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(71) Applicant: **LG Electronics Inc.**
Seoul 150-721 (KR)

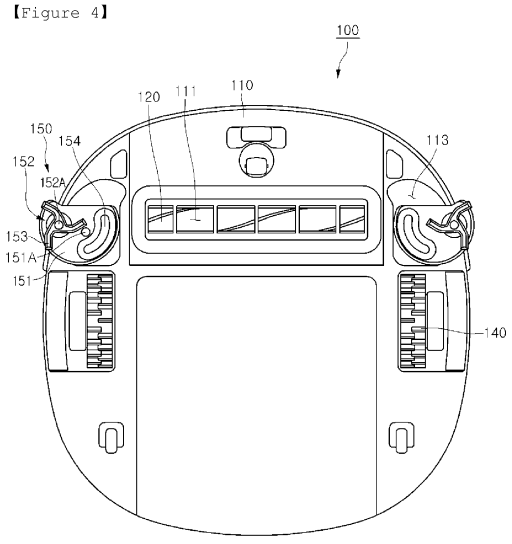
(72) Inventors:
- **YANG, Haeseock**
  Seoul 153-802 (KR)
- **GHIM, Yonggyun**
  Seoul 153-802 (KR)
- **YU, Seonil**
  Seoul 153-802 (KR)
- **SONG, Seunghyun**
  Seoul 153-802 (KR)
- **SHIN, Hyunseon**
  Seoul 153-802 (KR)
- **KIM, Hyosung**
  Seoul 153-802 (KR)

(74) Representative: **Ter Meer Steinmeister & Partner Patentanwälte**
Mauerkircherstrasse 45
81679 München (DE)

(54) AUTOMATIC VACUUM CLEANER

(57) Provided is an automatic cleaner, which includes a casing including a suction port, a suction device disposed in the casing to suction an outer foreign substance through the suction port, a moving device that moves the casing, and a side brush assembly movably installed on the casing. The side brush assembly includes a brush rotating to move a foreign substance located out of the casing, to the suction port. A rotation shaft of the brush is horizontally moved according to a movement of the side brush assembly.

【Figure 4】



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Description

BACKGROUND

[0001] The present disclosure relates to an automatic cleaner.

[0002] Cleaners may suction and remove a foreign substance from a cleaning surface. Recently, automatic cleaners for performing an automatic cleaning operation have been introduced. Automatic cleaners are moved by driving force of a motor operated by a battery, to suction and remove a foreign substance from a floor.

[0003] In general, a moving device is installed on a casing forming an appearance of an automatic cleaner. The moving device moves the automatic cleaner in a predetermined direction to suction a foreign substance from a floor. To this end, a suction port is disposed in the bottom of the casing to suction a foreign substance from a floor. A main brush, which directly contacts a foreign substance to suction the foreign substance through the suction port, may be disposed on the suction port.

[0004] However, the automatic cleaner suctions only a foreign substance located in a region under the casing, substantially, under the suction port. Thus, it may be difficult to effectively clean a region outside of the suction port.

[0005] To address this issue, a side brush may be disposed on the bottom of the casing. At least one portion of the side brush extends out of the casing. The side brush rotates relative to the casing to move a foreign substance located out of the casing, substantially, out of the suction port, toward the suction port.

[0006] However, such automatic cleaners have the following limitations.

[0007] As described above, since a foreign substance located out of the suction port can be suctioned through the suction port by means of rotation of the side brush, as the length of the side brush is increased, a cleaning area of the automatic cleaner is substantially increased. However, when the length of the side brush is increased, the side brush may be damaged while the automatic cleaner is in a cleaning operation or is stored. In addition, when the length of the side brush is increased, the automatic cleaner requires a large storage space. Thus, it may be inconvenient to store the automatic cleaner.

SUMMARY

[0008] Embodiments provide an automatic cleaner adapted for effectively cleaning a corner.

[0009] In one embodiment, an automatic cleaner includes: a casing including a suction port; a suction device disposed in the casing to suction an outer foreign substance through the suction port; a moving device that moves the casing; and a side brush assembly movably installed on the casing, wherein the side brush assembly includes a brush rotating to move a foreign substance located out of the casing, to the suction port, and a rotation shaft of the brush is horizontally moved according to a movement of the side brush assembly.

[0010] The side brush assembly may further include a movable member movably installed on the casing, and the brush may be rotatably installed on the movable member.

[0011] When the movable member is moved, a vertical overlap area of the movable member and the casing may be varied.

[0012] When the suction device is stopped, the movable member may be located in a first position. When the suction device is operated, the movable member may be moved to a second position.

[0013] While the suction device is operated, the movable member may stay in the second position.

[0014] While the suction device is operated, the movable member may be moved between the first and second positions.

[0015] When the suction device is operated, the movable member may be moved.

[0016] The brush may be rotated when the suction device is operated, and the movable member may be moved when the casing approaches a wall with a predetermined distance.

[0017] The automatic cleaner may further include: a first driving member that generates driving force for moving the movable member; and a second driving member that generates driving force for rotating the brush.

[0018] The first driving member and the second driving member may be disposed on the casing.

[0019] The first driving member may be disposed on the casing, and the second driving member may be disposed on the movable member and be moved together with the movable member.

[0020] The movable member may be installed on the casing and be allowed to linearly move.

[0021] The movable member may be installed on the casing and be allowed to rotate about a rotation shaft.

[0022] The side brush assembly may be provided in plurality. When one of the side brush assemblies is adjacent to a wall, the movable member of the side brush assembly adjacent to the wall may be moved.

[0023] In another embodiment, an automatic cleaner includes: a casing including a suction port; a suction device disposed on the casing to suction an outer foreign substance through the suction port; a moving device that moves the casing; a main brush contacting a foreign substance through the suction port and removing the foreign substance; a main driving member that provides driving force for rotating the main brush; a movable member movably installed on the casing; a first driving member that provides driving force for moving the movable member; and a brush rotatably installed on the movable member to move a foreign substance to the suction port.

[0024] When the suction device is stopped, the movable member may be located in a first position. When the suction device is operated, the movable member may be moved to a second position.

[0025] The automatic cleaner may further include a second driving member for driving the brush, wherein the second driving member is operated when the suction device is operated.

[0026] The automatic cleaner may further include: a first sensing part for sensing the first position of the movable member; and a second sensing part for sensing the second position of the movable member.

[0027] The first driving member may be operated when the casing approaches a wall.

[0028] When the first driving member is operated, a vertical overlap area of the movable member and the casing may be varied.

[0029] According to the embodiments, a side brush assembly can be withdrawn out of a casing, so as to effectively clean a corner.

BRIEF DESCRIPTION OF THE DRAWINGS

[0030]

Fig. 1 is a perspective view illustrating the bottom of an automatic cleaner according to a first embodiment.

Fig. 2 is a block diagram illustrating the automatic cleaner according to the first embodiment.

Figs. 3 and 4 are bottom views illustrating operations of side brush assemblies of the automatic cleaner according to the first embodiment.

Fig. 5 is a bottom view illustrating operations of side brush assemblies of an automatic cleaner according to a second embodiment.

Figs. 6 and 7 are bottom views illustrating operations of side brush assemblies of an automatic cleaner according to a third embodiment.

Fig. 8 is a bottom view illustrating operations of side brush assemblies of an automatic cleaner according to a fourth embodiment.

Fig. 9 is a bottom view illustrating operations of side brush assemblies of an automatic cleaner according to a fifth embodiment.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0031] Hereinafter, exemplary embodiments will be described with reference to the accompanying drawings.

[0032] Fig. 1 is a perspective view illustrating the bottom of an automatic cleaner according to a first embodiment. Fig. 2 is a block diagram illustrating the automatic cleaner according to the first embodiment.

[0033] Referring to Figs. 1 and 2, an automatic cleaner 100 (hereinafter, referred to as a cleaner for convenience in description) according to the current embodiment includes a casing 110 that forms an appearance of the cleaner 100. The casing 110 may have a flat polyhedral shape, but is not limited thereto. The casing 110 accommodates various components constituting the cleaner 100. For example, a suction member (not shown) for suctioning a foreign substance, and a collecting member (not shown) for collecting the suctioned foreign substance may be disposed in the casing 110.

[0034] A suction port 111 is disposed in a bottom portion of the casing 110. The suction port 111 functions as an inlet through which a foreign substance is suctioned into the casing 110, particularly, into the collecting member by the suction member. The suction port 111 is formed by partially cutting the bottom portion of the casing 110.

[0035] Seating recesses 113 are disposed in the bottom portion of the casing 110. The seating recesses 113 are formed by upwardly recessing a portion of the bottom of the casing 110 from the rest thereof. Although two as the seating recesses 113 are disposed at both sides of the suction port 111, the number of the seating recesses 113 are not limited thereto.

[0036] A main brush 120 is disposed inside of the casing 110 on an area corresponding to the suction port 111. The main brush 120 passes through the suction port 111 to contact a foreign substance on a cleaning target surface and remove the foreign substance. The main brush 120 is exposed downward through the suction port 111 and is rotatable. A main driving member 130 provides driving force for rotating the main brush 120.

[0037] The casing 110 is provided with a moving device 140 for moving the casing 110. For example, the moving device 140 may include a driving motor (not shown) disposed in the casing 110, and wheels rotated by the driving motor.

[0038] One or more side brush assemblies 150 may be installed on the bottom of the casing 110. In the current embodiment, the side brush assembly 150 is provided in plurality on the bottom of the casing 110.

[0039] The side brush assemblies 150 are movably installed on the casing 110. For example, the side brush assemblies 150 may be rotated to be selectively located at a lower side or outside of the casing 110. The side brush assemblies 150 are configured such that the suction member suctions, through the suction port 111, a foreign substance located outside of the suction port 111.

[0040] The side brush assembly 150 may include a movable member 151 and a brush 152 rotatably installed on the movable member 151.

[0041] In particular, the movable member 151 may have an approximately polyhedral shape corresponding to the seating recess 113. For example, the movable member 151 may be disposed on the bottom surface of the casing 110 and be rotatable about a vertical rotation shaft 151A. Since the brush 152 is connected to the movable member 151, which will be described later in detail, the movable member 151 may be referred to as a brush holder.

[0042] The brush 152 may be rotatably installed on the movable member 151. Substantially, the brush 152 moves a foreign substance located outside of the suction port 111 to the lower side of the suction port 111. The brush 152 may include a plurality of bristles 153 spaced

apart from each other by a preset angle. The number and position of the bristles 153 are not specifically limited.

[0043] The side brush assembly 150 may include a leg member 154.

[0044] The leg member 154 is disposed on a bottom surface of the movable member 151. The leg member 154 spaces the brush 152 from a cleaning target surface. Thus, the brush 152 is prevented from tightly contacting a cleaning target surface during a cleaning operation, and is thus protected from damage and is allowed to rotate. To this end, the bottom surface of the leg member 154 is substantially lower than the bottom surface of the brush 152.

[0045] The side brush assembly 150 may include a first driving member 155 and a second driving member 156.

[0046] The first driving member 155 provides driving force for rotating the movable member 151. The first driving member 155 may be disposed in the casing 110. The first driving member 155 may directly transmit driving force to the movable member 151, or indirectly transmit driving force to the movable member 151 through a separate driving force transmission member (not shown).

[0047] According to a movement of the movable member 151 relative to the casing 110, the side brush assembly 150 is selectively located in one of a first position (refer to Fig. 3) and a second position (refer to Fig. 4). The side brush assembly 150 is located under the casing 110 in the first position. In this case, a vertical projection of the movable member 151 is located within a vertical projection of the casing 110.. A portion of the side brush assembly 150 is located out of the casing 110 in the second position. When the side brush assembly 150 is moved between the first and second positions, a rotation shaft 152A of the brush 152 may be horizontally moved.

[0048] When the side brush assembly 150 is located in the second position, a portion of a vertical projection of the movable member 151 is located out of a vertical projection of the casing 110, and the rest of the vertical projection of the movable member 151 is located within the vertical projection of the casing 110. That is, a vertical overlap area between the movable member 151 and the casing 110 may be varied according to a movement of the side brush assembly 150. A vertical overlap area between the movable member 151 and the casing 110 is greater when the side brush assembly 150 is in the first position than in the second position.

[0049] When the side brush assembly 150 is in the second position, the movable member 151 is seated in the seating recess 113. When the side brush assembly 150 is in the first position, a vertical projection of the brush 152 is also located within the vertical projection of the casing 110. When the side brush assembly 150 is in the second position, a vertical projection of the brush 152 is located on both the inside and outside of the vertical projection of the casing 110. Alternatively, when the side brush assembly 150 is in the first position, a portion of the vertical projection of the brush 152 may be located outside of the vertical projection of the casing 110.

[0050] Substantially, the side brush assembly 150 may be selectively located in one of the first and second positions according to whether the cleaner 100 is in the cleaning operation. The cleaning operation may be an operation of the suction member. When the cleaner 100 is not in the cleaning operation, the side brush assembly 150 is in the first position. When the cleaner 100 is in the cleaning operation, the side brush assembly 150 is moved to the second position. That is, with respect to the first driving member 155, the start of an operation of the first driving member 155 for moving the side brush assembly 150 from the first position to the second position may be synchronized with the start of the operation of the suction member. In addition, the start of an operation of the first driving member 155 for moving the side brush assembly 150 from the second position to the first position may be synchronized with the stop of the operation of the suction member. For convenience in description, an operation direction of the first driving member 155 for moving the side brush assembly 150 from the first position to the second position is referred to as a forward direction, and an operation direction of the first driving member 155 for moving the side brush assembly 150 from the second position to the first position is referred to as a backward direction.

[0051] When the side brush assembly 150 is provided in plurality on the casing 110, the movable members 151 of a portion of the side brush assemblies 150 may be moved. For example, the movable member 151 of the side brush assembly 150 adjacent to a wall may be selectively moved from the first position to the second position.

[0052] The second driving member 156 provides driving force for rotating the brush 152. For example, the second driving member 156 may be disposed in the casing 110 to transmit driving force to the brush 152 through a separate driving force transmission member (not shown), or be disposed on the movable member 151 to directly transmit driving force to the brush 152. When the second driving member 156 is disposed on the movable member 151, the second driving member 156 may be moved together with the movable member 151.

[0053] The start and stop of an operation of the second driving member 156 may be synchronized with the start and stop of the operation of the suction member. In other words, the start and stop of the operation of the second driving member 156 may be synchronized with the start of a forward rotation of the first driving member 155 and the stop of a backward rotation of the first driving member 155.

[0054] The side brush assembly 150 may include a first switch 157 and a second switch 158.

[0055] The first switch 157 and the second switch 158 control operations of the first driving member 155. In particular, when the first driving member 155 rotates in the forward direction to move the side brush assembly 150 from the first position to the second position, the first

switch 157 generates a signal for stopping the first driving member 155. When the first driving member 155 rotates in the backward direction to move the side brush assembly 150 from the second position to the first position, the second switch 158 generates a signal for stopping the first driving member 155. For example, the movable member 151 may turn the first and second switches 157 and 158 on/off to generated signals.

[0056] Hereinafter, an operation of an automatic cleaner according to the first embodiment will now be described with reference to the accompanying drawings.

[0057] Figs. 3 and 4 are bottom views illustrating operations of side brush assemblies of an automatic cleaner according to the first embodiment.

[0058] Referring to Fig. 3, when the cleaner 100 is not in the cleaning operation, that is, when the cleaner 100 is stored or charged, the side brush assembly 150 is in the first position. Thus, the side brush assembly 150 is substantially located under the casing 110 and is thus not exposed out of the casing 110. Accordingly, a space for storing the cleaner 100 can be decreased. Furthermore, when the brush 152 is located under the casing 110, the possibility of damage to the brush 152 can be decreased while the cleaner 100 is stored.

[0059] In this state, when the cleaning operation is started, an operation of a suction device is started to suction a foreign substance through the suction port 111. In addition, the moving device 140 is operated to move the cleaner 100, thereby performing the cleaning operation.

[0060] Referring to Fig. 4, when the operation of the suction device is started, the first driving member 155 starts to rotate in the forward direction. Accordingly, the side brush assembly 150 is moved from the first position to the second position. In particular, when the operation of the suction device is started for the cleaning operation, the first driving member 155 starts to rotate in the forward direction. Thus, the first driving member 155 moves the side brush assembly 150 from the first position to the second position.

[0061] When the side brush assembly 150 arrives at the second position, the first switch 157 generates a signal for stopping the forward rotation of the first driving member 155. Accordingly, the forward rotation of the first driving member 155 is stopped, and thus, the side brush assembly 150 stays in the second position.

[0062] When the operation of the suction device is started, the second driving member 156 starts to rotate. Accordingly, the brush 152 is rotated to move a foreign substance located outside of the suction port 111 to the lower side of the suction port 111. The foreign substance, moved to the lower side of the suction port 111 by the brush 152, is suctioned by the suction device.

[0063] When the cleaning operation is ended, the operation of the suction device is ended. When the cleaner 100 is located in a predetermined position such as a storing position or a charging position, the operation of the moving device 140 is also ended.

[0064] When the operation of the suction device is ended, the first driving member 155 starts to rotate in the backward direction. Accordingly, the side brush assembly 150 is moved from the second position to the first position. When the side brush assembly 150 arrives at the first position, the second switch 158 generates a signal to stop the backward rotation of the first driving member 155. When the backward rotation of the first driving member 155 is stopped, the rotation of the second driving member 156 is stopped. Accordingly, the rotation of the brush 152 is also stopped.

[0065] Since the side brush assembly 150 is in the first position, the side brush assembly 150, particularly, the brush 152 is prevented from being exposed out of the cleaner 100. Thus, the side brush assembly 150 is prevented from being damaged while the cleaner 100 is charged or stored.

[0066] Hereinafter, an automatic cleaner according to a second embodiment will now be described with reference to the accompanying drawings.

[0067] Fig. 5 is a bottom view illustrating operations of side brush assemblies of an automatic cleaner according to the second embodiment. Like reference numerals denote like elements in the first and second embodiments, and a description of the same components as those of the first embodiment will be omitted in the second embodiment.

[0068] Referring to Fig. 5, while a cleaner 100 perform a cleaning operation, side brush assemblies 150 are continually moved between first and second positions. That is, during the cleaning operation, the side brush assembly 150 is not immobilized in the second position but is reciprocated along a predetermined trace between the first and second positions. Thus, a larger area can be cleaned by means of the reciprocation of the side brush assembly 150.

[0069] In the above embodiment, the start of the forward rotation of a first driving member and the start of the backward rotation thereof are synchronized with the start and stop of the operation of a suction member, respectively, but the present disclosure is not limited thereto. Thus, for example, the forward rotation of the first driving member may be started after the operation of the suction member is started. In addition, the backward rotation of the first driving member may be stopped before the operation of the suction member is stopped.

[0070] In addition, in the above embodiment, the start and stop of the rotation of a second driving member are synchronized with the start of the forward rotation of the first driving member and the stop of the backward rotation thereof, respectively, but the present disclosure is not limited thereto. Thus, for example, the start of the rotation of the second driving member may be synchronized with the stop of the forward rotation of the first driving member. In addition, for example, the stop of the rotation of the second driving member may be synchronized with the start of the backward rotation of the first driving member.

[0071] In addition, operations of the first and second driving members may be linked with an operation of a

main driving member. For example, the start of the forward rotation of the first driving member may be synchronized with the start of an operation of the main driving member. In addition, the start of the backward rotation of the first driving member may be synchronized with the stop of the operation of the main driving member. In addition, the start and stop of the rotation of the second driving member may be synchronized with the start and stop of the operation of the main driving member.

[0072] Furthermore, when the casing 110 approaches a wall with a predetermined distance, the first driving member 155 may be operated to move the movable member 151.

[0073] Figs. 6 and 7 are bottom views illustrating operations of side brush assemblies of an automatic cleaner according to a third embodiment.

[0074] The current embodiment is the same as the first embodiment except for a linear motion of side brush assemblies. Thus, a characterized part according to the current embodiment will be principally described.

[0075] Referring to Figs. 6 and 7, a side brush assembly 160 according to the third embodiment may include a movable member 161 and a brush 162 rotatably disposed on the movable member 161. The brush 162 includes a plurality of bristles 163. The movable member 161 may include a leg member 164.

[0076] The movable member 161 may linearly move in a back and forth direction.

[0077] When a cleaner 100 is not in a cleaning operation, that is, when the cleaner 100 is stored or charged, the side brush assembly 160 is in a first position. Thus, the side brush assembly 160 is substantially located under a casing 110 and is thus not exposed out of the casing 110. Accordingly, a space for storing the cleaner 100 can be decreased. Furthermore, when the brush 162 is located under the casing 110, the possibility of damage to the brush 162 can be decreased while the cleaner 100 is stored.

[0078] In this state, when the cleaning operation is started, an operation of a suction device is started to suction a foreign substance through a suction port 111. In addition, a moving device 140 is operated to move the cleaner 100, thereby performing the cleaning operation.

[0079] When the operation of the suction device is started, a first driving member 155 starts to operate in a forward direction. Accordingly, the side brush assembly 160 is moved from the first position to a second position. In particular, when the operation of the suction device is started for the cleaning operation, the first driving member 155 starts to operate in the forward direction. Thus, the first driving member 155 linearly moves the side brush assembly 160 from the first position to the second position.

[0080] When the side brush assembly 160 arrives at the second position, a first switch 157 generates a signal for stopping the forward operation of the first driving member 155. Accordingly, the forward operation of the first driving member 155 is stopped, and thus, the side brush assembly 160 stays in the second position.

[0081] When the operation of the suction device is started, a second driving member 156 starts to operate. Accordingly, the brush 162 is rotated to move a foreign substance located outside of the suction port 111 to the lower side of the suction port 111. The foreign substance, moved to the lower side of the suction port 111 by the brush 162, is suctioned by the suction device.

[0082] When the cleaning operation is ended, the operation of the suction device is ended. When the cleaner 100 is located in a predetermined position such as a storing position or a charging position, the operation of the moving device 140 is also ended.

[0083] When the operation of the suction device is ended, the first driving member 155 starts to operate in a backward direction. Accordingly, the side brush assembly 160 is moved from the second position to the first position. When the side brush assembly 160 arrives at the first position, a second switch 158 generates a signal to stop the backward operation of the first driving member 155. When the backward operation of the first driving member 155 is stopped, the operation of the second driving member 156 is stopped. Accordingly, the rotation of the brush 162 is also stopped.

[0084] Since the side brush assembly 160 is in the first position, the side brush assembly 160, particularly, the brush 162 is prevented from being exposed out of the cleaner 100. Thus, the side brush assembly 160 is prevented from being damaged while the cleaner 100 is charged or stored.

[0085] Fig. 8 is a bottom view illustrating operations of side brush assemblies of an automatic cleaner according to a fourth embodiment.

[0086] Referring to Fig. 8, a side brush assembly 170 according to the fourth embodiment, that is, a movable member 171 is linearly movable in a lateral direction (a left and right direction) of a casing 110. In other words, the side brush assembly 170, that is, the movable member 171 may be linearly movable in a direction parallel to a rotation shaft of a wheel constituting a moving device 140. Other components constituting the side brush assembly 170, that is, a leg member 174 and a brush 172 including bristles 173 may be the same as those of the first embodiment. Also, a first driving member 155 for moving the movable member 171, a second driving member 156 of rotating the brush 172, and first and second switches 157 and 158 for controlling operations of the first driving member 155 may be the same as those of the first embodiment.

[0087] Fig. 9 is a bottom view illustrating operations of side brush assemblies of an automatic cleaner according to a fifth embodiment.

[0088] Referring to Fig. 9, a side brush assembly 180 according to the fifth embodiment, that is, a movable member 181 is linearly movable in a diagonal direction of a casing 110. In other words, the movable member 181 may be linearly movable in a direction crossing a rotation shaft of a wheel constituting a moving device 140.

[0089] When the casing 110 has a circular shape, it may be difficult to clean an area located at approximately 45° about the center of the casing 110.

[0090] Since a corner of a cleaning region is located at approximately 45° about the center of the casing 110, the movable member 181 is moved in a line inclined at about 45° from the rotation shaft of the wheel constituting the moving device 140, thereby effectively cleaning the corner.

[0091] A component constituting the side brush assembly 180, that is, a brush 182 including bristles 183 may be the same as that of the first embodiment. Also, a first driving member 155 for moving the movable member 181, a second driving member 156 of rotating the brush 182, and first and second switches 157 and 158 for controlling operations of the first driving member 155 may be the same as those of the first embodiment.

[0092] Although embodiments have been described with reference to a number of illustrative embodiments thereof, it should be understood that numerous other modifications and embodiments can be devised by those skilled in the art that will fall within the spirit and scope of the principles of this disclosure. More particularly, various variations and modifications are possible in the component parts and/or arrangements of the subject combination arrangement within the scope of the disclosure, the drawings and the appended claims. In addition to variations and modifications in the component parts and/or arrangements, alternative uses will also be apparent to those skilled in the art.

Claims

1. An automatic cleaner comprising:

a casing comprising a suction port;
a suction device disposed in the casing to suction an outer foreign substance through the suction port;
a moving device that moves the casing; and
a side brush assembly movably installed on the casing,
wherein the side brush assembly comprises a brush rotating to move a foreign substance located out of the casing, to the suction port, and
a rotation shaft of the brush is horizontally moved according to a movement of the side brush assembly.

2. The automatic cleaner according to claim 1, wherein the side brush assembly further comprises a movable member movably installed on the casing, and
the brush is rotatably installed on the movable member.

3. The automatic cleaner according to claim 2, wherein when the movable member is moved, a vertical overlap area of the movable member and the casing is varied.

4. The automatic cleaner according to claim 2, wherein when the suction device is stopped, the movable member is located in a first position, and
when the suction device is operated, the movable member is moved to a second position.

5. The automatic cleaner according to claim 4, wherein while the suction device is operated, the movable member stays in the second position.

6. The automatic cleaner according to claim 4, wherein while the suction device is operated, the movable member is moved between the first and second positions.

7. The automatic cleaner according to claim 2, wherein when the suction device is operated, the movable member is moved.

8. The automatic cleaner according to claim 2, wherein the brush is rotated when the suction device is operated, and
the movable member is moved when the casing approaches a wall with a predetermined distance.

9. The automatic cleaner according to claim 2, further comprising:

a first driving member that generates driving force for moving the movable member; and
a second driving member that generates driving force for rotating the brush.

10. The automatic cleaner according to claim 9, wherein the first driving member and the second driving member are disposed on the casing.

11. The automatic cleaner according to claim 9, wherein the first driving member is disposed on the casing, and
the second driving member is disposed on the movable member and is moved together with the movable member.

12. The automatic cleaner according to claim 2, wherein the movable member is installed on the casing and is allowed to linearly move.

13. The automatic cleaner according to claim 2, wherein the movable member is installed on the casing and is allowed to rotate about a rotation shaft.

14. The automatic cleaner according to claim 2, wherein the side brush assembly is provided in plurality, and when one of the side brush assemblies is adjacent

to a wall, the movable member of the side brush assembly adjacent to the wall is moved.

15. An automatic cleaner comprising:

a casing comprising a suction port;
a suction device disposed on the casing to suction an outer foreign substance through the suction port;
a moving device that moves the casing;
a main brush contacting a foreign substance through the suction port and removing the foreign substance;
a main driving member that provides driving force for rotating the main brush;
a movable member movably installed on the casing;
a first driving member that provides driving force for moving the movable member; and
a brush rotatably installed on the movable member to move a foreign substance to the suction port.

16. The automatic cleaner according to claim 15, wherein when the suction device is stopped, the movable member is located in a first position, and
when the suction device is operated, the movable member is moved to a second position.

17. The automatic cleaner according to claim 16, further comprising a second driving member for driving the brush,
wherein the second driving member is operated when the suction device is operated.

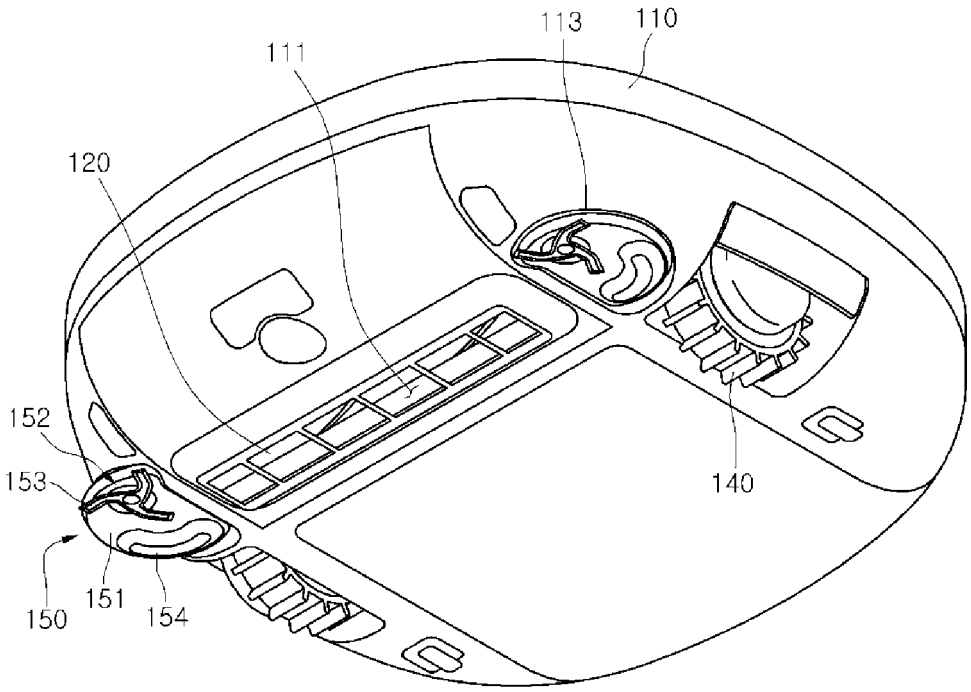
18. The automatic cleaner according to claim 16, further comprising:

a first sensing part for sensing the first position of the movable member; and
a second sensing part for sensing the second position of the movable member.

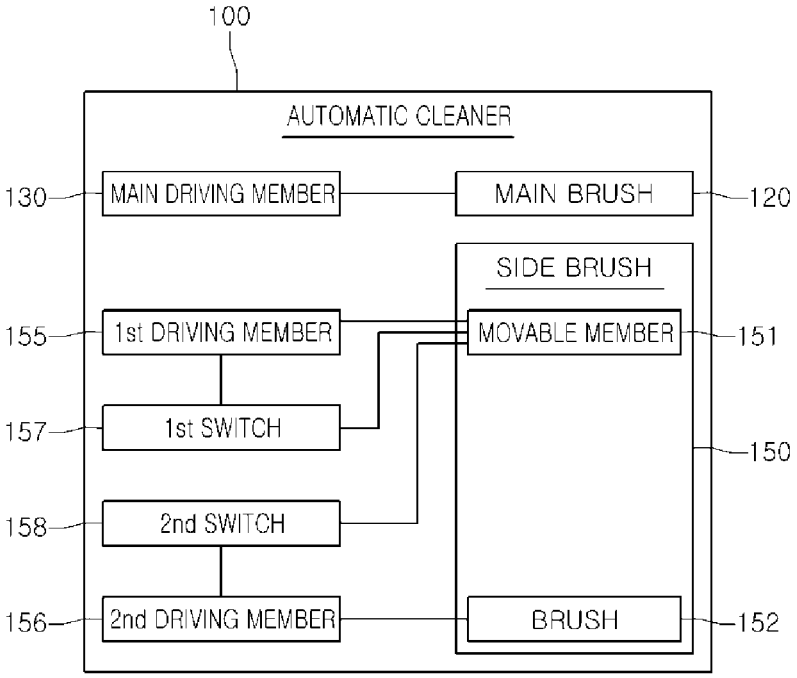
19. The automatic cleaner according to claim 15, wherein the first driving member is operated when the casing approaches a wall.

20. The automatic cleaner according to claim 15, wherein when the first driving member is operated, a vertical overlap area of the movable member and the casing is varied.

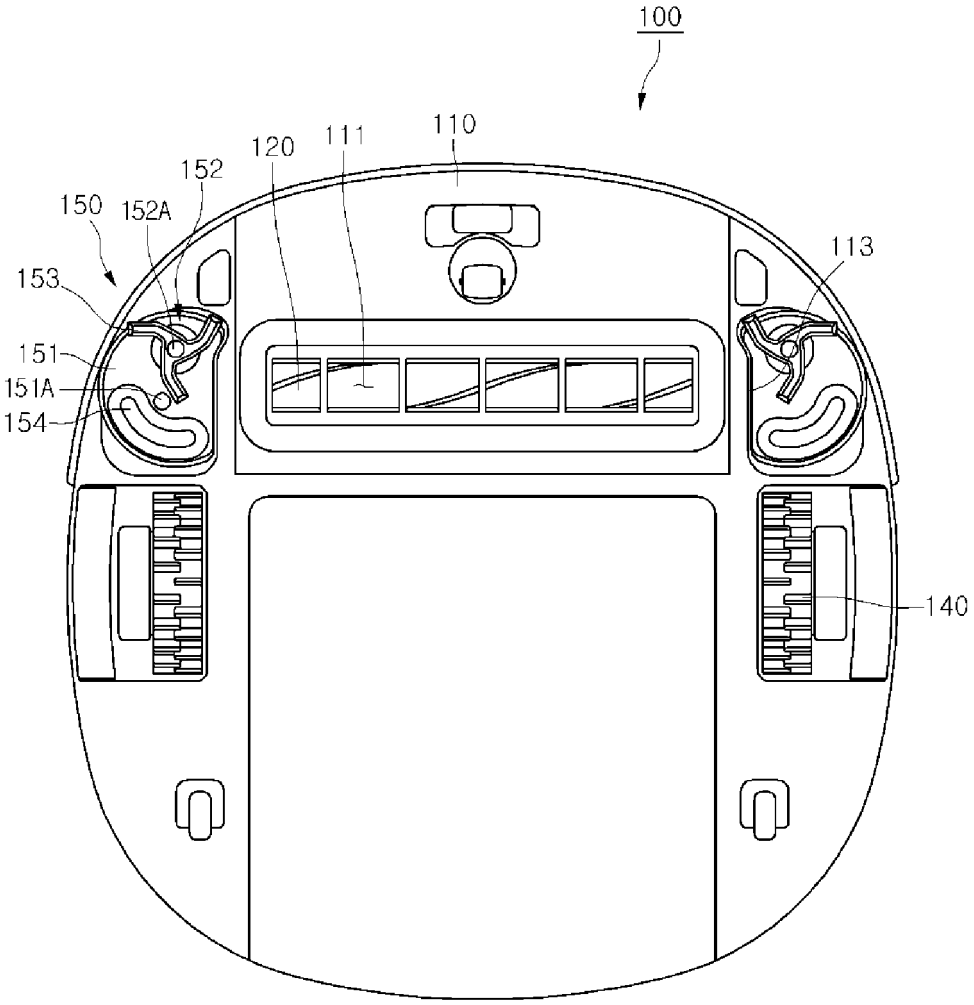
【Figure 1】



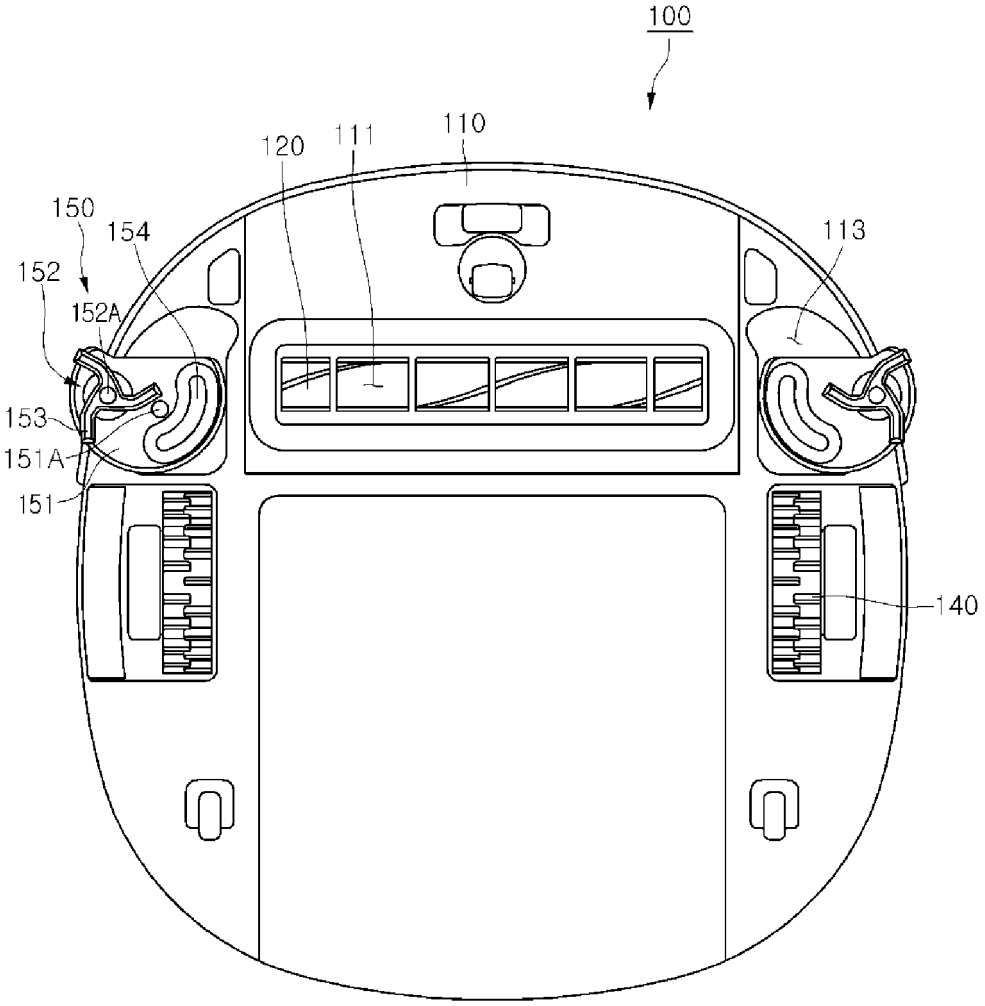
【Figure 2】


100
AUTOMATIC CLEANER
130
MAIN DRIVING MEMBER
MAIN BRUSH
120
SIDE BRUSH
155
1st DRIVING MEMBER
MOVABLE MEMBER
151
157
1st SWITCH
150
158
2nd SWITCH
156
2nd DRIVING MEMBER
BRUSH
152

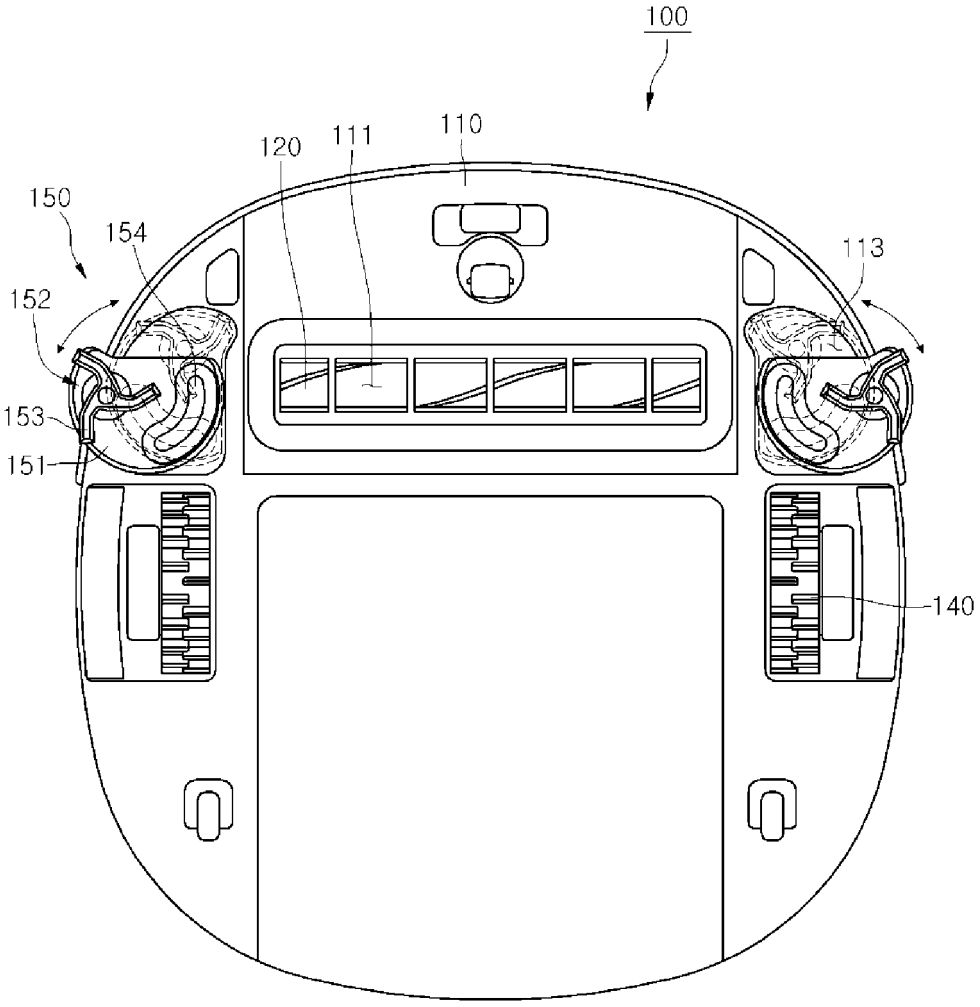
【Figure 3】



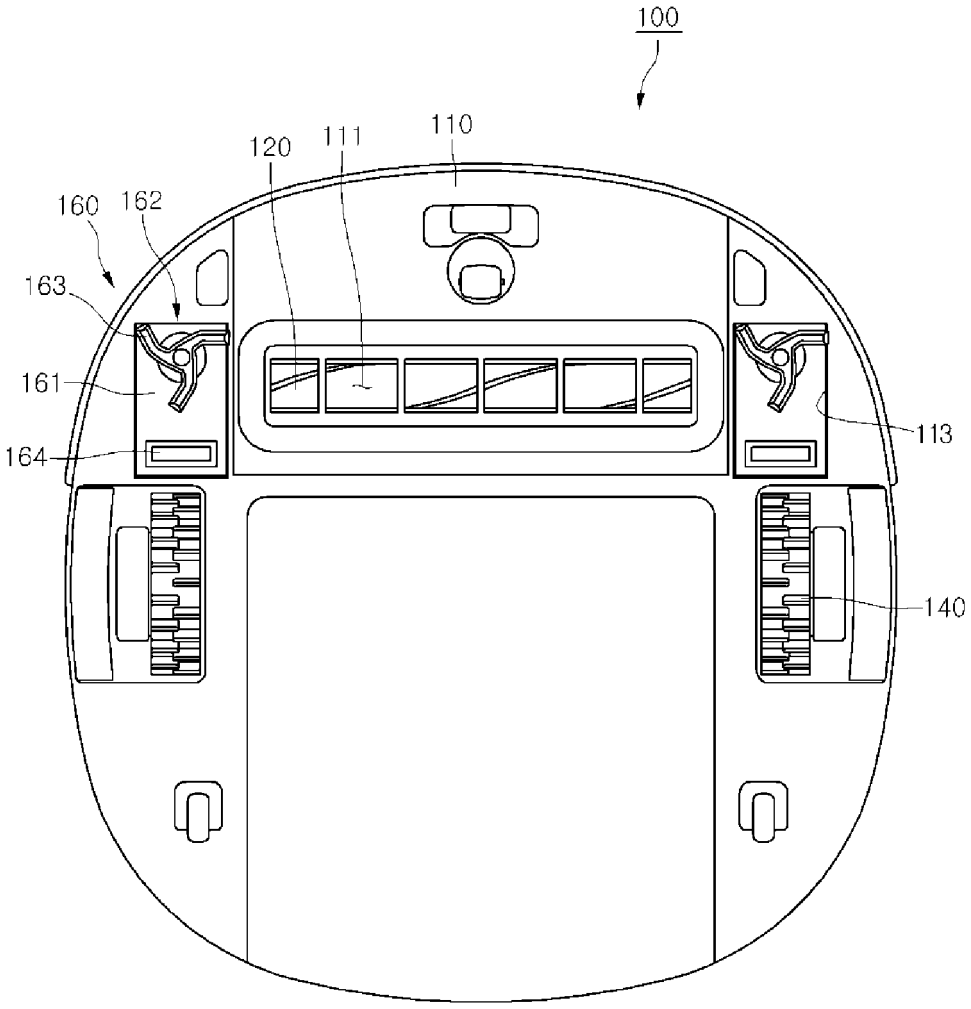
【Figure 4】



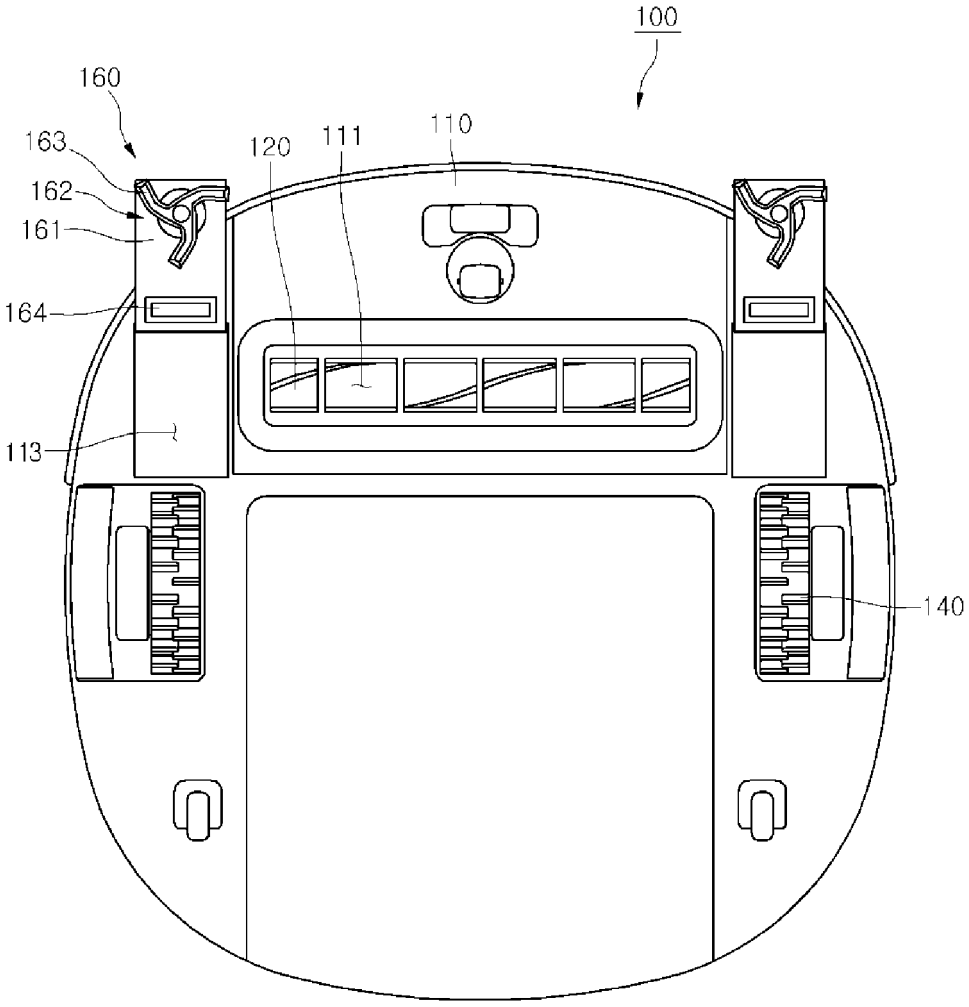
【Figure 5】



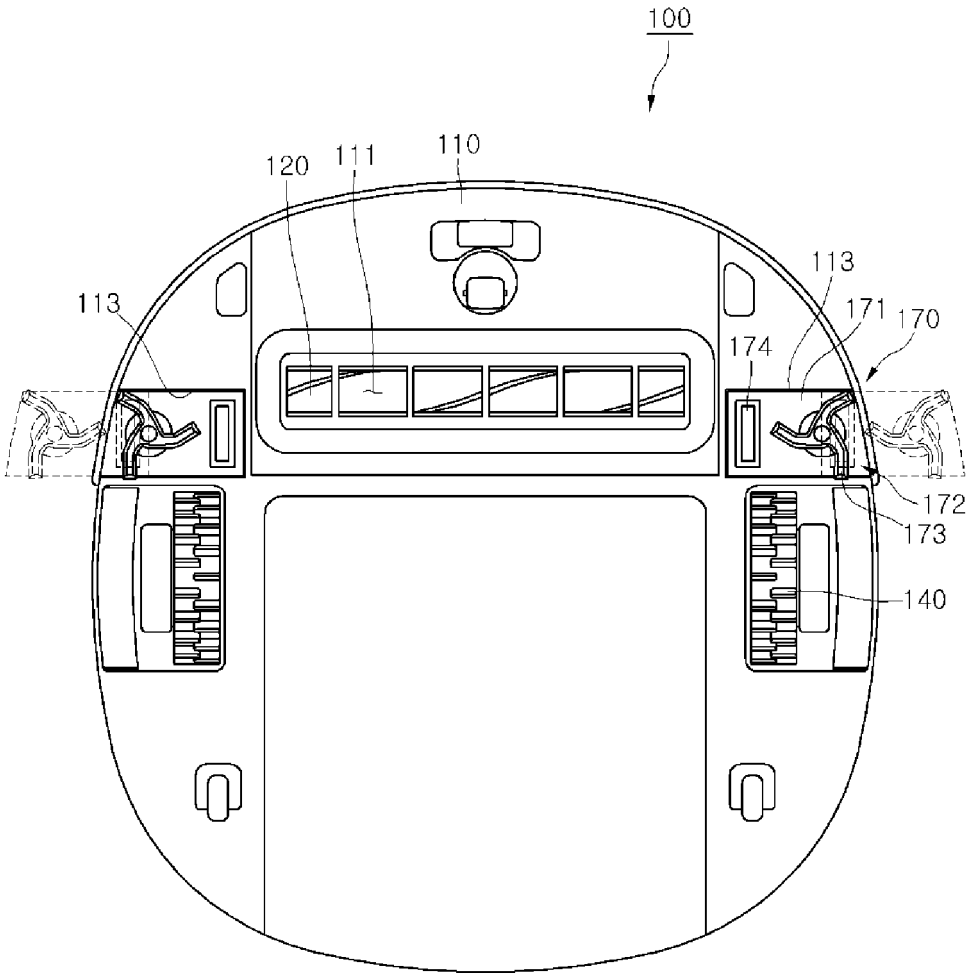
【Figure 6】



【Figure 7】



【Figure 8】



【Figure 9】