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(54) **CLEANING ROBOT MAINTENANCE SYSTEM AND CONTROL METHOD THEREFOR**

(57) The disclosure provides a cleaning robot maintenance system. The maintenance system includes a mop picking device and a first storage compartment, where the first storage compartment is configured to store at least two first sheet mops that are stacked; and the mop picking device is configured to pick a single first sheet mop from the first storage compartment, to connect the single first sheet mop and a mop board. Therefore, dirt is prevented from being left on a mop component of the cleaning robot and the base station during cleaning, thereby improving the user experience.

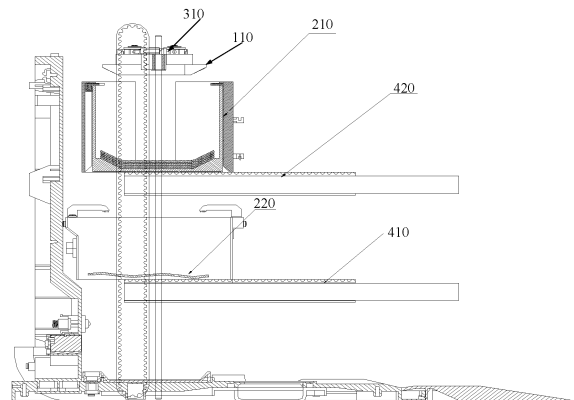


FIG. 43

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Description

BACKGROUND

Technical Field

[0001] The present disclosure relates to the technical field of robots, and in particular, to a cleaning robot maintenance system and a control method therefor.

Related Art

[0002] With the development of science and technology, robots, especially cleaning robots, are playing a more important role in people's life, freeing people from heavy housework. Cleaning robots having mopping and wiping functions are widely popular among users due to high applicability.

[0003] For the cleaning robots having the mopping and wiping functions, a mop is generally arranged at the bottom of a mop component of the cleaning robot, so that the cleaning robot can drive the mop to clean a working region by moving. Currently, to improve intelligence of the cleaning robot, a base station of the cleaning robot also has an automatic cleaning function. When the cleaning robot returns to the base station after working in the working region for a period of time, the cleaning robot may be cleaned by an automatic cleaning system arranged in the base station.

[0004] However, for such a solution of automatically cleaning cleaning robots, dirt will be left on the mop component of the cleaning robot and the base station during cleaning, reducing the user experience.

SUMMARY

[0005] In view of this, embodiments of the present disclosure provide a cleaning robot maintenance system, to reduce the generation of dirt at a mop component and a base station due to cleaning of a cleaning robot.

[0006] According to a first aspect, a cleaning robot maintenance system is provided, the maintenance system including:

a base station, configured to maintain a cleaning robot, where the base station includes a first storage compartment, and the first storage compartment is configured to store at least two first sheet mops that are stacked; and

a mop picking device, configured to pick a single first sheet mop from the first storage compartment, to connect the single first sheet mop and a mop board.

[0007] In a possible implementation, the mop picking device includes the mop board, the mop board and the first storage compartment are configured to move relative to each other, so that the mop board can extend into the

first storage compartment and reach a mop connection position and is connected to the first sheet mop.

[0008] In a possible implementation, when the mop board is connected to the first sheet mop, the first storage compartment does not move actively, and the mop board actively moves towards the first storage compartment and moves into the first storage compartment.

[0009] In a possible implementation, the mop board is mounted on the cleaning robot; and when the mop board is connected to the first sheet mop, the cleaning robot does not move actively, and the mop board actively moves towards the first storage compartment relative to the cleaning robot.

[0010] In a possible implementation, when the mop board is connected to the first sheet mop, both the first storage compartment and the mop board actively move.

[0011] In a possible implementation, the mop picking device further includes a movable component, configured to drive the mop board to move; and the mop board is connected to the cleaning robot in an assemble and disassemble manner, and the mop board is separable from the cleaning robot, so that when the cleaning robot needs to replace a mop, the separated mop board may be driven by the movable component to extend into the first storage compartment.

[0012] In a possible implementation, the maintenance system includes a mop board operating position, configured for the cleaning robot to separate the mop board.

[0013] In a possible implementation, the mop connection position or the first storage compartment is higher than the mop board operating position, to form a space for the cleaning robot to dock.

[0014] In a possible implementation, the mop board is configured to pick the single first sheet mop from the first storage compartment in a direction perpendicular to a mopping side of the first sheet mop.

[0015] In a possible implementation, an angle of less than 90 degrees is formed between a lower surface of the mop board and the mopping side of the first sheet mop.

[0016] In a possible implementation, the angle between the lower surface of the mop board and the mopping side of the first sheet mop is greater than or equal to 0 degrees and less than or equal to 35 degrees.

[0017] In a possible implementation, the first storage compartment includes a bottom portion configured to carry the mopping side of the first sheet mop, where an angle is formed between the bottom portion and a horizontal plane, and the angle is greater than or equal to 0 degrees and less than or equal to 45 degrees.

[0018] In a possible implementation, the mop board is provided with a connection region used for connecting the first sheet mop, where the connection region includes a pasting portion, and the first sheet mop may be pasted to the pasting portion, to connect the mop board and the first sheet mop.

[0019] In a possible implementation, the mop picking device includes a first movable mechanism, configured

to drive the mop board to shake after the first sheet mop is pasted to the mop board, so that the single first sheet mop is pasted on the pasting portion of the mop board, where the shaking means a reciprocating motion of the mop board in a first direction and a second direction, and the first direction is a direction in which the mop board picks out the first sheet mop from the first storage compartment, and the second direction is opposite to the first direction.

[0020] In a possible implementation, the first storage compartment is provided with a friction component, where after the first sheet mop is pasted to the mop board, the friction component is configured to generate an action force for preventing the mop board from moving in the first direction, so that the single first sheet mop can be pasted on the pasting portion of the mop board; and the first direction is a direction in which the mop board picks out the first sheet mop from the first storage compartment.

[0021] In a possible implementation, the first storage compartment is further provided with a separation component, configured to generate a gap between two adjacent first sheet mops.

[0022] In a possible implementation, the pasting portion includes a first part in contact with the first sheet mop and/or a second part exposed outside the first sheet mop, where an angle formed between the first part and the first sheet mop is greater than or equal to 0 degrees and less than or equal to 15 degrees; and an angle formed between the second part and the first sheet mop is greater than 0 degrees and less than 90 degrees.

[0023] In a possible implementation, the mop board includes a top portion, a bottom portion, and a side wall connecting the top bottom and the bottom portion, where the side wall is inclined from the bottom portion towards the top portion, the pasting portion includes a second part exposed outside the first sheet mop, and the second part of the pasting portion is arranged on the inclined side wall.

[0024] In a possible implementation, a ratio of an area of the pasting portion to an area of the first sheet mop falls within a preset range, so that the mop board can pick the single first sheet mop through pasting from a first sheet mop combination.

[0025] In a possible implementation, the mop picking device includes a separation mechanism, configured to separate a single first sheet mop from the at least two first sheet mops stacked in the first storage compartment, so that the mop board is connected to the separated single first sheet mop.

[0026] In a possible implementation, the mop picking device further includes a transfer mechanism, configured to transfer the separated single first sheet mop to a preset transfer position, so that the mop board is connected to the single first sheet mop.

[0027] In a possible implementation, the separation mechanism includes a paper suction device, configured to suck the first sheet mop at a mop suction position,

where the mop suction position is a position where the paper suction device can suck out the single first sheet mop.

[0028] In a possible implementation, the separation mechanism includes a fluid conveying device, configured to convey a fluid to a top surface of the at least two stacked first sheet mops, so that a first sheet mop at the top is separated from the at least two first sheet mop.

[0029] In a possible implementation, the mop picking device further includes a removal mechanism, and the mop board includes a removal region, where the paper removal mechanism cooperates with the removal region to remove a second sheet mop from the mop board, and the removal region is not connected to the second sheet mop.

[0030] In a possible implementation, the dislodging mechanism is configured to remove the second sheet mop in a removal direction, where an acute angle, a right angle, or an obtuse angle is formed between the removal direction and a mopping side of the second sheet mop or the mop board.

[0031] In a possible implementation, the dislodging mechanism is configured to apply an external force away from the mop board to the second sheet mop, and the second sheet mop falls under the action of gravity or the external force after being separated from the mop board.

[0032] In a possible implementation, when the second sheet mop is removed from the mop board, the cleaning robot does not move actively, and the mop board or the dislodging mechanism moves actively.

[0033] In a possible implementation, the maintenance system further includes a second storage compartment, configured to receive the second sheet mop removed from the mop board.

[0034] In a possible implementation, the second storage compartment is configured to be provided on a moving path of the second sheet mop removed from the mop board, so that the second sheet mop falls into the second storage compartment.

[0035] In a possible implementation, the removal mechanism is arranged on the second storage compartment.

[0036] In a possible implementation, the removal mechanism is mounted at a preset mop removal position, the mop removal position is located outside the second storage compartment, and the removal mechanism is configured to remove the second sheet mop from the mop board at the mop removal position and the second sheet mop is received by the second storage compartment.

[0037] In a possible implementation, the maintenance system includes a mop board operating position, configured for the cleaning robot to separate the mop board, where the mop removal position or the second storage compartment is higher than the mop board operating position, to form a space for the cleaning robot to dock.

[0038] In a possible implementation, the removal region includes a mop removal groove, and an outer edge

of the mop board is recessed towards the inside of the mop board, to form the mop removal groove.

[0039] In a possible implementation, the mop board includes at least a first state and a second state, where the mop board is at a mopping position in the first state; and the mop board is at a non-mopping position in the second state, where

the non-mopping position is higher than the mopping position, to provide an operation space for removal of the second sheet mop or mounting of the first sheet mop.

[0040] In a possible implementation, the first storage compartment and the second storage compartment are arranged up and down in a vertical direction.

[0041] According to a second aspect, the present disclosure further provides a control method for a cleaning robot maintenance system, the method including: providing a first storage compartment to store at least two first sheet mops that are stacked; and picking a single first sheet mop from the first storage compartment by using a mop picking device, to connect the single first sheet mop and a mop board.

[0042] In a possible implementation, the mop picking device includes the mop board; and the step of picking a single first sheet mop from the first storage compartment by using a mop picking device includes: controlling at least one of the mop board and the first storage compartment to move, so that the mop board can extend into the first storage compartment and reach a mop connection position and is connected to the first sheet mop.

[0043] In a possible implementation, the mop picking device includes a first movable mechanism, connected to the mop board; and the step of controlling at least one of the mop board and the first storage compartment to move includes: driving, by using the first movable mechanism, the mop board to move towards the first storage compartment and extend into the first storage compartment.

[0044] In a possible implementation, the mop board is mounted on the cleaning robot; and when the mop board is connected to the first sheet mop, the cleaning robot does not move actively, and the mop board actively moves towards the first storage compartment relative to the cleaning robot.

[0045] In a possible implementation, the mop picking device includes a first movable mechanism, connected to the mop board; the system further includes a third movable mechanism, connected to the first storage compartment; and the step of controlling at least one of the mop board and the first storage compartment to move includes: driving, by using the first movable mechanism, the mop board to move and driving, by using the third movable mechanism, the first storage compartment to move.

[0046] In a possible implementation, the mop picking device further includes a first movable mechanism, configured to drive the mop board to move; the mop board is detachably connected to the cleaning robot; the mop board is separable from the cleaning robot; and the method

further includes: causing the mop board to be separated from the cleaning robot when the cleaning robot needs to replace a mop, and connecting the first movable mechanism and the separated mop board, to drive the mop board to extend into the first storage compartment by using the first movable mechanism.

[0047] In a possible implementation, before the step of connecting the first movable mechanism and the separated mop board, the method further includes: pre-positioning the first movable mechanism and the mop board by magnetic attraction.

[0048] In a possible implementation, the maintenance system includes a mop board operating position, configured for the cleaning robot to separate the mop board; and the method further includes: causing the mop board to be separated from the cleaning robot when it is determined that the cleaning robot reaches the mop board operating position.

[0049] In a possible implementation, the mop connection position or the first storage compartment is higher than the mop board operating position, to form a space for the cleaning robot to dock.

[0050] In a possible implementation, the step of picking a single first sheet mop from the first storage compartment by using a mop picking device includes: controlling the mop board to pick the single first sheet mop from the first storage compartment in a direction perpendicular to a mopping side of the first sheet mop.

[0051] In a possible implementation, an angle is formed between a lower surface of the mop board and the mopping side of the first sheet mop, and the angle is less than 90 degrees.

[0052] In a possible implementation, the mop board is provided with a connection region used for connecting the first sheet mop, where the connection region includes a pasting portion, and the first sheet mop may be pasted to the pasting portion, to connect the mop board and the first sheet mop.

[0053] In a possible implementation, the mop picking device includes a first movable mechanism, connected to the mop board; and the method further includes: controlling the first movable mechanism to drive the mop board to shake after the first sheet mop is pasted to the mop board, so that the single first sheet mop is pasted on the pasting portion of the mop board, where the shaking means a reciprocating motion of the mop board in a first direction and a second direction, and the first direction is a direction in which the mop board picks out the first sheet mop from the first storage compartment, and the second direction is opposite to the first direction.

[0054] In a possible implementation, the first storage compartment is provided with a friction component; and the method further includes: generating a reaction force by using the friction component after the first sheet mop is pasted to the mop board and when the mop board moves in a first direction, so that the single first sheet mop can be pasted on the pasting portion of the mop board, where the first direction is a direction in which the

mop board picks out the first sheet mop from the first storage compartment.

[0055] In a possible implementation, the first storage compartment is further provided with a separation component, configured to generate a gap between two adjacent first sheet mops.

[0056] In a possible implementation, the pasting portion includes a first part in contact with the first sheet mop and/or a second part exposed outside the first sheet mop, where an angle formed between the first part and the first sheet mop is greater than or equal to 0 degrees and less than or equal to 10 degrees; and an angle formed between the second part and the first sheet mop is greater than 0 degrees and less than 90 degrees.

[0057] In a possible implementation, the mop board includes a top portion, a bottom portion, and a side wall connecting the top bottom and the bottom portion, where the side wall is inclined from the bottom portion towards the top portion, and the pasting portion is arranged on the inclined side wall.

[0058] In a possible implementation, a ratio of an area of the pasting portion to an area of the first sheet mop falls within a preset range, so that the mop board can pick the single first sheet mop through pasting from a first sheet mop combination.

[0059] In a possible implementation, the mop picking device includes a separation mechanism; and the method includes: separating, by using the separation mechanism, a single first sheet mop from the at least two first sheet mops stacked in the first storage compartment, so that the mop board is connected to the separated single first sheet mop.

[0060] In a possible implementation, the mop picking device includes a transfer mechanism; and the method includes: transferring the single first sheet mop to a preset transfer position by using the transfer mechanism, so that the mop board is connected to the single first sheet mop.

[0061] In a possible implementation, the separation mechanism includes a paper suction device; and the method includes: controlling the paper suction device to suck the first sheet mop at a mop suction position, where the mop suction position is a position where the paper suction device can suck out the single first sheet mop.

[0062] In a possible implementation, the separation mechanism includes: a fluid conveying device; and the method includes: controlling the fluid conveying device to convey a fluid to the first storage compartment, so that the first sheet mop at the top is separated from the at least two first sheet mops.

[0063] In a possible implementation, the method further includes: when a second sheet mop is mounted on the mop board, separating the second sheet mop and the mop board.

[0064] In a possible implementation, the maintenance system includes a removal mechanism, and the mop board includes a removal region, where the removal region is not connected to the second sheet mop; and the step of separating the second sheet mop and the mop

board includes: controlling at least one of the removal mechanism or the mop board to move, to remove the second sheet mop from the mop board.

[0065] In a possible implementation, the step of separating the second sheet mop and the mop board includes: removing the second sheet mop by using the dislodging mechanism in a removal direction, where an acute angle, a right angle, or an obtuse angle is formed between the removal direction and a mopping side of the second sheet mop or the mop board.

[0066] In a possible implementation, the step of separating the second sheet mop and the mop board includes: applying an external force away from the mop board to the second sheet mop by using the dislodging mechanism, so that the second sheet mop falls under the action of gravity or the external force after being separated from the mop board, and the second sheet mop is removed from the mop board.

[0067] In a possible implementation, when the second sheet mop is removed from the mop board, the cleaning robot does not move actively, and the mop board or the dislodging mechanism moves actively.

[0068] In a possible implementation, the system further includes a second storage compartment, configured to receive the second sheet mop removed from the mop board; and the step of separating the second sheet mop and the mop board includes: applying an external force away from the mop board to the second sheet mop by using the dislodging mechanism, to separate the second sheet mop and the mop board, so that the second sheet mop falls into the second storage compartment under the action of gravity or the external force after being separated from the mop board.

[0069] In a possible implementation, the removal mechanism is arranged on the second storage compartment.

[0070] In a possible implementation, the system includes a second movable mechanism, connected to the second storage compartment; the removal mechanism is mounted at a preset mop removal position, and the mop removal position is located outside the second storage compartment; and the method includes: driving the second storage compartment to move to the mop removal position by using the second movable mechanism, to receive the second sheet mop separated from the mop board.

[0071] In a possible implementation, the removal region includes a mop removal groove, and an outer edge of the mop board is recessed towards the inside of the mop board, to form the mop removal groove.

[0072] In a possible implementation, the mop board includes at least a first state and a second state, where the mop board is at a mopping position in the first state; and the mop board is at a non-mopping position in the second state, where the non-mopping position is higher than the mopping position, to provide an operation space for removal of the second sheet mop or mounting of the first sheet mop.

[0073] In a possible implementation, the mop removal position or the second storage compartment is higher than the mop board operating position, to form a space for the cleaning robot to dock.

[0074] In a possible implementation, the first storage compartment and the second storage compartment are arranged up and down in a vertical direction.

[0075] In a possible implementation, the first storage compartment is located above the second storage compartment.

[0076] According to a third aspect, the present disclosure further provides a method for replacing a mop of a cleaning robot, including:

determining that a cleaning robot has returned to a base station; and

controlling a mop picking device to replace a second sheet mop mounted on the cleaning robot with a first sheet mop in a first storage compartment.

[0077] In a possible implementation, the step of determining that a cleaning robot has returned to a base station includes:

determining that the cleaning robot reaches a mop board operating position, and controlling the cleaning robot to remove the mop board.

[0078] In a possible implementation, the mop picking device includes a first movable mechanism, configured to drive the mop board to move; and the step of controlling a mop picking device to replace a second sheet mop mounted on the cleaning robot with a first sheet mop in a first storage compartment includes: controlling the first movable mechanism to drive the mop board to move to a mop removal position, so as to remove the second sheet mop, and storing the second sheet mop into a second storage compartment configured to recycle the second sheet mop; and controlling the first movable mechanism to drive the mop board to move to a mop mounting position and extend into the first storage compartment, and mounting the first sheet mop on the mop board.

[0079] According to the solution provided by the present disclosure, when the cleaning robot requires mop maintenance, an unused first sheet mop may be replaced for the cleaning robot, to make the cleaning robot clean without the need to perform the process of cleaning the cleaning robot in a conventional cleaning robot maintenance system, thereby avoiding leaving dirt left on the mop component of the cleaning robot and the base station during cleaning, and improving the user experience.

BRIEF DESCRIPTION OF THE DRAWINGS

[0080]

FIG. 1 is a schematic architectural diagram of a cleaning robot maintenance system to which embodiments of the present disclosure are applicable.

FIG. 2 is a schematic diagram in which a cleaning robot returns to a base station according to an embodiment of the present disclosure.

FIG. 3 is a schematic diagram in which a connecting portion 311 is connected to a mop board 110 according to an embodiment of the present disclosure.

FIG. 4 is a schematic diagram in which a cleaning robot exits or semi exits a base station according to an embodiment of the present disclosure.

FIG. 5 is a schematic diagram in which a removal mechanism removes a second sheet mop according to an embodiment of the present disclosure.

FIG. 6 is a schematic diagram in which a removal mechanism removes a second sheet mop according to an embodiment of the present disclosure.

FIG. 7 is a schematic diagram in which a removal mechanism removes a second sheet mop according to another embodiment of the present disclosure.

FIG. 8 is a schematic diagram in which a removal mechanism removes a second sheet mop according to another embodiment of the present disclosure.

FIG. 9 is a schematic diagram of a mop board according to an embodiment of the present disclosure.

FIG. 10 is a schematic diagram of a mop board according to another embodiment of the present disclosure.

FIG. 11 is a schematic diagram of a cleaning robot maintenance system after removal is completed according to an embodiment of the present disclosure.

FIG. 12 is a schematic diagram of a cleaning robot maintenance system when a first sheet mop is mounted according to an embodiment of the present disclosure.

FIG. 13 is a schematic diagram of a cleaning robot maintenance system when a first sheet mop is mounted according to another embodiment of the present disclosure.

FIG. 14 is a schematic diagram of a cleaning robot maintenance system when a first sheet mop is mounted according to another embodiment of the present disclosure.

FIG. 15 is a schematic diagram of a cleaning robot maintenance system after mounting is completed according to an embodiment of the present disclosure.

FIG. 16 is a schematic diagram of a robot system after mounting is completed and when a cleaning robot enters a base station according to an embodiment of the present disclosure.

FIG. 17 is a schematic diagram of a base station 500 according to an embodiment of the present disclosure.

FIG. 18 is a schematic diagram in which a cleaning robot enters a base station according to another embodiment of the present disclosure.

FIG. 19 is a schematic diagram in which a cleaning robot exits a base station according to another embodiment of the present disclosure.

FIG. 20 is a schematic diagram in which a first movable mechanism is connected to a mop board according to another embodiment of the present disclosure.

FIG. 21 is a schematic diagram in which a mop board moves to a mop removal position according to another embodiment of the present disclosure.

FIG. 22 is a schematic diagram in which a removal mechanism removes a mop according to another embodiment of the present disclosure.

FIG. 23 is a schematic diagram in which a removal operation is completed according to another embodiment of the present disclosure.

FIG. 24 is a schematic diagram in which a first sheet mop is pasted according to another embodiment of the present disclosure.

FIG. 25 is a schematic diagram of pasting of a first sheet mop is completed according to another embodiment of the present disclosure.

FIG. 26 is a schematic diagram in which a mop board is squeezed by using a flexible abutting portion according to another embodiment of the present disclosure.

FIG. 27 is a schematic diagram in which a first movable mechanism is disconnected from a mop board according to another embodiment of the present disclosure.

FIG. 28 is a schematic diagram in which a cleaning robot is connected to a mop board according to another embodiment of the present disclosure.

FIG. 29 is a flowchart of a control method according to an embodiment of the present disclosure.

FIG. 30 is a schematic diagram of a control apparatus according to an embodiment of the present disclosure.

FIG. 31 is a schematic diagram of a controller according to another embodiment of the present disclosure.

FIG. 32 is a schematic diagram in which a cleaning robot enters a base station according to still another embodiment of the present disclosure.

FIG. 33 is a schematic diagram in which a cleaning robot is separated with a mop board according to still another embodiment of the present disclosure.

FIG. 34 is a schematic diagram in which a cleaning robot exits a base station according to still another embodiment of the present disclosure.

FIG. 35 is a schematic diagram in which a first movable mechanism falls down according to still another embodiment of the present disclosure.

FIG. 36 is a schematic diagram of a connection structure between a first movable mechanism and a mop board according to still another embodiment of the present disclosure.

FIG. 37 is a schematic diagram in which a first movable mechanism is connected to a mop board according to still another embodiment of the present disclosure.

FIG. 38 is a schematic diagram in which a mop board moves to a mop removal position according to still another embodiment of the present disclosure.

FIG. 39 is a schematic diagram in which a second storage compartment moves to a mop removal position according to still another embodiment of the present disclosure.

FIG. 40 is a schematic diagram of removal of a mop according to still another embodiment of the present disclosure.

FIG. 41 is a schematic diagram in which a removal mechanism removes a mop according to still another embodiment of the present disclosure.

FIG. 42 is a schematic diagram in which a mop board moves to a mop pasting position according to still another embodiment of the present disclosure.

FIG. 43 is a schematic diagram in which a first storage compartment moves to a mop pasting position according to still another embodiment of the present

disclosure.

FIG. 44 is a schematic diagram in which a first sheet mop is pasted according to still another embodiment of the present disclosure.

FIG. 45 is a schematic diagram in which a pasting operation is completed according to still another embodiment of the present disclosure.

FIG. 46 is a schematic diagram in which a first storage compartment resets according to still another embodiment of the present disclosure.

FIG. 47 is a schematic diagram in which a mop board moves to a mop board releasing position according to still another embodiment of the present disclosure.

FIG. 48 is a side view of FIG. 47.

FIG. 49 is a schematic diagram in which a mop board is disconnected from a first movable mechanism according to still another embodiment of the present disclosure.

FIG. 50 is a schematic diagram of releasing of a mop board according to still another embodiment of the present disclosure.

FIG. 51 is a schematic diagram in which a cleaning robot is connected to a mop board according to still another embodiment of the present disclosure.

FIG. 52 is a schematic diagram of a mop picking process according to the present disclosure. FIG. 52(a) is a schematic diagram of a state before a mop board is connected to a mop. FIG. 52(b) is a schematic diagram of a state in which a mop board is connected to a mop. FIG. 53 (c) is a schematic diagram of a state after a mop board is connected to a mop.

FIG. 53 is a schematic diagram in which a removal mechanism is arranged on a second storage compartment according to still another embodiment of the present disclosure.

FIG. 54 is a schematic structural diagram of a first storage compartment according to still another embodiment of the present disclosure.

FIG. 55 is a schematic structural diagram of a mop board according to still another embodiment of the present disclosure.

FIG. 56 is a schematic diagram of a first connected state between a mop board and a mop according to the present disclosure.

FIG. 57 is a schematic diagram of a second connected state between a mop board and a mop according to the present disclosure.

FIG. 58 is a flowchart of a control method according to still another embodiment of the present disclosure.

FIG. 59 is a schematic diagram of removal of a mop according to still another embodiment of the present disclosure.

DETAILED DESCRIPTION

[0081] The following clearly and completely describes the technical solutions in the embodiments of this application with reference to the accompanying drawings in the embodiments of this application. Apparently, the described embodiments are some embodiments of this application rather than all of the embodiments.

[0082] First, some terms involved in the present disclosure are described.

[0083] Picking should be understood in a broad sense, for example, that a mop picking device picks a first sheet mop from a first storage compartment may be that the mop picking device actively moves towards the first storage compartment for picking, or may be that the first storage compartment actively moves towards the mop picking device for picking, or may be that the mop picking device and the first storage compartment respectively move to a specific position for picking. A mop board may be directly connected to a mop or through an additionally arranged third-party mechanism. A picking direction may be from top to bottom or may be from bottom to top; or may be from left to right or may be from right to left; or certainly may be in another direction. Various picking solutions for connecting a single mop and the mop board should be within the protection scope of the present disclosure.

[0084] Active movement or non-active movement: generally, the active movement means a movement controlled by a controller (for example, under driving of a movable mechanism or a driving mechanism), and the non-active movement means a movement or a displacement that is not controlled by the controller. For ease of understanding, the non-active movement is simply described by using a movement of the first storage compartment as an example. When the mop board and the first storage compartment move relative to each other, to pick a mop from the first storage compartment, under the action of an action force generated when the mop board is connected to the first sheet mop in the first storage compartment, the first storage compartment may have a movement or displacement, and the movement or displacement is not controlled by the controller. In this case, the movement of the first storage compartment is the non-active movement.

[0085] Currently, for a cleaning robot maintenance system having mopping and wiping functions, after a

cleaning robot returns to a base station after working for a period of time, the cleaning robot is cleaned by an automatic cleaning system arranged in the base station. However, for such a solution of automatically cleaning the cleaning robot, dirt will be left on the mop component of the cleaning robot and the base station during cleaning, reducing the user experience.

[0086] The present disclosure provides a solution of cleaning a cleaning robot, after a cleaning robot returns to a base station, an unused sheet mop may be replaced for the cleaning robot to make the cleaning robot clean without the need to perform the process of cleaning the cleaning robot in a conventional cleaning robot maintenance system, thereby avoiding leaving dirt on the mop component of the cleaning robot and the base station during cleaning, and improving the user experience.

[0087] The present disclosure provides a cleaning robot maintenance system. The maintenance system includes a mop picking device and a first storage compartment, where the first storage compartment is configured to store at least two first sheet mops that are stacked; and the mop picking device is configured to pick a single first sheet mop from the first storage compartment, to connect the single first sheet mop and a mop board.

[0088] To facilitate maintenance, the first storage compartment may be arranged on a base station. In addition, the mop picking device may be arranged on the base station or may be arranged on a cleaning robot, or may be additionally arranged.

[0089] It should be noted that "stacking" mentioned in this specification may be partially overlapping or may be completely overlapping, that is, when there are at least two first sheet mops, the first sheet mops at least partially overlap during arrangement.

[0090] It may be understood that when the first sheet mops partially overlap, the mop picking device adaptively adjusts a picking position when picking a mop, to pick a corresponding first sheet mop, that is, the first sheet mops may have different placing positions, the mop picking device may have different picking positions, and the picking positions correspond to the placing positions, so as to pick out the corresponding first sheet mop. Preferably, when the first sheet mops completely overlap, on one hand, a space occupied by the mops is reduced, for example, a space of the first storage compartment may be reduced, on the other hand, because the mop may be picked at a same position each time, it is simple and convenient to pick the mop each time.

[0091] Considering how to pick out one mop from the plurality of stacked mops, in an implementation of the present disclosure, the mop picking device includes a mop board, and the mop board and the first storage compartment are configured to move relative to each other, so that the mop board can extend into the first storage compartment and is connected to the first sheet mop. For example, the mop board moves into the first storage compartment and reaches a mop connection position and is connected to the first sheet mop.

[0092] The mop connection position may be a position where the mop board is in contact with the first sheet mop or a position where the mop board can be connected to or engaged with the first sheet mop.

[0093] It may be understood that when the mop connection position is the position where the mop board is in contact with the first sheet mop, the mop connection position is changeable with the picking out of the mop. For example, when no gap exists between two adjacent mops, the mop connection position may change by a thickness of one mop each time the mop is picked out. In addition, when a gap exists between two adjacent mops, the mop connection position may change by a sum of a thickness of one mop and a height of the gap each time the mop is picked out. Based on the foregoing, the mop connection position may change by a thickness of at least one mop each time the mop is picked out.

[0094] The mop board and the first storage compartment cooperate with each other, so that the mop board moves into the first storage compartment to pick out the first sheet mop, so as to connect the mop board and the first sheet mop. In other words, the mop board is directly engaged with the first storage compartment (that is, the mop board moves into the first storage compartment to pick a mop), to connect the mop board and the first sheet mop, thereby simplifying a structure of the maintenance system.

[0095] It should be noted that the relative movement means that at least one of the mop board and the first storage compartment may actively move.

[0096] Therefore, in some implementations, when the mop board is connected to the first sheet mop, the first storage compartment does not move actively, and the mop board actively moves towards the first storage compartment and moves into the first storage compartment.

[0097] That is, when picking a mop, the mop board actively moves towards the first storage compartment to pick the first sheet mop.

[0098] For example, when the mop board is separated from the cleaning robot, the mop board actively moves towards the first storage compartment and moves into the first storage compartment and is connected to the first sheet mop. For ease of understanding, an example in which the first storage compartment is on one side of the mop board is used. The mop board may first move to a position higher than the first storage compartment in a vertical direction, then moves to a position above the first storage compartment in a horizontal direction, and moves into the first storage compartment and is connected to the first sheet mop. It should be noted that when the mop board actively moves towards the first storage compartment, the cleaning robot may perform active movement or may perform non-active movement, which is not limited in this embodiment.

[0099] In another example, when the mop board is mounted on the cleaning robot, that is, the mop board is in a connected state with the cleaning robot, the mop board may also actively move towards the first storage

compartment relative to the cleaning robot and extend into the first storage compartment and be connected to the first sheet mop. When the mop board actively moves towards the first storage compartment, the cleaning robot performs non-active movement, for example, the cleaning robot may remain stationary.

[0100] Based on the foregoing, regardless of whether the mop board is connected to or separated from the cleaning robot, the mop board actively moves towards the mop and is connected to the mop, to reduce the difficulty of connection and improve the reliability and safety of the connection with the mop.

[0101] To implement movement of the mop board, in an embodiment, the mop picking device may further include a movable component, configured to drive the mop board to move; and the mop board is detachably connected to the cleaning robot, and the mop board is separable from the cleaning robot, so that when the cleaning robot needs to replace a mop, the separated mop board may be driven by the movable component to extend into the first storage compartment.

[0102] For example, the movable component may include a first movable mechanism, configured to drive the mop board to move, where the first movable mechanism may include a connecting portion, and the connecting portion is connected to the mop board, to drive the mop board to move.

[0103] In this embodiment, the mop board may be removed from the cleaning robot, the mop picking device connects the mop board and the first sheet mop in the first storage compartment after being connected to the mop board removed from the cleaning robot by using the movable component. That is, after the mop board is removed, the mop is replaced, which has the advantages that the mop board may have a larger movement space after being removed from the cleaning robot, especially when the mop board is removed in the base station, because the base station has a limited space, the mop board moves more conveniently after being removed. In addition, a mop replacement manner is simple and easy to use, which improves the safety and reliability of mounting of the mop. Meanwhile, the cleaning robot may perform other tasks, making the mop board replacement and maintenance processes and the cleaning robot more intelligent.

[0104] Certainly, in another implementation, the mop board may alternatively be connected to or mounted on the cleaning robot without being removed to perform a mop picking operation.

[0105] It should be noted that, the replacement should be understood as removal and mounting, for example, when the mop board has no mop, replacing the mop means mounting the first sheet mop. If the mop board has a second sheet mop, replacing the mop may include removal of the second sheet mop and mounting of the first sheet mop. Whether the cleaning robot needs to replace a mop may be determined by detecting a dirtiness degree of the mop, obtaining a working duration for which

the cleaning robot uses the mop or a cleaning area cleaned by using the mop, receiving a replacement instruction from a user, or the like, and details are not described in this embodiment.

[0106] Considering how to separate the mop, in some implementations, the maintenance system includes a mop board operating position, configured for the cleaning robot to separate the mop board.

[0107] The mop board operating position may be arranged on the base station, to facilitate maintenance of the cleaning robot.

[0108] It should be noted that the mop board operating position may further be configured for the cleaning robot to mount the mop board. Certainly, in another embodiment, an additional mounting position may alternatively be provided for mounting the mop board, which is not limited in this embodiment. In addition, the mop board operating position in this specification may refer to a position or may refer to a region or a space.

[0109] Because the cleaning robot usually stops at a platform at the bottom of the base station for carrying the cleaning robot, further the mop connection position or the first storage compartment is higher than the mop board operating position, to form a space for the cleaning robot to dock.

[0110] The first storage compartment is arranged at a machine stop position or an upper part of the platform of the base station, to reduce an occupation space of the maintenance system or the base station.

[0111] For ease of understanding, the first mop cabin is in a regular shape such as a cube, and the mop connection position and a lowest position of the first storage compartment may be higher than the mop board operating position, to form a space for the cleaning robot to dock. The mop connection position, the first storage compartment, or a moving track of the first storage compartment is located in a projection range of the space for the cleaning robot to dock.

[0112] The lowest position of the first storage compartment is also related to a placement manner of the first storage compartment, for example, when an opening of the first storage compartment is provided upward, the lowest position of the first storage compartment is an outer surface at the bottom of the first storage compartment. In addition, when the opening of the first storage compartment is provided to the left or right, the lowest position of the first storage compartment is an outer surface at a side wall of the first storage compartment.

[0113] When the first storage compartment cannot move, a projection of the first storage compartment on a horizontal ground is located in the projection range of the space for the cleaning robot to dock. When the first storage compartment can move, a projection of the moving track of the first storage compartment on the horizontal ground is located in the projection range of the space for the cleaning robot to dock.

[0114] In this embodiment, the first storage compartment is located above the stop position of the cleaning

robot; or the base station has a position that can store the first storage compartment, and the first storage compartment may be arranged at the position, where the position is a height from the horizontal ground to reserve a stop space for the cleaning robot. The arrangement manner reduces an area occupied by the system and is conducive to miniaturization of the maintenance system.

[0115] In some other implementations, when the mop board is connected to the first sheet mop, both the first storage compartment and the mop board actively move.

[0116] That is, during picking of the mop, both the first storage compartment and the mop board actively move and cooperate with each other, to connect the mop board and the first sheet mop, thereby simplifying a moving track of the mop board of the maintenance system and the complexity of the structure.

[0117] For example, the mop picking device includes the movable component (for example, the first movable mechanism), configured to drive the mop board to move, and the maintenance system includes a third movable mechanism, configured to drive the first storage compartment to move.

[0118] Certainly, when the mop board is connected to the first storage compartment, the first storage compartment may actively move towards the mop board rather than the mop board actively moves.

[0119] Considering a direction in which the mop board picks a mop, in some implementations, the mop board is configured to pick a single first sheet mop from the first storage compartment in a stacking direction of the first sheet mops.

[0120] The stacking direction is a direction perpendicular to a mopping side of the first sheet mop or a direction from a non-mopping side opposite to a mopping side of the first sheet mop to the mopping side of the first sheet mop.

[0121] For example, the mop board is configured to pick the single first sheet mop from the first storage compartment in the direction perpendicular to the mopping side of the first sheet mop. That is, a movement direction of the mop board is perpendicular to the mopping side of the mop, to implement connection and mounting between the mop board and the mop, thereby achieving a simple and convenient connection process and high reliability.

[0122] It may be understood that the mopping side of the first sheet mop is a surface that can be used for performing a mopping work or a surface that is in contact with a ground to be cleaned to perform a cleaning work.

[0123] Considering a placement problem of the mop board in a mop picking direction, to ensure that the mop board can be connected to the mop, in some embodiments, an angle of less than 90 degrees is formed between a lower surface of the mop board and the mopping side of the first sheet mop.

[0124] To improve the stability of connection between the mop board and the mop, further, the angle between the lower surface of the mop board and the mopping side

of the first sheet mop is greater than or equal to 0 degrees and less than or equal to 45 degrees.

[0125] To facilitate connection between the mop board and the mop, in some implementations, a guide device may be arranged in the first storage compartment, to perform connection and positioning when the mop is connected to the mop, so as to prevent a problem of unstable connection or connection failure caused by excessive deviation. Optionally, the guide device may be, for example, a guide column, a sliding groove, or a sliding rail.

[0126] To improve the stability of connection between the mop board and the mop and the connection precision, further the angle between the lower surface of the mop board and the mopping side of the first sheet mop is greater than or equal to 0 degrees and less than or equal to 35 degrees.

[0127] Referring to FIG. 56, a guide device 810 is arranged in a first storage compartment 210, where the guide device 810 adopts a guide column, an angle between a lower surface of a mop board 210 and a mopping side of a first sheet mop is α , and the angle α is greater than or equal to 0 degrees and less than or equal to 35 degrees.

[0128] It should be noted that the angle α between the lower surface of the mop board and the mopping side of the first sheet mop is related to a hole diameter of the guide device (for example, the guide column) and a size of a positioning hole corresponding to the mop board and the guide column.

[0129] Considering a placement direction of the mop cabin in the mop picking direction, in some implementations, the first storage compartment includes a bottom portion configured to carry the mopping side of the first sheet mop, where an angle is formed between the bottom portion and a horizontal plane, and the angle is greater than or equal to 0 degrees and less than or equal to 45 degrees.

[0130] Referring to FIG. 57, the first storage compartment 210 includes a bottom portion 2104 configured to carry the mopping side of the first sheet mop, where an angle β is formed between the bottom portion 2104 and a horizontal plane, and the angle β is greater than or equal to 0 degrees and less than or equal to 45 degrees.

[0131] To facilitate the mop board to pick the mop and improve the reliability of connection between the mop board and the mop, further the angle between the bottom portion and the horizontal plane is greater than or equal to 0 degrees and less than or equal to 30 degrees.

[0132] Considering a manufacturing error of the mop cabin, further the angle between the bottom portion and the horizontal plane is greater than or equal to 0 degrees and less than or equal to 15 degrees.

[0133] Certainly, in another implementation, the mop picking device or the mop board moves into the first storage compartment in a direction of gravity at an angle less than or equal to 15 degrees.

[0134] The mop picking device or the mop board picks the first sheet mop in the direction of gravity or close to

gravity, to avoid a problem that the first sheet mop is placed unstably in another direction or requires an additional fixing device, or that the mop board cannot be accurately connected to the first sheet mop or the stability is poor after the mop board is connected to the first sheet mop due to displacement of the first sheet mop during movement. In addition, in a case that a plurality of mops are brought out when the mop is picked, the redundant mops are returned under the action of gravity, to maintain connection with a single mop.

[0135] Considering a manner of fixing the mop board and the mop, in some implementations, the mop board is provided with a connection region used for connecting the first sheet mop, where the connection region includes a pasting portion, and the first sheet mop may be pasted to the pasting portion, to connect the mop board and the first sheet mop.

[0136] That is, the mop board is connected to the first sheet mop through pasting, so that the mounting is simple, the reliability is high, and the structure of the mop board is simpler.

[0137] Considering an arrangement position of the pasting portion, in some implementations, the pasting portion includes a first part in contact with the first sheet mop and/or a second part exposed outside the first sheet mop, where an angle formed between the first part and the first sheet mop is greater than or equal to 0 degrees and less than or equal to 15 degrees; and an angle formed between the second part and the first sheet mop is greater than 0 degrees and less than 90 degrees.

[0138] The first part may implement face-to-face pasting between the mop board and the first sheet mop. Considering a manufacturing error or the like, the angle formed between the first part and the first sheet mop is greater than or equal to 0 degrees and less than or equal to 15 degrees. The second part causes the first sheet mop to warp through an interaction force between the mop board and the first sheet mop, to implement pasting between the mop board and the first sheet mop, and when the mop board picks the first sheet mop through pasting by using the first part and the second part, the stability of connection between the mop board and the first sheet mop can be improved.

[0139] To facilitate replacement of the mop, in some implementations, the mop board includes a top portion, a bottom portion, and a side wall connecting the top bottom and the bottom portion, where the side wall is inclined from the bottom portion towards the top portion, the pasting portion includes a second part exposed outside the first sheet mop, and the second part of the pasting portion is arranged on the inclined side wall.

[0140] Considering a degree of convenience of pasting, an angle formed between the second part and the first sheet mop is greater than 10 degrees and less than or equal to 60 degrees.

[0141] To improve a pasting effect, the angle formed between the second part and the first sheet mop is greater than or equal to 20 degrees and less than 45 degrees.

[0142] Considering easy mounting, firmness or stability of mounting, and easy removal, preferably, the angle formed between the second part and the first sheet mop is greater than or equal to 25 degrees and less than or equal to 35 degrees.

[0143] In this embodiment, preferably, the angle formed between the second part and the first sheet mop is 30 degrees.

[0144] A problem of sticking out a plurality of mops may be avoided through at least one of the following manners.

[0145] Manner 1. After the mop board is connected to the first sheet mop, a plurality of first sheet mops are prevented from being brought out in a shaking manner.

[0146] For example, the mop picking device includes a first movable mechanism, configured to drive the mop board to shake after the first sheet mop is pasted to the mop board, so that the single first sheet mop is pasted on the pasting portion of the mop board, where the shaking means a reciprocating motion of the mop board in a first direction and a second direction, and the first direction is a direction in which the mop board picks out the first sheet mop from the first storage compartment, and the second direction is opposite to the first direction.

[0147] Manner 2. After the first sheet mop is pasted to the mop board, a plurality of first sheet mops are prevented from being brought out by the mop board in a scraping manner.

[0148] For example, the first storage compartment is provided with a friction component, where after the first sheet mop is pasted to the mop board, the friction component is configured to generate an action force for preventing the mop board from moving in the first direction, so that the single first sheet mop can be pasted on the pasting portion of the mop board; and the first direction is a direction in which the mop board picks out the first sheet mop from the first storage compartment.

[0149] Manner 3. A separation component is arranged in the first storage compartment, to reduce pasting between the first sheet mops, thereby avoiding a problem that a plurality of first sheet mops are brought out when the mop board is connected to the first sheet mop.

[0150] For example, the first storage compartment is provided with a separation component, configured to generate a gap between two adjacent first sheet mops.

[0151] Manner 4. Adhesion between the mop board and the first sheet mop is controlled by controlling a ratio of an area of the pasting portion to an area of the first sheet mop, to avoid a problem that the mop board may pick a plurality of first sheet mops through pasting at a time.

[0152] For example, the ratio of the area of the pasting portion to the area of the first sheet mop falls within a preset range, so that the mop board can pick a single first sheet mop from a first sheet mop combination.

[0153] It should be understood that the preset range is related to factors such as a material used for the pasting portion, a material of a pasting face (or a non-mopping side) of the first sheet mop corresponding to the pasting

portion, and an arrangement position of the pasting portion.

[0154] To reduce the material of the pasting portion, the preset range is set to greater than or equal to 5% and less than or equal to 90%.

[0155] Preferably, the preset range is set to greater than or equal to 5%, and less than or equal to 60%, considering that it is also convenient to remove the mop, the preset range is set to greater than or equal to 5% and less than or equal to 30%.

[0156] An example in which the pasting portion is a hook-and-loop fastener, the pasting face of the mop is fluff, and the pasting portion is arranged at the side wall and the bottom of the mop board is used, and the preset range is 10% to 20%.

[0157] Certainly, in another embodiment, the adhesion between the first sheet mops may further be reduced through a position where the first sheet mops are stacked, for example, two adjacent first sheet mops partially overlap, or the adhesion between two adjacent sheet mops is reduced by considering materials of a surface in which a pasting portion of each first sheet mop is located and a surface in which a non-pasting portion is located.

[0158] For a problem of how to pick out a single mop from a plurality of mops, in another implementation of the present disclosure, the mop picking device may include a separation mechanism, configured to separate a single first sheet mop from the at least two first sheet mops stacked in the first storage compartment, and/or a transfer mechanism, configured to transfer the single first sheet mop to a preset transfer position, so that the mop board is connected to the single first sheet mop.

[0159] The single first sheet mop is picked out from the first storage compartment by separation and/or transfer, and then the single first sheet mop is connected to the mop board, so that a probability that a plurality of mops are picked out by the mop board may be effectively reduced through this indirect connection between the mop board and the mop.

[0160] For example, the mop board may be connected to a single mop through first separation and then transfer, or first transfer and then separation, or separation and transfer simultaneously. The execution sequence of the separation and transfer is related to factors such as a principle, a structure, and a position relationship of the mop picking device.

[0161] In some implementations, the single first sheet mop is separated through suction separation.

[0162] For example, the separation mechanism includes a paper suction device, configured to suck the first sheet mop at a mop suction position, where the mop suction position is a position where the paper suction device can suck out the single first sheet mop.

[0163] It may be understood that the mop suction position also changes as the suction of the sheet mop. For example, when no gap exists between adjacent mops, the mop suction position changes by a thickness of one mop each time the mop is sucked; and when a gap exists

between the adjacent mops, the mop suction position changes by a sum of a thickness of one mop and a height of the gap each time the mop is sucked.

[0164] For example, the mop picking device includes the separation mechanism, if both the mop board and a single mop separated by the separation mechanism are at a connection position, no transfer mechanism is required, that is, separation and transfer are completed simultaneously through the separation mechanism, that is, the separation and the transfer are performed simultaneously. If one of the mop board or the separated single mop is at the connection position, only the other of the mop board or the separated single mop needs to be transferred to the connection position through the transfer mechanism. If both the mop board and the separated mop are not at the connection position, the mop board and the mop need to be respectively transferred to the connection position. There may be one or two transfer mechanisms for transferring the mop board and the mop.

[0165] For ease of understanding, a brief description is made by using an example in which the separation mechanism is a paper suction device. If the paper suction device (for example, a vacuum sucker) separate a single mop by using a vacuum suction principle, when both the single mop and the mop board are at the connection position, for example, when the paper suction device is arranged on the mop board, the connection position is also consistent with the separated position, the mop is also transferred and connected when the single mop is separated, that is, the separation and transfer may be performed simultaneously. In this case, the mop picking device does not need an additional transfer mechanism.

[0166] If a distance exists between the mop board and the paper suction device, and the single mop separated by the paper suction device is at the connection position, the mop board needs to be transferred to the connection position by using the transfer mechanism. If the mop board is at the connection position, the separated single mop needs to be transferred to the connection position by using the transfer mechanism. If both the mop board and the separated mop are not at the connection position, the mop board and the mop need to be respectively transferred to the connection position. There may be one or two transfer mechanisms for transferring the mop board and the mop.

[0167] Certainly, in another embodiment, the single first sheet mop is separated by blowing.

[0168] For example, the separation mechanism includes a fluid conveying device, configured to convey a fluid to a top surface of the at least two stacked first sheet mops, so that a first sheet mop at the top is separated from the at least two first sheet mop.

[0169] For whether transfer is required after separation and a sequence of the separation and the transfer, reference may be made to the foregoing description. For brevity, details are not described herein.

[0170] Considering a removal problem of the mop board, in an implementation of the present disclosure,

the mop picking device further includes a removal mechanism, and the mop board includes a removal region, where the paper removal mechanism cooperates with the removal region to remove a second sheet mop from the mop board, and the removal region is not connected to the second sheet mop.

[0171] The second sheet mop may be a used, old, or dirty mop. For example, after the cleaning robot carries the first sheet mop to perform a mopping work for a preset time or complete a cleaning work for a preset area, and when the mop board carries the second sheet mop, the second sheet mop needs to be first removed when the mop on the mop board is replaced, and then the first sheet mop is connected. It may be understood that the first sheet mop may be switched to the second sheet mop after being used for mopping. Certainly, in another embodiment, the second sheet mop may also be a mop that needs to be removed in another case, for example, a mop for testing or a mop that needs to be removed in a case that a user finds that connection of the mop is not ideal. In this case, it is not required whether the second sheet mop is clean.

[0172] Optionally, the removal mechanism may be arranged on the base station.

[0173] The removal region is considered when the second sheet mop needs to be removed from the mop board. Because the removal region is not connected to the second sheet mop, the mop may be removed from the mop board more easily and conveniently.

[0174] Considering a mop removal direction of the dislodging mechanism, in some implementations, the dislodging mechanism is configured to remove the second sheet mop in a removal direction, where an acute angle, a right angle, or an obtuse angle is formed between the removal direction and a mopping side of the second sheet mop or the mop board.

[0175] The removal direction may be, for example, a direction in which the dislodging mechanism applies an external force to the second sheet mop.

[0176] The acute angle, the right angle, or the obtuse angle is formed between the removal direction and the mop board or the mopping side of the second sheet mop. That is, the removal direction is not parallel to the mopping side of the second sheet mop, so that the removal direction has a component direction perpendicular to the mopping side of the second sheet mop or an external force applied by the dislodging mechanism to the second sheet mop has a component force perpendicular to the mopping side of the second sheet mop, so that the mop is removed simply and efficiently, the residual mop on the mop board is reduced, the removal is relatively clean, and damage caused to the mop is reduced.

[0177] For ease of understanding, the removal direction is described by using an example in which the dislodging mechanism 320 is two hook portions mounted on the first storage compartment 220. Top ends of the hook portions may be connected to form a connection line, and when a mop is removed, the connection line (a

dashed line marked in FIG. 59) between the two hook portions is not parallel to the mop board or the mopping side of the second sheet mop. For example, referring to FIG. 41, a removal direction of the two hook portions is perpendicular to the mop board or the mopping side of the second sheet mop (certainly, if at least one of the dislodging mechanism 320 or the mop board 110 is inclined due to an arrangement or manufacturing error, an angle between the dislodging mechanism 320 and the mop board 110 or the second sheet mop may be an acute angle or an obtuse angle. FIG. 59 shows a case that the angle between the dislodging mechanism 320 and the mop board 110 or the second sheet mop is the acute angle). The removal direction (for example, a straight arrow direction marked in FIG. 59) is a direction in which the dislodging mechanism applies an external force away from the mop board to the second sheet mop or may be a perpendicular bisector of the connection line between the two hook portions, and the removal direction or the external force applied to the second sheet mop is perpendicular to the mopping side of the second sheet mop, so that the mop is removed simply and efficiently, a residue of the mop on the mop board is reduced as much as possible, and the mop is removed cleanly and completely, which is conducive to avoiding damage to the mop.

[0178] To avoid the residual mop on the mop board, in some implementations, the dislodging mechanism is configured to apply an external force away from the mop board to the second sheet mop, and the second sheet mop falls under the action of gravity or the external force after being separated from the mop board.

[0179] For example, during removal of the mop, when the lower surface of the mop board is perpendicular to or approximately perpendicular to a direction of gravity, the dislodging mechanism may be arranged on a moving path of the mop board. When the mop board moves upward relative to the dislodging mechanism from a lower part of the dislodging mechanism and passes through the dislodging mechanism, the second sheet mop is removed from the mop board under the action of an external force away from the mop board applied by the dislodging mechanism to the second sheet mop on the mop board, and the removed second sheet mop may fall down in the direction of gravity.

[0180] When the lower surface of the mop board is parallel to or basically parallel to the direction of gravity, the dislodging mechanism is arranged on the moving path of the mop board. For example, when the mop board moves to the right relative to the dislodging mechanism from a left side of the dislodging mechanism and passes through the dislodging mechanism (or moves to the left from a right side of the dislodging mechanism and passes through the dislodging mechanism), the second sheet mop is removed from the mop board under the action of the external force away from the mop board applied by the dislodging mechanism to the second sheet mop on the mop board, and the removed second sheet mop may

fall down in a direction of the external force.

[0181] To improve the convenience of removal of the mop, further when the second sheet mop is removed from the mop board, the cleaning robot does not move actively, and the mop board or the dislodging mechanism moves actively.

[0182] During removal of the mop, a body position of the cleaning robot is not adjusted, but the mop is removed through active movement of the mop board and/or the dislodging mechanism, to provide a relatively large space for an operation of removing the mop, thereby achieving simple and convenient removal of the mop and improving the reliability and the safety of the removal of the mop.

[0183] After the second sheet mop is removed, to facilitate the centralized recycle of the second sheet mop and avoid dirtying human hands due to manual handling of dirty cleaning media, the maintenance system further includes a second storage compartment, configured to receive the second sheet mop removed from the mop board. The second storage compartment may also be arranged on the base station for maintaining the cleaning robot.

[0184] Further, the dislodging mechanism is configured to apply an external force away from the mop board to the second sheet mop, and the second sheet mop falls into the second storage compartment under the action of gravity or the external force after being separated from the mop board.

[0185] The paper removal mechanism cooperates with the removal region to remove the second sheet mop from the mop board, and the second sheet mop falls into the second storage compartment.

[0186] That is, the second sheet mop is removed from the mop board and directly falls into the second storage compartment, to improve the mop recycling efficiency. For example, when the dislodging mechanism is arranged outside the second storage compartment, the second storage compartment may be arranged on a moving path of the separated second sheet mop, to cause the second sheet mop to enter the second storage compartment. For example, the removal mechanism is mounted at a preset mop removal position, the mop removal position is located outside the second storage compartment, and the removal mechanism is configured to remove the second sheet mop from the mop board at the mop removal position and the second sheet mop is received by the second storage compartment. The second storage compartment is arranged on a falling path of the second sheet mop.

[0187] To facilitate removal of the mop board, in some implementations, the maintenance system includes a mop board operating position, configured for the cleaning robot to separate the mop board.

[0188] Further, the mop removal position or the second storage compartment is higher than the mop board operating position, to form a space for the cleaning robot to dock.

[0189] When returning to the base station for maintenance,

the cleaning robot usually stops at the platform at the lower part of the base station. The second storage compartment is arranged above the stop space of the cleaning robot or in an upper region of the base station, to reduce a space occupied by the base station.

[0190] Considering a position relationship between the first storage compartment and the second storage compartment, in some implementations, the first storage compartment and the second storage compartment are arranged up and down in a vertical direction.

[0191] For example, both the first storage compartment and the second storage compartment are arranged in the upper region of the base station and are arranged up and down. It should be noted that considering that the first storage compartment and/or the second storage compartment is movable, the up-down arrangement should be understood in a broad sense, that is, heights of the first storage compartment and the second storage compartment are different, for example, initial positions of the first storage compartment and the second storage compartment may be located in a same straight line or may be located in different straight lines. This is not limited in the present disclosure.

[0192] Considering a space requirement for removing a mop and mounting a mop, from the perspective of reducing the space occupied by the base station, further the height of the first storage compartment is higher than the second storage compartment or the first storage compartment is located above the second storage compartment.

[0193] Considering a relatively large operation space for removing a mop, in the base station, the second storage compartment is arranged below the first storage compartment, so that a space of the first storage compartment may also be used as an operation space for removing the mop, thereby reducing a volume of the base station.

[0194] Certainly, in another embodiment, the dislodging mechanism may alternatively be directly arranged on the second storage compartment.

[0195] For a structure of the removal region, in some embodiments, the removal region includes a mop removal groove, and an outer edge of the mop board is recessed towards the inside of the mop board, to form the mop removal groove.

[0196] There may be one or more mop removal grooves. To improve the mop removal efficiency and reduce damage to the second sheet mop, a plurality of mop removal grooves may be spaced apart.

[0197] Considering a replacement operation space problem of the mop, in some implementations, the mop board includes at least a first state and a second state, where the mop board is at a mopping position in the first state; and the mop board is at a non-mopping position in the second state.

[0198] It should be noted that, the first state may be a mopping state, the second state may be a non-mopping state, and switching between the first state and the second state.

ond state may be performed. The mop board at the mopping position means that the mop board is at a position where the mop board may perform a mopping work or at a position where the mop board is in contact with the ground (for example, the mop board is removed from the cleaning robot). The mop board at the non-mopping position means that the mop board is at a position away from work, for example, is lifted or at a position where maintenance may be performed (for example, replacing or cleaning the mop) according to cleaning requirements or switching of working modes or user control. For ease of understanding, the mopping position and the non-mopping position are briefly described below by using an example in which a mop is mounted on the mop board: when the mop board is at the mopping position, the mop fits a working surface; and when the mop board is at the non-mopping position, the mop is away from the working surface.

[0199] The non-mopping position is higher than the mopping position, to provide an operation space for removal of the second sheet mop or mounting of the first sheet mop.

[0200] The mop board may be switched between the mopping position and the non-mopping position, to provide an operation space for replacement of the mop. For example, when the mop board is removed from the cleaning robot, the mop board is lifted from the mopping position to the non-mopping position to provide the operation space for removal and/or mounting of the mop board.

[0201] Certainly, in another embodiment, the mop board may still be mounted on or connected to the cleaning robot without being removed, and only the mop board is operated, so that the mop board is switched between the first state and the second state. For example, when the mop board needs to replace or mount the first sheet mop, the mop board is switched from the first state in which the mop board (if a mop is mounted on the mop board, here it refers to the mop) fits the working surface to the second state in which the mop board (if a mop is mounted on the mop board, here it may refer to the mop) is away from the working surface, to connect the mop board and the first sheet mop in the first storage compartment, thereby facilitating the mop board to replace the mop more quickly.

[0202] It should be noted that when the mop board is switched between the first state and the second state, the cleaning robot does not move actively, only the position of the mop board relative to the cleaning robot (the body) has changed. The positions of the mop board are different in the first state and the second state. Certainly, when the mop board is switched between the first state and the second state, the cleaning robot may also actively move, for example, the cleaning robot may perform a corresponding work. For ease of understanding, when the cleaning robot is provided with a cleaning component (for example, at least one of a brush, an edge brush, or a dust suction port), the cleaning robot may perform a cleaning work during the replacement of the mop.

[0203] For ease of understanding, a cleaning robot maintenance system to which embodiments of the present disclosure are applicable is first described in FIG. 1. As shown in FIG. 1, the system includes a cleaning robot 100 and a base station 200.

[0204] The cleaning robot 100 cleans a working region. The cleaning robot 100 may be, for example, a cleaning robot having mopping and wiping functions, or may be a mopping robot, or may be a sweeping and mopping integrated robot, or may be a glass cleaning robot. Correspondingly, the working region may be, for example, a region such as a floor or a window.

[0205] The base station 200 may communicate with the cleaning robot 100 and is configured to maintain the cleaning robot 100. In some embodiments, the base station 200 may further have a function of charging the cleaning robot 100. In some other embodiments, the base station 200 may further have a function of replacing a mop for the cleaning robot.

[0206] A structure of the base station in this embodiment of the present disclosure is described below in detail based on the base station 200 shown in FIG. 1. The base station 200 includes a first storage compartment 210 and a mop picking device 300.

[0207] The first storage compartment 210 is configured to store unused first sheet mops. In some embodiments, the first sheet mops may be stored in the first storage compartment 210 in a stacking manner.

[0208] The unused first sheet mops may be new sheet mops or clean sheet mops. The sheet mop may be understood as a mop sheet that can be directly used after cutting.

[0209] In some embodiments, the first sheet mop may be a disposable paper mop. Therefore, the first storage compartment may also be referred to as a "clean carton".

[0210] The mop picking device 300, When the cleaning robot 100 returns to the base station 200 (referring to FIG. 2), the mop picking device 300 is configured to replace a second sheet mop mounted on the cleaning robot 100 with a first sheet mop in the first storage compartment 210. The second sheet mop may be a used sheet mop or a dirty sheet mop.

[0211] After the mop picking device 300 replaces the first sheet mop for the cleaning robot 100, the removed second sheet mop may be stored in a second storage compartment 220, so that a user may replace the second sheet mops together in the second storage compartment 220 at intervals, to improve user experience. Certainly, after replacing the first sheet mop for the cleaning robot 100 each time, the user may manually clean the second sheet mop. Correspondingly, the second storage compartment 220 may alternatively not be provided in the base station 200.

[0212] As described above, the second sheet mop may be the used sheet mop or the dirty sheet mop. In addition, in some embodiments, the second sheet mop may also be a disposable paper mop. Therefore, the second storage compartment 220 may also be referred to as a "dirty

carton".

[0213] To reduce an occupied area of the base station, the first storage compartment 210 and the second storage compartment 220 may be arranged up and down in a vertical direction. For example, the first storage compartment 210 may be located above the second storage compartment 220, or the second storage compartment 220 may be located above the first storage compartment 210. Certainly, the first storage compartment 210 and the second storage compartment 220 may alternatively be arranged left and right in a horizontal direction.

[0214] To facilitate the user to put the first sheet mop into the first storage compartment 210, and/or clean the second sheet mop stored in the second storage compartment 220, the first storage compartment 210 and the second storage compartment 220 may be arranged in the vertical direction and close to a housing of the base station 200, for example, may be close to the housing at a front side of the base station 200 or may be close to the housing at a top side of the base station 200.

[0215] Correspondingly, when opening the first storage compartment 210 and/or the second storage compartment 220, the user may manually open the first storage compartment and/or the second storage compartment. Alternatively, when the user opens the first storage compartment 210 and/or the second storage compartment 220, the first storage compartment 210 and/or the second storage compartment 220 may be automatically ejected by pressing a key.

[0216] To simplify a sheet mop replacement process, when replacing a sheet mop for the cleaning robot 100, the mop picking device 300 may first separate a mop board 110 on the cleaning robot 100 from the cleaning robot 100. In this way, in the sheet mop replacement process, only the mop board 110 may be operated. Certainly, a mopping component with a water tank may also be separated. This is not limited in this embodiment of the present disclosure.

[0217] As described above, the cleaning robot 100 includes the mop board 110 that is separable from the cleaning robot 100. The mop picking device 300 includes: a first movable mechanism 310 and a connecting portion 311 with the mop board 110. After the mop board 110 is separated from the cleaning robot 100, the first movable mechanism 310 is connected to the mop board 110 by the connecting portion 311 and drives the mop board 110 to first move to a mop removal position, so as to remove and store the second sheet mop into the second storage compartment 220, and then drives the mop board 110 to move to a mop mounting position, so as to mount the first sheet mop in the first storage compartment 210 on the mop board 110.

[0218] The first movable mechanism 310 may drive the mop board 110 to move in the base station by sliding. For example, a sliding rail may be arranged in the base station 200, so that the first movable mechanism 310 drives the mop board 110 to move to the mop removal position and/or the mop mounting position. Certainly, the

first movable mechanism 310 may alternatively be a manipulator, which drives the mop board 110 to move through movement of the manipulator 310. A specific form of the first movable mechanism 310 is not limited in this embodiment of the present disclosure.

[0219] When the first movable mechanism 310 drives the mop board 110 to move, the first storage compartment 210 and the second storage compartment 220 may be stationary. In this way, only the first movable mechanism 310 drives the mop board 110 to move to corresponding positions of the first storage compartment 210 and the second storage compartment 220, to replace a mop. Certainly, to simplify the complexity of which the first movable mechanism 310 drives the mop board 110 to move, the first storage compartment 210 and/or the second storage compartment 220 may alternatively cooperate with the movement of the first movable mechanism 310. A description is made below with reference to FIG. 5 and FIG. 6. For brevity, details are not described herein again.

[0220] It should be noted that, in another embodiment, the mop board 110 may alternatively be stationary, and the first storage compartment 210 and the second storage compartment 220 move to the mop board 110, to replace the mop. The mop mounting position and/or the mop removal position may be a specific position on a moving path of the first movable mechanism 310 or may be a position region on a moving path. In some embodiments, a position of the mop board 110 may be sensed by a sensor mounted in the base station 200.

[0221] The connecting portion 311 may be connected to the mop board 110 by grasping. Referring to FIG. 3, the connecting portion 311 may include a mechanical claw. After the mop board 110 is separated from the cleaning robot 100, the mechanical claw is connected to the mop board 110 by grasping. Certainly, the connecting portion 311 may alternatively be connected to the mop board 110 by a mechanical hook. This is not limited in this embodiment of the present disclosure.

[0222] To facilitate the connection between the connecting portion 311 and the mop board 110, the first movable mechanism 310 may further be provided with a magnetic attraction positioning portion. In this way, before the connecting portion 311 is connected to the mop board 110, the first movable mechanism 310 may perform magnetic attraction positioning on the mop board 110 by using the magnetic attraction positioning portion.

[0223] After the mop board 110 is separated from the cleaning robot 100, to avoid blocking the connection between the first movable mechanism 310 and the mop board 110, the cleaning robot 100 may exit or semi exit the base station 200 shown in FIG. 4.

[0224] Optionally, the mop picking device 300 further includes a removal mechanism 320, located at the mop removal position and configured to remove the second sheet mop from the mop board 110.

[0225] The removal mechanism 320 includes a plurality of specific structures, for example, the removal mech-

anism 320 may include a manipulator. In another example, the removal mechanism 320 may further include a rod with a hook portion, and the second sheet mop is removed from the mop board 110 by using the hook portion. A detailed description is made below with reference to FIG. 7 and FIG. 8. For brevity, details are not described herein again.

[0226] Considering that if the removal mechanism is arranged on a dirty mop cabin (that is, the second storage compartment), the dirty mop cabin needs to be taken out as a whole for dumping and cleaning, which may lead to mechanical damage and rust of the removal mechanism during cleaning. Therefore, in some embodiments, referring to FIG. 11 and FIG. 17, the removal mechanism 320 may be arranged outside the second storage compartment 220, and a mounting position of the removal mechanism is adapted to a position of the second storage compartment. For example, an arrangement height of the removal mechanism is adapted to a height of the second storage compartment, and a gap between two groups of rods 321 that rotate around a fixed axis included in the removal mechanism is adapted to a size of an opening of the second storage compartment, thereby avoiding possible mechanical damage caused by the dirty mop cabin and rust of the removal mechanism caused by cleaning.

[0227] Certainly, in another embodiment, referring to FIG. 53, the removal mechanism 320 may alternatively be arranged on the second storage compartment 220, to reduce the complexity of a mop removal structure and save a mounting space.

[0228] As described above, the second storage compartment 220 is configured to recycle the second sheet mop separated by the removal mechanism 320. The separated second sheet mop is directly recycled into the second storage compartment 220, to prevent hands from being dirtied by manually processing the dirty second sheet mop. To directly recycle the dirty second sheet mop into the second storage compartment 220, the second storage compartment 220 is arranged on a moving path of the separated second sheet mop, so that the second sheet mop falls into the second storage compartment 220.

[0229] The removal mechanism 320 applies an external force away from the mop board 110 to the second sheet mop covering a removal region, to remove the second sheet mop, and the separated second sheet mop falls into the second storage compartment 220 depending on gravity. Optionally, the second storage compartment 220 may be arranged below the separated second sheet mop. In this way, the separated second sheet mop directly falls into the second storage compartment 220 due to gravity, and the second sheet mop may be recycled without an additional structure.

[0230] Alternatively, the removal mechanism 320 applies an external force away from the mop board 110 to the second sheet mop covering a removal region, to remove the second sheet mop, and the second sheet mop

is pulled into the second storage compartment 220 by using the external force. The second sheet mop is pulled into the second storage compartment 220 by using the external force applied by the removal mechanism 320 to the second sheet mop, and similarly the second sheet mop may be recycled without an additional structure.

[0231] Further, the removal mechanism 320 includes hook portions. The hook portions correspond to the removal region and hook the second sheet mop covering the removal region and apply an external force away from the mop board 110 to the second sheet mop, to separate the second sheet mop and the mop board 110. The hook portions may be arranged on the base station or may be arranged on the second storage compartment 220. In this embodiment, at least a part of the hook portions is located in the second storage compartment 220. An opening of the second storage compartment 220 is towards one side, and the hook portions are distributed on two side of the opening. Specifically, two rotation shafts are arranged on the second storage compartment 220 and are respectively arranged on the two sides of the opening of the second storage compartment 220, and the hook portions are arranged on the rotation shafts 203. There are a plurality of hook portions arranged on each rotation shaft, and the plurality of hook portions are uniformly arranged, to improve the efficiency of removing the dirty second sheet mop.

[0232] In an embodiment, an opening is provided on one side of the second storage compartment 220, and the hook portions are arranged outside the opening relative to the second storage compartment 220. Further, referring to FIG. 53, the opening is provided on an upper side of the second storage compartment 220, and the hook portions are arranged above the opening relative to the second storage compartment 220. A specific manner in which the hook portions are arranged outside the opening relative to the second storage compartment 220 is not limited, for example, both the second storage compartment 220 and the hook portions are connected to a base arranged inside the base station, and after the second sheet mop is separated, the second storage compartment 220 and the hook portions do not move relative to the base. Alternatively, the hook portions may be directly connected to the outside of the second storage compartment 220, and when the second sheet mop is separated, the second storage compartment 220 does not move relative to the hook portions.

[0233] It should be noted that a back surface of the hook portions, that is, a surface facing the opening, is a smooth surface, and a front surface, that is, a surface opposite to the opening, has sawteeth. In this way, the smooth back surface of the hook portions enters the second storage compartment with the mop board 110, to avoid blocking and interfering the mop board 110 from entering the second storage compartment 220, while the front surface with the sawteeth may hook the second sheet mop to achieve a better removal effect.

[0234] Further, to resolve the mechanical damage

caused by taking out the second storage compartment as a whole and the rust of the removal mechanism during cleaning, in some embodiments, the second storage compartment may be divided into a second inner cabin 2201 and a second outer cabin 2202, the second inner cabin and the second outer cabin may be separable, and the removal mechanism 320 is arranged on the second outer cabin. For example, the second inner cabin is mounted on the second outer cabin by embedding, and the second inner cabin may be drawn out separately. The removal mechanism is arranged on the outer cabin, to avoid the mechanical damage and the rust of the removal mechanism during cleaning and achieve a simpler and more convenient mop removal structure.

[0235] As described above, to reduce the complexity of the movement of the first movable mechanism 310, the first storage compartment 210 and the second storage compartment 220 may cooperate with the movement of the first movable mechanism 310. That is, the base station further includes a second movable mechanism 410 and/or a third movable mechanism 420.

[0236] The second movable mechanism 410 is connected to the second storage compartment 220 and is configured to control the second storage compartment 220 to move to a lower part of the removal mechanism 320, to receive the second sheet mop falling from the mop board 110.

[0237] In some embodiments, the second movable mechanism 410 may be a sliding mechanism, and correspondingly, the second storage compartment 220 may move to the lower part of the removal mechanism 320 by sliding. Certainly, the second movable mechanism 410 may alternatively be a manipulator, which is not limited in this embodiment of the present disclosure.

[0238] The third movable mechanism 420 is connected to the first storage compartment 210 and is configured to control the first storage compartment 210 to move to a lower part of the mop board 110, so that the mop board 110 enters the first storage compartment 210 and is connected to the first sheet mop in the first storage compartment 210.

[0239] In some embodiments, the third movable mechanism 420 may be a sliding mechanism, and correspondingly, the first storage compartment 210 may move to the lower part of the mop board 110 by sliding. Certainly, the third movable mechanism 420 may alternatively be a manipulator, which is not limited in this embodiment of the present disclosure.

[0240] In this embodiment of the present disclosure, the first movable mechanism 310, the second movable mechanism 410, and the third movable mechanism 420 may be implemented in a plurality of manners. To simplify the complexity of the movement of each movable mechanism, the first movable mechanism 310 may be configured to drive the mop board 110 to move up and down along a vertical path, the second movable mechanism 410 and the third movable mechanism 420 are located on one side or two sides of the vertical path, to respec-

tively drive the second storage compartment 220 and the first storage compartment 210 to move along a horizontal path.

[0241] Certainly, the first movable mechanism 310 may alternatively be configured to first drive the mop board 110 to move in a vertical direction to a height corresponding to the first storage compartment 210 and/or the second storage compartment 220, and then drive the mop board 110 to move in a horizontal direction to a same vertical surface of the first storage compartment 210 or the second storage compartment 220, so as to align the mop board 110 with the first storage compartment 210 or the second storage compartment 220.

[0242] A process of removing the second sheet mop from the mop board 110 is described below with reference to FIG. 5 and FIG. 6 by using an example in which the first movable mechanism 310 moves in the vertical direction and the second movable mechanism 410 moves in the horizontal direction. A process of mounting the first sheet mop on the mop board 110 is described below with reference to FIG. 12 by using an example in which the first movable mechanism 310 moves in the vertical direction and the third movable mechanism 420 moves in the horizontal direction.

[0243] Referring to FIG. 5, after the first movable mechanism 310 drives the mop board 110 to move to the mop removal position, and when the removal mechanism 320 removes the second sheet mop, the second storage compartment 220 and the removal mechanism 320 need to cooperate with each other, so that the removed second sheet mop may fall into the second storage compartment 220. That is, before the removal mechanism 320 removes the second sheet mop (for example, at the beginning of removing the second sheet mop or during removal of the sheet mop), the second storage compartment 220 needs to move to a lower part of the removal mechanism 320, for example, a position shown in FIG. 6.

[0244] This cooperation relationship may be controlled by the controller in the base station 200 in cooperation with a position sensor. However, to simplify the control complexity, the removal mechanism 320 may be pushed to move to the mop removal position while the second movable mechanism 410 drives the second storage compartment 220 to move.

[0245] For example, referring to FIG. 5, the removal mechanism 320 includes two groups of rods 321 that rotate around a fixed axis. For ease of distinguishing, the two groups of rods 321 are referred to as a rod 3211 and a rod 3212 below. The rod 3211 and the rod 3212 may be respectively located at two sides of a vertical moving track of the first movable device 310. Correspondingly, a first push portion 221 and a second push portion 222 are respectively arranged on a side surface and a back surface of the second storage compartment 220. When the second storage compartment 220 moves, the first push portion 221 may push the rod 3211 to rotate towards a direction of the mop board 110, and the second push portion 222 pushes the rod 3212 to rotate towards the

direction of the mop board 110, that is, the rod 3211 and the rod 3212 rotate towards each other.

[0246] To improve the efficiency of the removal mechanism 320 in removing the second sheet mop, an end portion of the removal mechanism 320 may be configured as a hook portion. That is, end portions of the rods 321 are configured as hook portions. When the second movable mechanism 410 drives the second storage compartment 220 to move, the hook portions pass through a position of the second sheet mop and move to a lower part of the second sheet mop from an upper part of the second sheet mop, to remove the second sheet mop from the mop board 110.

[0247] Alternatively, referring to FIG. 7 and FIG. 8, under the driving of the first movable mechanism 310, the second sheet mop moves relative to the hook portions, and through this relative movement, the hook portions pass through the position of the second sheet mop and move from the upper part of the second sheet mop to the lower part of the second sheet mop, to remove the second sheet mop from the mop board 110.

[0248] To facilitate the removal mechanism 320 to remove the second sheet mop from the mop board 110, an embodiment of the present disclosure further provides a mop board 110, that is, through arrangement of a shape of the mop board 110, the second sheet mop mounted on the mop board 110 has a part not covered by the mop board. The removal mechanism 320 applies a force to the part of the second sheet mop not covered by the mop board, to remove the second sheet mop from the mop board 110.

[0249] Referring to FIG. 9, the mop board 110 includes one or more mop removal grooves 111, the part of the second sheet mop not covered by the mop board 110 is located in the mop removal groove 111. Certainly, as a quantity of mop removal grooves 111 increases, it is easier to remove the second sheet mop from the mop board 110, or as an area of the part of the second sheet mop not covered by the mop board 110 increases, it is easier to remove the second sheet mop from the mop board 110.

[0250] In some other embodiments, the mop board 110 includes two opposing sides, where each side is provided with one or more mop removal grooves 111, and the mop removal grooves 111 on the two sides may be symmetrically arranged, to improve the efficiency of the removal mechanism 320 in removing the sheet mop from the mop board 110.

[0251] To simplify a connection manner between the mop board 110 and the sheet mop (including the first sheet mop and the second sheet mop), the mop board 110 and the sheet mop may be connected by pasting, that is, the mop board 110 is provided with a pasting portion 112, and the mop board 110 pastes the first sheet mop to the mop board 110 by using the pasting portion 112. The pasting portion 112 may be, for example, a hook-and-loop fastener.

[0252] To facilitate the removal mechanism 320 to remove the sheet mop from the mop board 110, referring

to FIG. 10, two opposing sides (that is, the two sides in which a plurality of mop removal grooves 112 are located) of the mop board 110 may be configured as bevels 113, and the pasting portion 112 may also be arranged on the bevels. Certainly, in this embodiment of the present disclosure, the pasting portion 112 may alternatively be arranged in the middle of the mop board 110, which is not specifically limited in this embodiment of the present disclosure.

[0253] Referring to FIG. 55, the present disclosure also provides a mop board. The difference between the mop boards shown in FIG. 9 and FIG. 10 is that the mop board 110 includes two mop board bodies 115, where the two mop board bodies are detachably connected, and the two mop board bodies may be opened and closed, for example, fan-shaped opening and closing, to increase a cleaning area, improve a cleaning effect, and enable the cleaning robot to adapt to more cleaning scenarios. Certainly, in another embodiment, the two mop board bodies may alternatively be integrally formed, and details are not described in the present disclosure.

[0254] The mop board 110 includes two opposing long ends 1111 and 1112, and the pasting portion 112 and/or the mop removal groove 111 are at least partially arranged on the opposing long ends 1111 and 1112.

[0255] The pasting portion 112 is arranged on the opposing long ends 1111 and 1112. The pasting portion 112 is arranged on the opposing long ends 1111 and 1112, which can make a span of a connection region with the mop board longer, and then make the first sheet mop paste more firmly. The pasting portion 112 may be, for example, a hook-and-loop fastener.

[0256] Further, the mop removal grooves 111 are arranged on the opposing long ends 1111 and 1112. For example, a plurality of mop removal grooves 111 are respectively provided on each of long sides 1111 and 1112, which can make a span of the removal region longer. When the second sheet mop is removed, a removal force applied to the second sheet mop may be more dispersed, which is more convenient for the removal of the second sheet mop, reduces a possibility of tearing the second sheet mop, avoids the residual of the second sheet mop. In addition, the mop removal groove may also be closer to the pasting portion, which is more labor-saving during removal and also avoids tearing a cleaning medium.

[0257] It should be noted that, to improve a connecting force between the mop board 110 and the first sheet mop during cleaning by the cleaning robot and prevent slipping, a surface 116 in which the mop board 110 is in contact with the sheet mop may be configured as a rough portion, for example, the surface 116 is provided with a soft glue surface, and a plurality of bumps or stripes are arranged on the soft glue to increase friction and prevent slipping.

[0258] In addition, to facilitate the removal mechanism 320 to remove the sheet mop from the mop board 110, two opposing long sides of the mop board 110 may be configured as bevels 113, the pasting portion 112 and

the mop removal grooves 111 are all arranged on the bevels, and the pasting portion 112 and the mop removal grooves 111 are adjacent. The pasting portion 112 and the mop removal grooves 111 are adjacent to each other on the bevels 113, which not only facilitates the removal and mounting of the sheet mop, but also does not affect a cleaning width of mopping.

[0259] In some embodiments, after the second sheet mop is removed from the mop board 110, the second movable mechanism 410 may drive the second storage compartment 220 to move back to an initial position (for example, a position near the housing of the base station described above), referring to FIG. 11, to reserve a space for mounting the first sheet mop on the mop board 110. Correspondingly, to avoid interfering with the movement of the second storage compartment 220, the first movable mechanism 310 may control the mop board to move upward.

[0260] The first storage compartment includes a bottom portion, an opening, and a side wall, where the bottom portion and the side wall enclose to form a space for accommodating the first sheet mop, and the first sheet mop can be stacked on a surface of the bottom portion to form a first sheet mop combination. The mop picking device is configured to pick a single first sheet mop from the first sheet mop combination in a stacking direction of the first sheet mops, so as to facilitate the connection between the first sheet mop and the mop board. For ease of understanding, the stacking direction is briefly described below: when the first sheet mops are stacked in a vertical direction from the bottom portion of the first storage compartment to the opening, the stacking direction is a vertical direction or an up-down direction; and when the first sheet mops are stacked in a horizontal direction from the bottom portion to the opening, the stacking direction is a horizontal direction or a left right direction.

[0261] In some embodiments, the first storage compartment is horizontally placed, and the opening is upward. The mop picking device is configured to extend into the first storage compartment in the direction from the opening to the bottom portion, so as to pick a single first sheet mop from at least two stacked first sheet mops.

[0262] The process of mounting the first sheet mop on the mop board 110 is described below with reference to FIG. 12 to FIG. 14.

[0263] As shown in FIG. 12, the first movable mechanism 310 may move in a vertical direction (for example, an up-down direction). When the first movable mechanism 310 moves in the vertical direction and the third movable mechanism 420 moves in the horizontal direction, and after the first movable mechanism 310 drives the mop board 110 to move to the mop mounting position, the first storage compartment 210 moves to the lower part of the mop board 110 under the driving of the third movable mechanism 420. In this case, the first movable mechanism 310 needs to drive only the mop board 110 to move downward and extend into the first storage com-

partment 210, and apply a downward force to the first sheet mop to paste the first sheet mop. The solution of mounting the first sheet mop reduces the difficulty of mounting the first sheet mop on the mop board 110, which is relatively simple.

[0264] When the mop board 110 moves into the first storage compartment 210 to paste the first sheet mop, the mop board 110 may bring out a plurality of first sheet mops at a time. Therefore, to control a quantity of the first sheet mops pasted each time, the first movable mechanism 310 may control the mop board 110 to shake off the redundant first sheet mops after the mop board 110 pastes a first sheet mop. For example, the first movable mechanism is configured to drive the mop board to shake after the first sheet mop is pasted to the mop board, so that the single first sheet mop is pasted on the pasting portion of the mop board, where the shaking means a reciprocating motion of the mop board in a first direction and a second direction, and the first direction is a direction in which the mop board picks out the first sheet mop from the first storage compartment, and the second direction is opposite to the first direction. It may be understood that the direction in which the mop board 110 brings out/picks out a mop refers to the vertical direction or the up-down direction.

[0265] Because the first movable mechanism 310 moves in the vertical direction, the mop board 110 may be controlled to shake up and down at a preset frequency in a direction of gravity.

[0266] Certainly, to prevent the mop board from bringing out a plurality of first sheet mops, in addition to shaking, in some other embodiments, scraping may also be used. Referring to FIG. 54, the first storage compartment 210 is provided with a friction component. After the first sheet mop is pasted to the mop board, the friction component is configured to generate friction when the first storage compartment is connected to the mop board, so that a single first sheet mop is pasted on the pasting portion of the mop board. For example, the friction component is configured to generate an action force for preventing the mop board from moving in a first direction, so that the single first sheet mop can be pasted on the pasting portion of the mop board; and the first direction is a direction in which the mop board picks out the first sheet mop from the first storage compartment or a direction from the bottom portion to the opening. Further, the friction component includes a first friction component 2102 arranged on an inner surface of the side wall of the first storage compartment and/or a second friction component 2103 arranged at the opening. The first friction component may be different from the second friction component, for example, the first friction component is a plurality of bunches of scraping hairs arranged at equal intervals, while the second friction component is a rubber block. It should be noted that, the first friction component and the second friction component may be arranged on a single side or two sides of the first storage compartment, and this is not limited in this embodiment.

[0267] It should be noted that, in another embodiment, the first storage compartment is horizontally placed, and from the bottom portion to the opening may be leftward or rightward. The mop picking device is configured to extend into the first storage compartment in the direction from the opening to the bottom portion, so as to pick a single first sheet mop from at least two stacked first sheet mops.

[0268] Specifically, the first movable mechanism 310 may alternatively move in the horizontal direction (for example, a left-right direction). For example, when the first movable mechanism 310 moves to the right (or the left) in the horizontal direction, and the third movable mechanism 420 moves to the left (or the right) in the horizontal direction, and after the first movable mechanism 310 drives the mop board 110 to move to the mop mounting position, the first storage compartment 210 moves to the right (the left) side of the mop board 110 under the driving of the third movable mechanism 420, so that the opening of the first storage compartment is spaced at a preset distance from the mop board. In this case, the first movable mechanism 310 needs to drive only the mop board 110 to continue to move to the right (or the left) and extend into the first storage compartment 210, and apply a rightward (or leftward) force to the first sheet mop to paste the first sheet mop. It should be noted that when the opening of the first storage compartment is towards the left (or the right), the first sheet mop is supported at the bottom portion of the first storage compartment in a vertical state (perpendicular to the side wall of the first storage compartment) in a stacking manner.

[0269] To prevent the mop board from bringing out a plurality of first sheet mops, in some embodiments, the first storage compartment includes a bottom portion, an opening, and a side wall, where the bottom portion and the side wall enclose to form a space for accommodating the first sheet mop, and the first sheet mop can be stacked on a surface of the bottom portion to form a first sheet mop combination. The first storage compartment 210 is provided with a friction component, where after the first sheet mop is pasted to the mop board, the friction component is configured to generate an action force for preventing the mop board from moving in a first direction, so that the single first sheet mop can be pasted on the pasting portion of the mop board; and the first direction is a direction in which the mop board picks out the first sheet mop from the first storage compartment or a direction from the bottom portion to the opening. Further, the friction component includes a first friction component arranged on an inner surface of the side wall of the first storage compartment and/or a second friction component arranged at the opening. The first friction component may be different from the second friction component, for example, the first friction component is a plurality of bunches of scraping hairs arranged at equal intervals, while the second friction component is a rubber block. It should be noted that, the first friction component and the second friction component may be arranged on a single

side or two sides of the first storage compartment, and this is not limited in this embodiment.

[0270] Certainly, in addition to the scraping manner, in some other embodiments, a shaking manner may also be used. For example, when the mop board 110 moves into the first storage compartment 210 to paste the first sheet mop, the mop board 110 may bring out a plurality of first sheet mops at a time. Therefore, to control a quantity of the first sheet mops pasted each time, the first movable mechanism 310 may control the mop board 110 to shake, for example, move back and forth for a plurality of times in a direction in which the mop board 110 brings out/picks out the mop (that is, the stacking direction of the mops, herein is the horizontal direction or the left-right direction), so as to shake off the redundant first sheet mops after the mop board 110 pastes a first sheet mop.

[0271] To prevent the mop board from bringing out a plurality of first sheet mops, in another embodiment, at least one of the following manners may further be used.

A. Adhesion is controlled by controlling a ratio of an area of the pasting portion to an area of the sheet mop, so that the mop board can paste a single sheet mop. For example, the ratio of the area of the pasting portion to the area of the first sheet mop is controlled within a preset range, so that the mop board can paste the single first sheet mop from the first sheet mop combination. The preset range may be obtained from experiments. B. A separation component is arranged in the first storage compartment and is configured to generate a gap between two adjacent first sheet mops. For example, a separation paper is arranged between adjacent first sheet mops, where the separation paper may be a smooth paper to reduce friction with the sheet mops. The size of the separation paper may be a value between 1/3 and 4/3 of a size of the mop. To avoid affecting the pasting portion arranged at the bevel, the separation paper is preferably arranged near the middle of the mop, to avoid the pasting portion as much as possible. In another example, steps are arranged on the inner surface of the side wall of the first storage compartment for separation, where a distance between the steps is equal to or slightly greater than a thickness of the sheet mop. When the pasting portion is arranged on a long side of the mop board, the steps are arranged on the side wall corresponding to a short side of the mop board to avoid affecting the pasting of the pasting portion arranged on the bevel. C. Materials of two surfaces of the first sheet mop are at least partially different, which reduces the adhesion between two adjacent first sheet mops.

[0272] In some embodiments, after the first sheet mop is mounted on the mop board 110, the third movable mechanism 420 may drive the first storage compartment 210 to move back to an initial position (for example, a position near the housing of the base station described above), referring to FIG. 13, to reserve a space for the cleaning robot 100 to mount the mop board 110. Correspondingly, to avoid interfering with the movement of the first storage compartment 210, the first movable mech-

anism 310 may first control the mop board 110 to move upward.

[0273] To improve a connecting force between the mop board 110 and the first sheet mop, the pasting portion 112 may be arranged on a flexible abutting portion 114 of the mop board 110. Referring to FIG. 14, after the first sheet mop is pasted to the mop board 110 through the flexible abutting portion 114, the first movable mechanism 310 may drive the mop board 110 to abut against a bottom surface of the base station 200, so as to improve the connecting force between the mop board 110 and the first sheet mop through the deformation of the flexible abutting portion 114.

[0274] In another embodiment, to improve the connecting force between the mop board 110 and the first sheet mop, an elastic pad may also be arranged in the first storage compartment, and a plurality of first sheet mops are stacked on the elastic pad. Two sides of the elastic pad are in a shape of step, matching the structure of the mop board, so that the elastic pad and the mop board can be closely pasted. Referring to FIG. 52 (FIG. 52(a) to FIG. 52(c)), when the mop board 110 moves into the first storage compartment 210 under the driving of the first movable mechanism 310, and continues to move downward to pick the mop, the mop board applies a downward action force (pressure) to a mop when being in contact with the mop. The first sheet mop is pressed by the mop board 110 and cooperates with a reaction force of the elastic pad 2101 to improve the connecting force between the mop board 110 and the first sheet mop.

[0275] After the first sheet mop is mounted on the mop board 110, the first movable mechanism 310 may be separated from the mop board 110. In addition, to reserve a space for the connection between the mop board 110 and the cleaning robot 100, the first movable mechanism 310 may move upward. In some embodiments, to simplify the control complexity, the first movable mechanism 310 may directly move up to the top, referring to FIG. 15.

[0276] After the first movable mechanism 310 moves upward, the cleaning robot 100 enters the base station 200, referring to FIG. 16. In this case, the mop board 110 with the first sheet mop is reconnected to the cleaning robot 100. For a specific connection manner, reference may be made to the foregoing description.

[0277] As described above, when the first storage compartment 210 and the second storage compartment 220 may alternatively be arranged in the horizontal direction. In this case, an embodiment of the present disclosure further provides a relatively simple movement manner, that is, the first storage compartment 210 and the second storage compartment 220 are respectively arranged on two sides of the vertical path. In this case, the first movable mechanism 310 may first drive the mop board 110 to move along the vertical path to reach the upper parts of the first storage compartment 210 and the second storage compartment 220, and then drive the mop board 110 to move along the horizontal path to reach the upper parts of the first storage compartment 210 and the second stor-

age compartment 220.

[0278] After the removal mechanism 320 removes the second sheet mop, there may be a residue of the second sheet mop on the removal mechanism 320, which affects a next removal of the second sheet mop. Therefore, a mechanism such as a manipulator, which is specially configured to remove a residual mop, may be arranged in the above embodiments provided in the present disclosure. However, a manner of newly adding a dedicated mechanism for cleaning a residual mop may cause the mechanism of the base station to be complex.

[0279] To avoid the above problem, an embodiment of the present disclosure further provides a base station 500. A description is made below with reference to a schematic structural diagram of a base station 500 in FIG. 16. It should be noted that, the mechanisms having same or similar functions in the base station 500 and the base station 200 use same number. For descriptions of specific structures and functions, reference may be made to the foregoing descriptions. For brevity, a difference between the base station 200 and the base station 500 is mainly described below.

[0280] As shown in FIG. 17, in the base station 500, the first storage compartment 210 and the second storage compartment 220 are arranged in the vertical direction, and the first storage compartment 210 is located above the second storage compartment 220. The removal mechanism 320 may be located between the first storage compartment 210 and the second storage compartment 220.

[0281] A scraping portion 510 is arranged below the first storage compartment 210, and the first storage compartment 210 may move downward to remove, by using the scraping portion 510, the residual second sheet mop on the removal mechanism 320. Certainly, in another embodiment, the first storage compartment 210 includes an outer cabin and an inner cabin arranged in the outer cabin. For example, the inner cabin is nested in the outer cabin. A gap exists between the inner cabin and the outer cabin, so that the inner cabin may move relative to the outer cabin. For example, the inner cabin may move up and down relative to the outer cabin. In some embodiments, an elastic device is arranged between the inner cabin and the outer cabin, the scraping portion is arranged at the bottom of the inner cabin, and the scraping portion matches the removal mechanism arranged on the second storage compartment. The inner cabin drives the scraping portion to move downward under the downward pressure of the mop board picking a paper, so that the scraping portion may scrape the removal mechanism arranged on a dirty carton (that is, the second storage compartment), so as to clean the residual paper on the removal mechanism.

[0282] That is, when the first storage compartment 210 moves downward through the removal mechanism 320, the scraping portion 510 of the first storage compartment 210 may scrape off the residual second sheet mop on the removal mechanism 320.

[0283] In some embodiments, to simplify a mechanism of the scraping portion 510, the scraping portion 510 may be configured as a convex shape. Certainly, a specific structure of the scraping portion 510 is not limited in this embodiment of the present disclosure, for example, the scraping portion may alternatively be a hook.

[0284] In some embodiments, the base station 500 may be provided with a vertical guide rail, so that the first storage compartment 210 may move downward by sliding. Certainly, the first storage compartment 210 may further be driven by a manipulator to move, and a movement mode of the first storage compartment is not specifically limited in this embodiment of the present disclosure.

[0285] To simplify a moving path of each movable mechanism in the base station 500, the moving path of the first storage compartment 210 in the vertical direction may be the same as that of the first movable mechanism 310 in the vertical direction. For example, referring to FIG. 17, the first movable mechanism 310 and the first storage compartment 210 may share a vertical slide rail to move.

[0286] The structure of the device in the embodiments of the present disclosure is described above with reference to FIG. 1 to FIG. 17. To facilitate understanding of the present disclosure, the process of replacing a sheet mop for the cleaning robot 100 is described in this embodiment of the present disclosure with reference to FIG. 18 to FIG. 28, by using the base station 500 as an example.

[0287] Referring to FIG. 18, the cleaning robot 100 enters the base station 500. Referring to FIG. 19, the cleaning robot 100 pushes the mop board 110 away, so that the mop board 110 falls in a predetermined region within the base station 500, and then a body of the cleaning robot exits the base station 500.

[0288] The predetermined region may be understood as a region in which the first movable mechanism 310 may be connected to the mop board 110. Referring to FIG. 20, the first movable mechanism 310 moves downward along a vertical track and is connected to the mop board 110. Referring to FIG. 21, the first movable mechanism 310 drives the mop board 110 to move upward to the mop removal position, to reserve a space for the movement of the second storage compartment 220. Referring to FIG. 22, the second movable mechanism 410 drives the second storage compartment 220 to move horizontally from the initial position to the lower part of the removal mechanism 320. During the movement of the second storage compartment 220, the removal mechanism 320 is pushed to rotate towards a direction of the mop board 110, so that the hook portions of the removal mechanism 320 may be aligned with the second sheet mop located in the mop removal groove 111 of the mop board 110.

[0289] Then, the first movable mechanism 310 drives the mop board 110 to move upward through a position of the hook portion, so that the hook portion moves from

the upper part of the second sheet mop to the lower part of the second sheet mop, so as to remove the second sheet mop from the mop board 110.

[0290] Referring to FIG. 23, after a removal operation is completed, the first movable mechanism 310 drives the mop board 110 to move upward, so that the second movable mechanism 410 drives the second storage compartment 220 to horizontally move back to the initial position.

[0291] Referring to FIG. 24, the third movable mechanism 420 drives the first storage compartment 210 to move horizontally from the initial position to the lower part of the mop board 110, and the first movable mechanism 310 drives the mop board 110 to extend into the first storage compartment 210 to paste the first sheet mop. Referring to FIG. 25, after a pasting operation is completed, the first movable mechanism 310 drives the mop board 110 to move upward, so that the third movable mechanism 420 drives the first storage compartment 210 to horizontally move back to the initial position.

[0292] Referring to FIG. 26, the first movable mechanism 310 drives the mop board 110 to move downward to the predetermined region, and squeezes the mop board 110 toward the bottom of the base station 500 to improve the connecting force between the mop board 110 and the first sheet mop through the deformation of the flexible abutting portion 114.

[0293] Referring to FIG. 27, the first movable mechanism 310 is disconnected from the mop board 110 and leaves the mop board 110 in the predetermined region. The first movable mechanism 310 moves upward to reserve a space for the cleaning robot 100 to connect the mop board 110.

[0294] Referring to FIG. 28, the cleaning robot 100 enters the base station 500 and connects the mop board 110 to the cleaning robot 100 in the predetermined region.

[0295] The cleaning robot, the base station, and the cleaning robot maintenance system provided in the embodiments of the present disclosure are described above with reference to FIG. 1 to FIG. 28, and a control method provided in an embodiment of the present disclosure is described below with reference to FIG. 29. It should be noted that, the method provided in this embodiment of the present disclosure may be used together with any cleaning robot maintenance system described above.

[0296] FIG. 29 is a flowchart of a control method according to an embodiment of the present disclosure. The method shown in FIG. 29 includes step S2910 and step S2920.

[0297] It should be understood that the control method shown in FIG. 29 may be performed by the controller in the base station or performed by other one or more devices having a control function. This is not limited in this embodiment of the present disclosure. It should be further understood that the controller or the device having the control function may perform any one or more control functions involved in the foregoing descriptions.

[0298] Step S2910. A controller determines that a cleaning robot 100 has returned to a base station 500.

[0299] Step S2920. The controller controls a mop picking device 300 to replace a second sheet mop mounted on the cleaning robot 100 with a first sheet mop in a first storage compartment 210.

[0300] Optionally, in an embodiment, the method further includes that: the controller controls the mop picking device 300 to remove the second sheet mop from the cleaning robot 100 and store the second sheet mop in a second storage compartment 220.

[0301] Optionally, in an embodiment, the cleaning robot 100 includes a mop board 110 that is separable from the cleaning robot 100.

[0302] Optionally, in an embodiment, the step of determining, by a controller, that a cleaning robot 100 has returned to a base station 500 includes:

determining that the cleaning robot 100 reaches a mop board operating position, and controlling the cleaning robot 100 to remove the mop board 110.

[0303] Optionally, in an embodiment, the mop picking device 300 includes: a first movable mechanism 310 and a connecting portion with the mop board 110. After the mop board 110 is separated from the cleaning robot 100, the first movable mechanism 310 is connected to the mop board 110 by the connecting portion. The method further includes that: the controller controls the first movable mechanism 310 to drive the mop board 110 to first move to a mop removal position, so as to remove and store the second sheet mop into the second storage compartment 220, and then drive the mop board 110 to move to a mop mounting position, so as to mount the first sheet mop in the first storage compartment 210 on the mop board 110.

[0304] For example, the controller communicates with the cleaning robot, controls an ejection mechanism of the cleaning robot to eject the mop board 110, so as to separate the mop board from the cleaning robot.

[0305] Optionally, in an embodiment, a second movable mechanism 410 is connected to the second storage compartment 220, and a third movable mechanism 420 is connected to the first storage compartment 210. The method further includes that: the controller controls the second movable mechanism 410 to drive the second storage compartment 220 to move to a lower part of a removal mechanism 320, so as to receive the second sheet mop falling from the mop board 110; and/or the controller controls the third movable mechanism 420 to drive the first storage compartment 210 to move a lower part of the mop board 110, so that the mop board 110 enters the first storage compartment 210 and is connected to the first sheet mop in the first storage compartment 210.

[0306] Optionally, in an embodiment, the second movable mechanism 410 and the third movable mechanism 420 are located on one side or two sides of a vertical path. The method further includes that: the controller controls the first movable mechanism 310 to drive the mop

board 110 to move up and down along the vertical path, and the controller controls the second movable mechanism 410 and the third movable mechanism 420 to respectively drive the second storage compartment 220 and the first storage compartment 210 to move along a horizontal path.

[0307] Optionally, in an embodiment, the first storage compartment 210 and the second storage compartment 220 are arranged in a vertical direction.

[0308] Optionally, in an embodiment, the method further includes that: when the controller controls the second movable mechanism 410 to drive the second storage compartment 220 to move, the second storage compartment 220 pushes the removal mechanism 320 to move to the mop removal position.

[0309] Optionally, in an embodiment, after the first sheet mop is pasted to the mop board 110, the method further includes that: the controller controls the first movable mechanism 310 to drive the mop board 110 to rise and shake.

[0310] Optionally, in an embodiment, a pasting portion 112 is arranged on a flexible abutting portion 114 of the mop board 110. The method further includes that: the controller controls the first movable mechanism 310 to drive the mop board 110 to abut against a bottom surface of the base station 500 after the first sheet mop is pasted to the mop board 110 through the flexible abutting portion 114, so as to improve a connecting force between the mop board 110 and the first sheet mop through the deformation of the flexible abutting portion 114.

[0311] The control method embodiment of the present disclosure is described in detail above with reference to FIG. 29, and the device embodiment for implementing the control method of the present disclosure is described below with reference to FIG. 30 and FIG. 31. It should be understood that the description of the method embodiment corresponds to the description of the device embodiment. Therefore, for a part not described in detail, reference may be made to the previous method embodiment.

[0312] FIG. 30 is a schematic diagram of a control apparatus according to an embodiment of the present disclosure. The control apparatus 3000 shown in FIG. 30 includes a determining module 3010 and a control module 3020. The determining module 3010 is configured to determine that a cleaning robot 100 has returned to a base station 500. The control module 3020 is configured to control

a mop picking device 300 to replace a second sheet mop mounted on the cleaning robot 100 with a first sheet mop in a first storage compartment 210.

[0313] In an optional embodiment, the determining module 3010 and the control module 3020 may be a processor 3120, and the controller may further include an input/output interface 3130 and a memory 3110, as shown in FIG. 31.

[0314] FIG. 31 is a schematic diagram of a controller according to another embodiment of the present disclosure.

sure. The controller 3100 shown in FIG. 31 may include: a memory 3110, a processor 3120, and an input/output interface 3130. The memory 3110, the processor 3120, and the input/output interface 3130 are connected to each other by using an internal connection path. The memory 3110 is configured to store instructions. The processor 3120 is configured to execute the instructions stored in the memory 3120, to control the input/output interface 3130 to receive input data and information, and output control instructions.

[0315] It should be understood that, in this embodiment of the present invention, the processor 3120 may use a general central processing unit (Central Processing Unit, CPU), a microprocessor, an application-specific integrated circuit (Application Specific Integrated Circuit, ASIC), or one or more integrated circuits to execute a related program, to implement technical solutions in embodiments of the present invention.

[0316] The memory 3110 may include a ROM and a RAM, and provides an instruction and data to the processor 3120. A part of the processor 3120 may further comprise a non-volatile random access memory. For example, the processor 3120 may further store information about a device type.

[0317] In an implementation process, each step of the foregoing method may be completed by using an integrated logical circuit of hardware in the processor 3120 or an instruction in a form of software. With reference to this embodiment of the present invention, the disclosed request upstream transport resources method may be directly reflected by being performed and completed by the hardware processor, or being performed and completed by using a combination of hardware and a software module in the processor. The software module may be stored in a storage medium that is mature in the art, such as a RAM, a flash memory, a ROM, a programmable ROM, an electrically erasable programmable memory, or a register. The storage medium is located in the memory 3110, and the processor 3120 reads information in the memory 3110 and completes the steps in the foregoing methods in combination with hardware of the processor. To avoid repetition, details are not described herein.

[0318] The cleaning robot maintenance system provided in the embodiments of the present disclosure is described above with reference to FIG. 1 to FIG. 28. Another cleaning robot maintenance system is described below with reference to FIG. 32 to FIG. 55.

[0319] Referring to FIG. 32, the cleaning robot 100 enters the base station 500.

[0320] In some embodiments, when the cleaning robot 100 needs to replace a mop, for example, when entering different regions (from one region to another region), or when a dirt degree of a mop reaches a preset degree, the cleaning robot 100 returns to and enters the base station 500.

[0321] Referring to FIG. 33 and FIG. 34, the cleaning robot 100 pushes a mop board 110 away, so that the

mop board 110 falls into a predetermined region within the base station 500, and then a body of the cleaning robot exits the base station 500.

[0322] In an embodiment, the cleaning robot 100 enters a predetermined position of the base station. For example, when a charging electrode of the cleaning robot 100 is in contact with a charging electrode of the base station 500, it may be considered as that the cleaning robot 100 enters the predetermined position of the base station. In this case, the cleaning robot 100 may push or eject the mop board 110 away, so that the mop board 110 falls into the predetermined region within the base station 500. It may be understood that once the cleaning robot reaches the predetermined position, the mop board may fall into the predetermined region within the base station.

[0323] Referring to FIG. 35 and FIG. 37, a first movable mechanism 310 moves downward along a vertical track and is connected to the mop board 110.

[0324] The vertical track includes a conveyor belt 314, and the first movable mechanism 310 moves under the driving of the conveyor belt. To reduce an alignment error generated during the downward movement of the first movable mechanism, the vertical track further includes a guide mechanism 315. In an embodiment, the conveyor belt may be, for example, a synchronous belt, and the guide mechanism may be, for example, a guide column.

[0325] To facilitate the connection between the connecting portion 311 and the mop board 110, the first movable mechanism 310 may further be provided with a magnetic attraction positioning portion. In this way, before the connecting portion 311 is connected to the mop board 110, the first movable mechanism 310 may perform magnetic attraction positioning on the mop board 110 by using the magnetic attraction positioning portion.

[0326] Referring to FIG. 36, a first magnet 3111 is arranged at the bottom of the connecting portion 311. Correspondingly, a second magnet 1101 is arranged at the top of the mop board 110, and the first movable mechanism 310 is aligned with the mop board 110 through mutual attraction between the two magnets on the connecting portion 311 and the mop board 110. For example, the magnets may be respectively arranged at the bottom center of the first movable mechanism 310 and the top center of the mop board 110.

[0327] Further, to prevent the mop board from falling off during movement, the connecting portion 311 may further be connected to the mop board 110 by grasping. For example, the connecting portion 311 may be connected to the mop board 110 by a mechanical hook. Specifically, a locking member 3112 is further arranged on the connecting portion 311, and correspondingly, a locking portion 1102 is arranged on the mop board 110, so that the mop board and the first movable mechanism are fixed through the cooperation between the locking member and the locking portion.

[0328] Certainly, the connecting portion 311 may alternatively include a mechanical claw. After the mop board

110 is separated from the cleaning robot 100, the mechanical claw is connected to the mop board 110 by grasping. This is not limited in this embodiment of the present disclosure.

[0329] Referring to FIG. 38, the first movable mechanism 310 drives the mop board 110 to move upward to a position higher than the second storage compartment or above the mop removal position, to reserve a space for the movement of the second storage compartment 220.

[0330] Referring to FIG. 39, the second movable mechanism 410 drives the second storage compartment 220 to move horizontally from the initial position to the mop removal position.

[0331] Referring to FIG. 40, the first movable mechanism 310 drives the mop board 110 to move downward through a position of the removal mechanism 320, to cause the second sheet mop to move from the upper part of the removal mechanism 320 to the lower part of the removal mechanism 320, so that the second sheet mop is removed from the mop board 110 subsequently.

[0332] Because the sheet mop may be deformed when subject to a force, and a mop removal groove 111 is provided on the mop board 110, when the first movable mechanism 310 drives the mop board 110 to move downward to the mop removal position, the second sheet mop on the mop board smoothly passes through the hook portion of the removal mechanism 320 without being stuck. In this case, the hook portion of the removal mechanism 320 may be aligned with the second sheet mop in the mop removal groove 111 of the mop board 110.

[0333] Referring to FIG. 41, the first movable mechanism 310 drives the mop board 110 to rise, and the removal mechanism 320 removes the second sheet mop from the mop board 110.

[0334] When the first movable mechanism 310 drives the mop board 110 to rise through a position of the hook portion of the removal mechanism 320, so that the hook portion hooks the second sheet mop, to remove the second sheet mop from the mop board 110, and the second sheet mop falls off.

[0335] Referring to FIG. 42, the first movable mechanism drives the mop board 110 to continue to rise and move upward to a mop pasting position, to reserve a space for the movement of the first storage compartment.

[0336] The mop pasting position may be higher than the height of the first storage compartment, for example, the mop pasting position may be an upper limit of the travel of the first movable mechanism, so that relatively large pressure may be provided during the downward movement, which is conducive to improving the connection stability with the mop (for example, improving the adhesion effect). It should be noted that by controlling the mop pasting position, the adhesion may also be controlled, so that the mop board can paste only a single first sheet mop. It may be understood that the mop pasting position may be determined by experiment.

[0337] When the first movable mechanism drives the

mop board 110 to continue to rise, the second sheet mop falls into the second storage compartment 220 to recycle the second sheet mop.

[0338] Referring to FIG. 43, the third movable mechanism 420 drives the first storage compartment 210 to move horizontally from the initial position to the mop pasting position.

[0339] Referring to FIG. 44, the first movable mechanism 310 drives the mop board 110 to extend into the first storage compartment 210 to paste the first sheet mop.

[0340] An elastic pad 2101 may be arranged on an inner surface at the bottom portion of the first storage compartment, to improve the adhesion effect between the mop board and the mop. Two sides of the elastic pad are in a shape of step, matching the structure of the mop board to facilitate the pasting between the two. A plurality of first sheet mops are stacked on the elastic pad. The first sheet mop is pressed by the mop board and cooperates with a reaction force of the elastic pad to improve the adhesiveness between the mop board and the first sheet mop.

[0341] It should be noted that, referring to FIG. 56, the first storage compartment may further be provided with a guide device 810 to facilitate connection and positioning when the mop is connected to the mop, so as to prevent a problem of unstable connection or connection failure caused by excessive deviation. Optionally, the guide device 810 may be a guide column, a sliding groove, or a sliding rail.

[0342] Referring to FIG. 45, after a pasting operation is completed, the first movable mechanism 310 drives the mop board 110 to move upward, to reserve a space for reset of the first storage compartment, so that the third movable mechanism 420 drives the first storage compartment 210 to move back to the initial position horizontally.

[0343] Referring to FIG. 46, the third movable mechanism 420 drives the first storage compartment 210 to horizontally move back to the initial position.

[0344] It should be understood that if the second storage compartment is not reset, it is also necessary to reset the second storage compartment.

[0345] It should be noted that during the reset of the first storage compartment, the second storage compartment may be reset simultaneously; or the second storage compartment may be reset after the first storage compartment is reset; or certainly, the second storage compartment may be reset after the second sheet mop is recycled. This is not limited in the present disclosure.

[0346] Referring to FIG. 47, FIG. 48, and FIG. 49, the first movable mechanism 310 drives the mop board 110 to move downward to a mop board release position to release the mop board 110, so that the mop board 110 can accurately fall into the predetermined region at the bottom of the base station 500, so that the cleaning robot 100 can pick it up.

[0347] When the mop board 110 is released, the mag-

nets may be separated by using a release mechanism 600. It may be understood that if the mop board and the first movable mechanism are locked together by using the locking member and the locking portion, the locking portion and the locking member are unlocked first, and then the magnets are separated.

[0348] Referring to FIG. 50, the first movable mechanism 310 is disconnected from the mop board 110. After the mop board 110 is left in the predetermined region, the first movable mechanism 310 moves upward, for example, the first movable mechanism moves upward to the initial position (reset) to reserve a space for the cleaning robot 100 to connect the mop board 110.

[0349] Referring to FIG. 51, the cleaning robot 100 enters the base station 500 and picks the mop board 110 at the predetermined region, so as to connect the mop board 110 with the first sheet mop to the cleaning robot 100. Then, the cleaning robot 100 exits the base station 500 and may continue to perform a working task, for example, the cleaning robot may return to a previous breakpoint position to continue cleaning.

[0350] In the present disclosure, the first storage compartment is in an upper part and the second storage compartment is in a lower part, which improves an operation space for replacing a mop, especially for removing the mop, avoid a problem that the height of the base station increases due to a relatively large space travel required by a dirty mop cabin, and is conducive to reducing the volume of the base station.

[0351] In the two mop replacement embodiments described in FIG. 18 to FIG. 28 and FIG. 32 to FIG. 51, the mop is replaced by removing the mop board from the cleaning robot.

[0352] Certainly, in another embodiment, the mop board may alternatively be arranged on the cleaning robot, and the mop may be replaced without being removed.

[0353] In addition, in the embodiments of automatically picking the mop described above, the mop board and the first storage compartment are connected to pick the first sheet mop, so as to connect the mop board and the single first sheet mop. In other words, the first sheet mop is connected to the mop board through connection and cooperation between the mop board and the first storage compartment.

[0354] In another embodiment, the mop board may further be connected to a single mop by separating the single mop or transferring the single mop or a combination of separation and transfer.

[0355] For example, a separation and transfer device may be arranged, to transfer the single first sheet mop from the first storage compartment to a preset transfer position, and then the mop board is connected to the single first sheet mop at the preset transfer position. That is, the mop picking device includes: the separation and transfer device, configured to transfer the single first sheet mop separated from at least two first sheet mops stacked in the first storage compartment to the preset

transfer position, so that the mop board is connected to the single first sheet mop.

[0356] Optionally, the separation and transfer device includes a separation mechanism, configured to separate the single first sheet mop from the at least two stacked first sheet mops. Further, the separated single first sheet mop is transferred to the preset transfer position through a transfer mechanism, to facilitate the connection with the mop board.

[0357] The transfer mechanism is configured to transfer the single first sheet mop picked by the mop picking device from the first storage compartment to the preset transfer position, so as to connect the mop board. In some embodiments, the transfer mechanism may be arranged between the first storage compartment and the mop board, for example, in a position close to the first storage compartment or in a position convenient for separating the sheet mop in the first storage compartment.

[0358] It should be understood that functions of separation and transfer may be implemented by one device (for example, the separation and transfer device).

[0359] Certainly, the functions of separation and transfer may alternatively be implemented by the two separate functional mechanisms. For example, the mop picking device includes: a separation mechanism, configured to separate a single first sheet mop from the at least two first sheet mops stacked in the first storage compartment, so that the mop board is connected to the separated single first sheet mop; and/or a transfer mechanism, configured to transfer the single first sheet mop to the preset transfer position, so that the mop board is connected to the single first sheet mop.

[0360] It should be noted that the above separation and transfer may be performed simultaneously or sequentially, for example, separation may be first performed and then transfer may be performed (for example, a first sheet mop is first separated and then transferred by vacuum suction), or transfer may be performed and the separation may be performed (for example, final separation may be implemented during transfer).

[0361] The preset transfer position mentioned herein is to facilitate the pasting of the mop board, for example, the position of the first sheet mop may be separated or the first sheet mop may be transferred to the position of the mop board; or the first sheet mop may be transferred to a position outside the first storage compartment, to provide a larger operation space for connection between the mop board and the first sheet mop and avoid damage to the first storage compartment; or certainly, the first sheet mop may be transferred to another position in the first storage compartment, and this is not limited in this embodiment.

[0362] Different from the manner in which the mop board moves into the first mop cabin and is connected to the mop, in this embodiment, after a single first sheet mop is separated and transferred from the first storage compartment, the mop board is connected to the single first sheet mop. That is, the mop board may be connected

to the first sheet mop by using separation and transfer mechanisms between the mop board and the first storage compartment, which reduces a probability of pasting a plurality of mops, thereby simplifying the operations of picking a single mop or the complexity of the structure for picking a single mop.

[0363] In some embodiments, the separation mechanism includes a paper suction device, configured to suck the first sheet mop at a mop suction position, where the mop suction position is a position where the paper suction device can suck out the single first sheet mop.

[0364] Further, the paper suction device is a vacuum sucker component, and the vacuum sucker component includes a vacuum sucker.

[0365] Certainly, in addition to the manner of separating mops by suction, in another embodiment, the applicant found that it is also possible to separate a single sheet mop by "blowing" based on the porosity of the sheet mop. For example, the separation mechanism includes a fluid conveying device, configured to convey a fluid to a top surface of the stacked first sheet mop combination to separate a first sheet mop at the top from the first sheet mop combination. In addition, the mop may also be separated by friction. For example, the separation mechanism may further include a friction paper feeding mechanism to lift one end (a paper feeding end) of the first sheet mop by using a friction principle, then the first sheet mop at the paper feeding end is blocked by a gasket with a friction coefficient, and the first sheet mop at the top is brought out to the preset transfer position by a rubber wheel. The raised height may be set to a difference between a depth (or a height) of the first storage compartment and a thickness of the first sheet mop.

[0366] In addition, the transfer mechanism transfers the separated first sheet mop, which is different from the movable component that drives the entire first storage compartment to move.

[0367] The present disclosure further provides a control method used together with any of the above mentioned cleaning robot maintenance systems. Referring to FIG. 58, the cleaning robot control method includes:

Step S5810. Provide a first storage compartment, to store at least two first sheet mops that are stacked.

Step S5820. Pick a single first sheet mop from the first storage compartment by using a mop picking device, to connect the single first sheet mop and a mop board.

[0368] Optionally, step S5820 may be implemented in one of the following two manners.

[0369] Manner 1. The mop picking device includes the mop board; and

at least one of the mop board and the first storage compartment is controlled to move, so that the mop board can extend into the first storage compartment and reach a mop connection position and is connected to the first

sheet mop.

[0370] Optionally, in an implementation, the mop picking device includes a first movable mechanism, connected to the mop board; and

the at least one of the mop board and the first storage compartment is controlled to move, and the mop board may be driven by the first movable mechanism to move towards the first storage compartment.

[0371] Optionally, in an implementation, the mop board is mounted on the cleaning robot; and when the mop board is connected to the first sheet mop, the cleaning robot does not move actively, and the mop board actively moves towards the first storage compartment relative to the cleaning robot.

[0372] Optionally, in an implementation, the mop picking device further includes a first movable mechanism, configured to drive the mop board to move; the mop board is detachably connected to the cleaning robot; the mop board is separable from the cleaning robot; and the method further includes:

causing the mop board to be separated from the cleaning robot when the cleaning robot needs to replace a mop, and connecting the first movable mechanism and the separated mop board, to drive the mop board to extend into the first storage compartment by using the first movable mechanism.

[0373] Optionally, in an implementation, the maintenance system includes a mop board operating position, configured for the cleaning robot to separate the mop board; and the method further includes: causing the mop board to be separated from the cleaning robot when it is determined that the cleaning robot reaches the mop board operating position.

[0374] Optionally, in an implementation, the mop connection position or the first storage compartment is higher than the mop board operating position, to form a space for the cleaning robot to dock.

[0375] Optionally, in an implementation, before the step of connecting the first movable mechanism and the separated mop board, the method further includes: pre-positioning the first movable mechanism and the mop board by magnetic attraction.

[0376] Optionally, in an implementation, the mop picking device includes a first movable mechanism, connected to the mop board; the maintenance system further includes a third movable mechanism, connected to the first storage compartment; and

the step of controlling at least one of the mop board and the first storage compartment to move includes:

driving, by using the first movable mechanism, the mop board to move and driving, by using the third movable mechanism, the first storage compartment to move.

[0377] Manner 2. The mop picking device includes a separation mechanism and/or a transfer mechanism;

a single first sheet mop is separated from the at least two first sheet mops stacked in the first storage compartment by using the separation mechanism; and/or

the single first sheet mop is transferred to a preset transfer position by using the transfer mechanism, so that the mop board is connected to the single first sheet mop.

[0378] Optionally, in an implementation, the separation mechanism includes a paper suction device; and the method includes:

controlling the paper suction device to suck the first sheet mop at a mop suction position, where the mop suction position is a position where the paper suction device can suck out the single first sheet mop.

[0379] Optionally, in an implementation, the separation mechanism includes a fluid conveying device; and the method includes:

controlling the fluid conveying device to convey a fluid to the first storage compartment, so that the first sheet mop at the top is separated from the at least two first sheet mops.

[0380] Optionally, in an implementation, step S5820 may be implemented through the following step:

controlling the mop board to pick the single first sheet mop from the first storage compartment in a direction perpendicular to a mopping side of the first sheet mop.

[0381] Optionally, in an implementation, an angle is formed between a lower surface of the mop board and the mopping side of the first sheet mop, and the angle is less than 90 degrees.

[0382] Optionally, in an implementation, the mop board is provided with a connection region used for connecting the first sheet mop, where the connection region includes a pasting portion, and the first sheet mop may be pasted to the pasting portion, to connect the mop board and the first sheet mop.

[0383] Optionally, in an implementation, the mop picking device includes a first movable mechanism, connected to the mop board; and the method further includes: controlling the first movable mechanism to drive the mop board to shake after the first sheet mop is pasted to the mop board, so that the single first sheet mop is pasted on the pasting portion of the mop board, where the shaking means a reciprocating motion of the mop board in a first direction and a second direction, and the first direction is a direction in which the mop board picks out the first sheet mop from the first storage compartment, and the second direction is opposite to the first direction.

[0384] Optionally, in an implementation, the first storage compartment is provided with a friction component; and the method further includes:

generating a reaction force by using the friction component after the first sheet mop is pasted to the mop board and when the mop board moves in the first direction, so that the single first sheet mop can be pasted on the pasting portion of the mop board, where the first direction is a direction in which the mop board picks out the first sheet mop from the first storage compartment.

[0385] Optionally, in an implementation, the first storage compartment is further provided with a separation

component, configured to generate a gap between two adjacent first sheet mops.

[0386] Optionally, in an implementation, the pasting portion includes a first part in contact with the first sheet mop and/or a second part exposed outside the first sheet mop, where an angle formed between the first part and the first sheet mop is greater than or equal to 0 degrees and less than or equal to 10 degrees; and an angle formed between the second part and the first sheet mop is greater than 0 degrees and less than 90 degrees.

[0387] Optionally, in an implementation, the mop board includes a top portion, a bottom portion, and a side wall connecting the top bottom and the bottom portion, where the side wall is inclined from the bottom portion towards the top portion, and the pasting portion is arranged on the inclined side wall.

[0388] Optionally, in an implementation, a ratio of an area of the pasting portion to an area of the first sheet mop falls within a preset range, so that the mop board can pick the single first sheet mop through pasting from a first sheet mop combination.

[0389] Optionally, in an implementation, the method further includes:

when a second sheet mop is mounted on the mop board, separating the second sheet mop and the mop board.

[0390] Optionally, in an implementation, the maintenance system includes a removal mechanism, and the mop board includes a removal region, where the removal region is not connected to the second sheet mop; and the step of separating the second sheet mop and the mop board includes:

controlling at least one of the removal mechanism or the mop board to move, to remove the second sheet mop from the mop board.

[0391] Optionally, in an implementation, the step of separating the second sheet mop and the mop board includes:

removing the second sheet mop in a removal direction by using the dislodging mechanism, where the removal direction is not parallel to a mopping side of the second sheet mop or the mop board.

[0392] Optionally, in an implementation, the step of separating the second sheet mop and the mop board includes:

applying, by using the dislodging mechanism, an external force away from the mop board to the second sheet mop, so that the second sheet mop falls under the action of gravity or the external force after being separated from the mop board and the second sheet mop is removed from the mop board.

[0393] Optionally, in an implementation, when the second sheet mop is removed from the mop board, the cleaning robot does not move actively, and the mop board or the dislodging mechanism moves actively.

[0394] Optionally, in an implementation, the maintenance system further includes a second storage compartment, configured to receive the second sheet mop removed from the mop board; and the step of separating

the second sheet mop and the mop board includes:

applying, by using the dislodging mechanism, an external force away from the mop board to the second sheet mop by using the removal mechanism, to separate the second sheet mop and the mop board, so that the second sheet mop falls into the second storage compartment under the action of gravity or the external force after being separated from the mop board.

[0395] Optionally, in an implementation, the removal mechanism is arranged on the second storage compartment.

[0396] Optionally, in an implementation, the maintenance system includes a second movable mechanism, connected to the second storage compartment; the removal mechanism is mounted at a preset mop removal position, and the mop removal position is located outside the second storage compartment; and the method includes:

driving the second storage compartment to move to the mop removal position by using the second movable mechanism, to receive the second sheet mop separated from the mop board.

[0397] Optionally, in an implementation, the removal region includes a mop removal groove, and an outer edge of the mop board is recessed towards the inside of the mop board, to form the mop removal groove.

[0398] Optionally, in an implementation, the mop board includes at least a first state and a second state, where the mop board is at a mopping position in the first state; and the mop board is at a non-mopping position in the second state, where

the non-mopping position is higher than the mopping position, to provide an operation space for removal of the second sheet mop or mounting of the first sheet mop.

[0399] Optionally, in an implementation, the mop removal position or the first storage compartment is higher than the mop board operating position, to form a space for the cleaning robot to dock.

[0400] Optionally, in an implementation, the first storage compartment and the second storage compartment are arranged up and down in a vertical direction.

[0401] Optionally, in an implementation, the first storage compartment is located above the second storage compartment.

[0402] It should be noted that, for brevity, for a part of the control method that is not described in detail, reference is made to the system, and details are not described herein again.

[0403] It should be understood that in various embodiments of the present disclosure, mechanisms or components with similar functions and structures use the same number.

[0404] It should be understood that the term "and/or" in this specification describes only an association relationship for describing associated objects and represents that three relationships may exist. For example, A and/or B may represent the following three cases: Only A exists, both A and B exist, and only B exists. In addition, the

character "/" in this specification generally indicates an "or" relationship between the associated objects.

[0405] It should be understood that sequence numbers of the foregoing processes do not mean execution sequences in various embodiments of this application. The execution sequences of the processes should be determined according to functions and internal logic of the processes, and should not be construed as any limitation on the implementation processes of the embodiments of the present invention.

[0406] In the embodiments provided in the present disclosure, it should be understood that the disclosed system, apparatus, and method may be implemented in other manners. For example, the described apparatus embodiments are only exemplary. For example, the division of the units is only a logical function division and may be other divisions during actual implementation. For example, a plurality of units or components may be combined or integrated into another system, or some features may be ignored or not performed. In addition, the shown or discussed mutual couplings or direct couplings or communication connections may be implemented through some interfaces. The indirect couplings or communication connections between the apparatus or units may be implemented in electronic, mechanical, or other forms.

[0407] In addition, functional units in the embodiments of the present disclosure may be integrated into one processing unit, or each of the units may be physically separated, or two or more units may be integrated into one unit.

[0408] All or some of the foregoing embodiments may be implemented by using software, hardware, firmware, or any combination therefor. When software is used for implementation, implementation may be entirely or partially performed in the form of a computer program product. The computer program product includes one or more computer instructions. When the computer program instructions are loaded and executed on a computer, all or some of the processes or functions according to the embodiments of the present invention are produced. The computer may be a general-purpose computer, a dedicated computer, a computer network, or other programmable apparatuses. The computer instructions may be stored in a computer-readable storage medium or may be transmitted from one computer-readable storage medium to another computer-readable storage medium. For example, the computer instructions may be transmitted from a website, computer, server, or data center to another website, computer, server, or data center in a wired (for example, by using a coaxial cable, an optical fiber, or a digital subscriber line (Digital Subscriber Line, DSL)) or wireless (for example, infrared, radio, or microwave) manner. The computer-readable storage medium may be any usable medium accessible by a computer, or a data storage device, such as a server or a data center, integrating one or more usable media. The usable medium may be a magnetic medium (for example, a floppy disk, a hard disk, or a magnetic tape), an optical medium

(for example, a digital video disc (DVD), a semiconductor medium (for example, a solid state disk (SSD), or the like.

[0409] The foregoing descriptions are merely specific implementations of the present disclosure, but are not intended to limit the protection scope of the present disclosure. Any variation or replacement readily figured out by a person skilled in the art within the technical scope disclosed in the present disclosure shall fall within the protection scope of the present disclosure. Therefore, the protection scope of the present disclosure shall be subject to the protection scope of the claims.

Claims

1. A cleaning robot maintenance system, wherein the maintenance system comprising:

a base station, configured to maintain a cleaning robot, where the base station comprises a first storage compartment, and the first storage compartment is configured to store at least two first sheet mops that are stacked; and
a mop picking device, configured to pick a single first sheet mop from the first storage compartment, to connect the single first sheet mop and a mop board.

2. The maintenance system according to claim 1, wherein the mop picking device comprises the mop board, the mop board and the first storage compartment are configured to move relative to each other, so that the mop board can extend into the first storage compartment and reach a mop connection position and is connected to the first sheet mop.
3. The maintenance system according to claim 2, wherein when the mop board is connected to the first sheet mop, the first storage compartment does not move actively, and the mop board actively moves towards the first storage compartment and moves into the first storage compartment.
4. The maintenance system according to claim 3, wherein the mop board is mounted on the cleaning robot; and when the mop board is connected to the first sheet mop, the cleaning robot does not move actively, and the mop board actively moves towards the first storage compartment relative to the cleaning robot.
5. The maintenance system according to claim 2, wherein when the mop board is connected to the first sheet mop, both the first storage compartment and the mop board actively move.
6. The maintenance system according to claim 2, wherein the mop picking device further comprises a

movable component, configured to drive the mop board to move; and the mop board is detachably connected to the cleaning robot, and the mop board is separable from the cleaning robot, so that when the cleaning robot needs to replace a mop, the separated mop board may be driven by the movable component to extend into the first storage compartment.

7. The maintenance system according to claim 6, wherein the maintenance system comprises a mop board operating position, configured for the cleaning robot to separate the mop board.
8. The maintenance system according to claim 7, wherein the mop connection position or the first storage compartment is higher than the mop board operating position, to form a space for the cleaning robot to dock.
9. The maintenance system according to claim 2, wherein the mop board is configured to pick the single first sheet mop from the first storage compartment in a direction perpendicular to a mopping side of the first sheet mop.
10. The maintenance system according to claim 9, wherein an angle of less than 90 degrees is formed between a lower surface of the mop board and the mopping side of the first sheet mop.
11. The maintenance system according to claim 10, wherein the angle between the lower surface of the mop board and the mopping side of the first sheet mop is greater than or equal to 0 degrees and less than or equal to 35 degrees.
12. The maintenance system according to claim 9, wherein the first storage compartment comprises a bottom portion configured to carry the mopping side of the first sheet mop, where an angle is formed between the bottom portion and a horizontal plane, and the angle is greater than or equal to 0 degrees and less than or equal to 45 degrees.
13. The maintenance system according to claim 2, wherein the mop board is provided with a connection region used for connecting the first sheet mop, wherein the connection region comprises a pasting portion, and the first sheet mop may be pasted to the pasting portion, to connect the mop board and the first sheet mop.
14. The maintenance system according to claim 13, wherein the mop picking device comprises a first movable mechanism, configured to drive the mop board to shake after the first sheet mop is pasted to the mop board, so that the single first sheet mop is

pasted on the pasting portion of the mop board, where the shaking means a reciprocating motion of the mop board in a first direction and a second direction, and the first direction is a direction in which the mop board picks out the first sheet mop from the first storage compartment, and the second direction is opposite to the first direction.

15. The maintenance system according to claim 13, wherein the first storage compartment is provided with a friction component, where after the first sheet mop is pasted to the mop board, the friction component is configured to generate an action force for preventing the mop board from moving in the first direction, so that the single first sheet mop can be pasted on the pasting portion of the mop board; and the first direction is a direction in which the mop board picks out the first sheet mop from the first storage compartment.
16. The maintenance system according to claim 13, wherein the first storage compartment is further provided with a separation component, configured to generate a gap between two adjacent first sheet mops.
17. The maintenance system according to claim 13, wherein the pasting portion comprises a first part in contact with the first sheet mop and/or a second part exposed outside the first sheet mop, where an angle formed between the first part and the first sheet mop is greater than or equal to 0 degrees and less than or equal to 15 degrees; and an angle formed between the second part and the first sheet mop is greater than 0 degrees and less than 90 degrees.
18. The maintenance system according to claim 17, wherein the mop board comprises a top portion, a bottom portion, and a side wall connecting the top bottom and the bottom portion, where the side wall is inclined from the bottom portion towards the top portion, the pasting portion comprises a second part exposed outside the first sheet mop, and the second part of the pasting portion is arranged on the inclined side wall.
19. The maintenance system according to claim 17, wherein a ratio of an area of the pasting portion to an area of the first sheet mop falls within a preset range, so that the mop board can pick the single first sheet mop through pasting from a first sheet mop combination.
20. The maintenance system according to claim 1, wherein the mop picking device comprises a separation mechanism, configured to separate a single first sheet mop from the at least two first sheet mops stacked in the first storage compartment, so that the

mop board is connected to the separated single first sheet mop.

21. The maintenance system according to claim 20, wherein the mop picking device further comprises a transfer mechanism, configured to transfer the separated single first sheet mop to a preset transfer position, so that the mop board is connected to the single first sheet mop.
22. The maintenance system according to claim 20, wherein the separation mechanism comprises a paper suction device, configured to suck the first sheet mop at a mop suction position, where the mop suction position is a position where the paper suction device can suck out the single first sheet mop.
23. The maintenance system according to claim 20, wherein the separation mechanism comprises a fluid conveying device, configured to convey a fluid to a top surface of the at least two stacked first sheet mops, so that a first sheet mop at the top is separated from the at least two first sheet mop.
24. The maintenance system according to claim 1, wherein the mop picking device further comprises a removal mechanism, and the mop board comprises a removal region, where the paper removal mechanism cooperates with the removal region to remove a second sheet mop from the mop board, and the removal region is not connected to the second sheet mop.
25. The maintenance system according to claim 24, wherein the dislodging mechanism is configured to remove the second sheet mop in a removal direction, where an acute angle, a right angle, or an obtuse angle is formed between the removal direction and a mopping side of the second sheet mop or the mop board.
26. The maintenance system according to claim 24, wherein the dislodging mechanism is configured to apply an external force away from the mop board to the second sheet mop, and the second sheet mop falls under the action of gravity or the external force after being separated from the mop board.
27. The maintenance system according to claim 24, wherein when the second sheet mop is removed from the mop board, the cleaning robot does not move actively, and the mop board or the dislodging mechanism moves actively.
28. The maintenance system according to claim 24, wherein the maintenance system further comprises a second storage compartment, configured to receive the second sheet mop removed from the mop

board.

29. The maintenance system according to claim 28, wherein the second storage compartment is configured to be provided on a moving path of the second sheet mop removed from the mop board, so that the second sheet mop falls into the second storage compartment. 5
30. The maintenance system according to claim 28, wherein the removal mechanism is arranged on the second storage compartment. 10
31. The maintenance system according to claim 28, wherein the removal mechanism is mounted at a pre-set mop removal position, the mop removal position is located outside the second storage compartment, and the removal mechanism is configured to remove the second sheet mop from the mop board at the mop removal position and the second sheet mop is received by the second storage compartment. 15 20
32. The maintenance system according to claim 31, wherein the maintenance system comprises a mop board operating position, configured for the cleaning robot to separate the mop board, where the mop removal position or the second storage compartment is higher than the mop board operating position, to form a space for the cleaning robot to dock. 25 30
33. The maintenance system according to claim 24, wherein the removal region comprises a mop removal groove, and an outer edge of the mop board is recessed towards the inside of the mop board, to form the mop removal groove. 35
34. The maintenance system according to claim 24, wherein the mop board comprises at least a first state and a second state, where the mop board is at a mopping position in the first state; and the mop board is at a non-mopping position in the second state, where the non-mopping position is higher than the mopping position, to provide an operation space for removal of the second sheet mop or mounting of the first sheet mop. 40 45
35. The method according to claim 28, wherein the first storage compartment and the second storage compartment are arranged up and down in a vertical direction. 50
36. A control method for a cleaning robot maintenance system, wherein the method comprising: providing a first storage compartment to store at least two first sheet mops that are stacked; and picking a single first sheet mop from the first storage compartment by using a mop picking device, to connect the single 55

first sheet mop and a mop board.

37. The method according to claim 26, wherein the mop picking device comprises the mop board; and the step of picking a single first sheet mop from the first storage compartment by using a mop picking device comprises: controlling at least one of the mop board and the first storage compartment to move, so that the mop board can extend into the first storage compartment and reach a mop connection position and is connected to the first sheet mop.
38. The method according to claim 37, wherein the mop picking device comprises a first movable mechanism, connected to the mop board; and the step of controlling at least one of the mop board and the first storage compartment to move comprises: driving, by using the first movable mechanism, the mop board to move towards the first storage compartment and extend into the first storage compartment.
39. The method according to claim 38, wherein the mop board is mounted on the cleaning robot; and when the mop board is connected to the first sheet mop, the cleaning robot does not move actively, and the mop board actively moves towards the first storage compartment relative to the cleaning robot.
40. The method according to claim 37, wherein the mop picking device comprises a first movable mechanism, connected to the mop board; the system further comprises a third movable mechanism, connected to the first storage compartment; and the step of controlling at least one of the mop board and the first storage compartment to move comprises: driving, by using the first movable mechanism, the mop board to move and driving, by using the third movable mechanism, the first storage compartment to move.
41. The method according to claim 37, wherein the mop picking device further comprises a first movable mechanism, configured to drive the mop board to move; the mop board is detachably connected to the cleaning robot; the mop board is separable from the cleaning robot; and the method further comprises: causing the mop board to be separated from the cleaning robot when the cleaning robot needs to replace a mop, and connecting the first movable mechanism and the separated mop board, to drive the mop board to extend into the first storage compartment by using the first movable mechanism.
42. The method according to claim 41, wherein before the step of connecting the first movable mechanism and the separated mop board, the method further comprises: pre-positioning the first movable mechanism and the mop board by magnetic attraction.

43. The method according to claim 41, wherein the maintenance system comprises a mop board operating position, configured for the cleaning robot to separate the mop board; and the method further comprises: causing the mop board to be separated from the cleaning robot when it is determined that the cleaning robot reaches the mop board operating position.
44. The method according to claim 43, wherein the mop connection position or the first storage compartment is higher than the mop board operating position, to form a space for the cleaning robot to dock.
45. The method according to claim 36, wherein the step of picking a single first sheet mop from the first storage compartment by using a mop picking device comprises:
controlling the mop board to pick the single first sheet mop from the first storage compartment in a direction perpendicular to a mopping side of the first sheet mop.
46. The method according to claim 45, wherein an angle is formed between a lower surface of the mop board and the mopping side of the first sheet mop, and the angle is less than 90 degrees.
47. The method according to claim 37, wherein the mop board is provided with a connection region used for connecting the first sheet mop, where the connection region comprises a pasting portion, and the first sheet mop may be pasted to the pasting portion, to connect the mop board and the first sheet mop.
48. The method according to claim 47, wherein the mop picking device comprises a first movable mechanism, connected to the mop board; and the method further comprises:
controlling the first movable mechanism to drive the mop board to shake after the first sheet mop is pasted to the mop board, so that the single first sheet mop is pasted on the pasting portion of the mop board, where the shaking means a reciprocating motion of the mop board in a first direction and a second direction, and the first direction is a direction in which the mop board picks out the first sheet mop from the first storage compartment, and the second direction is opposite to the first direction.
49. The method according to claim 47, wherein the first storage compartment is provided with a friction component; and the method further comprises: generating a reaction force by using the friction component after the first sheet mop is pasted to the mop board and when the mop board moves in a first direction, so that the single first sheet mop can be pasted on the pasting portion of the mop board, where the first direction is a direction in which the mop board picks out the first sheet mop from the first storage compartment.
50. The method according to claim 47, wherein the first storage compartment is further provided with a separation component, configured to generate a gap between two adjacent first sheet mops.
51. The method according to claim 47, wherein the pasting portion comprises a first part in contact with the first sheet mop and/or a second part exposed outside the first sheet mop, where an angle formed between the first part and the first sheet mop is greater than or equal to 0 degrees and less than or equal to 10 degrees; and an angle formed between the second part and the first sheet mop is greater than 0 degrees and less than 90 degrees.
52. The method according to claim 47, wherein the mop board comprises a top portion, a bottom portion, and a side wall connecting the top bottom and the bottom portion, where the side wall is inclined from the bottom portion towards the top portion, and the pasting portion is arranged on the inclined side wall.
53. The method according to claim 47, wherein a ratio of an area of the pasting portion to an area of the first sheet mop falls within a preset range, so that the mop board can pick the single first sheet mop through pasting from a first sheet mop combination.
54. The method according to claim 36, wherein the mop picking device comprises a separation mechanism; and the method comprises: separating, by using the separation mechanism, a single first sheet mop from the at least two first sheet mops stacked in the first storage compartment, so that the mop board is connected to the separated single first sheet mop.
55. The method according to claim 54, wherein the mop picking device comprises a transfer mechanism; and the method comprises: transferring the single first sheet mop to a preset transfer position by using the transfer mechanism, so that the mop board is connected to the single first sheet mop.
56. The method according to claim 54, wherein the separation mechanism comprises a paper suction device; and the method comprises: controlling the paper suction device to suck the first sheet mop at a mop suction position, where the mop suction position is a position where the paper suction device can suck out the single first sheet mop.
57. The method according to claim 54, wherein the separation mechanism comprises: a fluid conveying device; and the method comprises: controlling the fluid conveying device to convey a fluid to the first storage

compartment, so that the first sheet mop at the top is separated from the at least two first sheet mops.

- 58.** The method according to claim 36, wherein the method further comprises:

when a second sheet mop is mounted on the mop board, separating the second sheet mop and the mop board.

- 59.** The method according to claim 58, wherein the maintenance system comprises a removal mechanism, and the mop board comprises a removal region, where the removal region is not connected to the second sheet mop; and the step of separating the second sheet mop and the mop board comprises: controlling at least one of the removal mechanism or the mop board to move, to remove the second sheet mop from the mop board.

- 60.** The maintenance system according to claim 58, wherein the step of separating the second sheet mop and the mop board comprises: removing the second sheet mop by using the dislodging mechanism in a removal direction, where an acute angle, a right angle, or an obtuse angle is formed between the removal direction and a mopping side of the second sheet mop or the mop board.

- 61.** The maintenance system according to claim 60, wherein the step of separating the second sheet mop and the mop board comprises: applying an external force away from the mop board to the second sheet mop by using the dislodging mechanism, so that the second sheet mop falls under the action of gravity or the external force after being separated from the mop board, and the second sheet mop is removed from the mop board.

- 62.** The maintenance system according to claim 58, wherein when the second sheet mop is removed from the mop board, the cleaning robot does not move actively, and the mop board or the dislodging mechanism moves actively.

- 63.** The method according to claim 59, wherein the maintenance system further comprises a second storage compartment, configured to receive the second sheet mop removed from the mop board; and the step of separating the second sheet mop and the mop board comprises: applying an external force away from the mop board to the second sheet mop by using the dislodging mechanism, to separate the second sheet mop and the mop board, so that the second sheet mop falls into the second storage compartment under the action of gravity or the external force after being separated from the mop board.

- 64.** The method according to claim 63, wherein the re-

moval mechanism is arranged on the second storage compartment.

- 65.** The method according to claim 63, wherein the maintenance system comprises a second movable mechanism, connected to the second storage compartment; the removal mechanism is mounted at a preset mop removal position, and the mop removal position is located outside the second storage compartment; and the method comprises: driving the second storage compartment to move to the mop removal position by using the second movable mechanism, to receive the second sheet mop separated from the mop board.

- 66.** The method according to claim 59, wherein the removal region comprises a mop removal groove, and an outer edge of the mop board is recessed towards the inside of the mop board, to form the mop removal groove.

- 67.** The method according to claim 58, wherein the mop board comprises at least a first state and a second state, where the mop board is at a mopping position in the first state; and the mop board is at a non-mopping position in the second state, where the non-mopping position is higher than the mopping position, to provide an operation space for removal of the second sheet mop or mounting of the first sheet mop.

- 68.** The method according to claim 65, wherein the mop removal position or the second storage compartment is higher than the mop board operating position, to form a space for the cleaning robot to dock.

- 69.** The method according to claim 63, wherein the first storage compartment and the second storage compartment are arranged up and down in a vertical direction.

- 70.** The method according to claim 69, wherein the first storage compartment is located above the second storage compartment.

- 71.** A method for replacing a mop of a cleaning robot, comprising:

determining that a cleaning robot has returned to a base station; and
controlling a mop picking device to replace a second sheet mop mounted on the cleaning robot with a first sheet mop in a first storage compartment.

- 72.** The method according to claim 71, wherein the step of determining that a cleaning robot has returned to a base station comprises:

determining that the cleaning robot reaches a mop board operating position, and controlling the cleaning robot to remove the mop board.

- 73.** The method according to claim 72, wherein the mop picking device comprises a first movable mechanism, configured to drive the mop board to move; and the step of controlling a mop picking device to replace a second sheet mop mounted on the cleaning robot with a first sheet mop in a first storage compartment comprises: controlling the first movable mechanism to drive the mop board to move to a mop removal position, so as to remove the second sheet mop, and storing the second sheet mop into a second storage compartment configured to recycle the second sheet mop; and controlling the first movable mechanism to drive the mop board to move to a mop mounting position and extend into the first storage compartment, and mounting the first sheet mop on the mop board.

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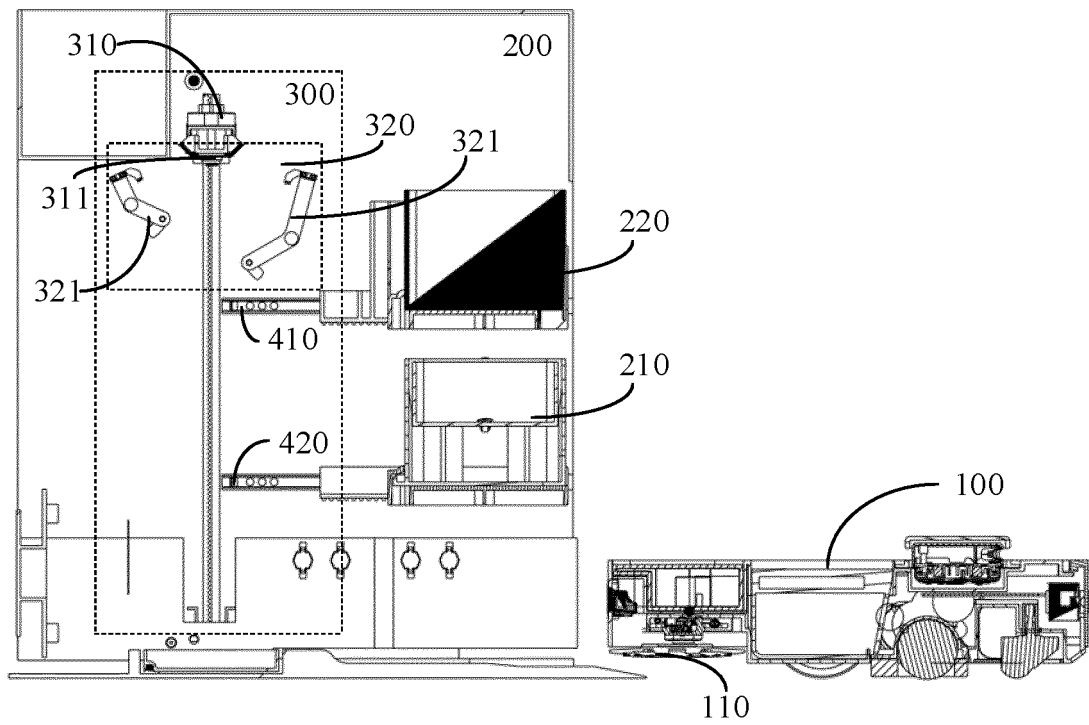


FIG. 1

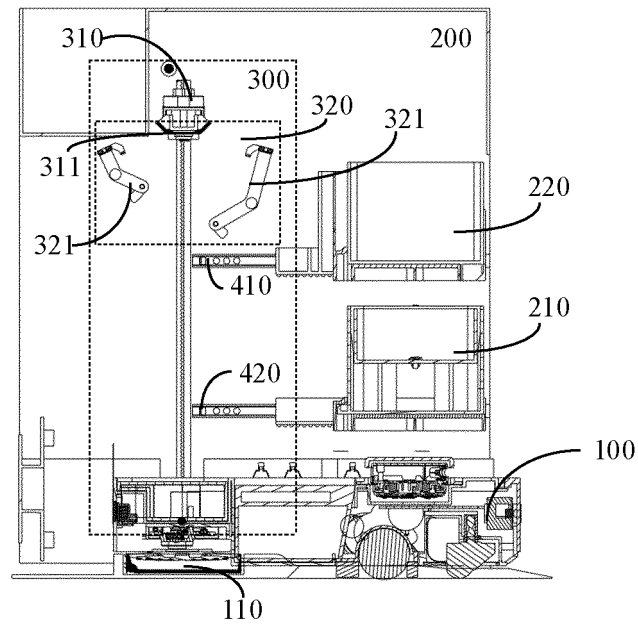


FIG. 2

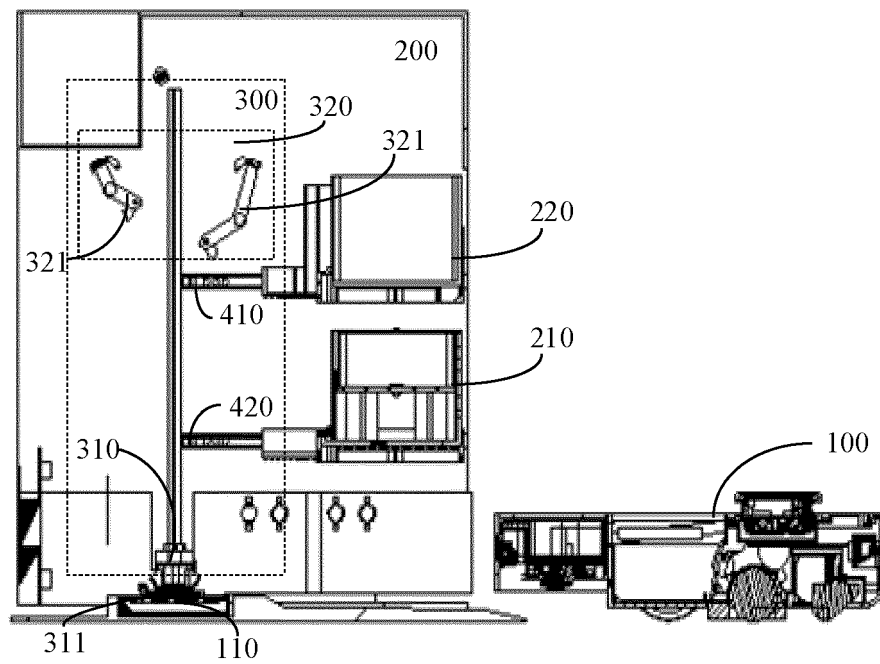


FIG. 3

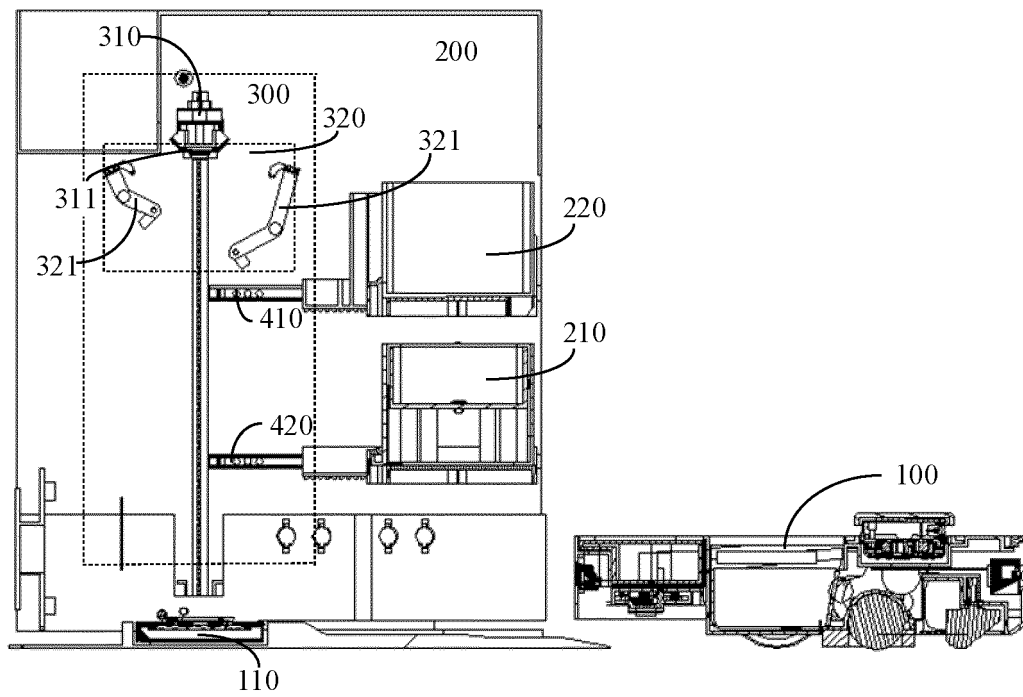


FIG. 4

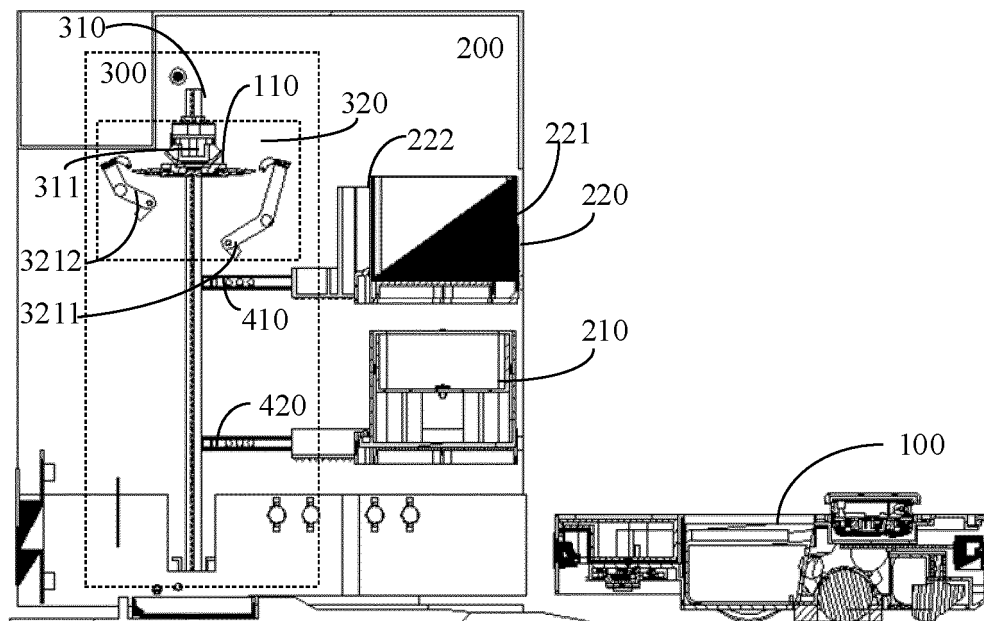


FIG. 5

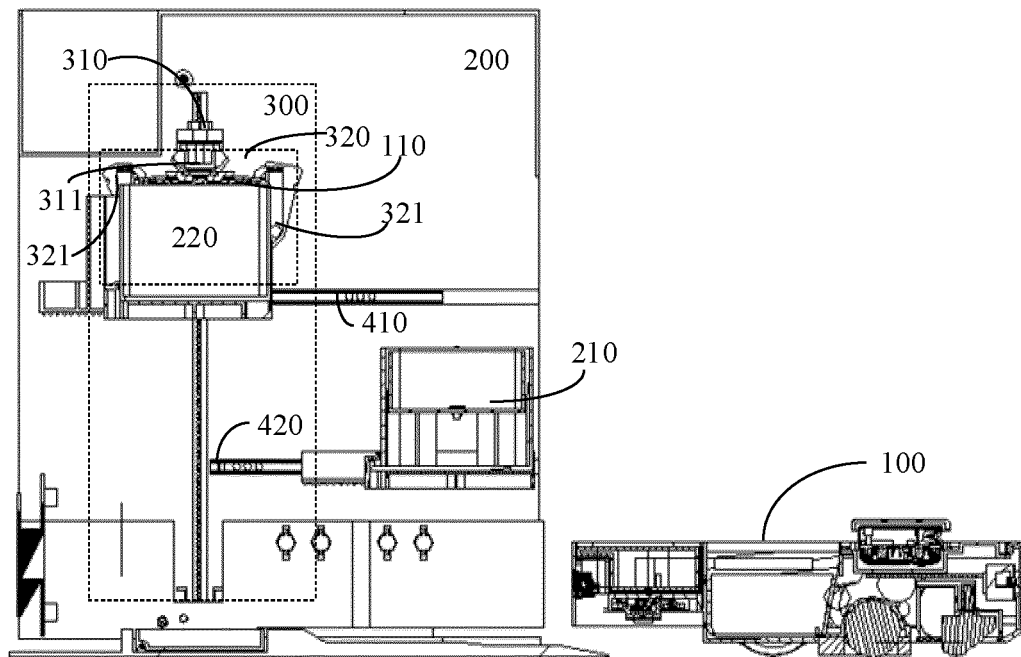


FIG. 6

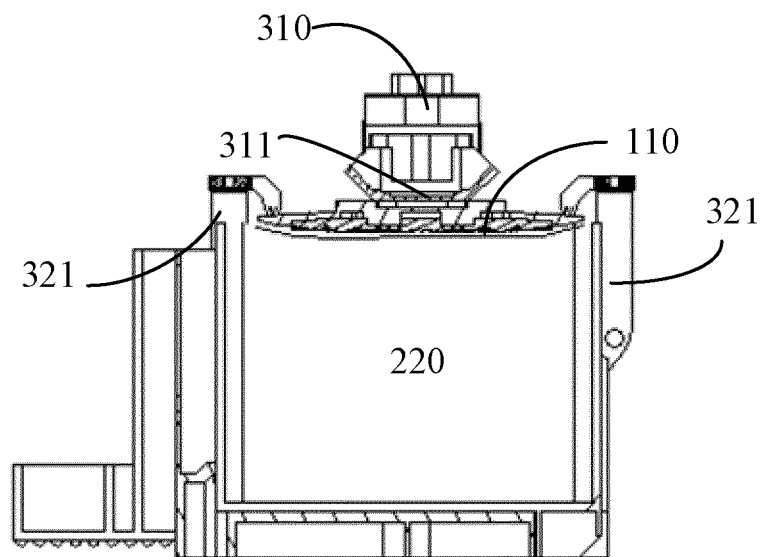


FIG. 7

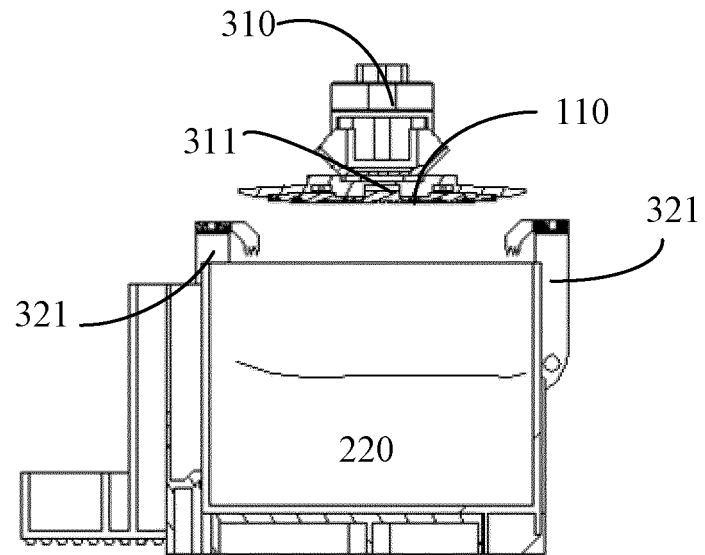


FIG. 8

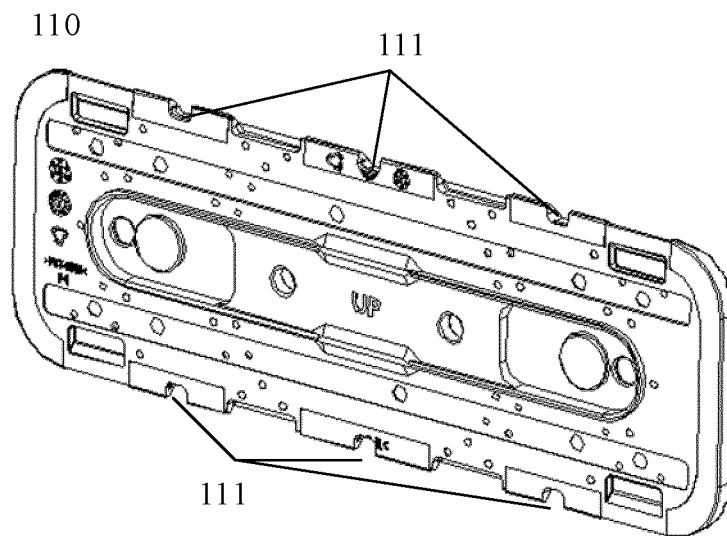


FIG. 9

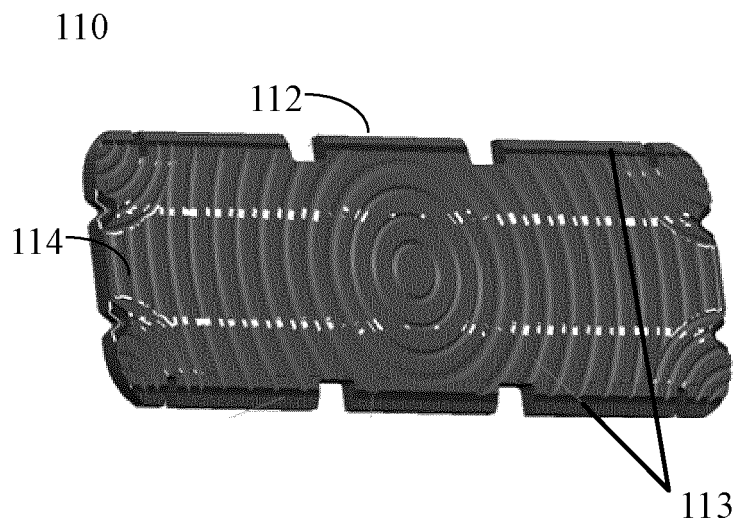


FIG. 10

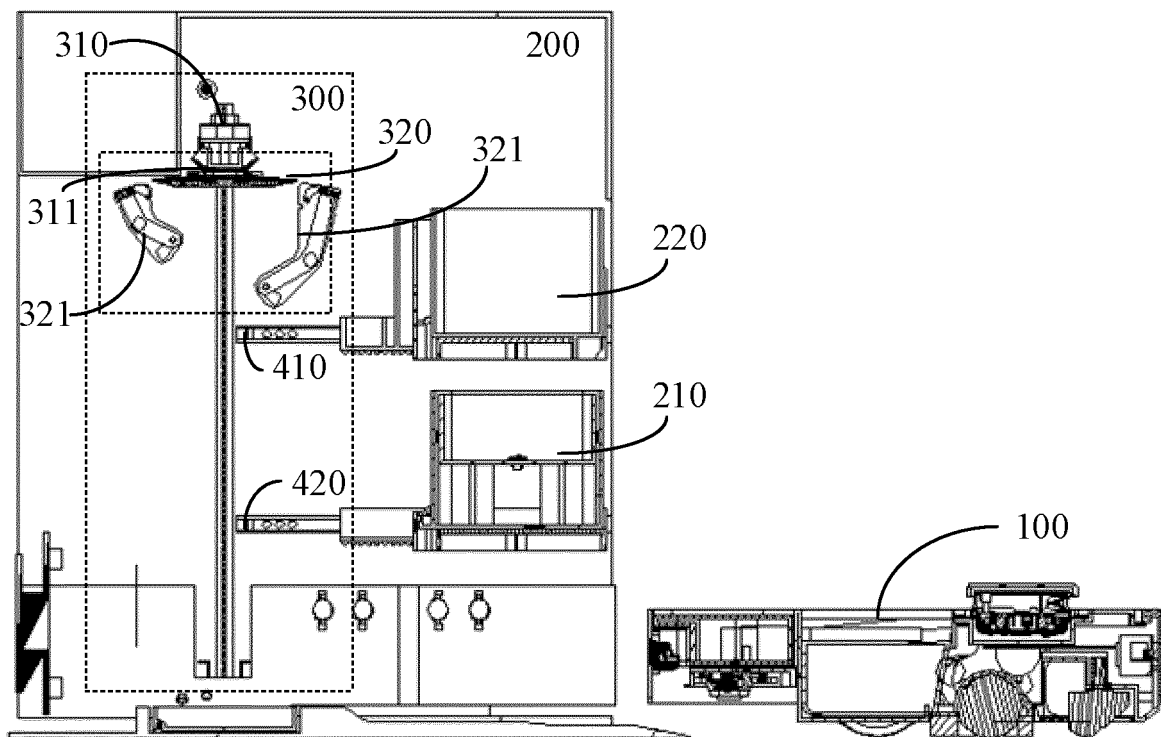


FIG. 11

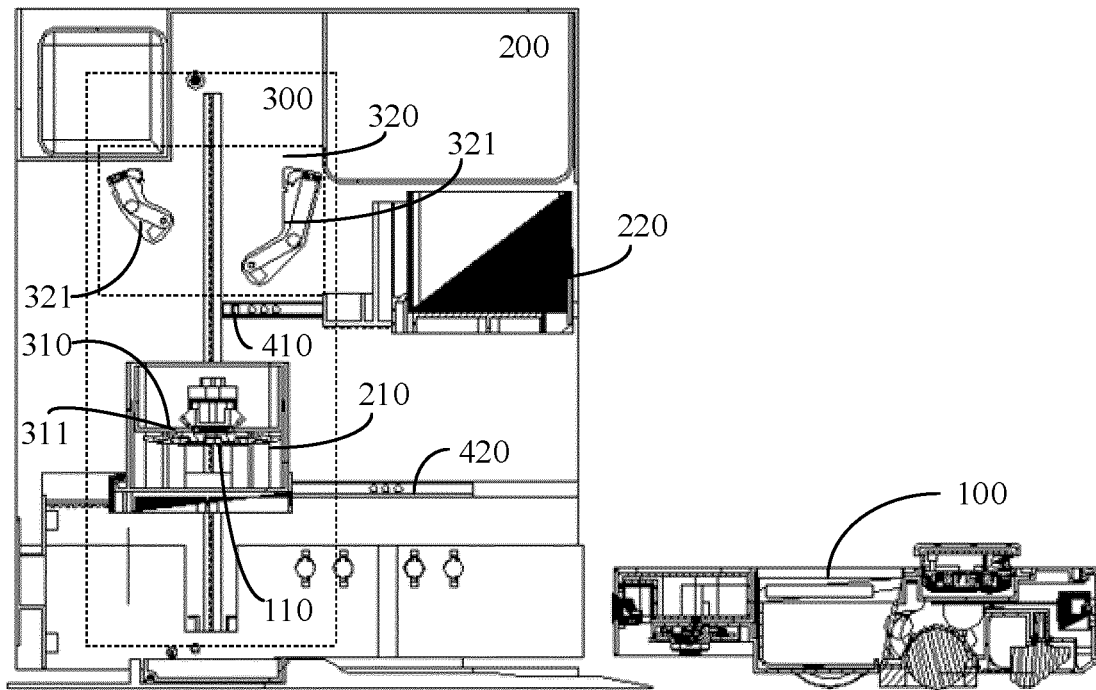


FIG. 12

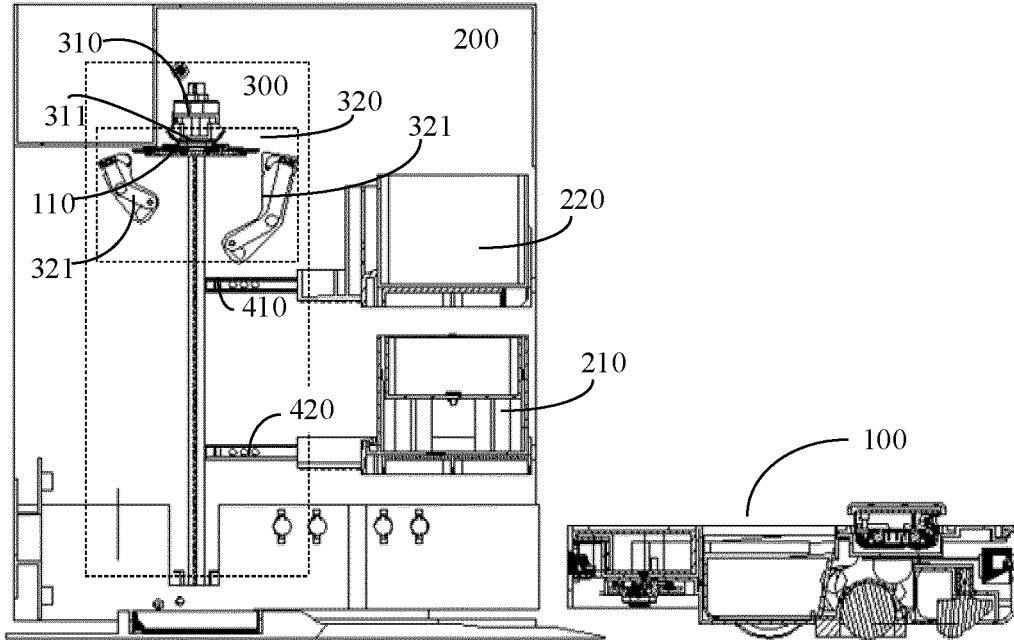


FIG. 13

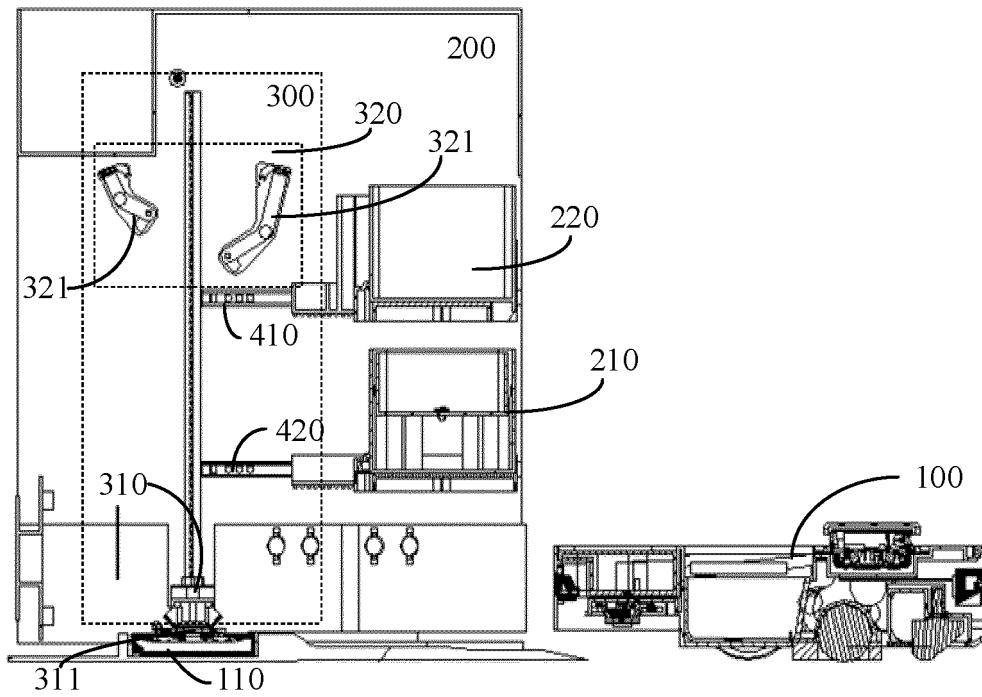


FIG. 14

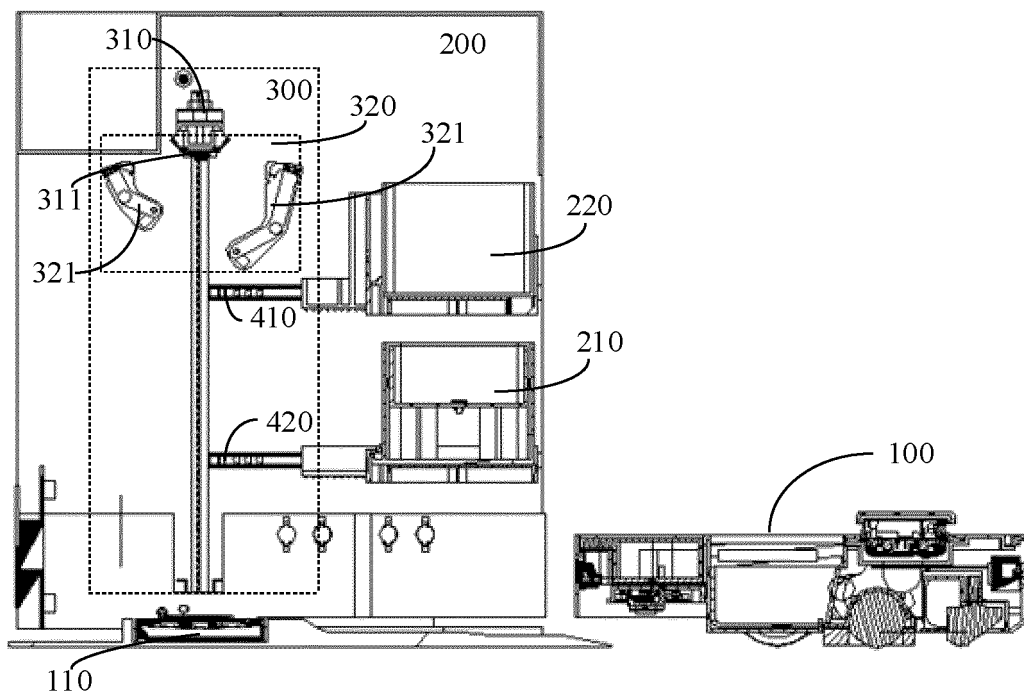


FIG. 15

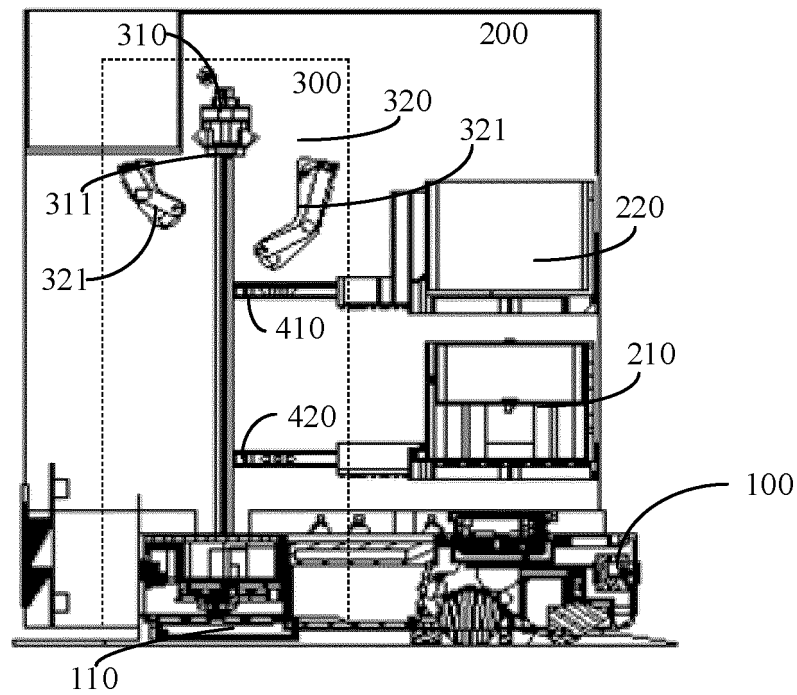


FIG. 16

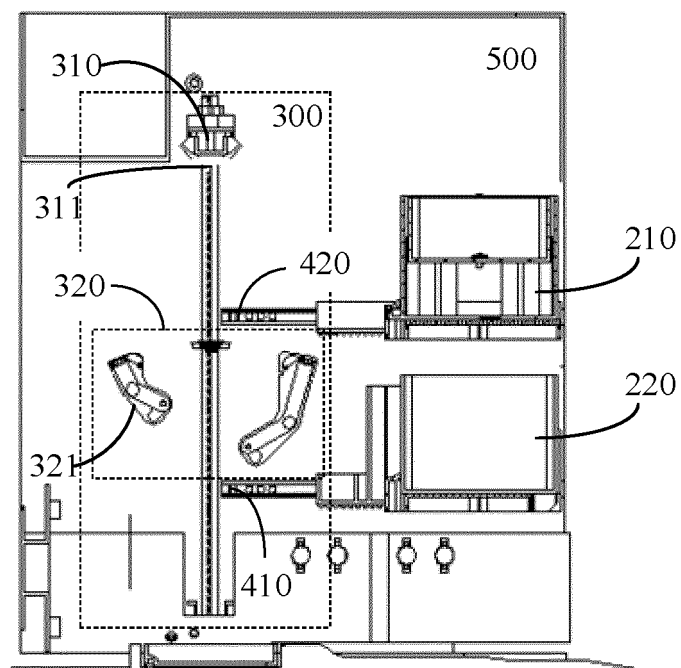


FIG. 17

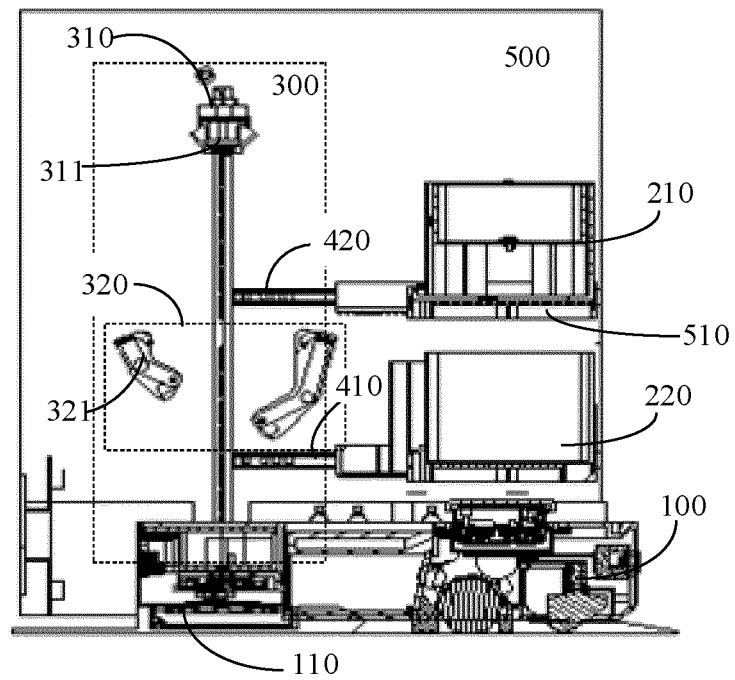


FIG. 18

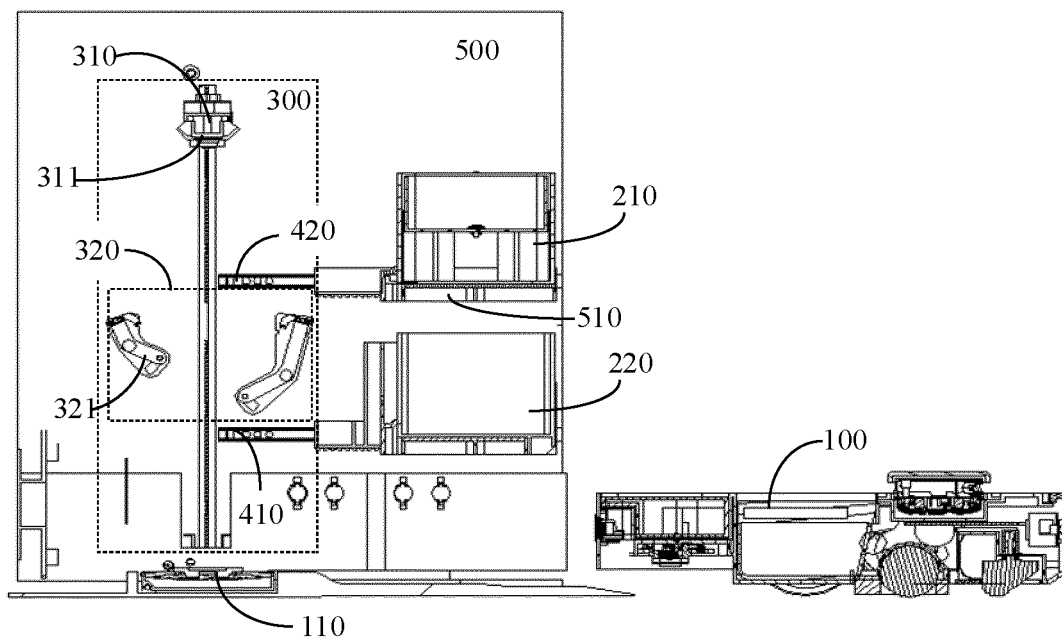


FIG. 19

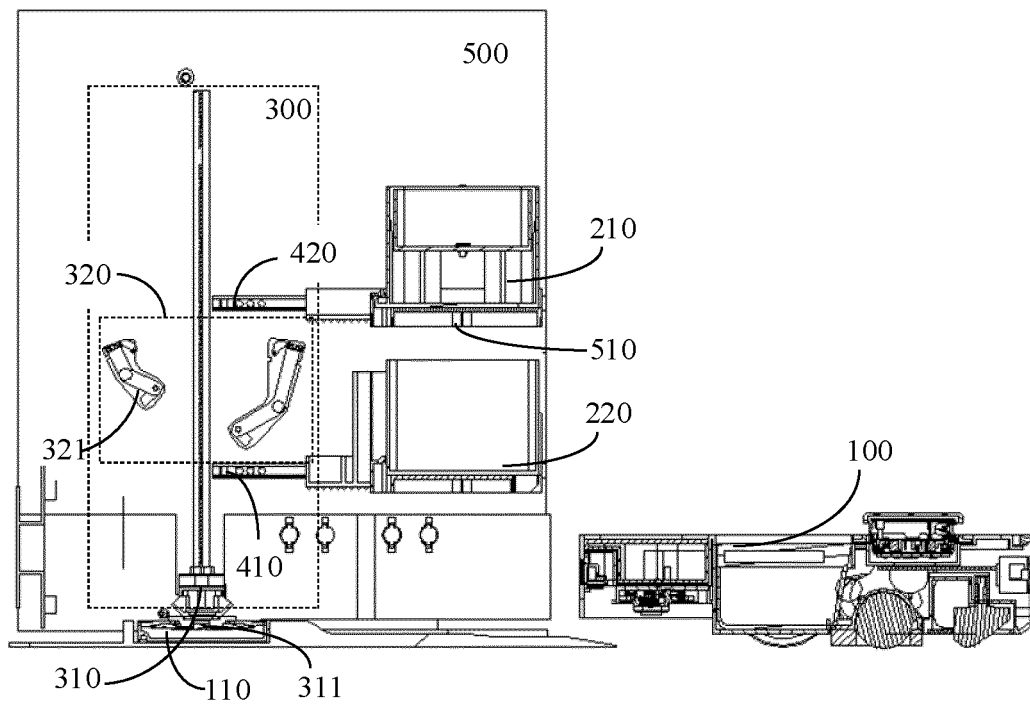


FIG. 20

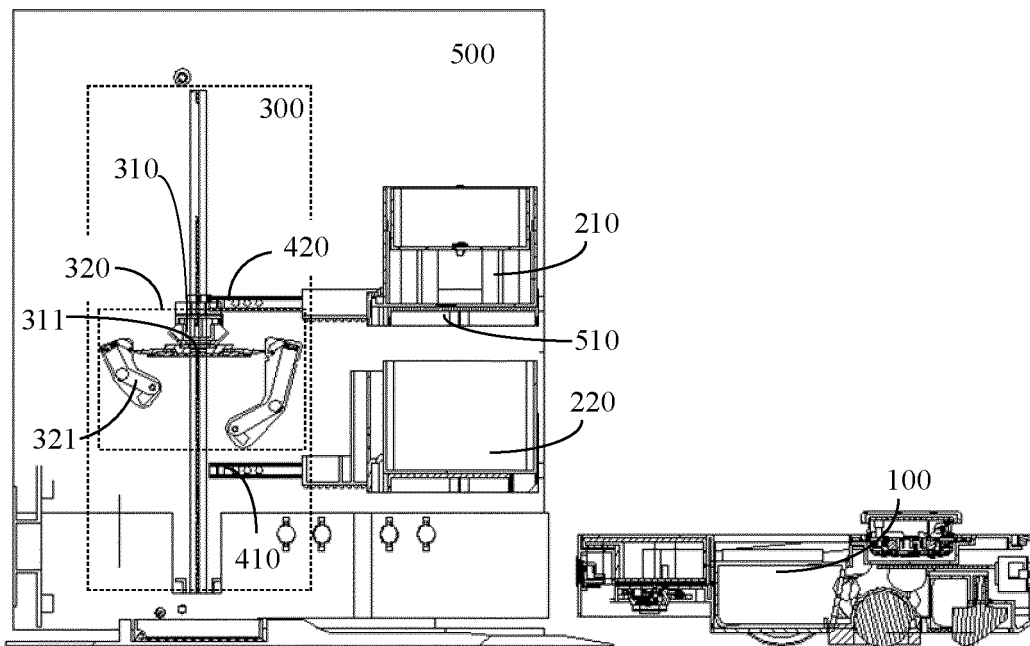


FIG. 21

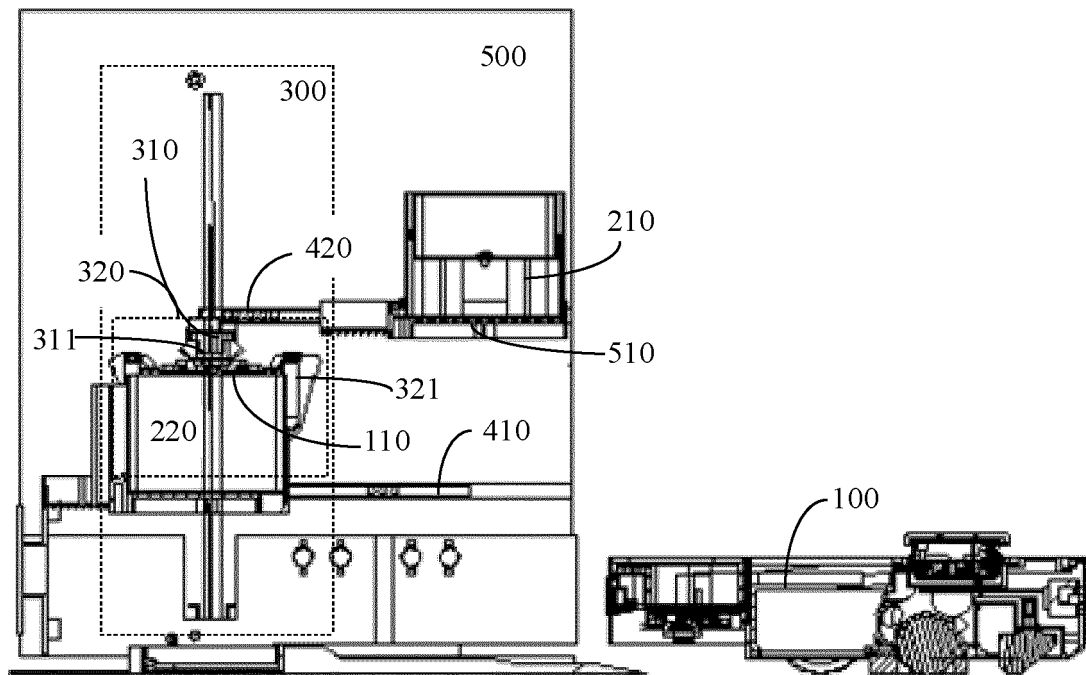


FIG. 22

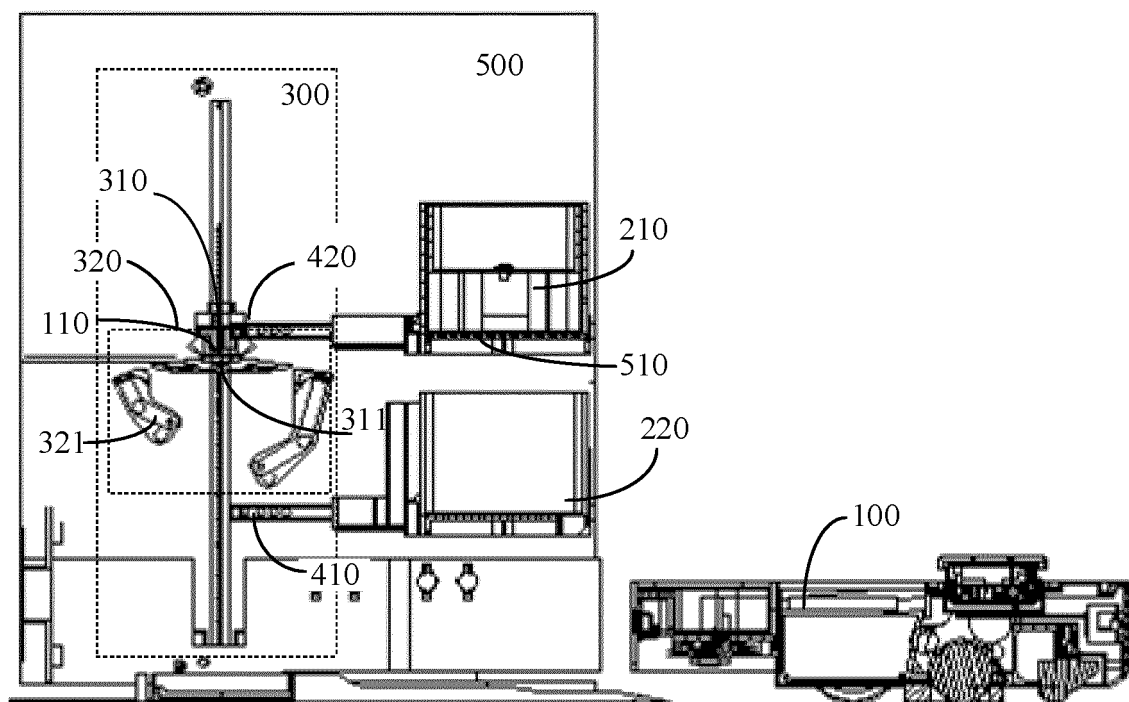


FIG. 23

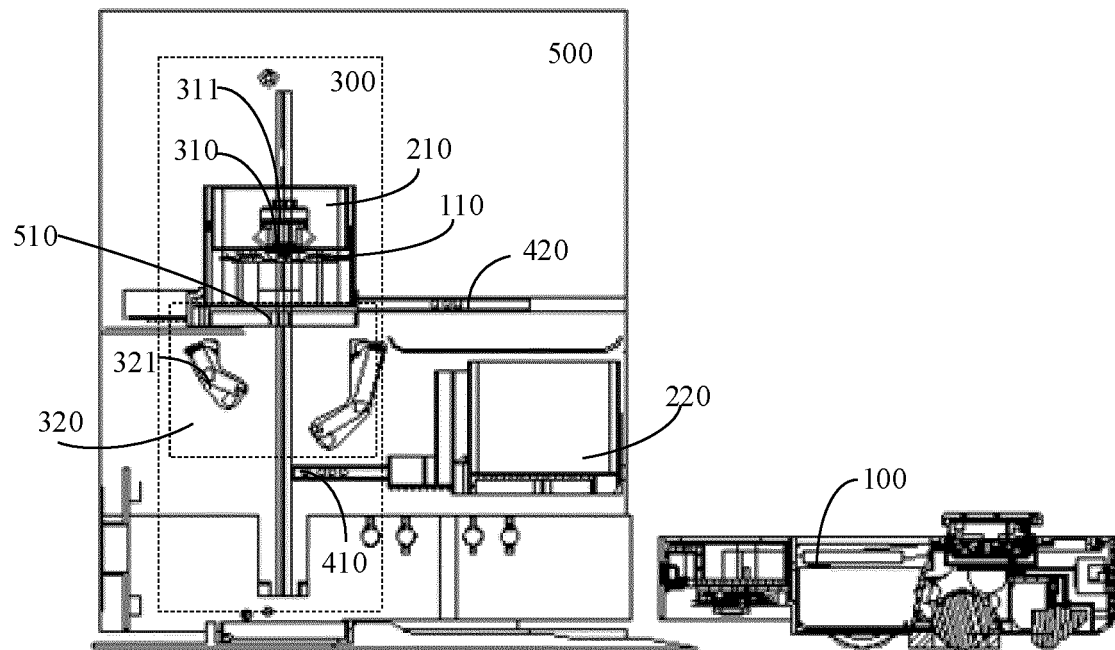


FIG. 24

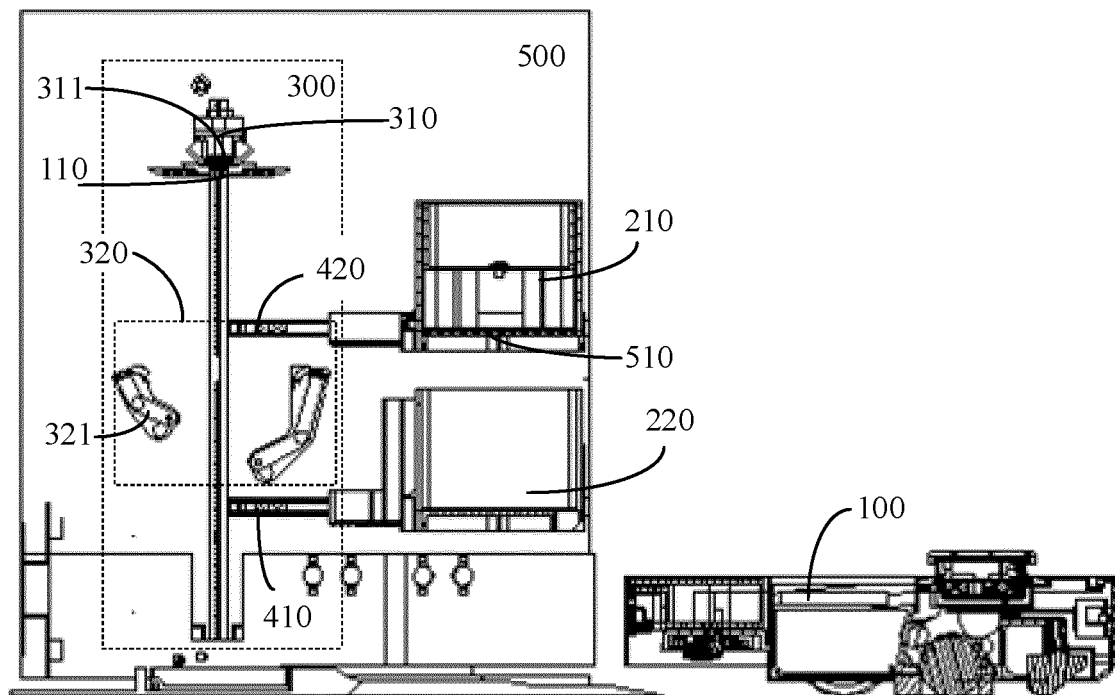


FIG. 25

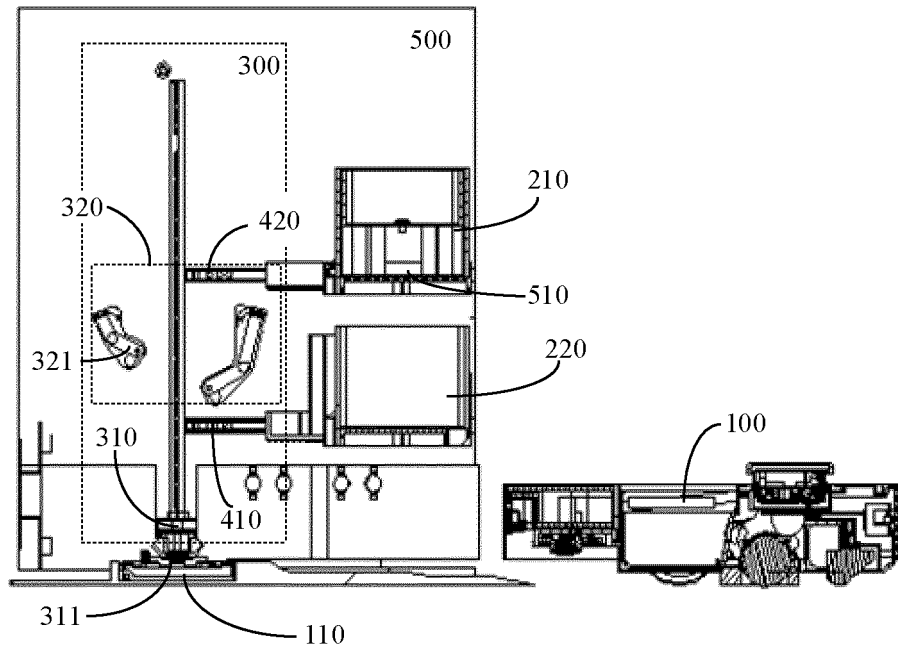


FIG. 26

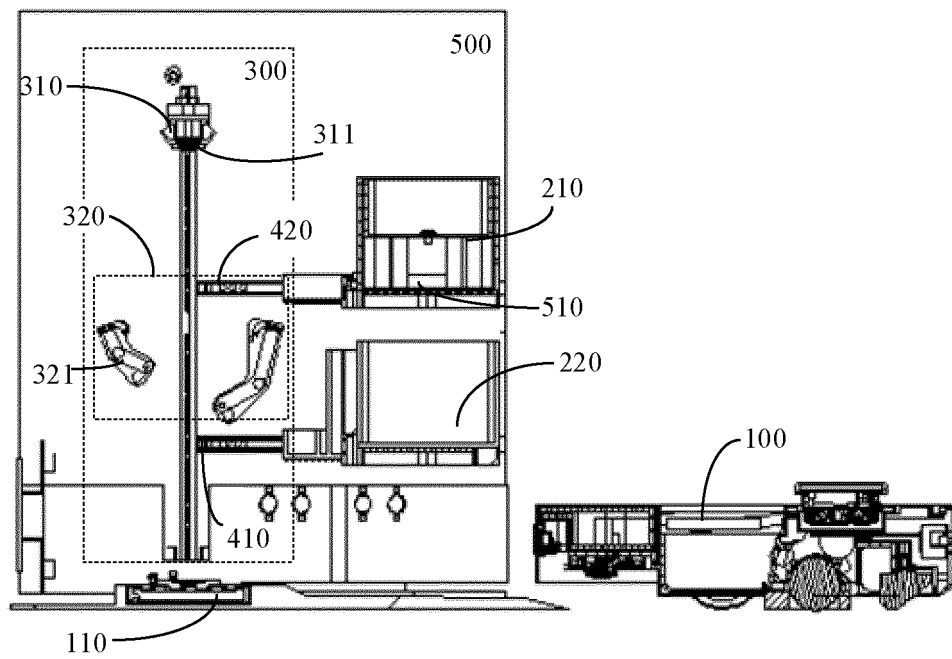


FIG. 27

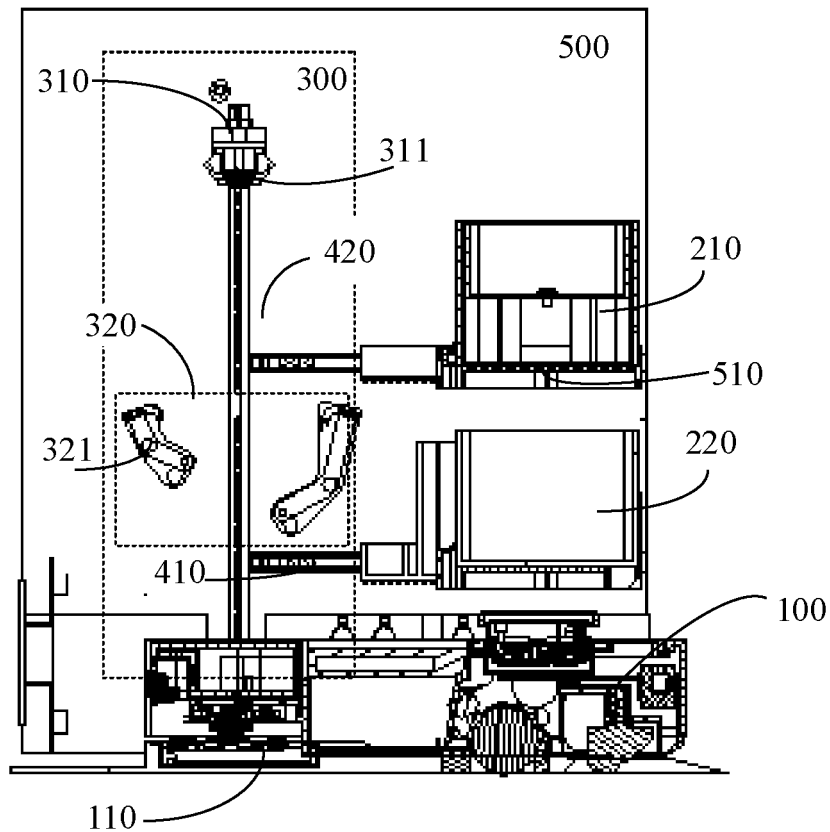


FIG. 28

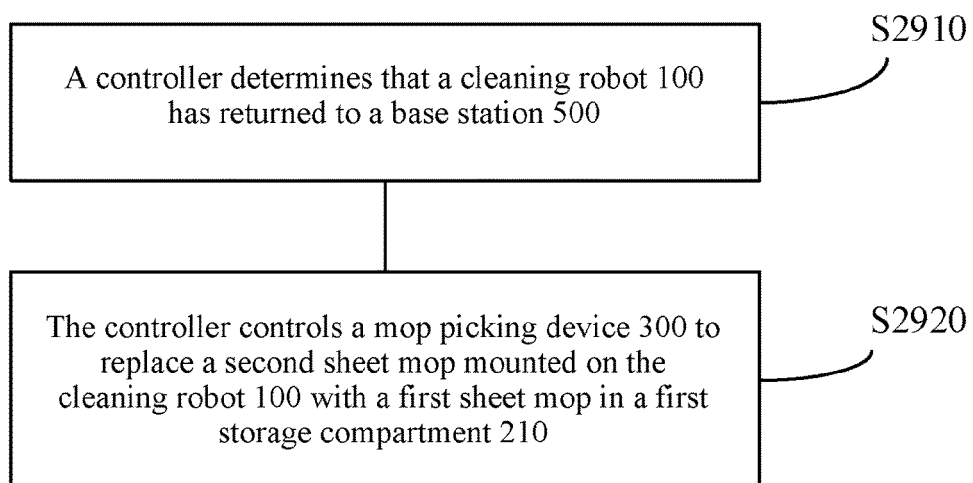


FIG. 29

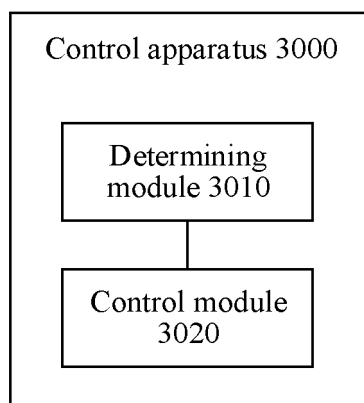


FIG. 30

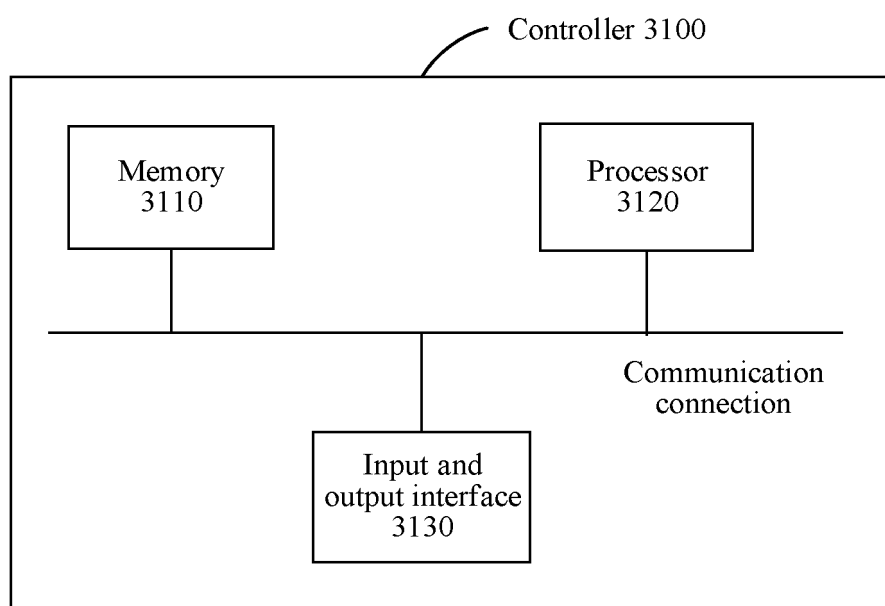


FIG. 31

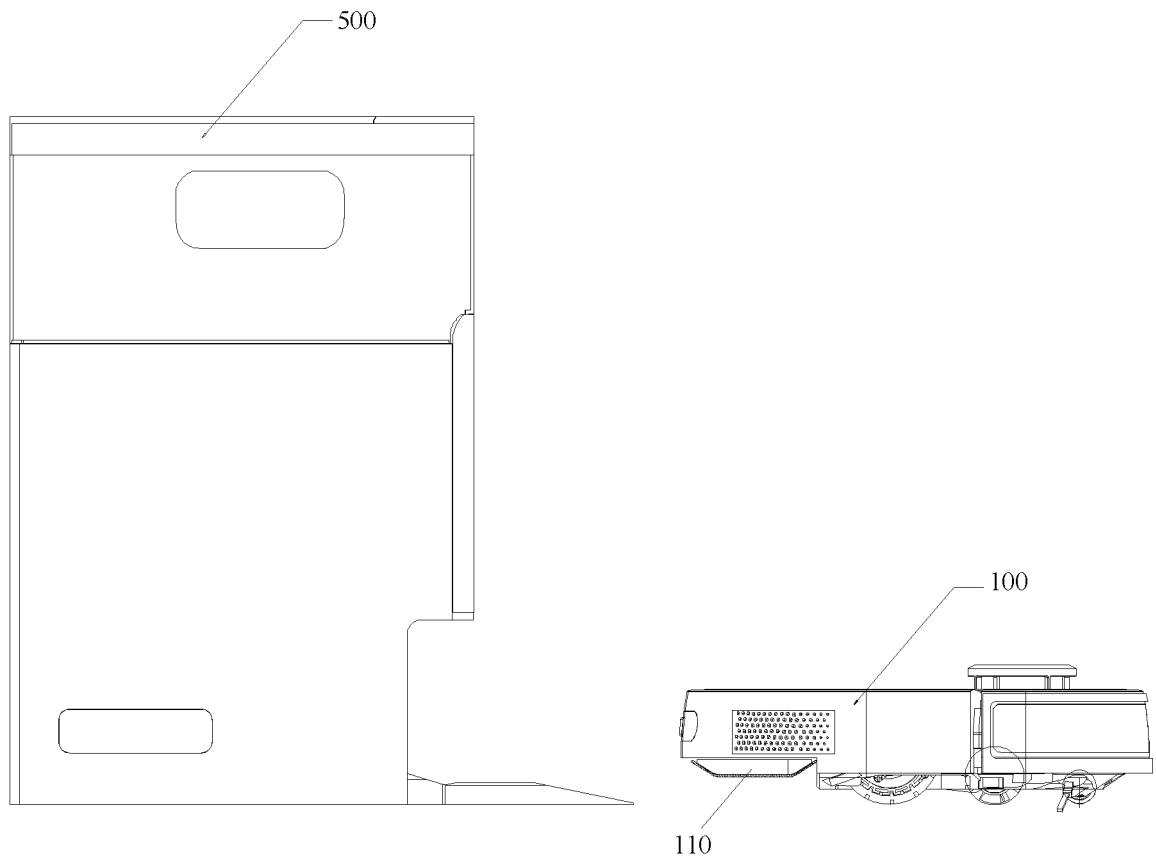


FIG. 32

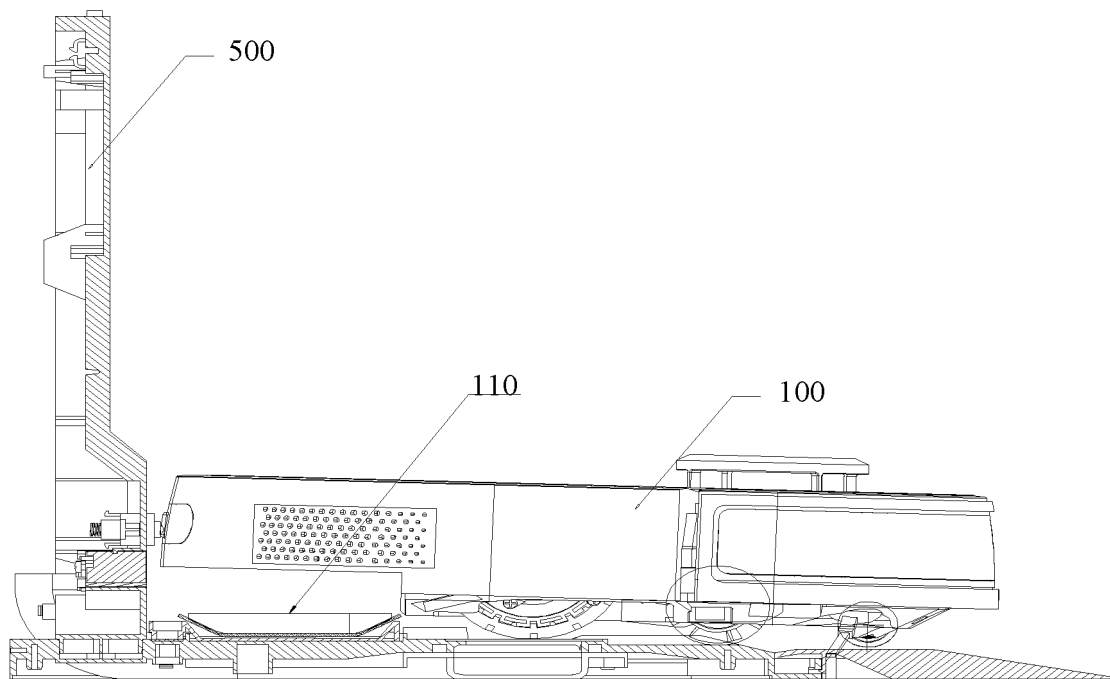


FIG. 33

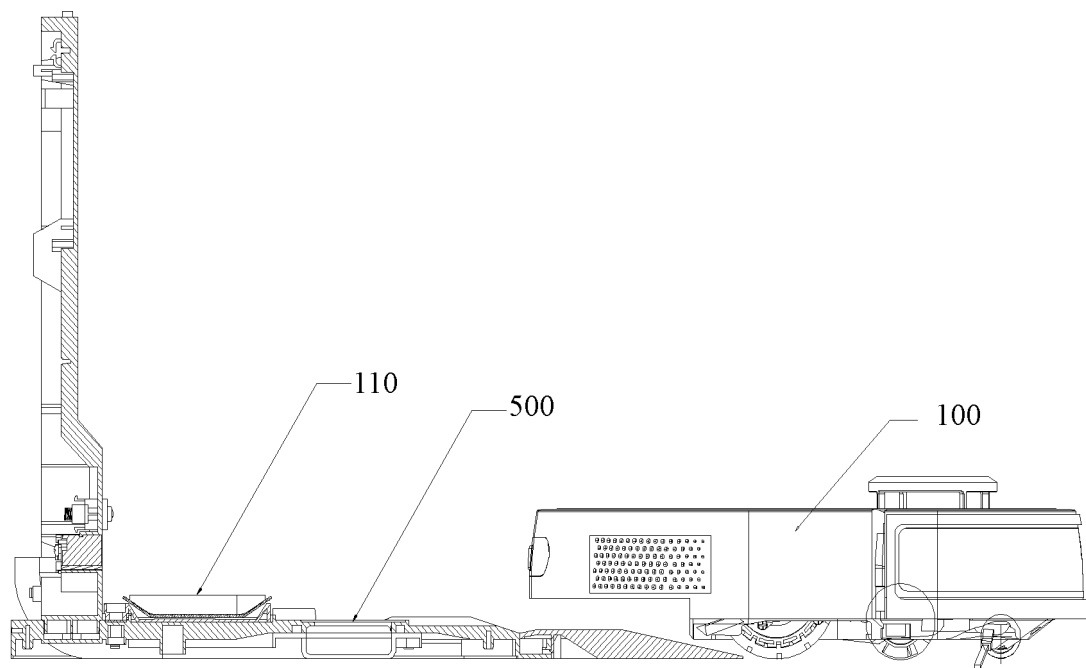


FIG. 34

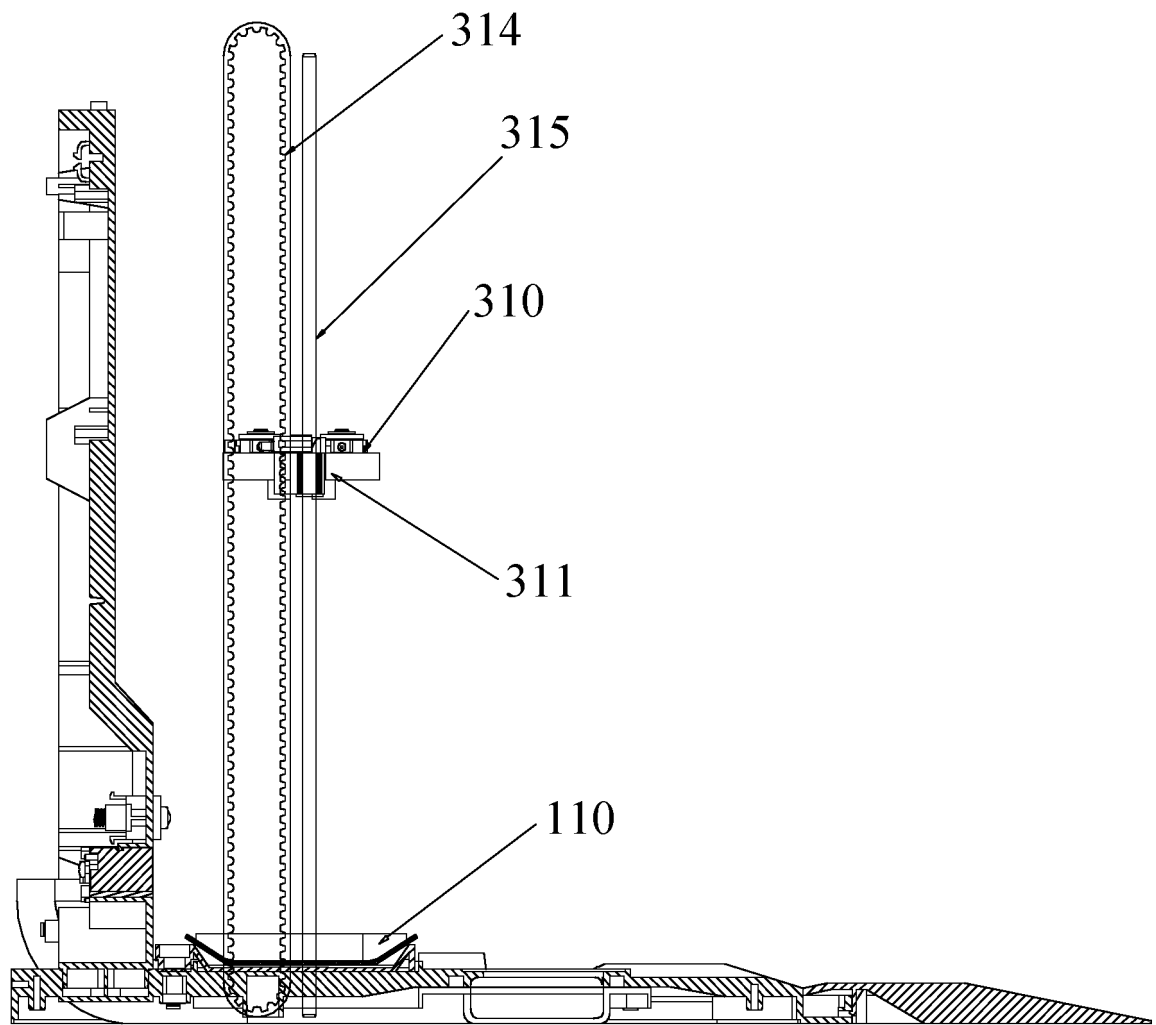


FIG. 35

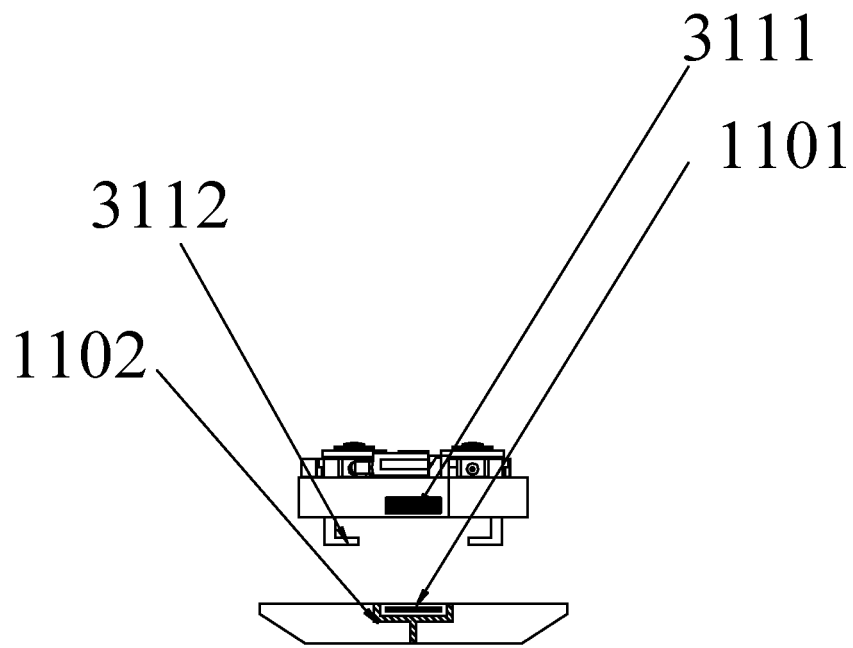


FIG. 36

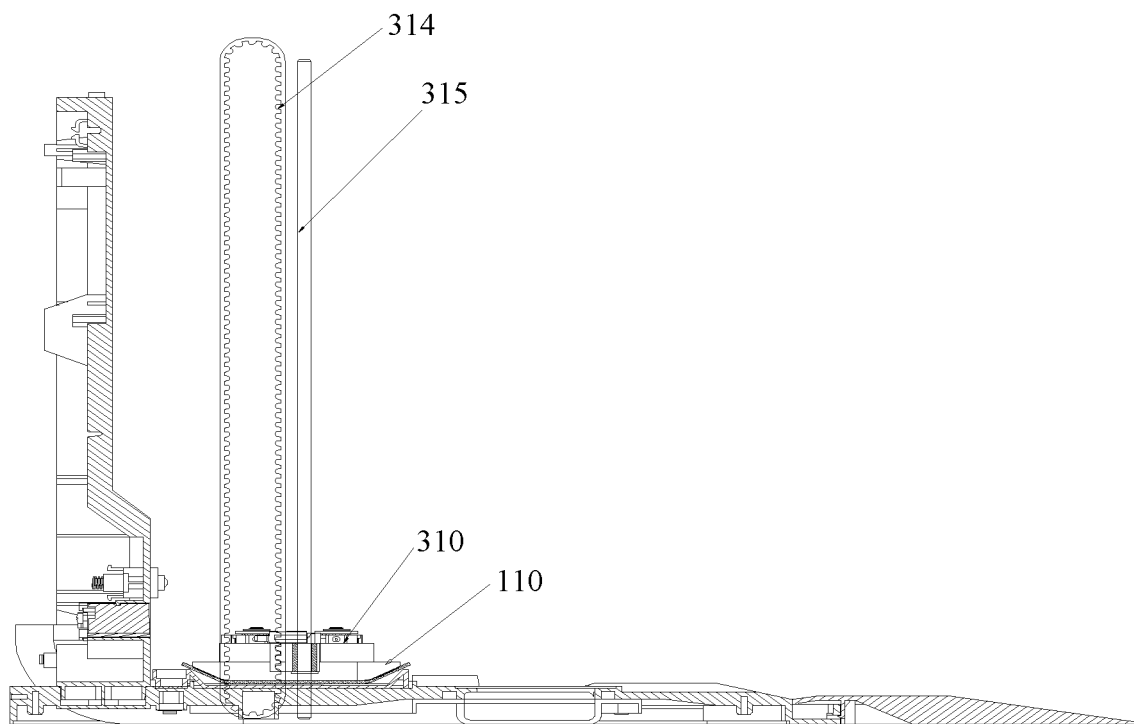


FIG. 37

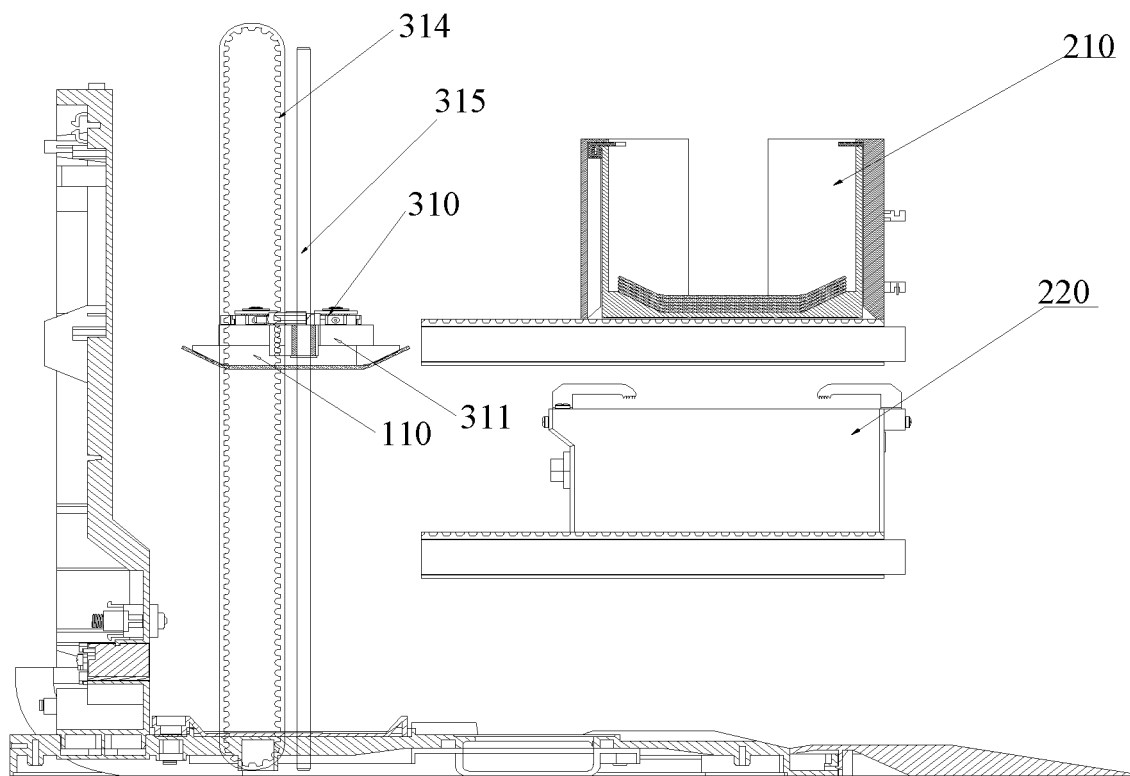


FIG. 38

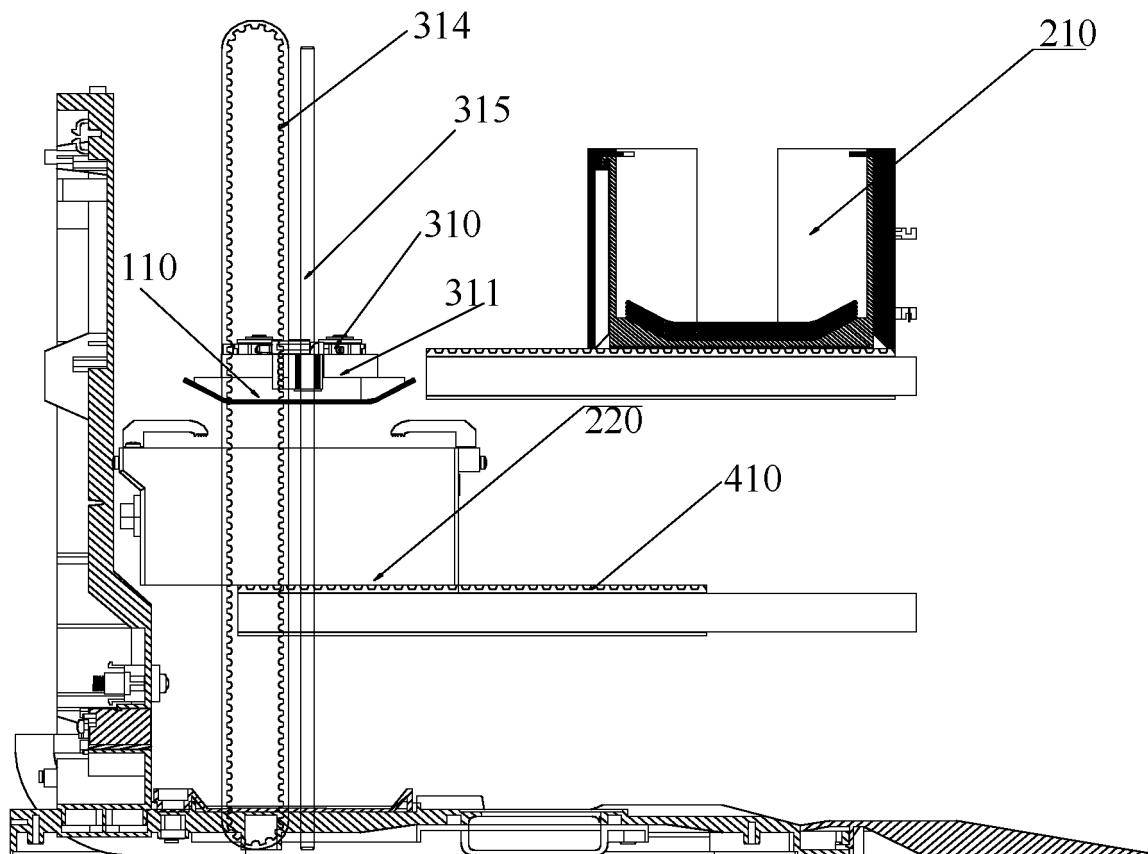


FIG. 39

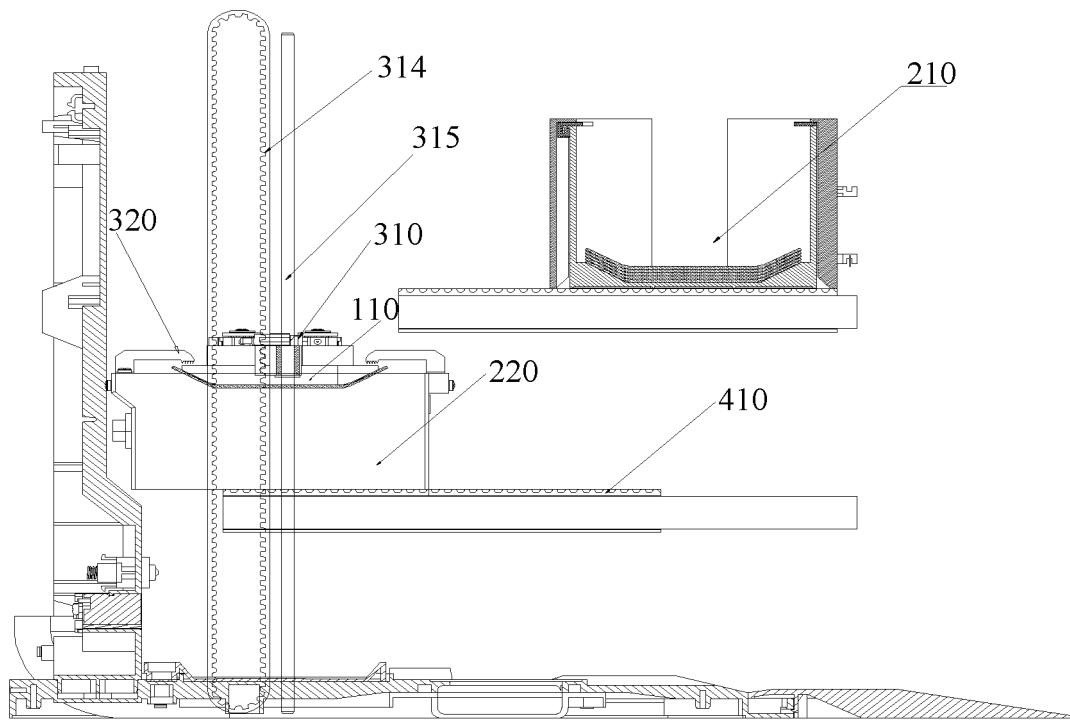


FIG. 40

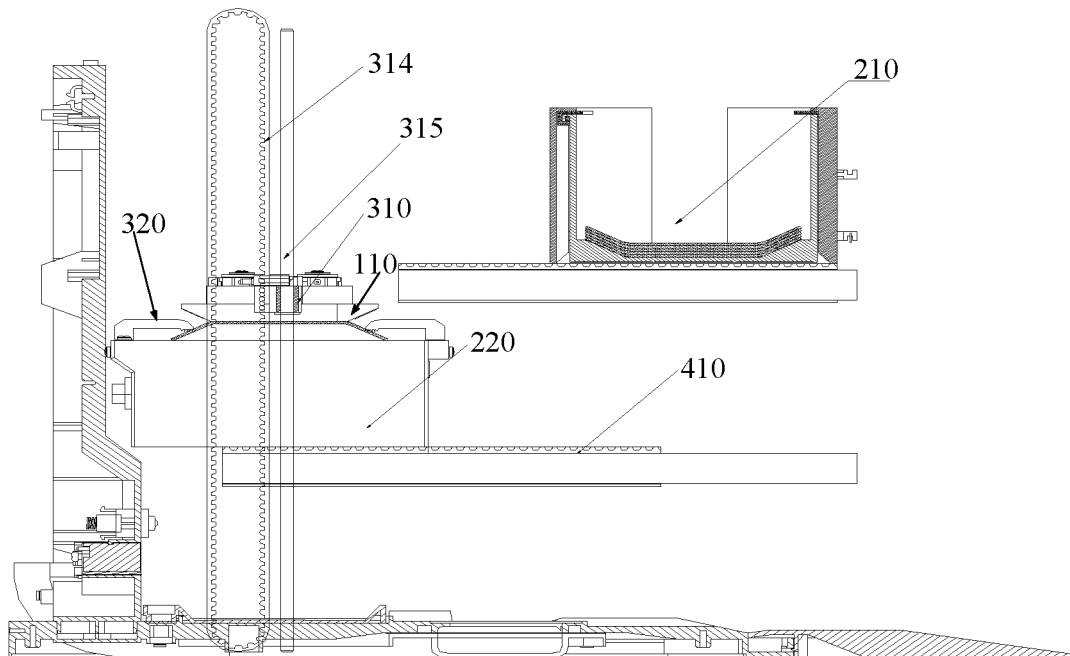


FIG. 41

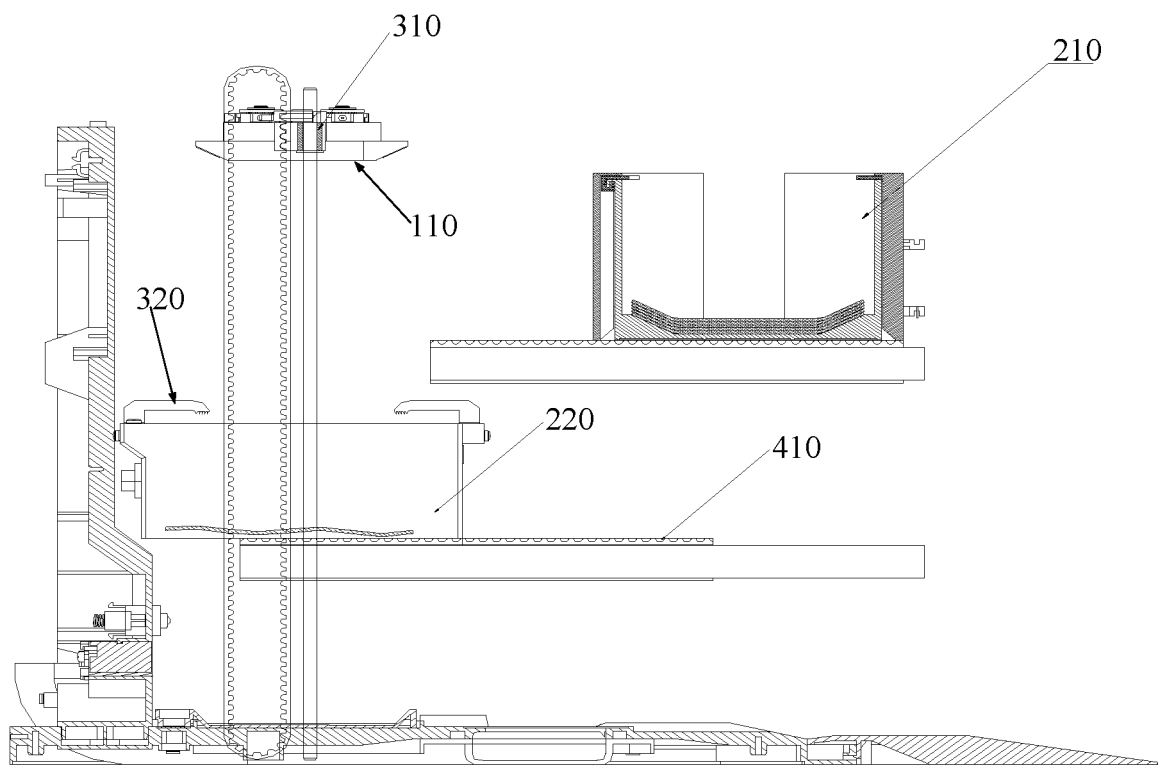


FIG. 42

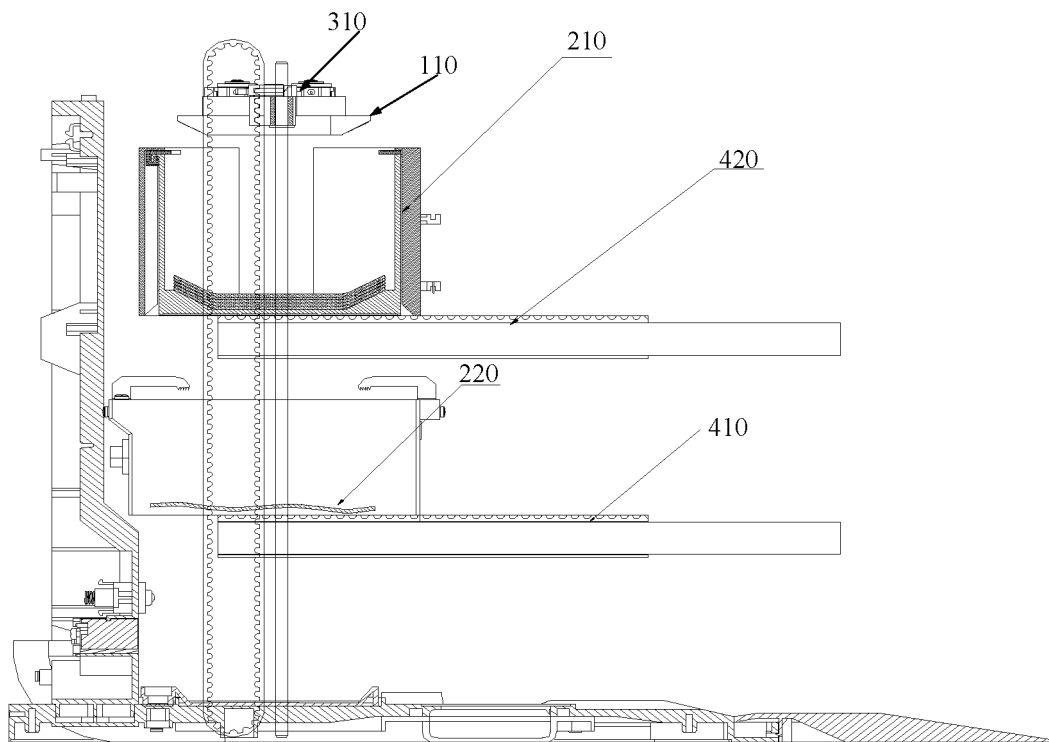


FIG. 43

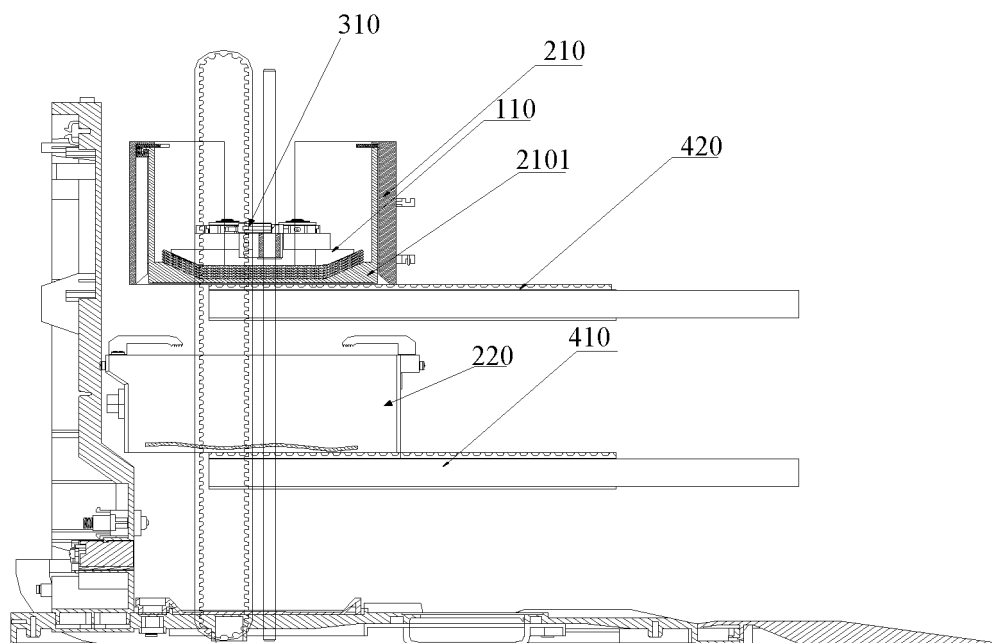


FIG. 44

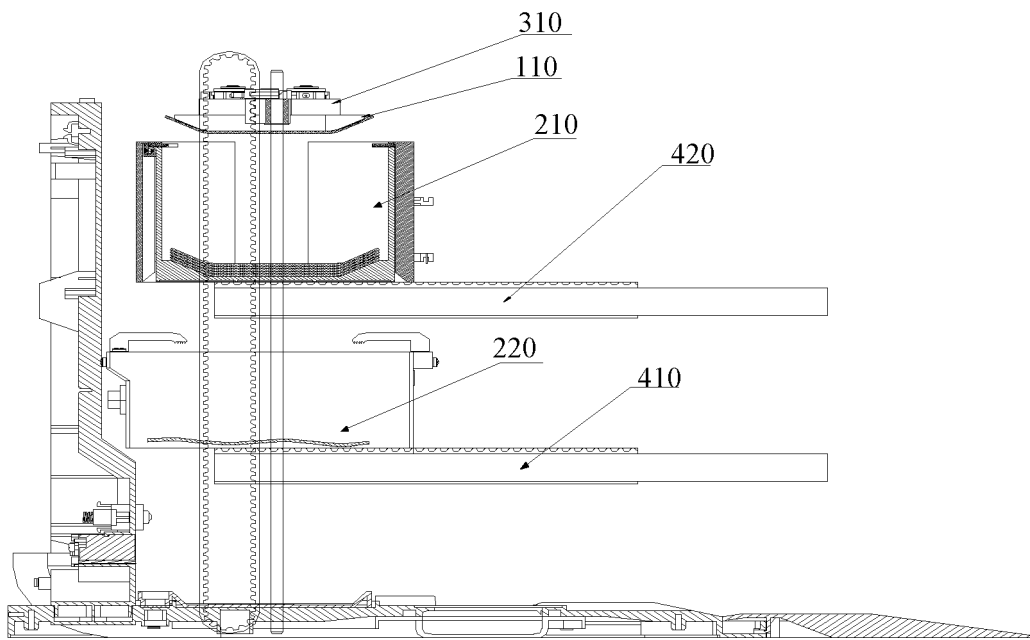


FIG. 45

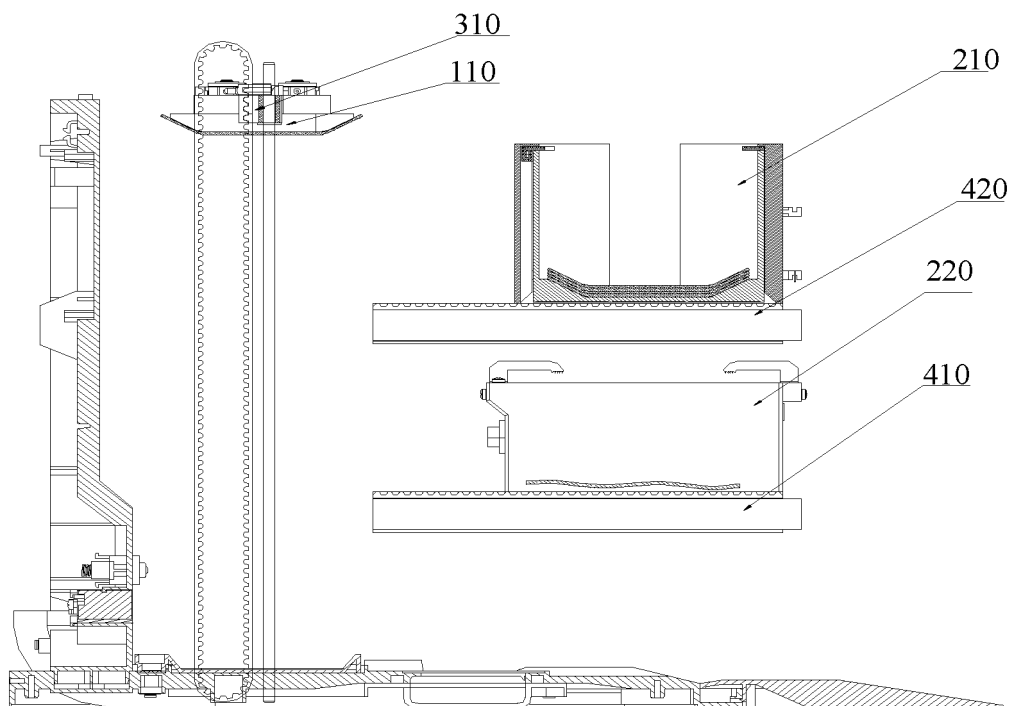


FIG. 46

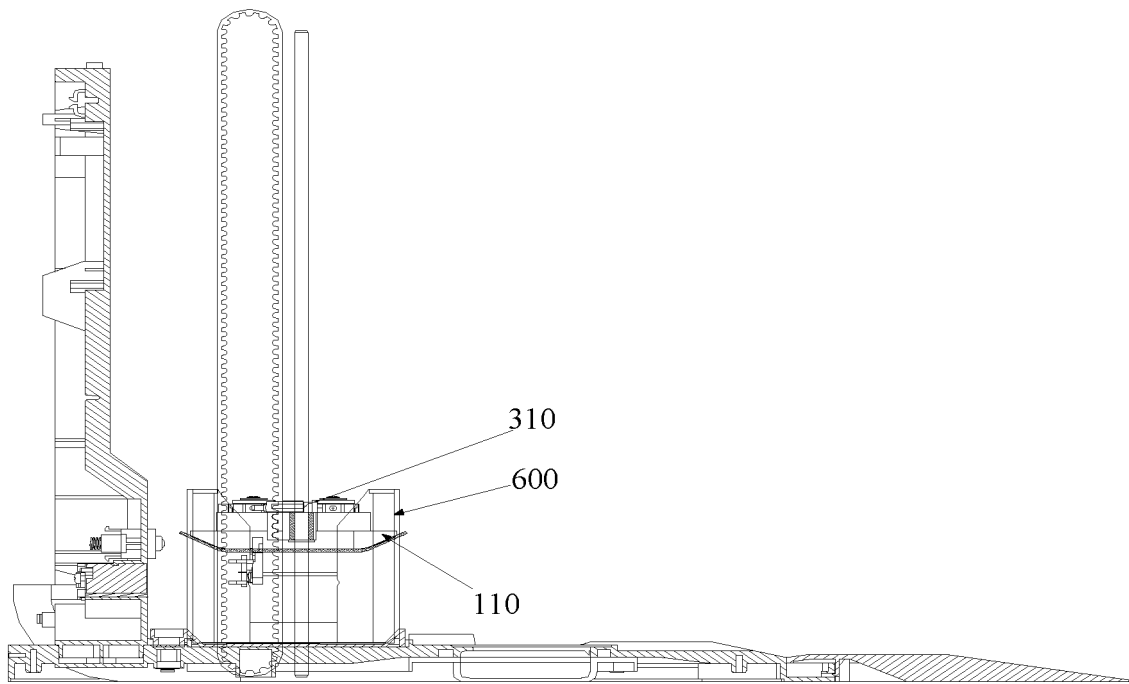


FIG. 47

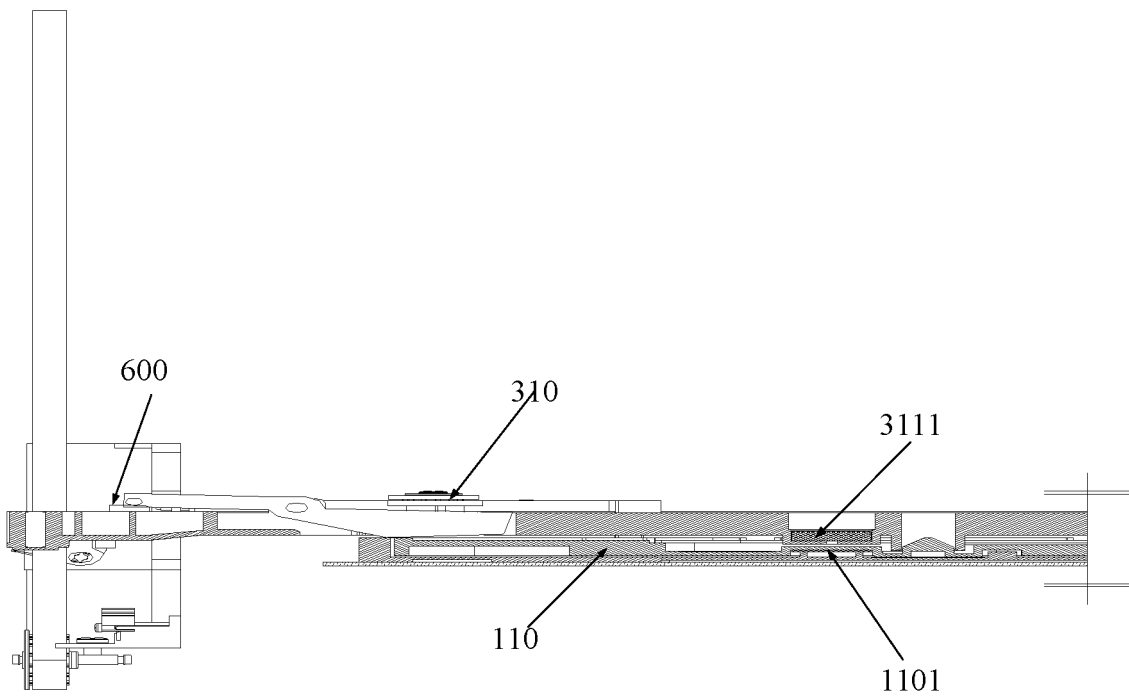


FIG. 48

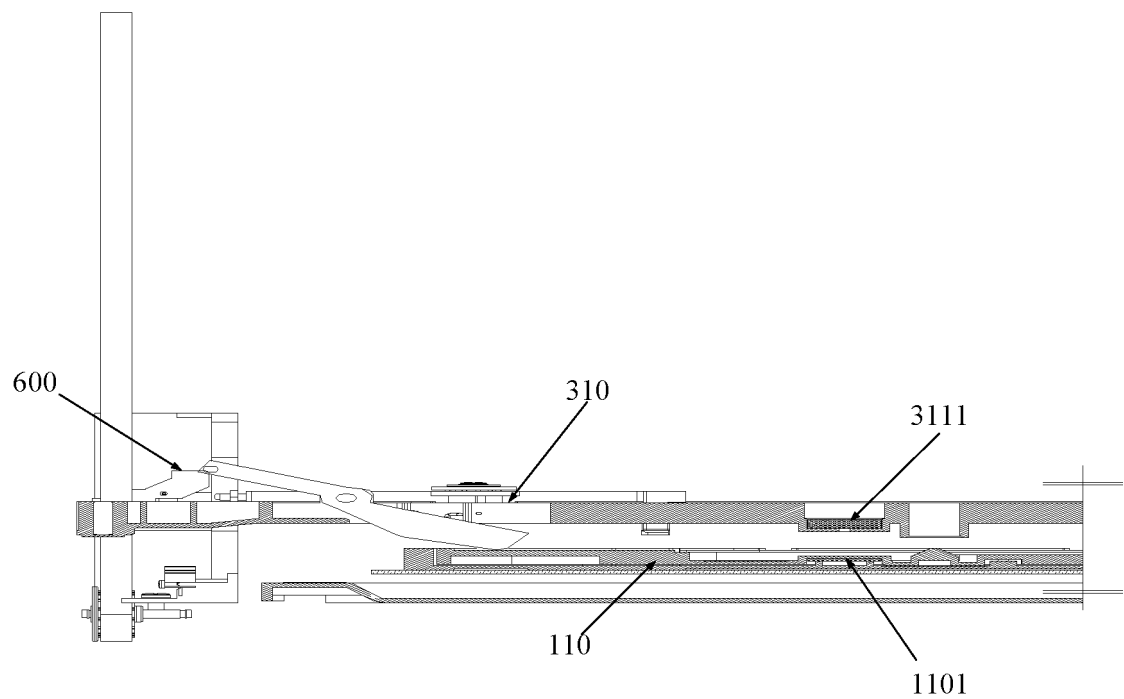


FIG. 49

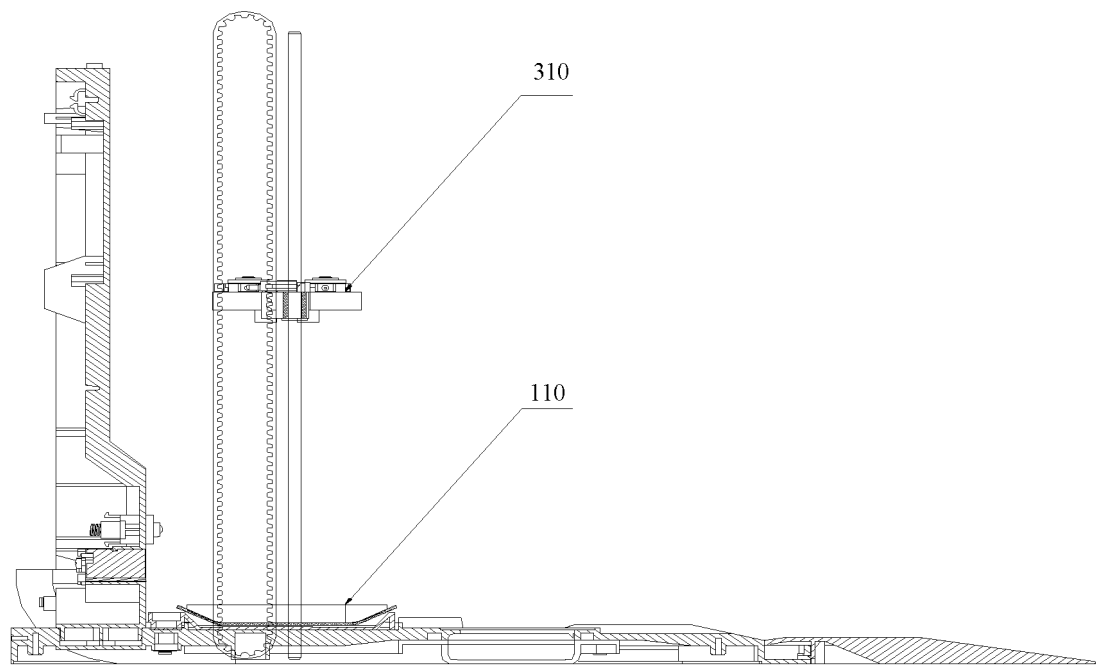


FIG. 50

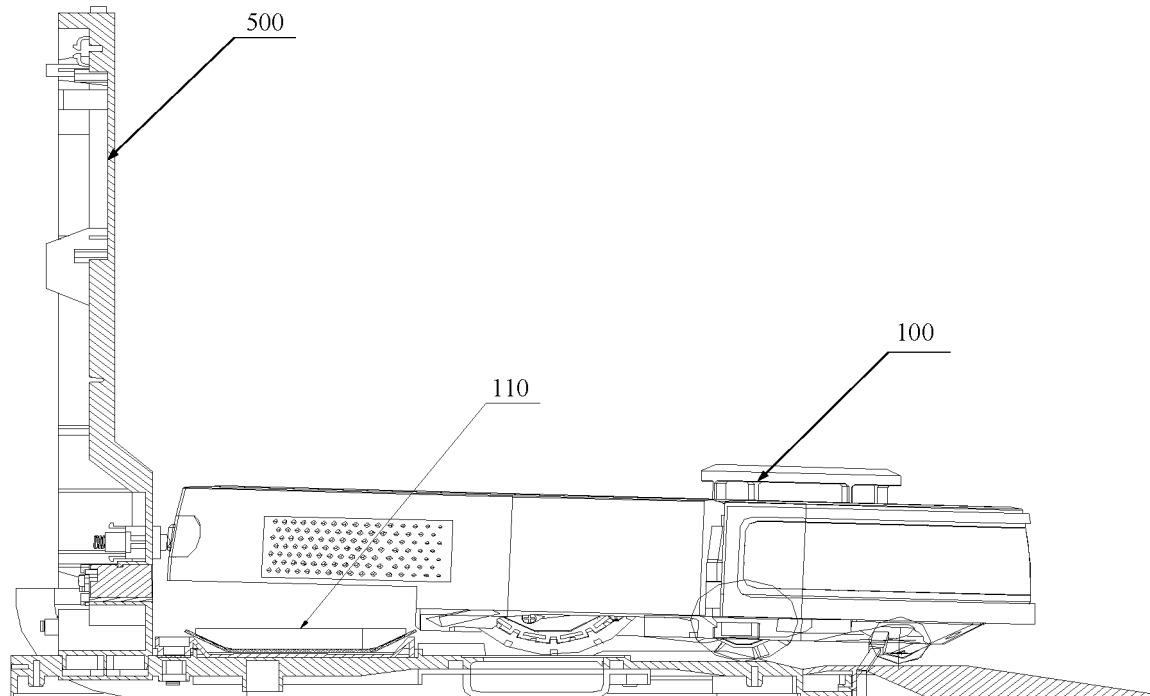


FIG. 51

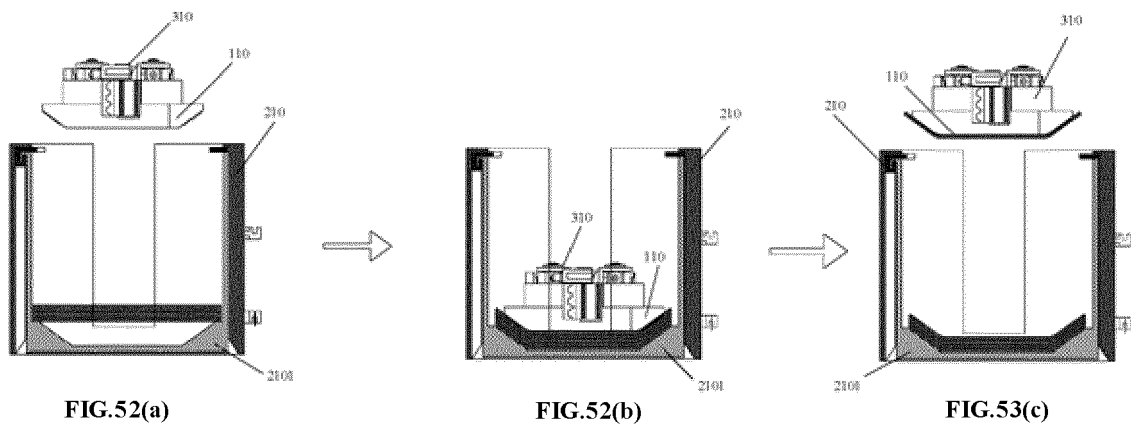


FIG. 52

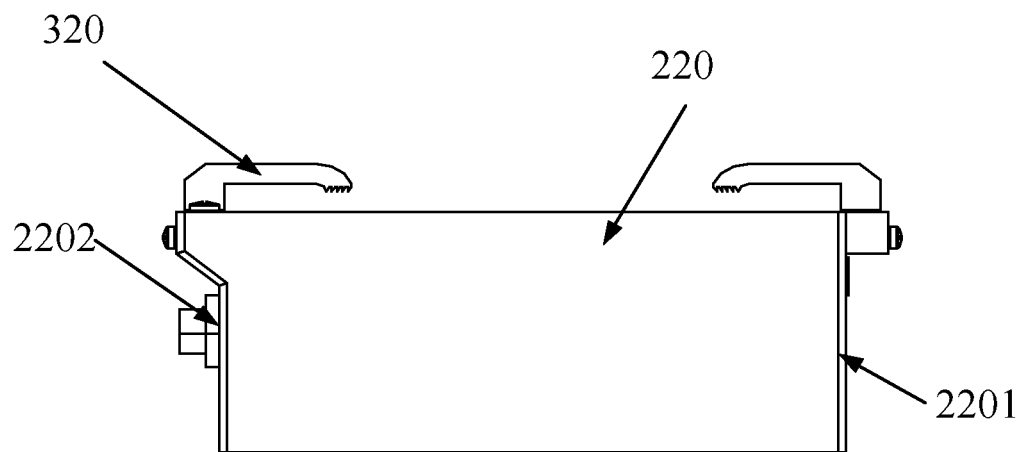


FIG. 53

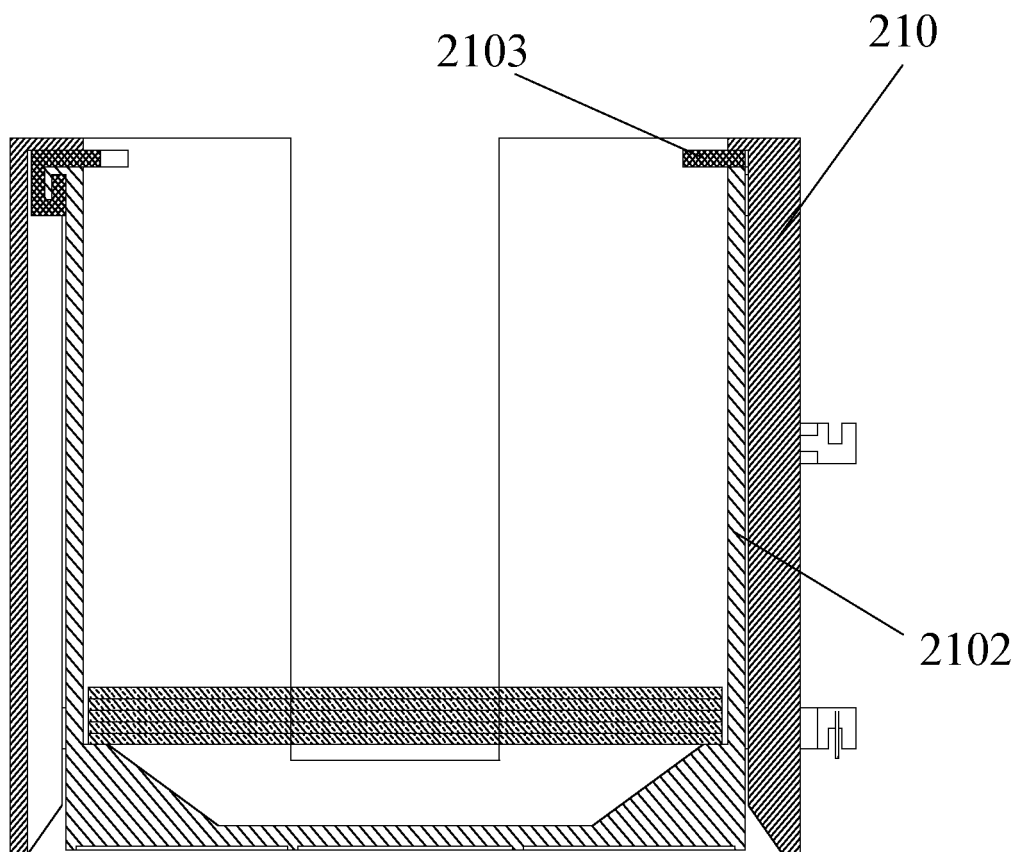


FIG. 54

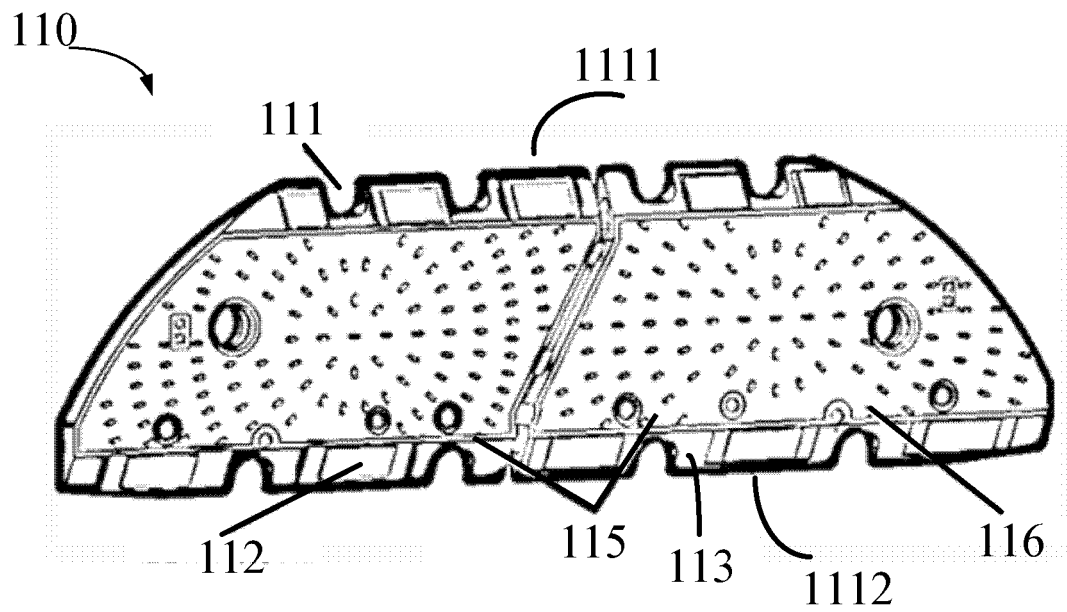


FIG. 55

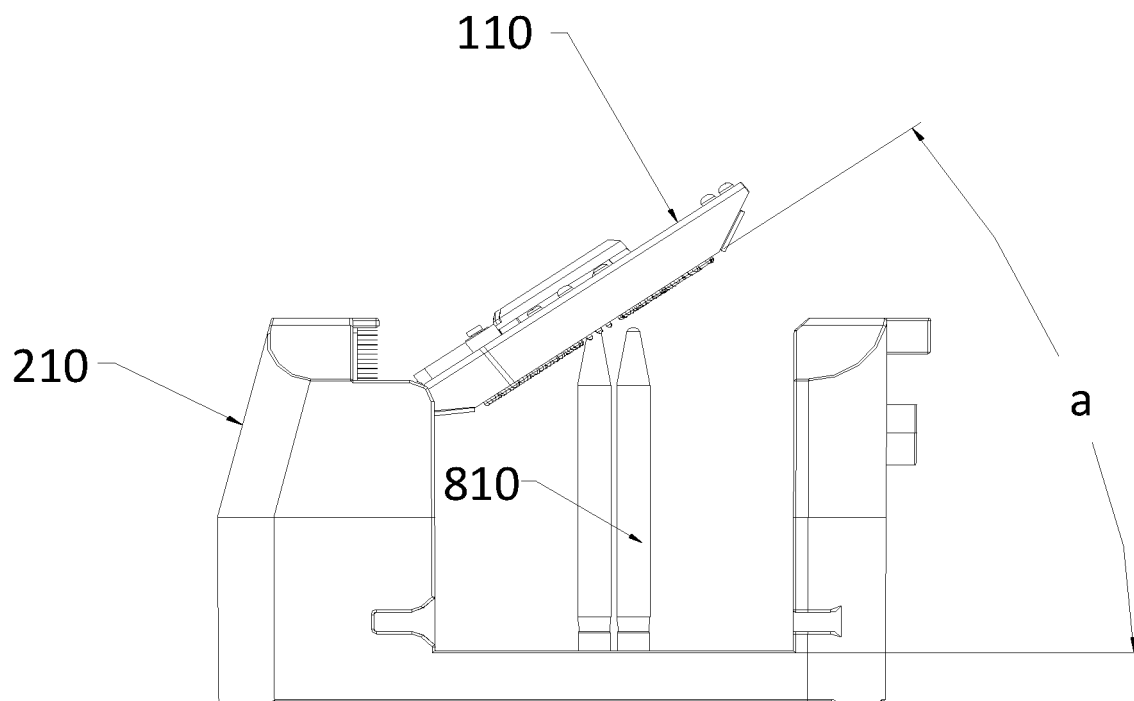


FIG. 56

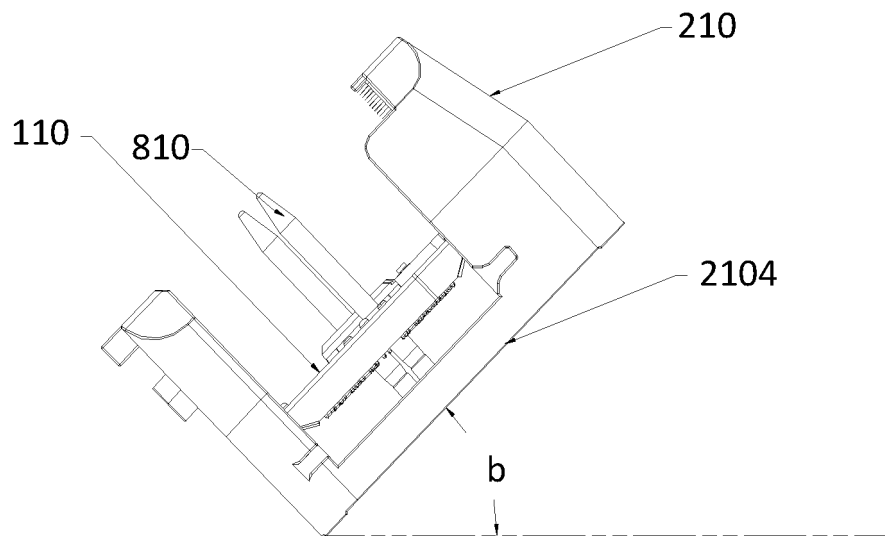


FIG. 57

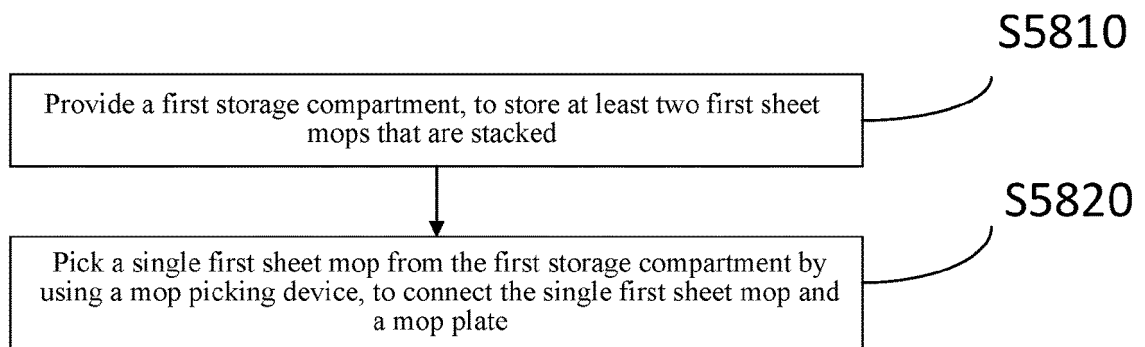


FIG. 58

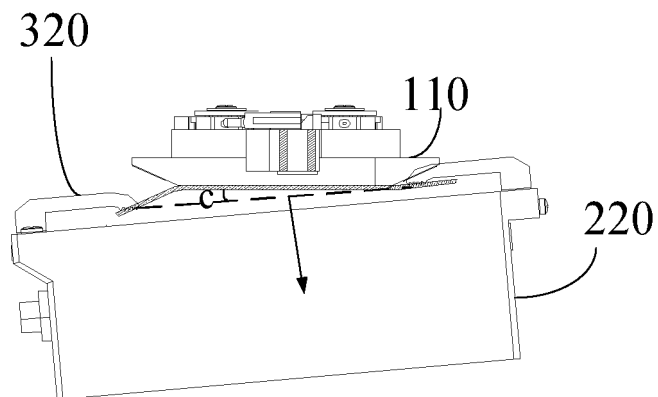


FIG. 59

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2022/097032

A. CLASSIFICATION OF SUBJECT MATTER A47L 11/10(2006.01)i; A47L 11/40(2006.01)i; A47L 11/28(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; B08B 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) WPI; EPODOC; CNPAT; CNKI: 苏州宝时得电动工具有限公司, 清洁, 扫地, 清扫, 机器人, 维护, 基站, 拖布, 拖布板, 安装板, 容纳, 仓, 拾取, 粘贴, 磁, 吸, 可拆卸, 移动, 储存, 替换, 更换, 去除, 移除, 结合, 接合, clean+, robot?, base, station, park+, replac+, remov+, sweep+, lift+, mov+, pad?, separat+, receiv+, mop+, mobile, hospital, cover?, plate?, fix+, past+, stick+																					
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>X</td> <td>WO 2021104689 A1 (CARL FREUDENBERG KG.) 03 June 2021 (2021-06-03) description, page 8, line 5 to page 11, line 24, and figures 1-9</td> <td>1, 20-36, 45-46, 54-72</td> </tr> <tr> <td>Y</td> <td>WO 2021104689 A1 (CARL FREUDENBERG KG.) 03 June 2021 (2021-06-03) description, page 8, line 5 to page 11, line 24, and figures 1-9</td> <td>47-53</td> </tr> <tr> <td>Y</td> <td>CN 108158512 A (DONGGUAN MINGYU ELECTRONIC TECHNOLOGY CO., LTD.) 15 June 2018 (2018-06-15) description, paragraph 0039, and figure 3</td> <td>47-53</td> </tr> <tr> <td>A</td> <td>WO 2021104689 A1 (CARL FREUDENBERG KG.) 03 June 2021 (2021-06-03) description, page 8, line 5 to page 11, line 24, and figures 1-9</td> <td>2-19, 37-44, 73</td> </tr> <tr> <td>A</td> <td>CN 212118053 U (POSITEC POWER TOOLS (SUZHOU) CO., LTD.) 11 December 2020 (2020-12-11) entire document</td> <td>1-73</td> </tr> <tr> <td>A</td> <td>CN 106859512 A (SHENZHEN RUANJING TECHNOLOGY CO., LTD.) 20 June 2017 (2017-06-20) entire document</td> <td>1-73</td> </tr> </tbody> </table>	Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.	X	WO 2021104689 A1 (CARL FREUDENBERG KG.) 03 June 2021 (2021-06-03) description, page 8, line 5 to page 11, line 24, and figures 1-9	1, 20-36, 45-46, 54-72	Y	WO 2021104689 A1 (CARL FREUDENBERG KG.) 03 June 2021 (2021-06-03) description, page 8, line 5 to page 11, line 24, and figures 1-9	47-53	Y	CN 108158512 A (DONGGUAN MINGYU ELECTRONIC TECHNOLOGY CO., LTD.) 15 June 2018 (2018-06-15) description, paragraph 0039, and figure 3	47-53	A	WO 2021104689 A1 (CARL FREUDENBERG KG.) 03 June 2021 (2021-06-03) description, page 8, line 5 to page 11, line 24, and figures 1-9	2-19, 37-44, 73	A	CN 212118053 U (POSITEC POWER TOOLS (SUZHOU) CO., LTD.) 11 December 2020 (2020-12-11) entire document	1-73	A	CN 106859512 A (SHENZHEN RUANJING TECHNOLOGY CO., LTD.) 20 June 2017 (2017-06-20) entire document	1-73
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Date of the actual completion of the international search 12 August 2022	Date of mailing of the international search report 31 August 2022																				
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 SEARCH REPORT

International application No.
PCT/CN2022/097032

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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.
A	CN 212879162 U (POSITEC POWER TOOLS (SUZHOU) CO., LTD.) 06 April 2021 (2021-04-06) entire document	1-73
A	EP 3494855 A1 (BSH BOSCH UND SIEMENS HAUSGERATE GMBH) 12 June 2019 (2019-06-12) entire document	1-73
A	CN 111345741 A (POSITEC POWER TOOLS (SUZHOU) CO., LTD.) 30 June 2020 (2020-06-30) entire document	1-73

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/CN2022/097032

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		JP 2022514932 A	16 February 2022
		WO 2020125492 A1	25 June 2020

Form PCT/ISA/210 (patent family annex) (January 2015)