealing strip 1003. Specifically, to improve the deformation capability of the front sealing strip 1003, a plurality of gaps 1004 are formed at intervals on the front sealing strip 1003. Preferably, the width of each gap 1004 is less than or equal to 5 mm. If the width of the gaps is too large, the vacuum degree at the suction port will be obviously reduced. Meanwhile, the length of the gaps 1004 is substantially the same as the longitudinal length of the front sealing strip 1003, so that the deformation capability of the front sealing strip is further improved.

[0025] However, if the length of the gaps is larger, the sealing effect is worse and the vacuum degree is lower. In practical applications, the length of the gaps can be flexibly set according to the size of large particles on the working surface. For example, if the length of the gaps is set to be greater than 3 mm (the diameter of particles such as rice grains is usually 3 mm) and less than the longitudinal length of the front sealing strip, the front sealing strip has a good cleaning effect in a working environment without too large dust particles.

[0026] Other technical features of this embodiment are the same as those of Embodiment 1, and the detailed description refers to the first Embodiment 1 and will not be repeated here.

Embodiment 3

[0027] FIG. 8 is a schematic diagram of a bottom structure of a suction nozzle according to Embodiment 3 of the present disclosure. As shown in FIG. 8, this embodiment is also an improvement on the basis of Embodiment 1. Similarly, to improve the deformation capability of the front sealing strip 1003, a plurality of notches 1005 are formed on the front sealing strip 1003 at intervals. However, the notches are generally greater than 1 cm, which are larger than the gaps in the above-described Embodiment 2 and have slightly worse sealing effect.

[0028] Other technical features of this embodiment are the same as those of Embodiment 1, and the detailed description refers to the first Embodiment 1 and will not be repeated here.

Embodiment 4

[0029] As shown in FIG. 4, the present disclosure further provides a suction nozzle 1000 with a suction port 100 formed on its bottom. The advancing direction A of the suction nozzle during the operation process is set as a forward direction. A front sealing strip 1003 is provided on the front side of the suction port 100. The front sealing strip 1003 includes a fixed end 10031 and a free end 10032. The front sealing strip is made of a material, and the front sealing strip is arranged to deviate from the forward direction, so that a projection of the fixed end 10031 on the working surface B is positioned before a projection of the free end 10032 on the working surface B.

[0030] In conclusion, the present disclosure provides a self-moving ground processing apparatus and a suction nozzle, where the perimeter of the suction port on the suction nozzle is sealed, so that the vacuum suction in the suction port is improved, and the dust removal capability of the self-moving ground processing apparatus is improved thereby. Due to the arrangement mode of the front sealing strip, the projection of the fixed end of the front sealing strip on the working surface is positioned before the projection of the free end on the working surface, and the front sealing strip is made of a flexible material. When the front sealing strip comes into contact with large-particle dirt during the operation process, the front sealing strip is easier to bend to roll over the large-particle dirt. Consequently, the large-particle dirt can

quickly pass over the front sealing strip and enter the suction port and be brought into a dust box under the action of the rolling brush and/or the vacuum suction force, so that the dust removal operation is completed. In other words, in the present disclosure, large-particle dust can be effectively sucked, the vacuum degree of the suction port can be maintained, and the dust removal efficiency is high.

Claims

1. A self-moving ground processing apparatus, comprising at least an apparatus main body and a suction nozzle (1000) coupled to the apparatus main body, wherein, a suction port (100) is formed on the bottom of the suction nozzle, an advancing direction of the suction nozzle during the operation process is set as a forward direction, a front sealing strip (1003) is arranged on the front side of the suction port, the front sealing strip comprises a fixed end (10031) and a free end (10032) extending toward a working surface (B), the front sealing strip is made of a flexible material, and the front sealing strip is arranged to deviate from the forward direction, so that a projection of the fixed end on the working surface is positioned before a projection of the free end on the working surface.

2. The self-moving ground processing apparatus according to claim 1, wherein, the front sealing strip (1003) is arranged on the front side of the suction port (100) through the fixed end (10031), and a thickness of the fixed end is less than a thickness of the free end (10032).

3. The self-moving ground processing apparatus according to claim 1, wherein, the thickness of the front sealing strip (1003) is less than or equal to 1.8 mm.

4. The self-moving ground processing apparatus according to claim 3, wherein, the front sealing strip (1003) is arc-shaped.

5. The self-moving ground processing apparatus according to claim 4, wherein, a rolling brush is mounted at the suction port (100) of the suction nozzle (1000), and the front sealing strip (1003) is arranged concentrically with the rolling brush.

6. The self-moving ground processing apparatus according to claim 1, wherein, a suction port cover plate (1001) is mounted on the bottom of the suction nozzle (1000), the suction port (100) is formed in the middle of the suction port cover plate, the suction port cover plate comprises a left side cover and a right side cover arranged on the left side and the right side respectively, each cover comprises a inclined portion (10011) on the front side and a planar portion (10012) on the rear side, and a contact point of the free end (10032) of the front sealing strip (1003) with the working surface (B) is located at or behind the foremost end of the planar portion.

7. The self-moving ground processing apparatus according to claim 6, wherein, the left side cover and the right side cover of the suction port cover plate (1001) are covered with a soft cushion.

8. The self-moving ground processing apparatus according to claim 1, wherein, a plurality of gaps (1004) are formed on the front sealing strip (1003) at intervals.

9. The self-moving ground processing apparatus according to claim 8, wherein, the width of the gaps (1004) is less than or equal to 5 mm.

10. The self-moving ground processing apparatus according to claim 8, wherein, the length of the gaps (1004) is the same as a longitudinal length of the front sealing strip (1003);
or, the length of the gaps (1004) is greater than 3 mm.

11. The self-moving ground processing apparatus according to claim 1, wherein, a plurality of notches (1005) are formed on the front sealing strip (1003) at intervals.

12. The self-moving ground processing apparatus according to claim 1, wherein, the length of the front sealing strip (1003) is greater than the height of the fixed end (10031) from the working surface (B), so that when the suction nozzle (1000) works, the free end (10032) of the front sealing strip abuts against the working surface.

13. The self-moving ground processing apparatus according to claim 1, wherein, a clearance is provided between the free end of the front sealing strip (1003) and the working surface.

14. The self-moving ground processing apparatus according to claim 13, wherein, the clearance is less than or equal to 1.5 mm.

15. A suction nozzle, wherein, a suction port is formed on the bottom of the suction nozzle, an advancing direction of the suction nozzle during the operation process is set as a forward direction, a front sealing strip is arranged on the front side of the suction port (100), the front sealing strip (1003) comprises a fixed end (10031) and a free end (10032), the front sealing strip is made of a flexible material, and the front sealing strip is arranged to deviate from the forward direction, so that a projection of the fixed end on a

working surface is positioned before a projection of the free end on the working surface.

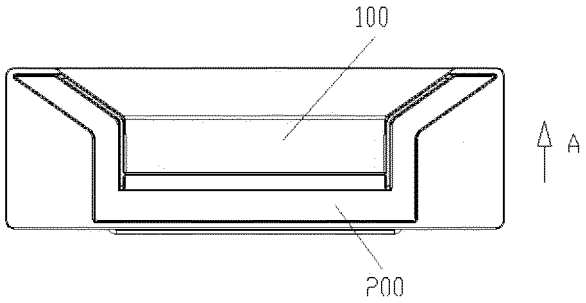

FIG. 1

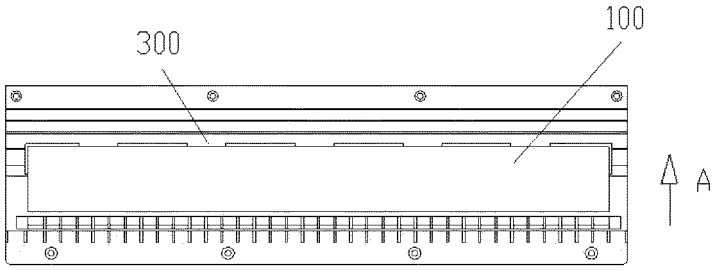

FIG. 2

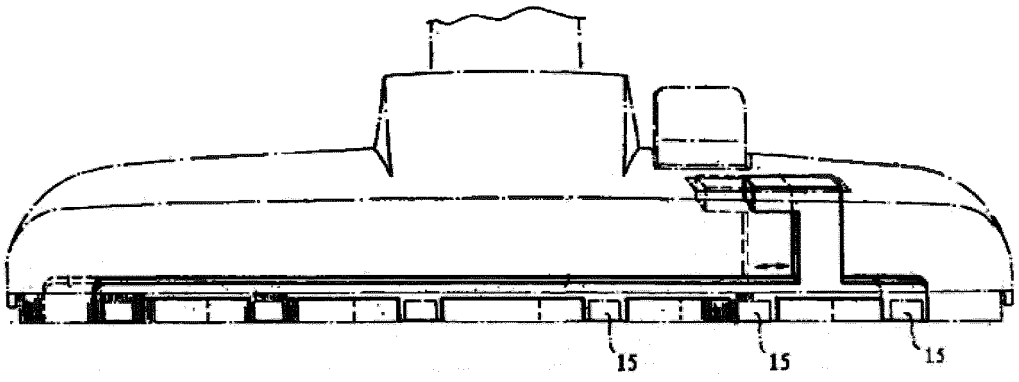

FIG. 3

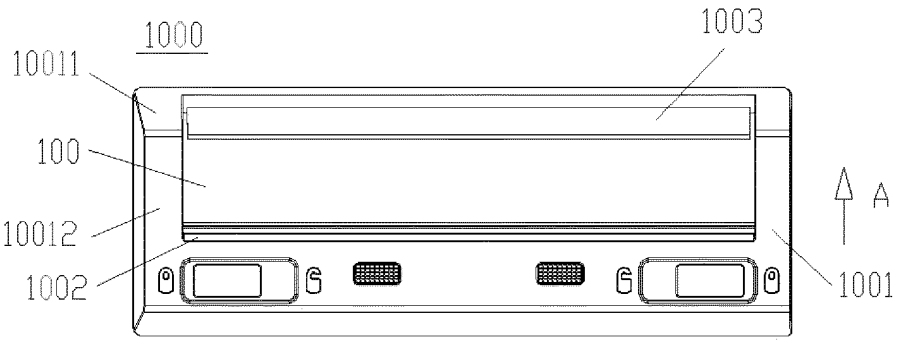

FIG. 4

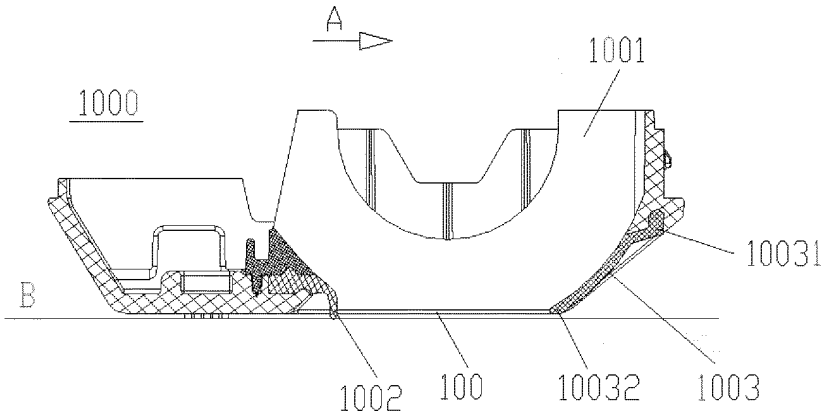

FIG. 5

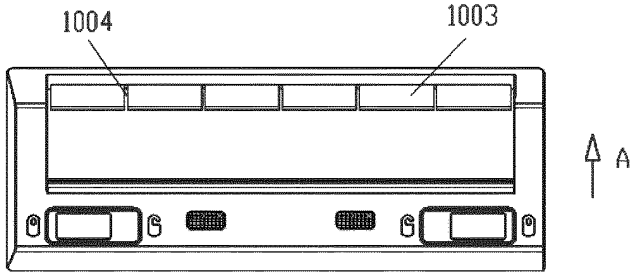

FIG. 6

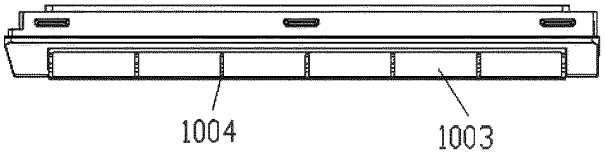

FIG. 7

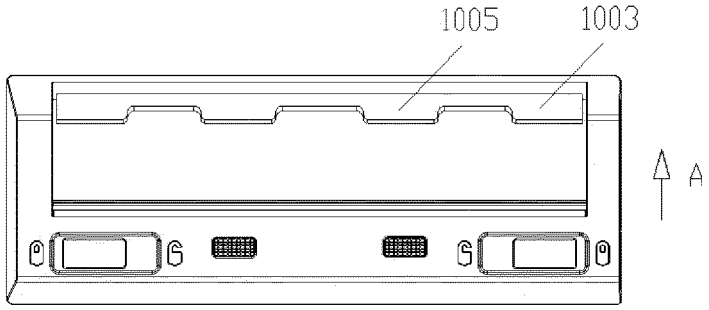

FIG. 8

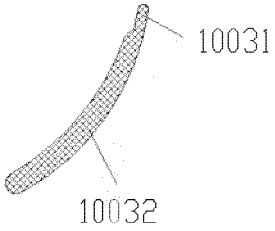

FIG. 9

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2017/109938

A. CLASSIFICATION OF SUBJECT MATTER

A47L 9/04 (2006.01) i

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A47L

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

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

CNKI, CNPAT, WPI, EPODOC: 吸尘, 扫地, 吸嘴, 吸口, 吸头, 密封, 负压, 柔性, 弹性, 形变, 变形, 橡胶; dust, suction, nozzle, hole, sucker, seal+, flexible, deform+, elastic+, rubber

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
PX	CN 206576821 U (ECOVACS ROBOT CO., LTD.), 24 October 2017 (24.10.2017), claims 1-15	1-15
X	CN 104674734 A (ZOOMLION HEAVY INDUSTRY SCIENCE&TECHNOLOGY DEVELOPMENT CO., LTD.), 03 June 2015 (03.06.2015), description, paragraphs [0028]-[0044], and figures 1-4	1-15
A	CN 201912013 U (KINGCLEAN ELECTRIC CO., LTD.), 03 August 2011 (03.08.2011), entire document	1-15
A	CN 200958203 Y (JIAODA SHENZHOU MOTOR DESIGN AND DEVELOPMENT CO., LTD.), 10 October 2007 (10.10.2007), entire document	1-15
A	JP H08228975 A (FUKOKU K.K. et al.), 10 September 1996 (10.09.1996), entire document	1-15

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

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

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

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
02 January 2018	31 January 2018

Name and mailing address of the ISA	Authorized officer
State Intellectual Property Office of the P. R. China No. 6, Xitucheng Road, Jimenqiao Haidian District, Beijing 100088, China Facsimile No. (86-10) 62019451	YIN, Huayu Telephone No. (86-10) 61648179

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2017/109938

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
CN 206576821 U	24 October 2017	None	
CN 104674734 A	03 June 2015	CN 104674734 B	06 June 2017
CN 201912013 U	03 August 2011	None	
CN 200958203 Y	10 October 2007	None	
JP H08228975 A	10 September 1996	JP 3174239 B2	11 June 2001

Form PCT/ISA/210 (patent family annex) (July 2009)

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- CN 101522459 B **[0002] [0018]**