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(54) CLEANING MECHANISM AND CLEANING ROBOT

(57) A sweeping mechanism comprises an air duct suction opening (12) formed in the bottom (11) of a shell (1) and at least one sweeping brush (15) which is independently arranged on the bottom (11) of the shell (1) and is separated from the air duct suction opening (12), and each of the at least one sweeping brush (15) is driven to move back and forth. Each of the at least one sweeping brush (15) is driven to move back and forth integrally close to and far away from the air duct suction opening (12). Each of the at least one sweeping brush (15) is driven to move back and forth in the axis direction (A1, A2) of the sweeping brush or in the direction (B1, B2) perpendicular to the axis of the sweeping brush. The invention further provides a sweeping robot. The sweeping mechanism and the sweeping robot can effectively solve the problems of dust suction blockage and the like caused by winding due to the fact that the rolling main brush (108) is arranged in the air suction opening (107), and the dust suction efficiency and effect are effectively improved.

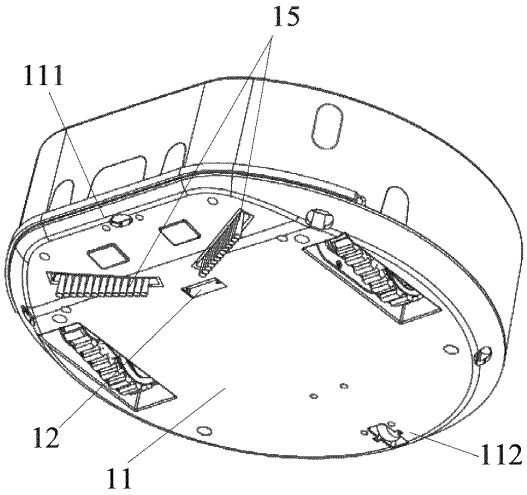

FIG.2C

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Description

FIELD OF THE INVENTION

[0001] The invention relates to the field of intelligent robots, in particular to a sweeping mechanism and a sweeping robot.

BACKGROUND OF THE INVENTION

[0002] A sweeping robot, also known as a cleaning robot, an intelligent dust collection robot, a robot dust collector and the like, is one of intelligent household appliances, and can automatically complete floor cleaning work in a room by means of certain artificial intelligence. The sweeping robot generally adopts a brush sweeping mode and a vacuum mode to absorb impurities on the ground and enter a garbage storage box thereof, so that the function of cleaning the ground is achieved. Generally speaking, a robot that performs cleaning, dust collection and floor wiping is collectively called a sweeping robot.

[0003] Currently, a common structure of a sweeping robot is shown in FIG. 1, the sweeping robot comprises a robot body 100, the robot body 100 comprises a face shell 101, a bottom shell 102 and a face cover (not shown), and the bottom shell 102 is sleeved and screwed to the bottom of the face shell 101. A universal wheel 104 is arranged at the front end of the bottom shell 102, a left driving wheel 105 and a right driving wheel 106 are respectively arranged on two sides of the middle part of the bottom shell 102, and the universal wheel 104, the left driving wheel 105 and the right driving wheel 106 are connected with a motor (not shown). An air suction opening 107 is formed between the left driving wheel 105 and the right driving wheel 106, a main brush 108 is arranged in the air suction opening 107, and the main brush 108 is a rolling brush, is in transmission connection with a rolling brush motor (not shown) and is driven by the rolling brush motor to rotate. The main brush 108 has a brush shaft 1081 and brush bristles 1082 extending outwardly from the outer wall surface of the brush shaft 1081. The brush shaft 1081 is driven by the rolling brush motor to rotate, and the brush bristles 1082 sweep the ground to raise dust during rotation of the brush shaft 1081. A dust collection box (not shown) communicated with the air suction opening 107 and a dust collection fan communicated with the dust collection box are arranged in the robot body 100. Under the action of the dust collection fan, dust raised by the main brush 108 is sucked into the dust collection box through the air suction opening 107.

[0004] A left side brush 1091 and a right side brush 1092 are arranged in front of the left driving wheel 105 and the right driving wheel 106 respectively, the left side brush 1091 and the right side brush 1092 are arranged to be three-blade type brush handles 10911 and 10921, and brush bristles 10912 and 10922 are installed on the brush handles. The left side brush 1091 and the right side brush 1092 are connected with side brush motors respectively and enable the brush handles 10911 and 10921 to rotate around their center shafts by 360 degrees under the driving action of the side brush motors respectively, and therefore the brush bristles 10912 and 10922 are driven to rotate so as to sweep dust on the ground and suck the dust into the dust collection box through the air suction opening 107.

[0005] The present inventor finds that the prior art has at least the following technical drawbacks during the practice of the present invention:

[0006] the rolling main brush is arranged in the air suction opening for cleaning, the rolling main brush is easy to wind hairs on the ground in the rotating process, the air suction opening is blocked due to the winding of the hairs after long-term use, the dust suction and cleaning effects are influenced, and the normal use of the sweeper is influenced; and the service life of the sweeper is shortened because the main brush is severely blocked. The hairs on the rolling main brush need to be manually cleaned regularly, and inconvenience is brought to a user due to troublesome cleaning.

SUMMARY OF THE INVENTION

[0007] An embodiment of the present invention aims to provide a sweeping mechanism and a sweeping robot, which can effectively solve the problems of dust collection blockage and the like caused by winding due to arrangement of a rolling main brush in an air duct suction opening in the prior art, and effectively improve the dust suction efficiency and effect.

[0008] In order to achieve the purpose, the embodiment of the invention provides a sweeping mechanism, the sweeping mechanism comprises an air duct suction opening formed in a bottom of a shell and at least one sweeping brush which is independently arranged at the bottom of the shell and is separated from the air duct suction opening, and each of the at least one sweeping brush is driven to move back and forth.

[0009] Preferably, the at least one sweeping brush is driven to move back and forth integrally close to and away from the air duct suction opening.

[0010] Preferably, each of the at least one sweeping brush is driven to move back and forth integrally between the air duct suction opening and en edge of the bottom of the shell.

[0011] Preferably, each of the at least one sweeping brush moves back and forth in a direction of an axis thereof.

[0012] Preferably, each of the at least one sweeping brush moves back and forth in a direction perpendicular to an axis thereof.

[0013] Preferably, each of the at least one sweeping brush swings back and forth around the axis thereof, and a swing range of each of the at least one sweeping brush swinging back and forth around the axis thereof is 120 degrees.

[0014] Preferably, each of the at least one sweeping

brush rotates 360 ° about the axis thereof.

[0015] Preferably, each of the at least one sweeping brush comprises a fixed seat arranged at the bottom of the shell, a movable support arranged on the fixed seat and bristles arranged on the movable support, and the movable support is driven by a driving component to move back and forth relative to the fixed seat.

[0016] Preferably, the movable support is driven by the driving component to move back and forth relative to the fixed seat as follows:
moving back and forth in a direction of an axis thereof; or moving back and forth in a direction perpendicular to an axis thereof.

[0017] Preferably, the movable support is further driven by a driving component to move relative to the fixed seat as follows: swinging back and forth around an axis thereof, and a swinging range is 120 °; or rotating 360 ° around an axis thereof.

[0018] Preferably, the movable support is driven by a driving component to move up and down away from or close to a horizontal plane where the fixed seat is located.

[0019] Preferably, the fixed seat comprises a limiting body, a containing groove is formed in the limiting body, the movable support comprises a movable body for containing bristles, a driven member is arranged at a bottom of the movable body, and the driven member extends out of the containing groove and drives the movable body to move back and forth in the containing groove under an action of the driving component.

[0020] Preferably, the driving component comprises a motor and a coupling member driven by the motor, and the coupling member is connected with the driven member in a matched manner.

[0021] Preferably, the motor is a brushed direct current motor or a brushless direct current motor, and the coupling member is an eccentric shaft.

[0022] Preferably, the movable body reciprocates in a length direction in the containing groove; a length of the movable body is smaller than that of the containing groove; the movable body comprises an upper portion for arranging bristles and a lower portion connected with the upper portion, and the driven member is arranged on the bottom surface of the lower portion; a longitudinal section of the movable body in a width direction of the movable body is in a convex shape; a width of the upper portion is smaller than that of the containing groove so that the upper portion can be contained in the containing groove, and a width of the lower portion is larger than that of the containing groove.

[0023] Preferably, the movable body reciprocates in a width direction in the containing groove; a width of the movable body is smaller than that of the containing groove; the movable body comprises an upper portion for arranging bristles and a lower portion connected with the upper portion, and the driven member is arranged on a bottom surface of the lower portion; a longitudinal section of the movable body in a length direction of the movable body is in a convex shape; a length of the upper portion is smaller than that of the containing groove so that the upper portion can be contained in the containing groove, and a length of the lower portion is larger than that of the containing groove.

[0024] Preferably, the fixed seat further comprises a bottom case, the limiting body is fixed inside the bottom case through a connecting piece so as to prevent the movable body from being separated from the limiting body, and an opening is formed in a bottom of the bottom case to extend out of the driven member.

[0025] Preferably, the bristles are mainly formed by arranging pluralities of bristle bundles.

[0026] Preferably, the movable support provided on each fixed seat comprises pluralities; and/or the bristles arranged on each movable support comprise pluralities of rows.

[0027] Preferably, each of the pluralities of rows of the bristles extends out of a surface of the bottom of the shell to abut against ground.

[0028] Preferably, an upper surface of each of the pluralities of rows of the bristles is in a same horizontal plane to be flush with the ground.

[0029] Preferably, each of the pluralities of bristle bundles is driven to rotate 360 ° around a center of circle thereof.

[0030] Preferably, the at least one sweeping brush which is independently arranged at the bottom of the shell and is separated from the air duct suction opening comprises one sweeping brush, and the one sweeping brush is arranged between a front end of the bottom of the shell and the air duct suction opening.

[0031] Preferably, the one sweeping brush is provided with bristles which are integrally linear, wavy, or arc-shaped.

[0032] Preferably, the at least one sweeping brush which is independently arranged at the bottom of the shell and is separated from the air duct suction opening comprises two sweeping brushes, and the two sweeping brushes are arranged on two sides of the air duct suction opening respectively or arranged between a front end of the bottom of the shell and the air duct suction opening.

[0033] Preferably, the two sweeping brushes integrally form a straight line shape, a splayed shape or an inverted splayed shape.

[0034] Preferably, each of the two sweeping brushes is provided with bristles which are integrally linear, wavy, or arc-shaped.

[0035] Preferably, the at least one sweeping brush which is independently arranged at the bottom of the shell and is separated from the air duct suction opening comprises pluralities of sweeping brushes, and the pluralities of sweeping brushes are integrally arranged between a front end of the bottom of the shell and the air duct suction opening in a line shape.

[0036] Preferably, the sweeping mechanism further comprises a side brush disposed on each of at least one corner of a front end of the bottom of the shell, the side brush being adapted to rotate when driven by a driving

means.

[0037] Preferably, a left corner and a right corner of the front end of the bottom of the shell each is provided with the side brush.

[0038] Preferably, each side brush is a multi-blade type rotary side brush.

[0039] Preferably, each side brush is a three-blade type rotary side brush.

[0040] Preferably, each side brush is set so that bristles thereof do not interfere with each of the at least one sweeping brush during rotation.

[0041] Preferably, the sweeping mechanism further comprises at least one groove formed in a surface of the bottom of the shell, each of the at least one groove communicating with the air duct suction opening to form a dust guide air duct for guiding dust into the air duct suction opening.

[0042] Preferably, one end of each of the at least one groove is connected with the air duct suction opening, and an other end of each of the at least one groove is in smooth transition connection with an edge of the bottom of the shell.

[0043] Preferably, the at least one groove formed in the surface of the bottom of the shell comprises pluralities of grooves, and the pluralities of grooves satisfy: the pluralities of grooves are formed in a front end of a surface of the bottom of the shell in parallel; or, the pluralities of grooves are formed in two sides of the air duct suction opening in parallel.

[0044] Preferably, the at least one sweeping brush comprises pluralities of sweeping brushes, the pluralities of sweeping brushes being disposed to mate with the pluralities of grooves to facilitate guiding raised dust through the pluralities of grooves into the air duct suction opening.

[0045] Preferably, the pluralities of sweeping brushes and the pluralities of grooves are disposed alternately.

[0046] Preferably, the pluralities of sweeping brushes is disposed parallel to the pluralities of grooves.

[0047] Preferably, the at least one sweeping brush is disposed to mate with the at least one groove to facilitate guiding raised dust into the air duct suction opening through the at least one groove.

[0048] Preferably, the at least one grooves formed in the surface of the bottom of the shell comprise a first groove and a second groove which are formed in two sides of the air duct suction opening respectively, and the at least one sweeping brush arranged at the bottom of the shell comprises a first sweeping brush and a second sweeping brush which are arranged in front of the first groove and the second groove respectively.

[0049] Preferably, the first sweeping brush is disposed parallel to the first groove and the second sweeping brush is disposed parallel to the second groove.

[0050] Preferably, the first groove and the second groove each comprises pluralities of sub-grooves arranged in parallel, the first sweeping brush and the second sweeping brush each comprises pluralities of sweeping sub-brushes arranged in parallel, and the pluralities of sub-grooves and the pluralities of sweeping sub-brushes are arranged alternately.

[0051] Preferably, the first groove and the second groove are integrally formed in a straight line shape, a splayed shape or an inverted splayed shape.

[0052] Preferably, the at least one groove is disposed between a front end of the surface of the bottom of the shell and the air duct suction opening, and the at least one sweeping brush and the at least one groove are arranged in parallel.

[0053] Preferably, the at least one groove comprises at least two grooves, the at least two grooves are arranged between the front end of the surface of the bottom of the shell and the air duct suction opening in parallel, and the at least one sweeping brush and the at least two grooves are arranged alternately.

[0054] Preferably, the air duct suction opening is shaped as a circle, an ellipse, a triangle, a quadrilateral, an irregular polygon, or an approximate ellipse with a rectangular middle part and semicircular sides.

[0055] Preferably, the air duct suction opening is shaped as a polygon, and one end of each of the at least one groove is correspondingly connected with one edge of the air duct suction opening.

[0056] Preferably, the at least one groove formed in the surface of the bottom of the shell comprises two or more grooves, the shape of the air duct suction opening is matched with that of the two or more grooves, and one end of each of the two or more grooves is correspondingly connected with one edge of the air duct suction opening.

[0057] Preferably, the air duct suction opening is rectangular, the at least one groove formed in the surface of the bottom of the shell comprises a first groove and a second groove, and one end of the first groove and one end of the second groove are connected with a left short edge and a right short edge of the air duct suction opening respectively.

[0058] Preferably, a width of the one end of the first groove and a width of the one end of the second groove are equal to a length of the left short edge and a length of the right short edge of the air duct suction opening.

[0059] Preferably, the at least one groove formed in the surface of the bottom of the shell further comprises a third groove, a front end of the third groove is in smooth transition connection with an edge of a front end of the bottom of the shell, and a rear end of the third groove is connected with a front edge of the air duct suction opening.

[0060] Preferably, a width of the rear end of the third groove is less than or equal to a length of the front edge of the air duct suction opening.

[0061] Preferably, a depth of each of the at least one groove is gradually increased from one end away from the air duct suction opening to the other end connected with the air duct suction opening.

[0062] Preferably, the air duct suction opening is formed in a central axis of the bottom of the shell, and a

distance between the air duct suction opening and a front end of the bottom of the shell is smaller than a distance between the air duct suction opening and a rear end of the bottom of the shell.

[0063] Preferably, an inclined guide surface is arranged at a front end of the bottom of the shell, and an included angle theta between the inclined guide surface and a horizontal plane is more than 0 degree and less than 45 degrees.

[0064] Preferably, the included angle theta between the inclined guide surface and the horizontal plane is more than 5 degrees and less than 45 degrees.

[0065] Preferably, the included angle theta between the inclined guide surface and the horizontal plane is more than 10 degrees and less than 20 degrees.

[0066] Preferably, a front or rear edge of the air duct suction opening abuts a rear end of the inclined guide surface.

[0067] Preferably, each of the at least one sweeping brush is disposed on the inclined guide surface.

[0068] Preferably, the at least one sweeping brush arranged on the inclined guide surface comprise a first sweeping brush and a second sweeping brush, and the first sweeping brush and the second sweeping brush are arranged at the front ends of two sides of the air duct suction opening respectively.

[0069] Preferably, the inclined guide surface is further provided with at least one groove, and each of the least one groove is communicated with the air duct suction opening to form a dust guide air duct for guiding dust into the air duct suction opening.

[0070] Preferably, the at least one groove formed in the surface of the bottom of the shell comprises a first groove and a second groove, the first groove and the second groove are formed in two sides of the air duct suction opening respectively, and front edges or rear edges of the first groove and the second groove abut the rear end of the inclined guide surface.

[0071] Preferably, the at least one groove further comprises a third groove, a front end of the third groove is in smooth transition connection with the front end of the bottom of the shell, and a rear end of the third groove is connected with the air duct suction opening; the first sweeping brush and the second sweeping brush are located in front of the first groove and the second groove respectively and arranged on two sides of the third groove.

[0072] Preferably, the inclined guide surface comprises a first inclined guide surface and a second inclined guide surface which are connected in a front-to-back transition manner, and an included angle between the first inclined guide surface and a horizontal plane is larger than an included angle between the second inclined guide surface and the horizontal plane.

[0073] Preferably, the third groove is formed in the second inclined guide surface, the front end of the third groove is in smooth transition connection with a rear end of the first inclined guide surface, and the rear end of the third groove is connected with the air duct suction opening.

[0074] Preferably, the inclined guide surface is a curved surface, and the angle theta between the inclined guide surface and the horizontal plane gradually decreases from the front end to the rear end of the inclined guide surface.

[0075] Preferably, the first sweeping brush is disposed parallel to the first groove and the second sweeping brush is disposed parallel to the second groove.

[0076] Preferably, each of the first sweeping brush and the second sweeping brush moves back and forth in a direction of an axis thereof.

[0077] Preferably, each of the first sweeping brush and the second sweeping brush moves back and forth in a direction perpendicular to an axis thereof.

[0078] Preferably, each of the first sweeping brush and the second sweeping brush swings back and forth around an axis thereof, and a swing range of each of the first sweeping brush and the second sweeping brush swinging back and forth around the axis thereof is 120 degrees.

[0079] Preferably, each of the first sweeping brush and the second sweeping brush rotates 360 degrees around an axis thereof.

[0080] Preferably, each of the first sweeping brush and the second sweeping brush comprises at least one row of bristles, each of the least one row of bristles comprising pluralities of bristle bundles.

[0081] Preferably, each of the least one row of bristles extends out of a surface of the bottom of the shell abut against ground.

[0082] Preferably, an upper surface of each of the least one row of bristles is in a same horizontal plane to be flush with the ground.

[0083] Preferably, each of the at least one groove is integrally formed with the air duct suction opening.

[0084] Preferably, the sweeping mechanism further comprises a baffle arranged on a rear edge of the air duct suction opening.

[0085] Preferably, the sweeping mechanism further comprises baffles, the baffles comprise a middle baffle arranged on a rear edge of the air duct suction opening, and a left baffle and a right baffle which are connected to a left side and a right side of the middle baffle respectively, and the left baffle and the right baffle are arranged on rear edges the two grooves respectively.

[0086] Preferably, the bottom of the shell is in a disc-like shape with a front end edge being a straight line section.

[0087] Preferably, the sweeping mechanism further comprises a dust collection box and a draught fan which are arranged inside the shell, and the air duct suction opening, the dust collection box and the draught fan are sequentially communicated.

[0088] Preferably, the draught fan comprises a first draught fan and a second draught fan, and the first draught fan and the second draught fan communicate with the dust collection box through an air suction guide

component; the air suction guide component comprises a first air suction channel and a second air suction channel which are independent of each other, the first draught fan is communicated with the first air suction channel, and the second draught fan is communicated with the second air suction channel.

[0089] The embodiment of the present invention further provides a sweeping robot which comprises the sweeping mechanism of any embodiment.

[0090] Compared with the prior art, the embodiment of the present invention has at least the following technical effects:

(1) at least one groove is formed in the surface of the bottom of the shell, and each of the at least one groove is communicated with the air duct suction opening to form a dust guide air duct for guiding dust into the air duct suction opening, so that the dust on the ground is favorably guided and sucked into the air duct suction opening, and the dust suction efficiency is improved. In addition, the dust guide air duct is adopted to replace a rolling main brush arranged in the air suction opening, and the problems that winding caused by the rolling main brush blocks the air suction opening, and the sweeping effect of the dust suction box is affected can be effectively avoided.

(2) the sweeping brush matched with the groove is arranged at the bottom of the shell, so that the dust raised by the sweeping brush is further favorably guided into the air duct suction opening through the groove, and the dust suction efficiency is improved; besides, the sweeping brush is arranged at the bottom of the shell and is separated from the air duct suction opening to be independently arranged, the dust collection efficiency can be more effectively improved, and the problem that the sweeping effect of the dust collection box is affected due to the fact that the sweeping brush is wound to block the air duct suction opening after being used for a long time can be avoided.

(3) at least one groove is formed in the surface of the bottom of the shell, and rotary side brushes are arranged on at least one corner (preferably the left corner and the right corner) of the front end of the bottom of the shell in a matched mode, so that the problem that the sweeping effect of the dust collection box is affected due to the fact that the air dust suction opening is blocked by winding of a rolling main brush arranged on the air duct suction opening can be effectively avoided; and dust raised by the side brushes can be guided into the air duct suction opening through the groove, so that the dust suction efficiency is improved, and particularly, the sweeping and cleaning effects on corners are very ideal.

(4) the sweeping brush arranged at the bottom of the shell integrally performs reciprocating circulating movement close to and far away from the air duct suction opening when being driven to sweep, so that dust raised by sweeping is favorably sucked into the air duct suction opening in the moving process, and the sweeping effect and the dust collection effect are improved.

(5) the sweeping brush arranged at the bottom of the shell integrally does reciprocating circulating movement between the air duct suction opening and the edge of the bottom of the shell when being driven, and the sweeping brush is used for sweeping dust at the center and the edge of the sweeping robot in the moving process, namely, the sweeping brush provided by the embodiment of the present invention can serve as a main brush and a side brush in the moving process at the same time, the sweeping range of the sweeping robot can be widened, the cost can be reduced, the main brush, the side brush and corresponding drivers do not need to be arranged respectively, and the cost is lower.

(6) the movable sweeping brush integrally doing reciprocating circulation movement between the air duct suction opening and the edge of the bottom of the shell is adopted to replace a rotary side brush to sweep the area around the sweeping robot, and the problems that hair is wound and a driving wheel slips and the like due to an existing rotary side brush is used can be effectively solved.

(7) the inclined guide surface is arranged between the air duct suction opening and the edge of the front end of the bottom of the shell, so that the obstacle crossing function can be achieved, dust at the front end of the sweeping robot can be further guided and sucked into the air duct suction opening, and the dust suction efficiency is improved.

(8) the inclined guide surface between the air duct suction opening and the front end edge of the bottom of the shell is set to be a first inclined guide surface and a second inclined guide surface which are in front-back transition connection, and the included angle between the first inclined guide surface and the horizontal plane is larger than that between the second inclined guide surface and the horizontal plane. Thus, the included angle between the first inclined guide face and the horizontal plane is larger, the obstacle crossing function is improved, the included angle between the second inclined guide face closer to the air duct suction opening and the horizontal plane is smaller, the closer the air duct suction opening is, the larger the suction force is, and dust suction is facilitated.

and (9) the inclined guide surface between the air duct suction opening and the edge of the front end of the bottom of the shell is set to be a curved surface, and the included angle theta between the inclined guide surface and the horizontal plane is gradually reduced from the front end of the inclined guide surface to the rear end of the inclined guide surface. Thus, the included angle theta between the inclined

guide face close to the edge of the front end of the bottom of the shell and the horizontal plane is larger, the obstacle crossing function is better improved, the included angle theta between the inclined guide face close to the air duct suction opening and the horizontal plane is smaller, the closer the air duct suction opening is, the larger the suction force is, and dust suction is better facilitated.

BRIEF DESCRIPTION OF THE DRAWINGS

[0091]

FIG. 1 is a schematic structural view of a sweeping robot employed in the prior art.

FIGs. 2A-2D are schematic structural views of a sweeping robot and a sweeping mechanism thereof provided in Example 1 of the present invention.

FIG. 2E shows embodiments of various alternative shapes of an air duct suction opening of the sweeping mechanism provided in Example 1 of the present invention.

FIGs. 3A-3D are schematic structural views of a sweeping mechanism provided in Example 2 of the present invention.

FIGs. 3E-3G are schematic structural views of alternative embodiments of modes of motion and corresponding structures of a sweeping brush of the sweeping mechanism provided in Example 2 of the present invention.

FIGs. 4A-4F are structure views of a preferred embodiment of a sweeping brush of the sweeping mechanism provided in Example 2 of the present invention.

FIGs. 5A-5F are structure views of another preferred embodiment of a sweeping brush of the sweeping mechanism provided in Example 2 of the present invention.

FIGs. 6A-6B are schematic structural views of other alternative embodiments of a bristle arrangement shape structure of a sweeping brush of the sweeping mechanism provided in Example 2 of the present invention.

FIG. 7A is a schematic view of a preferred embodiment of an inclined guide surface of the sweeping mechanism provided by Example 2 of the present invention.

FIG. 7B is a schematic view of another preferred embodiment of an inclined guide surface of the sweeping mechanism provided by Example 2 of the present invention.

FIGs. 8A-8C are schematic structural views of the sweeping mechanism provided in Example 3 of the present invention.

FIGs. 8D-8E are schematic structural views of another preferred embodiment of the sweeping mechanism provided in Example 3 of the present invention.

FIGs. 9A-9D are schematic structural views of a sweeping mechanism provided in Example 4 of the present invention.

FIGs. 10A-10C are schematic structural views of structures of the sweeping mechanism provided in Example 5 of the present invention.

FIGs. 11A-11D are schematic structural views of the sweeping mechanism provided in Example 6 of the present invention.

FIGs. 12A-12B are schematic structural views of the sweeping mechanism provided in Example 7 of the present invention.

FIGs. 13A-13B are schematic structural views of the sweeping mechanism provided in Example 8 of the present invention.

FIG. 14 is a schematic structural views of a sweeping mechanism provided in Example 10 of the present invention.

FIGs. 15A-15F are schematic structural views of a sweeping robot and a sweeping mechanism thereof provided in Example 11 of the present invention.

FIG. 16 is a schematic structural view of a preferred embodiment of a sweeping brush of the sweeping mechanism provided in Example 11 of the present invention.

FIG. 17 is a schematic structural view of a sweeping mechanism provided in Example 12 of the present invention.

FIG. 18 is a schematic structural view of a sweeping mechanism provided in Example 13 of the present invention.

FIG. 19 is a schematic structural view of a sweeping mechanism provided in Example 14 of the present invention.

FIG. 20 is a schematic structural view of the sweep-

ing mechanism provided in Example 15 of the present invention.

FIG. 21 is a schematic structural view of a sweeping mechanism provided in Example 16 of the present invention.

FIG. 22 is a schematic structural view of a sweeping mechanism provided in Example 17 of the present invention.

FIGs. 23A and 23B are schematic structural views of a sweeping mechanism provided in Example 18 of the present invention.

FIGs. 24A and 24B are schematic structural views of a sweeping mechanism provided in Example 19 of the present invention.

FIGs. 25A and 25B are schematic structural views of a sweeping mechanism provided in Example 20 of the present invention.

FIGs. 26A and 26B are schematic structural views of a sweeping mechanism provided in Example 21 of the present invention.

FIG. 27 is a schematic structural view of a sweeping mechanism provided in Example 22 of the present invention.

FIGs. 28A-28C are schematic structural views of the sweeping mechanism provided in Example 23 of the present invention.

FIG. 29 is a schematic structural view of a sweeping mechanism provided in Example 24 of the present invention.

FIGs. 30A and 30B are schematic structural views of a sweeping mechanism provided in Example 25 of the present invention.

FIG. 31 is a schematic structural view of a sweeping mechanism provided in Example 26 of the present invention.

FIG. 32 is a schematic structural view of a sweeping mechanism provided in Example 27 of the present invention.

DETAILED DESCRIPTION OF ILLUSTRATED EMBODIMENTS

[0092] Technical solutions in embodiments of the present invention will be described clearly and fully hereinafter in connection with the accompanying drawings in embodiments of the present invention, and obviously, the described embodiments are only a part of, and not all, embodiments of the present invention. Based on the embodiments of the present invention, all other embodiments obtained by one of ordinary skill in the art without creative work fall within the scope of the present invention.

[0093] In the description of the present invention, it is to be understood that the terms "center", "longitudinal", "lateral", "length", "width", "thickness", "upper", "lower", "front", "rear", "left", "right", "vertical", "horizontal", "top", "bottom", "inner", "outer", "clockwise", "counterclockwise", and the like, indicate orientations or positional relationships based on those shown in the drawings, merely for convenience of description and simplification of the description, and do not indicate or imply that the device or element referred to must have a particular orientation, be constructed in a particular orientation, and be operated, and thus, are not to be construed as limiting the present invention.

[0094] Furthermore, the terms "first", "second" are used for descriptive purposes only and are not to be construed as indicating or implying relative importance or to implicitly indicate the number of technical features indicated. Thus, a feature defined as "first" or "second" may explicitly or implicitly include one or more of that features. In the description of the present invention, "pluralities" means at least two, e.g., two, three, etc., unless explicitly specified otherwise.

[0095] In the present invention, unless expressly specified and limited otherwise, the terms "installed", "jointed", "connected", "fixed" and the like are to be construed broadly, e.g., as being permanently connected, detachably connected, or integral; may be mechanically, electrically or otherwise in communication with each other; they may be directly connected or indirectly connected through intervening media, or may be connected through the use of two elements or the interaction of two elements. The specific meanings of the above terms in the present invention can be understood according to specific situations by those of ordinary skill in the art.

Example 1:

[0096] Referring to FIGs. 2A-2D, an embodiment of the present invention provides a sweeping robot. The sweeping robot is provided with a sweeping mechanism, the sweeping mechanism comprises an air duct suction opening 12 formed in the bottom 11 of the shell 1 and at least one sweeping brush 15 which is arranged on the bottom 11 of the shell 1 and is separated from the air duct suction opening 12 and independently arranged, and each of the at least one sweeping brush 15 moves back and forth when driven to sweep and raise dust and paper scraps on the ground.

[0097] The sweeping mechanism further comprises a dust collection box 2 and a draught fan 3 which are arranged in the shell 1, an inlet 20 of the dust collection box 2 is communicated with the air duct suction opening

12 in the bottom of the shell 1, and an outlet (not shown) of the dust collection box 2 is communicated with an inlet 30 of the draught fan 3.

[0098] The draught fan 3 comprises a first draught fan 31 and a second draught fan 32, and the first draught fan 31 and the second draught fan 32 are communicated with the dust collection box 2 through an air suction guide component 33. The air suction guide component 33 comprises a first air suction channel 331 and a second air suction channel 332 which are independent of each other, the first draught fan 31 is communicated with the first air suction channel 331, and the second draught fan 32 is communicated with the second air suction channel 332. The air suction guide component 33 is provided with a partition plate 333 at the position, close to an inlet 30 of the draught fan 3, of the first air suction channel 331 and the second air suction channel 332, and therefore the first air suction channel 331 and the second air suction channel 332 are separated to be independent of each other.

[0099] The bottom 11 of the shell 1 is in a disc-like shape with the front end edge being a straight line section. Preferably, the air duct suction opening 12 is formed in the central axis of the bottom 11 of the shell 1, and the distance between the air duct suction opening 12 and the front end 111 of the bottom 11 of the shell 1 is smaller than the distance between the air duct suction opening 12 and the rear end 112 of the bottom 11 of the shell 1. It will be appreciated that the air duct suction opening 12 may be shaped as a circle 12a, an ellipse 12b, a triangle 12c, a quadrilateral 12d, or an irregular polygon 12e, as shown in FIG. 2E; or the air duct suction opening 12 is shaped as an approximate ellipse 12f with a rectangular middle part and semicircular sides, and the like.

[0100] Each of the at least one sweeping brush 15 is preferably arranged near the air duct suction opening 12, and preferably, each of the at least one sweeping brush 15 is driven to move back and forth integrally close to and far away from the air duct suction opening 12. More preferably, each of the at least one sweeping brush 15 is driven to move back and forth integrally between the air duct suction opening 12 and the edge of the bottom 11 of the shell 1.

[0101] Therefore, according to the embodiment, at least one sweeping brush 15 which is separated from the air duct suction opening 12 and independently arranged is arranged at the bottom 11 of the shell 1 so as to sweep raised dust, and the dust collection efficiency can be more effective. In addition, the sweeping brush 15 which is separated from the air duct suction opening 12 and independently arranged is adopted to replace a rolling main brush arranged in the air suction opening, and the problems that winding caused by the rolling main brush blocks the dust suction opening, and the sweeping effect of the dust suction box is affected can be effectively avoided.

[0102] The sweeping robot disclosed by the embodiment of the invention comprises a sweeping mechanism, the sweeping mechanism is provided with a sweeping brush at the bottom of a shell 1, under the suction effect of the draught fan 3 in the shell 1, dust and paper scraps which are swept and raised by at least one sweeping brush arranged on the surface of the bottom of the shell are sucked into the air duct suction opening 12, and the dust enters the dust collecting box through the air duct suction opening 12, so that the ground cleaning function is completed.

[0103] In the following, alternative specific structures and corresponding working principles of the sweeping mechanism of the embodiment of the invention will be described in detail through pluralities of embodiments.

Example 2:

[0104] Referring to FIGs. 3A-3D, a sweeping mechanism provided by the embodiment of the invention comprises an air duct suction opening 12 formed in a bottom 11 of a shell 1 and a sweeping brush 15 independently arranged at the bottom 11 of the shell 1 and separated from the air duct suction opening 12, and the sweeping brush 15 is driven to move back and forth to sweep and raise dust and scraps of paper on the ground.

[0105] Specifically, the sweeping brush 15 is arranged between the front end 111 of the bottom 11 of the shell 1 and the air duct suction opening 12. The sweeping brush 15 is driven to move back and forth and mainly comprises the following two implementation modes:

the first mode is as follows: the sweeping brush 15 is driven to move back and forth between the left edge and the right edge of the bottom 11 of the shell 1, and the movement direction is shown as the arrow direction A1 shown in FIG. 3A or the arrow direction B1 shown in the FIG. 3E;

and the second mode is as follows: the sweeping brush 15 is driven to move back and forth between the air duct suction opening 12 and the edge of the bottom 11 of the shell 1, and the moving direction is shown as the arrow direction A2 shown in FIG. 3F or the arrow direction B2 shown in FIG. 3G.

[0106] In particular embodiments, the sweeping brush 15 can be driven to move back and forth in the direction of its own axis (direction of each of the arrows A1 and A2 in FIGs. 3A and 3F), or in a direction perpendicular to its own axis (direction of each of the arrows B1 and B2 in FIGs. 3E and 3G)

[0107] Referring to FIGs. 4A-4F, a preferred configuration of the sweeping brush 15 employed in the present embodiment is shown. The sweeping brush 15 provided in this embodiment is able to move back and forth in its own axial direction when driven. The sweeping brush comprises a fixed seat 91 arranged at the bottom 11 of the shell 1, a movable support 92 arranged on the fixed seat 91 and bristles 93 arranged on the movable support 92, and the movable support 92 is driven by a driving

component 94 to move relative to the fixed seat 91. Specifically, the movable support 92 is driven by a driving component to move back and forth relative to the fixed seat 91 in the axis direction (shown in the arrow A direction in FIG. 4E) of the movable support 92.

[0108] The fixed seat 91 comprises a limiting body 911, and a containing groove 910 is formed in the limiting body 911. The movable support 92 comprises a movable body 921 for arranging bristles 93, a driven member 922 is arranged at the bottom of the movable body 921, and the driven member 922 extends out of the containing groove 910 and drives the movable body 921 to move back and forth in the containing groove 910 under the action of the driving component 94. The driving component 94 comprises a motor 941 and a coupling member 942 driven by the motor 941, and the coupling member 942 is connected with the driven member 922 in a matched manner. The motor 941 is preferably a brush direct current motor or a brushless direct current motor, and the coupling member 942 is an eccentric shaft driven by the brush direct current motor or the brushless direct current motor.

[0109] Specifically, the movable body 921 reciprocates in the length direction in the containing groove 910. The length of the movable body 921 is smaller than that of the containing groove 910. The movable body 921 further comprises an upper portion 9211 for arranging the bristles 93 and a lower portion 9212 connected with the upper portion 9211, and the driven member 922 is arranged on the bottom surface of the lower portion 9212. The longitudinal section of the movable body 921 in the width direction of the movable body 921 is in a convex shape. The width of the upper portion 9211 is smaller than that of the containing groove 910 so that the upper portion 9211 can be contained in the containing groove 910, and the width of the lower portion 9212 is larger than that of the containing groove 910.

[0110] Preferably, the fixed seat 91 of the embodiment further comprises a bottom case 913, and the limiting body 911 is fixed into the bottom case 913 through a connecting piece (e.g., a screw or the like) so as to prevent the movable body 921 contained in the containing groove 910 from being separated from the limiting body 911. An opening 9130 is formed in the bottom of the bottom case 913 to extend out of the driven member 922. However, it can be understood that the sweeping brush of the present embodiment may not be provided with a bottom case 913, as shown in FIG. 4F, and the implementation effect thereof is not affected.

[0111] In specific implementation, the coupling member (eccentric shaft) 942 is driven by the motor to rotate, and in the rotating process of the coupling member (eccentric shaft) 942, the coupling member (eccentric shaft) 942 is connected with the driven member 922 at the bottom of the movable body 921 in a matched manner to drive the driven member 922 to move, so that the movable body 921 is driven to do reciprocating motion in the length direction in the containing groove 910.

[0112] Preferably, in the present embodiment, the bristles 93 are mainly formed by arranging pluralities of bristle bundles. In addition, the movable support 92 provided on each fixed seat 91 include pluralities; and/or the bristles 93 provided on each movable support 92 include pluralities of rows. Each row of the bristles 93 extends out of the surface of the bottom 11 of the shell 1 to abut against the ground. The upper surface of each row of the bristles 93 is in the same horizontal plane to be flush with the ground.

[0113] Preferably, in the present embodiment, the movable support 92 is also driven by a driving component 94 (or other driving means) to move relative to the fixed seat as follows:

swinging back and forth around the axis of the movable support 92 in the length direction, and the swinging range is 120 degrees; or

rotating 360 degrees around the axis of the movable support 92 in the length direction.

[0114] In the above-described modification, the sweeping brush is arranged to move back and forth in the length direction of the sweeping brush and can also conduct 120-degree back-and-forth swinging or 360-degree rotating self-motion around the axis in the length direction of the sweeping brush, the sweeping effect can be further improved, and therefore the dust collection effect and efficiency are improved.

[0115] Preferably, in the present embodiment, the movable support 92 can also be driven by the driving component 94 to do lifting motion far away from or close to the horizontal plane where the fixed seat is located. According to the improved scheme, the sweeping brush is arranged to be a floating brush, so that the sweeping brush is suitable for uneven grounds, self-adaptive lifting can be carried out according to concave-convex conditions of different grounds, the sweeping brush is tightly attached to the ground to sweep the grounds, and the sweeping effect is guaranteed.

[0116] Referring to FIGs. 5A-5F, another preferred structure of the sweeping brush 15 employed in the present embodiment is shown. The sweeping brush 15 provided in the present embodiments driven to move back and forth in a direction perpendicular to its own axis. The sweeping brush 15 comprises a fixed seat 91 arranged at the bottom 11 of the shell 1, a movable support 92 arranged on the fixed seat 91 and bristles 93 arranged on the movable support 92, and the movable support 92 is driven by a driving component 94 to move relative to the fixed seat 91. Specifically, the movable support 92 is driven by the driving component 94 to move back and forth relative to the fixed seat 91 in the axis direction (shown in the arrow B direction in FIG. 5A) of the movable support 92.

[0117] The fixed seat 91 comprises a limiting body 911, and a containing groove 910 is formed in the limiting body 911. The movable support 92 comprises a movable body

921 for containing bristles 93, a driven member 922 is arranged at the bottom of the movable body 921, and the driven member 922 extends out of the containing groove 910 and drives the movable body 921 to move back and forth in the containing groove 910 under the action of the driving component 94.The driving component 94 comprises a motor 941 and a coupling member 942 driven by the motor 941, and the coupling member 942 is connected with the driven member 922 in a matched manner. The motor 941 is preferably a brush direct current motor or a brushless direct current motor, and the coupling member 942 is an eccentric shaft driven by the brush direct current motor or the brushless direct current motor.

[0118] Specifically, the movable body 921 reciprocates in the width direction in the containing groove 910. The width of the movable body 921 is smaller than that of the containing groove 910. The movable body 921 comprises an upper portion 9211 for arranging the bristles 93 and a lower portion 9212 connected with the upper portion 9211, and the driven member 922 is arranged on the bottom surface of the lower portion 9212. The longitudinal section of the movable body 921 in the length direction of the movable body 921 is in a convex shape. The length of the upper portion 9211 is smaller than that of the containing groove 910 so that the upper portion 9211 can be contained in the containing groove 910, and the length of the lower portion 9212 is larger than that of the containing groove 910.

[0119] Preferably, the fixed seat 91 of the present embodiment further comprises a bottom case 913, and the limiting body 911 is fixed into the bottom case 913 through a connecting piece (e.g., a screw or the like) so as to prevent the movable body 921 contained in the containing groove 910 from being separated from the limiting body 911. An opening 9130 is formed in the bottom of the bottom case 913 to extend out of the driven member 922. However, it can be understood that the sweeping brush of the present embodiment may not be provided with a bottom case 913, as shown in FIG. 15F, and the implementation effect thereof is not affected.

[0120] In specific implementation, the coupling member (eccentric shaft) 942 is driven by the motor to rotate, and in the rotating process, the coupling member (eccentric shaft) 942 is connected with the driven member 922 at the bottom of the movable body 921 in a matched manner to drive the driven member 922 to move, so that the movable body 921 is driven to do reciprocating motion in the width direction in the containing groove 910.

[0121] Therefore, according to the embodiment of the present invention, the sweeping brush 15 arranged at the bottom of the shell is arranged to integrally move back and forth for sweeping when being driven, so that dust raised by sweeping is favorably sucked into the air duct suction opening in the moving process, and the sweeping effect and the dust collection effect are improved. Moreover, the sweeping brush is preferably arranged to integrally move back and forth between the air duct suction opening and the edge of the bottom of the shell when being driven, and the sweeping brush is used for sweeping dust at the center and the edge of the sweeper in the moving process. That is to say, the sweeping brush provided by the embodiment of the invention can serve as a main brush and a side brush in the moving process at the same time, the sweeping range of the sweeping robot can be widened, the cost can be reduced, the main brush, the side brush and corresponding drivers do not need to be arranged respectively, and the cost is lower.

[0122] It can be understood that the bristles arranged on the sweeping brush 15 shown in the embodiment are linear as a whole, but the bristles can also be arranged to be wavy (as shown in FIG. 6A) or arc-shaped (as shown in FIG. 6B) as a whole, and the effect of the embodiment of the invention can also be achieved.

[0123] Preferably, referring back to FIG. 3C, the rear edge 122 of the air duct suction opening 12 is provided with a baffle 120 extending upwards, and the baffle 120 is arranged on the rear edge 122 of the air duct suction opening 12 and can block raised dust and paper scraps, and the situation that the dust and the paper scraps diffuse to the position behind the air duct suction opening 12 and cannot be sucked into the air duct suction opening 12 is avoided.

[0124] Preferably, an inclined guide surface 14 is arranged at the front end of the bottom of the shell, and the front edge 121 or the rear edge 122 of the air duct suction opening 12 abuts the rear end of the inclined guide surface 14. The included angle theta between the inclined guide surface and the horizontal plane is more than 0 degree and less than 45 degrees. Preferably, the included angle theta between the inclined guide surface 14 and the horizontal plane is more than 5 degrees and less than 30 degrees. More preferably, the included angle theta between the inclined guide surface and the horizontal plane is more than 10 degrees and less than 20 degrees. The groove 13 is arranged on the inclined guide surface 14.

[0125] According to the embodiment, the inclined guide surface 14 is arranged between the air duct suction opening 12 and the front end edge of the bottom 11 of the shell 1, the inclined guide surface 14 can achieve the obstacle crossing function and is beneficial to dust guide, and the groove 13 arranged on the inclined guide surface 14 is matched to further guide and suck dust in front of the sweeping robot into the air duct suction opening 12, so that the dust suction efficiency is improved.

[0126] In a preferred embodiment, as shown in FIG. 7A, the inclined guide surface 14 itself is a curved surface, and the included angle theta between the inclined guide surface 14 and the horizontal plane is gradually reduced from the front end to the rear end of the inclined guide surface 14. According to the embodiment, the inclined guide surface 14 between the air duct suction opening and the edge of the front end of the bottom of the shell is arranged as a curved surface, and the included angle theta between the inclined guide surface and the horizontal plane is gradually reduced from the front end to

the rear end of the inclined guide surface 14. Thus, the included angle theta between the inclined guide surface close to the edge of the front end of the bottom of the shell and the horizontal plane is larger, the obstacle crossing function is better improved, the included angle theta between the inclined guide face close to the air duct suction opening and the horizontal plane is smaller, the closer the air duct suction opening is, the larger the suction force is, and dust suction is better facilitated.

[0127] In another preferred embodiment, as shown in FIG. 7B, the inclined guide surface 14 comprises a first inclined guide surface 141 and a second inclined guide surface 142 which are connected in a front-to-back transition manner, and the included angle theta 1 between the first inclined guide surface 141 and the horizontal plane is larger than the included angle theta 2 between the second inclined guide surface 142 and the horizontal plane. According to the embodiment, the inclined guide surface 14 between the air duct suction opening 12 and the front end edge of the bottom 11 of the shell 1 is set to be the first inclined guide surface 141 and the second inclined guide surface 142 which are connected in a front-to-back transition manner, and the included angle theta 1 between the first inclined guide surface 141 and the horizontal plane is larger than the included angle theta 2 between the second inclined guide surface 142 and the horizontal plane. Thus, the included angle between the first inclined guide surface 141 and the horizontal plane is larger, which is beneficial to improving the obstacle crossing function, and the included angle between the second inclined guide surface 142 close to the air duct suction opening and the horizontal plane is smaller, so that the suction force near the air duct suction opening is larger, which is beneficial to sucking dust.

Example 3:

[0128] Referring to FIGs. 8A-8C, a sweeping mechanism provided in the embodiment of the present invention comprises an air duct suction opening 12 formed in the bottom 11 of the shell 1, and a first sweeping brush 151 and a second sweeping brush 152 arranged at the bottom 11 of the shell land separately and independently arranged from the air duct suction opening 12, the first sweeping brush 151 and the second sweeping brush 152 are driven to move back and forth so as to sweep and raise dust and paper scraps on the ground. Specifically, the first sweeping brush 151 and the second sweeping brush 152 are arranged at the front ends of two sides of the air duct suction opening 12 respectively and integrally form an inverted splayed shape.

[0129] In this embodiment, the first and second brushes 151, 152 move back and forth in their own axial directions (arrow A3 and A4 directions in FIG.8), respectively. Preferably, the first sweeping brush 151 and the second sweeping brush 152 are driven to move back and forth integrally between the air duct suction opening and the edge of the bottom of the shell and sweep dust in the center and the edge of the sweeper in the moving process, that is to say, the first sweeping brush 151 and the second sweeping brush 152 provided by the embodiment of the invention can serve as a main brush and a side brush in the moving process at the same time, the sweeping range of the sweeping robot can be widened, the cost can be reduced, the main brush, the side brush and corresponding drivers do not need to be arranged respectively, and the cost is lower. The specific configuration of the first and second sweeping brushes 151, 152 may be referred to FIGs. 4A-4F.

[0130] In addition, the sweeping mechanism of the embodiment can also be provided with an inclined guide surface 14, and the first sweeping brush 151 and the second sweeping brush 152 are both arranged on the inclined guide surface 14. The specific structure and principle of operation of this inclined guide surface 14 can be referred to associated description of Example 2.

[0131] It will be appreciated that the first sweeping brush 151 and the second sweeping brush 152 arranged in the present embodiment are driven to move back and forth in the directions perpendicular to the axes of the first sweeping brush 151 and the second sweeping brush 152 respectively (the directions of arrows B3 and B4 in FIGs. 8D and 8E), the specific configuration of the first and second sweeping brushes 151, 152 may be with reference to FIGs. 5A-5F.

Example 4:

[0132] Referring to FIGs. 9A-9D, a sweeping mechanism provided by the embodiment of the invention comprises an air duct suction opening 12 formed in the bottom 11 of a shell 1, a first sweeping brush 151 and a second sweeping brush 152, and the first sweeping brush 151 and the second sweeping brush 152 are independently arranged at the bottom 11 of the shell 1 and separated from the air duct suction opening 12. The first sweeping brush 151 and the second sweeping brush 152 are driven to move back and forth so as to sweep and raise dust and paper scraps on the ground.

[0133] The sweeping mechanism provided by the embodiment is substantially the same as the sweeping mechanism provided in Example 3, except that the first sweeping brush 151 and the second sweeping brush 152 provided in this embodiment are respectively arranged on the left side and the right side of the air duct suction opening 12 in parallel, and the first sweeping brush 151 and the second sweeping brush 152 adopt any of the following structures and movement modes:

(1) the first sweeping brush 151 and the second sweeping brush 152 are driven to move back and forth between the front end and the rear end of the bottom 11 of the shell 1, and the first sweeping brush 151 and the second sweeping brush 152 are driven to move in the directions along their own axes, and the directions of movement of the first and second

sweeping brushes 151 and 152 are shown by arrows C1 and C2 in FIG. 9A;

(2) the first sweeping brush 151 and the second sweeping brush 152 are driven to move back and forth between the front end and the rear end of the bottom 11 of the shell 1, and the first sweeping brush 151 and the second sweeping brush 152 are driven to move in the directions perpendicular to their own axes, and the directions of movement of the first sweeping brush 151 and the second sweeping brush 152 are shown by arrows C3 and C4 in FIG. 9B;

(3) the first sweeping brush 151 and the second sweeping brush 152 are driven to move back and forth between the air duct suction opening 12 and the edge of the bottom 11 of the shell 1, and the first sweeping brush 151 and the second sweeping brush 152 are driven to move in the directions perpendicular to their own axes, and the directions of movement of the first sweeping brush 151 and the second sweeping brush 152 are shown by arrows C5 and C6 in FIG. 9C;

And (4) the first sweeping brush 151 and the second sweeping brush 152 are driven to move back and forth between the air duct suction opening 12 and the edge of the bottom 11 of the shell 1, and the first sweeping brush 151 and the second sweeping brush 152 are driven to move in the directions along their own axes, and the directions of movement of the first and second sweeping brushes 151 and 152 are shown by arrows C7 and C8 in FIG. 9D;

[0134] It can be understood that no matter which kind of structure and movement mode are adopted to the first sweeping brush 151 and the second sweeping brush 152 of the sweeping mechanism provided by the embodiment, the first sweeping brush 151 and the second sweeping brush 152 can be matched to sweep and raise dust and paper scraps in the moving process so as to effectively suck the dust and the paper scraps into the air duct suction opening, and the dust collection efficiency and effect can be improved.

Example 5:

[0135] Referring to FIGs. 10A-10C, a sweeping mechanism provided by the embodiment of the invention comprises an air duct suction opening 12 formed in a bottom 11 of a shell land pluralities of sweeping brushes 151, 152, 153 independently arranged at the bottom 11 of the shell 1 and separated from the air duct suction opening 12, the sweeping brushes 151, 152 and 153 are arranged between the air duct suction opening 12 and the front end of the surface of the bottom 11 of the shell 1 in a radial mode and move back and forth when driven so as to sweep and raise dust and paper scraps on the ground.

[0136] The pluralities of sweeping brushes 151, 152, 153 can adopt any of the following structures and movement modes:

(1) the pluralities of sweeping brushes 151, 152, 153 are driven to move back and forth between the air duct suction opening 12 and the edge of the bottom 11 of the shell 1, and the pluralities of sweeping brushes 151, 152, 153 are driven to move in the directions along their own axes , as shown in FIG. 10A;

(2) the pluralities of sweeping brushes 151, 152, 153 are driven to move back and forth between the air duct suction opening 12 and the edge of the bottom 11 of the shell 1, and the pluralities of sweeping brushes 151, 152, 153 are driven to move in the directions perpendicular to their own axes, as shown in FIG. 10B; and

(3) the pluralities of sweeping brushes 151, 152, 153 are driven to move back and forth between the left and right ends of the bottom 11 of the shell 1, and the pluralities of sweeping brushes 151, 152, 153 are driven to move in the directions perpendicular to their own axes, as shown in FIG. 10C.

[0137] It will be appreciated that the present embodiment shows a structure of the sweeping mechanism employing three sweeping brushes, four, five, six or more sweeping brushes may also be provided in order to further improve the sweeping and dust collection effect, and the pluralities of sweeping brushes are radially arranged at the front end of the surface of the bottom 11 of the shell 1 and close to the air duct suction opening.

Example 6:

[0138] Referring to FIGs. 11A-11D, a sweeping mechanism provided in an embodiment of the present invention is substantially the same as that provided in Example 5, and comprises an air duct suction opening 12 formed in a bottom 11 of a shell 1 and pluralities of sweeping brushes 151, 152, 153 independently arranged at the bottom 11 of the shell 1 and separated from the air duct suction opening 12, except that the pluralities of sweeping brushes 151, 152 and 153 are arranged between the air duct suction opening 12 and the front end of the surface of the bottom 11 of the shell 1 in parallel and move back and forth when driven so as to sweep and raise dust and paper scraps on the ground.

[0139] The pluralities of sweeping brushes 151, 152, 153 can adopt any of the following structures and movement modes:

(1) the pluralities of sweeping brushes 151, 152, 153 are driven to move back and forth between the air duct suction opening 12 and the edge of the bottom 11 of the shell 1, and the pluralities of sweeping

brushes 151, 152, 153 are driven to move in the directions along their own axes, as shown in FIG. 11 A;

(2) the pluralities of sweeping brushes 151, 152, 153 are driven to move back and forth between the air duct suction opening 12 and the edge of the bottom 11 of the shell 1, and the pluralities of sweeping brushes 151, 152, 153 are driven to move in the directions perpendicular to their own axes, as shown in FIG. 11B;

(3) the pluralities of sweeping brushes 151, 152, 153 are driven to move back and forth between the left and right ends of the bottom 11 of the shell 1, and the pluralities of sweeping brushes 151, 152, 153 are driven to move in the directions along their own axes, as shown in FIG. 11C; and

(4) the pluralities of sweeping brushes 151, 152, 153 are driven to move back and forth between the left and right ends of the bottom 11 of the shell 1, and the pluralities of sweeping brushes 151, 152, 153 are driven to move in the directions perpendicular to their own axes, as shown in FIG. 11D.

[0140] It will be appreciated that the present embodiment shows a structure of the sweeping mechanism employing three sweeping brushes, four, five, six or more sweeping brushes may also be provided in order to further improve the sweeping and dust collection effect, and the pluralities of sweeping brushes are arranged parallel to each other at the front end of the surface of the bottom 11 of the shell 1.

Example 7:

[0141] Referring to FIGs. 12A-12B, a sweeping mechanism provided in an embodiment of the present invention is substantially the same as that provided in Example 3, except that the first sweeping brush 151 and the second sweeping brush 152 which are independently arranged on the bottom 11 of the shell 1 and are separated from the air duct suction opening 12 respectively comprise a sweeping sub-brush 151a and a sweeping sub-brush 151b which are arranged in parallel, and a sweeping sub-brush 152a and a sweeping sub-brush 152b which are arranged in parallel.

[0142] The sweeping sub-brush 151a, the sweeping sub-brush 151b, the sweeping sub-brush 152a and the sweeping sub-brush 152b can be arranged to move back and forth in the directions along their own axes or move back and forth in the directions perpendicular to their own axes. Reference may be made to the foregoing related embodiments for specific structures and principles.

[0143] According to the embodiment, each of the front ends of the two sides of the air duct suction opening 12 is provided at least two sweeping sub-brushes in parallel for sweeping and raising dust in the moving process so as to suck the dust into the air duct suction opening, so that the cleaning and dust collection efficiency and effect can be further improved.

[0144] It can be understood that the number of the sweeping sub-brushes arranged at each of the front ends of the two sides of the air duct suction opening 12 in parallel can also be three or more, and the technical effect needing to be achieved by the embodiment of the invention can also be achieved.

[0145] According to the embodiment, the sweeping sub-brushes arranged at the front ends of the two sides of the air duct suction opening 12 in parallel and the air duct suction opening 12 are arranged to integrally form an inverted-splayed shape, but it can be understood that the sweeping sub-brushes and the air duct suction opening 12 can also be arranged to integrally form a linear shape or a splayed shape, and the effect to be achieved by the embodiment of the invention can also be achieved.

Example 8:

[0146] Referring to FIGs. 13A-13B, a sweeping mechanism provided in an embodiment of the present invention is substantially the same as that provided in Example 4, except that the first sweeping brush 151 and the second sweeping brush 152 which are independently arranged on the bottom 11 of the shell 1 and are separated from the air duct suction opening 12 respectively comprise a sweeping sub-brush 151a and a sweeping sub-brush 151b which are arranged in parallel, and a sweeping sub-brush 152a and a sweeping sub-brush 152b which are arranged in parallel.

[0147] The sweeping sub-brush 151a, the sweeping sub-brush 151b, the sweeping sub-brush 152a and the sweeping sub-brush 152b can be arranged to move back and forth in the directions along their own axes or move back and forth in the directions perpendicular to their own axes. Reference may be made to the foregoing related embodiments for specific structures and principles.

[0148] According to the embodiment, each of the front ends of the two sides of the air duct suction opening 12 is provided at least two sweeping sub-brushes in parallel for sweeping and raising dust in the moving process so as to suck the dust into the air duct suction opening, so that the cleaning and dust collection efficiency and effect can be further improved.

[0149] It can be understood that the number of the sweeping sub-brushes arranged at each of the front ends of the two sides of the air duct suction opening 12 in parallel can also be three or more, and the technical effect needing to be achieved by the embodiment of the invention can also be achieved.

[0150] It can be understood that the at least two sweeping sub-brushes arranged at each of the two sides of the air duct suction opening 12 can also be in a radial state instead of a parallel state, and the technical effect needing to be achieved by the embodiment of the invention can also be achieved.

Example 9:

[0151] The embodiment of the invention provides a sweeping mechanism which is on the basis of any one of the previous embodiments, at least one groove is formed in the surface of a bottom 11 of the shell 1, and each groove is communicated with the air duct suction opening 12 to form a dust guide air duct for guiding dust into the air duct suction opening 12. Each groove is shaped to match the shape of the air duct suction opening 12 for connecting. Specifically, one end of each groove is connected with the air duct suction opening 12, and the other end of each groove is in smooth transition connection with the edge of the bottom 11 of the shell 1. Each groove and the air duct suction opening 12 can be integrally formed.

[0152] Preferably, each groove is matched with the sweeping brush on the bottom 11 of the shell 1 so that raised dust can be guided into the air duct suction opening 12 through the groove.

[0153] Therefore, according to the sweeping mechanism disclosed by the embodiment of the invention, at least one groove is formed in the surface of the bottom of the shell, and each groove is communicated with the air duct suction opening to form the dust guide air duct for guiding dust into the air duct suction opening, so that the dust on the ground can be conveniently guided and sucked into the air duct suction opening, and the dust suction efficiency is improved. The groove matched with the sweeping brush is formed in the bottom of the shell, so that dust raised by the sweeping brush is further guided into the air duct suction opening through the groove, and the dust suction efficiency is improved.

[0154] Hereinafter, the mating arrangement, specific structure, and principle of operation of each of the at least one sweeping brush with the groove that may be employed will be described in detail by a number of embodiments.

Example 10:

[0155] Referring to FIG. 14, an embodiment of the present invention provides a sweeping mechanism which is on the basis of Example 2, at least one groove is formed in the surface of a bottom 11 of the shell 1.

[0156] Specifically, a groove 13 is formed between the air duct suction opening 12 and the edge of the front end of the bottom 11 of the shell 1, the groove 13 is communicated with the air duct suction opening 12 to form a dust guide air duct for guiding dust into the air duct suction opening 12, and the groove 13 and the sweeping brush 15 are arranged in parallel.

[0157] Specifically, the front end 131 of the groove 13 is in smooth transition connection with the edge of the front end of the bottom 11 of the shell 1, the rear end 132 of the groove 13 is connected with the front edge 121 of the air duct suction opening 12, the depth of the groove 13 is gradually increased from the front end 131 to the rear end 132 of the groove 13, and the width D1 of the rear end 132 of the groove 13 is smaller than or equal to the length of the front edge 121 of the air duct suction opening 12. This facilitates the introduction of dust into the duct suction 12. Besides, a baffle 120 extending upwards is arranged on the rear edge 122 of the air duct suction opening 12, the baffle 120 is arranged on the rear edge 122 of the air duct suction opening 12, raised dust and paper scraps can be blocked, and the situation that the dust and the paper scraps diffuse to the position behind the air duct suction opening 12 and cannot be sucked into the air duct suction opening 12 is avoided.

[0158] Therefore, according to the embodiment, the groove matched with the sweeping brush is formed in the bottom of the shell, so that dust raised by the sweeping brush is further guided into the air duct suction opening through the groove, and the dust suction efficiency is improved.

[0159] It can be understood that the sweeping brush 15 can adopt any structure and movement mode in Example 2, and the implementation effect of the embodiment of the invention can also be achieved.

Example 11:

[0160] Referring to FIGs. 15A-15F, an embodiment of the present invention provides a sweeping mechanism that, on the basis of Example 3, is provided with at least one groove 13 in communication with the air duct suction opening 12 in the surface of the bottom 11 of the shell 1.

[0161] Specifically, a first groove 133 and a second groove 134 are formed in the two sides of the air duct suction opening 12, and the first groove 133 and the second groove 133 communicate with the air duct suction opening 12 to form a dust guide air duct for guiding dust into the air duct suction opening 12.

[0162] In addition, the first groove 133 and the second groove 134 are arranged in a manner of being matched with the first sweeping brush 151 and the second sweeping brush 152, so that the first sweeping brush 151 is arranged in front of the first groove 133 and is parallel to the first groove 133, and the second sweeping brush 152 is arranged in front of the second groove 134 and is parallel to the second groove 134.

[0163] Specifically, one end 1331 of the first groove 133 is connected with the air duct suction opening 12, and the other end 1332 of the first groove 133 is in smooth transition connection with the edge of the bottom 11 of the shell 1. One end 1341 of the second groove 134 is connected with the air duct suction opening 12, and the other end 1342 of the second groove 134 is in smooth transition connection with the edge of the bottom 11 of the shell 1. The air duct suction opening 12 is rectangular, the one end 1331 of the first groove 133 and the one end 1341 of the second groove 134 are connected with the left short edge and the right short edge of the air duct suction opening respectively, and the width of the one end 1331 of the first groove 133 and the width of the one

end 1341 of the second groove 134 are equal to the length of the left short edge and the length of the right short edge of the air duct suction opening 12 respectively. The depth of the first groove 133 is gradually increased from the one end 1332to the other end 1331 of the first groove 133, the depth of the second groove 134 is gradually increased from the one end 1342 to the other end 1341 of the second groove 134, such a design facilitates the direction of dust and makes it easier for dust to be drawn into the air duct suction opening 12 via the first groove 133 and the second groove 134. Preferably, the first groove 133 and the second groove 134 are integrally formed in an inverted splayed shape, that is, the one end 1331 of the first groove 133 and the one end 1341 the second groove 134 are connected with the air duct suction opening in the middle front part of the bottom of the shell, and the other end 1332 of the first groove 133 and the other end 1341 of the second groove 134 are in smooth transition connection with the edges of the left and right corners of the bottom of the shell respectively .

[0164] In addition, the dust collection guide structure of the present embodiment may also be provided with an inclined guide surface 14, and the front or rear edges of the first and second grooves 133, 134 abut the rear end of the inclined guide surface 14. The specific structure and principle of operation of the inclined guide surface 14 can be referred to the associated description of Example 2.

[0165] It will be appreciated that when the inclined guide surface 14 of the present embodiment employs the structure of the inclined guide surface 14 shown in FIG. 4B, the first groove 133 and the second groove 134 are arranged on the second inclined guide surface 142.

[0166] In addition, the embodiment is further provided with baffles, the baffles comprise a middle baffle 1201 arranged on the rear edge 122 of the air duct suction opening 12, a left baffle 1202 connected to the left side of the middle baffle 1201 and a right baffle 1203 connected to the right side of the middle baffle 1201, and the left baffle 1202 and the right baffle 1203 are arranged on the rear edge of the first groove 133 and the rear edge of the second groove 134 respectively. According to the embodiment, the baffles can block raised dust and paper scraps, and the situation that the dust and the paper scraps are diffused to the position behind the air duct suction opening 12 and cannot be sucked into the fresh air duct suction opening 12 is avoided.

[0167] In addition, as shown in FIG. 16, the present embodiment may also provides the first groove 133 and the second groove 134 described above on the structure shown in FIGs. 8D or 8E of Example 3 to match the first sweeping brush 151 and the second sweeping brush 152, and the first groove 133 and the second groove 133 are communicated with the air duct suction opening 12 to form a dust guide air duct for guiding dust into the air duct suction opening 12.

Example 12:

[0168] Referring to FIG. 17, an embodiment of the present invention provides a sweeping mechanism that, on the basis of Example 3, is provided with at least one groove 13 in communication with the air duct suction opening 12 in the surface of the bottom 11 of the shell 1. Specifically, a first groove 133 and a second groove 134 are formed to be matched with the first sweeping brush 151 and the second sweeping brush 152, so that the first sweeping brush 151 is arranged on the first groove 133, and the second sweeping brush 152 is arranged on the second groove 133.

[0169] Reference can be made to Example 11 for the specific structure and principle of operation of the first and second grooves 133, 134.

[0170] The first and second sweeping brushes 151, 152 are arranged to move back and forth in the directions along their own axes, with reference to Example 2 for specific structure and principle of operation.

Example 13:

[0171] Referring to FIG. 18, the embodiment of the invention provides a sweeping mechanism which is substantially the same as that of Example 11, except that the sweeping mechanism provided by this embodiment further comprises a third groove 135 formed in the surface of the bottom 11 of the shell 1, the front end of the third groove 135 is in smooth transition connection with the edge of the front end of the bottom 11 of the shell 1, and the rear end of the third groove 135 is connected with the front edge of the air duct suction opening 12.

[0172] The first sweeping brush 151 and the second sweeping brush 152 are arranged in front of the first groove 133 and the second groove 134 respectively and arranged on the two sides of the third groove 135.

[0173] According to the embodiment, three grooves matched with the first sweeping brush 151 and the second sweeping brush 152 are formed to guide dust raised from the front end and the two sides of the air duct suction opening 12 to be sucked into the air duct suction opening 12, and the dust suction efficiency and effect can be further improved.

Example 14:

[0174] Referring to FIG. 19, the embodiment of the invention provides a sweeping mechanism, on the basis of Example 5, at least one groove communicated with the air duct suction opening 12 is formed in the surface of the bottom 11 of the shell 1. Specifically, a first groove 133, a second groove 134, a third groove 135 and a fourth groove 136 are formed in the bottom 11 of the shell 1 in a matched manner, and the first groove 133, the second groove 134, the third groove 135 and the fourth groove 136 are integrally arranged at the front end of the surface of the bottom 11 of the shell 1 in a radial mode and are

arranged alternately with the first sweeping brush 151, the second sweeping brush 152 and the third sweeping brush 153.

[0175] The specific structure and principle of operation of the first, second, third, and fourth grooves 133, 134, 135, 136 may be referred to in Example 11, which is not described in detail herein.

Example 15:

[0176] Referring to FIG. 20, the embodiment of the invention provides a sweeping mechanism, on the basis of Example 6, at least one groove communicated with the air duct suction opening 12 is formed in the surface of the bottom 11 of the shell 1. Specifically, a first groove 1301 and a second groove 1302 are arranged in a matched manner, and the first groove 1301 and a second groove 1302 are arranged between the front end of the surface of the bottom 11 of the shell 1 and the air duct suction opening 12 and are arranged in parallel and alternately with the pluralities of sweeping brushes 151, 152 and 153.

[0177] The specific structure and principle of operation of the first and second grooves 1301, 1302 may be referred to Example 10, and will not be described in detail herein.

Example 16:

[0178] Referring to FIG. 21, the embodiment of the invention provides a sweeping mechanism which is substantially the same as that provided in Example 11, except that the first groove and the second groove, which are respectively formed in the two sides of the air duct suction opening 12, of the sweeping mechanism provided by the embodiment each comprises two sub-grooves. For example, the first groove comprises a sub-groove 133a and a sub-groove 133b, the second groove comprises a sub-groove 134a and a sub-groove 134b, and the sub-groove 133a and the sub-groove 133b are disposed in parallel, and the sub-groove 134a and the sub-groove 134b are disposed in parallel.

[0179] In addition, the first sweeping brush 151 is arranged between the sub-groove 133a and the sub-groove 133b and is parallel to the sub-groove 133a and the sub-groove 133b. The second sweeping brush 152 is arranged between the sub-groove 134a and the sub-groove 134b and is parallel to the sub-groove 134a and the sub-groove 134b.

[0180] According to the embodiment, two sub-grooves are formed in each of the two sides of the air duct suction opening 12 in parallel in the mode of being matched with the sweeping brush and serve as the dust guide air ducts for guiding raised dust into the air duct suction opening, and the dust suction efficiency and effect can be further improved.

[0181] It can be understood that the two sub-grooves formed in each of the two sides of the air duct suction opening 12 in the embodiment can also be in a radial state instead of a parallel state, and the technical effect needing to be achieved by the embodiment of the invention can also be achieved.

Example 17:

[0182] Referring to FIG. 22, the embodiment of the invention provides a sweeping mechanism that, on the basis of Example 7, is provided with a sub-groove 133a and a sub-groove 133b which are arranged in parallel and a sub-groove 134a and a sub-groove 134b which are arranged in parallel in a matched manner. The sweeping sub-brush 151a and the sweeping sub-brush 151b are arranged parallelly in front of the sub-groove 133a and the sub-groove 133b and are arranged alternately with the sub-groove 133a and the sub-groove 133b. The sweeping sub-brush 152a and the sweeping sub-brush 152b are arranged parallelly in front of the sub-groove 134a and the sub-groove 134b and are arranged alternately with the sub-groove 134a and the sub-groove 134b.

Example 18:

[0183] The embodiment of the invention provides a sweeping mechanism which is on the basis of any embodiment, at least one corner of the front end of the bottom of the shell is provided with a side brush, and the side brush is driven by a driving device to rotate.

[0184] The side brush is arranged so that the bristles of the side brush do not interfere with the sweeping brush and the like in the rotating process. Preferably, the side brush is a three-blade type rotary side brush.

[0185] Therefore, according to the embodiment of the invention, by arranging the at least one sweeping brush which is separated from and independently arranged from the air duct suction opening near the center of the bottom of the shell so as to sweep and raise dust, and arranging the side brushes which rotate on at least one corner (preferably the left corner and the right corner) of the front end of the bottom of the shell, the problem that the sweeping effect of the dust collection box is affected due to the fact that the air suction opening is blocked by winding of the rolling main brush arranged on the air suction opening can be effectively avoided, dust raised by the side brush can be guided into the air duct suction opening through the groove, and the dust suction efficiency is improved, and particularly, the sweeping and cleaning effects on corners are very ideal.

[0186] In the following, the matching arrangement, the specific structure and the working principle of the side brush and the sweeping brush which can be adopted are described in detail through pluralities of embodiments.

[0187] Referring to FIGs. 23A and 23B, an embodiment of the present invention provides a sweeping mechanism that, on the basis of Example 2, provides a side brush on each of at least one corner of the front end of

the bottom 11 of the shell 1, and the side brush performs a rotational motion when driven by a driving means.

[0188] Specifically, a first side brush 181 is arranged at the upper left corner of the front end of the bottom 11 of the shell 1, a second side brush 182 is arranged at the upper right corner of the front end of the bottom 11 of the shell 1, and the first side brush 181 and the second side brush 182 are preferably three-blade type rotary side brushes. In addition, the lengths of bristles of the first side brush 181 and the second side brush 182 are set so that the first side brush 181 and the second side brush 182 cannot interfere with the sweeping brush and the like in the rotating process.

[0189] Therefore, according to the embodiment of the invention, by arranging the sweeping brush 15 which is separated from and independently arranged from the air duct suction opening near the center of the bottom of the shell so as to sweep and raise dust, and arranging the first side brush 181 and the second side brush 182 which rotate on the left corner and the right corner of the front end of the bottom of the shell, the dust at the center and the edge of the sweeper can be effectively swept to be sucked into the air duct suction opening 12, the sweeping and cleaning effects are particularly ideal, and the sweeping efficiency and effect are effectively improved.

[0190] It can be understood that the sweeping brush 15 can adopt any structure and movement mode Example 2, and the implementation effect of the embodiment of the invention can also be achieved.

Example 19:

[0191] Referring to FIGs. 24A and 24B, an embodiment of the present invention provides a sweeping mechanism that, on the basis of Example 3 or Example 4, provides a side brush on each of the at least one corner of the front end of the bottom 11 of the shell 1 that rotates when driven by a driving means.

[0192] Specifically, a first side brush 181 is arranged at the upper left corner of the front end of the bottom 11 of the shell 1, a second side brush 182 is arranged at the upper right corner of the front end of the bottom 11 of the shell 1, and the first side brush 181 and the second side brush 182 are preferably three-blade type rotary side brushes. In addition, the lengths of the bristles of the first side brush 181 and the second side brush 182 are set so that the first side brush 181 and the second side brush 182 do not interfere with the first sweeping brush 151, the second sweeping brush 152 and the like in the rotating process.

[0193] Therefore, according to the embodiment of the invention, by arranging the first sweeping brush 151 and the second sweeping brush 152 which are separated from and independently arranged from the air duct suction opening near the center of the bottom of the shell so as to sweep and raise dust, and arranging the first side brush 181 and the second side brush 182 which rotate on the left corner and the right corner of the front end of the bottom of the shell, the dust at the center and the edge of the sweeper can be effectively swept to be sucked into the air duct suction opening 12, the sweeping and cleaning effects are particularly ideal, and the sweeping efficiency and effect are effectively improved.

[0194] It can be understood that the first sweeping brush 151 and the second sweeping brush 152 can adopt any structure and movement mode in Example 3 or Example 4, and the implementation effect of the embodiment of the invention can be achieved as well.

Example 20:

[0195] Referring to FIGs. 25A and 25B, an embodiment of the present invention provides a sweeping mechanism that, on the basis of Example 5 or Example 6, provides a side brush on each of the at least one corner of the front end of the bottom 11 of the shell 1 that rotates when driven by a driving means.

[0196] Specifically, a first side brush 181 is arranged at the upper left corner of the front end of the bottom 11 of the shell 1, a second side brush 182 is arranged at the upper right corner of the front end of the bottom 11 of the shell 1, and the first side brush 181 and the second side brush 182 are preferably three-blade type rotary side brushes. In addition, the lengths of bristles of the first side brush 181 and the second side brush 182 are set so that the first side brush 181 and the second side brush 182 cannot interfere with the sweeping brushes 151, 152, 153 and the like in the rotating process.

[0197] Therefore, according to the embodiment of the invention, by arranging the pluralities of sweeping brushes 151, 152 and 153 which are separated from and independently arranged from the air duct suction opening near the center of the bottom of the shell so as to sweep and raise dust, and arranging the first side brush 181 and the second side brush 182 which rotate on the left corner and the right corner of the front end of the bottom of the shell, the dust at the center and the edge of the sweeper can be effectively swept to be sucked into the air duct suction opening 12, the sweeping and cleaning effects are particularly ideal, and the sweeping efficiency and effect are effectively improved.

[0198] It will be appreciated that the pluralities of sweeping brushes 151, 152, 153 may employ any of the structures and modes of motion of Example 5 or Example 6 to achieve the effects of the embodiments of the present invention.

Example 21:

[0199] Referring to FIGs. 26A and 26B, an embodiment of the present invention provides a sweeping mechanism that, on the basis of Example 7 or Example 8, provides a side brush on each of the at least one corner of the front end of the bottom 11 of the shell 1 that rotates when driven by a drive means.

[0200] Specifically, a first side brush 181 is arranged

at the upper left corner of the front end of the bottom 11 of the shell 1, a second side brush 182 is arranged at the upper right corner of the front end of the bottom 11 of the shell 1, and the first side brush 181 and the second side brush 182 are preferably three-blade type rotary side brushes. In addition, the lengths of bristles of the first side brush 181 and the second side brush 182 are set so that the bristles cannot interfere with the sweeping sub-brush 151a, the sweeping sub-brush 151b, the sweeping sub-brush 152a, the sweeping sub-brush 152b and the like in the rotating process.

[0201] Therefore, according to the embodiment of the invention, by arranging the sweeping sub-brush 151a, the sweeping sub-brush 151b, the sweeping sub-brush 152a and the sweeping sub-brush 152b which are separated from and independently arranged from the air duct suction opening near the center of the bottom of the shell so as to sweep and raise dust, and arranging the first side brush 181 and the second side brush 182 which rotate on the left corner and the right corner of the front end of the bottom of the shell, the dust at the center and the edge of the sweeper can be effectively swept to be sucked into the air duct suction opening 12, the sweeping and cleaning effects are particularly ideal, and the sweeping efficiency and effect are effectively improved.

[0202] It can be understood that the sweeping sub-brush 151a, the sweeping sub-brush 151b, the sweeping sub-brush 152a and the sweeping sub-brush 152b can adopt any structure and movement mode in the Example 7 or 8, and the implementation effect of the embodiment of the invention can be achieved.

Example 22:

[0203] Referring to FIG. 27, an embodiment of the present invention provides a sweeping mechanism that, on the basis of Example 10, provides a side brush on each of the at least one corner of the front end of the bottom 11 of the shell 1 that rotates when driven by a driving means.

[0204] Specifically, a first side brush 181 is arranged at the upper left corner of the front end of the bottom 11 of the shell 1, a second side brush 182 is arranged at the upper right corner of the front end of the bottom 11 of the shell 1, and the first side brush 181 and the second side brush 182 are preferably three-blade type rotary side brushes. In addition, the lengths of bristles of the first side brush 181 and the second side brush 182 are set so that the first side brush 181 and the second side brush 182 cannot interfere with the sweeping brush 15 and the like in the rotating process.

[0205] Therefore, according to the embodiment of the invention, by arranging a sweeping brush 15 which is separated from and independently arranged from the air duct suction opening near the center of the bottom of the shell and a groove which is matched with the sweeping brush 15, and arranging the first side brush 181 and the second side brush 182 which rotate on the left corner and the right corner of the front end of the bottom of the shell, the dust at the center and the edge of the sweeper can be effectively swept to be sucked into the air duct suction opening 12, the sweeping and cleaning effects are particularly ideal, and the sweeping efficiency and effect are effectively improved.

[0206] It can be understood that the sweeping brush 15 can adopt any structure and movement mode in Example 10, and the implementation effect of the embodiment of the invention can also be achieved.

Example 23:

[0207] Referring to FIGs. 28A-28C, an embodiment of the present invention provides a sweeping mechanism that, on the basis of Example 11 or 12, provides a side brush on each of the at least one corner of the front end of the bottom 11 of the shell 1 that rotates when driven by a driving means.

[0208] Specifically, a first side brush 181 is arranged at the upper left corner of the front end of the bottom 11 of the shell 1, a second side brush 182 is arranged at the upper right corner of the front end of the bottom 11 of the shell 1, and the first side brush 181 and the second side brush 182 are preferably three-blade type rotary side brushes. In addition, the lengths of the bristles of the first side brush 181 and the second side brush 182 are set so that the first side brush 181 and the second side brush 182 do not interfere with the first sweeping brush 151, the second sweeping brush 152 and the like in the moving process.

[0209] Therefore, according to the embodiment of the invention, by arranging a first sweeping brush 151 and a second sweeping brush 152 which are separated from and independently arranged from the air duct suction opening near the center of the bottom of the shell and a first groove 133 and a second groove 134 which are matched with the first sweeping brush 151 and the second sweeping brush 152, and arranging the first side brush 181 and the second side brush 182 which rotate on the left corner and the right corner of the front end of the bottom of the shell, the dust at the center and the edge of the sweeper can be effectively swept to be sucked into the air duct suction opening 12, the sweeping and cleaning effects are particularly ideal, and the sweeping efficiency and effect are effectively improved.

[0210] It will be appreciated that the first sweeping brush 151 and the second sweeping brush 152 can adopt the corresponding structures and modes of motion in Examples 11 or 12, and the implementation effect of the embodiment of the invention can also be achieved.

Example 24:

[0211] Referring to FIG. 29, an embodiment of the present invention provides a sweeping mechanism that, on the basis of Example 13, provides a side brush on each of the at least one corner of the front end of the

housing bottom 11 that rotates when driven by a driving means.

[0212] Specifically, a first side brush 181 is arranged at the upper left corner of the front end of the bottom 11 of the shell 1, a second side brush 182 is arranged at the upper right corner of the front end of the bottom 11 of the shell 1, and the first side brush 181 and the second side brush 182 are preferably three-blade type rotary side brushes. In addition, the lengths of the bristles of the first side brush 181 and the second side brush 182 are set so that the first side brush 181 and the second side brush 182 do not interfere with the first sweeping brush 151, the second sweeping brush 152 and the like in the rotating process.

[0213] Therefore, according to the embodiment of the invention, by arranging a first sweeping brush 151 and a second sweeping brush 152 which are separated from and independently arranged from the air duct suction opening near the center of the bottom of the shell and a first groove 133, a second groove 134 and a third groove 135 which are matched with the first sweeping brush 151 and the second sweeping brush 152, and arranging the first side brush 181 and the second side brush 182 which rotate on the left corner and the right corner of the front end of the bottom of the shell, the dust at the center and the edge of the sweeper can be effectively swept to be sucked into the air duct suction opening 12, the sweeping and cleaning effects are particularly ideal, and the sweeping efficiency and effect are effectively improved.

[0214] It can be understood that the first sweeping brush 151 and the second sweeping brush 152 can adopt the corresponding structures and movement modes in Example 13, and the implementation effect of the embodiment of the invention can also be achieved.

Example 25:

[0215] Referring to FIGs. 30A and 30B, an embodiment of the present invention provides a sweeping mechanism that, on the basis of Example 14 or Example 15, provides a side brush on each of the at least one corner of the front end of the bottom 11 of the shell 1 that rotates when driven by a driving means.

[0216] Specifically, a first side brush 181 is arranged at the upper left corner of the front end of the bottom 11 of the shell 1, a second side brush 182 is arranged at the upper right corner of the front end of the bottom 11 of the shell 1, and the first side brush 181 and the second side brush 182 are preferably three-blade type rotary side brushes. In addition, the lengths of bristles of the first side brush 181 and the second side brush 182 are set so that the first side brush 181 and the second side brush 182 do not interfere with the first sweeping brush 151, the second sweeping brush 152, the third sweeping brush 153 and the like in the rotating process.

[0217] Therefore, according to the embodiment of the invention, by arranging a first sweeping brush 151, a second sweeping brush 152 and a third sweeping brush 153 which are separated from and independently arranged from the air duct suction opening near the center of the bottom of the shell and a first groove 133, a second groove 134, a third groove 135 and a fourth groove 136 which are matched with the first sweeping brush 151, the second sweeping brush 152 and the third sweeping brush 153, and arranging the first side brush 181 and the second side brush 182 which rotate on the left corner and the right corner of the front end of the bottom of the shell, the dust at the center and the edge of the sweeper can be effectively swept to be sucked into the air duct suction opening 12, the sweeping and cleaning effects are particularly ideal, and the sweeping efficiency and effect are effectively improved.

[0218] It will be appreciated that the first, second and third sweeping brushes 151, 152, 153 may employ the corresponding structures and modes of motion in embodiments 14 or 15, and the implementation effect of the embodiment of the invention can also be achieved.

Example 26:

[0219] Referring to FIG. 31, an embodiment of the present invention provides a sweeping mechanism that, on the basis of Example 16, provides a side brush on each of the at least one corner of the front end of the bottom 11 of the shell 1 that rotates when driven by a driving means.

[0220] Specifically, a first side brush 181 is arranged at the upper left corner of the front end of the bottom 11 of the shell 1, a second side brush 182 is arranged at the upper right corner of the front end of the bottom 11 of the shell 1, and the first side brush 181 and the second side brush 182 are preferably three-blade type rotary side brushes. In addition, the lengths of the bristles of the first side brush 181 and the second side brush 182 are set so that the first side brush 181 and the second side brush 182 do not interfere with the first sweeping brush 151, the second sweeping brush 152 and the like in the rotating process.

[0221] Therefore, according to the embodiment of the invention, by arranging a first sweeping brush 151 and a second sweeping brush 152 which are separated from and independently arranged from the air duct suction opening near the center of the bottom of the shell and a sub-groove 133a, a sub-groove 133b, a sub-groove 134a and a sub-groove 134b which are matched with the first sweeping brush 151 and the second sweeping brush 152, and arranging the first side brush 181 and the second side brush 182 which rotate on the left corner and the right corner of the front end of the bottom of the shell, the dust at the center and the edge of the sweeper can be effectively swept to be sucked into the air duct suction opening 12, the sweeping and cleaning effects are particularly ideal, and the sweeping efficiency and effect are effectively improved.

[0222] It will be appreciated that the first sweeping brush 151 and the second sweeping brush 152 can adopt

the corresponding structures and modes of motion in Example 16, and the implementation effect of the embodiment of the invention can also be achieved.

Example 27:

[0223] Referring to FIG. 32, an embodiment of the present invention provides a sweeping mechanism that, on the basis of Example 17, provides a side brush on each of the at least one corner of the front end of the bottom 11 of the shell 1 that rotates when driven by a driving means.

[0224] Specifically, a first side brush 181 is arranged at the upper left corner of the front end of the bottom 11 of the shell 1, a second side brush 182 is arranged at the upper right corner of the front end of the bottom 11 of the shell 1, and the first side brush 181 and the second side brush 182 are preferably three-blade type rotary side brushes. In addition, the lengths of bristles of the first side brush 181 and the second side brush 182 are set so that the bristles do not interfere with the sweeping sub-brush 151a, the sweeping sub-brush 151b, the sweeping sub-brush 152a, the sweeping sub-brush 152b and the like in the rotating process.

[0225] Therefore, according to the embodiment of the invention, by arranging a sweeping sub-brush 151a, a sweeping sub-brush 151b, a sweeping sub-brush 152a and a sweeping sub-brush 152b which are separated from and independently arranged from the air duct suction opening near the center of the bottom of the shell and a sub-groove 133a, a sub-groove 133b, a sub-groove 134a and a sub-groove 134b which are matched with sweeping sub-brush 151a, the sweeping sub-brush 151b, the sweeping sub-brush 152a and the sweeping sub-brush 152b, and arranging the first side brush 181 and the second side brush 182 which rotate on the left corner and the right corner of the front end of the bottom of the shell, the dust at the center and the edge of the sweeper can be effectively swept to be sucked into the air duct suction opening 12, the sweeping and cleaning effects are particularly ideal, and the sweeping efficiency and effect are effectively improved.

[0226] It can be understood that the sweeping sub-brush 151a, the sweeping sub-brush 151b, the sweeping sub-brush 152a and the sweeping sub-brush 152b can adopt corresponding structures and movement modes in the Example 17, and the implementation effect of the embodiment of the invention can also be achieved.

[0227] The foregoing descriptions are merely exemplary embodiments of the present invention, and it should be noted that several modifications and substitutions may also be made to those of ordinary skill in the art without departing from the principles of the invention, which should also be considered as a scope of protection of the invention.

Claims

1. A sweeping mechanism, **characterized by** comprising an air duct suction opening formed in a bottom of a shell and at least one sweeping brush which is independently arranged at the bottom of the shell and is separated from the air duct suction opening, and each of the at least one sweeping brush is driven to move back and forth.

2. The sweeping mechanism according to claim 1, **characterized in that**, the at least one sweeping brush is driven to move back and forth integrally close to and away from the air duct suction opening.

3. The sweeping mechanism according to claim 2, **characterized in that**, each of the at least one sweeping brush is driven to move back and forth integrally between the air duct suction opening and en edge of the bottom of the shell.

4. The sweeping mechanism according to claim 1, **characterized in that**, each of the at least one sweeping brush moves back and forth in a direction of an axis thereof.

5. The sweeping mechanism according to claim 1, **characterized in that**, each of the at least one sweeping brush moves back and forth in a direction perpendicular to an axis thereof.

6. The sweeping mechanism according to claim 4 or 5, **characterized in that**, each of the at least one sweeping brush swings back and forth around the axis thereof, and a swing range of each of the at least one sweeping brush swinging back and forth around the axis thereof is 120 degrees.

7. The sweeping mechanism according to claim 4 or 5, **characterized in that**, each of the at least one sweeping brush rotates 360 ° about the axis thereof.

8. The sweeping mechanism according to claim 1, **characterized in that**, each of the at least one sweeping brush comprises a fixed seat arranged at the bottom of the shell, a movable support arranged on the fixed seat and bristles arranged on the movable support, and the movable support is driven by a driving component to move back and forth relative to the fixed seat.

9. The sweeping mechanism according to claim 8, **characterized in that**, the movable support is driven by the driving component to move back and forth relative to the fixed seat as follows:
moving back and forth in a direction of an axis thereof; or moving back and forth in a direction perpendicular to an axis thereof.

10. The sweeping mechanism according to claim 9, **characterized in that**, the movable support is further driven by a driving component to move relative to the fixed seat as follows:
swinging back and forth around an axis thereof, and a swinging range is 120 °; or rotating 360 ° around an axis thereof.

11. The sweeping mechanism according to claim 9, **characterized in that**, the movable support is driven by a driving component to move up and down away from or close to a horizontal plane where the fixed seat is located.

12. The sweeping mechanism according to claim 8, **characterized in that**, the fixed seat comprises a limiting body, a containing groove is formed in the limiting body, the movable support comprises a movable body for containing bristles, a driven member is arranged at a bottom of the movable body, and the driven member extends out of the containing groove and drives the movable body to move back and forth in the containing groove under an action of the driving component.

13. The sweeping mechanism according to claim 12, **characterized in that**, the driving component comprises a motor and a coupling member driven by the motor, and the coupling member is connected with the driven member in a matched manner.

14. The sweeping mechanism according to claim 13, **characterized in that**, the motor is a brushed direct current motor or a brushless direct current motor, and the coupling member is an eccentric shaft.

15. The sweeping mechanism according to claim 12, **characterized in that**, the movable body reciprocates in a length direction in the containing groove; a length of the movable body is smaller than that of the containing groove; the movable body comprises an upper portion for arranging bristles and a lower portion connected with the upper portion, and the driven member is arranged on the bottom surface of the lower portion; a longitudinal section of the movable body in a width direction of the movable body is in a convex shape; a width of the upper portion is smaller than that of the containing groove so that the upper portion can be contained in the containing groove, and a width of the lower portion is larger than that of the containing groove.

16. The sweeping mechanism according to claim 12, **characterized in that**, the movable body reciprocates in a width direction in the containing groove; a width of the movable body is smaller than that of the containing groove; the movable body comprises an upper portion for arranging bristles and a lower portion connected with the upper portion, and the driven member is arranged on a bottom surface of the lower portion; a longitudinal section of the movable body in a length direction of the movable body is in a convex shape; a length of the upper portion is smaller than that of the containing groove so that the upper portion can be contained in the containing groove, and a length of the lower portion is larger than that of the containing groove.

17. The sweeping mechanism according to claim 15 or 16, **characterized in that**, the fixed seat further comprises a bottom case, the limiting body is fixed inside the bottom case through a connecting piece so as to prevent the movable body from being separated from the limiting body, and an opening is formed in a bottom of the bottom case to extend out of the driven member.

18. The sweeping mechanism according to claim 8, **characterized in that**, the bristles are mainly formed by arranging pluralities of bristle bundles.

19. The sweeping mechanism according to claim 8, **characterized in that**, the movable support provided on each fixed seat comprises pluralities; and/or the bristles arranged on each movable support comprise pluralities of rows.

20. The sweeping mechanism according to claim 18, **characterized in that**, each of the pluralities of rows of the bristles extends out of a surface of the bottom of the shell to abut against ground.

21. The sweeping mechanism according to claim 20, **characterized in that**, an upper surface of each of the pluralities of rows of the bristles is in a same horizontal plane to be flush with the ground.

22. The sweeping mechanism according to claim 18, **characterized in that**, each of the pluralities of bristle bundles is driven to rotate 360 ° around a center of circle thereof.

23. The sweeping mechanism according to claim 1, **characterized in that**, the at least one sweeping brush which is independently arranged at the bottom of the shell and is separated from the air duct suction opening comprises one sweeping brush, and the one sweeping brush is arranged between a front end of the bottom of the shell and the air duct suction opening.

24. The sweeping mechanism according to claim 23, **characterized in that**, the one sweeping brush is provided with bristles which are integrally linear, wavy, or arc-shaped.

25. The sweeping mechanism according to claim 1, **characterized in that**, the at least one sweeping brush which is independently arranged at the bottom of the shell and is separated from the air duct suction opening comprises two sweeping brushes, and the two sweeping brushes are arranged on two sides of the air duct suction opening respectively or arranged between a front end of the bottom of the shell and the air duct suction opening.

26. The sweeping mechanism according to claim 25, **characterized in that**, the two sweeping brushes integrally form a straight line shape, a splayed shape or an inverted splayed shape.

27. The sweeping mechanism according to claim 26, **characterized in that**, each of the two sweeping brushes is provided with bristles which are integrally linear, wavy, or arc-shaped.

28. The sweeping mechanism according to claim 1, **characterized in that**, the at least one sweeping brush which is independently arranged at the bottom of the shell and is separated from the air duct suction opening comprises pluralities of sweeping brushes, and the pluralities of sweeping brushes are integrally arranged between a front end of the bottom of the shell and the air duct suction opening in a line shape.

29. The sweeping mechanism according to any one of claims 23-28, **characterized by** further comprising a side brush disposed on each of at least one corner of a front end of the bottom of the shell, the side brush being adapted to rotate when driven by a driving means.

30. The sweeping mechanism according to claim 29, **characterized in that**, a left corner and a right corner of the front end of the bottom of the shell each is provided with the side brush.

31. The sweeping mechanism according to claim 29, **characterized in that**, each side brush is a multi-blade type rotary side brush.

32. The sweeping mechanism according to claim 31, **characterized in that**, each side brush is a three-blade type rotary side brush.

33. The sweeping mechanism according to claim 29, **characterized in that**, each side brush is set so that bristles thereof do not interfere with each of the at least one sweeping brush during rotation.

34. The sweeping mechanism according to claim 1, **characterized by** further comprising at least one groove formed in a surface of the bottom of the shell, each of the at least one groove communicating with the air duct suction opening to form a dust guide air duct for guiding dust into the air duct suction opening.

35. The sweeping mechanism according to claim 34, **characterized in that**, one end of each of the at least one groove is connected with the air duct suction opening, and an other end of each of the at least one groove is in smooth transition connection with an edge of the bottom of the shell.

36. The sweeping mechanism according to claim 34 or 35, **characterized in that**, the at least one groove formed in the surface of the bottom of the shell comprises pluralities of grooves, and the pluralities of grooves satisfy: the pluralities of grooves are formed in a front end of a surface of the bottom of the shell in parallel; or, the pluralities of grooves are formed in two sides of the air duct suction opening in parallel.

37. The sweeping mechanism according to claim 36, **characterized in that**, the at least one sweeping brush comprises pluralities of sweeping brushes, the pluralities of sweeping brushes being disposed to mate with the pluralities of grooves to facilitate guiding raised dust through the pluralities of grooves into the air duct suction opening.

38. The sweeping mechanism according to claim 37, **characterized in that**, the pluralities of sweeping brushes and the pluralities of grooves are disposed alternately.

39. The sweeping mechanism according to claim 37, **characterized in that**, the pluralities of sweeping brushes is disposed parallel to the pluralities of grooves.

40. The sweeping mechanism according to claim 34 or 35, **characterized in that**, the at least one sweeping brush is disposed to mate with the at least one groove to facilitate guiding raised dust into the air duct suction opening through the at least one groove.

41. The sweeping mechanism according to claim 40, **characterized in that**, the at least one grooves formed in the surface of the bottom of the shell comprise a first groove and a second groove which are formed in two sides of the air duct suction opening respectively, and the at least one sweeping brush arranged at the bottom of the shell comprises a first sweeping brush and a second sweeping brush which are arranged in front of the first groove and the second groove respectively.

42. The sweeping mechanism according to claim 41, **characterized in that**, the first sweeping brush is disposed parallel to the first groove and the second sweeping brush is disposed parallel to the second

groove.

43. The sweeping mechanism according to claim 41, **characterized in that**, the first groove and the second groove each comprises pluralities of sub-grooves arranged in parallel, the first sweeping brush and the second sweeping brush each comprises pluralities of sweeping sub-brushes arranged in parallel, and the pluralities of sub-grooves and the pluralities of sweeping sub-brushes are arranged alternately.

44. The sweeping mechanism according to claim 41, **characterized in that**, the first groove and the second groove are integrally formed in a straight line shape, a splayed shape or an inverted splayed shape.

45. The sweeping mechanism according to claim 40, **characterized in that**, the at least one groove is disposed between a front end of the surface of the bottom of the shell and the air duct suction opening, and the at least one sweeping brush and the at least one groove are arranged in parallel.

46. The sweeping mechanism according to claim 45, **characterized in that**, the at least one groove comprises at least two grooves, the at least two grooves are arranged between the front end of the surface of the bottom of the shell and the air duct suction opening in parallel, and the at least one sweeping brush and the at least two grooves are arranged alternately.

47. The sweeping mechanism according to claim 1, **characterized in that**, the air duct suction opening is shaped as a circle, an ellipse, a triangle, a quadrilateral, an irregular polygon, or an approximate ellipse with a rectangular middle part and semicircular sides.

48. The sweeping mechanism according to claim 34 or 35, **characterized in that**, the air duct suction opening is shaped as a polygon, and one end of each of the at least one groove is correspondingly connected with one edge of the air duct suction opening.

49. The sweeping mechanism according to claim 48, **characterized in that**, the at least one groove formed in the surface of the bottom of the shell comprises two or more grooves, the shape of the air duct suction opening is matched with that of the two or more grooves, and one end of each of the two or more grooves is correspondingly connected with one edge of the air duct suction opening.

50. The sweeping mechanism according to claim 49, **characterized in that**, the air duct suction opening is rectangular, the at least one groove formed in the surface of the bottom of the shell comprises a first groove and a second groove, and one end of the first groove and one end of the second groove are connected with a left short edge and a right short edge of the air duct suction opening respectively.

51. The sweeping mechanism according to claim 50, **characterized in that**, a width of the one end of the first groove and a width of the one end of the second groove are equal to a length of the left short edge and a length of the right short edge of the air duct suction opening.

52. The sweeping mechanism according to claim 50, **characterized in that**, the at least one groove formed in the surface of the bottom of the shell further comprises a third groove, a front end of the third groove is in smooth transition connection with an edge of a front end of the bottom of the shell, and a rear end of the third groove is connected with a front edge of the air duct suction opening.

53. The sweeping mechanism according to claim 52, **characterized in that**, a width of the rear end of the third groove is less than or equal to a length of the front edge of the air duct suction opening.

54. The sweeping mechanism according to claim 35, **characterized in that**, a depth of each of the at least one groove is gradually increased from one end away from the air duct suction opening to the other end connected with the air duct suction opening.

55. The sweeping mechanism according to claim 1, **characterized in that**, the air duct suction opening is formed in a central axis of the bottom of the shell, and a distance between the air duct suction opening and a front end of the bottom of the shell is smaller than a distance between the air duct suction opening and a rear end of the bottom of the shell.

56. The sweeping mechanism according to claim 1, **characterized in that**, an inclined guide surface is arranged at a front end of the bottom of the shell, and an included angle theta between the inclined guide surface and a horizontal plane is more than 0 degree and less than 45 degrees.

57. The sweeping mechanism according to claim 56, **characterized in that**, the included angle theta between the inclined guide surface and the horizontal plane is more than 5 degrees and less than 45 degrees.

58. The sweeping mechanism according to claim 57, **characterized in that**, the included angle theta between the inclined guide surface and the horizontal

plane is more than 10 degrees and less than 20 degrees.

59. The sweeping mechanism according to claim 56, **characterized in that**, a front or rear edge of the air duct suction opening abuts a rear end of the inclined guide surface.

60. The sweeping mechanism according to claim 56, **characterized in that**, each of the at least one sweeping brush is disposed on the inclined guide surface.

61. The sweeping mechanism according to claim 59, **characterized in that**, the at least one sweeping brush arranged on the inclined guide surface comprise a first sweeping brush and a second sweeping brush, and the first sweeping brush and the second sweeping brush are arranged at the front ends of two sides of the air duct suction opening respectively.

62. The sweeping mechanism according to claim 61, **characterized in that**, the inclined guide surface is further provided with at least one groove, and each of the least one groove is communicated with the air duct suction opening to form a dust guide air duct for guiding dust into the air duct suction opening.

63. The sweeping mechanism according to claim 62, **characterized in that**, the at least one groove formed in the surface of the bottom of the shell comprises a first groove and a second groove, the first groove and the second groove are formed in two sides of the air duct suction opening respectively, and front edges or rear edges of the first groove and the second groove abut the rear end of the inclined guide surface.

64. The sweeping mechanism according to claim 62, **characterized in that**, the at least one groove further comprises a third groove, a front end of the third groove is in smooth transition connection with the front end of the bottom of the shell, and a rear end of the third groove is connected with the air duct suction opening; the first sweeping brush and the second sweeping brush are located in front of the first groove and the second groove respectively and arranged on two sides of the third groove.

65. The sweeping mechanism according to claim 64, **characterized in that**, the inclined guide surface comprises a first inclined guide surface and a second inclined guide surface which are connected in a front-to-back transition manner, and an included angle between the first inclined guide surface and a horizontal plane is larger than an included angle between the second inclined guide surface and the horizontal plane.

66. The sweeping mechanism according to claim 65, **characterized in that**, the third groove is formed in the second inclined guide surface, the front end of the third groove is in smooth transition connection with a rear end of the first inclined guide surface, and the rear end of the third groove is connected with the air duct suction opening.

67. A sweeping mechanism according to any one of claims 56-64, **characterized in that**, the inclined guide surface is a curved surface, and the angle theta between the inclined guide surface and the horizontal plane gradually decreases from the front end to the rear end of the inclined guide surface.

68. The sweeping mechanism according to claim 64, **characterized in that**, the first sweeping brush is disposed parallel to the first groove and the second sweeping brush is disposed parallel to the second groove.

69. The sweeping mechanism according to claim 61, **characterized in that**, each of the first sweeping brush and the second sweeping brush moves back and forth in a direction of an axis thereof.

70. The sweeping mechanism according to claim 61, **characterized in that**, each of the first sweeping brush and the second sweeping brush moves back and forth in a direction perpendicular to an axis thereof.

71. The sweeping mechanism according to claim 68 or 69, **characterized in that**, each of the first sweeping brush and the second sweeping brush swings back and forth around an axis thereof, and a swing range of each of the first sweeping brush and the second sweeping brush swinging back and forth around the axis thereof is 120 degrees.

72. The sweeping mechanism according to claim 68 or 69, **characterized in that**, each of the first sweeping brush and the second sweeping brush rotates 360 degrees around an axis thereof.

73. The sweeping mechanism according to claim 61, **characterized in that**, each of the first sweeping brush and the second sweeping brush comprises at least one row of bristles, each of the least one row of bristles comprising pluralities of bristle bundles.

74. The sweeping mechanism according to claim 73, **characterized in that**, each of the least one row of bristles extends out of a surface of the bottom of the shell abut against ground.

75. The sweeping mechanism according to claim 74, **characterized in that**, an upper surface of each of

the least one row of bristles is in a same horizontal plane to be flush with the ground.

76. The sweeping mechanism according to claim 34 or 35, **characterized in that**, each of the at least one groove is integrally formed with the air duct suction opening.

77. The sweeping mechanism according to claim 1 or 2, **characterized by** further comprising a baffle arranged on a rear edge of the air duct suction opening.

78. The sweeping mechanism according to claim 34 or 35, **characterized by** further comprising baffles, the baffles comprise a middle baffle arranged on a rear edge of the air duct suction opening, and a left baffle and a right baffle which are connected to a left side and a right side of the middle baffle respectively, and the left baffle and the right baffle are arranged on rear edges the two grooves respectively.

79. The sweeping mechanism according to claim 1 or 2, **characterized in that**, the bottom of the shell is in a disc-like shape with a front end edge being a straight line section.

80. The sweeping mechanism according to claim 1 or 2, **characterized by** further comprising a dust collection box and a draught fan which are arranged inside the shell, and the air duct suction opening, the dust collection box and the draught fan are sequentially communicated.

81. The sweeping mechanism according to claim 80, **characterized in that**, the draught fan comprises a first draught fan and a second draught fan, and the first draught fan and the second draught fan communicate with the dust collection box through an air suction guide component; the air suction guide component comprises a first air suction channel and a second air suction channel which are independent of each other, the first draught fan is communicated with the first air suction channel, and the second draught fan is communicated with the second air suction channel.

82. A sweeping robot, **characterized by** comprising the sweeping mechanism according to any one of claims 1-81.

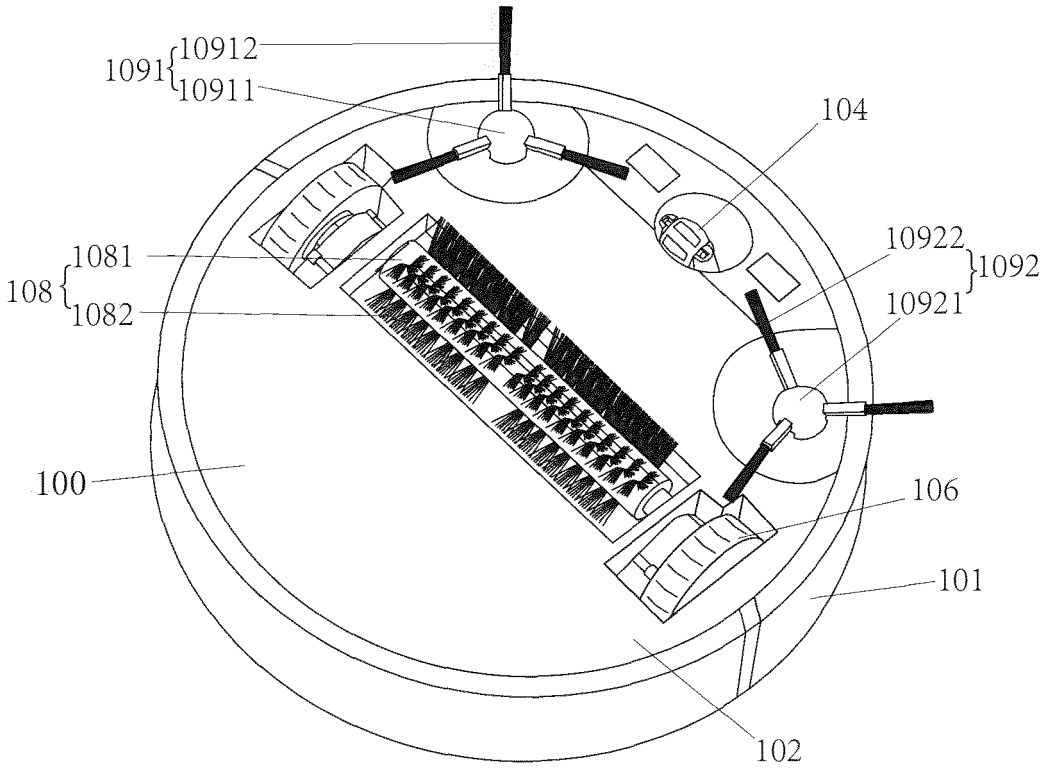

FIG.1 (Prior Art)

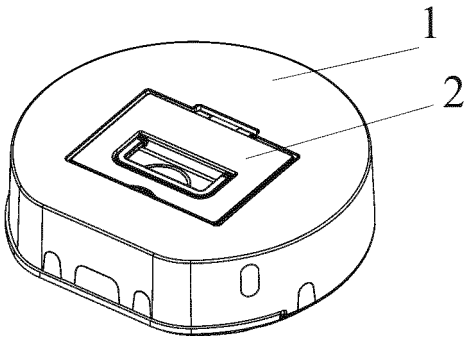

FIG.2A

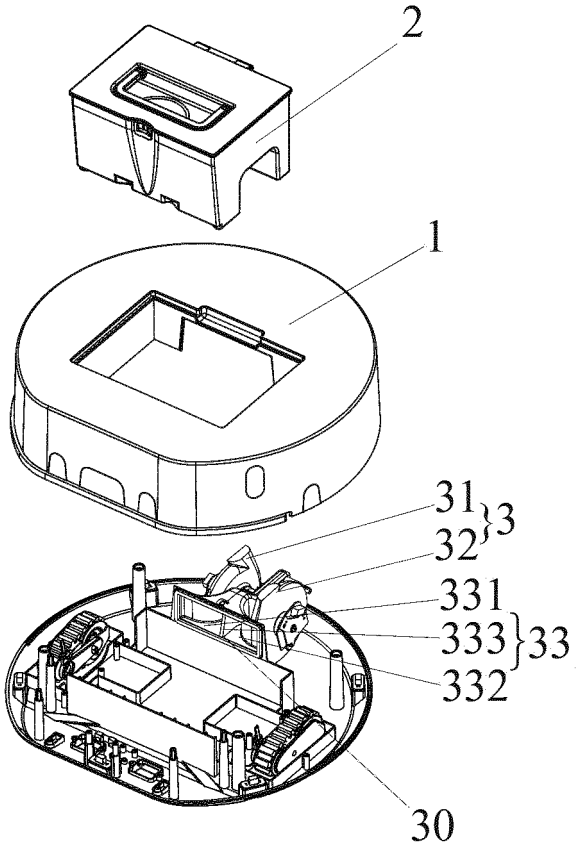

FIG.2B

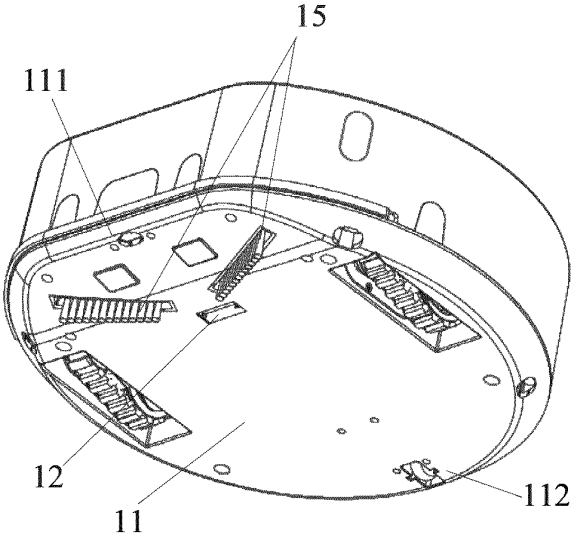

FIG.2C

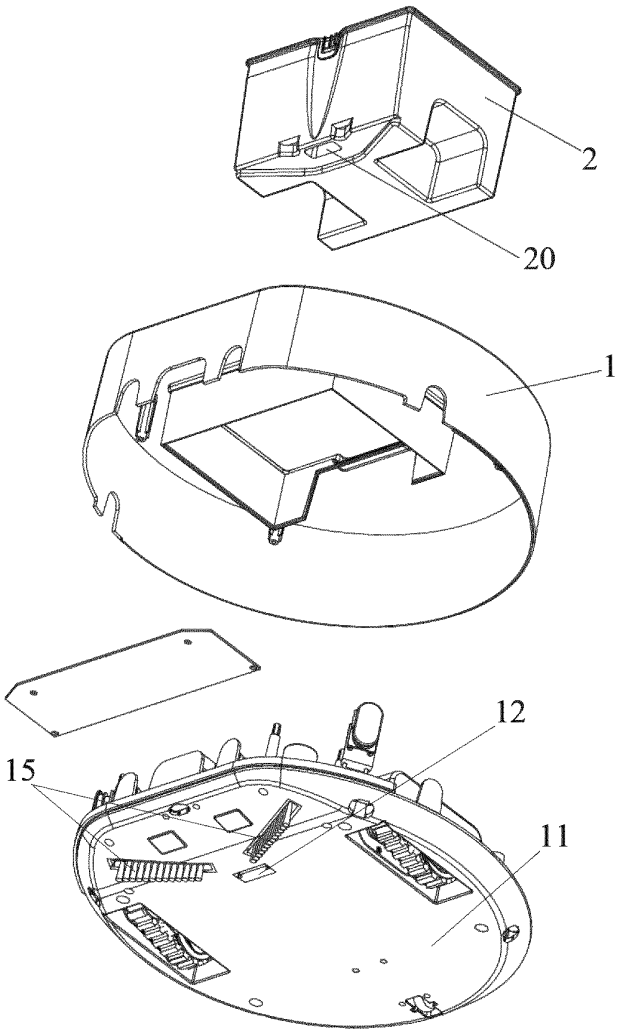

FIG.2D

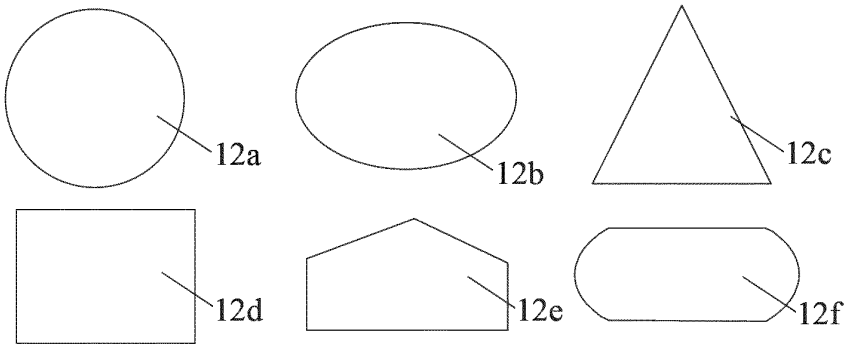

FIG.2E

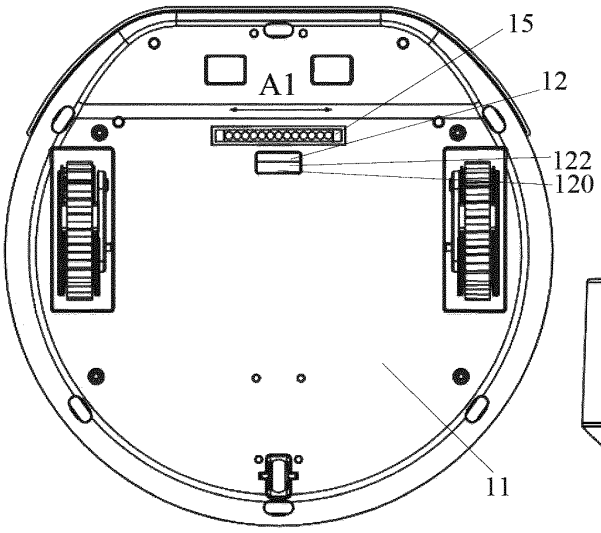

FIG.3A

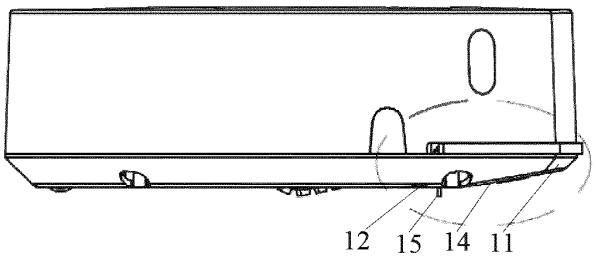

FIG.3B

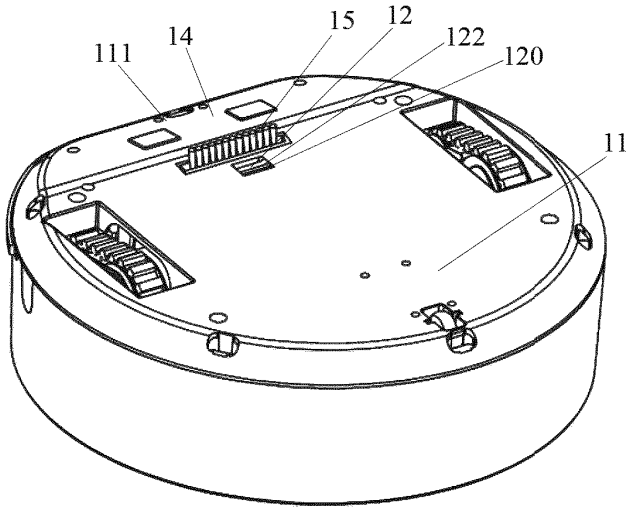

FIG.3C

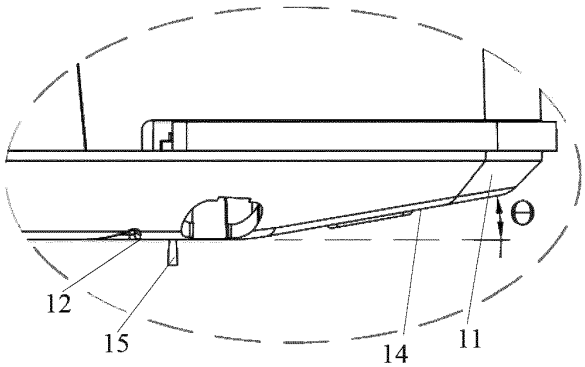

FIG.3D

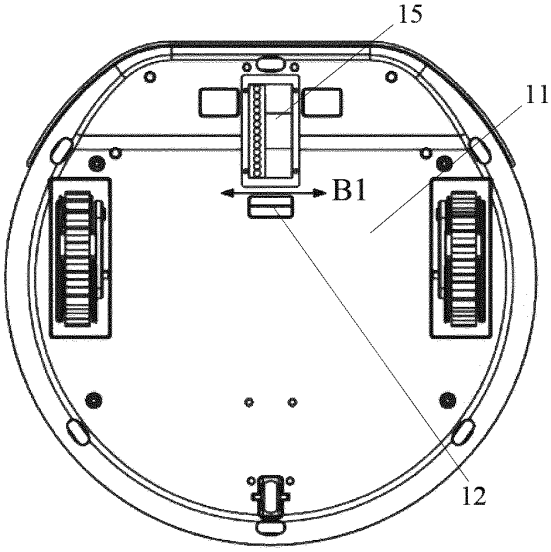

FIG.3E

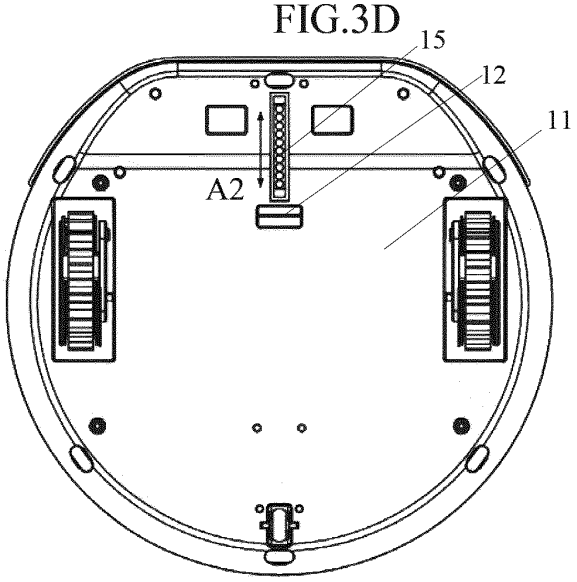

FIG.3F

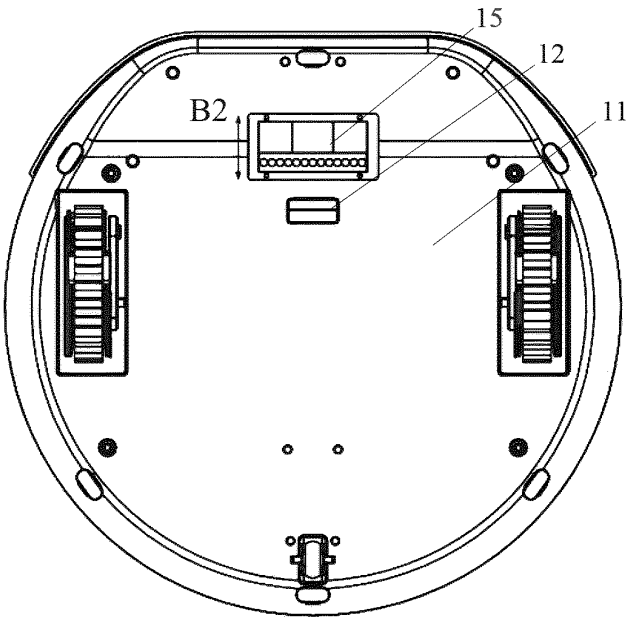

FIG.3G

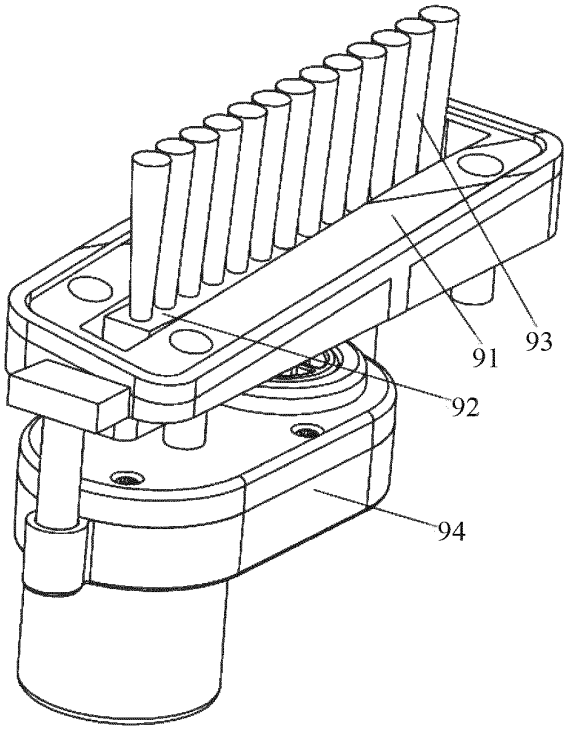

FIG.4A

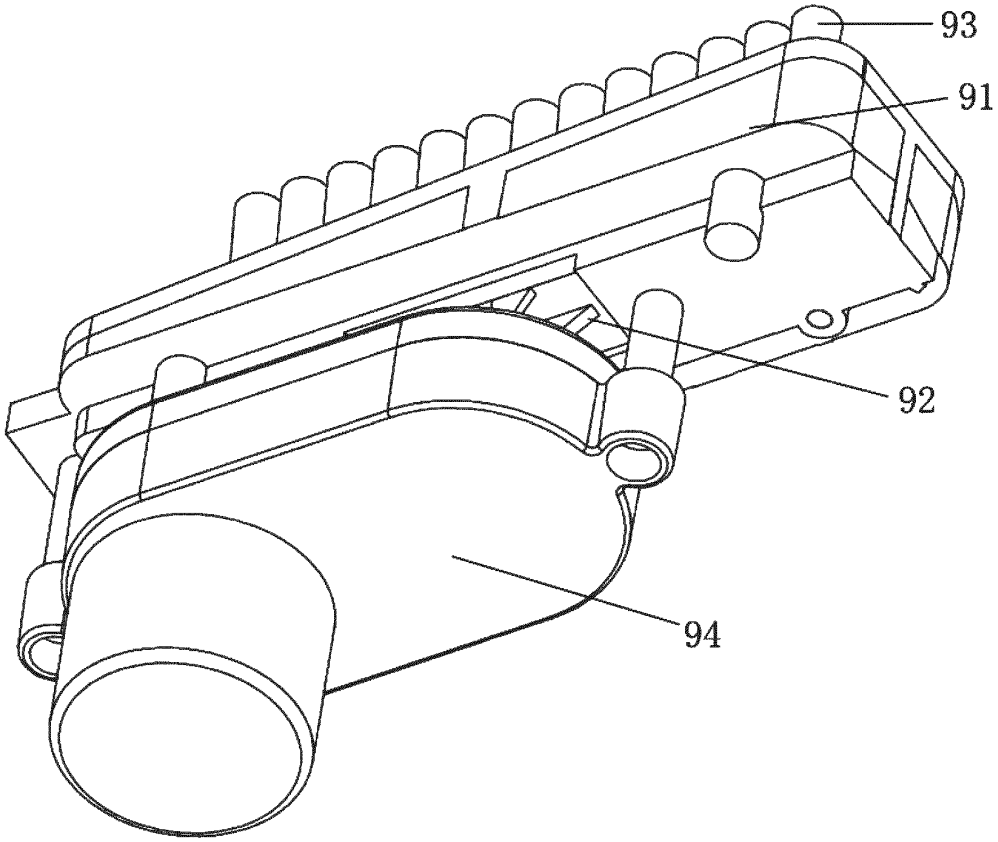

FIG.4B

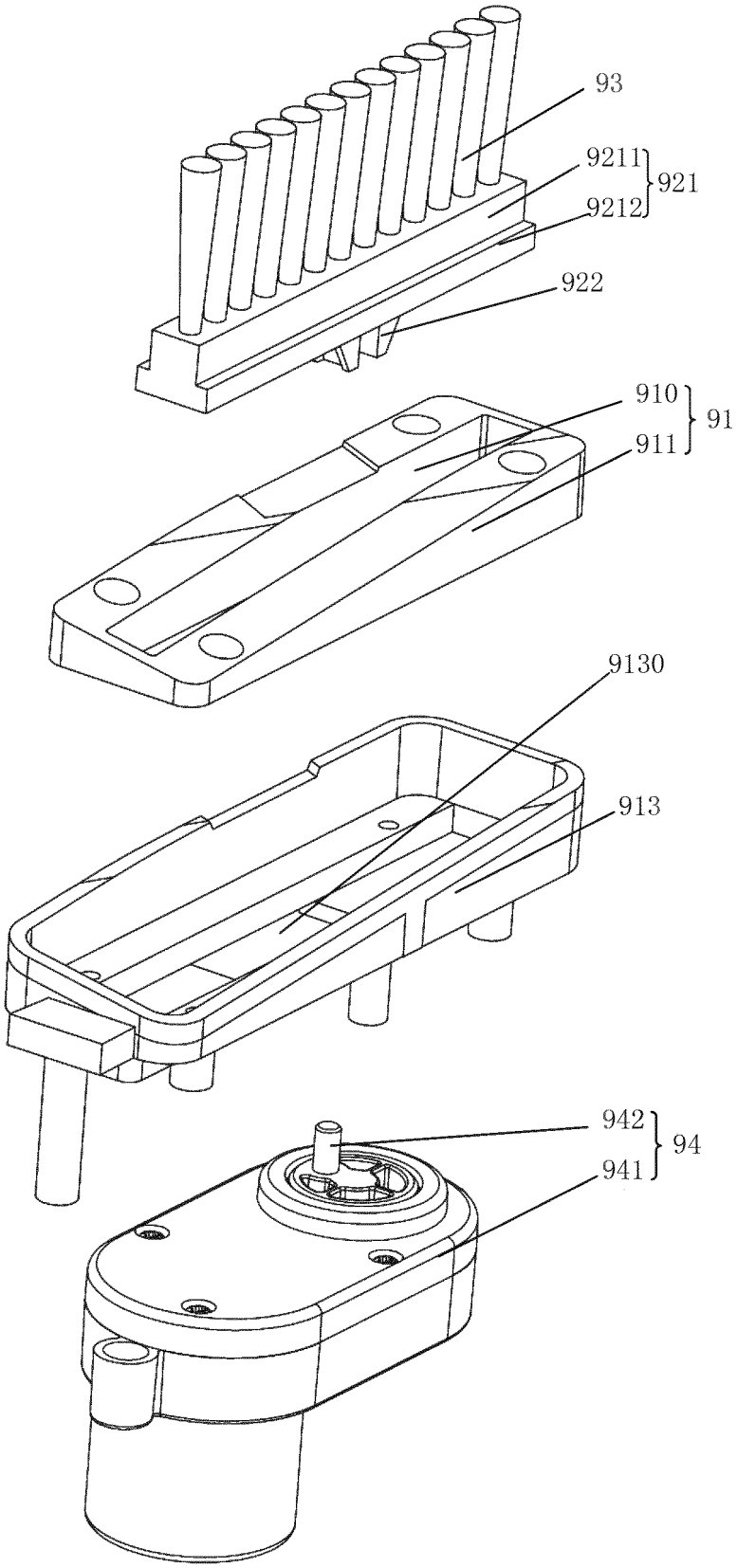

FIG.4C

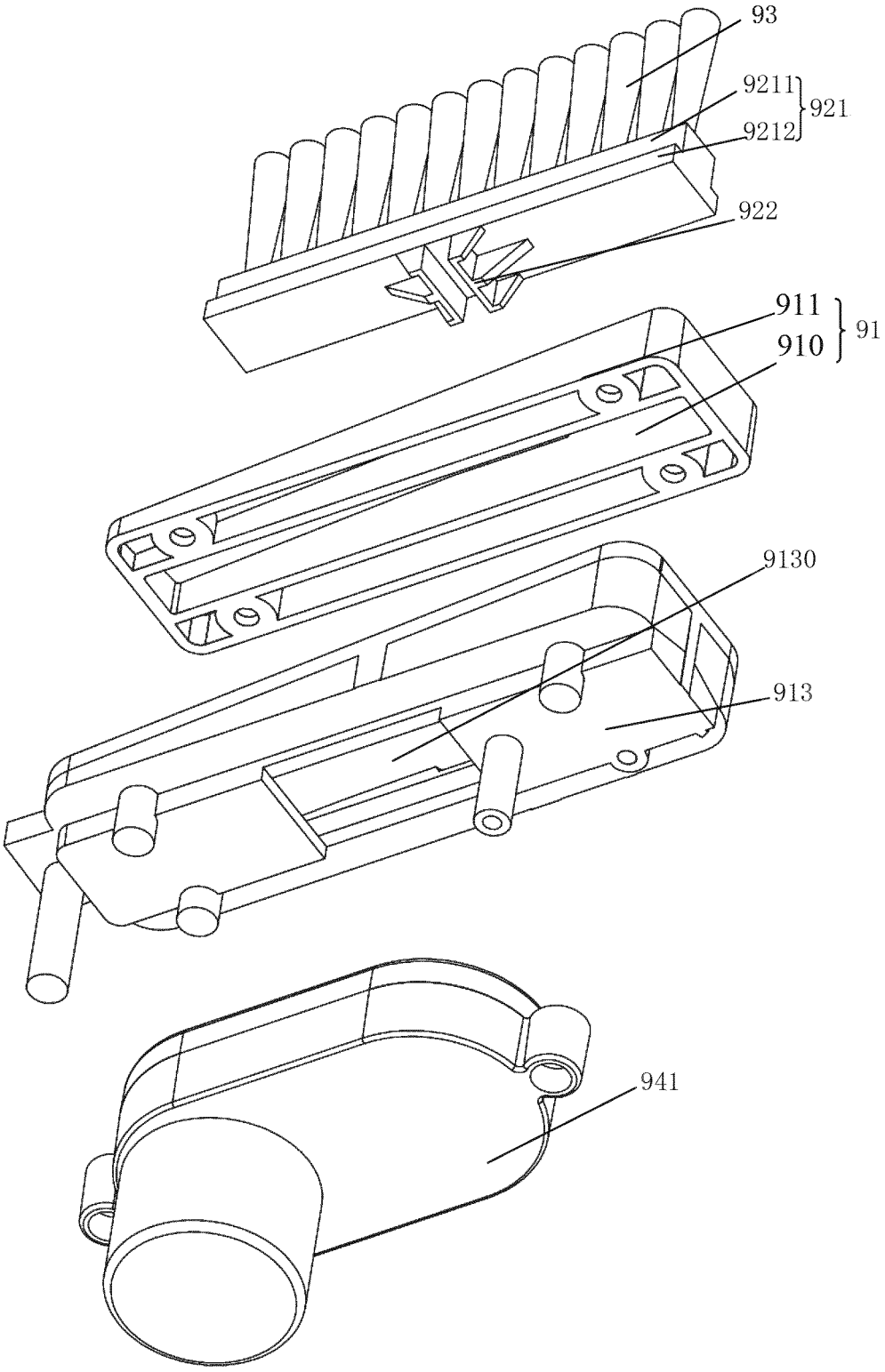

FIG.4D

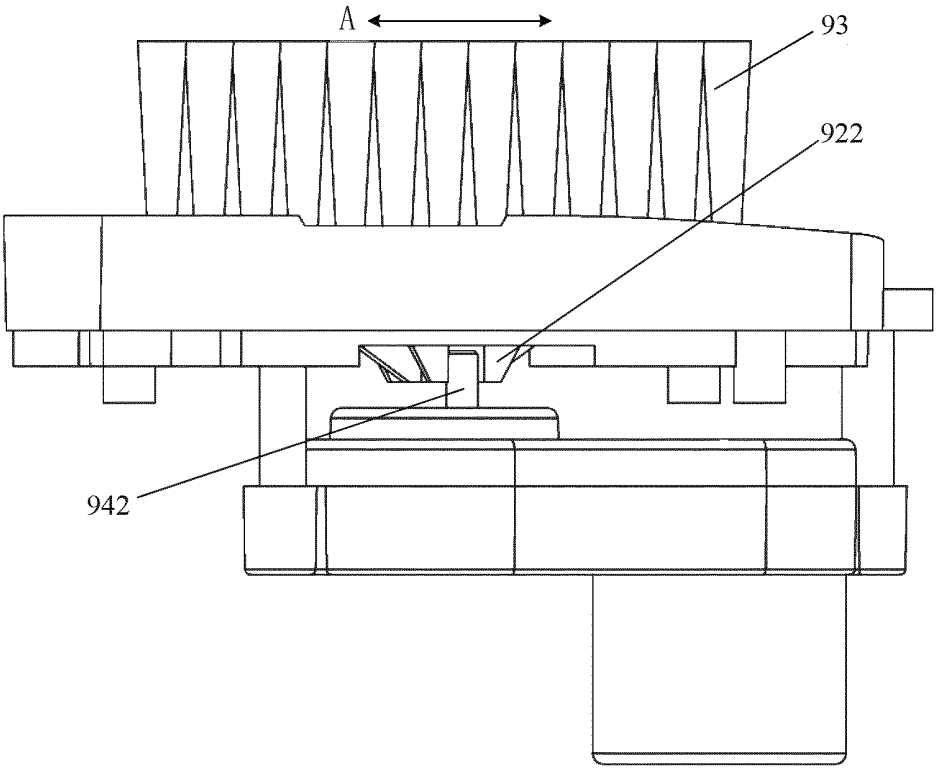

FIG.4E

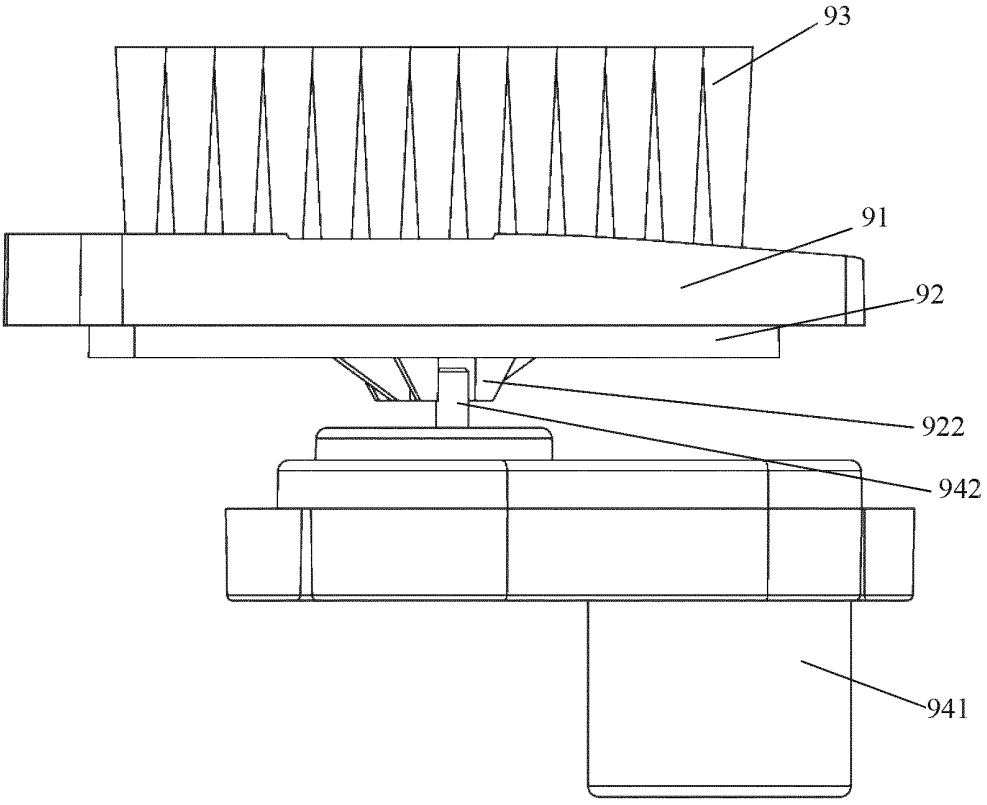

FIG.4F

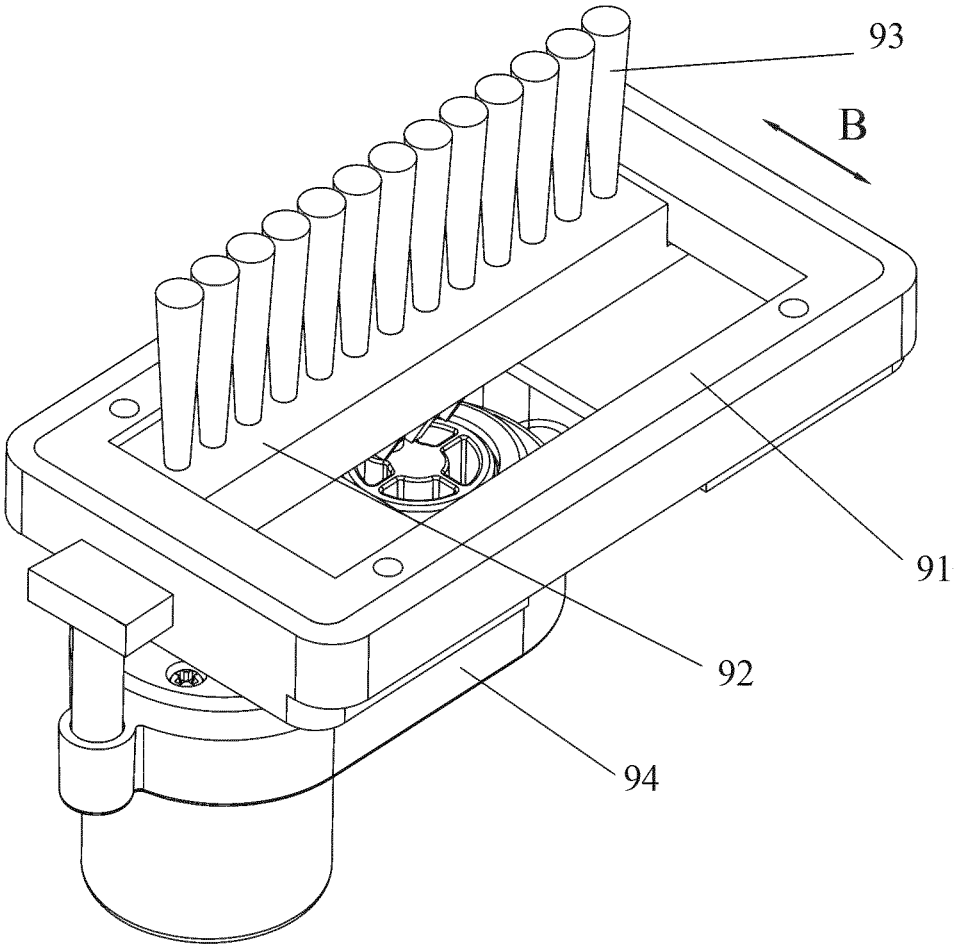

FIG.5A

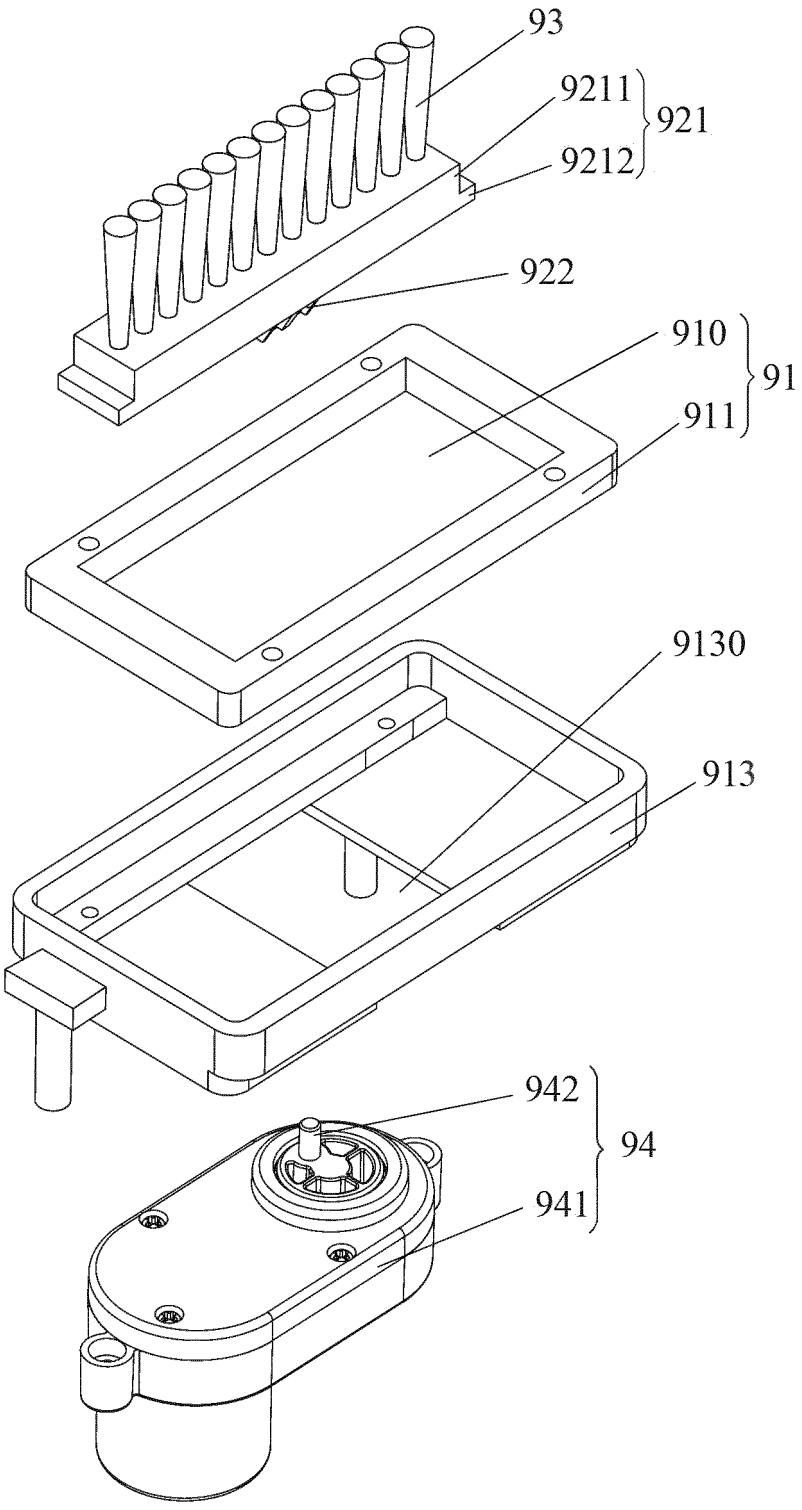

FIG.5B

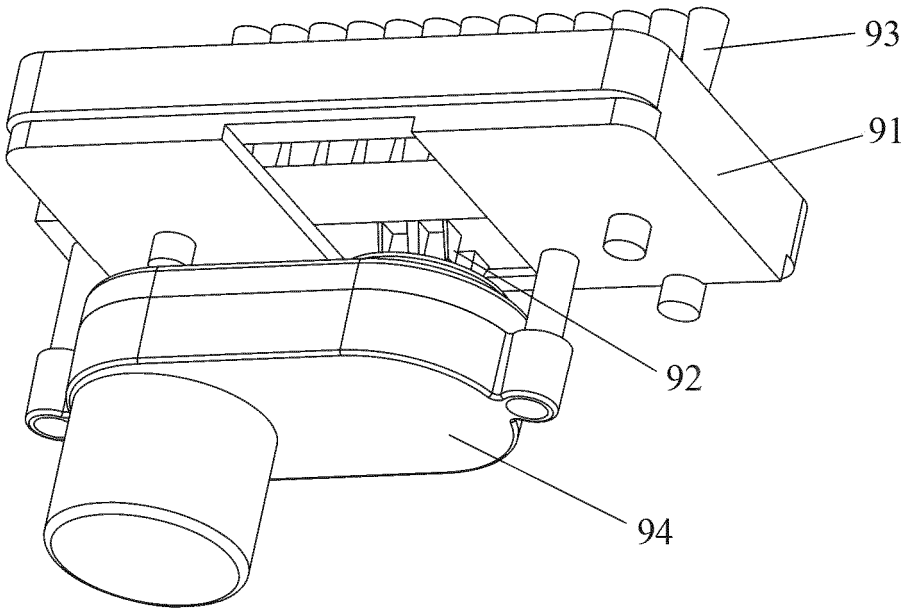

FIG.5C

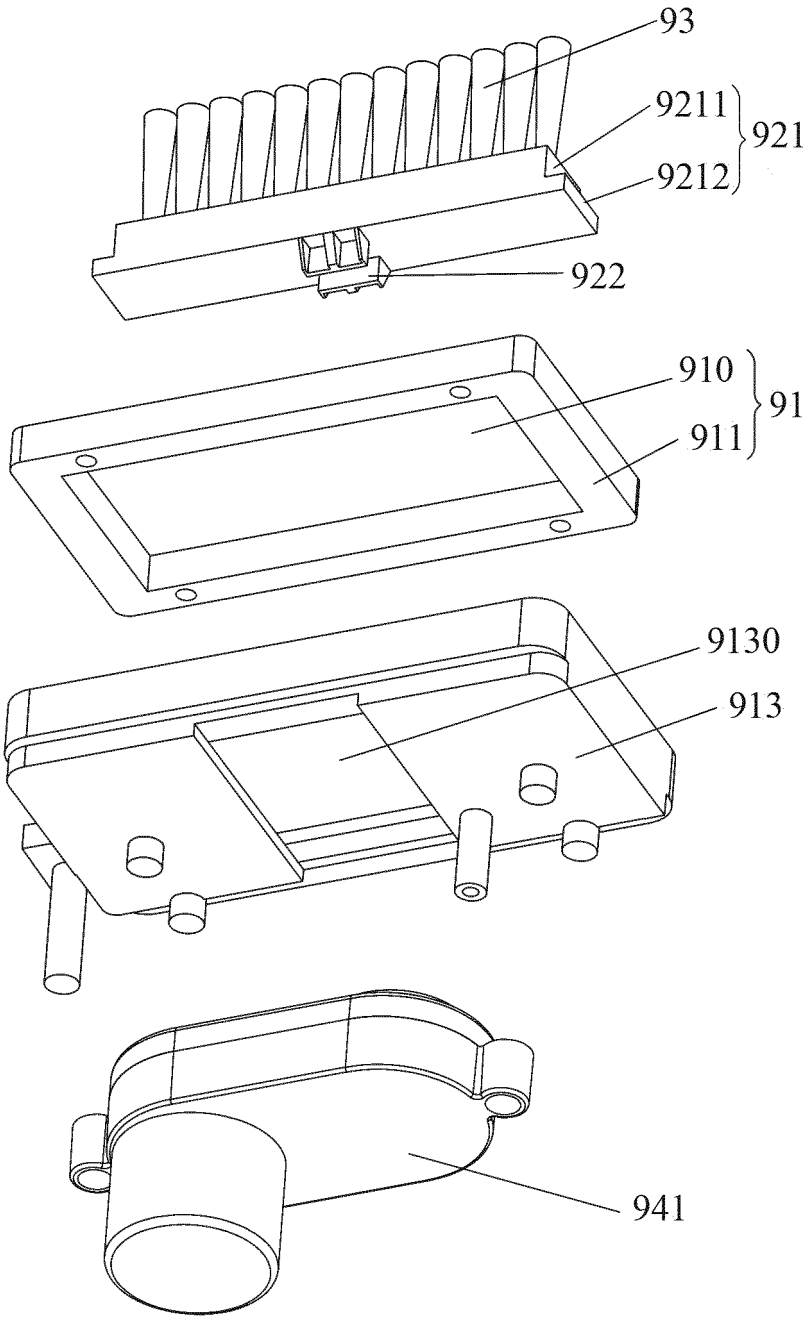

FIG.5D

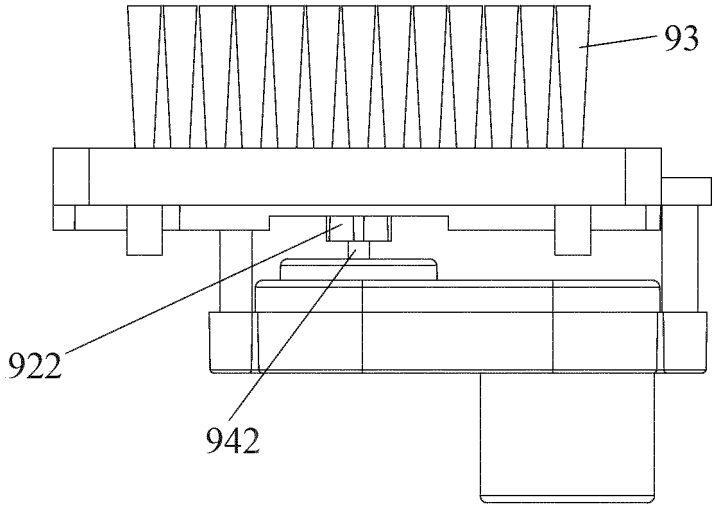

FIG.5E

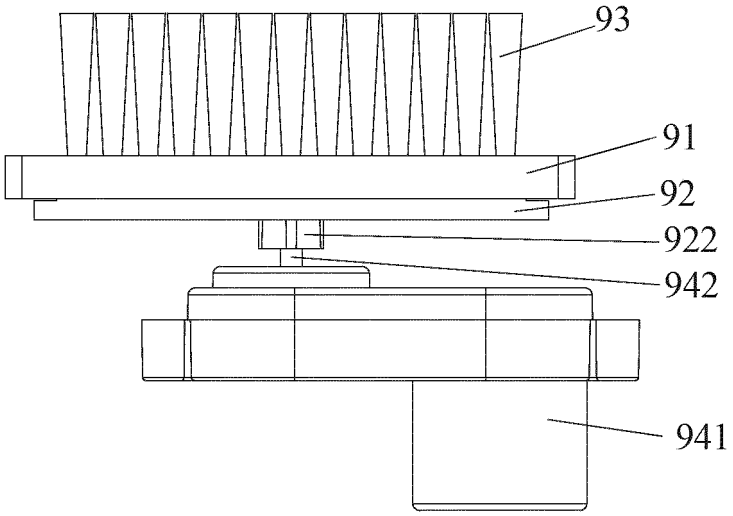

FIG.5F

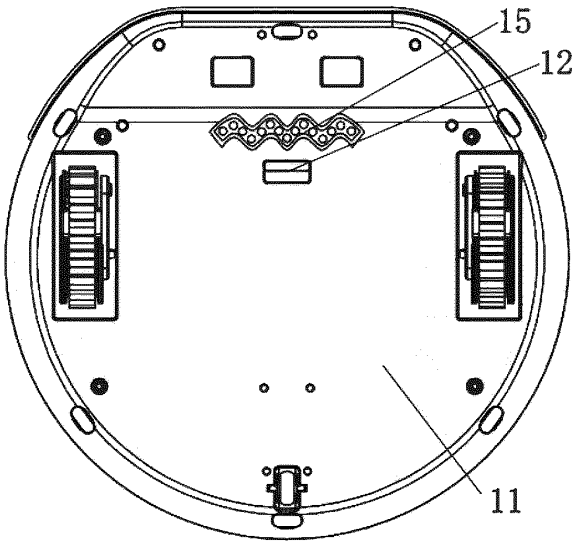

FIG.6A

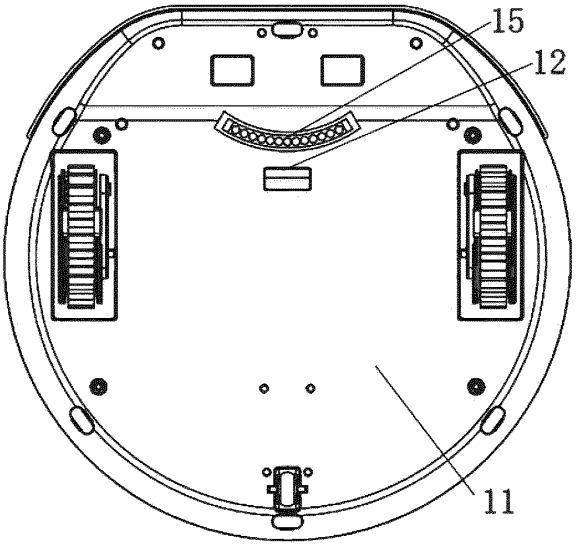

FIG.6B

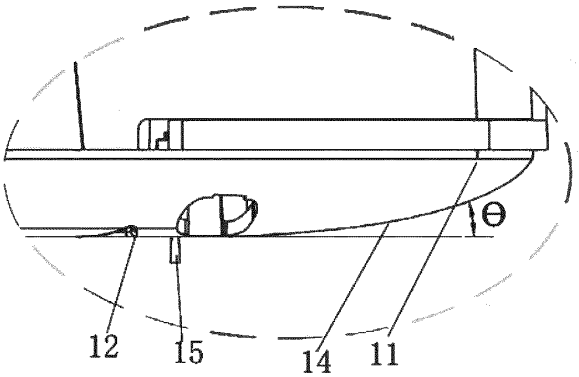

FIG.7A

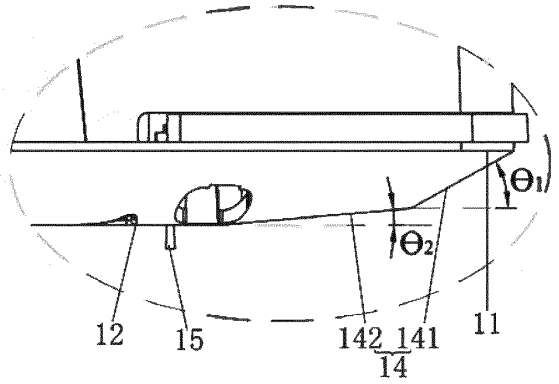

FIG.7B

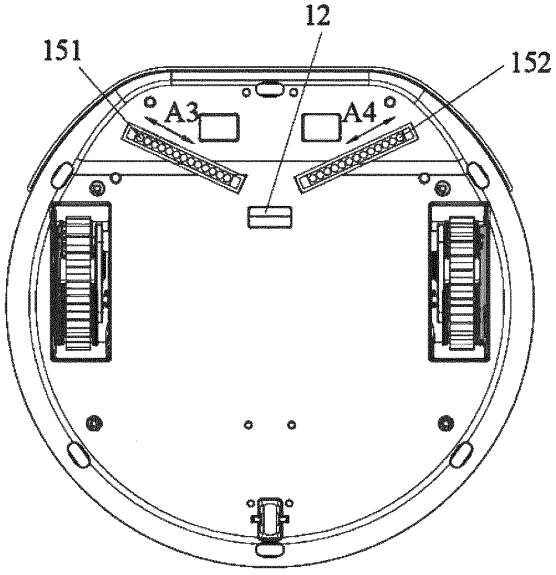

FIG.8A

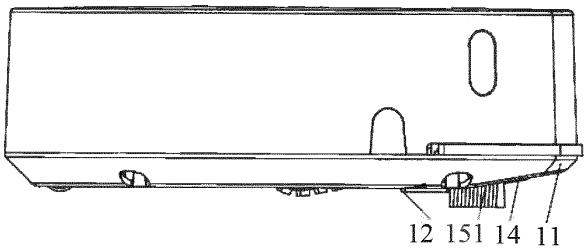

FIG.8B

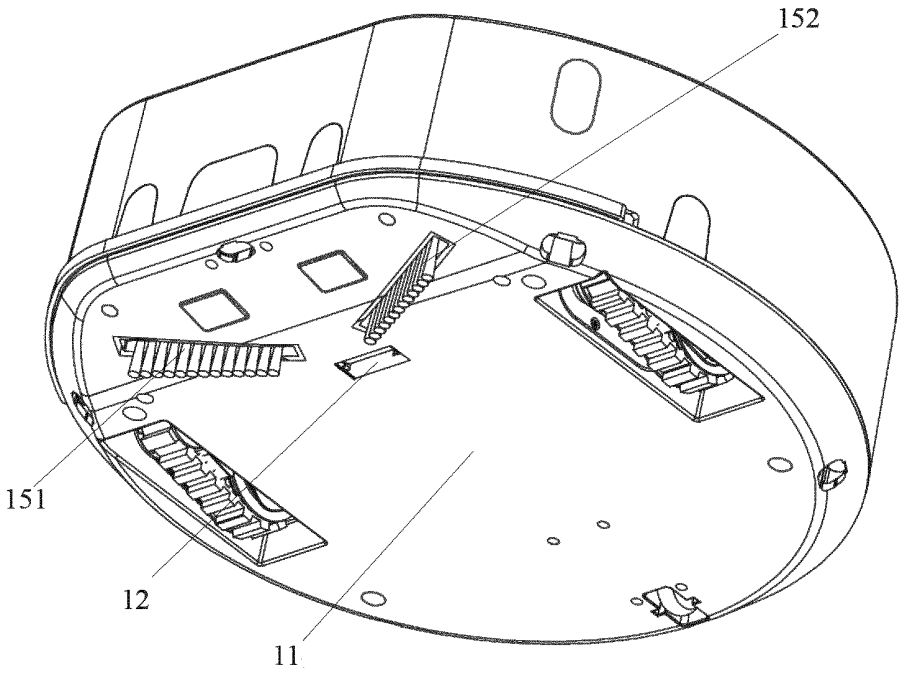

FIG.8C

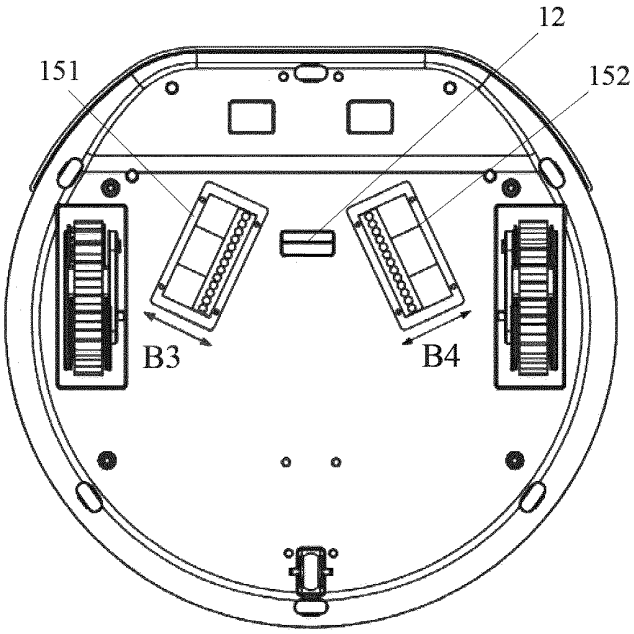

FIG.8D

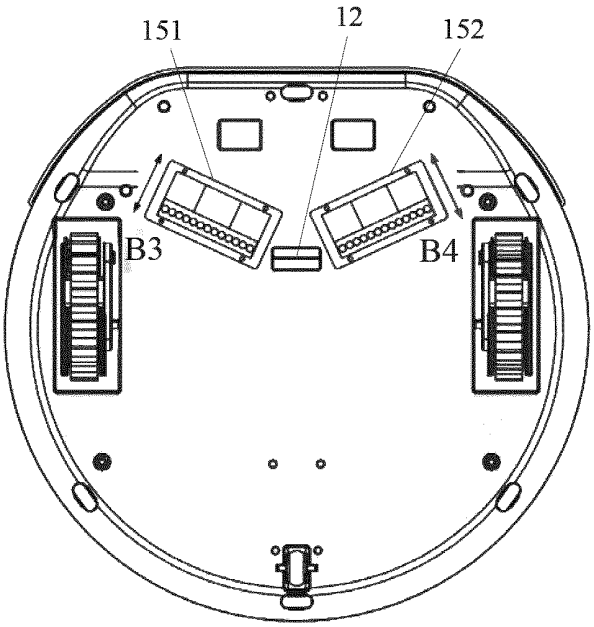

FIG.8E

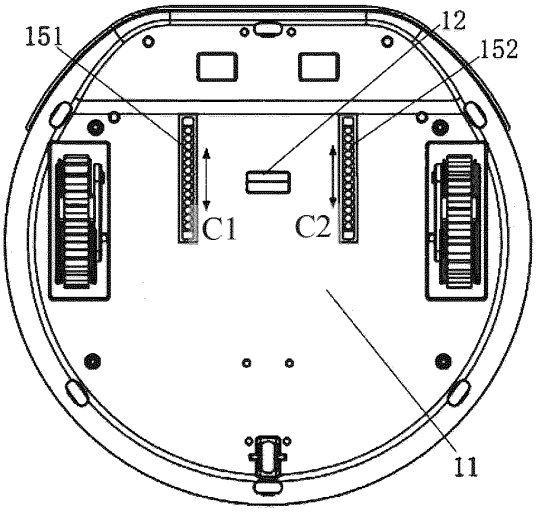

FIG.9A

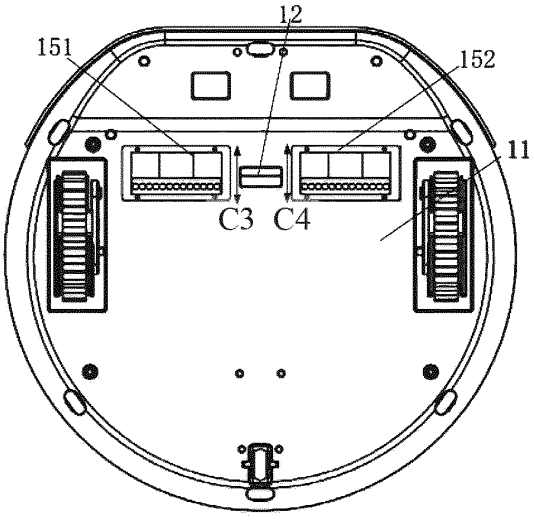

FIG.9B

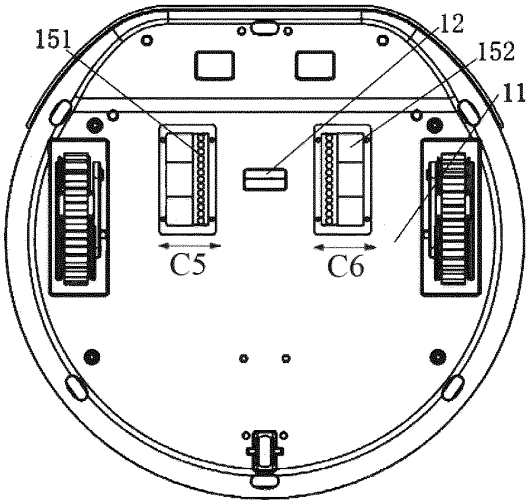

FIG.9C

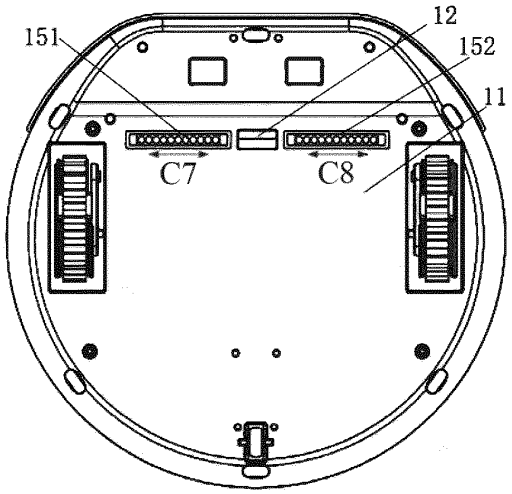

FIG.9D

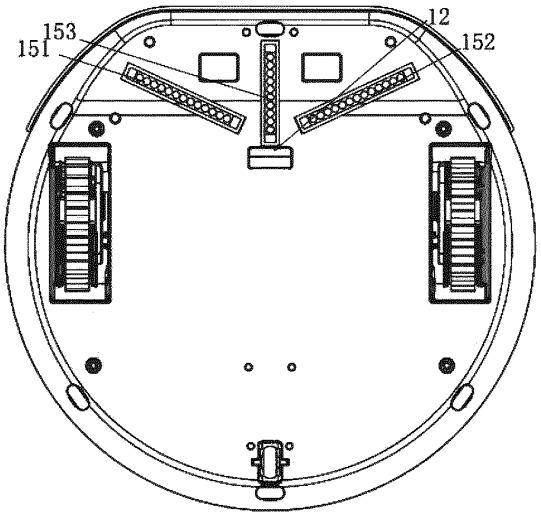

FIG.10A

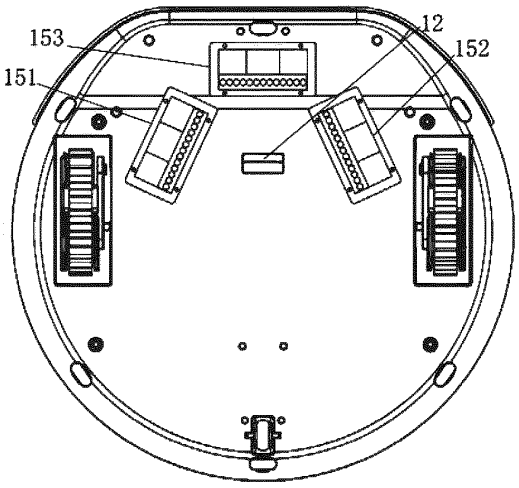

FIG.10B

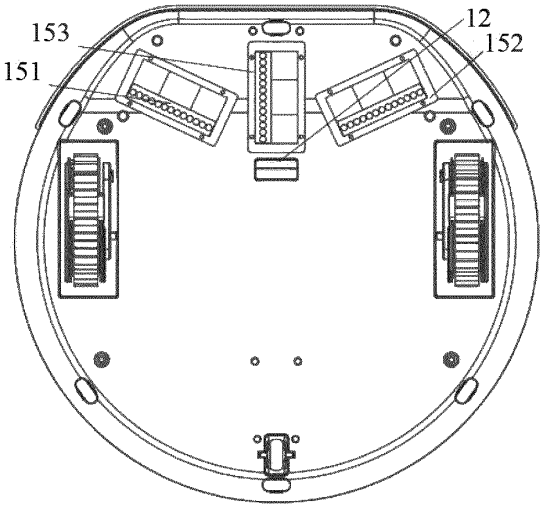

FIG.10C

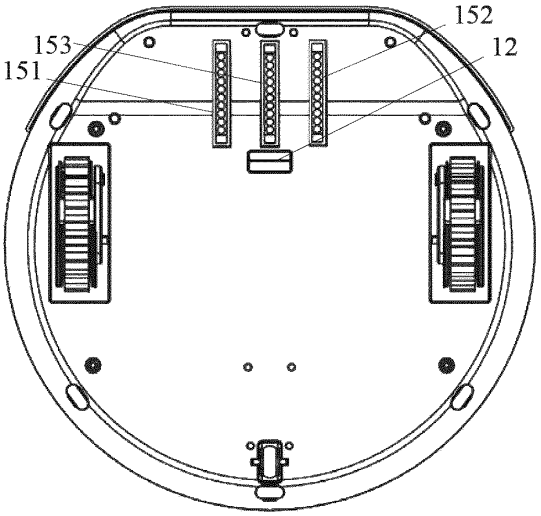

FIG.11A

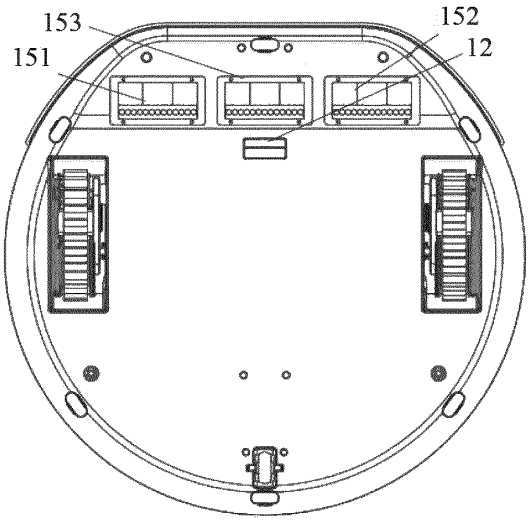

FIG.11B

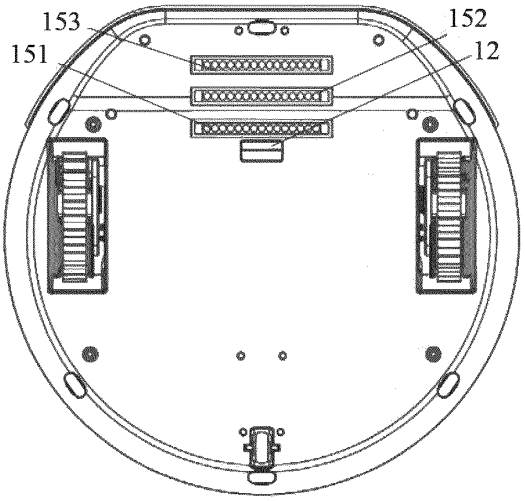

FIG.11C

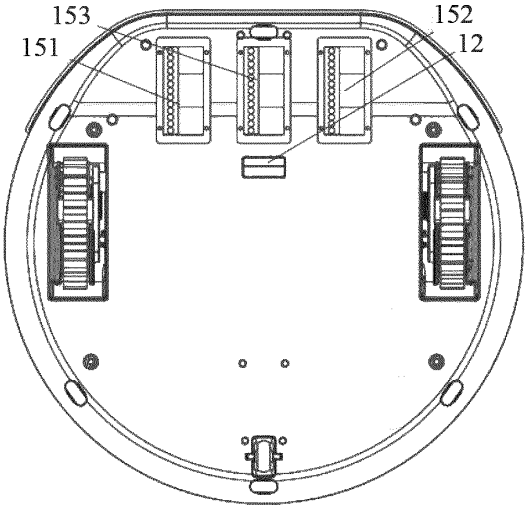

FIG.11D

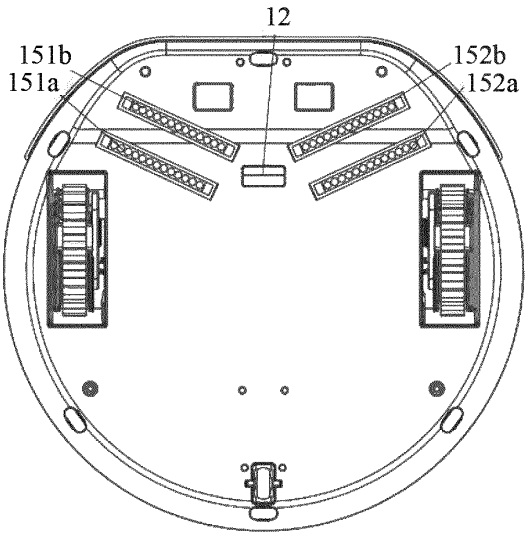

FIG.12A

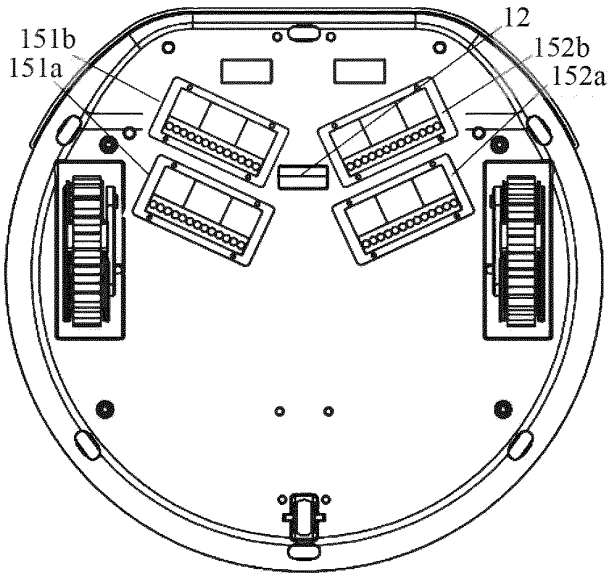

FIG.12B

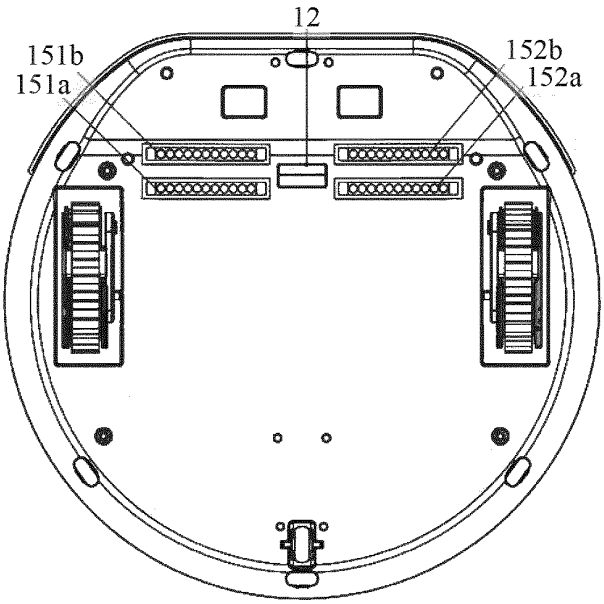

FIG.13A

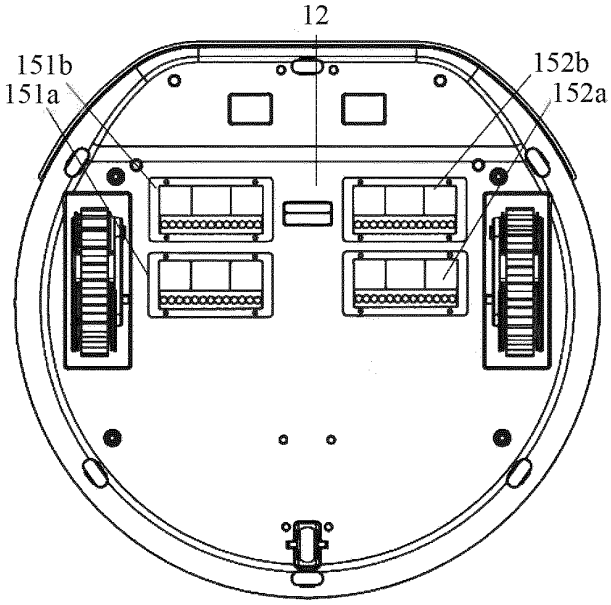

FIG.13B

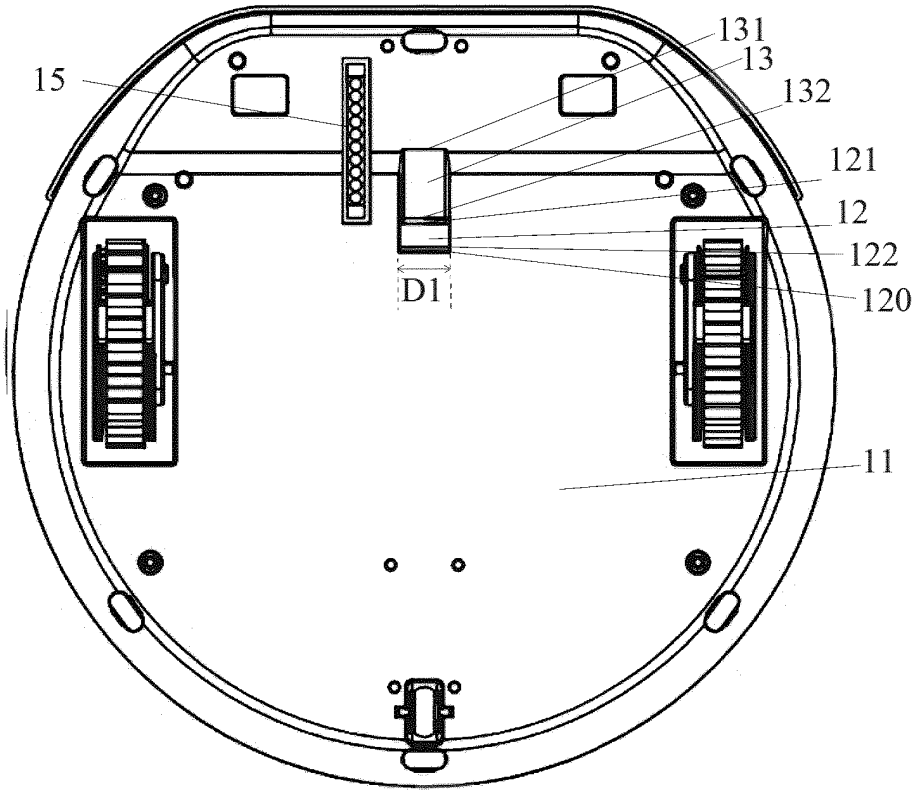

FIG.14

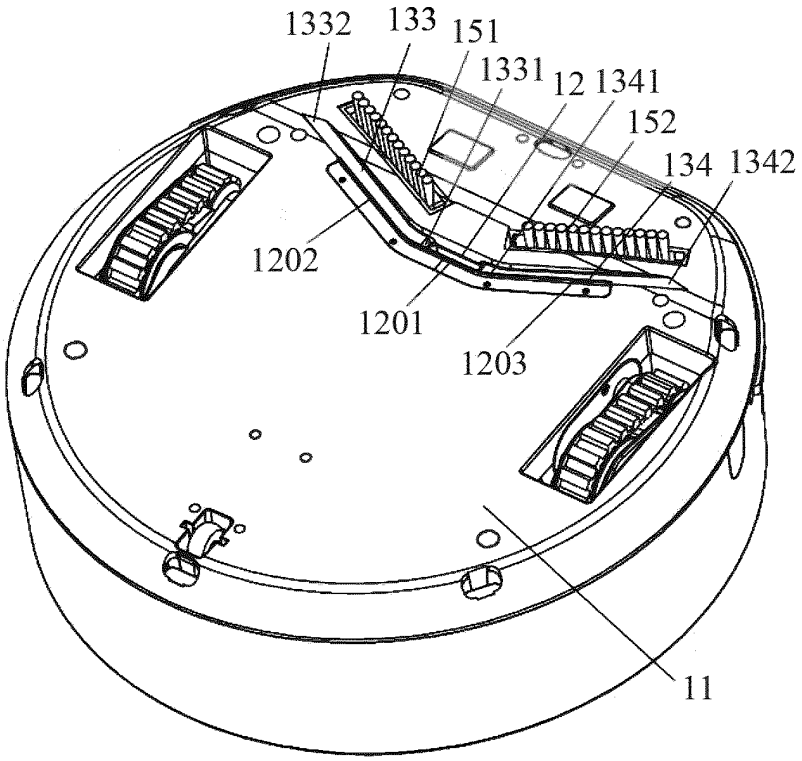

FIG.15A

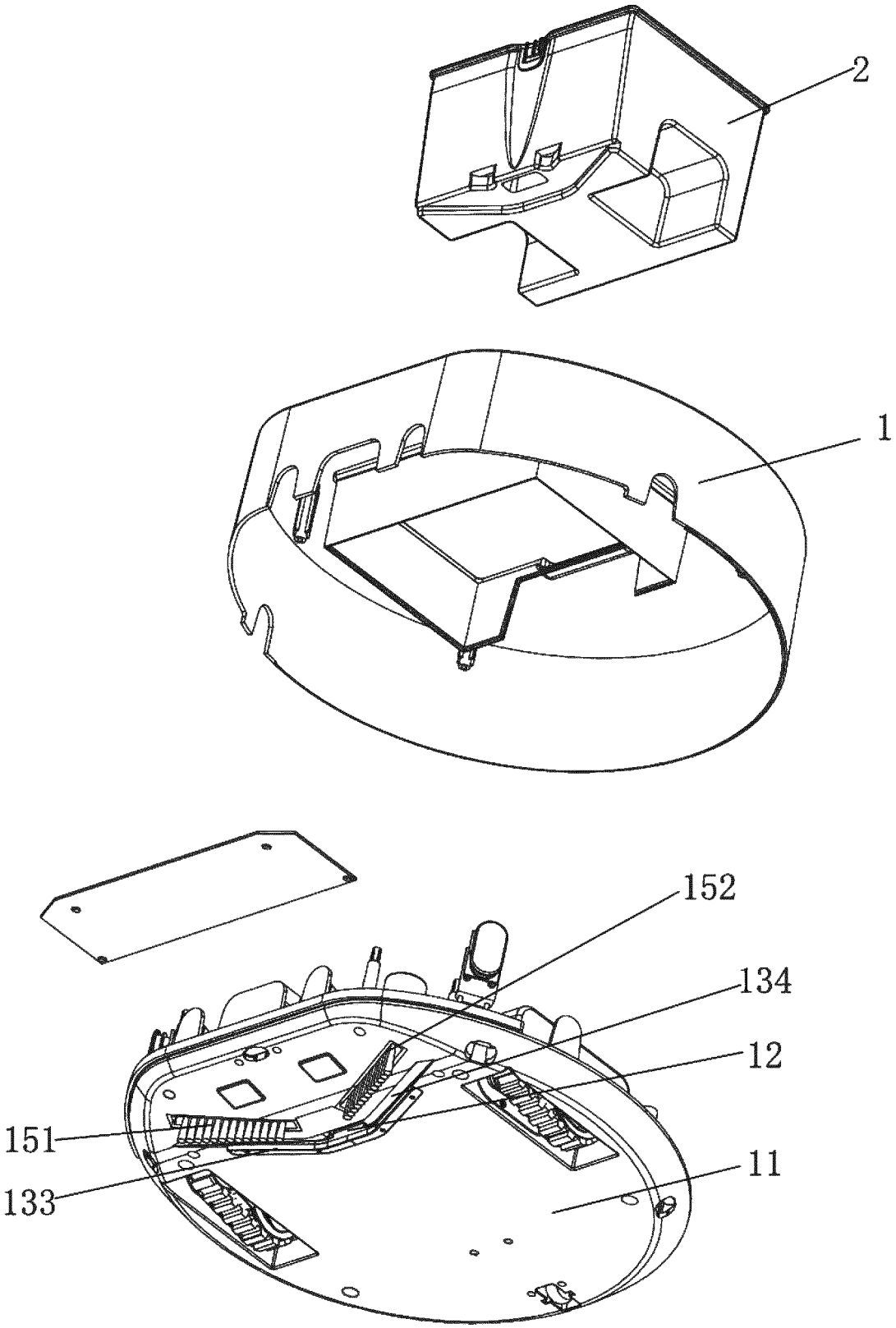

FIG.15B

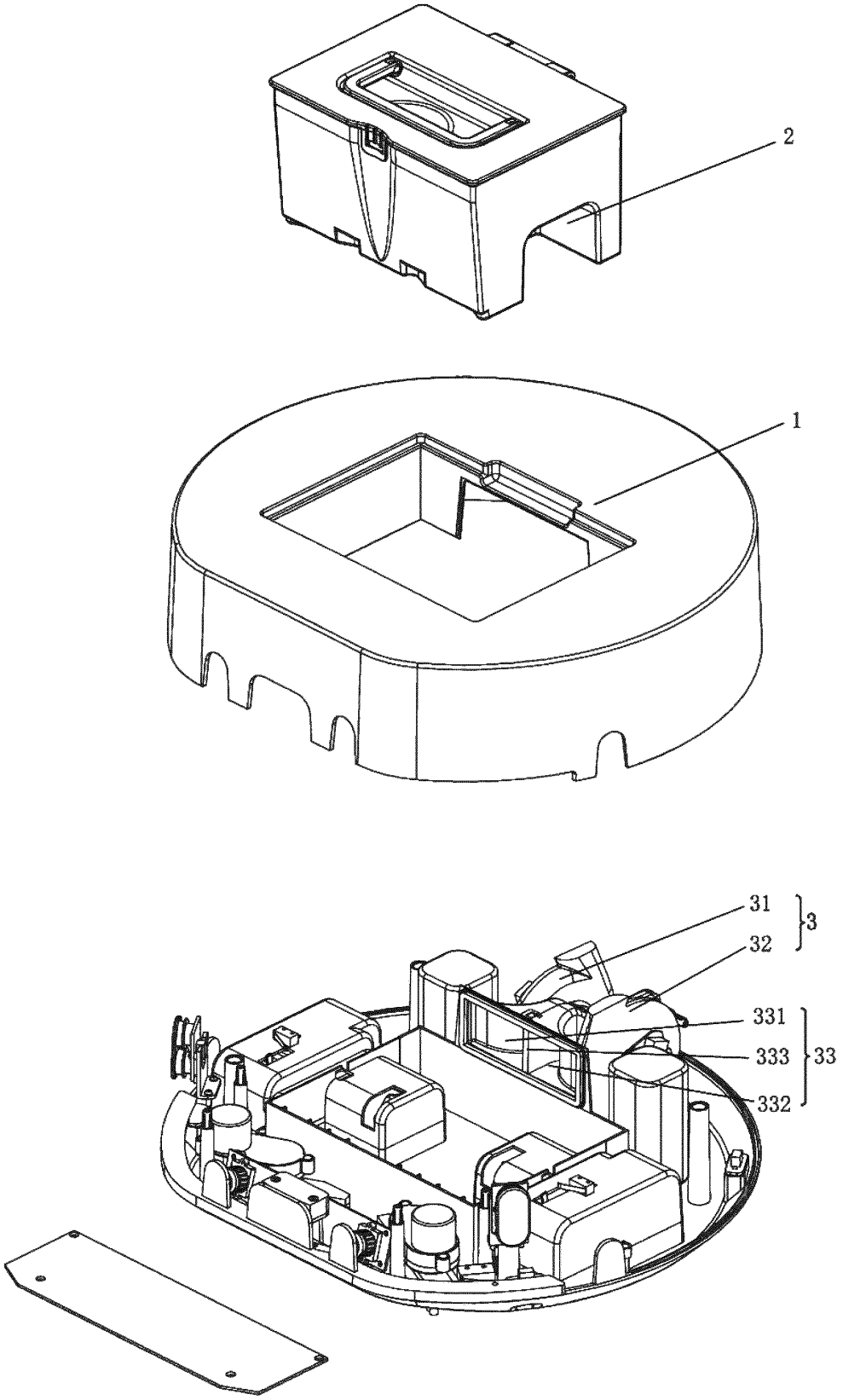

FIG.15C

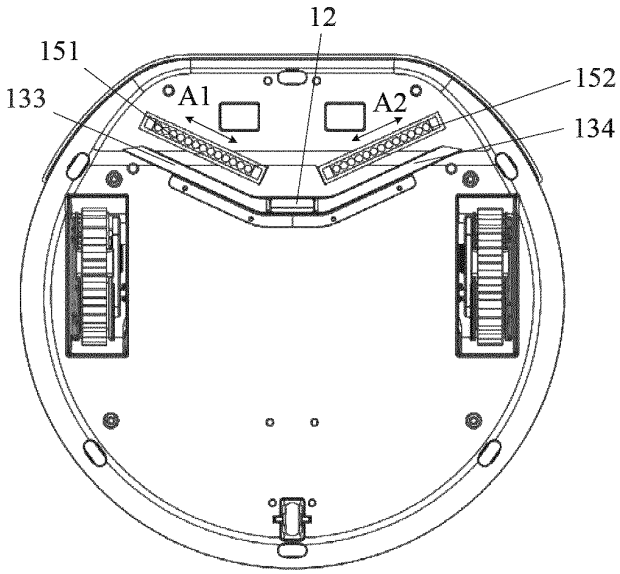

FIG.15D

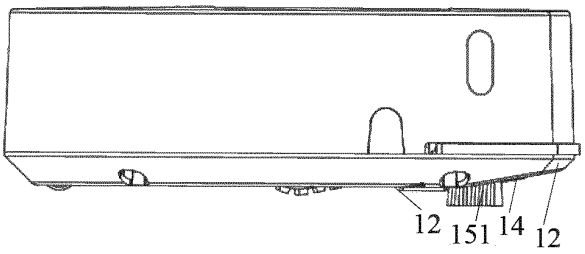

FIG.15E

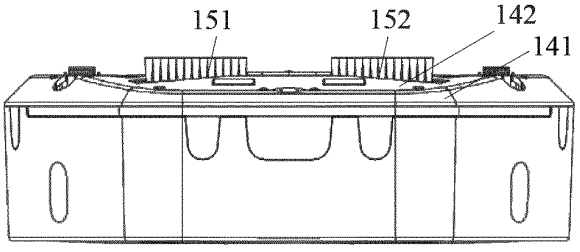

FIG.15F

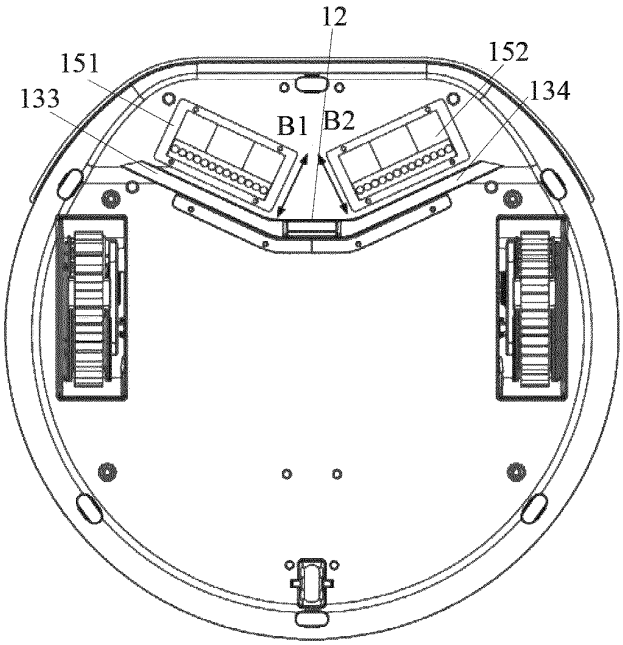

FIG.16

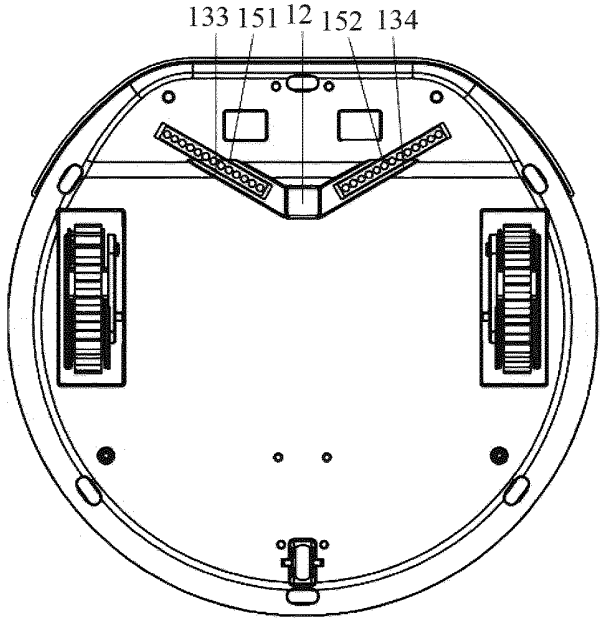

FIG.17

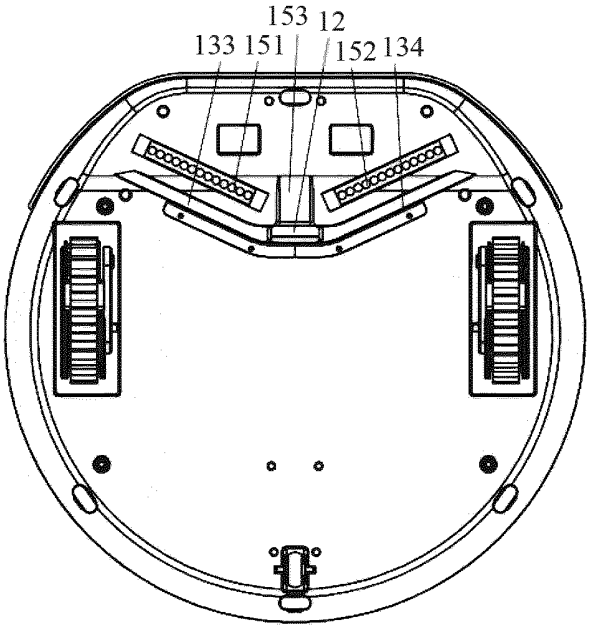

FIG.18

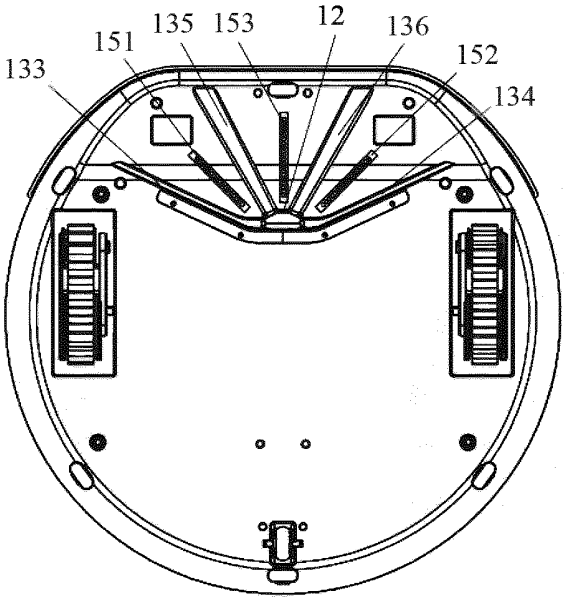

FIG.19

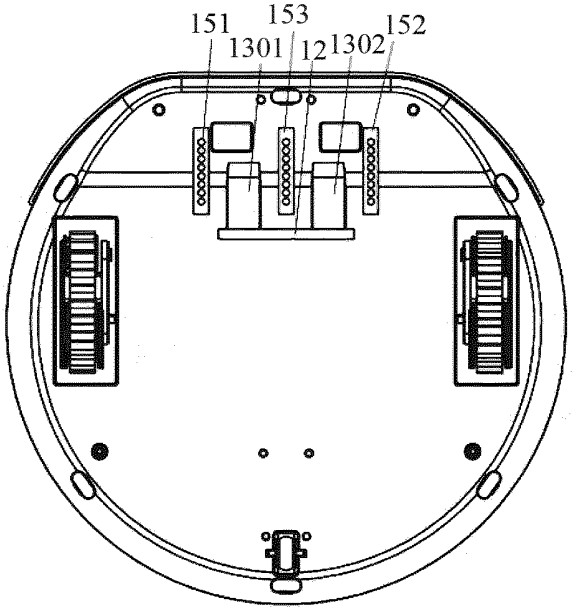

FIG.20

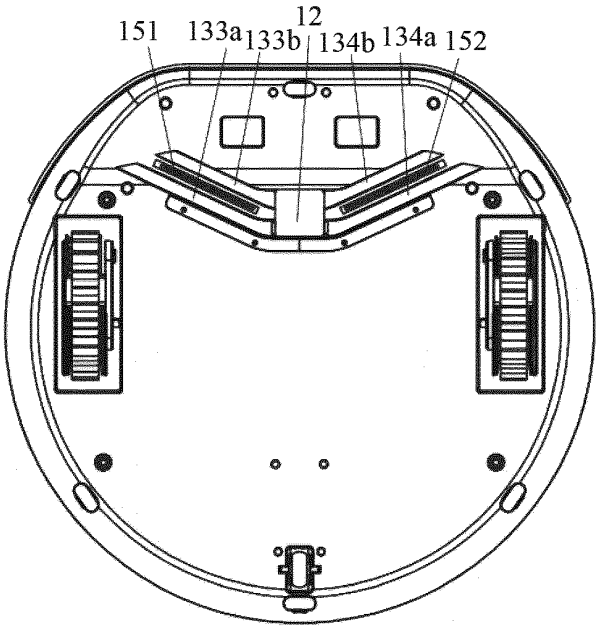

FIG.21

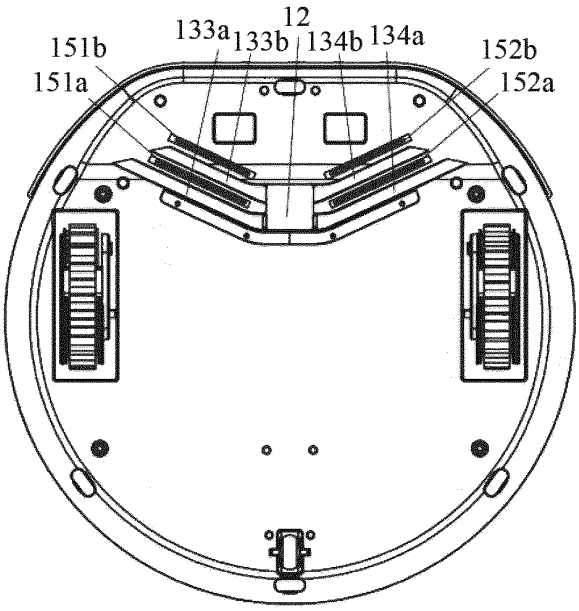

FIG.22

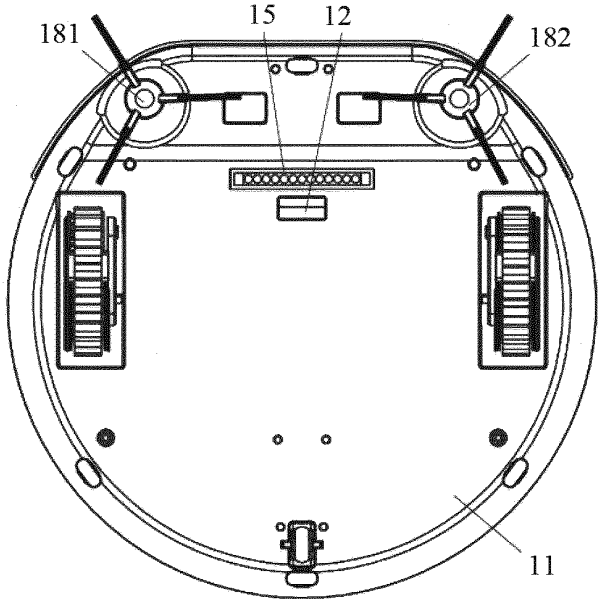

FIG.23A

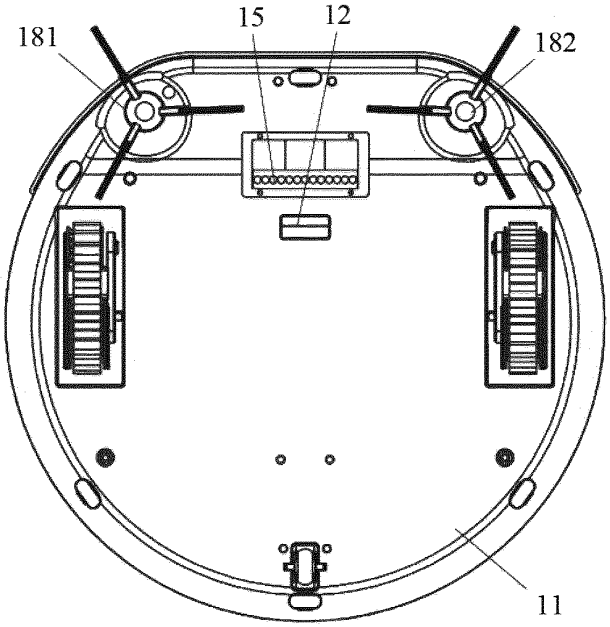

FIG.23B

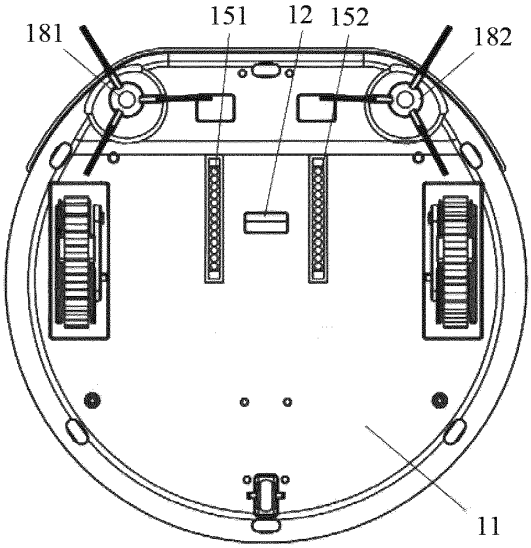

FIG.24A

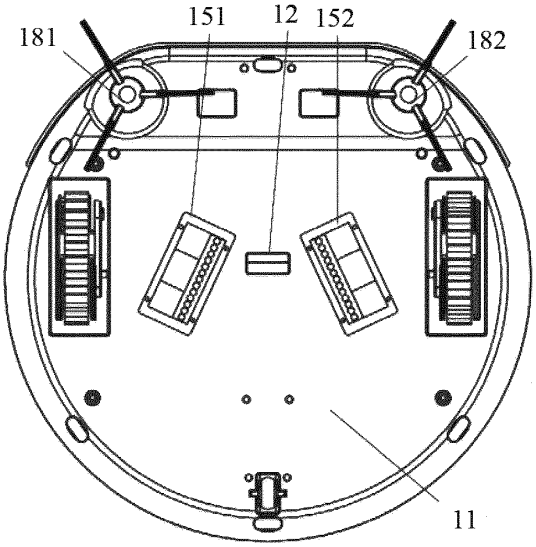

FIG.24B

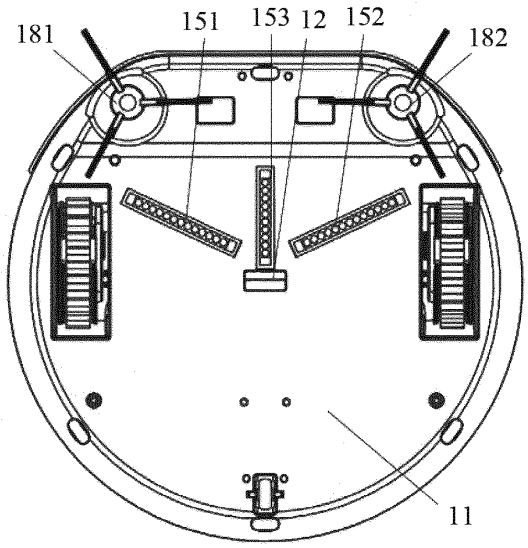

FIG.25A

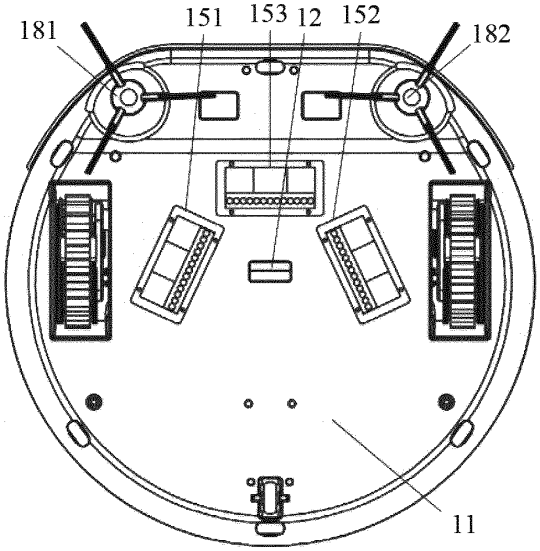

FIG.25B

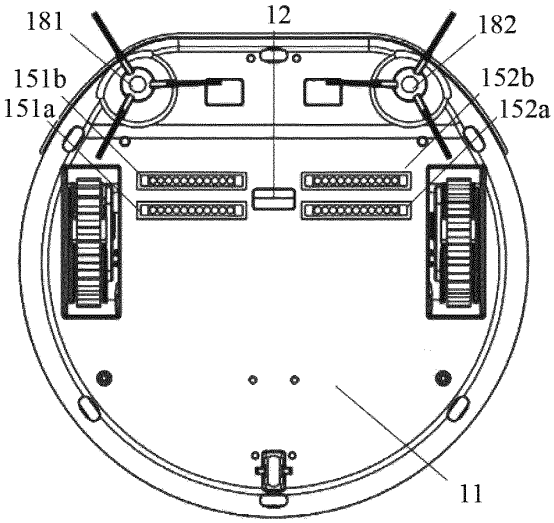

FIG.26A

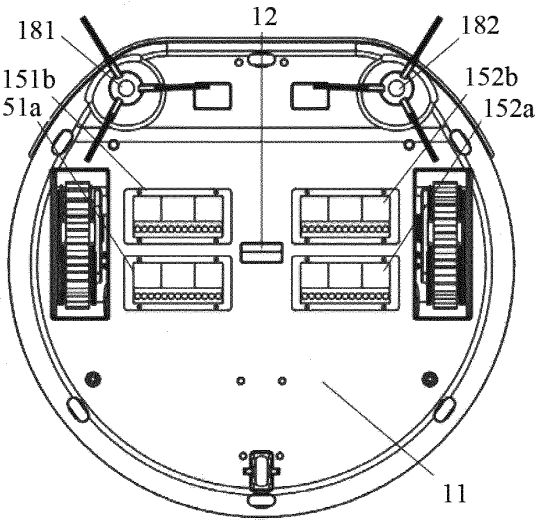

FIG.26B

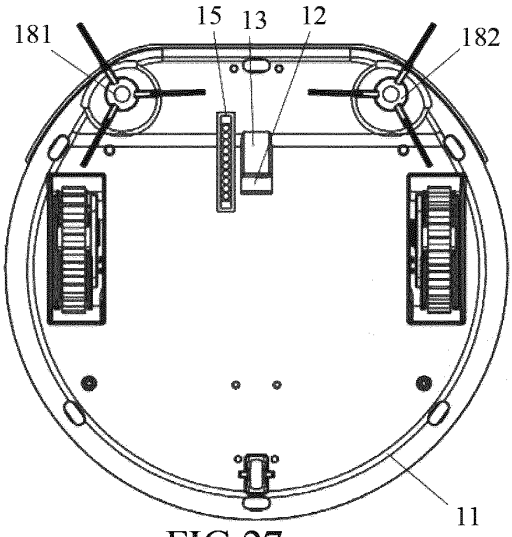

FIG.27

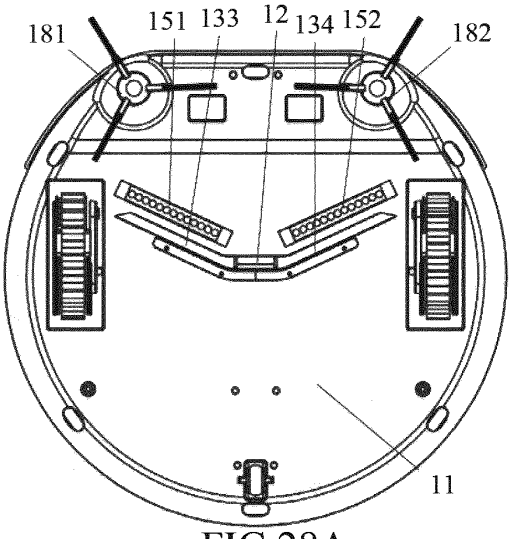

FIG.28A

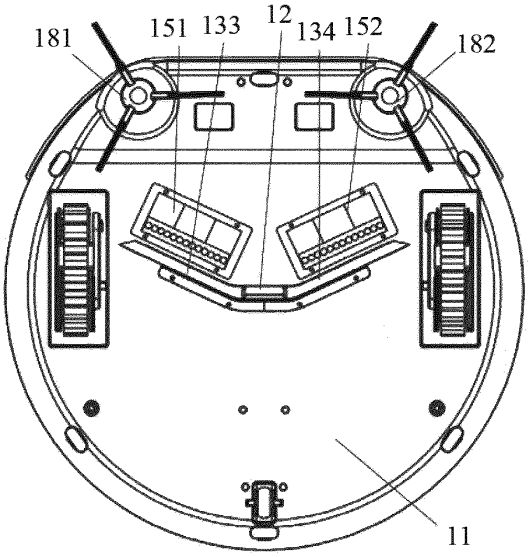

FIG.28B

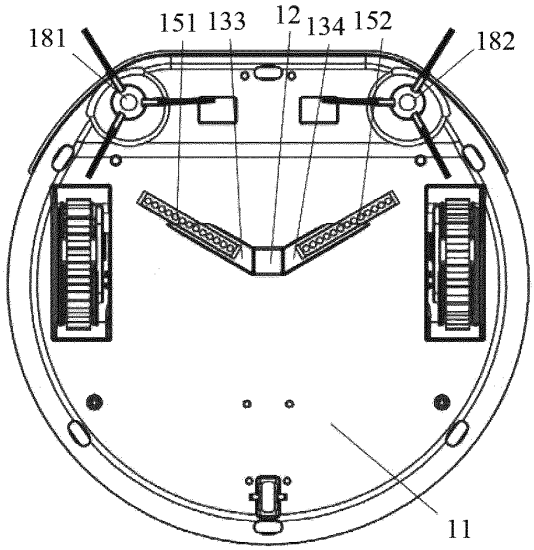

FIG.28C

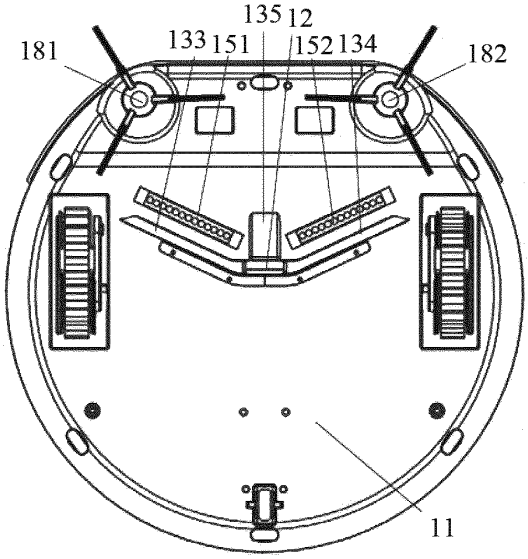

FIG.29

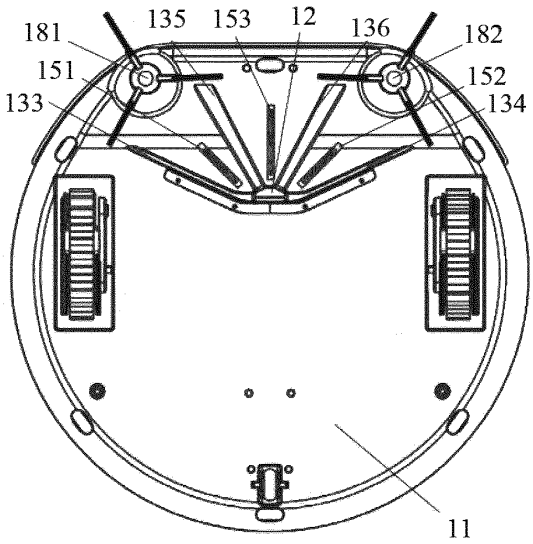

FIG.30A

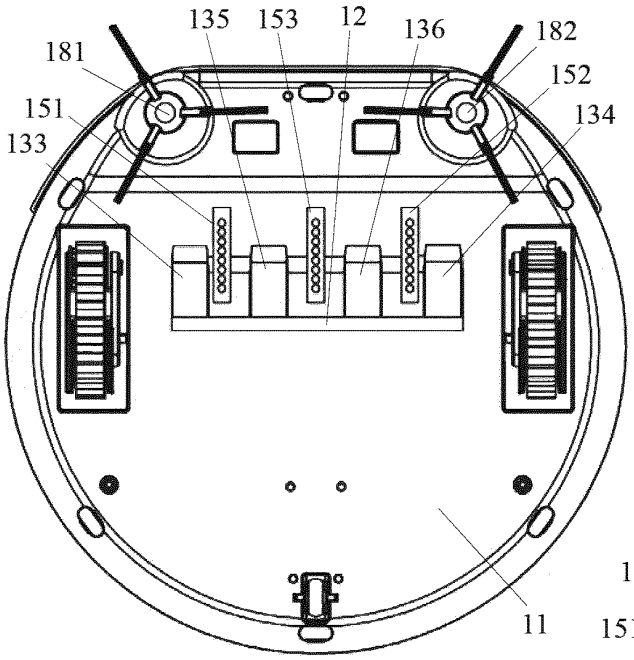

FIG.30B

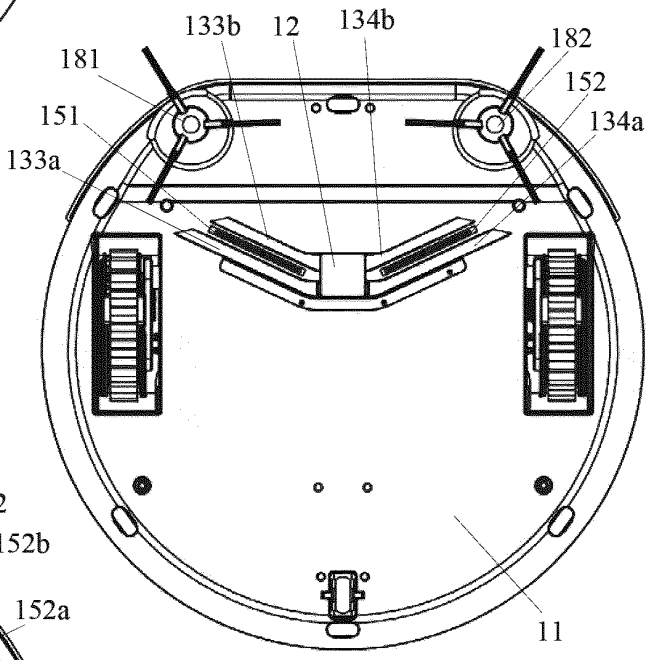

FIG.31

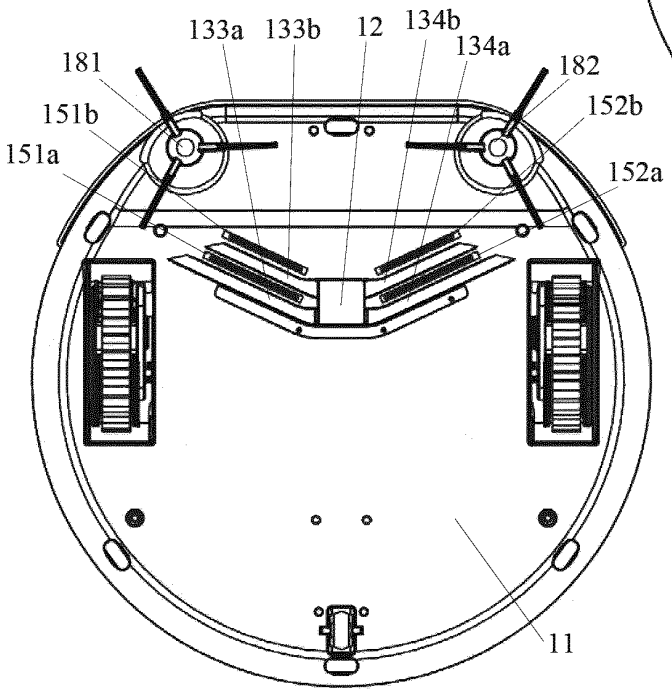

FIG.32

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2018/101601

A. CLASSIFICATION OF SUBJECT MATTER

A47L 11/24(2006.01)i

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A47L11

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)

CNPAT, CNKI, WPI, EPODOC: 清扫, 吸尘, 吸, 口, 孔, 来回, 往复, 循环, 刷, clear+, clean+, dust, collect+, suck+, suction, hole?, orifice?, reciprocat+, brush+

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN 103705179 A (SUZHOU CH'IN-HOO CLEANING EQUIPMENT CO., LTD.) 09 April 2014 (2014-04-09) the abstract, description, specific embodiment part, and figures 1-8	1-82
A	CN 207575102 U (KUNMING HEMEIHUA FEED CO., LTD.) 06 July 2018 (2018-07-06) entire document	1-82
A	CN 106510557 A (GUILIN UNIVERSITY OF ELECTRONIC TECHNOLOGY) 22 March 2017 (2017-03-22) entire document	1-82
A	CN 206080408 U (NINGBO CAINIAO INTELLIGENT TECHNOLOGY CO., LTD.) 12 April 2017 (2017-04-12) entire document	1-82
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☐ Further documents are listed in the continuation of Box C. ☑ See patent family annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
29 April 2019	**20 May 2019**
Name and mailing address of the ISA/CN **China National Intellectual Property Administration (ISA/CN)** **No. 6, Xitucheng Road, Jimenqiao, Haidian District, Beijing 100088** **China**	Authorized officer
Facsimile No. **(86-10)62019451**	Telephone No.

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2018/101601

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