

(19)



(11)

EP 2 554 086 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention
of the grant of the patent:
18.11.2015 Bulletin 2015/47

(51) Int Cl.:
A47L 9/00 ^(2006.01) **A47L 9/02** ^(2006.01)
A47L 9/04 ^(2006.01) **A47L 9/28** ^(2006.01)
A47L 11/40 ^(2006.01)

(21) Application number: **11762990.7**

(86) International application number:
PCT/KR2011/002124

(22) Date of filing: **29.03.2011**

(87) International publication number:
WO 2011/122818 (06.10.2011 Gazette 2011/40)

(54) **DUST COLLECTION BLADE STRUCTURE FOR CLEANING ROBOT AND CLEANING ROBOT
HAVING SAME**

STAUBSAMMELNDE SCHAUFELSTRUKTUR FÜR EINEN REINIGUNGSROBTER UND
REINIGUNGSROBTER DAMIT

STRUCTURE DE LAME RAMASSE-POUSSIÈRE POUR ROBOT DE NETTOYAGE ET ROBOT DE
NETTOYAGE DOTÉ DE CELLE-CI

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

- **LEE, No Soo**
Seoul 153-782 (KR)
- **KIM, Jong Hyun**
Seoul 153-782 (KR)

(30) Priority: **29.03.2010 KR 20100028147**

(74) Representative: **Capasso, Olga et al**
de Simone & Partners
Via Vincenzo Bellini, 20
00198 Roma (IT)

(43) Date of publication of application:
06.02.2013 Bulletin 2013/06

(73) Proprietor: **Yujin Robot Co., Ltd.**
Seoul 153-802 (KR)

(56) References cited:
WO-A1-2006/068403 KR-A- 20070 021 763
KR-A- 20080 058 856 KR-B1- 100 588 061
KR-B1- 100 761 667 US-A- 4 901 394
US-A- 5 212 848 US-A- 5 881 417
US-A1- 2006 190 146 US-A1- 2006 293 809
US-B2- 7 571 511

(72) Inventors:
• **YOO, Ho Sang**
Seoul 153-030 (KR)
• **SHIN, Kyung Chul**
Seoul 158-752 (KR)
• **PARK, Seong Ju**
Incheon 403-023 (KR)

Note: Within nine months of the publication of the mention of the grant of the European patent in the European Patent Bulletin, any person may give notice to the European Patent Office of opposition to that patent, in accordance with the Implementing Regulations. Notice of opposition shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

EP 2 554 086 B1

Description

[Technical Field]

[0001] The present invention relates to a cleaning robot. More particularly, the present invention relates to a cleaning robot including a dust collection blade, which receives dust flowing or splattered in a rear direction of a brush and makes the dust flow into a dust container.

[Background Art]

[0002] In general, a robot refers to a mechanical device automatically performing a certain operation or manipulation. The robot may be used for industry or medicine, or may be used for performing a dangerous operation in a polar region, in which it is difficult for a person to act, that is, in place of the person.

[0003] With the development of a robot technology, a robot used at home has recently appeared, and a most representative robot among home service robots is a cleaning robot.

[0004] Currently, the cleaning robot includes various sensors and a navigation function, so that it is possible to recognize its position, recognize a boundary of a room, and thoroughly clean every nook and corner of the room, and reaches the level that the cleaning robot can start and finish a cleaning for itself without a separate command for the cleaning.

[0005] Efforts to improve efficiency of cleaning by a cleaning robot have been gradually increased, and as a result of the efforts, more advanced cleaning robots have been developed.

US 2006/0293809 relates to an autonomous cleaning device which comprises a flexible blade provided in front of a dust bin. The flexible blade directs dirt collected by a brush of the cleaning device into the dust bin.

[Disclosure]

[0006] The present invention provides a cleaning robot in accordance with independent claim 1. Preferred embodiments of the invention are reflected in the dependent claims. The claimed invention can be better understood in view of the embodiments described hereinafter. In general, the described embodiments describe preferred embodiments of the invention. The attentive reader will note, however, that some aspects of the described embodiments extend beyond the scope of the claims. To the extent that the described embodiments indeed extend beyond the scope of the claims, the described embodiments are to be considered supplementary background information and do not constitute definitions of the invention per se. This also holds for the subsequent paragraphs "Technical Problem", "Technical Solution", "Advantageous Effects", "Description of Drawings", "Best Mode" as well as the "Industrial Applicability"

[Technical Problem]

[0007] An object of the present disclosure is to provide a dust collection blade structure which is easily maintained and repaired while further improving waste collection performance, and a cleaning robot including the dust collection blade according to a development trend of the cleaning robot.

10 [Technical Solution]

[0008] In order to accomplish the object, the present disclosure provides dust collection blade structure for a cleaning robot, which is installed in front of an inlet aperture of a dust container included in a cleaning robot so as to guide waste to flow into the dust container, including a dust collection blade including a plurality of supporting protrusions formed in a lateral direction on a rear surface thereof to improve restoration force.

20 The dust collection blade structure further includes a hook part including a hook formed at one end thereof so as to be attached/detached to/from one side of the dust container; and a pivot part hinge-coupled to an opposite side of the dust container to pivot.

25 **[0009]** Here, the plurality of supporting protrusions may be formed to have a smaller diameter as the plurality of supporting protrusions is disposed closer to a lower end of the dust collection blade.

30 **[0010]** Further, the pivot part includes a hinge insertion aperture formed in the shape of a letter "C" so as to be coupled to and separated from the hinge formed in the dust container.

35 **[0011]** In the meantime, the present disclosure provides a cleaning robot including: a dust container configured to collect waste flowing through an inlet aperture formed in a front surface thereof; and a dust collection blade installed in front of the inlet aperture and configured to guide waste to flow into the dust container, the dust collection blade including a plurality of supporting protrusions formed in a lateral direction on a rear surface thereof.

40 **[0012]** Here, the dust container includes a hook insertion recess formed in the shape of a recess in one side thereof and a hinge protruding in a vertical direction in an opposite side thereof, and the dust collection blade includes a hook part including a hook attached/detached to/from the hook insertion recess and a pivot part coupled to the hinge to pivot.

45 **[0013]** Further, the plurality of supporting protrusions may be formed to have a smaller diameter as the plurality of supporting protrusions is disposed closer to a lower end of the dust collection blade.

50 **[0014]** Further, the pivot part includes a hinge insertion aperture formed in the shape of a letter "C" so as to be coupled to and separated from the hinge formed in the dust container.

[0015] Further, the dust container includes a separation prevention part formed so as to surround an outer

peripheral surface of the hinge insertion aperture in a state where the hinge insertion aperture is coupled to the hinge, and the hinge insertion aperture is separated after pivoting in a predetermined angle so as to avoid interference with the separation prevention part.

[0016] Further, the dust container includes a leaking prevention plate protruding from a lower surface thereof in a predetermined height so as to block a lower part of the inlet aperture.

[Advantageous Effects]

[0017] According to the present disclosure, it is possible to constantly maintain the shape of the dust collection blade during long periods of use on various floor conditions, thereby improving cleaning efficiency. Further, even if the dust collection blade is worn out, it is possible to replace only the dust collection blade, so that efforts and costs for maintenance and repair may be reduced.

[Description of Drawings]

[0018]

FIG. 1 is a perspective view of a cleaning robot including a dust collection blade according to an exemplary embodiment of the present disclosure.

FIG. 2 is a partial cross-sectional view of a cleaning robot including a dust collection blade according to an exemplary embodiment of the present disclosure.

FIG. 3 is an exploded perspective view of a dust collection blade and a dust container according to an exemplary embodiment of the present disclosure.

FIG. 4 is a side view of a dust collection blade according to an exemplary embodiment of the present disclosure.

FIG. 5 is a view illustrating a modified state of a dust collection blade.

FIG. 6 is a perspective view illustrating a state in which a dust collection blade is installed in a dust container.

FIG. 7 is a perspective view illustrating a state in which a dust collection blade is separated from a dust container.

FIG. 8 is a cross-sectional view illustrating a state in which a pivot part is coupled to a hinge.

[Best Mode]

[0019] Hereinafter, an exemplary embodiment according to the present disclosure will be described in detail with reference to the accompanying drawings. First, in denoting reference numerals to constitutional elements of respective drawings, it should be noted that the same elements will be denoted by the same reference numerals although they are illustrated in different drawings. Further, a detailed explanation of known related functions and constitutions may be omitted so as to avoid un-

essarily obscuring the subject matter of the present disclosure. Further, an exemplary embodiment of the present disclosure will be described below, but the technical spirit of the present disclosure is not limited thereto and may be modified and variously carried out by those skilled in the art.

[0020] FIG. 1 is a perspective view of a cleaning robot including a dust collection blade according to an exemplary embodiment of the present disclosure, and FIG. 2 is a partial cross-sectional view of a cleaning robot including a dust collection blade according to an exemplary embodiment of the present disclosure.

A cleaning robot 1 according to an exemplary embodiment of the present disclosure includes a dust container 100 configured to collect waste and a dust collection blade 200 fastened to the dust container 100.

[0021] The dust container 100 is provided at a rear of the cleaning robot 1. More particularly, the dust container 100 is provided at a rear end of a brush 2 as illustrated in FIG. 2, so as to serve to collect waste flowing into dust container 100 by the brush 2.

[0022] A dust container handle 104 configured to easily grip the dust container 100 is provided at an upper portion of the dust container 100. The dust container handle 104 is preferably hinge-coupled to the upper part of the dust container 100 so that the dust container handle 104 can be folded when the dust container 100 is installed to the cleaning robot 1.

[0023] FIG. 3 is an exploded perspective view of the dust collection blade and the dust container according to an exemplary embodiment of the present disclosure.

[0024] An inlet aperture 106 opened so that waste flows into the dust container 100 is provided at a front-lower part of the dust container 100.

[0025] The dust container 100 is provided with a hook insertion recess 110, which is formed to have a concave recess toward an inside direction thereof, in one side thereof. Further, the dust container 100 is provided with a hinge 120 protruding in a vertical direction thereof in an opposite side thereof.

[0026] The hook insertion recess 110 and the hinge 120 are provided so as to attach/detach the dust collection blade 200 to/from the dust container 100, and will be described below in detail together with the dust collection blade 200.

[0027] The dust container 100 includes a leaking prevention plate 124 protruding from a lower surface thereof in a predetermined height so as to block a lower part of the inlet aperture 106. The leaking prevention plate 124 serves to prevent waste, such as dust, collected closely to the inlet aperture 106 from being arbitrarily spilled when the dust collection blade 200 is separated from the dust container 100.

[0028] Here, the height of the leaking prevention plate 124 is formed to be smaller than that of the dust collection blade 200 so that waste may smoothly flow into the dust container 100.

[0029] The dust collection blade 200 is installed in front

of the inlet aperture 106. The dust collection blade 200 serves to guide waste carried in the rear direction by rotation of the brush 2 to flow into the dust container 100.

[0030] FIG. 4 is a side view of the dust collection blade according to an exemplary embodiment of the present disclosure, and FIG. 5 is a view illustrating a modified state of the dust collection blade.

[0031] As illustrated in FIG. 4, the dust collection blade 200 includes a plurality of supporting protrusions 202 elongated in a lengthwise direction, that is, a lateral direction, of the dust collection blade 200 on a rear surface thereof.

[0032] When a lower end part of the dust collection blade 200 is in contact with a protruding floor or an obstacle on the floor during the cleaning by the cleaning robot 1, the lower end part of the dust collection blade 200 needs to be bent so as not to disturb driving of the cleaning robot 1 to pass the obstacle, and the like.

[0033] For example, in a case where the cleaning robot 1 crosses a door sill or moves on a carpet, the dust collection blade 200 needs to be formed so as to pass an obstacle while being bent in the opposite direction of a driving direction even though the dust collection blade 200 is in contact with the obstacle, such as the door sill protruding from a floor or a carpet, as illustrated in FIG. 5.

[0034] However, when the dust collection blade 200 is in contact with the floor to be bent, a shape of the dust collection blade 200 may be restored at a beginning time by elasticity of the dust collection blade 200 itself, but when the bending is repeated, the dust collection blade 200 loses elasticity and is permanently deformed.

[0035] Accordingly, a distance between the brush 2 and the end part of the dust collection blade 200 increases, so that a problem occurs in that it is difficult to carry waste to the rear by the brush 2 flow into the dust container 100.

[0036] The supporting protrusion 202 serves to improve restoration force of the dust collection blade 200 and prevent permanent deformation thereof to continue high cleaning efficiency for a long time.

[0037] The plurality of supporting protrusions 202 is preferably formed to have a smaller diameter as the plurality of supporting protrusions 202 is disposed closer to the lower end of the dust collection blade 200 so that the dust collection blade 200 may be bent more smoothly. As supporting protrusion 202 is formed in the lengthwise direction of the dust collection blade 200, the dust collection blade 200 is sufficiently bendable so as to easily pass the door sill or the carpet.

[0038] FIG. 6 is a perspective view illustrating a state in which the dust collection blade is installed in the dust container, and FIG. 7 is a perspective view illustrating a state in which the dust collection blade is separated from the dust container.

[0039] The dust collection blade 200 includes a hook part 210 attached/detached to/from the hook insertion recess 110 and a pivot part 220 coupled to the hinge 120 to pivot.

[0040] The hook part 210 is positioned in one side of the dust collection blade 200 so as to be matched to the hook insertion recess 110. The hook part 210 includes a hook 212 formed to be latched to the hook insertion recess 110 at one end thereof.

[0041] The hook 212 formed as described above is provided to be separated from the hook insertion recess 110 by applying predetermined power in a state where the hook 212 is elastically supported so as to be latched to the hook insertion recess 110.

[0042] The pivot part 220 is provided in the opposite side of the dust collection blade 200 corresponding to the position of the hinge 120. The pivot part 220 is pivoted in a state of being coupled to the hinge 120 to serve to open/close the inlet aperture 106.

[0043] FIG. 8 is a cross-sectional view illustrating a state in which the pivot part is coupled to the hinge.

[0044] The pivot part 220 includes a hinge insertion aperture 222 formed so that an inner peripheral surface thereof is in contact with an outer peripheral surface of the hinge 120. The hinge insertion aperture 222 is preferably formed in the shape of a semicircle or a letter "C" so as to be coupled to and separated from the hinge 120.

[0045] By forming the hinge insertion aperture 222 as described above, the dust collection blade 200 may be completely separated from the dust container 100 as illustrated in FIG. 3, and thus the dust collection blade 200 may be easily replaced when the dust collection blade 200 is damaged or a life (use) thereof is ended. Further, in a case where the dust collection blade 200 is completely separated, the inside of the dust container 100 may be easily cleaned.

[0046] In the meantime, the dust container 100 includes a separation prevention part 122 formed so as to surround an outer peripheral surface of the hinge insertion aperture 222 in a state where the hinge insertion aperture 222 is coupled to the hinge 120.

[0047] The separation prevention part 122 serves to allow the hinge insertion aperture 222 coupled to the hinge 120 to be separated only when the hinge insertion aperture 222 pivots in a predetermined angle or larger so as to avoid interference with the separation prevention part 122.

[0048] According to the configuration, the hinge insertion aperture 222 may be maintained in a state where the hinge insertion aperture 222 is coupled to the hinge 120 even in a state where the hook part 210 is separated from the hook insertion recess 110, so that the dust collection blade 200 is prevented from being arbitrarily separated from the dust container 100.

[Industrial Applicability]

[0049] The present disclosure provides a dust collection blade structure which is installed in front of an inlet aperture of a dust container included in a cleaning robot so as to guide waste to flow into the dust container, the dust collection blade structure including a dust collection

blade which has a plurality of supporting protrusions formed in the lateral direction on the rear surface thereof so as to enhance the restoration force, so that it is possible to constantly maintain the shape of the dust collection blade for a long time on various floor conditions, thereby improving cleaning efficiency.

Claims

1. A cleaning robot, comprising:

a dust container (100) configured to collect waste flowing through an inlet aperture (106) formed in a front surface thereof; and
a dust collection blade (200) installed in front of the inlet aperture (106) and configured to guide waste to flow into the dust container (100), the dust collection blade (200) comprising a plurality of supporting protrusions (202), each protrusion forming itself an horizontal line extending from side to side on a rear surface of the dust collection blade and having semi-circular shape in view of a cross section,

characterized in that

the dust container (100) comprises a hook insertion recess (110) formed in the shape of a recess in one side thereof and a hinge (120) protruding in a vertical direction in an opposite side thereof, and the dust collection blade (200) comprises a hook part (210) including a hook (212) attached/detached to/from the hook insertion recess (110) and a pivot part (220) coupled to the hinge (120) to pivot.

2. The cleaning robot of claim 1, wherein the pivot part (220) comprises a hinge insertion aperture (222) formed in the shape of a letter "C" so as to be coupled to and separated from the hinge (120) formed in the dust container (100).

3. The cleaning robot of claim 2, wherein the dust container (100) comprises a separation prevention part (122) formed so as to surround an outer peripheral surface of the hinge insertion aperture (222) in a state where the hinge insertion aperture (222) is coupled to the hinge (120), and the hinge insertion aperture (222) is separated after pivoting in a predetermined angle so as to avoid interference with the separation prevention part (122).

Patentansprüche

1. Reinigungsroboter, umfassend:

einen Staubcontainer (100), der konfiguriert ist, Abfall aufzunehmen, der durch eine in einer vor-

deren Fläche davon gebildete Eintrittsöffnung (106) strömt; und

eine Staubaufnahmelamelle (200), die vor der Eintrittsöffnung (106) installiert und konfiguriert ist, Abfall zu lenken, sodass er in den Staubcontainer (100) strömt, wobei die Staubaufnahmelamelle (200) mehrere stützende Vorsprünge (202) aufweist und jeder Vorsprung selbst eine horizontale Linie bildet, die sich von Seite zu Seite an einer Rückfläche der Staubaufnahmelamelle erstreckt und eine Halbkreisform hinsichtlich eines Querschnitts aufweist,

dadurch gekennzeichnet, dass

der Staubcontainer (100) eine Hakeneinführungsaussparung (110) umfasst, die in der Form einer Aussparung in einer Seite davon gebildet ist, und ein Scharnier (120), das in einer vertikalen Richtung in einer gegenüberliegenden Seite davon vorsteht, und

die Staubaufnahmelamelle (200) einen Hakenabschnitt (210) umfasst, der einen Haken (212) umfasst, der befestigt/abgelöst an/von der Hakeneinführungsaussparung (110) ist, und einen Drehabschnitt (220) umfasst, der mit dem Scharnier (120) gekoppelt ist, um sich zu drehen.

2. Reinigungsroboter nach Anspruch 1, wobei der Drehabschnitt (220) eine Scharniereinführungsöffnung (222) umfasst, die in der Form eines Buchstabens "C" gebildet ist, um mit dem Scharnier (120), das im Staubcontainer (100) gebildet ist, gekoppelt und davon getrennt zu werden.

3. Reinigungsroboter nach Anspruch 2, wobei der Staubcontainer (100) einen Trennungsvermeidungsabschnitt (122) umfasst, der derart gebildet ist, dass er eine äußere Umfangsfläche der Scharniereinführungsöffnung (222) in einem Zustand umgibt, bei dem die Scharniereinführungsöffnung (222) mit dem Scharnier (120) gekoppelt ist, und wobei die Scharniereinführungsöffnung (222) nach dem Drehen in einen vorbestimmten Winkel getrennt wird, um eine Kollision mit dem Trennungsvermeidungsabschnitt (122) zu vermeiden.

Revendications

1. Robot de nettoyage, comprenant :

un récipient de poussière (100) configuré pour collecter des déchets s'écoulant à travers une ouverture d'entrée (106) constituée dans une surface avant de celui-ci ; et
une pale de collecte de poussière (200) installée devant l'ouverture d'entrée (106) et configurée pour guider les déchets pour qu'ils s'écoulent

dans le récipient de poussière (100), la pale de collecte de poussière (200) comprenant une pluralité de protubérances de support (202), chaque protubérance constituant elle-même une ligne horizontale s'étendant d'un côté à l'autre sur une surface arrière de la pale de collecte de poussière et présentant une forme semi-circulaire en vue d'une coupe transversale,

caractérisé en ce que

le récipient de poussière (100) comprend un évidement d'insertion de crochet (110) présentant la forme d'un évidement dans un côté de celui-ci et une charnière (120) faisant saillie dans un sens vertical dans un côté opposé de celui-ci, et la pale de collecte de poussière (200) comprend une partie de crochet (210) comprenant un crochet (212) attaché à/détaché de l'évidement d'insertion de crochet (110) et une partie de pivotement (220) couplée à la charnière (120) pour pivoter.

2. Robot de nettoyage selon la revendication 1, dans lequel la partie de pivotement (220) comprend une ouverture d'insertion de charnière (222) présentant la forme de la lettre « C » de manière à être couplée à et séparée de la charnière (120) constituée dans le récipient de poussière (100).
3. Robot de nettoyage selon la revendication 2, dans lequel le récipient de poussière (100) comprend une partie de prévention de séparation (122) constituée de manière à entourer une surface périphérique extérieure de l'ouverture d'insertion de charnière (222) dans un état dans lequel l'ouverture d'insertion de charnière (222) est couplée à la charnière (120), et l'ouverture d'insertion de charnière (222) est séparée après un pivotement à un angle prédéterminé de manière à éviter toute interférence avec la partie de prévention de séparation (122).

40

45

50

55

FIG. 1

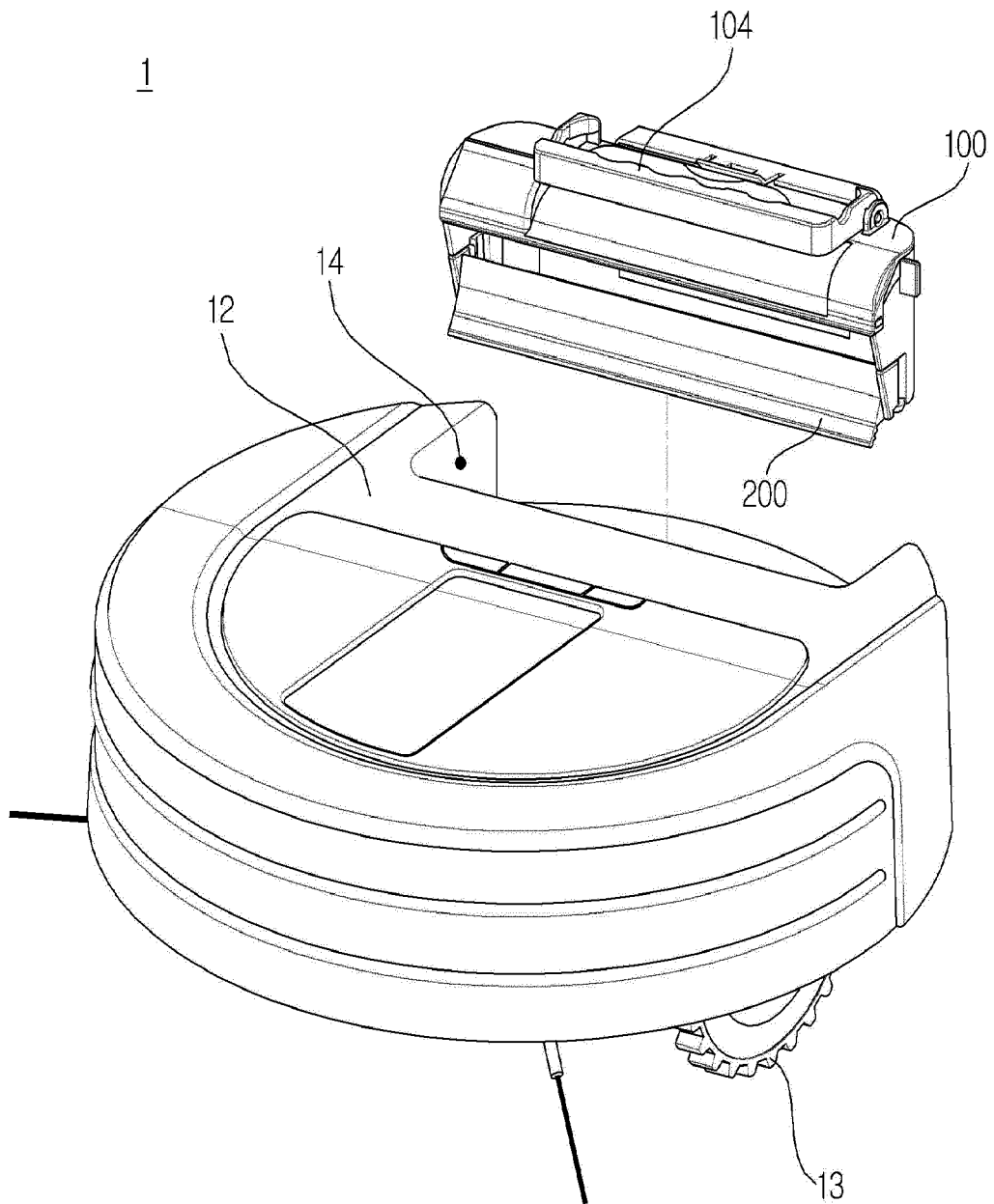


FIG. 2

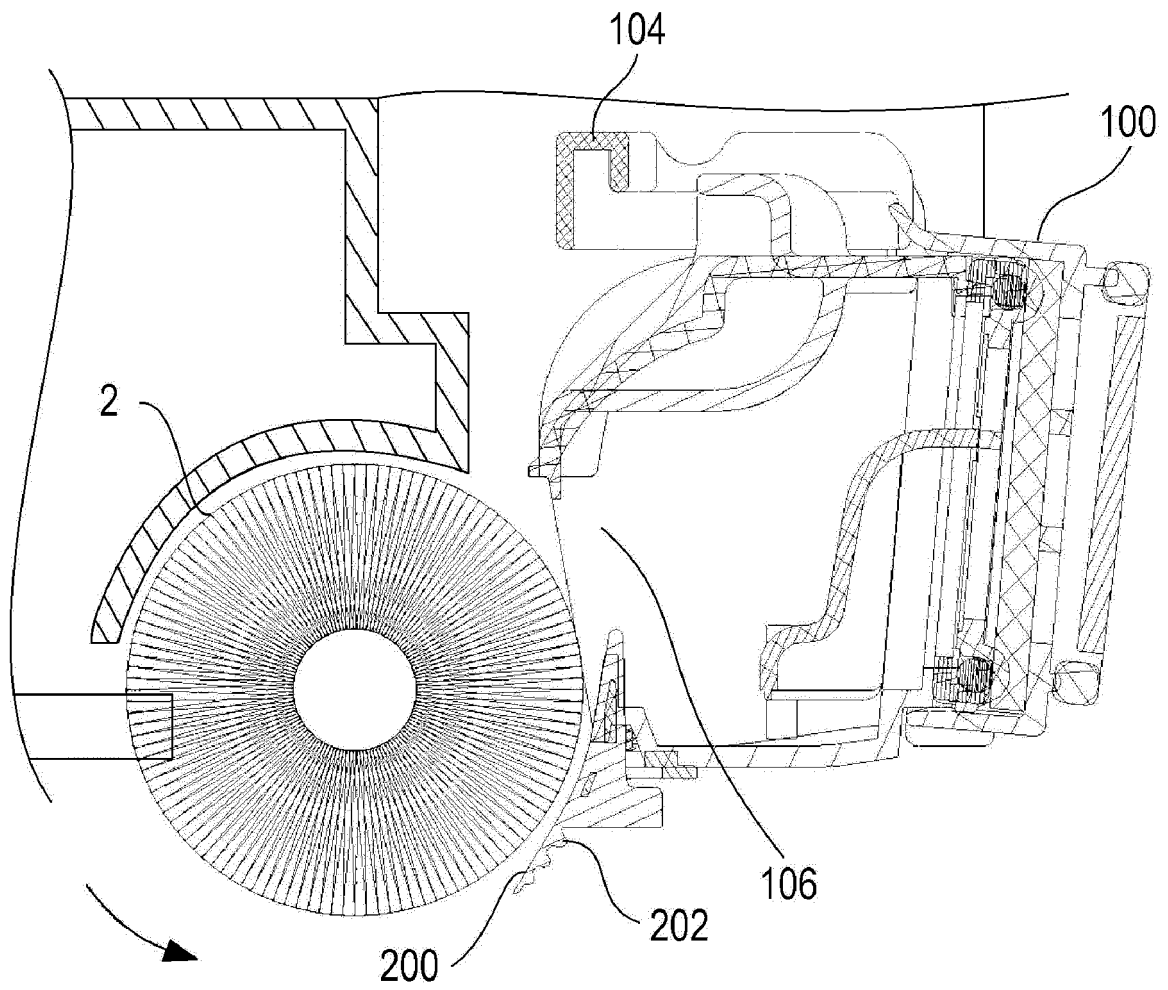


FIG. 3

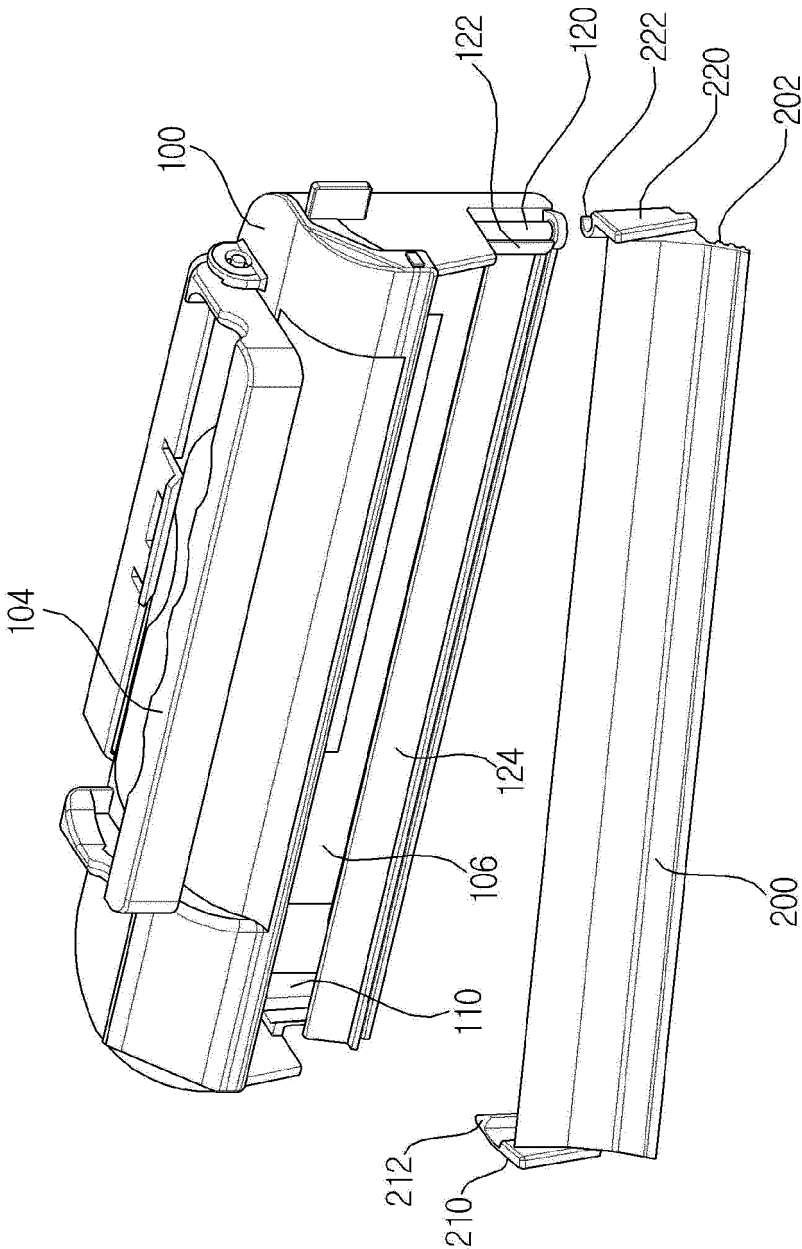


FIG. 4

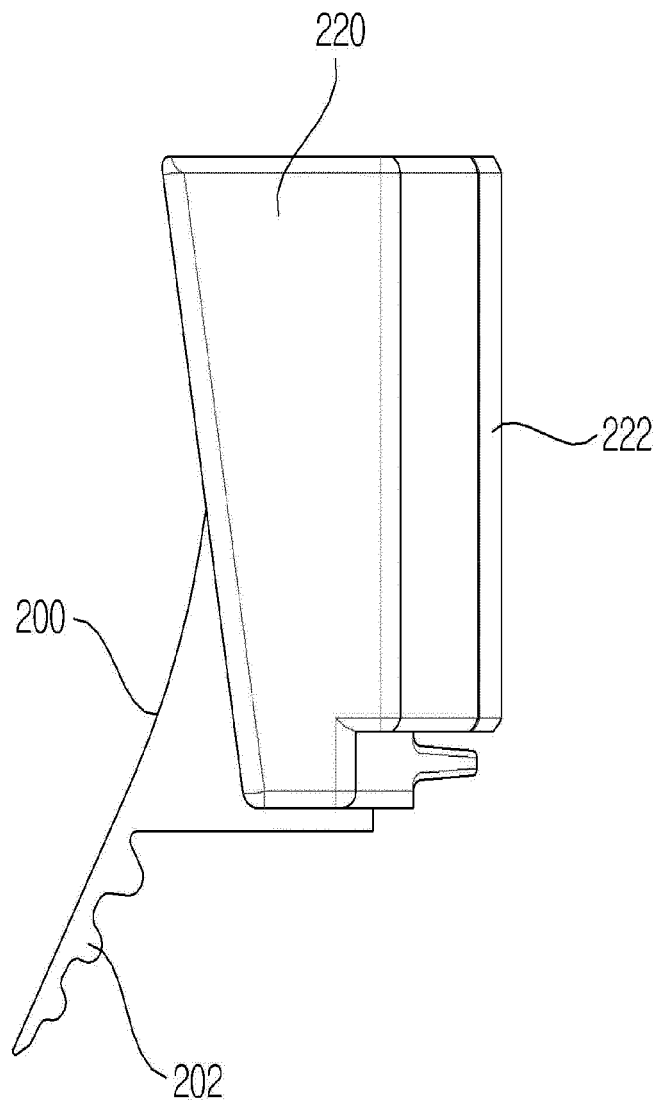


FIG. 5

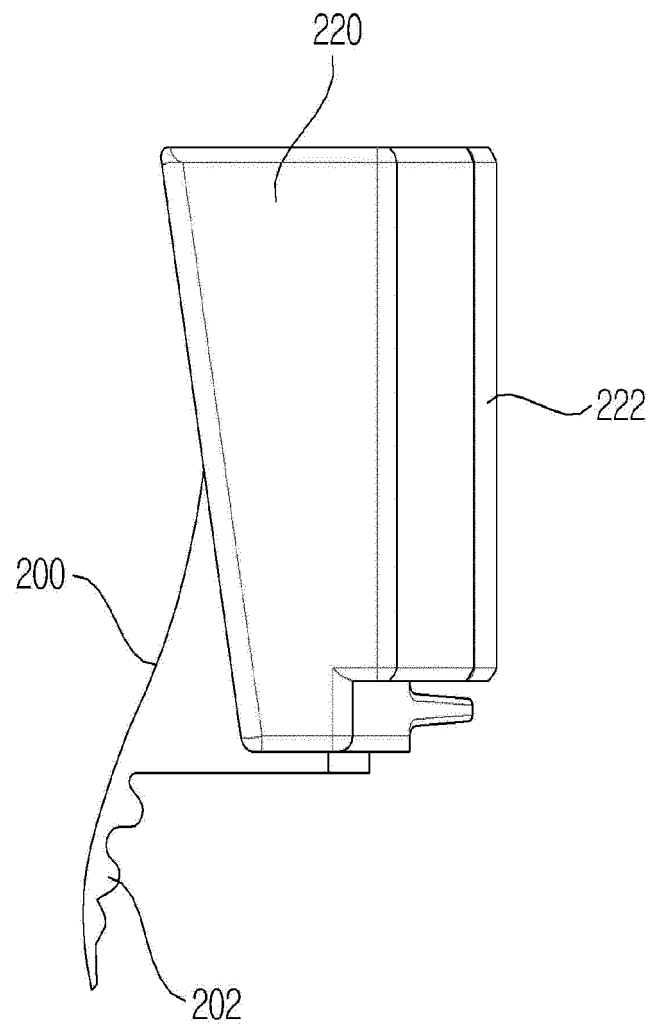


FIG. 6

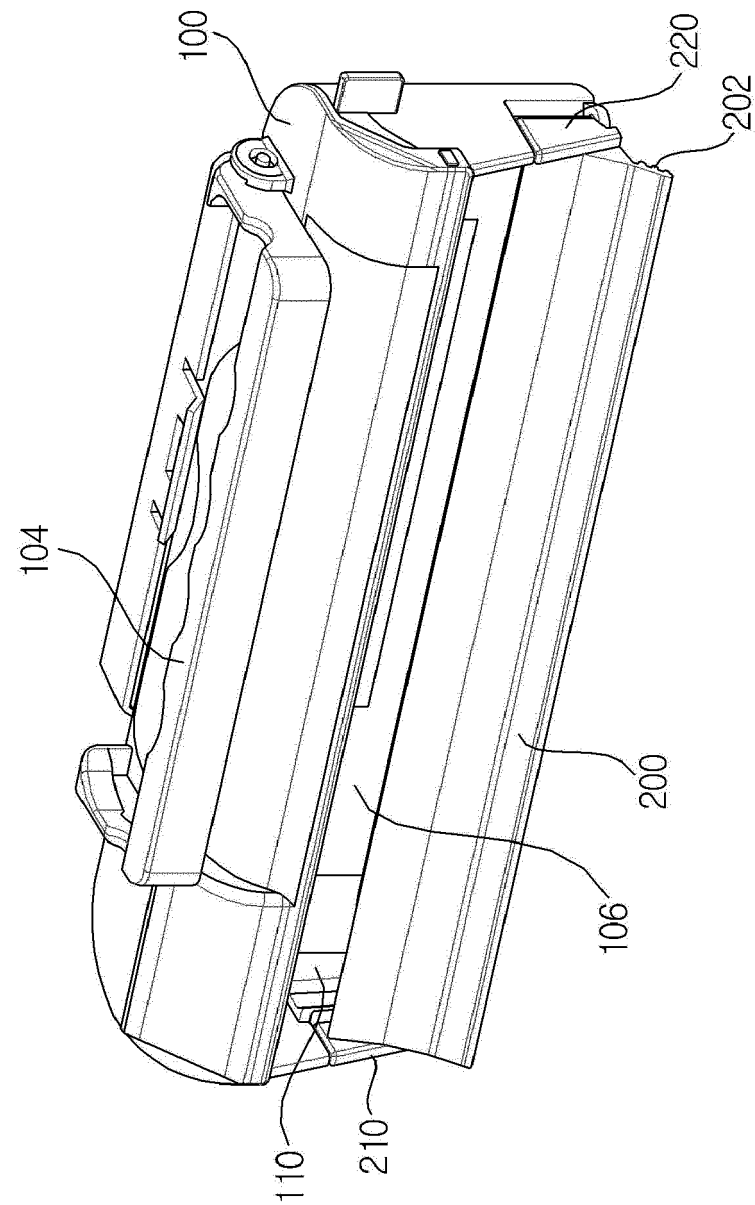


FIG. 7

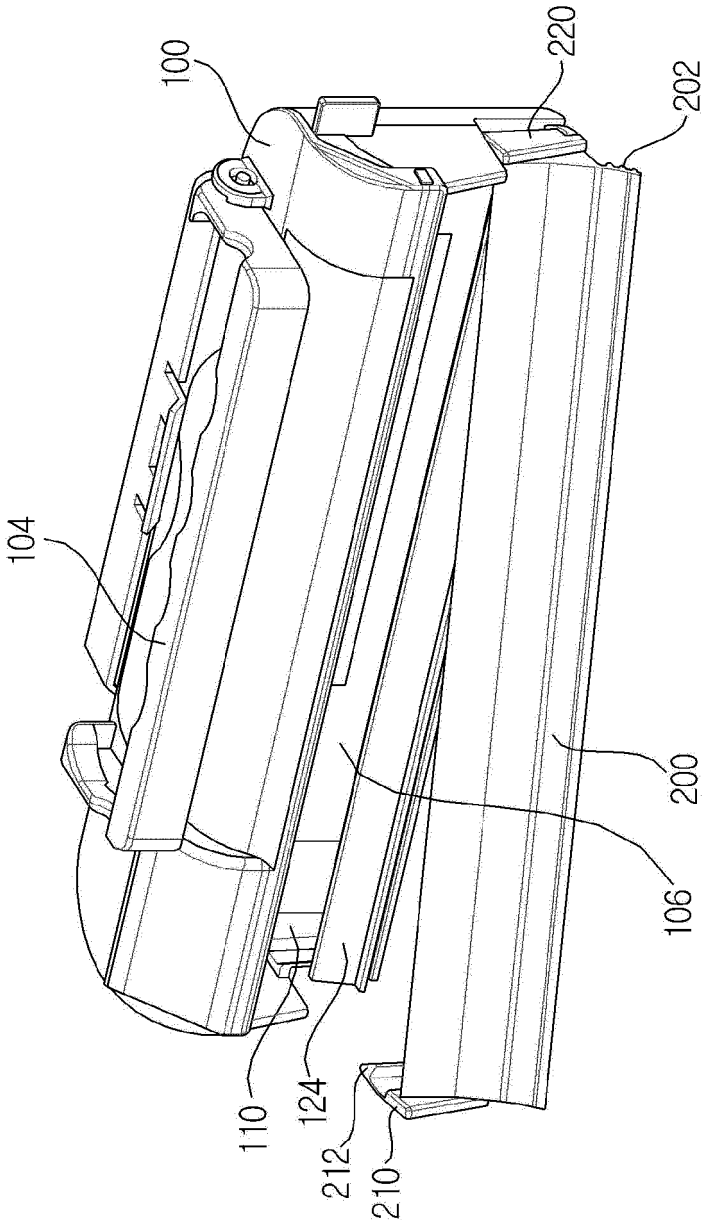
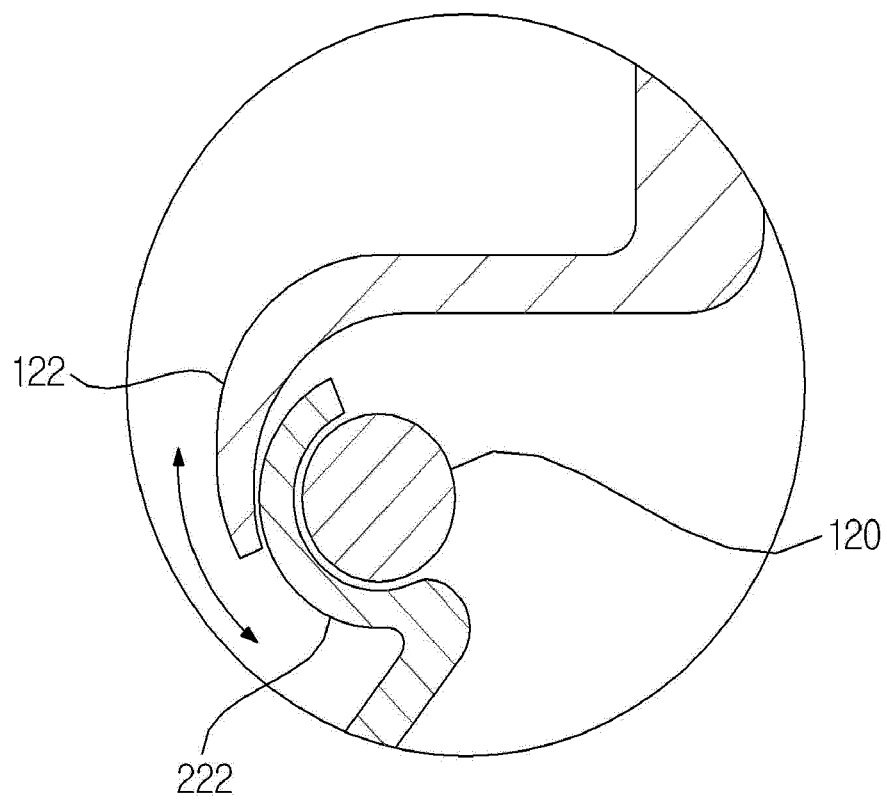


FIG. 8



REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- US 20060293809 A [0005]