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(54) **PRESS-DOWN-MOPPING-TYPE FLOOR SWEEPING ROBOT**

(57) Disclosed is a press-down-mopping-type floor sweeping robot, comprising: a floor sweeper body (9), wherein a mounting part (90) is formed at the bottom of the floor sweeper body; and a floor sweeper water tank (1) detachably mounted in the mounting part (90), wherein a cleaning cloth is fixed to the bottom of the floor sweeper water tank by means of a hook-and-loop fastener. Press-down assemblies (8) are fixed to two sides of an interior of the floor sweeper body (9) by means of bolts; each press-down assembly (8) comprises a press-down boss (836) capable of elastically extending into the mounting part (90); and the press-down boss (836) elastically presses down on the top of the floor sweeper water tank (1), such that the cleaning cloth can be stably attached to the ground needing to be cleaned in a pressing manner. The problem that the pressure applied to the ground needing to be cleaned by the cleaning cloth is gradually weakened due to the fact that stored water in the floor sweeper water tank (1) continuously flows out of same is solved; and a water pump (60) is mounted in the floor sweeper water tank (1) in an integrated manner, and a first electrifying sheet (41) and a second electrifying sheet (42) supply power to the water pump (60), such that spatial arrangement of the floor sweeper water tank (1) and the floor sweeper body (9) is optimized, and the overall structure of the floor sweeping robot is more com-

pact.

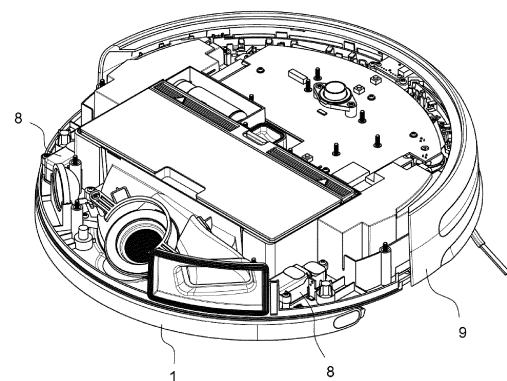


FIG. 2

Description

comprises:

TECHNICAL FIELD

[0001] The utility model relates to a technical field of sweeping robots, in particular to a down-pressure mopping type sweeping robot.

BACKGROUND

[0002] With the development of technology, a variety of automatic cleaning devices have been developed, such as automatic sweeping robots, automatic mopping robots, and so on. The automatic cleaning devices can automatically perform cleaning operations, which is convenient for users.

[0003] Among them, the automatic sweeping robots realize automatic cleaning of the area to be cleaned through technologies such as direct brushing, vacuum cleaning, water tank spraying, and rag wiping. In the prior art, a rag used for mopping is usually fixed at a bottom of a sweeper water tank, and the rag is attached to the ground to be cleaned by relying on the gravity of the sweeper water tank and the water stored in the sweeper water tank. As the water stored in the sweeper water tank continuously to flow out, the pressure of the rag to clean the ground will gradually weaken. In the end, the rag floats on the ground and it is difficult to clean the ground.

SUMMARY

[0004] Aiming at the deficiencies in the above-mentioned technology, the present utility model provides a down-pressure mopping type sweeping robot.

[0005] A technical solution adopted by the utility model to solve the technical problems is:
a down-pressure mopping type sweeping robot, comprising:

a sweeper body comprising a battery pack installed inside the sweeper body and a mounting portion formed at a bottom of the sweeper body, a protrusion portion being formed in the mounting portion; and a sweeper water tank detachably installed in the mounting portion for wetting a ground to be cleaned during a mopping process, a bottom of the sweeper water tank being fixed with a rag through a sticky-and-hook strap;

wherein both sides of an inside of the sweeper body are fixed with down-pressure assemblies by bolts; the down-pressure assembly comprises a down-pressure protrusion capable of elastically protruding into the mounting portion; and the down-pressure protrusion is elastically pressed downwardly on a top of the sweeper water tank so that the rag can be stably pressed against the ground to be cleaned.

[0006] Alternatively, the down-pressure assembly

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a lower shell of which an upper side and a lower side are formed as open;

an upper shell fixed to a top of the lower shell by a buckle, a first hook being formed inside the upper shell;

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a turning plate having a hollow shell structure, one end of the turning plate being hingedly mounted on a bottom of the lower shell through a turning block, a second hook being formed at the one end of the turning plate; and

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a tension spring of which one end is fixed to the second hook and the other end is fixed on the first hook, in order to provide a flipping force for the other end of the turning plate to move toward the bottom of the lower shell;

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wherein the down-pressure protrusions are formed on a bottom side of the other end of the turning plate; a first turning limit block is formed on the other end of the turning plate; and a second turning limit block corresponding to a position of the first turning limit block is formed on an inner side of the lower shell.

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[0007] Alternatively, a first lower shell fixing ear plate is formed at the one end of the lower shell, and a second lower shell fixing ear plate is formed at the other end of the lower shell;

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an upper shell fixing ear plate is formed at one end of the upper shell; and

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the bolt is capable of passing through the upper shell fixing ear plate and the first lower shell fixing ear plate in sequence in order to fix one end of the down-pressure assembly in the sweeper body; and wherein the bolt is capable of passing through the second lower shell fixing ear plate in order to fix the other end of the down-pressure assembly in the sweeper body.

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[0008] Alternatively, a recessed portion is formed on a top of the sweeper water tank, and mounting slots are formed on both sides of the recessed portion; and wherein mounting inserts are formed on both sides of the protrusion portion, and the mounting inserts are capable of being inserted into the mounting slots so that the protrusion portion is introduced and installed in the recessed portion.

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[0009] Alternatively, both sides of the sweeper water tank are formed with lock installation cavities, a lock is slidably installed in the lock installation cavity;

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an L-shaped positioning cavity is formed on the lock, a lock positioning block is fixed at one end of an inner

side of the L-shaped positioning cavity, and a lock positioning plate is formed at the other end of the inner side of the L-shaped positioning cavity;

a hook is also formed at the other end of the inner side of the L-shaped positioning cavity;

a lock limiting plate is fixedly disposed in the lock installation cavity, a return spring is installed between the lock limiting plate and the lock positioning block;

a front side of the sweeper water tank comprises two water tank installation grooves communicating with the two lock installation cavities, respectively;

a first hook and a second hook are formed in the mounting portion which is located on both sides of the protrusion portion, and the first hook and the second hook are capable of passing through the water tank installation grooves and are correspondingly hooked to the two hooks.

[0010] Alternatively, a water storage cavity and an energized cavity are sealedly formed in the sweeper water tank;

a filter device and a water outlet pipe are fixedly disposed in the water storage cavity, a water pump and a first energizing piece and a second energizing piece for transmitting power to the water pump are fixedly disposed in the energized cavity;

a water inlet hose and a water outlet hose are installed on the water pump, and the water inlet hose and the water outlet hose both extend into the water storage cavity;

the water inlet hose and the filter device are in communication, and the water outlet hose and the water outlet pipe are in communication; and

a plurality of drain channels are opened at a bottom of the water outlet pipe.

[0011] Alternatively, the bottom of the sweeper water tank comprises a plurality of drain holes which are in sealed communication with the plurality of drain channels; and

the rag is disposed at a bottom of the plurality of drain holes.

[0012] Alternatively, a bottom of the sweeper water tank is formed with a wheel cover recessed into the water storage cavity; and a bottom of the wheel cover is provided with a walking wheel for supporting the movement of the sweeper water tank on a bottom surface of the work.

[0013] Alternatively, the first energizing piece and the

second energizing piece are both embedded and fixed in a top of the sweeper water tank;

a bottom of the down-pressure protrusion is fixed with a down-pressure charging piece, the two down-pressure charging pieces are correspondingly energized and connected to the first energizing piece and the second energizing piece; and

a conductive plate which is electrically connected to the down-pressure charging piece is fixed inside the turning plate, and the two conductive plates are electrically connected to the battery pack.

[0014] Alternatively, a plurality of reinforcing ribs are formed inside the turning plate.

[0015] Alternatively, the upper shell located on top of the first hook comprises an inspection hole, and the lower shell located on top of the conductive plate comprises a wire hole.

[0016] Compared with the prior art, beneficial effects of the utility model include: the down-pressure mopping type sweeping robot provided by the utility model can continuously provide downward pressure to the sweeper water tank through the down-pressure protrusion, so that the rag can be stably pressed on the ground to be cleaned. This effectively solves the problem that the pressure on the ground to be cleaned by the rag is gradually weakened due to the continuous outflow of water in the sweeper water tank. In the present application, the water pump is integrated and installed in the sweeper water tank, and the pump is supplied with electricity through the down-pressure charging piece, the first energizing piece and the second energizing piece which are fixed at the bottom of the two down-pressure protrusions. This greatly optimizes the spatial arrangement of the sweeper water tank and the sweeper body, making the overall structure of the sweeping robot more compact, and improving its practicability and aesthetics.

BRIEF DESCRIPTION OF DRAWINGS

[0017]

FIG. 1 is a schematic view of an overall structure of the utility model;

FIG. 2 is a schematic view of the installation of a down-pressure assembly of the utility model;

FIG. 3 is a schematic view of the installation of the sweeper water tank of the utility model;

FIG. 4 is a schematic view of a bottom structure of a sweeper body of the utility model;

FIG. 5 is a schematic view of an overall structure of the down-pressure assembly of the utility model;

FIG. 6 is a schematic view of an internal structure of the down-pressure assembly of the utility model;

FIG. 7 is a schematic view of an overall structure of the sweeper water tank of the utility model;

FIGS. 8 to 9 are schematic views of an internal structure of the sweeper water tank of the utility model; and

FIG. 10 is a schematic view of the installation of a lock of the utility model.

[0018] In the drawings: 9: sweeper body; 90: mounting part; 900: protrusion portion; 1: sweeper water tank; 8: down-pressure assembly; 836: down-pressure protrusion; 82: lower shell; 81: upper shell; 812: first hook; 83: turning plate; 830: turning block; 832: second hook; 84: tension spring; 833: first turning limit block; 823: second turning limit block; 821: first lower shell fixing ear plate; 822: second lower shell fixing ear plate; 811: upper shell fixing ear plate; 10: recessed portion; 100: mounting slot; 901: mounting insert; 51: lock; 510: L-shaped positioning cavity; 511: lock positioning block; 513: lock positioning plate; 512: hook; 14: lock limiting plate; 15: return spring; 131: water tank installation groove; 91: first hook 92: second hook; 101: water storage cavity; 102: energized cavity; 61: filter device; 72: water outlet pipe; 60: water pump; 41: first energizing piece; 42: second energizing piece; 621: water inlet hose; 622: water outlet hose; 722: drain channel; 21: drain hole; 20: wheel cover; 22: walking wheel; 834: down-pressure charging piece; 835: conductive plate; 831: reinforcing rib; 810: inspection hole; 820: wire hole.

DETAILED DESCRIPTION

[0019] The following describes the utility model in further detail with reference to the accompanying drawings, so that those skilled in the art can implement it with reference to the text of the description.

[0020] As shown in FIGS. 1 to 10, the present utility model provides a down-pressure mopping type sweeping robot, including:

a sweeper body 9 including a battery pack installed inside the sweeper body 9 and a mounting portion 90 formed at a bottom of the sweeper body 9, a protrusion portion 900 being formed in the mounting portion 90; and

a sweeper water tank 1 detachably installed in the mounting portion 90 for wetting a ground to be cleaned during a mopping process, a bottom of the sweeper water tank 1 being fixed with a rag through a sticky-and-hook strap;

wherein both sides of an inside of the sweeper body 9

are fixed with down-pressure assemblies 8 by bolts; the down-pressure assembly 8 includes a down-pressure protrusion 836 capable of elastically protruding into the mounting portion 90; and the down-pressure protrusion 836 is elastically pressed downwardly on a top of the sweeper water tank 1 so that the rag can be stably pressed against the ground to be cleaned.

[0021] As an embodiment of the present utility model, the down-pressure assembly 8 includes:

a lower shell 82 of which an upper side and a lower side are formed as open;

an upper shell 81 fixed to a top of the lower shell 82 by a buckle, a first hook 812 being formed inside the upper shell 81;

a turning plate 83 having a hollow shell structure, one end of the turning plate 83 being hingedly mounted on a bottom of the lower shell 82 through a turning block 830, a second hook 832 being formed at the one end of the turning plate 83; and

a tension spring 84 of which one end is fixed to the second hook 832 and the other end is fixed on the first hook 812, in order to provide a flipping force for the other end of the turning plate 83 to move toward the bottom of the lower shell 82;

wherein the down-pressure protrusions 836 are formed on a bottom side of the other end of the turning plate 83; a first turning limit block 833 is formed on the other end of the turning plate 83; and a second turning limit block 823 corresponding to a position of the first turning limit block 833 is formed on an inner side of the lower shell 82.

[0022] As an embodiment of the present utility model, a first lower shell fixing ear plate 821 is formed at the one end of the lower shell 82, and a second lower shell fixing ear plate 822 is formed at the other end of the lower shell 82;

an upper shell fixing ear plate 811 is formed at one end of the upper shell 81; and

the bolt is capable of passing through the upper shell fixing ear plate 811 and the first lower shell fixing ear plate 821 in sequence in order to fix one end of the down-pressure assembly 8 in the sweeper body 9; and wherein the bolt is capable of passing through the second lower shell fixing ear plate 822 in order to fix the other end of the down-pressure assembly 8 in the sweeper body 9.

[0023] As an embodiment of the present utility model, a recessed portion 10 is formed on a top of the sweeper water tank 1, and mounting slots 100 are formed on both sides of the recessed portion 10; and wherein mounting inserts 901 are formed on both sides

of the protrusion portion 900, and the mounting inserts 901 are capable of being inserted into the mounting slots 100 so that the protrusion portion 900 is introduced and installed in the recessed portion 10.

[0024] As an embodiment of the present utility model, both sides of the sweeper water tank 1 are formed with lock installation cavities, a lock 51 is slidably installed in the lock installation cavity;

an L-shaped positioning cavity 510 is formed on the lock 51, a lock positioning block 511 is fixed at one end of an inner side of the L-shaped positioning cavity 510, and a lock positioning plate 513 is formed at the other end of the inner side of the L-shaped positioning cavity 510;

a hook 512 is also formed at the other end of the inner side of the L-shaped positioning cavity 510;

a lock limiting plate 14 is fixedly disposed in the lock installation cavity, a return spring 15 is installed between the lock limiting plate 14 and the lock positioning block 511;

a front side of the sweeper water tank 1 includes two water tank installation grooves 131 communicating with the two lock installation cavities, respectively;

a first hook 91 and a second hook 92 are formed in the mounting portion 90 which is located on both sides of the protrusion portion 900, and the first hook 91 and the second hook 92 are capable of passing through the water tank installation grooves 131 and are correspondingly hooked to the two hooks 512.

[0025] As an embodiment of the present utility model, a water storage cavity 101 and an energized cavity 102 are sealedly formed in the sweeper water tank 1;

a filter device 61 and a water outlet pipe 72 are fixedly disposed in the water storage cavity 101, a water pump 60 and a first energizing piece 41 and a second energizing piece 42 for transmitting power to the water pump 60 are fixedly disposed in the energized cavity 102;

a water inlet hose 621 and a water outlet hose 622 are installed on the water pump 60, and the water inlet hose 621 and the water outlet hose 622 both extend into the water storage cavity 101;

the water inlet hose 621 and the filter device 61 are in communication, and the water outlet hose 622 and the water outlet pipe 72 are in communication; and

a plurality of drain channels 722 are opened at a bottom of the water outlet pipe 72.

[0026] As an embodiment of the present utility model, the bottom of the sweeper water tank 1 includes a plurality of drain holes 21 which are in sealed communication with the plurality of drain channels 722; and the rag is disposed at a bottom of the plurality of drain holes 21.

[0027] As an embodiment of the present utility model, a bottom of the sweeper water tank 1 is formed with a wheel cover 20 recessed into the water storage cavity 101. A bottom of the wheel cover 20 is provided with a walking wheel 22 for supporting the movement of the sweeper water tank 1 on a bottom surface of the work.

[0028] As an embodiment of the present utility model, the first energizing piece 41 and the second energizing piece 42 are both embedded and fixed in a top of the sweeper water tank 1;

a bottom of the down-pressure protrusion 836 is fixed with a down-pressure charging piece 834, the two down-pressure charging pieces 834 are correspondingly energized and connected to the first energizing piece 41 and the second energizing piece 42; and

a conductive plate 835 which is electrically connected to the down-pressure charging piece 834 is fixed inside the turning plate 83, and the two conductive plates 835 are electrically connected to the battery pack.

[0029] As an embodiment of the present utility model, a plurality of reinforcing ribs 831 are formed inside the turning plate 83.

[0030] As an embodiment of the present utility model, the upper shell 81 located on top of the first hook 812 includes an inspection hole 810, and the lower shell 82 located on top of the conductive plate 835 includes a wire hole 820.

[0031] The working principle of the down-pressure mopping type sweeping robot is as follows:

[0032] The sweeper body 9 pushes the sweeper water tank 1 to move on the bottom surface of the working through its walking mechanism. When it is necessary to wet the ground to be cleaned, the sweeping robot controls the operation of the water pump 60. The water stored in the water storage cavity 101 sequentially passes through the filter device 61, the water inlet hose 621, the water pump 60, the water outlet hose 622, the water outlet pipe 72, and the drain channel 722, and is finally led to the rag through the drain holes 21, and then moisten the floor with the rag with clean water.

[0033] In the process of mopping the floor with the rag, the down-pressure protrusions 836 can continuously press the sweeper water tank 1, so that the rag can be stably pressed on the ground to be cleaned. The down-pressure charging pieces 834 fixed at the bottom of the two down-pressure protrusions 836 can be correspondingly energized and connected to the first energizing piece 41 and the second energizing piece 42, in order to

realize the normal operation of the water pump 60 driven by the power of the battery pack.

[0034] Although the embodiment of the present invention has been disclosed as above, it is not limited to the applications listed in the specification and the embodiments, and it can be applied to various fields suitable for the present utility model. For those skilled in the art, additional modifications can be easily implemented. Therefore, without departing from the general concept defined by the claims and equivalent scope, the present utility is not limited to the specific details and the drawings shown and described here.

Claims

1. A down-pressure mopping type sweeping robot, comprising:

a sweeper body (9) comprising a battery pack installed inside the sweeper body (9) and a mounting portion (90) formed at a bottom of the sweeper body (9), a protrusion portion (900) being formed in the mounting portion (90); and a sweeper water tank (1) detachably installed in the mounting portion (90) for wetting a ground to be cleaned during a mopping process, a bottom of the sweeper water tank (1) being fixed with a rag through a sticky-and-hook strap;

wherein both sides of an inside of the sweeper body (9) are fixed with down-pressure assemblies (8) by bolts; the down-pressure assembly (8) comprises a down-pressure protrusion (836) capable of elastically protruding into the mounting portion (90); and the down-pressure protrusion (836) is elastically pressed downwardly on a top of the sweeper water tank (1) so that the rag can be stably pressed against the ground to be cleaned.

2. The down-pressure mopping type sweeping robot according to claim 1, wherein the down-pressure assembly (8) comprises:

a lower shell (82) of which an upper side and a lower side are formed as open;
an upper shell (81) fixed to a top of the lower shell (82) by a buckle, a first hook (812) being formed inside the upper shell (81);
a turning plate (83) having a hollow shell structure, one end of the turning plate (83) being hingedly mounted on a bottom of the lower shell (82) through a turning block (830), a second hook (832) being formed at the one end of the turning plate (83); and
a tension spring (84) of which one end is fixed to the second hook (832) and the other end is fixed on the first hook (812), in order to provide

a flipping force for the other end of the turning plate (83) to move toward the bottom of the lower shell (82);

wherein the down-pressure protrusions (836) are formed on a bottom side of the other end of the turning plate (83); a first turning limit block (833) is formed on the other end of the turning plate (83); and a second turning limit block (823) corresponding to a position of the first turning limit block (833) is formed on an inner side of the lower shell (82).

3. The down-pressure mopping type sweeping robot according to claim 2, wherein a first lower shell fixing ear plate (821) is formed at the one end of the lower shell (82), and a second lower shell fixing ear plate (822) is formed at the other end of the lower shell (82);

an upper shell fixing ear plate (811) is formed at one end of the upper shell (81); and the bolt is capable of passing through the upper shell fixing ear plate (811) and the first lower shell fixing ear plate (821) in sequence in order to fix one end of the down-pressure assembly (8) in the sweeper body (9); and wherein the bolt is capable of passing through the second lower shell fixing ear plate (822) in order to fix the other end of the down-pressure assembly (8) in the sweeper body (9).

4. The down-pressure mopping type sweeping robot according to claim 1, wherein a recessed portion (10) is formed on a top of the sweeper water tank (1), and mounting slots (100) are formed on both sides of the recessed portion (10); and wherein mounting inserts (901) are formed on both sides of the protrusion portion (900), and the mounting inserts (901) are capable of being inserted into the mounting slots (100) so that the protrusion portion (900) is introduced and installed in the recessed portion (10).

5. The down-pressure mopping type sweeping robot according to claim 4, wherein both sides of the sweeper water tank (1) are formed with lock installation cavities, a lock (51) is slidably installed in the lock installation cavity;

an L-shaped positioning cavity (510) is formed on the lock (51), a lock positioning block (511) is fixed at one end of an inner side of the L-shaped positioning cavity (510), and a lock positioning plate (513) is formed at the other end of the inner side of the L-shaped positioning cavity (510);
a hook (512) is also formed at the other end of the inner side of the L-shaped positioning cavity

- (510);
 a lock limiting plate (14) is fixedly disposed in the lock installation cavity, a return spring (15) is installed between the lock limiting plate (14) and the lock positioning block (511);
 a front side of the sweeper water tank (1) comprises two water tank installation grooves (131) communicating with the two lock installation cavities, respectively;
 a first hook (91) and a second hook (92) are formed in the mounting portion (90) which is located on both sides of the protrusion portion (900), and the first hook (91) and the second hook (92) are capable of passing through the water tank installation grooves (131) and are correspondingly hooked to the two hooks (512).
6. The down-pressure mopping type sweeping robot according to claim 2, wherein a water storage cavity (101) and an energized cavity (102) are sealedly formed in the sweeper water tank (1);
- a filter device (61) and a water outlet pipe (72) are fixedly disposed in the water storage cavity (101), a water pump (60) and a first energizing piece (41) and a second energizing piece (42) for transmitting power to the water pump (60) are fixedly disposed in the energized cavity (102);
 a water inlet hose (621) and a water outlet hose (622) are installed on the water pump (60), and the water inlet hose (621) and the water outlet hose (622) both extend into the water storage cavity (101);
 the water inlet hose (621) and the filter device (61) are in communication, and the water outlet hose (622) and the water outlet pipe (72) are in communication; and
 a plurality of drain channels (722) are opened at a bottom of the water outlet pipe (72).
7. The down-pressure mopping type sweeping robot according to claim 6, wherein the bottom of the sweeper water tank (1) comprises a plurality of drain holes (21) which are in sealed communication with the plurality of drain channels (722); and the rag is disposed at a bottom of the plurality of drain holes (21).
8. The down-pressure mopping type sweeping robot according to claim 6, wherein the first energizing piece (41) and the second energizing piece (42) are both embedded and fixed in a top of the sweeper water tank (1);
- a bottom of the down-pressure protrusion (836) is fixed with a down-pressure charging piece (834), the two down-pressure charging pieces (834) are correspondingly energized and connected to the first energizing piece (41) and the second energizing piece (42); and
 a conductive plate (835) which is electrically connected to the down-pressure charging piece (834) is fixed inside the turning plate (83), and the two conductive plates (835) are electrically connected to the battery pack.
9. The down-pressure mopping type sweeping robot according to claim 2, wherein a plurality of reinforcing ribs (831) are formed inside the turning plate (83).
10. The down-pressure mopping type sweeping robot according to claim 8, wherein the upper shell (81) located on top of the first hook (812) comprises an inspection hole (810), and the lower shell (82) located on top of the conductive plate (835) comprises a wire hole (820).

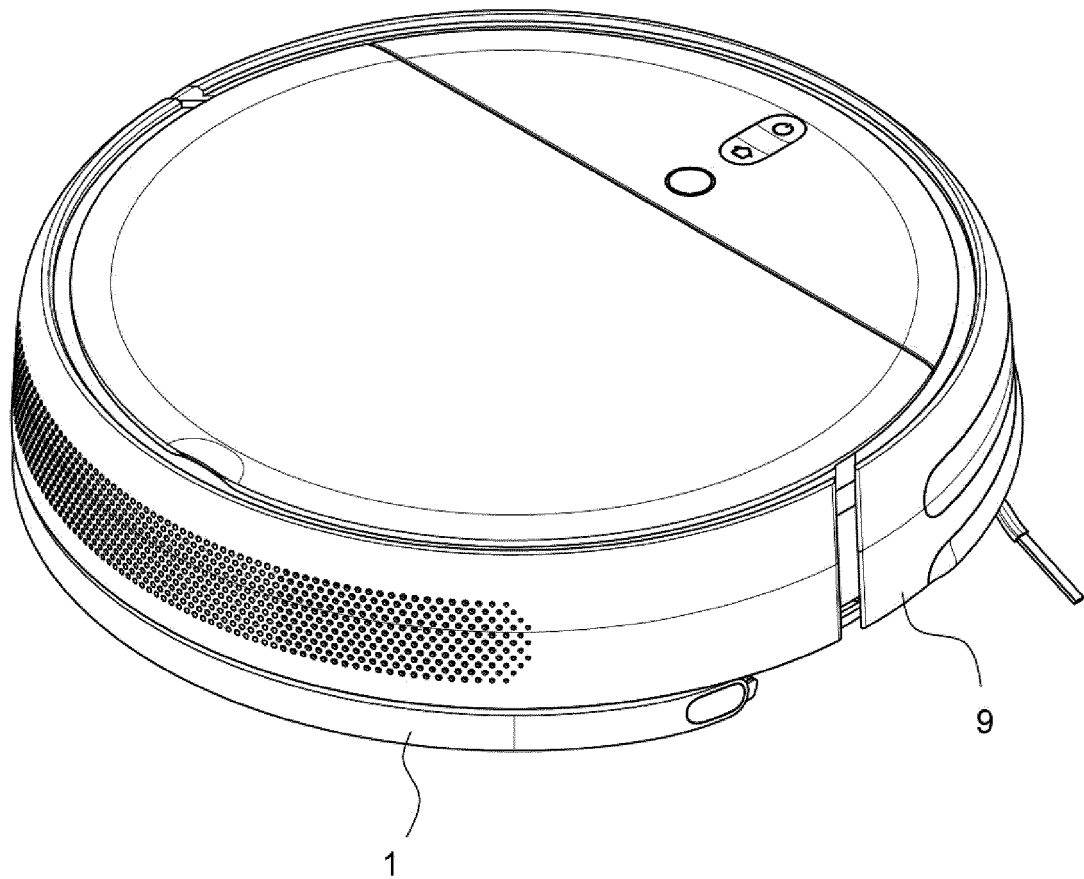


FIG. 1

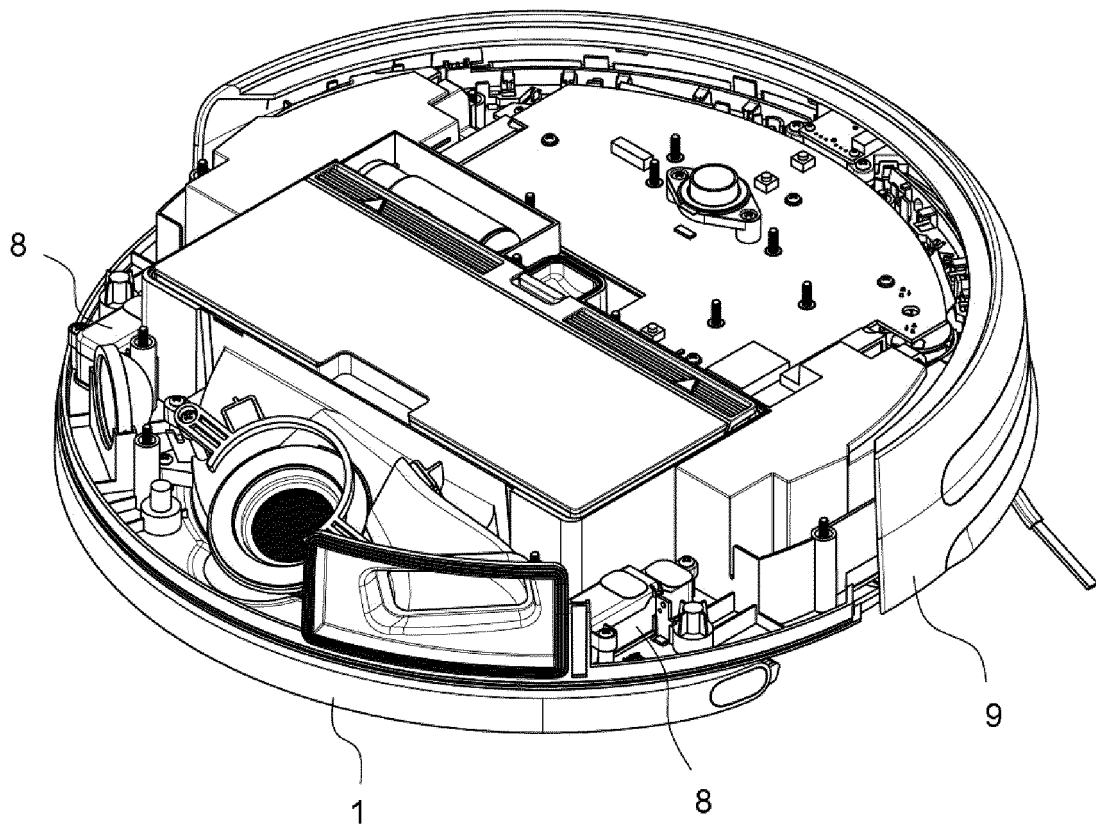


FIG. 2

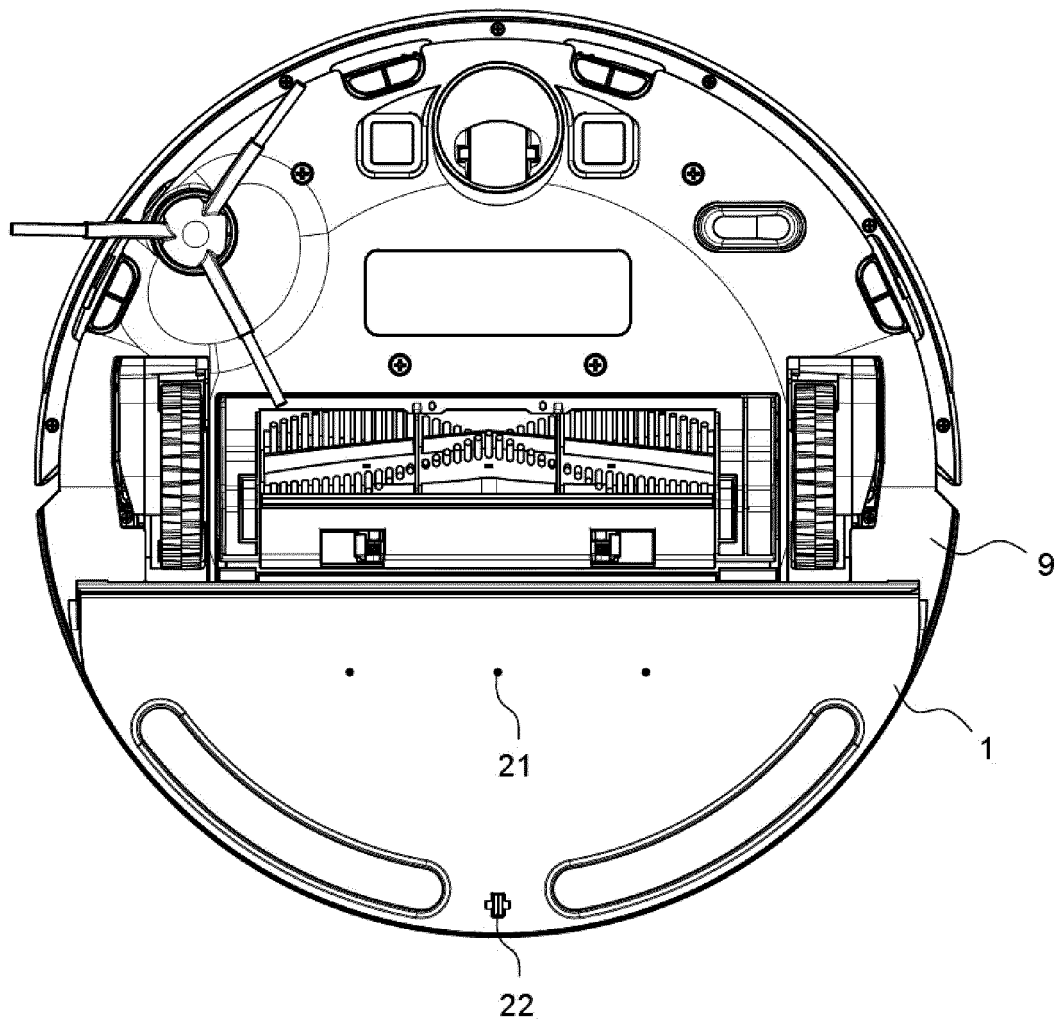


FIG. 3

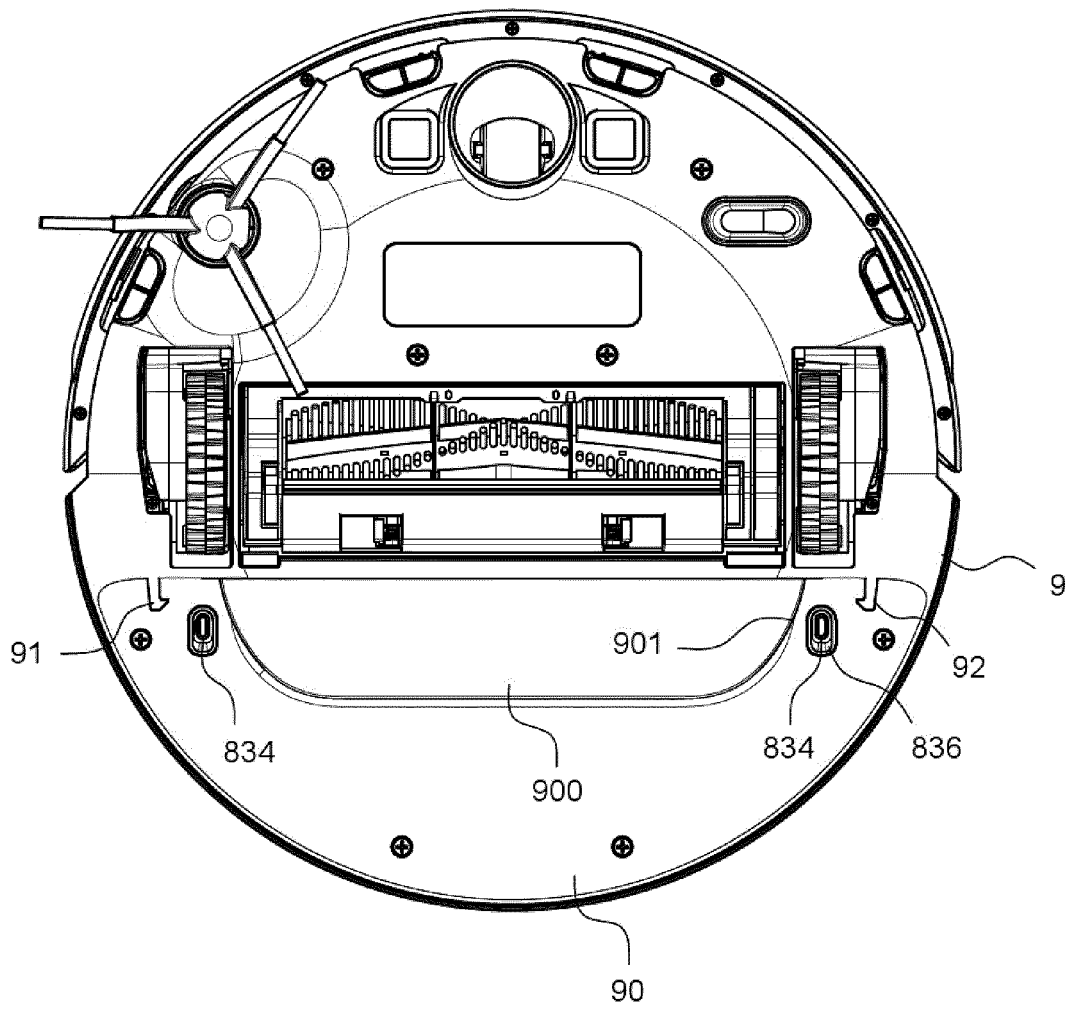


FIG. 4

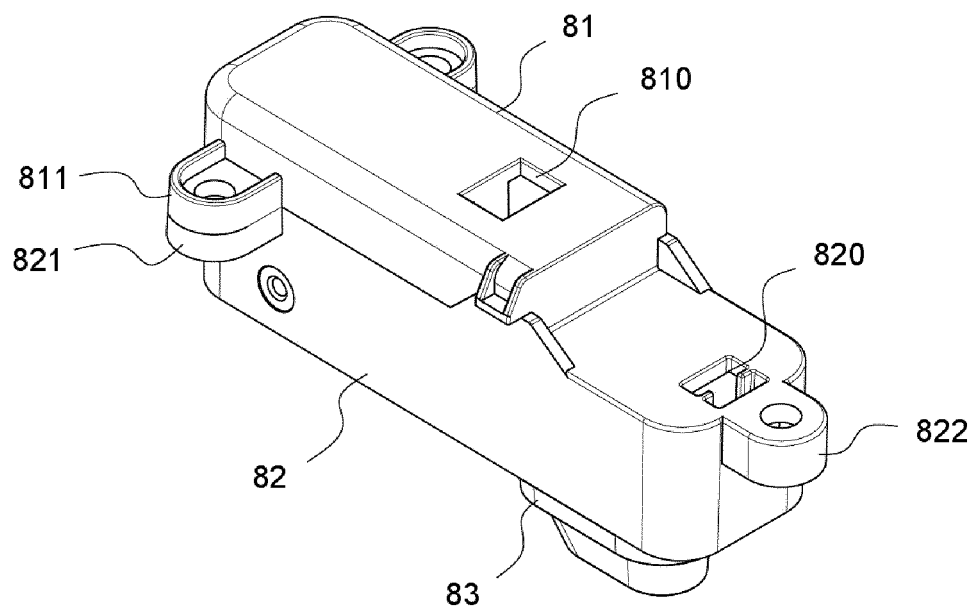


FIG. 5

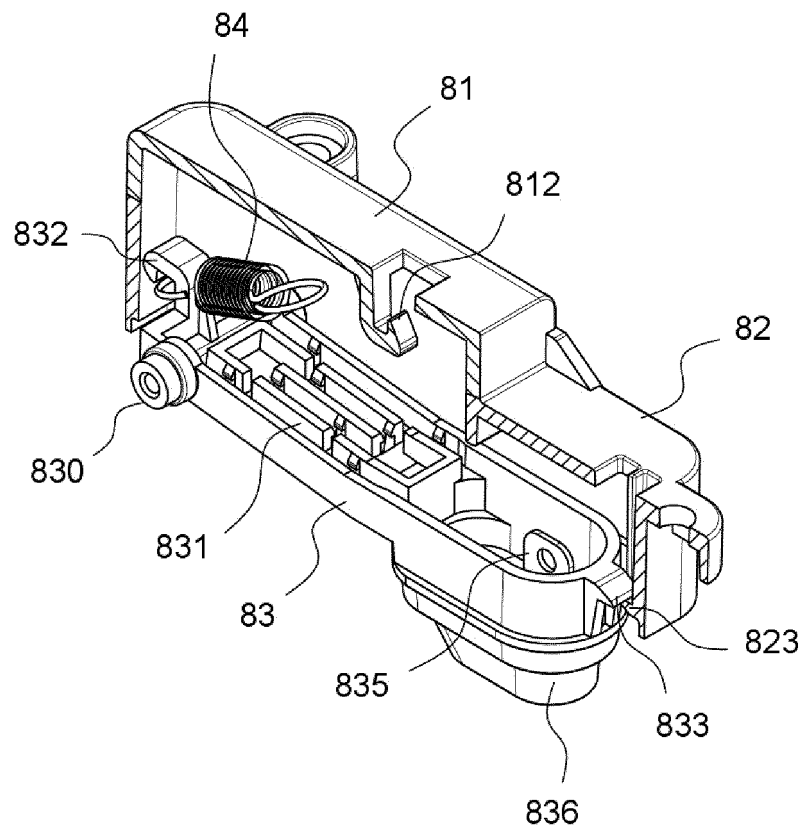


FIG. 6

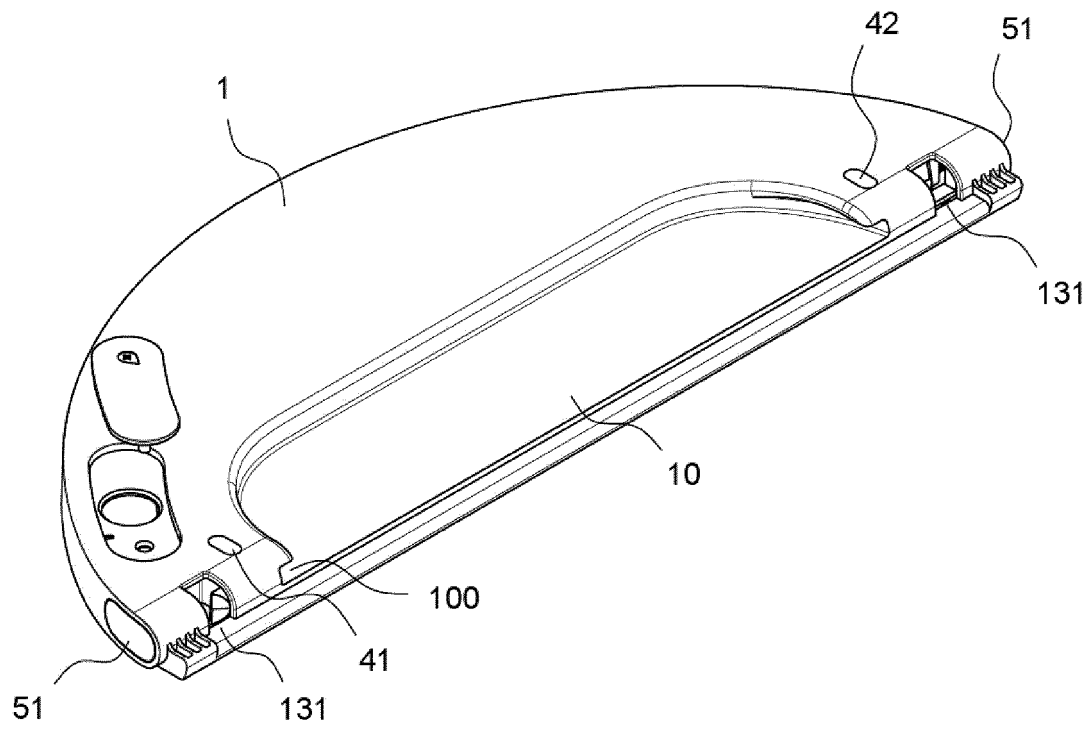


FIG. 7

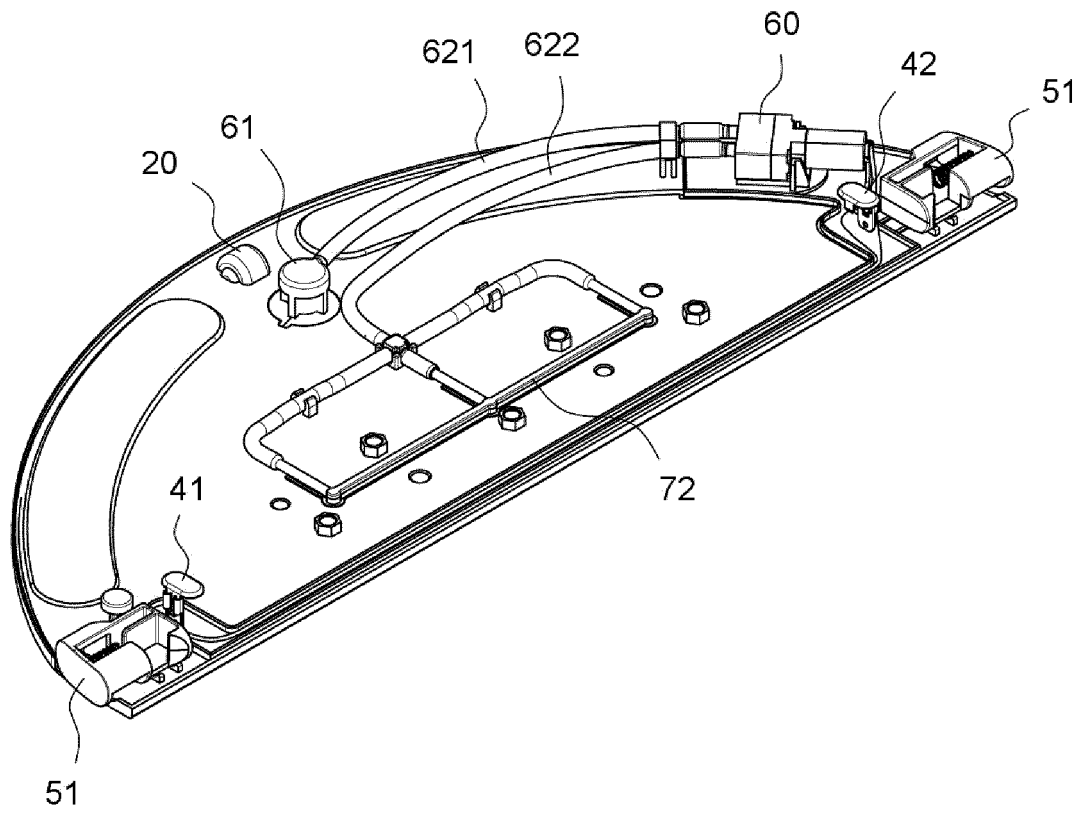


FIG. 8

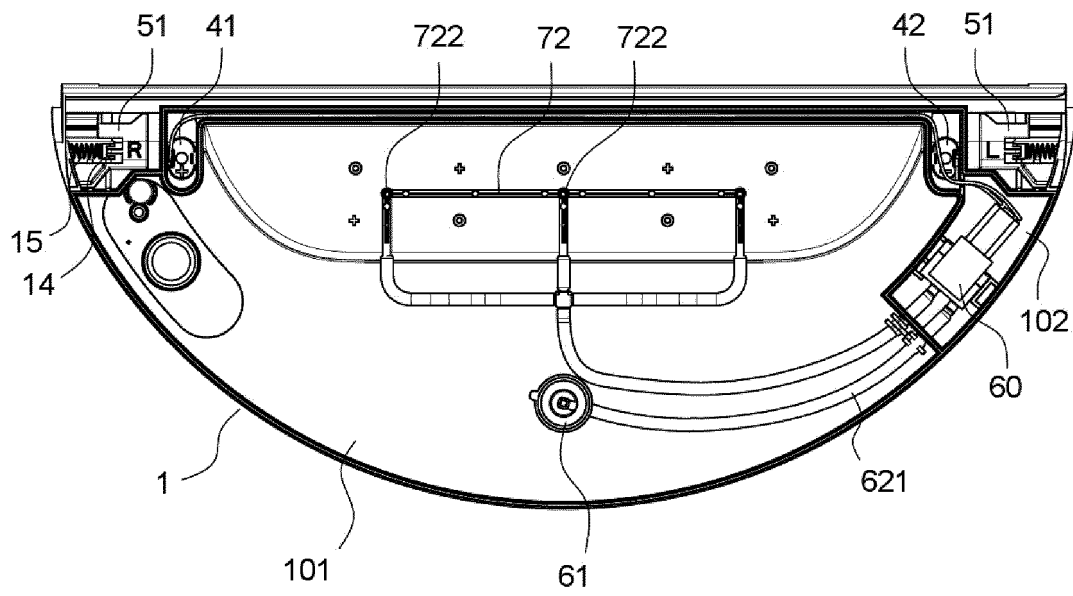


FIG. 9

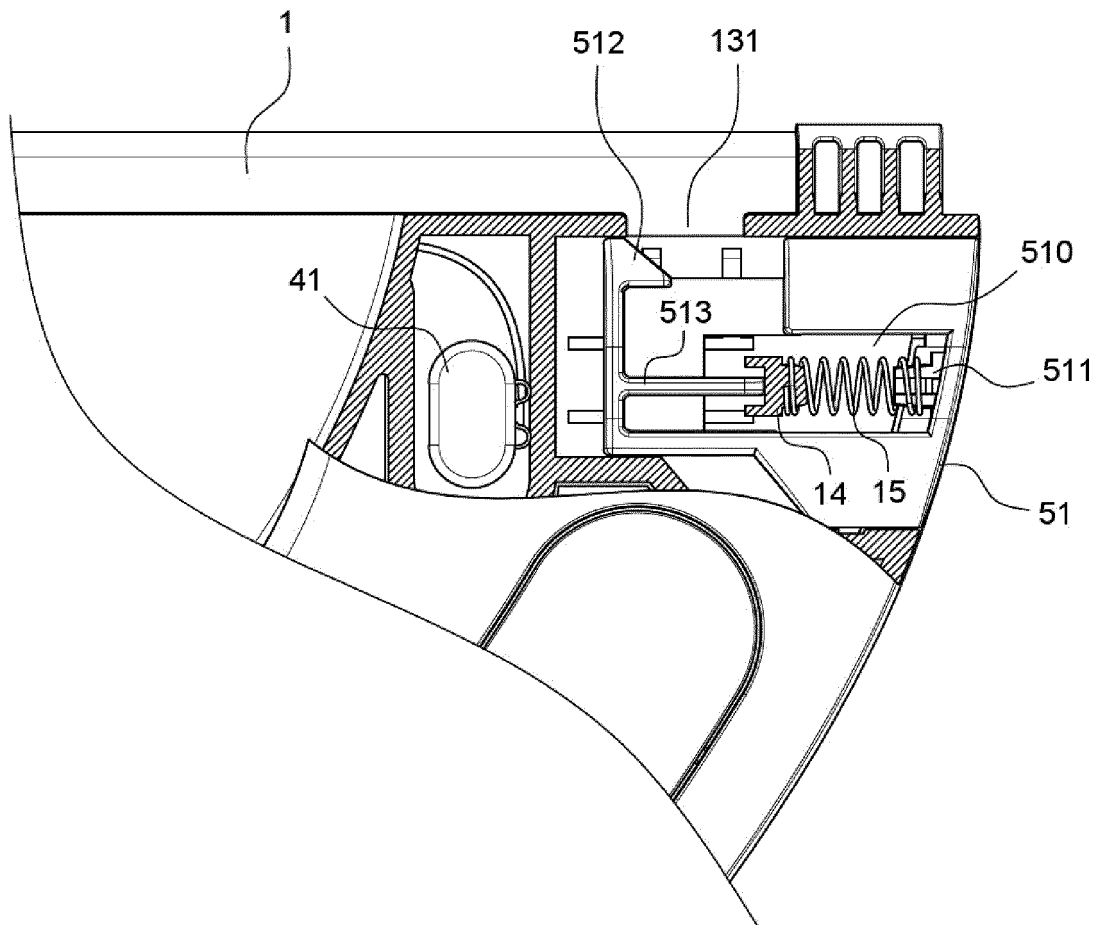


FIG. 10

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2019/120428

A. CLASSIFICATION OF SUBJECT MATTER A47L 11/40(2006.01)i According to International Patent Classification (IPC) or to both national classification and IPC	B. FIELDS SEARCHED																		
Minimum documentation searched (classification system followed by classification symbols) A47L; B25J	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) CNABS, CNTXT, VEN: 拖地, 抹地, 擦地, 洗地, 清洁, 清扫, 抹布, 毛巾, 拖布, 布, 水箱, 贴压, 下压, 贴紧, 贴合, 压力, 弹簧, 弹性, 弹力, 拉簧, 钩, 翻转, 板, clean+, floor+, ground, sweep+, towel+, cloth+, rag, mop+, water, tank, chamber, press+, down, spring, tension+, clasp, reversal, board																			
C. DOCUMENTS CONSIDERED TO BE RELEVANT																			
<table border="1"> <thead> <tr> <th>Category*</th> <th>Citation of document, with indication, where appropriate, of the relevant passages</th> <th>Relevant to claim No.</th> </tr> </thead> <tbody> <tr> <td>PX</td> <td>CN 110353582 A (ZHUICHUANG TECH SUZHOU CO., LTD.) 22 October 2019 (2019-10-22) description, paragraphs 20-32, figures 1-10</td> <td>1-10</td> </tr> <tr> <td>Y</td> <td>CN 206285061 U (NINGBO KLINSMANN INTELLIGENT TECHNOLOGY CO., LTD.) 30 June 2017 (2017-06-30) description, paragraphs 22-28, and figures 1-4</td> <td>1, 4-5</td> </tr> <tr> <td>Y</td> <td>CN 108372508 A (ZHEJIANG JIWO INTELLIGENT TECH CO., LTD.) 07 August 2018 (2018-08-07) description, paragraphs 17-26, figures 1-10</td> <td>1, 4-5</td> </tr> <tr> <td>A</td> <td>CN 207545024 U (LI, Weiguang) 29 June 2018 (2018-06-29) entire document</td> <td>1-10</td> </tr> <tr> <td>A</td> <td>CN 207253312 U (GUANGZHOU DKN ELECTRONIC TECHNOLOGY CO., LTD.) 20 April 2018 (2018-04-20) entire document</td> <td>1-10</td> </tr> </tbody> </table>	Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.	PX	CN 110353582 A (ZHUICHUANG TECH SUZHOU CO., LTD.) 22 October 2019 (2019-10-22) description, paragraphs 20-32, figures 1-10	1-10	Y	CN 206285061 U (NINGBO KLINSMANN INTELLIGENT TECHNOLOGY CO., LTD.) 30 June 2017 (2017-06-30) description, paragraphs 22-28, and figures 1-4	1, 4-5	Y	CN 108372508 A (ZHEJIANG JIWO INTELLIGENT TECH CO., LTD.) 07 August 2018 (2018-08-07) description, paragraphs 17-26, figures 1-10	1, 4-5	A	CN 207545024 U (LI, Weiguang) 29 June 2018 (2018-06-29) entire document	1-10	A	CN 207253312 U (GUANGZHOU DKN ELECTRONIC TECHNOLOGY CO., LTD.) 20 April 2018 (2018-04-20) entire document	1-10	☒ Further documents are listed in the continuation of Box C. ☒ See patent family annex. * Special categories of cited documents: “A” document defining the general state of the art which is not considered to be of particular relevance “E” earlier application or patent but published on or after the international filing date “L” document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) “O” document referring to an oral disclosure, use, exhibition or other means “P” document published prior to the international filing date but later than the priority date claimed “T” later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention “X” document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone “Y” document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art “&” document member of the same patent family
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.																	
PX	CN 110353582 A (ZHUICHUANG TECH SUZHOU CO., LTD.) 22 October 2019 (2019-10-22) description, paragraphs 20-32, figures 1-10	1-10																	
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A	CN 207545024 U (LI, Weiguang) 29 June 2018 (2018-06-29) entire document	1-10																	
A	CN 207253312 U (GUANGZHOU DKN ELECTRONIC TECHNOLOGY CO., LTD.) 20 April 2018 (2018-04-20) entire document	1-10																	
Date of the actual completion of the international search 19 April 2020	Date of mailing of the international search report 24 April 2020																		
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 Facsimile No. (86-10)62019451	Authorized officer Telephone No.																		

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International application No. PCT/CN2019/120428

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C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	CN 109730588 A (SHENZHEN H&T INTELLIGENT CONTROL CO., LTD.) 10 May 2019 (2019-05-10) entire document	1-10
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CN 110353582 A	22 October 2019	None	
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