

# US Patent & Trademark Office

## Patent Public Search | Text View

United States Patent Application Publication

20250255448

Kind Code

A1

Publication Date

August 14, 2025

Inventor(s)

YANG; Xuan et al.

### CLEANING DEVICE, BASE STATION AND CLEANING SYSTEM

#### Abstract

The present disclosure disclosed a cleaning device, comprises a body, a main cleaning module and an auxiliary cleaning module, the main cleaning module is disposed on the body, the first lift structure is configured to drive the main cleaning assembly to ascend and descend, the auxiliary cleaning assembly is non-swingable relative to the body, at least part of the auxiliary cleaning assembly is always disposed outside the edge of the body, to clean along the edge, under the driving of the first lift structure, the auxiliary cleaning module ascends or descends synchronously with the main cleaning assembly, enabling the main cleaning assembly and the auxiliary cleaning assembly to ascend and descend to stay in the lifting position and the mopping position synchronously. Cleaning along the edge while prevent the cleaning-missed area from existing between the main cleaning assembly and the auxiliary cleaning assembly, enhancing the overall cleaning effect.

**Inventors:** YANG; Xuan (Suzhou, CN), SHU; Zhongyi (Suzhou, CN), HU; Jianhua (Suzhou, CN), ZHENG; Xing (Suzhou, CN), CHENG; Ning (Suzhou, CN)

**Applicant:** Dreame Innovation Technology (Suzhou) Co., Ltd. (Suzhou, CN)

**Family ID:** 91435010

**Appl. No.:** 19/048929

**Filed:** February 09, 2025

#### Foreign Application Priority Data

CN 202410179201.6

Feb. 09, 2024

CN 202420466657.6

Mar. 11, 2024

#### Publication Classification

**Int. Cl.:** A47L11/40 (20060101); A47L11/12 (20060101); A47L11/18 (20060101)

## Background/Summary

### TECHNICAL FIELD

[0001] The present disclosure belongs to the technical field of cleaning, and in particular, relates to a cleaning device, base station and cleaning system.

### BACKGROUND

[0002] There are multiple implementation methods to implement cleaning along the edge for existing cleaning robots when dealing with obstacles. For example, the cleaning robot published by the Chinese patent with the publication No. CN116919259A, the cleaning robot comprises a machine body, a cleaning system and a driving system disposed on the machine body. Wherein, along the forward direction of the machine body, the cleaning system is disposed in front of the driving system, the driving system comprises at least two driving wheels disposed on the bottom of the machine body symmetrically.

[0003] The cleaning system comprises a cleaning head and an auxiliary cleaning head; the auxiliary cleaning head is disposed at a corner of the forward portion, and disposed beneath the buffer (i.e. the collision plate disposed at the front portion of the machine body), a part of the auxiliary cleaning head extends beyond the buffer (i.e. extends beyond the edge of the machine body), due to a part of the auxiliary cleaning head extending beyond the edge of the machine body, it can clean the area outside the machine body, such that the cleaning robot improves the cleaning of wall edges, corners, and other areas.

[0004] Wherein, the cleaning head can be rolling brush, the rolling brush rotates to sweep the debris from the floor and carries it to the suction opening of the dust box, to realize dry cleaning; or the cleaning head is cleaning pad, remove the stains on the floor through the reciprocal vibration of the cleaning head; or, the cleaning head is rolling brush for wet cleaning, and recycling system of the garbage used for rolling brush in wet cleaning. The cleaning head in the first two ways both implement dry cleaning to the floor, the cleaning effect is poor; the cleaning head in the latter method can implement wet cleaning to the floor to improve the cleaning effect, however, wet cleaning head cleans dry garbage and wet garbage, it is necessary to set up a recycling system to recycle dry garbage and wet garbage, and set up scraping bar to squeeze the wet cleaning head to squeeze the dirt or grime out from the cleaning head, leading to a complex structure; in case where no recycling system is set, the wet cleaning head can be soiled more easily by the garbage, the wet cleaning needs to be cleaned constantly, the cleaning effect is reduced.

### BRIEF SUMMARY OF THE INVENTION

[0005] Based on the problems mentioned above, the present application provides a cleaning device, the cleaning device comprises a body, a dry cleaning module disposed on the body, and a main cleaning module and an auxiliary cleaning module configured for wet cleaning; the dry cleaning module comprises at least one rolling brush; the main cleaning module comprises at least one main cleaning assembly; the auxiliary cleaning module comprises at least one auxiliary cleaning assembly, at least a part of the auxiliary cleaning assembly extends beyond of the edge of the body to clean along the edge; along the forward direction of the body, the main cleaning assembly and the auxiliary cleaning assembly are both disposed behind the rolling brush; along the width direction of the body, there is no cleaning-missed area between the cleaning area of the main cleaning assembly and the cleaning area of the auxiliary cleaning assembly; wherein, the width

direction of the body is perpendicular to the forward direction of the body.

[0006] Optionally, the cleaning device further comprises a locomotion system, the locomotion system at least comprises two driving wheels, the two driving wheels are disposed on the bottom of the body symmetrically; along the forward direction of the body, the main cleaning assembly and/or the auxiliary cleaning assembly is disposed behind the driving wheel

[0007] Optionally, the main cleaning assembly comprises a main cleaning disk, and a main cleaning component disposed on the bottom of the main cleaning disk; the auxiliary cleaning assembly comprises an auxiliary cleaning disk, and an auxiliary cleaning component disposed on the bottom of the auxiliary cleaning disk; the auxiliary cleaning disk and the auxiliary cleaning component are both round in shape, the diameter of the auxiliary cleaning disk is smaller than the diameter of the main cleaning disk; the auxiliary cleaning disk is distributed within the first region, which is surrounded by the driving wheel, the main cleaning disk, and the bottom of the body that are adjacent to or in close to the auxiliary cleaning disk.

[0008] Optionally, the diameter of the main cleaning disk is 2 to 4 times greater than the diameter of the auxiliary cleaning disk.

[0009] Optionally, along the forward direction of the body, further comprising an edge brush disposed on the bottom of the front portion of the body, the edge brush is disposed in front of the rolling brush; [0010] along the width direction of the body, the edge brush and the auxiliary cleaning disk are both disposed at the right side of the body, to form the cleaning along the right edge.

[0011] Optionally, along the forward direction of the body, the rotation center of the auxiliary cleaning disk is disposed in front of the rotation center of the main cleaning disk, such that the auxiliary cleaning disk distributes within the first region, which is disposed on the upper right of the main cleaning disk adjacent with the auxiliary cleaning disk.

[0012] Optionally, the main cleaning assembly comprises a main cleaning disk, and a main cleaning component disposed on the bottom of the main cleaning disk; the auxiliary cleaning component comprises an auxiliary cleaning disk, and an auxiliary cleaning component disposed on the auxiliary cleaning disk; [0013] a gap exists between the main cleaning disk and the auxiliary cleaning disk; the adjacent edges of the auxiliary cleaning component and the main cleaning component are either tangent or pressed against each other, ensuring that there is no gap between the adjacent edges of the main cleaning component and auxiliary cleaning component, without affecting the independent rotation of the main cleaning disk and auxiliary cleaning disk.

[0014] Optionally, both of the main cleaning component and the auxiliary cleaning component are rags, the main cleaning component and the auxiliary cleaning component are pressed against each other to form a second interference region, along the second connecting line between the rotation centers of the main cleaning component and the auxiliary cleaning component, the maximum width of the second interference region is smaller than 5 mm.

[0015] Optionally, the main cleaning assembly is at least provided with a first part; the auxiliary cleaning assembly is at least provided with a second part, the cleaning area of the first part and the cleaning area of the second part have an overlapping region along the forward direction of the body.

[0016] Optionally, the first part is disposed behind the second part along the forward direction of the body, such that the second part of the auxiliary cleaning assembly cleans firstly, and the first part of the main cleaning assembly cleans afterwards, the cleaning area cleaned by the second part at first and the cleaning area cleaned by the first part afterwards have the overlapping region.

[0017] Optionally, the main cleaning assembly comprises a main cleaning disk, and a main cleaning component disposed on the bottom of the main cleaning disk; the auxiliary cleaning component comprises an auxiliary cleaning disk, and an auxiliary cleaning component disposed on the auxiliary cleaning disk; [0018] a gap exists between the main cleaning disk and the auxiliary cleaning disk, the adjacent edges of the auxiliary cleaning component and the main cleaning

component are either tangent or pressed against each other, ensuring that there is no gap between the adjacent edges of the main cleaning component and auxiliary cleaning component, without affecting the independent rotation of the main cleaning disk and auxiliary cleaning disk; [0019] in the forward direction of the body, the first part is disposed where the adjacent edges of the auxiliary cleaning component and the main cleaning component are tangent, or disposed behind the position where the auxiliary cleaning component and the main cleaning component are pressed against each other.

[0020] Optionally, the auxiliary cleaning disk is provided with the second part, the main cleaning disk is provided with the first part.

[0021] Optionally, the auxiliary cleaning module further comprises a first driving structure which is configured to drive the auxiliary cleaning assembly to ascend, descend and rotate; [0022] the main cleaning module further comprises a second driving structure which is configured to drive the main cleaning assembly to ascend, descend and rotate; [0023] the number of the main cleaning assembly is two, the number of the second driving structure is two, one second driving structures drives one main cleaning assembly correspondently. [0024] the first driving structure and the second driving structure are disposed in the cavity of the body, the first driving structure extends through the bottom of the body to connect to the auxiliary cleaning assembly, such that the auxiliary cleaning assembly is disposed beneath the bottom of the body; [0025] the second driving structure extends through the bottom of the body to connect to the main cleaning assembly, such that the main cleaning assembly is disposed beneath the bottom of the body.

[0026] Optionally, the dry cleaning module further comprises a dust box and a main fan, the main fan is configured to suction the garbage into the dust box; a dust box chamber for mounting the dust box is disposed in the body; a dust exhaust channel connected with the dust box is also disposed in the body, the dust exhaust channel is configured to draw the garbage from the dust box into the base station under the action of the dust collection fan of the base station; [0027] the main fan is disposed in the cavity of the body, and distributed in a second region surround by the dust exhaust channel, the dust box chamber and the two first driving structure; the first driving structure is distributed out of the second region and a side facing away from the dust exhaust channel, and disposed behind the driving wheel that is adjacent to or in close to the first driving structure.

[0028] Optionally, further comprises a water replenishing mechanism, the water replenishing mechanism is configured to replenish water to the main cleaning component and/or the auxiliary cleaning component, to form wet cleaning; [0029] the water replenishing mechanism avoids the first driving structure and disposed on the body, and disposed out of the second region.

[0030] Optionally, the water replenishing mechanism comprises a water tank and a pump body, a third region is formed between the two first driving structures and the rear sidewall of the body, at least one of the water tank and pump body is disposed within the third region.

[0031] Optionally, the water replenishing mechanism comprises a water tank and a pump body; a fourth region is surround by another driving wheel, the dust exhaust channel and the sidewall of the body, the driving wheel is disposed facing away from the auxiliary cleaning assembly; at least one of the water tank and pump body is disposed within the fourth region.

[0032] Optionally, a third region is formed between the two first driving structures and the rear sidewall of the body, one of the water tank and pump body is disposed within the third region, the other one is disposed within the fourth region.

[0033] Optionally, the cleaning device, further comprises an exhaust duct connected to the exhaust outlet of the main fan; [0034] the exhaust duct extends out of the second region and towards the sidewall of the body that is adjacent to the exhaust duct, to connect with the outer space; along the forward direction of the body, the first driving structure is disposed behind the exhaust duct.

[0035] Optionally, the vertical projection of the body on the surface to be cleaned presents a rectangular shape, the longer side of the rectangular is disposed in the forward direction of the body, the shorter side of the rectangular is disposed in the width direction of the body, the dust box

chamber is distributed between the two driving wheels, along the forward direction of the body, the rolling brush is disposed in front of the driving wheel and the dust box chamber; or [0036] the vertical projection of the body on the surface to be cleaned presents a circular shape, at least part of the rolling brush is disposed between the two driving wheels; along the forward direction of the body, the dust box is disposed behind the rolling brush.

[0037] Optionally, the cleaning device, along the forward direction of the body, the body is provided with a rear portion, and a front portion disposed in front of the rear portion; a buffer is disposed on the front portion, the buffer detects obstacles by colliding with the obstacles; the auxiliary cleaning assembly and the main cleaning assembly are disposed on the rear portion of the body.

[0038] Optionally, the main cleaning module further comprises a second driving structure, the second driving structure is a first lift structure, the first lift structure is at least configured to drive the main cleaning assembly to ascend or descend, ensuring that the main cleaning assembly switches between the mopping position and the lifting position; [0039] the auxiliary cleaning module further comprises a first driving structure, the first driving structure is a second lift structure, the second lift structure is at least configured to drive the auxiliary cleaning assembly to ascend or descend, ensuring that the auxiliary cleaning assembly switches between the mopping position and the lifting position.

[0040] Optionally, the main cleaning assembly and the auxiliary cleaning assembly are in the mopping position and the lifting position synchronously.

[0041] Optionally, the cleaning device, the second driving structure is further configured to drive the cleaning assembly to rotate in the mopping position, in order to clean the surface to be cleaned;

[0042] the first driving structure is further configured to drive the cleaning assembly to rotate in the mopping position, in order to clean the surface to be cleaned; [0043] the main cleaning assembly comprises a main cleaning disk, and a main cleaning component disposed on the bottom of the main cleaning disk; the auxiliary cleaning assembly comprises an auxiliary cleaning disk, and an auxiliary cleaning component disposed on the auxiliary cleaning disk; the main cleaning disk and the auxiliary cleaning disk both round in shape; in the mopping position, the adjacent auxiliary cleaning disk and the main cleaning disk rotate in opposite directions.

[0044] Optionally, the number of the main cleaning assembly is two, the two main cleaning assemblies are disposed on the bottom of the body symmetrically; along the forward direction of the body, there is no gap between the main cleaning components of the two main cleaning assemblies; [0045] the main cleaning assembly comprises a circular main cleaning disk, and a main cleaning component disposed on the bottom of the main cleaning disk; the auxiliary cleaning assembly comprises a circular auxiliary cleaning disk, and an auxiliary cleaning component disposed on the bottom of the auxiliary cleaning disk; the auxiliary cleaning disk is disposed at the right side of the body, to form a right edge; in the mopping position, the adjacent two main cleaning disk rotate in opposite directions, the rotational direction of the auxiliary cleaning disk rotates along counterclockwise.

[0046] Optionally, the first driving structure and/or the second driving structure comprises a first motor and a lifting assembly, the lifting assembly is connected to the cleaning assembly, the cleaning assembly is main cleaning assembly or auxiliary cleaning assembly, the lifting assembly drives the cleaning assembly to ascend or descend, and rotate in the mopping position.

[0047] Optionally, the first driving structure and the second driving structure share a same motor; further comprises a first transmission mechanism, one end of the first transmission mechanism is connected to the power output shaft of the first motor, the other end is provided with a first output end and a second output end; the first output end is connected to the lifting assembly of the first driving structure, the second output end is connected to the lifting assembly of the second driving structure, ensuring that one first motor can drive the main cleaning assembly and the auxiliary cleaning assembly to ascend, descend and rotate synchronously.

[0048] Optionally, the lifting assembly drives the cleaning assembly to ascend, descend and rotate through a spiral mechanism; the rotational direction of the first output end and the second output end is opposite, the spiral direction of the spiral mechanism of the first driving structure is same as the spiral direction of the spiral mechanism of the second driving structure.

[0049] Optionally, the lifting assembly drives the cleaning assembly to ascend, descend and rotate through a spiral mechanism; the rotational direction of the first output end and the second output end is same, the spiral direction of the spiral mechanism of the first driving structure is opposite to the spiral direction of the spiral mechanism of the second driving structure.

[0050] Optionally, the lifting assembly comprises [0051] a first fixed body, connected to the power output shaft of the first motor; [0052] a second fixed body, connected to the cleaning assembly, the cleaning assembly is main cleaning assembly or auxiliary cleaning assembly; a spiral mechanism is formed between the first fixed body and the second fixed body; [0053] the power output shaft rotates along a first direction, under the action of the power output shaft or at least under the gravity of the second fixed body and the cleaning assembly, the second fixed body descends relative to the first fixed body through the spiral mechanism; in the mopping position, the power output shaft continues to rotate along the first direction, there is no continually descending motion of the second fixed body relative to the first fixed body, the second fixed body rotates to drive the cleaning assembly to rotate to clean the surface to be cleaned; [0054] the power output shaft is rotating along the second direction, under the action of the power output shaft, the second fixed body ascends relative to the first fixed body through the spiral mechanism, to drive the cleaning assembly to ascend.

[0055] Optionally, the first fixed body comprises a first sleeve, a first mounting cavity recessed upwardly is disposed at the bottom of the first sleeve, the top of the first sleeve is in driving connection with the power output shaft of the first motor; [0056] the second fixed body comprises a second sleeve and a housing, a second annular cavity recessed downwardly is disposed on the top of the second sleeve, a second mounting cavity recessed upwardly is disposed at the bottom of the second sleeve; a mounting protrusion on the top of the cleaning assembly is detachably mounted inside the second mounting cavity; [0057] the housing is sleeved on an outer side of the second sleeve, fixed relative to the body; a damping component is disposed between the inner wall of the housing and the outer wall of the second sleeve, such that the rotational speed of the first sleeve and the second sleeve is different, the second sleeve ascends or descends relative to the first sleeve; [0058] the first sleeve embeds into the annular cavity through the first mounting cavity, a rib is disposed on the outer wall of the first sleeve, a spiral groove compatible with the rib is disposed on the inner wall of the second sleeve, the spiral mechanism is formed by the rib and the spiral groove; a first limiting portion is disposed on the top of the spiral groove, in the mopping position, along the spiral direction of the spiral groove, the rib abuts on the sidewall of the first limiting portion to limit the continually descending of the second sleeve relative to the first sleeve; [0059] the descending motion of the second sleeve relative to the first sleeve is driven by the power output shaft rotating along the first direction.

[0060] Optionally, the damping component is a fluff strip, one end of the fluff strip is fixed on the inner wall of the housing, the other end interference abuts on the outer wall of the second sleeve, to form a flexible abutment; or [0061] at least one clearance hole is disposed on the housing, at least one first protrusion is disposed in the clearance hole, the first protrusion protrudes in the direction towards the second sleeve, to interference abut on the outer wall of the second sleeve; or [0062] at least one clearance hole is disposed on the housing, a rotatable first rotating body is disposed in the clearance hole, an interference abutment is formed between the first rotating body and the outer wall of the second sleeve; during the process of the ascending or descending of the cleaning assembly, the first rotating body does not rotate; in the mopping position, a rolling friction is formed between the first rotating body and the second sleeve.

[0063] Optionally, [0064] the first fixed body comprises a first cylinder body, the first cylinder

body sleeves on an outer side of the power output shaft of the first motor through a first one-way bearing; the one-way bearing possesses a transmission state that transfers the force of the power output shaft to the first cylinder body, and a disconnection state that disconnects the force transmission of the force of the power output shaft to the first cylinder body; [0065] the second fixed body comprises a floating shaft and a second cylinder body, the second cylinder body is disposed rotatably on the outer wall of the floating shaft; the top of the floating shaft is connected to the power output shaft, the bottom of the floating shaft is connected to the top of the cleaning assembly; [0066] a spiral mechanism is formed between the first cylinder body and the second cylinder body; [0067] the power output shaft is rotating along the first direction, the first cylinder body is in a disconnection state; the power output shaft drives the floating shaft to rotate to drive the cleaning assembly to rotate, under the gravity of the second fixed body and the cleaning assembly, the second cylinder body descends relative to the first cylinder body; [0068] the power output shaft is rotating along the second direction, the first cylinder body is in a transmission state, the power output shaft drives the floating shaft to rotate, such that the second cylinder body ascends relative to the first cylinder body, to drive the floating shaft, to drive the ascend of the floating shaft and the cleaning assembly.

[0069] Optionally, the spiral mechanism comprises a first spiral surface, and a first matching component abuts on the first spiral surface, one of the first spiral surface and the first matching component is disposed on the first cylinder body, the other one is disposed on the second cylinder body, the first matching component is a second spiral surface or a first rolling wheel; and/or [0070] further comprises a first reset component, the first reset component is disposed between the floating shaft and the power output shaft, the first reset component is configured to apply downward reset force to the floating shaft and the cleaning assembly; the power output shaft is rotating along the first direction, under the driving of the gravity of the second fixed body and the cleaning assembly, and the driving of the reset force, the second cylinder body descends relative to the first cylinder body.

[0071] Optionally, the lifting assembly comprises a third cylinder body, the third cylinder body sleeves on the outer side of the power output shaft of the first motor through a one-way bearing; the one-way bearing possesses a transmission state that transfers the force of the power output shaft to the third cylinder body, and a disconnection state that disconnects the force transmission of the force of the power output shaft to the third cylinder body; the bottom of the power output shaft is connected to the cleaning assembly; a supporting body, the supporting body is fixed relative to the body, the supporting body is disposed on the outside of the third cylinder body, a spiral mechanism is formed between the supporting body and the third cylinder body; [0072] when the power output shaft is rotating along the first direction, driving the cleaning assembly to rotate, the third cylinder body is in a disconnection state, at least under the gravity of the third cylinder body and the cleaning assembly, the third cylinder body can descend relative to the supporting body through the spiral mechanism, to drive the cleaning assembly to descend; and in the mopping position, the power output shaft continues to rotate along the first direction, there is no continually descending motion of the third cylinder body relative to the supporting body, the power output shaft drives the cleaning assembly to rotate; [0073] when the power output shaft is rotating along the second direction, the third cylinder body is in a transmission state, the power output shaft drives the third cylinder body to ascend relative to the supporting body through the spiral mechanism, to drive the cleaning assembly to ascend.

[0074] Optionally, the spiral mechanism comprises a third spiral surface, and a second matching component complements the third spiral surface, one of the third spiral surface and the second matching component is disposed on the supporting body, the other one is disposed on the outside of the third cylinder body, the second matching component is a fourth spiral surface or a second rolling wheel.

[0075] Optionally, the third spiral surface is disposed on the supporting body, a third limiting

portion is disposed on the bottom of the third spiral surface; [0076] along the spiral direction of the third spiral surface, the second matching component abuts on the sidewall of the third limiting portion to limit the continually descending of the third cylinder body relative to the supporting body in the mopping position.

[0077] Optionally, the cleaning device, further comprises a first shell body and a second reset component; [0078] the first motor, the power output shaft and the third cylinder body are all disposed on the first shell body, the first shell body is slidably disposed on the supporting body along the vertical direction; [0079] the second reset component is disposed between the first shell body and the supporting body; the second reset component is configured to apply downward second reset force to the first shell body; [0080] driving the first shell body to descending relative to the supporting body under the gravity of the third cylinder body, the first shell body and the cleaning assembly, and under the action of the second reset force.

[0081] Optionally, the cleaning device, further comprises a torque component, the torque component sleeves on the outer side of the third cylinder body, one end of the torque component is connected to the supporting body, the other end abuts on the third cylinder body; the torque component is configured to apply torque to the third cylinder body, such that the third cylinder body can rotate downwardly relative to the supporting body.

[0082] Optionally, the main cleaning module further comprises a first lift structure, the first lift structure is configured to drive the main cleaning assembly ascend or descend; [0083] the auxiliary cleaning module is disposed on the main cleaning module, under the driving of the first lift structure, the auxiliary cleaning module ascends or descends synchronously with the main cleaning assembly.

[0084] Optionally, the main cleaning assembly is at least provided with a first part and the auxiliary cleaning assembly is at least provided with a second part, the cleaning area of the first part and the cleaning area of the second part have an overlapping region along the forward direction of the body.

[0085] Optionally, on the forward direction of the body, the first part is disposed behind the second part, such that the second part cleans firstly, and the first part cleans afterwards, the cleaning area cleaned by the second part at first and the cleaning area cleaned by the first part afterwards have the overlapping region.

[0086] Optionally, the main cleaning assembly comprises a mounting base, the bottom of the mounting base is for the mounting of the main cleaning component, in the forward direction of the body, the first part of the mounting base is disposed behind the second part of the auxiliary cleaning disk of the auxiliary cleaning assembly.

[0087] Optionally, the cleaning device, the mounting base is flat mop, the flat mop is at least provided with a vibrating plate, the main cleaning component is disposed on the bottom of the vibrating plate, the vibrating plate oscillates or twists reciprocally to drive the main cleaning component to move, to clean the surface to be cleaned.

[0088] Optionally, the auxiliary cleaning assembly comprises an auxiliary cleaning disk, and an auxiliary cleaning component disposed on the bottom of the auxiliary cleaning disk; [0089] the auxiliary cleaning module further comprises a second driving structure, the second driving structure is configured to drive the auxiliary cleaning disk to rotate, the second driving structure is disposed on the mounting base; the area of the auxiliary cleaning disk is smaller than the area of the mounting base.

[0090] Optionally, further comprising an edge brush and a locomotion system, the edge brush is disposed on the bottom of the front portion of the body; along the width direction of the body, the auxiliary cleaning disk and the edge brush are both disposed at the right side of the body, to form a right edge; [0091] the locomotion system at least comprises two driving wheels, the two driving wheels are disposed on the bottom of the body symmetrically; [0092] along the forward direction of the body, the main cleaning assembly is disposed behind the driving wheel, the auxiliary



cleaning disk is disposed in front of the main cleaning assembly; [0093] along the width direction of the body, at least part of the auxiliary cleaning disk is disposed at the region on the outside of the right side driving wheel.

[0094] Optionally, the first driving structure comprises a second motor, and a second transmission mechanism configured to transfer the driving force of the second motor to the auxiliary cleaning disk; [0095] the second motor is disposed on the mounting base, one end of the output shaft of the second transmission mechanism facing away from the second motor extends in the direction towards the right side driving wheel, and avoids the driving wheel, such that the auxiliary cleaning disk is disposed within the region on the outside of the right side driving wheel.

[0096] Optionally, the auxiliary cleaning assembly comprises an auxiliary cleaning disk, and an auxiliary cleaning component disposed on the bottom of the auxiliary cleaning disk; when the auxiliary cleaning component is cleaning the surface to be cleaned, the pressure applied on the auxiliary cleaning disk is 900 Pa to 1500 Pa.

[0097] The present application further provides a base station, comprises [0098] a main body, the main body is provided with a cleaning chamber, the cleaning chamber is provided with at least one main cleaning area and auxiliary cleaning area; [0099] when any one of the aforementioned cleaning devices returns to the base station, [0100] the main cleaning area and the auxiliary cleaning area are respectively configured for cleaning the main cleaning component of the main cleaning assembly and the auxiliary cleaning component of the auxiliary cleaning assembly disposed on the cleaning device.

[0101] The present application further provides a cleaning system, comprises any one of the aforementioned cleaning devices and the base station.

#### Beneficial Effect

[0102] The cleaning device of the present application, along the forward direction of the body of the cleaning device, the main cleaning module and the auxiliary cleaning module configured for wet cleaning on the cleaning device are both disposed behind the dry cleaning module, enabling the rolling brush of the dry cleaning module to implement dry sweeping in the front, the main cleaning assembly of the main cleaning module and the auxiliary cleaning assembly of the auxiliary cleaning module for wet cleaning to implement wet mopping behind the rolling brush, forms a cleaning mode of dry sweeping firstly and wet mopping afterwards, the cleaning mode prevents dry garbage on the floor from attaching to the main cleaning assembly and auxiliary cleaning assembly, thus avoiding soiling the main cleaning assembly and auxiliary cleaning assembly, reducing the frequency of cleaning of the main cleaning assembly and auxiliary cleaning assembly, and there is no need to set up a scraping bar of the recycling system in the body to scrape off the dirt or grime from the main cleaning assembly and auxiliary cleaning assembly, resulting in a simpler structure for the robot. Furthermore, achieving the cleaning along the edge to the edge of the obstacles or walls, along the width direction of the body, due to there is no cleaning-missed area between the cleaning area of the main cleaning assembly and the cleaning area of the auxiliary cleaning assembly, thereby achieving the cleaning along the edge while prevent the cleaning-missed area from existing between the main cleaning assembly and the auxiliary cleaning assembly, enhancing the overall cleaning effectiveness.

---

## Description

### BRIEF DESCRIPTION OF THE DRAWINGS

[0103] In order to more clearly illustrate the embodiments of the present disclosure or the technical solutions in the existing art, the accompanying drawings required in the description of the embodiments or the existing art are briefly described beneath, obviously, the accompanying drawings in the following description are some embodiments of the present disclosure, for those of

ordinary skill in the art, other accompanying drawings can be obtained according to these accompanying drawings without exerting creative efforts.

[0104] FIG. 1 is a schematic diagram (top view) of a cleaning device (the auxiliary cleaning module is not shown) provided by the embodiment of the present disclosure;

[0105] FIG. 2 is a schematic diagram (top view with upper shell removed) of a cleaning device (the auxiliary cleaning module is not shown) provided by the embodiment of the present disclosure;

[0106] FIG. 3 is a partial enlarged diagram of the cleaning device in FIG. 2;

[0107] FIG. 4 is a schematic diagram (top view) of a cleaning device provided by the embodiment of the present disclosure;

[0108] FIG. 5 is a three-dimensional schematic diagram of a cleaning device provided by the embodiment of the present disclosure;

[0109] FIG. 6 is a schematic diagram (top view with upper shell removed) of another cleaning device provided by the embodiment of the present disclosure;

[0110] FIG. 7 is a partial enlarged diagram of the cleaning device in FIG. 6;

[0111] FIG. 8 is a schematic diagram of another cleaning device provided by the embodiment of the present disclosure;

[0112] FIG. 9 is a perspective view schematic diagram of the cleaning device in FIG. 8;

[0113] FIG. 10 is a schematic diagram of the internal structure layout of the cleaning device in FIG. 8;

[0114] FIG. 11 is a schematic diagram of the first driving structure provided by the embodiment of the present disclosure;

[0115] FIG. 12 is a cross-sectional schematic diagram of the second sleeve of the first driving structure in FIG. 11;

[0116] FIG. 13 is an explosion schematic diagram of the first sleeve and the second sleeve of the first driving structure in FIG. 11;

[0117] FIG. 14 is a schematic diagram of another first driving structure provided by the embodiment of the present disclosure;

[0118] FIG. 15 is a partial explosion schematic diagram of the first driving structure in FIG. 14;

[0119] FIG. 16 is an explosion schematic diagram of the first driving structure in FIG. 14;

[0120] FIG. 17 is a schematic diagram of another implementation method of the first driving structure in FIG. 14;

[0121] FIG. 18 is a schematic diagram of another first driving structure provided by the embodiment of the present disclosure;

[0122] FIG. 19 is a schematic diagram (top view) of one way of the rotation of two main mop and auxiliary mop in the embodiment of the present disclosure;

[0123] FIG. 20 is a schematic diagram (top view) of another way of the rotation of two main mops and auxiliary mop in the embodiment of the present disclosure;

[0124] FIG. 21 is a schematic diagram (top view) of another way of the rotation of two main mops and auxiliary mop in the embodiment of the present disclosure;

[0125] FIG. 22 is a schematic diagram (top view) of another way of the rotation of two main mops and auxiliary mop in the embodiment of the present disclosure;

[0126] FIG. 23 is a schematic diagram of another implementation method of the cleaning device provided by the embodiment of the present disclosure;

[0127] FIG. 24 is a schematic diagram of the cleaning device removed the main mop in FIG. 23;

[0128] FIG. 25 is an explosion schematic diagram of the main cleaning assembly of the cleaning device in FIG. 23;

[0129] FIG. 26 is a layout schematic diagram (perspective view) of two main mop and auxiliary mop provided by the embodiment of the present disclosure;

[0130] FIG. 27 is a cross-sectional schematic diagram of the first driving structure in FIG. 11;

[0131] FIG. 28 is a schematic diagram of another cleaning device provided by the embodiment of

the present disclosure;

[0132] FIG. **29** is a schematic diagram of the internal layout of another cleaning device provided by the embodiment of the present disclosure;

[0133] FIG. **30** is a schematic diagram of one structure of the first driving structure of the cleaning device in FIG. **29**;

[0134] FIG. **31** is a test data diagram of the auxiliary mop of the cleaning device with downward pressure, service life, and area cleaning rate.

#### IMPLEMENTATIONS OF THIS APPLICATION

[0135] The inventive concept of this application is:

[0136] As shown in FIG. **1** to FIG. **4**, along the forward direction of the body **10** of the cleaning device, the main cleaning module **20** and the auxiliary cleaning module **30** configured for wet cleaning on the cleaning device are both disposed behind the dry cleaning module **40**, so that the rolling brush **403** of the dry cleaning module **30** sweeps in the front, the main cleaning assembly **202** of the main cleaning module **20** and the auxiliary cleaning assembly **302** of the auxiliary cleaning module **30** for wet cleaning are disposed behind the rolling brush **403** to implement wet mopping, forms a cleaning mode of dry sweeping firstly and wet mopping afterwards, the cleaning mode prevents dry garbage on the floor from attaching to the main cleaning assembly **202** and auxiliary cleaning assembly **302**, thus avoiding soiling the main cleaning assembly **202** and auxiliary cleaning assembly **302**, reducing the frequency of cleaning of the main cleaning assembly **202** and auxiliary cleaning assembly **302**, and there is no need to set up a scraping bar of the recycling system in the body to scrape off the dirt or grime from the main cleaning assembly **202** and auxiliary cleaning assembly **302**, resulting in a simpler structure for the robot. Furthermore, at least a part of the auxiliary cleaning assembly **302** always extends beyond the edge of the body **10** to achieve the cleaning along the edge to the edge of the obstacles or walls, in the width direction of the body **10**, since there is no cleaning-missed area between the cleaning area of the main cleaning assembly **202** and the cleaning area of the auxiliary cleaning assembly **302**, thereby achieving the cleaning along the edge while prevent cleaning-missed area from existing between the main cleaning assembly **202** and the auxiliary cleaning assembly **302**, enhancing the overall cleaning effectiveness.

[0137] In particular, the main cleaning module **20** comprises at least one main cleaning assembly **202** (i.e. a cleaning disk, flat mop, track) or two main cleaning assemblies **202** (i.e. two cleaning disks, both are round tray). The auxiliary module **30** comprises at least one auxiliary cleaning assembly **302**, at least a part of the auxiliary cleaning assembly **302** always extends beyond the edge of the body **10** to achieve the cleaning along the edge to the edge of the obstacles or walls. The width direction of the body **10** is perpendicular to the forward direction of the body **10**. Along the forward direction of the body **10** (such as along the arrow direction as shown in FIG. **9**), as shown in FIG. **4**, the dry cleaning module **40** is disposed in front of the main cleaning module **20**; the dry cleaning module **40** comprises at least one rolling brush **403** configured for cleaning the surface to be cleaned. Wherein, the surface to be cleaned can include, but are not limited to, the surfaces or scenes of objects such as floors, tabletops, glass, walls, etc. In order to facilitate the explanation, the surface to be cleaned of the following description takes the floor as an example.

[0138] Wherein, the area of the auxiliary cleaning assembly **302** is smaller than the area of the main cleaning assembly **202**. For example, the area of the auxiliary cleaning assembly **302** is smaller than three-fourths of the area of the main cleaning component **202**, or less than a half of the area of the main cleaning assembly **202**; or smaller than one-third, one-fourth, one-fifth of the area of the main cleaning assembly **202**, etc. The size relationship of the area between the auxiliary cleaning assembly **302** and the main cleaning assembly **202** can be chosen based on the requirement.

[0139] For example, the auxiliary cleaning assembly **302** comprises an auxiliary cleaning disk **3021** and an auxiliary cleaning component, the main cleaning assembly **202** comprises a mounting

base **2023** and a main cleaning component, the relationship of the sizes of the aforementioned areas. In one implementation method, the area of the auxiliary cleaning disk **3021** can be compared to the area of the mounting base **2023**, such as the area of the auxiliary cleaning disk **3021** is smaller than the area of the mounting base **2023**; in another embodiment, the area of the auxiliary cleaning component can be compared to the area of the main cleaning component, such as the area of the auxiliary cleaning component is smaller than the area of the main cleaning component. In case where the main cleaning assembly **202** at least comprises a track, correspondently, the area of the auxiliary cleaning component is smaller than the track. That is, when both of the main cleaning component and the auxiliary cleaning component are rags, the main cleaning component forms big rag cleaning, the auxiliary cleaning component forms small rag cleaning, in non-edge mode, the main cleaning is big rag cleaning; when cleaning along the edge, small rag cleaning is used, under the cooperation of the main cleaning component and the auxiliary cleaning component, to achieve the cleaning along the edge while the cleaning-missed area does not exist between the big rag and the small rag.

[0140] It should be noted that the area here can be understood as the area of the vertical projection of the cleaning disk or cleaning component on the surface to be cleaned; it can also be understood as the area that the cleaning component can clean when the body **10** of the robot remains stationary in its original position without moving.

[0141] The cleaning device can be a self-moving cleaning robot, or a handheld cleaner, or a window cleaning robot, etc., taking a cleaning robot as an example to explore the structure of the cleaning device.

[0142] The body **10** is typically formed in shapes such as circular, D-shaped, rectangular, or square, the contour of the body **10** refers to a circular contour, D-shaped contour, rectangular contour, or square contour, for example, as shown in FIG. 1 and FIG. 2, the contour of the body **10** is round in shape; exemplarily, the range of the contour of the body **10** can be determined based on the projection of the body **10** on the horizontal plane. The contour of the body **10** is square, exemplarily, the range of the contour of the body **10** can be determined based on the projection of the body **10** on the horizontal plane (or vertical projection on the surface to be cleaned).

[0143] As shown in FIG. 1 and FIG. 5, to the body **10**, the body **10** usually at least comprises a base tray **101**, and an upper shell **102** connected to the base tray **101**, the interior cavity of the body **10** is enclosed between the base tray **101** and the upper shell **102**, to form a containment chamber, both the main cleaning assembly **202** and the auxiliary cleaning assembly **302** are disposed beneath the base tray **101**.

[0144] As shown in FIG. 1, FIG. 2 and FIG. 3, the dry cleaning module **40** at least comprises a rolling brush **403**, a dust box **401** and a main fan **402**, the rolling brush **403** is disposed rotatably in the rolling brush cavity **109** on the bottom of the base tray **101**, such that the cleaning robot cleans the garbage on the floor along the forward direction. The number of the rolling brush **403** can be one, or two rolling brushes **403**, in case where the number of the rolling brush **403** is two, two rolling brushes **403** both can be disposed rotatably in the rolling brush cavity **109**, the rotational direction of the two rolling brushes **403** is opposite, so that when the two rolling brushes **403** rotate, the garbage on the floor can be swept in the direction towards the dust suction opening of the dust box **401**.

[0145] The dust box **401** and the main fan **402** are disposed in the inner cavity of the body **10** respectively, the main fan **402** is configured to provide negative pressure airflow into the dust box **401**, dust suction opening connected with the dust box **401** is disposed on the body **10**, for example, the dust suction opening is disposed at the bottom of the body **10**, the dust suction opening is connected with the rolling brush cavity **109**, therefore, the rolling brush **403** is configured to gather the garbage on the floor to the dust suction opening, the negative pressure suction can collect the garbage, dust particles, and other materials into the dust box **401** through the dust suction opening, thus achieving the purpose of cleaning the floor. The main fan **402** includes,

but is not limited to a negative pressure fan, and can be replaced by other negative pressure generating devices, such as a vacuum pump.

[0146] As shown in FIG. 2, the dry cleaning module **40** further comprises a dust exhaust channel **404** disposed inside the body **10**, the dust exhaust channel **404** is connected to the dust collection fan of the base station, the garbage in the dust box **401** is collected into the base station through the dust exhaust channel **404** under the action of the dust collection fan of the base station, achieving the automatic discharge of garbage from the dust box **401**.

[0147] As shown in FIG. 4, the robot further comprises a locomotion system **80**, the locomotion system **80** is configured to drive the body **10** to move, achieving the walking function of self-movement on the surface to be cleaned, the locomotion system **80** at least comprises a driver and a driving wheel **801**, the driver drives the driving wheel **801** to move. The number of the driving wheel **801** is usually two, the two driving wheels **801** are disposed on the bottom of the body **10** symmetrically. Moreover, the locomotion system **80** is disposed swingable on the body **10**, such that the cleaning device possesses obstacle-surpassing function during in the process of locomotion.

[0148] As shown in FIG. 4 and FIG. 6, along the forward direction of the body **10**, bounded by the dust box **401** or the rolling brush **403** or the driving wheel **801**, the body **10** is provided with a front portion and a rear portion, and a connecting portion or a middle portion that connects the front portion and the rear portion. The dust box **401** or the rolling brush **403** or the driving wheel **801** is disposed at the connecting portion or the middle portion. Or, bounded by the connecting line of the rotation centers of the two driving wheels **801**, the body **10** is provided with a front portion and a rear portion, the front portion of the body **10** and the rear portion of the body **10** both comprises part of the base tray **101** and part of the upper shell **102**. The main cleaning assembly **202** and the auxiliary cleaning assembly **302** are both disposed at the rear portion of the body **10**, both disposed behind the rolling brush **403**.

[0149] Such as, take the rolling brush **403** or the dust box **401** as an example, the portion disposed in front of the brush roll **403** or dustbin **401** on the body **10** is referred to as the front portion of the body **10**, the portion disposed behind the brush roll **403** or dustbin **401** is referred to as the rear portion of the body **10**.

[0150] Please refer to FIG. 1, FIG. 3, FIG. 4, FIG. 5, FIG. 6, the cleaning robot further comprising an edge brush **100**, along the forward direction of the body **10**, the edge brush is disposed in front of the rolling brush **403** of the dry cleaning module **40**, or at least part of the edge brush is disposed in front of the rolling brush **403** of the dry cleaning module **40**, the rotation center of the edge brush is disposed in front of the rolling brush **403** of the dry cleaning module **40**. When the robot is cleaning, the edge brush rotates, to be configured to gather the garbage on the floor into the inner side of the cleaning robot, so that the dry cleaning module **40** can collect the garbage that has been gathered to the inner side of the cleaning robot into the dust box **401** of the body **10** through the way of suction.

[0151] Exemplarily, at least part of the edge brush can be disposed in front of the dry cleaning module **40** and adjacent to the edge of the body **10**, for example, the edge brush can be disposed at the edges including but not limited to the left front and the right front of the dry cleaning module **40**, enabling that when the edge brush is rotating, at least part of the brush is disposed or extends beyond the contour of the body **10**, so that the edge brush can gather the garbage outside the contour of the body **10** to the inner side of the cleaning robot, increasing the cleaning range. The edge brush can be made of rubber or bristles, or any other materials as long as the edge brush can sweep the floor, there are no restrictions here.

[0152] In one implementation method, the main cleaning module **20** and the auxiliary cleaning module **30** mentioned above are both disposed at the rear portion of the body **10**, the edge brush is disposed at the front portion of the body **10**, and on the forward direction of the body **10**, the edge brush and the auxiliary cleaning module **30** are both distributed at the same side of the body **10**.

[0153] As shown in FIG. 5 and FIG. 6, for example, the edge brush and the auxiliary cleaning assembly 302 are both distributed on the right side of the body 10, to form a cleaning along the right edge.

[0154] Due to the edge brush and the auxiliary cleaning assembly 302 are both configured for the cleaning along the edge, the edge brush is disposed at the front portion of the body 10, the auxiliary cleaning assembly 302 is disposed at the rear portion of the body 10, during the process of the cleaning along the edge, the edge brush implements dry cleaning at front, the auxiliary cleaning assembly 302 implements wet cleaning at back, so that when cleaning the edges of the obstacles, wall edges, corner areas (such as inner right angle), etc, forming a cleaning mode of the dry sweeping followed by the wet mopping cleaning, further enhancing the effectiveness of the cleaning along the edge.

[0155] Taking the example of the side brush and the auxiliary cleaning assembly 302 both being disposed on the right side of the body 10 as mentioned above, similarly, both of the side brush and the auxiliary cleaning assembly 302 can also be disposed on the left side of the body 10 to form a cleaning mode along the left edge.

[0156] The perception system comprises the following sensing devices: a LDS disposed above the body 10, a buffer 70 (as shown in FIG. 2) and a visual sensor disposed at the front portion of the body 10, an edge sensor disposed on the sidewall of the front portion of the body 10, an ultrasonic sensor and a downward-looking sensor disposed at the bottom of the body 10. Wherein, the LDS, the buffer 70, the edge sensor can all measure the distance to obtain the distance between the edge of the body 10 and obstacle, the control system controls the cleaning device to perform corresponding actions according to the distance.

[0157] For example, control the cleaning device to perform obstacle avoidance, edge cleaning, and other actions. The ultrasonic sensor is configured to recognize carpet signals, the control system controls the main cleaning assembly 202 of the cleaning device to implement lifting action, the auxiliary cleaning assembly 302 of the cleaning device to implement lifting action, or controls the cleaning device to return to the base station, for robot charging, dust collection, cleaning of the main cleaning component, disassembling and installing the main cleaning assembly 202. The visual sensor is configured to recognize image of the environment where the cleaning device stays to obtain information of the obstacles, the control system controls the cleaning device to perform obstacle avoidance, obstacles overcoming and edge cleaning according to the information.

[0158] The cleaning device at least further comprises a water replenishing mechanism, the water replenishing mechanism is configured to implement water replenishing to the main cleaning component of the main cleaning assembly 202, to moisten the main cleaning component to ensure that the main cleaning component is in a moist or wet state to mop the floor, forming wet cleaning to enhance cleaning effectiveness. The water replenishing mechanism at least comprises a water tank 501, a conveying mechanism conveys the water in the water tank 501 to the main cleaning component. For example, the conveying mechanism comprises a pump body 502 and a pipe, one end of the pump body is connected with the water tank 501 through the pipe, the other end conveys to a distributor through the pipe, and conveys to the main cleaning component through the liquid outlet of the distributor, by setting the distributor, the liquid can be evenly conveyed to the main cleaning component, the main cleaning component can be moistened more evenly. Certainly the distributor cannot be set, the other end of the pump body 502 conveys the water to the main cleaning component directly through the pipe.

[0159] The water replenishing mechanism can also implement water replenishing to the auxiliary cleaning component of the auxiliary cleaning assembly 302, to moisten the auxiliary cleaning component to ensure that the auxiliary cleaning component can implement wet cleaning to the floor.

[0160] The auxiliary cleaning module 30 is mainly configured to cooperate with the main cleaning module 20, implement auxiliary cleaning to the cleaning-missed area that not easily being cleaned

by the main cleaning assembly **202**.

[0161] Corresponding to the auxiliary cleaning assembly **302**, as shown in FIG. **9** and FIG. **14**, the auxiliary cleaning assembly **302** comprises an auxiliary cleaning disk **3021**, an auxiliary cleaning component disposed at the bottom of the auxiliary cleaning disk **3021**. The auxiliary cleaning component can be rag, wiping attachment, cleaning cloth, etc., the auxiliary cleaning disk is round in shape, the auxiliary component is an auxiliary mop **3022** in round shape matched with the auxiliary cleaning disk **3021**, and fixed on the bottom of the auxiliary cleaning disk **3021** through the way of sticking.

[0162] The auxiliary module **30** further comprises a first driving structure **302**, the first driving structure is configured to drive the auxiliary cleaning disk to rotate, so as to drive the auxiliary mop **3022** to rotate, to increase the friction between the auxiliary mop **302** and the floor, enhancing the cleaning effectiveness along the edge.

[0163] The auxiliary cleaning module **30** further comprises a second lift mechanism, the second lift mechanism is at least configured to drive the auxiliary cleaning assembly **302** to ascend or descend, such that the auxiliary cleaning assembly **302** stays in a lifting position to get off the floor; or stays in a mopping position to implement cleaning along the edge.

[0164] Under the cooperation of the first driving structure **302** and the second lift mechanism, such that the auxiliary cleaning disk **3021** ascends or descends to switch position, and to rotate to mop the floor. Due to the space of the body **10** in the robot is limited, the first driving structure **302** and the second lift mechanism use one motor to drive, that is the first driving structure **302** and the second lift mechanism are the same structure, in order to facilitate the explanation, take the first driving structure **302** to expand, the first driving structure **302** can drive the auxiliary cleaning disk **3021** to ascend, descend and rotate, such that the first driving structure **302** is compact and occupies less space inside the body **10**.

[0165] Certainly, under the condition of the inner space of the body **10** is big, the first driving structure **302** and the second lift mechanism can be two driving structures, the second lift mechanism can drive the auxiliary cleaning disk **3021** and the first driving structure **302** to ascend or descend together, in the mopping position, the second lift mechanism stops, the first driving structure **302** drives the auxiliary cleaning disk **3021** to rotate.

[0166] The cleaning device further comprises a second driving structure **201**, the second driving structure **201** is disposed in the inner cavity of the body **10**, the second driving structure **201** is configured to drive the main cleaning assembly **202** to move to mop the floor; and further comprises a first lift structure, the first lift structure is configured to drive the cleaning assembly to implement ascending or descending motion, such that the main cleaning assembly **202** stays in a mopping position or lifting position.

[0167] Since the main cleaning assembly **202** is required to implement ascending in some scene, such when the body **10** is on the carpet, in order not to wet the carpet, the main cleaning assembly **202** is required to stay in the lifting position; or, some scene such as obstacle avoidance and returning to the base station are required, the main cleaning assembly **202** is required to stay in the lifting position to avoid the main cleaning assembly **202** being blocked by the obstacles and detaching from the body **10**. Therefore, the cleaning device further comprises the first lift mechanism disposed inside the body **10**, the first lift structure is configured to drive the main cleaning assembly **202** to implement ascending or descending, to switch between the mopping position and the lift position.

[0168] To the main cleaning assembly **202**, the main cleaning assembly **202** has many ways, the structure of the main cleaning assembly **202** is different, correspondingly, the motions of the second driving structure **201** drives the main cleaning assembly **202** to mop the floor is different, for example, the mopping motion can be the rotating of the circular main cleaning disk **2021**, the oscillating or twisting of a flat mop, or the moving of a track. When the shape of the body **10** is different, correspondingly, the layout of the aforementioned auxiliary cleaning module **30**, the dry

cleaning module **40**, the driving wheel **801**, the water replenishing mechanism, the main cleaning module **20**, the auxiliary cleaning module **30** on the body **10** of the robot is different. That is, the robot all have the aforementioned the body **10**, the edge brush, the locomotion system **80**, the water replenishing mechanism, the main cleaning module **20**, the auxiliary cleaning module **30**, the buffer **70**, and other structures, in order to clearly record the layout of the aforementioned contents in different machine models, expanding one by one through specific embodiment as follows.

#### Embodiment 1

[0169] The implementation method provides a cleaning device, such as cleaning robot, as shown in FIG. 8, FIG. 9, FIG. 19, FIG. 28, the robot comprises aforementioned the body **10**, the edge brush, the locomotion system **80**, the dry cleaning module **40**, the water replenishing mechanism, the main cleaning module **20**, the auxiliary cleaning module **30**, the perception system.

[0170] Wherein, as shown in FIG. 8, the outer contour of the body **10** is rectangular, that is the vertical projection of the body **10** on the surface to be cleaned presents rectangular shape, the longer side of the rectangular is disposed in the forward direction of the body **10**, the shorter side of the rectangular is disposed in the width direction of the body **10**.

[0171] As shown in FIG. 27, the main cleaning assembly **202** comprises a circular main cleaning disk **2021**, and a main mop **2022** disposed on the bottom of the main cleaning disk **2021**, the main mop **2022** presents in round shape, the main mop **2022** attaches to the bottom of the main cleaning disk **2021** by using a Velcro, the second driving structure **201** is configured to drive the main cleaning disk **2021** to rotate on the body **10**, such that the main mop **2022** rotates to clean the floor. The first lift mechanism is configured to drive the main cleaning disk **2021** to implement ascending or descending motion, to drive the main cleaning component to ascend or descend, achieving to switch between the lifting position and the mopping position.

[0172] In this implementation method, the number of the main cleaning assembly **202** is two, the two circular main cleaning disks **2021** disposed on the bottom of the body **10** symmetrically, the two circular main cleaning disks **2021** rotate, and rotates in opposite directions, for example, one main cleaning disk **2021** rotates along clockwise, the other main cleaning disk **2021** rotates along counterclockwise, to clean the floor. In order to avoid existing the cleaning-missed area between the two circular main cleaning disks **2021**, there is a gap between adjacent edges of the two main cleaning disks **2021**, enabling the rotation of the two main cleaning disks **2021** not to interfere with each other, the adjacent edges of the main mops **2022** disposed on the bottom of the two main cleaning disks **2021** are either tangent or pressed against each other; or, due to the main mop **2022** is usually flexible and has a certain deformation amount, the adjacent edges of the two main mops **2022** pressed against to form a first interference region **905**, eliminating the gap between the adjacent edges of the two main mops **2022**, avoiding the cleaning-missed area.

[0173] There is a gap between the two main cleaning disks **2021**, without affecting the rotating motion of each other, as shown in FIG. 26, a certain first interference region **905** exists between the two main mops **2022**, so as to prevent the problem of missing cleaning from happening. Wherein, the maximum width of the interference region between the two main mops **2022** can be approximately 1 mm, 2 mm, 3 mm, 4 mm, 5 mm, or 6 mm, a specific numerical is not limited here.

[0174] The rags have a certain deformation amount, during the rotations of the two rags, the adjacent parts of the two rags pressed against each other to eliminate the gap, to form the interference region, and the normal rotation of the rag is not affected.

[0175] As to the maximum width of the first interference region **905**: the second connecting line of the rotation center of the two main cleaning disks **2021**, the maximum width of the interference region is the length **L1** of the cross line of the second connecting line and the interference region, as shown in FIG. 26.

[0176] The auxiliary tray **3021** of the auxiliary cleaning assembly **302** is a circular tray, correspondingly, the auxiliary cleaning component is an auxiliary mop **3022**, the auxiliary mop **3022** attaches to the auxiliary cleaning disk **3021** by using a Velcro. Certainly, the auxiliary mop



**3022** can be disposed detachably on the auxiliary cleaning disk **3021** in other ways.

[0177] The main cleaning module **20** and the auxiliary cleaning module **30** are both disposed at the rear portion of the body, the edge brush is disposed at the front portion of the body **10**, and on the forward direction of the body **10**, the edge brush and the auxiliary cleaning module **30** are both distributed on the right side of the body **10**, to form a cleaning along the right edge.

[0178] Due to the edge brush is disposed at the front portion of the body **10**, the auxiliary cleaning assembly **302** is disposed at the rear portion of the body **10**, the edge brush and the auxiliary cleaning assembly **302** are both disposed on the right side of the body **10**, during the process of the cleaning along the edge, the edge brush implements dry cleaning at front, the auxiliary cleaning assembly **302** implements wet cleaning at back, so that when cleaning the edges of the obstacles, wall edges, corner areas (such as inner right perspectives), etc., forming a cleaning mode of the dry sweeping followed by the wet mopping cleaning, further enhancing the effectiveness of the cleaning along the edge.

[0179] As shown in FIG. **10**, the two driving wheels **801** of the locomotion system **80** are disposed on the bottom of the body **10** symmetrically, the dry cleaning module **40** comprises the aforementioned rolling brush **403**, the dust box **401** and the main fan **402**. Due to the body **10** is a square-shaped machine, corresponding to a circular-shaped machine whose body **10** is circular, the width of the body **10** of the square-shaped machine is smaller than the maximum width (the diameter of the circular) of a circular-shaped machine. On the width direction of the body **10**, the length of the rolling brush **403** is greater than the distance between the two driving wheels **801**, therefore in the square-shaped machine, along the forward direction of the body **10**, the rolling brush **403** is disposed in front of the driving wheel **801**, the dust box **401** is distributed between the two driving wheels **801**.

[0180] The two main cleaning assemblies **202** are both disposed behind the dust box **401** (or the dust box chamber **108** on the body **10**), and distributed beneath the bottom of the rear portion of the body symmetrically, along the forward direction of the body **10**, the two main cleaning assemblies **202** are both disposed behind the two driving wheels, to form that the driving wheel **801** move at front, the main cleaning assembly **202** mops the floor behind the driving wheel **801**, so that within the area already cleaned by the main mop **2022**, no wheel mark of the driving wheel **801** will be remained, so as to enhancing the cleaning effectiveness of the main mop **2022**.

[0181] It should be noted that there are two ways that the main cleaning assembly **202** disposed behind the driving wheel **801**, the first way: as shown in FIG. **10**, along the forward direction of the body **10**, the main cleaning assembly **202** is totally disposed behind the two driving wheels **801**; the second way: on the forward direction of the body **10** and the width direction of the body **10**, the driving wheel **801** and the main cleaning disk **2021** are staggered, the main cleaning disk **2021** is disposed behind the connecting line of the rotation center of the two driving wheels **801**, but a part of the arc of the main cleaning disk **2021** is disposed within the region between the two driving wheels **801**, the rotation of the main cleaning disk **2021** and the movement of the driving wheel **801** does not affect each other, therefore along the forward direction of the body **10**, the length of the body **10** can be shortened, achieving that the driving wheel **801** moves at front, the main mop **2022** cleans at back, enhancing the cleaning effectiveness.

[0182] In order to avoid the cleaning-missed area between the auxiliary mop **3022** and the main mop **2022**, in this implementation method, along the width direction of the body **10**, there is no cleaning-missed area between the cleaning area of the main mop **2022** and the cleaning area of the auxiliary mop **3022**, ensuring the cleaning effectiveness along the edge and high cleaning efficiency.

[0183] As to the way of no area left cleaned between the main mop **2022** and the auxiliary mop **3022**, there are several implementation methods, specifically:

[0184] The first implementation method, there is a gap between the auxiliary cleaning disk **3021** and the main cleaning disk **2021**, such that the auxiliary cleaning disk **3021** and the main cleaning

disk **2021** rotates, without affecting each other; there is no gap between the main mop **2022** and the auxiliary mop **3022**, enabling that the cleaning-missed area does not exist while the main mop **2022** and the auxiliary mop **3022** are rotating to clean.

[0185] For example, the adjacent edges of the main mop **2022** and the auxiliary mop **3022** are tangent, enabling that the cleaning-missed area does not exist between the main mop **2022** and the auxiliary mop **3022**. Due to the main mop **2022** and the auxiliary mop **3022** are usually flexible and have a certain deformation amount, when the main mop **2022** and the auxiliary mop **3022** deform after a certain period of using, to prevent the situation that the gap can exist between the tangent adjacent edges between the main mop **2022** and the auxiliary mop **3022** from occurring, to further ensure that there is no gap between the main mop **2022** and the auxiliary mop **3022**, in another embodiment, as shown in FIG. **26**, the adjacent ends of the main mop **2022** and the auxiliary mop **3022** squeeze, to form a small mount of the second interference region **906**, ensuring that there is no gap between the main mop **2022** and the auxiliary mop **3022**, while the main mop **2022** and the auxiliary mop **3022** are rotating with respective cleaning disk without being affected, thus achieving that there is no cleaning-missed area between the auxiliary cleaning disk **3021** and the main cleaning disk **2021** on the right side. However, in this implementation method, due to the continuous tangency or mutual compression between the main mop **2022** and the auxiliary mop **3022**, a tangential line or compression line (the second interference region **906**) is formed between the adjacent edges of the the main mop **2022** and the auxiliary mop **3022**, after the robot mops the floor, one or more trace lines is easily remained on the floor, resulting in the floor cannot be cleaned thoroughly and affecting the cleaning effectiveness.

[0186] The second interference region **906** is similar to the aforementioned first interference region **905**, the maximum width of the second interference region **906** between the main mop **2022** and the auxiliary mop **3022** can be approximately 1 mm, 2 mm, 3 mm, 4 mm, 5 mm, or 6 mm, a specific numerical is not limited here.

[0187] As shown in FIG. **26**, as to the maximum width of the second interference region **906**: the first connecting line between the rotation center of the main cleaning disk **2021** on the right side and the auxiliary cleaning disk **3021**, the maximum width of the second interference region **906** is the length L2 of the cross line of the first connecting line and the second interference region **906**.

[0188] Due to the radius of the main cleaning disk **2021** is much bigger than the radius of the auxiliary cleaning disk **3021**, in case where the maximum width of the second interference region **906** exceeds 5 mm, the rotation of the main cleaning disk **2021** is not affected, but the rotation of the auxiliary cleaning disk **3021** is affected, therefore, the maximum width of the second interference region **906** is smaller than or equal to 5 mm, the rotations of the main cleaning disk **2021** and the auxiliary cleaning disk **3021** are not affected, while preventing cleaning-missed cases.

[0189] In the second implementation method, there is a gap between the main cleaning disk **2021** and the auxiliary cleaning disk **3021**, without affecting the rotating motion of each other; there is a gap between the adjacent or closed edges of the main mop **2022** and the auxiliary mop **3022**, the rotations of the main mop **2022** and the auxiliary mop **3022** do not interfere with each other, while the main mop **2022** and the auxiliary mop **3022** are rotating with respective cleaning disk. The main cleaning disk **2021** is provided with a first part **901**; the auxiliary cleaning disk **3021** is provided with a second part **902**, on the forward direction of the body **10**, the first part **901** and the second part **902** have an overlapping region **903**, thus on the forward direction of the body **10**, the main mop **2022** on the first part **901** and the auxiliary mop **3022** on the second part **902** also have the overlapping region **903**.

[0190] Due to part of the main cleaning disk **2021** extends beyond the edge of the rear portion of the body **10**, therefore in this implementation method, on the forward direction of the body **10**, the second part **902** of the auxiliary cleaning disk **3021** is disposed in front of the first part **901** of the main cleaning disk **2021** (or the first part **901** is disposed behind the second part **902**), when the robot is in the cleaning process, the auxiliary mop **3022** on the second part **902** of the auxiliary

cleaning disk **3021** cleans firstly, and the main mop **2022** on the first part **901** of the main cleaning disk **2021** cleans afterwards, on the forward direction of the body **10**, the cleaning area cleaned by the auxiliary mop **3022** firstly and the cleaning area cleaned by the main mop **2022** afterwards have the overlapping region **903**, thus avoiding the existence of the cleaning-missed area, corresponding to no gap exist between the adjacent edges of the aforementioned main mop **2022** and the auxiliary mop **3022**, in this implementation method, because there is a gap between the main mop **2022** and the auxiliary mop **3022**, without interfering with each other, after the robot mops the floor, the trace line cannot remain on the floor, the cleaning effect is better.

[0191] The third implementation method has the first implementation method and the second implementation method mentioned above at the same time, specifically, there is a gap between the main cleaning disk **2021** and the auxiliary cleaning disk **3021**, without interfering with each other when the main cleaning disk **2021** and the auxiliary cleaning disk **3021** rotates; the adjacent edges of the auxiliary mop **3022** and the main mop **2022** are either tangent or pressed against each other (the second interference region **906** mentioned above exists); meanwhile, the auxiliary cleaning disk **3021** is provided with a second part **902**, the main cleaning disk **2021** is provided with a first part **901**, the second part **902** is disposed in front of the first part **901**, the cleaning area of the auxiliary mop **3022** of the second part **902** and the cleaning area of the main mop **2022** on the first part **901** have the overlapping region **903**, double the effect of avoiding cleaning-missed cases; the first part **901** of the main cleaning disk **2021** is disposed behind the position of the tangential line or compression line of the adjacent edges between the main mop **2022** and the auxiliary mop **3022**, during the process of cleaning, the trace line formed by the tangential line or compression line on the floor can be cleaned and covered by the main mop **2022** on the first part **901** of the main cleaning disk **2021**, which is disposed at back, so that no trace line remained on the floor while possessing the double function of no cleaning-missed cases, enhancing the cleaning effectiveness to the floor, as shown in FIG. 9.

[0192] Meanwhile, because there is not gap between the main mop **2022** and the auxiliary mop **3022**, such that the auxiliary cleaning disk **3021** is disposed in the limited first region **103** on the body **10** (mentioned later in the text), the rotation center of the auxiliary cleaning disk **3021** can vertically project on the bottom of the body **10**, the diameter of the auxiliary cleaning disk **3021** is larger, a larger portion of the auxiliary cleaning disk **3021** extends beyond the edge of the body **10**, the area of cleaning along the edge is wider.

[0193] Under the layout of the main cleaning disk **2021**, the driving wheel **801**, the dust box chamber **108** mentioned above, the rolling brush **403** and the edge brush, without increasing the length and width of the body **10**, to increase the cleaning area of the main cleaning disk **2021**, as shown in FIG. X, part of the main cleaning disk **2021** extends beyond the edge of the rear portion of the body **10** (i.e. the rear sidewall of the body **10**).

[0194] Without changing the layout of the edge brush, the rolling brush **403**, the dust box **401**, the driving wheel **801** and the two main cleaning disk **2021** on the bottom of the body **10**. Due to part of the main cleaning disk **2021** extends beyond the edge of the rear portion of the body **10**, thus the auxiliary cleaning disk **3021** cannot distribute behind the main cleaning disk **2021**, in order to achieve the cleaning along the edge of the auxiliary mop **3022** on the auxiliary cleaning disk **3021**, the auxiliary cleaning disk **3021** is disposed within the first region **103**, which is surrounded by the rear of the right side driving wheel **801** and the cleaning disk on the right side, the bottom of the right side of the body **10**, during the manufacturing process of the base tray **101**, only one fist avoidance hole is needed to be added within the first region **103** of the base tray **101**, for part of the first driving structure **302** to pass through the first avoidance hole to connect to the auxiliary cleaning disk **3021**, allowing the auxiliary cleaning disk **3021** to be disposed beneath the base tray **101**. That is, when the auxiliary cleaning disk **3021** is disposed on the base tray **101** or not, when the layout of the edge brush, the rolling brush **403**, the driving wheel **801**, the dust box chamber **108** and the main cleaning assembly **202** on the bottom of the body **10** remains unchanged, the cost

of manufacturing and processing of the base tray **101** can be reduced, there is no need for a separate mold for the base tray **101**, the base tray **101** can be manufactured at first, and then the first avoidance hole **60171** can be manufactured on the base tray **101**; meanwhile, there is space for installing the auxiliary cleaning assembly **302**, such that the auxiliary cleaning rag achieves the function of cleaning along the edge.

[0195] In case where the edge brush and the auxiliary cleaning disk **3021** are both disposed on the left side of the body **10**, to form a left edge, correspondingly, the auxiliary cleaning disk **3021** is disposed within the first region **103**, which is surrounded by the driving wheel **801** disposed on the left side and the main cleaning disk **2021** on the left side, the bottom of the left side of the body **10** (or the left side edge along the width direction of the body **10**). That is, the auxiliary cleaning disk **3021** is disposed within the first region **103**, which is surrounded by the rear of driving wheel **801** and the main cleaning disk **2021**, the side edge of the body **10** that are adjacent to or in close to the auxiliary cleaning disk **2021**.

[0196] Meanwhile, in order to set up the auxiliary cleaning disk **3021** in the limited first region, the diameter of the auxiliary cleaning disk **3021** must be smaller than the diameter of the main cleaning disk **2021**, the radius  $R2$  of the auxiliary cleaning disk **3021** is at least smaller than half of the radius  $R1$  of the main cleaning disk **2021**, such that the main mop **2022** presents a big rag, the auxiliary mop **3022** presents a small rag, when non-edge cleaning, the cleaning mainly depends on the big rag, when cleaning along the edge, the cleaning mainly depends on the small rag to implement the cleaning along the edge.

[0197] For example, the ratio of  $R1$  to  $R2$  is 2, or the ratio of  $R1$  to  $R2$  is 2.5, the ratio of  $R1$  to  $R2$  is 4, or the ratio of  $R1$  to  $R2$  is 3.6. In case where the diameter of the auxiliary cleaning disk **3021** is too small, although the auxiliary cleaning disk **3021** can clean along the edge, from the perspective of practical testing, the intensity of the cleaning along the edge is insufficient, the auxiliary cleaning disk **3021** is needed to implement cleaning along the edge at least two or more times.

[0198] Therefore, considering the effect of the intensity of the cleaning and no cleaning-missed case exists between the auxiliary mop **3022** and the main mop **2022** within the limited space of the first region **103**, for example, the ratio of  $R1$  to  $R2$  is 2 to 4 times, in case where the arrangement of  $R1$  and  $R2$  exceeds the range, one circumstance is the diameter of the auxiliary cleaning disk **3021** is too small, the intensity of cleaning is insufficient, more times of cleaning along the edge is needed; another circumstance is the diameter of the auxiliary cleaning disk **3021** is too big, the intensity of cleaning is sufficient, the rotation center of the auxiliary cleaning disk **3021** is difficult to project vertically within the first region **103**, because the two main cleaning disks **2021** are disposed on the bottom of the body **10** in an axial symmetry way, the rotation center of the auxiliary cleaning disk **3021** needs to project vertically on the bottom of the body **10**, without extending beyond the edge of the body **10**, so as to mount the auxiliary cleaning disk **3021** on the bottom of the body **10**, on the one hand, ensuring that the inner cavity of the body **10** will not connect with the outside because the auxiliary cleaning disk **301** is disposed, ensuring that the stable operation of the first driving structure **302** and the second driving structure **201**, providing a waterproof and dustproof function.

[0199] In case where the rotation center of the auxiliary cleaning disk **3021** exceeds the edge of the body **10**, the first driving structure **302** used for driving the auxiliary cleaning disk **3021** cannot be disposed in the inner cavity of the body **10**, an avoidance opening is needed to be disposed on the sidewall of the body **10**, one part of the first driving structure **302** is disposed in the inner cavity of the body **10**, the other part of the first driving structure **302** extends out of the body **10** through the avoidance opening, resulting in the inner cavity of the body **10** is connected with the outside, the external water vapor, dust, garbage and other particles can enter the inner cavity of the body **10**, affecting the electrical components inside the body **10**, and affecting the stability of the movement of the first driving structure **302**, resulting in a low lifespan of the produce and complex structure.

[0200] In order to choose a relative big radius of the auxiliary cleaning disk **3021**, increase of the area along the edge of the auxiliary mop **3022**, simultaneously, under the cooperation of the auxiliary mop **3022** and the main mop **2022**, there is no cleaning-missed area between the cleaning area of the auxiliary mop **3022** and the cleaning area of the main mop **2022**, and without changing the setting position of the main cleaning disk **2021**, optimally, along the forward direction of the body **10**, the rotation center of the auxiliary cleaning disk **3021** is disposed in front of the rotation center of the main cleaning disk **2021**, such that the auxiliary cleaning disk **3021** distributes within the first region **103**, which is disposed on the upper right of the main cleaning disk **2021** adjacent with the auxiliary cleaning disk **3021**, and the adjacent edges of the auxiliary mop **3022** and the main mop **2022** are tangent or pressed against each other or exist small amount of second interference region **906**.

[0201] In other words, in two solutions of without setting the auxiliary cleaning disk **3021** and setting the auxiliary cleaning disk **3021**, the layout of the main cleaning disk **2021**, the driving wheel **801**, the dust box chamber **108** and the rolling brush **403** on the bottom of the body **10** is same, without changing the layout of the main cleaning disk **2021**, the driving wheel **801**, the dust box chamber **108** and the rolling brush **403** on the bottom of the body **10**, and without changing the size of the body **10**, setting the auxiliary cleaning disk **3021** within the first region **103**, which is disposed on the upper right (or the top right corner) and the rear of the right side driving wheel **801**, due to the rotation center of the auxiliary cleaning disk **3021** is disposed in front of the rotation center of the main cleaning disk **2021**, the first connecting line between the rotation center of the auxiliary cleaning disk **3021** and the rotation center of the main cleaning disk **2021** crosses with the second connecting line between the rotation centers of the two main cleaning disk **2021**, as shown in FIG. 9, the second connecting line between the rotation centers of the two main cleaning disk **2021** is perpendicular to the middle line of the body **10** along the forward direction of the body **10**, and the auxiliary cleaning disk **3021** is disposed behind the right driving wheel **801**, thus when the the adjacent edges of the auxiliary mop **3022** and the main mop **2022** are tangent or pressed against each other or exist interference region, the main cleaning disk **2021** is inevitably provided with the first part **901** mentioned above, the auxiliary cleaning disk **3021** is provided with the second part **902** mentioned above, and the first part **901** is disposed behind the tangential line or compression line or interference strip region of the adjacent edges of the auxiliary mop **3022** and the main mop **2022**, during the process of cleaning, the trace lines formed by the tangential line or compression line or interference strip region on the floor can all be cleaned and covered by the main mop **2022** on the first part **901** of the main cleaning disk **2021**, which is disposed at back, enhancing the cleaning effectiveness to the floor.

[0202] Therefore, within the limited first region **103** of the top right corner (or the upper right) of the main cleaning disk **2021**, selecting the maximum radius for the auxiliary cleaning disk **3021**, the cleaning area along the edge in one time is big, the auxiliary cleaning disk **3021** can possess the double function of no cleaning-missed cases while achieving the cleaning function along the edge, no trace line remained on the floor, enhancing the cleaning effectiveness to the floor, and in the premise of without increasing the size of the base tray **101**, the layout and the achieved function of the main cleaning disk **2021**, the driving wheel **801**, the edge brush, the rolling brush **403** and the dust box chamber **108** disposed on the base tray **101** is not affected, such that the arrangement of the structure on the bottom of the body **10** is compact.

[0203] In another implementation method, along the width direction of the body **10**, the aforementioned first connecting line and the second connecting line can overlap, that is the auxiliary cleaning disk **3021** is not disposed on the aforementioned upper right, the rotation centers of the auxiliary cleaning disk **3021** and the two main cleaning disks **2021** fall on the same straight line (i.e. the aforementioned first connecting line and the second connecting line overlaps), in this implementation method, the maximum width of the right side main cleaning disk **2021** and the space area of the right side edge of the body **10** is smaller than the area of the aforementioned first

region **103** on the upper right of the main cleaning disk **2021**, the diameter of the auxiliary cleaning disk **3021** is small, although the auxiliary cleaning disk **3021** can clean along the edge, the cleaning area along the edge is small, the auxiliary mop **3022** and the main mop **2022** are tangent or pressed against each other or exist interference region between thereof, possessing the function of no cleaning-missed cases; due to the rotation centers of the auxiliary cleaning disk **3021** and the two main cleaning disks **2021** fall on the same straight line, the auxiliary cleaning disk **3021** is not provided with the second part **902**, the main cleaning disk **2021** is not provided with the first part **901**, therefore, after the robot cleans, the trace line will exist on the floor, with respect to the aforementioned solution of the auxiliary cleaning disk **3021** disposed on the top right corner of the main cleaning disk **2021**, the cleaning effectiveness is poor.

[0204] As shown in FIG. **9**, both of the right corner edge and the left corner edge of the body **10** of the square-shaped machine are chamfer in an arc shape, the distance between the right side edge with the maximum width of the main cleaning disk **2021** and the right side edge of the body **10** is smaller, in case where setting the auxiliary cleaning disk **3021** when the aforementioned first connecting line and the second connecting line overlaps (i.e. the rotation centers of the auxiliary cleaning disk **3021** and the two main cleaning disks **2021** fall on the same straight line), the diameter of the auxiliary cleaning disk **3021** is selected to be smaller, the cleaning efficiency and the cleaning effectiveness is relative weaker.

[0205] In this implementation method, when the auxiliary cleaning component is cleaning the surface to be cleaned, the pressure applied to the auxiliary cleaning disk is preferably 900 to 1500 Pa, such as 900 Pa, 950 Pa, 1000 Pa, 1100 Pa, 1150 Pa, 1200 Pa, 1300 Pa, 1400 Pa, 1450 Pa, 1500 Pa.

[0206] When the rotational speed of the auxiliary cleaning disk and the main cleaning disk is same, due to the radius of the auxiliary cleaning disk is smaller than the radius of the main cleaning disk, the linear velocity of each fiber on the small rag on the auxiliary cleaning disk is smaller than the linear velocity of the fiber on the big rag on the main cleaning disk, by increasing the downward pressure to the small rag and the auxiliary cleaning disk, enabling that under the same linear velocity, on one hand, the frictional force of the small rag against the sweeping off of the stains, such that the stains can be removed more easily, so that the cleaning effectiveness of the small rag is increased; on the other hand, further increasing the deformation amount of the fibers on the small rag after compressed, such that the fibers on the small rag fully wrap around the stains, increasing the contact area between the fibers and the stains, and the cleaning solution can also soak the stains more fully, so that further enhancing the cleaning effectiveness of the small rag.

[0207] The stains in the blind area that cannot be cleaned by the main mop, due to the frequency of being cleaned is low, such that the stains in the area easily to change from easily cleaned stains into stubborn stains, the solid-type stubborn stains or the solid-type stubborn stains formed from the stains used to be liquid after being dried and solidified, which contact and adhere to the surface of the object mainly relies on the intermolecular forces, the adhesive force mainly coming from van der Waals forces. Usually, the intensity of adhesion enhances with the time increases, and strengthens with the temperature of the air or the surface of the object increases. Based on this, the stains in the blind area of the obstacles are cleaned in a low frequency in daily, over time, such that the stains in the area are more easily to change from easily cleaned stains into stubborn stains. In the embodiment of the present application, "blind area" refers to the gap or region formed between the main mop and the obstacle, which cannot be cleaned by the main mop when the cleaning robot moving along the predefined cleaning direction. For the consideration of collision avoidance, jamming prevention strategies, or fall prevention strategies, the cleaning robot needs to maintain predefined distance from the obstacles, when the cleaning robot performs cleaning tasks along the edges of obstacles, the cleaning frequency of the cleaning blind area formed is lower, the stubborn stains formed in the cleaning area will become more difficult to clean over time. In the embodiment of the present application, the obstacles can be solid objects that cannot be surpassed such as walls,

furniture, appliances, etc., the obstacles can also be areas that are suspension and easy to fall such as suspension area, steps area, steep slopes area, pits area, etc.

[0208] Stubborn stains are usually removed by increasing the rotational speed of the cleaning disk in the existing art, to enhance the cleaning friction force to the stubborn stains, such that the stubborn stains is removed, but there is always a limit to the rotational speed of the auxiliary cleaning disk, the rotational speed cannot be infinitely increased. Moreover, the increasing of the rotational speed will bring the effects of higher cost, shorter endurance and a shorter lifespan of the rag tray, additionally, due to the small radius of the auxiliary cleaning disk, increasing the rotational speed does not significantly increase the linear velocity of the auxiliary cleaning disk, or even if the rotational speed of the auxiliary cleaning disk is increased, the final linear velocity is still insufficient to clean such solid-type stubborn stains.

[0209] By increasing the downward pressure to the auxiliary cleaning disk, the cleaning friction force of the small rag (i.e. auxiliary mop) on the auxiliary cleaning disk to the stains is enhanced at first under the same linear velocity, such that the stains can be cleaned more easily, thereby enhancing the cleaning effectiveness of the small rag to the stubborn stains; secondly, further increasing the deformation amount of the fibers on the small rag after compressed, such that the fibers on the small fully wrap around the stains, increasing the contact area between the fibers and the stains, and the cleaning solution can also soak the stains more fully, so that further enhancing the cleaning effectiveness of the small rag; the increased deformation of the small rag can increase the cleaning area of the small rag, such that the small rag can fit to the blind area such as wall corner even without external spreading or expansion, thereby also increasing the cleaning range of the small rag tray, enhancing the cleaning effectiveness. As shown in FIG. 31, control the downward pressure within the range of 900 to 1500 Pa, not only the cleaning effectiveness is increased, but also the service life of the small rag tray can be controlled in an expected range. In case where the downward pressures is lower than 900 Pa, the lifespan of the small rag is long, but the area cleaning rate will reduce; in case where the the downward pressures is higher than 1500 Pa, the area cleaning rate of the small rag is high, but the lifespan is reduced, from the diagram, it can be observed that control the downward pressure to the small rag within the range of 900 to 1500 Pa considering the downward pressure to the small rag, the area cleaning rate and the service life of the small rag comprehensively. In small optional embodiments, controlling the downward pressure to the small rag at around 1000 Pa, such as 900 Pa, 1000 Pa, or around 1100 Pa, whether the area cleaning rate or the service life of the small rag can both obtain better effect. The so-called area cleaning rate refers to the percentage of remaining stains in the cleaning area to the total stains in the cleaning area over a unit of time.

[0210] Increasing the pressure to the small rag is to achieve a more human-like operation at the same time. When dealing with stubborn stains during household cleaning, people tend to consciously apply pressure to the mop, in order to increase the pressure to the stains, thus achieving better cleaning effect. The pressure boosting function of the small rag is to simulate the operation of pressing the rag when people is cleaning on one hand, thereby achieving a good cleaning effectiveness to the stubborn stains. On the other hand, in order to achieve a more intelligent cleaning from the software logic, the logical operation of pressure boosting for the small rag is designed to simulate to apply corresponding pressure to the mop according to the level of dirtiness when humans are using the rag to implement the cleaning work, maximizing the cleaning efficiency. Deploying this software logic on the floor sweeping machine can avoid the traditional “carpet-style” repetitive cleaning to an extreme, and achieve planned and relatively “intelligent” cleaning.

[0211] From the perspective of industrial manufacturing and environmental protection, using small rag to enhance the lifespan of big rag, thus enhancing the service life of the mopping function of the whole machine entirely, such that the machine maintains a good cleaning effectiveness during the middle and later periods of long-term use, reduce the times of changing rag, thus reduces the

carbon emissions of the lifecycle of the sweeping machine, protect the environment. The reduction in carbon emissions is because the rag of the sweeping machine can be made from polyester fiber materials, and the raw material for producing such fiber materials is generally from the petrochemical products, the processing of these products usually leads to higher environmental pollution and carbon emissions.

[0212] Due to the downward pressure of the auxiliary cleaning disk is enhanced, the small rag on the auxiliary cleaning rag can not only clean along the edge, but also can detect the stains on the floor when non-edge cleaning, in case where the level of the dirtiness is bigger than the predefined value, the controller can control the main cleaning disk to ascend, the small rag of the auxiliary cleaning disk can implement the cleaning to the garbage or stains with a higher level of dirtiness, such that the small rag not only achieves the cleaning along the edge, but also implements cleaning to the stains with a higher level of dirtiness.

[0213] The rotational directions of the auxiliary cleaning disk **3021** on the right side and the two main cleaning disk are different, the corresponding cleaning effectiveness along the edge is different, specifically:

[0214] In the first implementation method, as shown in FIG. **19**, in the mopping position, the main cleaning disk **2021** on the left side rotates along counterclockwise, the main cleaning disk **2021** on the right side rotates along clockwise, the auxiliary cleaning disk **3021** rotates along counterclockwise. That is the rotational directions of the two main cleaning disks **2021** are opposite, the rotational directions of the auxiliary cleaning disk **3021** and the main cleaning disk **2021** on the right side are opposite. During the process of cleaning, due to the auxiliary mop **3022** rotates along counterclockwise, the auxiliary mop **3022** directs the garbage on the edge of the obstacle or by the side of the wall along the direction towards the main cleaning disk **2021** on the right side continuously when mopping along the edge, such that the garbage moves to the first front region in front of the adjacent edges between the main cleaning disk **2021** and the auxiliary cleaning disk **3021** on the right side, due to there is a function of preventing cleaning-missed cases between the auxiliary mop **3022** and the main mop **2022**, thereby removing the garbage from the edge of the obstacle or by the side of the wall to the first front region, further enhancing the cleaning effectiveness along the edge.

[0215] In the second implementation method, as shown in FIG. **20**, in the mopping position, the main cleaning disk **2021** on the left side rotates along counterclockwise, the main cleaning disk **2021** on the right side rotates along clockwise, the auxiliary cleaning disk **3021** rotates along clockwise. That is the rotational directions of the two main cleaning disks **2021** are opposite, the rotational directions of the auxiliary cleaning disk **3021** and the main cleaning disk **2021** on the right side are same. During the process of cleaning, due to the auxiliary mop **3022** rotates along clockwise, the auxiliary mop **3022** directs the garbage disposed within the first front region which is disposed in front of the adjacent edges between the right side main cleaning disk **2021** and the auxiliary cleaning disk **3021** to the edge of the obstacle continuously when mopping along the edge; due to the main cleaning disk **2021** on the right side rotates along clockwise, the main mop **2022** directs the garbage in front of the main mop **2022** to the first front region when mopping the floor, or the main mop **2022** directs the garbage within the second front region which is disposed in front of the adjacent edges between the two main mops **2022** to the first front region when mopping the floor, over a period of cleaning, the edge of the obstacle is easy to gather the garbage, the cleaning effectiveness along the edge of the auxiliary cleaning disk **3021** is relatively reduced.

[0216] In the third implementation method, as shown in FIG. **22**, in the mopping position, the main cleaning disk **2021** on the left side rotates along clockwise, the main cleaning disk **2021** on the right side rotates along counterclockwise, the auxiliary cleaning disk **3021** rotates along counterclockwise, that is the rotational directions of the auxiliary cleaning disk **3021** and the main cleaning disk **2021** on the right side are same.

[0217] During the process of cleaning, similar to the first implementation method, due to the



auxiliary cleaning disk **3021** rotates along counterclockwise, the auxiliary mop **3022** directs the garbage on the edge of the obstacle or by the side of the wall along the direction towards the main cleaning disk **2021** on the right side continuously when mopping along the edge, such that the garbage moves to the first front region in front of the adjacent edges between the main cleaning disk **2021** and the auxiliary cleaning disk **3021** on the right side, due to there is a function of preventing cleaning-missed cases between the auxiliary mop **3022** and the main mop **2022**, thereby removing the garbage away from the first front region, enhancing the cleaning effectiveness along the edge; even if the garbage disposed within the first front region cannot be removed by the adjacent edges between the main mop **2022** and the auxiliary mop **3022** or by the aforementioned first part **901**, the garbage is remained in the first front region; but because the main cleaning disk **2021** on the right side rotates along counterclockwise, the main mop **2022** directs the remaining garbage within the first front region to the second front region between the two main cleaning disks **2021** continuously when mopping the floor, the two main mops **2022** possess the function of preventing cleaning-missed cases, thus the remaining garbage is further removed by the two main mops, further enhancing the cleaning effectiveness along the edge of the auxiliary mop **3022**.

[0218] Compare with the first implementation method, the cleaning effectiveness of this implementation method is better, because in the first implementation method, the main cleaning disk **2021** on the right rotates along clockwise, during the process of rotating of the main cleaning disk **2021**, the main mop **2022** mops the floor, meanwhile the main cleaning disk **2021** and the main mop **2022** directs the garbage located in front of the main cleaning disk **2021** or the garbage within the second front region which is disposed between the two main cleaning disks **2021** to the first front region, increasing the difficulty or intensity of the cleaning of the auxiliary cleaning disk **3021** and the right side main cleaning disk **2021**.

[0219] In this implementation method, due to the main cleaning disk **2021** on the right side rotates along counterclockwise, the main cleaning disk **2021** and the main mop **2022** rotates to direct the garbage within the first front region to the second front region, due to the diameter of the two main mops **2022** is big, the cleaning ability and the function of preventing cleaning-missed cases of the two main mops **2022** are all stronger than the cleaning ability and the function of preventing cleaning-missed cases of the main mop **2022** on the right side and the auxiliary mop **3022**, therefore the cleaning effectiveness along the edge in this implementation method is better under the cooperation of the main cleaning disk **2021** and the auxiliary cleaning disk **3021**.

[0220] In the fourth implementation method, as shown in FIG. **21**, in the mopping position, the main cleaning disk **2021** on the left side rotates along clockwise, the main cleaning disk **2021** on the right side rotates along counterclockwise, the auxiliary cleaning disk **3021** rotates along clockwise. Similar to the second implementation method, during the process of cleaning, due to the auxiliary cleaning disk **3021** rotates along clockwise, the auxiliary cleaning disk **3021** directs the garbage disposed within the front region which is disposed in front of the adjacent edges between the right side main cleaning disk **2021** and the auxiliary cleaning disk **3021** to the edge of the obstacle continuously when mopping along the edge, over a period of cleaning, the edge of the obstacle is easy to gather the garbage, the cleaning effectiveness along the edge of the auxiliary cleaning disk **3021** is relatively reduced. But corresponding to the second implementation method, due to the cleaning disk on the right side rotates along counter clockwise, the garbage within the front region can be brought to the front region between the two main mops **2022** by the cleaning disk on the right side, and being removed by the two main mops **2022**, the aforementioned second driving structure **201** is configured to drive the main cleaning disk **2021** to rotate on the body **10** to mop. The first lift structure is configured to drive the main cleaning disk **2021** to implement the ascending or descending motion, and achieving to switch between the lifting position and the mopping position. Each one main cleaning disk **2021** is correspondent to one set of the first driving structure **302** and the first lift structure.

[0221] The aforementioned first driving structure **302** drives the auxiliary cleaning disk **3021** to

rotate to mop, the second lift structure is configured to drive the auxiliary cleaning disk **3021** to ascend or descend, so as to switch between the lifting position and the mopping position.

[0222] During the process of cleaning, the main cleaning disk **2021** and the auxiliary cleaning disk **3021** can be in the lifting position synchronously, and in the mopping position synchronously, under the cooperation of the main cleaning disk **2021** and the auxiliary cleaning disk **3021**, the main mop **2022** and the auxiliary mop **3022** mop synchronously, the main mop **2022** implements the non-edge cleaning, the auxiliary mop **3022** implements the cleaning along the edge, no cleaning-missed cases occur in the cleaning area of the the main mop **2022** and the cleaning area of the auxiliary mop **3022**, enhancing the cleaning effectiveness. When encountering scenarios such as carpets or returning to the base station, the main cleaning disk **2021** and the auxiliary cleaning disk **3021** are both in the lifting position. Wherein, the robot returning to the base station mainly implements charging, cleaning the main cleaning disk **2022** and auxiliary cleaning disk **3022**, and collecting dust from the dust box **401**.

[0223] In addition, under the mode of non-edge cleaning, the auxiliary cleaning disk **3021** is in the lifting position, the main cleaning disk **2021** is in the mopping position, the cleaning of the main cleaning disk **2021** is in priority. Certainly, under the mode of non-edge cleaning, the auxiliary cleaning disk **3021** and the main cleaning disk **2021** can both be in the mopping position, the auxiliary mop **3022** and the main mop **2022** both mop, under the cooperation of the auxiliary mop **3022** and the main mop **2022**, along the width direction of the body **10**, the area of a single cleaning is big, the cleaning time is shortened, the cleaning efficiency is increased. Under the mode of preventing the non-edge cleaning, the auxiliary cleaning disk **3021** is in the mopping position and easy to get caught by other objects or obstacles with the region to be cleaned, resulting in the auxiliary cleaning disk **3021** is easy to detach from the body **10**, therefore, the auxiliary cleaning disk **3021** is in the lifting position when in the non-edge cleaning; the auxiliary cleaning disk **3021** is in the mopping position when in the cleaning along the edge.

[0224] Under the mode of cleaning along the edge, the auxiliary cleaning disk **3021** is in the mopping position, the main cleaning disk **2021** can be in the lifting position without mopping to clean, that is the main cleaning disk **2021** does not cooperate with the auxiliary cleaning disk **3021** when cleaning along the edge, relying solely on the main mop **2022** for cleaning, the cleaning effect is inferior compared to the cleaning effect achieved when both the main mop **2022** and the auxiliary mop **3022** are in the mopping position.

[0225] The aforementioned second driving structure and the first lift structure are the same structure, configured for driving the main cleaning disk **2021** to ascend, descend and rotate, to enable the main cleaning disk **2021** to switch between the lifting position and the mopping position, and to rotate in the mopping position, such that the driving structure is compact and occupies less space. Similarly, the aforementioned first driving structure and the second lift structure are the same structure, driving the auxiliary cleaning disk **3021** to ascend, descend and rotate, to enable the auxiliary cleaning disk **3021** to switch between the lifting position and the mopping position, and to rotate in the mopping position, such that the driving structure is compact and occupies less space. That is to drive the main cleaning disk **2021** or the auxiliary cleaning disk **3021** to ascend, descend and rotate by one motor.

[0226] The first driving structure **302** and the second driving structure **201** can adopt same structure, and can adopt different driving structure.

[0227] For example, the first driving structure **302** and the second driving structure **201** can both be spiral mechanism, the rotational direction when the main cleaning disk **2021** is descending is the same as the rotational direction during mopping; the rotational direction when the main cleaning disk **2021** is ascending is opposite to rotational direction when the main cleaning disk **2021** is descending.

[0228] In the inner cavity of the body **10**, when the auxiliary cleaning module **30** is not set, the layout of the dust box chamber **108** (or dust box **401**) of the dry cleaning module **40**, the main fan

**402**, the dust exhaust channel **404**, the second driving structure **201** and the water replenishing mechanism inside the body **10**. The main fan **402** is configured to suction the garbage into the dust box **401**; the dust box **108** for mounting the dust box **401** is disposed inside the body **10**; the dust exhaust channel **404** connected with the dust box **401** is also disposed in the body **10**, the dust exhaust channel **402** is configured to draw the garbage from the dust box **401** into the base station under the action of the dust collection fan of the base station.

[0229] The dust box **401** is provided with a dust inlet, an air outlet, an air inlet, and a dust outlet, wherein, the dust inlet is connected with the dust suction opening of the body **10**, the air outlet is disposed on the rear said wall of the dust box chamber **108**, the main fan **402** is disposed on the air outlet and behind the dust box chamber **108**; the air inlet is disposed on the right sidewall of the dust box **401**; the dust outlet is disposed on the left sidewall of the dust box **401**, or the corner between the left sidewall and the rear sidewall, the dust exhaust channel **404** is connected with the dust outlet, the air inlet can be connected with the inner cavity of the body **10**, the inner cavity of the body **10** serves as an intake area, under the suction of the dust collection fan, the air of the intake area opens the valve on the air inlet and enters into the dust box **401**, the garbage within the dust box **401** opens the valve on the dust outlet with the air, and is sucked into the dust collection container of the base station through the dust exhaust channel **401**.

[0230] Along the forward direction of the body **10**, the main fan **402** is disposed in front of the two first driving structures **302**, and behind the dust box chamber **108**; the dust box **108** is disposed between the two driving wheels **801**, a third driving mechanism that respectively drives the driving wheel **801** to move is disposed inside the body **10**, the two third driving mechanisms are distributed on the two sides of the dust box chamber **108**, corresponding to their respective driving wheels **801**; the dust exhaust channel **404** is usually disposed on the left side of the dust box chamber **108**, or the junction between the left side and the rear side.

[0231] In the inner cavity of the body **10**, the second region **104** is surrounded by the dust exhaust channel **401** and the dust box chamber **108**, the two second driving structures **201**, the main fan **402** is distributed within the second region **104** in the inner cavity of the body **10**.

[0232] As shown in FIG. **10**, the dry cleaning module **40** further comprises an exhaust duct **405** connected to the exhaust outlet of the main fan **402**; the exhaust duct is disposed in the inner cavity of the body **10**, one end of the exhaust duct is disposed within the second region **104**, the other end extends out of the second region **104** and towards the right sidewall of the body **10**, and connects with the air outlet on the right sidewall of the body **10**, and further connects with the exterior of the body **10**.

[0233] The water replenishing mechanism is configured to replenish water to the main cleaning component, such that the main mop **2022** forms wet cleaning. As shown in FIG. **28**, the water replenishing mechanism comprises a water tank **501** and a pump body **502**, there is a pipe connection between the water tank **501** and the pump body **502**, the pump body **502** is configured to transport the solution from the water tank **501** to the main mop **2022**, to moisten the main mop **2022**.

[0234] In the inner cavity of the body **10**, a third region **105** is formed between the two second driving structures **201** and the rear sidewall of the body **10**; a fourth region **106** is surrounded by the driving wheel **801** on the left side and the dust exhaust channel **401**, the left sidewall of the body **10**; a fifth region **107** is surrounded by the second driving structure **201** on the right side and the right sidewall of the body **10**, the exhaust duct of the main fan **402**.

[0235] When the auxiliary cleaning module **30** mentioned above is not set, the layout of the water tank **501** and the pump body **502** in the inner cavity of the body **10** is: the water tank **501** is an irregularly shaped water tank **501**, the irregularly shaped water tank **501** is provided with a first tank body **503**, and a second tank body **504** fixed and connected to the first tank body **503**, the two tank bodies are integrated into one unit, of course the two tank bodies also cannot be integrated into one unit. The first tank body **503** is disposed within the third region **501**, the second tank body **504**

is disposed within the fifth region **107**, the pump body **502** is disposed within the fourth region **106**, in this setting method, due to the pump body **502** is a peristaltic pump, or any other relatively large-sized pump body, the pump body **502** occupies a large space, the peristaltic pump is disposed within the fourth region **106**; the water tank **501** is disposed within the third region **105** and the fifth region **107**, ensuring the capacity of the water tank **501** to hold a larger amount of solution to replenish water to the two main mops **2022**. The rear side of the housing of two second driving structures **201**, and the outside of the right sidewall of the housing of the right side second driving structure **201** are surrounded by the front sidewall of the water tank **501**, in order to fill up the third region **105** and the fifth region **107**.

[0236] When the auxiliary cleaning module **30** mentioned above is set, due to the auxiliary cleaning disk **3021** is disposed behind the driving wheel **801** on the right side, and within the first region **103** of the upper right of the main cleaning disk **2021** on the right side. In order to set the first driving structure **302** in the inner cavity of the body **10**, as shown in FIG. **10**, the layout of the main fan **402**, the dust box chamber **108**, the dust exhaust channel **404**, the two second driving structures **201**, the driving structure of the driving wheel **801** and the exhaust duct of the main fan **402** in the inner cavity of the body **10** stays unchanged. But the layout of the water replenishing mechanism inside the body **10** changes.

[0237] As shown in FIG. **10**, the water replenishing mechanism is designed to avoid the fifth region **107** to reserve installation space for the first driving structure **302**, the first driving structure **302** is disposed within the fifth region **107**, due to the fifth region **107** is disposed behind the right side driving wheel **801**, and on the right side of the right side second driving structure **201**, thus the first driving structure **302** is disposed right above or approximately right above the auxiliary cleaning disk **3021**, only a minimal transmission mechanism is needed between the power output shaft **2031** of the first motor **203** of the first driving structure **302** and the auxiliary cleaning disk **3021**, to transfer the driving force of the first motor **203** to the auxiliary cleaning disk **3021**, such that the auxiliary cleaning disk **3021** rotates, ascend or descend, such that the first driving structure **302** is compact in structure, without increasing the size of the body **10**, particularly the width size of the body **10**, without changing the layout of the dust box chamber **108**, the main fan **402**, the two second driving structures **201** and the dust exhaust channel **404** in the inner cavity of the body **10**, such that the first driving structure **302** is disposed within the fifth region **107**, achieving to drive the auxiliary cleaning disk **3021** to rotate, ascend or descend. The first driving structure **302** is formed as a whole modular unit, facilitating the assembling and manufacturing of the first driving structure **302**, the first driving structure **302** can be pre-assembled, and then installed into the inner cavity of the body **10**, facilitating the installation in the inner cavity of the body **10**.

[0238] To minimize the reduction of the volume of the water tank **501**, there are multiple implementation methods for the set of the water tank **501**, specifically:

[0239] In the first implementation method, as shown in FIG. **10**, the pump body **502** is still disposed within the fourth region **106**, the first tank body **503** is still disposed within the third region **105**, the second tank body **504** is connected with the first tank body **503**, and the second tank body **504** is distributed above the top of the dust exhaust channel **404**, and extends towards the interior of the fourth region **106**, part of the second tank body **504** can be disposed within the fourth region **106**, the shape of the second tank body **504** changed, the thickness is reduced to ensure the water tank **501** to replenish water to the main mops **2022**, and to replenish water to the auxiliary mop **3022**.

[0240] In the second implementation method, in order to reduce the volume of the water tank **501**, the pump body **502** is still disposed within the fourth region **106**, the first tank body **503** is disposed within the third region **105**, the second tank body **504** is distributed on the top of the housing of one second driving structure **201**, for example, distributing above the housing of the second driving structure **202** on the left side, the second tank body **504** is disposed near one side of the second region **104**, facilitating the connection between the water tank **501** and the pump body **502**,

similarly, the shape of the second tank body **504** changes without reducing the volume.

Furthermore, part of the second tank body **504** can cover above the dust exhaust channel **404**, to increase the volume of the water tank **501**, more easily to connect to the pump body **502**.

[0241] Due to the water replenishing mechanism not only replenishes the water to the two main mops **2022**, but also replenishes the water to auxiliary mop **3022**, optimally, the second tank body **504** is distributed above the housing of the two second driving structures **201**, to increase the volume of the water tank **501**.

[0242] Furthermore, when the second driving structure **201** on the right side and the first driving structure **302** share a single motor for driving, the shared motor can be disposed within the fifth region **107**, no motor is disposed on the second driving structure **201**, the second driving structure **201** can reserve the space for the installation of the second tank body **504**, to increase the volume of the water tank **501**. Certainly, the second tank body **504** cannot be disposed above the left-side first driving structure **302**, the second tank body **504** is only disposed above the right side second driving structure **201**.

[0243] In the third implementation method, the pump body **502** is disposed within the third region **105**, the water tank **501** is disposed within the fourth region **106**, to ensure the volume of the water tank **501** not to reduce, to satisfy the requirement of the water supply.

[0244] Or, the second tank body **504** of the water tank **501** is disposed within the fourth region **106**, the first tank body **503** of the water tank **501** is disposed within the third region **105**, the volume of the first tank body **503** is reduced to reserve space for the pump body **502**, such that the pump body **502** is disposed within the third region **105**. For example, the pump body **502** is disposed within a sub-region, which is surrounded by the adjacent edges of the rear portions of the housings of the two second driving structures **201**, and the rear sidewall of the body **10**. Along the forward direction of the body **10**, due to the sub-region encloses a concave region at the rear portion of the adjacent edges of the housings of the two second driving structures **201**, the space of the sub-region formed by the concave region and the rear sidewall of the body **10** is big enough to accommodate a larger volume peristaltic pump. The first tank body **503** is disposed on the left side of the pump body **502**, and covers above the dust exhaust channel **404**, and connects with the second tank body **504** within the fourth region **106**.

[0245] When the peristaltic pump is not adopted, replace with other water pump with a small volume, the water pump can be disposed within other sub-regions of the third region **105**. For example, the pump body **502** is distributed within the sub-region, which is between the right side of the dust exhaust channel **404** and the rear sidewall of the housing of the left-side second driving structure **201**, the rear sidewall of the body **10**; or, the pump body **502** is distributed within the sub-region, which is between the rear sidewall of the housing of the right side second driving structure **201** and the rear sidewall of the body **10**, correspondingly, the first tank body **503** covers above the dust exhaust channel **404** to connect to the second tank body **504**.

[0246] In the fourth implementation method, as an alternative implementation method for the water tank **501** in the aforementioned three implementation methods, the water tank **501** cannot set the first tank body **503** and only set the second tank body **504**. [0247] specially when the water tank **501** is disposed within the fourth region **106**, in the implementation method where the first tank body **503** is disposed within the third region **105**, the pump body **502** is disposed within the third region **105**, part of the first tank body **503** is needed to be disposed on the top of the dust exhaust channel **404** to connect to the first tank body **503**, and inconvenient to connect to the two tank bodies, due to the space of the fourth region **106** is big enough, when the pump body **502** is not set and the second tank body **504** is fully filled with the fourth region **106**, the volume of the fourth region **106** is big enough to only set the second tank body **504**, without setting the first tank body **503**, and the pump body **502** is disposed within the third region **105** and is closer to the main mop **2022** and the auxiliary mop **3022**, facilitating the pump body **502** in conveying the solution to the liquid outlet at the bottom of the body **10**.

[0248] Due to multiple hollow regions or hollow holes are set along the circumference direction of the mail cleaning disk **2021** and the auxiliary cleaning disk **3021**, the liquid outlet at the bottom of the body **10** is correspondent to the hollow region, the main mop **2022** is disposed on the bottom of the main cleaning disk **2021**, the main mop **2022** covers the bottom of the hollow hole. During the process of rotation of the main cleaning disk **2021** and the auxiliary cleaning disk **3021**, the liquid drops down from the liquid outlet passes through the hollow region and drops onto the main mop **2022** or the auxiliary rag **3022**, to replenish water to the rag. Three liquid outlets are disposed on the bottom of the body **10**, respectively are the first liquid outlet, the second liquid outlet and the third liquid outlet, the first liquid outlet on the left side corresponds to the main cleaning disk **2021** on the left side, the second liquid outlet in the middle corresponds to the main cleaning disk **2021** on the right side, and the third liquid outlet on the right side corresponds to the hollow region of the auxiliary cleaning disk **3021**.

[0249] That is, in the inner cavity of the body **10**, without changing the layout of the dust box chamber **108**, the dust box **401**, the dust exhaust channel **404**, the main fan **402** and the two second driving structures **201**, on the base of without reducing the volume of the water tank **501**, by changing the position of the water replenishing mechanism and the shape of the water tank **501** to reserve a position to the first driving structure **302**, such that the first driving structure **302** is disposed within the fifth region **107**, the water replenishing mechanism **50** can replenish water to the main mop **2022** and the auxiliary mop **3022**.

[0250] In the fifth implementation method, the water replenishing mechanisms share a single pump body **502**, but the layout of the first tank body **503** and the second tank body **504** in the inner cavity of the body **10** is same as the four aforementioned implementation methods, the two tank bodies are independent, the first tank body **503** replenishes water to the auxiliary rag **3022**, the second tank body **504** replenishes water to the main mop **2022**.

[0251] For example, the second tank body **504** is disposed within the fourth region **106**, the first tank body **503** is disposed within the third region **105**, the volume of the second tank body **504** is big, the second tank body **504** is configured to replenish water to the two main mops **2022**, the volume of the first tank body **503** is small, the first tank body **503** is configured to replenish water to the auxiliary mop **3022**, the pump body **502** is disposed within the third region **105**, the first tank body **503** is distributed near the first driving structure **302**, the pump body **502** is disposed between the first tank body **503** and the dust exhaust channel **404**, the pump body **502** is connected with the first tank body **503** and the second tank body **504** through the pipe respectively.

[0252] Or, the number of the pump body **502** is two, respectively are the first pump body **502** and the second pump body **502**, the second tank body **504** is disposed within the fourth region, the first tank body **503** is disposed within the third region **105**, the first pump body **502** is disposed within the third region **105** and is configured to connect to the first tank body **503**, transfer the solution in the first tank body **503** to the third liquid outlet, to replenish water to the auxiliary mop **3022**. The second pump body **502** can be disposed within the third region **105** or the fourth region **106** and connect to the second tank body **504**, the second pump body **502** is configured to transfer the solution in the second tank body **504** to the first liquid outlet and the second liquid outlet, to replenish water to the two main mops **2022**.

[0253] Another implementation method: by changing the exhaust duct of the main fan to reserve space for the first driving structure **302**, for the installation of the first driving structure **302**.

[0254] Specifically, the main fan **402** is disposed behind the dust box **401** and between the two second driving structures **201**; the exhaust duct is not disposed behind the right side driving wheel **801**, the exhaust duct is disposed within the region between the housings of the two second driving structures **201** and extends to the rear sidewall of the body **10** and connects with the exterior. The first driving structure **302** is disposed within the fifth region **107**, which is between the rear of the right side driving wheel **801**, the right sidewall of the housing of the right side second driving structure **201** and the right sidewall of the body **10**. The second water tank **501** of the water

replenishing mechanism **50** is disposed within the fourth region **106**, the second water tank **501** and the first water tank **501** are independent, the second water tank **501** replenishes water to the two main mops **2022**, the first water tank **501** replenishes water to the auxiliary mop **3022**. Due to the position of the exhaust duct changes, increasing the space of the fifth region **107**, at least part of the first water tank **501** is disposed within the fifth region **107**, but behind the the first driving structure **302**, the pump body **502** is disposed within the third region **105**, the number of the pump body **502** can be one, configured to replenish water to the main mop **2022** and the auxiliary mop **3022** respectively with the solution in the two tank bodies, in case where the number of the pump body **502** is two, respectively are the first pump body **502** and the second pump body **502**, the first pump body **502** is configured to replenish water to the auxiliary mop **3022** with the solution in the first tank body **503**, the second pump body **502** is configured to replenish water to the auxiliary mop **3022** with the solution within the second tank body **504**. Optimally, the first pump body **502** and the second pump body **502** are disposed on the two sides of the exhaust duct.

[0255] The aforementioned first driving structure **302** and the second driving structure **201** can be same structure, and can be different structures, preferably, the first driving structure **302** and the second driving structure **201** is same, in order to facilitate the explanation, the following description will take the first driving structure **302** as an example to expand.

[0256] The first driving structure **302** comprises the first motor **203** and the lifting assembly **60**, the lifting assembly **60** is connected to the auxiliary cleaning disk **3021**, the lifting assembly **60** drives the auxiliary cleaning disk **3021** to ascend or descend, and to rotate in the mopping position to mop.

[0257] As shown in FIG. **11**, the first driving structure **302** comprises the first motor **203** and the lifting assembly **60**, the lifting assembly **60** is connected to the auxiliary cleaning assembly **302**, the lifting assembly **60** drives the cleaning assembly to ascend or descend, to rotate in the mopping position.

[0258] The lifting assembly **60** comprises a first fixed body and a second fixed body, the first fixed body is connected to the power output shaft **2031** of the first motor **203**; the second fixed body is connected to the auxiliary cleaning assembly **302**, a spiral mechanism is formed between the first fixed body and the second fixed body.

[0259] In the first implementation method of the lifting assembly **60**, the power output shaft **2031** is rotating along the first direction, such that the second fixed body descends relative to the first fixed body through the spiral mechanism, during the process of descending, the auxiliary cleaning disk **3021** rotates; in the mopping position, the power output shaft **2031** continues to rotate along the first direction, there is no continually descending motion of the second fixed body relative to the first fixed body, the second fixed body rotates to drive the cleaning assembly to rotate to clean the surface to be cleaned; the power output shaft **2031** is rotating along the second direction, such that the second fixed body ascends relative to the first fixed body through the spiral mechanism, to drive the auxiliary assembly **302** to ascend.

[0260] That is, in the first implementation method, relies on the first motor **203** to drive the auxiliary cleaning disk **3021** to descend, ascend and rotate.

[0261] For example, as shown in FIG. **11**, FIG. **12**, FIG. **13** and FIG. **27**, the first fixed body comprises a first sleeve **6011**, a first mounting cavity recessed upwardly is disposed at the bottom of the first sleeve **6011**, the top of the first sleeve **6011** is in driving connection with the power output shaft **2031** of the first motor **203**; the second fixed body comprises a second sleeve **6012** and a housing **6017**, a first annular cavity **60122** recessed downwardly is disposed on the top of the second sleeve **6012**, a second mounting cavity **60122** recessed upwardly is disposed at the bottom of the second sleeve **6012**; a mounting protrusion **3023** on the top of the cleaning assembly is detachably mounted inside the second mounting cavity **60122**; the first sleeve **6011** embeds into the first annular cavity **60122** through the first mounting cavity. The housing **6017** sleeves on an outer side of the second sleeve **6012**, fixed relative to the body **10**; a damping component is disposed

between the inner wall of the housing **6017** and the outer wall of the second sleeve **6012**, such that the second sleeve **6012** rotates relative to the first sleeve **6011** to ascend or descend; at least a rib **6014** is disposed on the outer wall of the first sleeve **6011**, a spiral groove **6013** compatible with the rib **6014** is disposed on the inner wall of the second sleeve **6012**, the spiral mechanism is formed by the rib **6014** and the spiral groove **6013**; a first limiting portion **6015** is disposed on the top of the spiral groove **6013**, in the mopping position, along the spiral direction of the spiral groove **6013**, the rib **6014** abuts on the sidewall of the first limiting portion **6015** to limit the continually descending of the second sleeve **6012** relative to the first sleeve **6011**. The first motor **203** can be disposed on the housing **6017**, The first motor **203** is fixed relative to the body **10**; or the first motor **203** is disposed on the housing **6017**, the housing **6017** is fixed relative to the body **10**.

[0262] The lifting assembly **60** in this implementation method, when the power output shaft **2031** of the first motor **203** is rotating along the first direction, driving the first sleeve **6011** to rotate, the rib **6014** on the outer wall of the first sleeve **6011** rotates in the spiral groove **6013** on the inner wall of the second sleeve **6012**, due to the damping component is disposed between the housing **6017** and the second sleeve **6012**, under the action of the damping component, such that the rotational speed of the second sleeve **6012** and the first sleeve **6011** is different, the second sleeve **6012** can descend relative to the first sleeve **6011**, further drives the auxiliary cleaning disk **3021** to descend, when the rib **6014** abuts on the first limiting portion **6015** on the top of the spiral groove **6013**, the first limiting portion **6015** limits the rib **6014** to rotate continuously relative to the second sleeve **6012**, there is no continually descending motion of the second sleeve **6012**, the second sleeve **6012** arrives at the mopping position, at this moment, the power output shaft **2031** of the first motor **203** continues to rotate along the first direction, there is no correspondent movement between the second sleeve **6012** and the first sleeve **6011**, the first sleeve **6011** and the second sleeve **6012** rotates synchronously, the second sleeve **6012** drives the auxiliary cleaning disk **3021** to rotate continuously, enabling the auxiliary rag **3022** to rotate to mop.

[0263] On the contrary, the first motor **203** is rotating along the second direction to drive the first sleeve **6011** to rotate in an opposite direction, the rib **6014** on the outer wall of the first sleeve **6011** rotates in the spiral groove **6013** of the second sleeve **6012**, due to the action of the damping component, the second sleeve **6012** ascends relative to the first sleeve **6011**, driving the auxiliary cleaning disk **3021** to ascend. In addition, a second limiting portion **6016** is disposed on the bottom of the spiral groove **6013**, along the spiral direction of the spiral groove **6013**, the rib **6014** abuts on the sidewall of the second limiting portion **6016**, thereby limiting the ascending position of the second sleeve **6012**, thereby achieving to use one first motor **203** to drive the auxiliary cleaning disk **3021** to ascend, descend and rotate.

[0264] In this implementation method, using one second sleeve **6012**, the first annular cavity **60122** on the top of the second sleeve **6012** is compatibly connected to the first sleeve, and forms the spiral mechanism, achieving the ascending or descending motion and the rotating motion, the second mounting cavity **60122** on the bottom of the second sleeve **6012** is connected to the auxiliary cleaning disk **3021**, and the first annular cavity **60122** is disposed on the outer periphery of the second mounting cavity **60122**, such that the mounting protrusion **3023** on the top of the auxiliary cleaning disk **3021** is disposed inside the second mounting cavity **60122**, without increasing the height of the lifting assembly **60**, such that the whole lifting assembly **60** is compact and simple in structure, forms a modular structure as a whole, reducing the space occupied in the inner cavity of the body **10**.

[0265] The auxiliary cleaning disk **3021** is disposed beneath the base tray **101** of the body **10**, an avoidance hole is disposed on the base tray **101**, the first sleeve **6011** and the first motor **203** are both disposed within the inner cavity of the body **10**, the bottom of the second sleeve **6012** passes through the first avoidance hole, such that the second mounting cavity **60122** connects with the exterior, facilitating the mounting protrusion **3023** of the auxiliary cleaning disk **3021** to mount inside the second mounting cavity **60122**, outside of the body **10**. The mounting protrusion **3023**



can be installed inside the second mounting cavity **60122** through a magnetic suction method, or with a snap-fastener, spring pin, and groove connection, or any other removable fixing method. [0266] As to the damping component, there is at least three implementation methods, the first implementation method of the damping component, as shown in FIG. X, the housing **6017** is provided with at least one avoidance hole **60171**, for example, at least two avoidance holes **60171** are uniformly disposed along the periphery direction of the housing **6017**, at least one first protrusion is disposed inside each avoidance hole **60171**, the first protrusion protrudes in the direction towards the second sleeve **6012**, to interference abut on the outer wall of the second sleeve **6012**; such as the first protrusion presents in a wave-like shape.

[0267] The damping component is the first protrusion, an interference abutment is formed between the first protrusion and the second sleeve **6023**, the damping component blocks the second sleeve **6012** to produce frictional force, such that the rotational speed of the first sleeve **6011** and the second sleeve **6012** is different, the second sleeve **6012** can ascend or descend relative to the first sleeve **6011**.

[0268] The second implementation method of the damping component, as shown in FIG. 11, the housing **6017** is provided with at least one avoidance hole **60171**, a rotatable first rotating body is disposed inside the avoidance hole **60171**, an interference abutment is formed between the first rotating body and the outer wall of the second sleeve **6012**; during the process of ascending or descending of the auxiliary cleaning disk **3021**, the first rotating body does not rotate; in the mopping position, a rolling friction is formed between the first rotating body and the second sleeve **6012**, the first rotating body is the damping component.

[0269] The damping component of this implementation method, the damping component is the first rotating body, during the process of ascending or descending of the auxiliary cleaning disk **3021**, the first rotating body does not rotate, a slidable friction is formed between the second sleeve **6012** and the first rotating body, when the second sleeve **6012** is driving the auxiliary cleaning disk **3021** to rotate to mop, the second sleeve **6012** rotates to drive the first rotating body to rotate, such that a rolling friction is formed between the second sleeve **6012** and the first rotating body, reducing the frictional force between the first protrusion **60181** and the second sleeve **6012**, reducing the abrasion to the damping component and the second sleeve **6012**, prolonging the service life of the lifting assembly **60**, corresponding to the circumstance when the second sleeve **6012** is driving the auxiliary cleaning disk **3021** to rotate in embodiment 1.

[0270] The third implementation method of the damping component, the damping component is a fluff strip, one end of the fluff strip is fixed on the inner wall of the housing **6017**, the other end interference abuts on the outer wall of the second sleeve **6012**, to form a flexible abutment. Implant or adhere a ring of fluff strip on the inner peripheral wall of the housing **6017** to be the damping component, such that a flexible frictional force is formed between the second sleeve **6012** and the damping component when the second sleeve **6012** is driving the auxiliary cleaning disk **3021** to ascend, descend and rotate, corresponding to the hard frictional force between the damping component and the second sleeve **6012** in the first two implementation methods, reducing the abrasion between the second sleeve **6012** and the fluff strip, providing protection for both the fluff strip and the second sleeve **6023**, prolonging the lifespan of the second sleeve **6012** while enabling the damping component to perform damping function, ensuring the lifting assembly **60** to drive the auxiliary cleaning disk **3021** to implement ascending, descending and rotating motion under the driving of the first motor **203**. In addition, due to the first driving structure **302** is disposed inside the inner cavity of the body **10**, replacement or maintenance of the lifting assembly **60** all requires to open the upper shell of the body **10**, resulting in the inconvenience to the replacement or maintenance of the lifting assembly **60**, using the fluff strip as the damping component, the lifespan of the lifting assembly **60** can be prolonged, the frequency of repair is reduced.

[0271] The second implementation of the lifting assembly **60**, the descending of the auxiliary cleaning disk **3021** relies on the driving of the gravity of the second fixed body, the auxiliary

cleaning disk **3021** and the auxiliary mop **3022**, the rotation of the auxiliary cleaning disk **3021** relies on the driving of the first motor **203** along the first direction; the ascending of the auxiliary cleaning disk **3021** relies on the rotation of the first motor **203** along the second direction, to drive the first fixed body to rotate, lift assembly the second fixed body to drive the auxiliary cleaning disk **3021** to ascend.

[0272] Specifically, as shown in FIG. **18**, the first fixed body comprises a first cylinder body **6021**, the first cylinder body **6021** sleeves on an outer side of the power output shaft **2031** of the first motor **203** through a first one-way bearing **6024**; the first one-way bearing **6024** possesses a transmission state that transfers the force of the power output shaft **2031** to the first cylinder body **6021**, and a disconnection state that disconnects the force transmission of the force of the power output shaft **2031** to the first cylinder body **6021**;

[0273] The second fixed body comprises a floating shaft **6022** and a second cylinder body **6023**, the second cylinder body **6023** rotatably sleeves on the outer wall of the floating shaft **6022**; the top of the floating shaft **6022** is connected to the power output shaft **2031**, the bottom of the floating shaft **6022** is connected to the top of the auxiliary cleaning disk **3021**. The spiral mechanism is formed between the second cylinder body **6023** and the first cylinder body **6021**.

[0274] A second annular cavity **60231** recessed downwardly is disposed on the top of the second sleeve **6023**, the lower portion of the first sleeve **6012** embeds into the second annular cavity **60231**, the upper portion is disposed outside the second annular cavity **60231**, and sleeves on an outer side of the one-way bearing, at least one first spiral surface **6025** is disposed on the outer wall surface at the lower portion of the first cylinder body **6021**, at least one first rolling wheel **6021** is disposed on the inner wall of the second annular cavity **60231** of the second cylinder body **6023**, the first rolling wheel **6026** and the first spiral surface **6025** correspond to each other one by one, the first rolling wheel **6026** abuts on the the first spiral surface **6025**, the aforementioned spiral mechanism is formed by the first rolling wheel **6026** and the first spiral surface **6025**. A third limiting portion is disposed on the bottom of the first spiral surface **6025**, a fourth limiting portion is disposed on the top of the first spiral surface **6025**.

[0275] When the power output shaft **2031** of the first motor **203** is rotating along the first direction, under the action of the one-way bearing, the first cylinder body **6021** is in the disconnection state; the power output shaft **2031** drives the floating shaft **6022** to rotate, due to the rotatable connection between the floating shaft **6022** and the second cylinder body **6023**, such as through bearing, the floating shaft **6022** rotates, the second cylinder body **6023** does not rotate, to drive the auxiliary cleaning disk **3021** to rotate; meanwhile, under the gravity of the second cylinder body **6023**, the floating shaft **6022**, the auxiliary cleaning disk **3021** and the auxiliary mop **3022**, the first rolling wheel **6026** on the second cylinder body **6023** moves downwardly along the first spiral surface **6025**, to drive the second cylinder body **6023**, the floating shaft **6022** and the auxiliary cleaning disk **3021** to move downwardly as a whole, to arrive at the mopping position, in the mopping position, the power output shaft **2031** is rotating along the first direction continuously to drive the floating shaft **6022**, the auxiliary cleaning disk **3021** and the auxiliary mop **3022** to rotate, to achieve mopping.

[0276] When the power output shaft **2031** of the first motor **203** is rotating along the second direction, under the action of the one-way bearing, the force of the power output shaft **2031** is conveyed to the first cylinder body **6021**, the first cylinder body **6021** is in a transmission state, the power output shaft **2031** drives the first cylinder body **6021** to rotate, and drives the floating shaft **6022** to rotate at the same time, such that the first rolling wheel **6026** of the second cylinder body **6023** rotates on the first spiral surface **6025** while the first cylinder body **6021** is rotating, the second cylinder body **6023** drives the floating shaft **6022** and the auxiliary cleaning disk **3021** to ascend, when the first rolling wheel **6026** abuts on the fourth limiting portion, the first rolling wheel **6026** does not ascend continuously, the auxiliary cleaning disk **3021** arrives at the lifting position, thus achieve the ascending, descending and rotating of the auxiliary cleaning disk **3021** by

using one first motor and the spiral mechanism of the lifting assembly **60**.

[0277] As an implementation method to replace, the position of the aforementioned first spiral surface and the first rolling wheel **6026** can be interchanged, or the first rolling wheel **6026** can be replaced with the second spiral surface.

[0278] Moreover, the lift **60** further comprises a first reset component **6027**, the first reset component **6027** is disposed between the floating shaft **6-22** and the power output shaft **2031**, the first reset component **6027** is configured to apply downward reset force to the floating shaft **6022** and the cleaning assembly, enable the auxiliary mop **3022** of the auxiliary cleaning disk **3021** can always keep abutting on the floor, increasing the frictional force, facilitating the auxiliary mop **3022** to clean the floor.

[0279] The first reset component **6027** can be a compression spring, disposed between the third mounting cavity **20311** of the power output shaft **2031** and the top of the floating shaft **6022**.

[0280] In order to facilitate the installation of the compression spring, there are two connecting methods of between the floating shaft **6022** and the power output shaft **2031**, the first method, as shown in FIG. **18**, the third mounting cavity **20311** is disposed on the bottom of the power output shaft **2031**, the inner hole of the floating shaft **6022** presents the fourth mounting cavity **60221**, the floating shaft **6022** is disposed inside the third mounting cavity **20311**; the mounting protrusion **3023** on the top of the auxiliary cleaning disk **3021** is detachably disposed inside the fourth mounting cavity **60221**, an annular step surface can be disposed in the fourth mounting cavity **60221**, one end of the compression spring abuts on the top of the third mounting cavity **20311** of the power output shaft **2031**, the other end abuts on the step surface.

[0281] In the second implementation method, when the floating shaft **6022** is not disposed inside the third mounting cavity **20311** of the power output shaft **2031**, the floating shaft **6022** sleeves on the outer periphery of the power output shaft **2031**, the fourth mounting cavity **60221** is disposed on the outer periphery of the third mounting cavity **20311**, the compression spring sleeves on the outer periphery of the floating shaft **6022**, the top of the compression spring is disposed on the power output shaft **2031**, the other end sleeves on the floating shaft **6022** to apply downward acting force to the floating shaft **6022**. For example, an annular step surface is disposed on the outer wall of the power output shaft **2031**, the top of the compression spring abuts on the step surface. The bottom of the mounting protrusion **3023** is disposed on the inner wall on the bottom of the fourth mounting cavity **60221**, to achieve the connection between the auxiliary cleaning disk **3021** and the floating shaft **6022**.

[0282] In the mopping position, the mounting protrusion **3023** of the auxiliary cleaning disk **3021** is disposed inside the fourth mounting cavity **60221**, part of the mounting protrusion **3023** can extend into the third mounting cavity **20311**, or do not extend into the third mounting cavity **20311**, that is the fourth mounting cavity **60221** is disposed beneath the third mounting cavity **20311**; in the lifting position, the fourth mounting cavity **60221** is disposed on the outer periphery of the third mounting cavity **20311**, the compression spring is in a compression state, the mounting protrusion **3023** of the auxiliary cleaning disk **3021** extends into the third mounting cavity **20311**, such that the structures of the floating shaft **6022**, the power output shaft **2031** and the compression spring are compact, occupy small space, the ascending height of the auxiliary cleaning disk **3021** in this implementation method corresponding to the first implementation method of the connection between the floating shaft **6022** and the power output shaft **2031**.

[0283] Another implementation method of the first driving structure **302**, as shown in FIG. **14** to FIG. **16**, the lifting assembly **60** comprises a third cylinder body **6031**, the third cylinder body **6031** sleeves on the outer side of the power output shaft **2031** of the first motor **203** through a second one-way bearing; the second one-way bearing possesses a transmission state that transfers the force of the power output shaft **2031** to the third cylinder body **6031**, and a disconnection state that disconnects the force transmission of the force of the power output shaft **2031** to the third cylinder body **6031**; the bottom of the power output shaft **2031** is connected to the cleaning assembly;

[0284] a supporting body **6032**, the supporting body **6032** is fixed relative to the body **10**, the supporting body **6032** is disposed on the outside of the third cylinder body **6031**, a spiral mechanism is formed between the supporting body **6032** and the third cylinder body **6031**;

[0285] For example, the spiral mechanism comprises a third spiral surface **6034**, and a second matching component complements the third spiral surface, the second matching component is the fourth spiral surface or the second rolling wheel. Taking an example that the second matching component is the fourth spiral surface **60351** to expand, one of the third spiral surface and the fourth spiral surface **60351** is disposed on the supporting body **6032**, the other one is disposed on the outside of the third cylinder body **6031**. For example, the fourth spiral surface **60351** is disposed on the outside of the third cylinder body **6031**, a projection **6035** is protruded on the outer wall of the third cylinder body **6031**, the fourth spiral surface **60351** is disposed on the bottom of the projection **6035**, the third spiral surface **6034** is disposed on the supporting body **6032**, the third spiral surface **6034** and the fourth spiral surface **60351** abuts.

[0286] When the power output shaft **2031** of the first motor **203** is rotating along the first direction, due to the connection between the auxiliary cleaning disk **3021** and the power output shaft **2031**, the power output shaft **2031** drives the auxiliary cleaning disk **3021** to rotate under the action of the one-way bearing, the third cylinder body **6031** is in a disconnection state, under the gravity of the third cylinder body **6031**, the auxiliary cleaning disk **3021** and the auxiliary rg **3022**, the third spiral surface **6034** of the third cylinder body **6031** rotates on the fourth spiral surface **60351**, implementing descending motion, to drive the auxiliary cleaning disk **3021** to descend, when descend to the mopping position, in the mopping position, the power output shaft **2031** of the first motor **203** continues to rotate along the first direction, there is no continually descending motion of the third cylinder body **6031** relative to the supporting body **6032**, the power output shaft **2031** drives the cleaning assembly to rotate.

[0287] When the power output shaft **2031** of the first motor **203** is rotating along the second direction, the third cylinder body **6031** is in a transmission state, the third cylinder body **6031** and the auxiliary cleaning disk **3021** both rotates, the third spiral surface **6034** of the third cylinder body **6031** rotates on the fourth spiral surface **60351** of the supporting body **6032**, to drive the third cylinder body **6031**, the auxiliary cleaning disk **3021** to ascend relative to the supporting body **6032**, and to drive the auxiliary cleaning disk **3021** to ascend.

[0288] Due to the supporting body **6032** is fixed relative to the body **10**, the bottom of the power output shaft **2031** is connected to the auxiliary cleaning disk **3021**, the third cylinder body **6031** sleeves on the outer side of the power output shaft **2031** through the second one-way bearing, during the process of the third cylinder body **6031** drives the auxiliary cleaning disk **3021** to ascend or descend, the whole lifting assembly **60** implements ascending or descending motion relative to the supporting body **6032**. As shown in FIG. X, the first motor **203** and the lifting assembly **60** are both disposed on the shell, the first motor **203** and the shell both ascend or descend synchronously.

[0289] However, in the first implementation method and the second implementation method of the lifting assembly **60** mentioned above, the first motor **203**, the shell for mounting the first motor **203**, and the third cylinder body **6031** or the first sleeve **6011** of the lifting assembly **60** do not ascend or descend, the second cylinder body **6023** or the second sleeve **6012** connected to the auxiliary cleaning disk **3021** implements the ascending or descending motion.

[0290] In order to limit the continuously descending of the third cylinder body **6031** at the mopping position, the third spiral surface is disposed on the supporting body **6032**, the third limiting portion is disposed on the bottom of the third spiral surface **6034**; along the spiral direction of the third spiral surface, the second matching portion abuts on the sidewall of the third limiting portion, and limit the continuously descending of the third cylinder body **6031** relative to the supporting body **6032** in the mopping position.

[0291] Similar to the second implementation method, further comprise a first shell body **6037** and a second reset component **6036**; the first motor **203**, the power output shaft **2031** and the third

cylinder body **6031** are all disposed on the first shell body **6037**, the first shell body **6037** is slidably disposed on the supporting body **6032** along the vertical direction; the second reset component **6036** is disposed between the first shell body **6037** and the supporting body **6032**; the second reset component **6036** is configured to apply downward second reset force to the first shell body **6037**, the second reset force applies on the shell and further acts on the auxiliary cleaning disk **3021**, such that the auxiliary mop **3022** on the bottom of the auxiliary cleaning disk **3021** keeps contacting with the floor; meanwhile, due to the shell, the first motor **203** and the lifting assembly **60** ascends or descends as a whole, when the first motor **203** is rotating along the first direction, under the joint action of the gravity and the second reset force of the third cylinder body **6031**, the shell and the cleaning assembly, driving the whole shell to descend relative to the supporting body **6032**, increasing the driving force of the descending of the auxiliary cleaning disk **3021**.

[0292] As shown in FIG. **16**, further comprises a torque component, for example, the torque component is a torsion spring **6038**, the torsion spring **6038** sleeves on the outer side of the third cylinder body **6031**, one end of the torsion spring **6038** is connected to the supporting body **6032**, the other end abuts on the third cylinder body **6031**; the torsion spring **6038** is configured to apply torque to the third cylinder body **6031**, such that the third cylinder body **6031** can rotate downwardly relative to the supporting body **6032**, during the process of descending, urging the third spiral surface or the second rolling wheel on the third cylinder body **6031** to rotate through the torque produced by the torsion spring **6038**, to rotate on the fourth spiral surface **60351** disposed on the outer wall of the supporting body **6032**. Furthermore, one of the third spiral surface **6034** and the second matching component can be replaced by the spiral groove **6013**, the other one is replaced by thread or the rib **6014**, when the projection **6035** of the third cylinder body **6031** is rotating downward in the spiral groove **6013**, due to the acting force applied by the top of the spiral groove **6013** to the rib **6014**, such that the rib **6014** possesses the trend of spiral rotation, the aforementioned torsion spring **6038** can be omitted.

[0293] As shown in FIG. **17**, a gear box is usually disposed between the first motor **203** and the power output shaft **2031**, in order to change the speed ratio of the auxiliary cleaning disk **3021** driven by the power output shaft **2031**, a sun wheel **60391**, a planetary gear **60393**, a ring gear **60392**, and a planetary carrier **60394** are disposed on the power output shaft **2031**, wherein the sun wheel **60391** sleeves on the power output shaft **2031** through a one-way bearing, the planetary carrier severs as the third cylinder body **6031**, the projection **6035** is disposed at the exterior of the planetary carrier, the fourth spiral surface **60351** or the second rolling wheel is disposed at the exterior of the planetary carrier. The ring gear **60392** serves as the first shell **6037**, an extending portion **603941** is disposed on the outer wall of the ring gear **60392**, the extending portion **603941** is slidably disposed on the supporting body **6032**.

[0294] Optionally, the structure of the second driving structure **201** of the main cleaning disk **2021** on the right side and the first driving structure **302** of the auxiliary cleaning disk **3021** are same, and share a first motor **203**, to lower the cost and reduce the space occupied by the two driving structures in the inner cavity of the body **10**.

[0295] Specifically, a first transmission mechanism, one end of the first transmission mechanism is connected to the power output shaft **2031** of the first motor **203**, the other end is provided with a first output end and a second output end; [0296] the first output end is connected to the lifting assembly **60** of the first driving structure **302**, the second output end is connected to the lifting assembly **60** of the second driving structure **201**, ensuring that one first motor **203** can drive the main cleaning assembly **202** and the auxiliary cleaning assembly **302** to ascend, descend and rotate synchronously.

[0297] For example, when the lifting assembly **60** serves as the first implementation method, the first output end is connected to first sleeve **6011** of the lifting assembly **60** of the first driving structure **201**, thus the first motor **203** rotates along the first direction, the first sleeves **6011** of the two lifting assemblies **60** rotates, the second sleeve **6012** implements the ascending and descend

motion, to achieve the function of ascending or descending synchronously and mopping synchronously, and facilitating the control to the first motor **203**. The first transmission mechanism can be a belt drive or a gear transmission, among others.

[0298] When the lifting assembly **60** serves as the second implementation method or the third implementation method, in the two lifting assemblies **60**, one third cylinder body **6031** sleeves on the first output end through a one-way bearing, the other cylinder body **6031** sleeves on the second output end through a one-way bearing.

[0299] Based on the rotational direction of the aforementioned two main cleaning disks **2021** and the auxiliary trays **3021**, when using one first motor **203** to drive, the rotational direction of the auxiliary cleaning disk **3021** and the main cleaning disk **2021** can be same, or opposite, there at least two implementation method correspondingly.

[0300] Take an example that the rotation direction of the auxiliary cleaning disk **3021** and the main cleaning disk **2021** is opposite to explain, the first implementation method: the spiral directions of the spiral mechanism of the two lifting assemblies **60** are same, the rotational directions of the first output end and the second output end are opposite. For example, by setting different amount of gears in the transmission mechanism, such that the rotational directions of the first output end and the second output end are different. The second implementation method, the spiral directions of the spiral mechanism of the two lifting assemblies **60** are opposite, the rotational directions of the first output end and the second output end are same.

[0301] Similarly, when the rotational directions of the auxiliary cleaning disk **3021** and the right side main cleaning disk **201** are same, the rotational directions of the aforementioned first output end and the second output end are same, and the spiral directions of the spiral mechanism of the two lifting assemblies **60** are also same.

[0302] For example, as shown in FIG. **6** and FIG. **7**, what shown in the FIG. **6** and FIG. **7** is square-shaped machine, but the first driving structure and the second driving structure can be same, the transmission mechanism is gear set, for example, the gear set comprises main gear **604** and four transmission gears **605**, the main gear is disposed on the power output shaft **2031**, wherein, one transmission gear meshes with the main gear, and the inner bore of the transmission gear is provided with a first output shaft, the first output shaft is provided with a first output end; three transmission gears mesh with the main gear, the inner bore of one transmission gear at the last end is fixed to the second output shaft, the second output shaft is provided with a second output end, ensuring that the first output end and the second output end rotate in the same direction.

[0303] In case where the second output end and the first output end are required to rotate in different directions, changes the number of transmission gears between the main gear and the end gear of either the first output end or the second output end.

[0304] Or, the rotational directions of the first output end and the second output end are opposite, meanwhile, the spiral directions of the spiral mechanism of the two lifting assemblies **60** are opposite.

[0305] One of the rotatable first direction and the second direction of the power output shaft **2031** of the first motor **203** mentioned above is clockwise direction, the other is counterclockwise direction.

[0306] In addition, the existing cleaning robot in the background, during the process of moving forward of the robot, the buffer **70** disposed in front of the robot body meets the obstacles at first, impacted by an obstacle, the controller utilizes the signal from the buffer **70** or the corresponding signal triggered by the buffer **70** to control the drive system of the robot to perform actions such as obstacle avoidance, moving along the edge, and obstacle surpassing. Due to part of the auxiliary cleaning head extends beyond the buffer **70** and is disposed at the corner of the robot body, the auxiliary cleaning head protrudes beyond the buffer **70** in both the forward and width direction of the robot body, therefore, when the robot encounters an obstacle, the auxiliary cleaning head hits the obstacle before the buffer **70**, after the auxiliary cleaning head is hitted, the auxiliary cleaning

head is easy to be damaged, affecting the cleaning effectiveness along the edge; the auxiliary cleaning head may get stuck by the obstacle, preventing the buffer **70** from hitting the obstacle, the presence of the obstacle cannot be detected, affecting the planning of the cleaning path of the robot. [0307] The cleaning robot in this implementation method, along the forward direction of the body **10**, the body **10** is provided with a rear portion, and a front portion disposed in front of the rear portion; a buffer **70** is disposed on the front portion of the body **10**, to detect the obstacle by colliding with the obstacle; the auxiliary cleaning disk **3021** and the two main cleaning disk **2021** are all disposed on the rear portion of the body **10**.

[0308] Due to the auxiliary cleaning disk **3021** is disposed on the rear portion of the body **10**, the buffer **70** is disposed on the front portion of the body **10**, during the forward movement of the body **10**, the buffer **70** encounters the obstacle before the auxiliary cleaning disk **3021** and detects the obstacle, thus the setting of the auxiliary cleaning module **30** will not affect the function of obstacle detecting of the buffer **70**, ensuring the cleaning effectiveness along the edge, without affecting the detection of the buffer **70** to the obstacle.

[0309] As an alternative implementation method of embodiment 1, the vertical projection of the body **10** on the floor is in circular shape, that is circular-shaped machine, due to the edge of the body **10** of the square-shaped machine of the embodiment 1 presents in straight line, part of the auxiliary cleaning disk **3021** extends beyond the edge of the body, the cleaning along the edge can be achieved. But to the circular-shaped machine, due to the maximum width of the body **10** is the diameter of the body **10** in the width direction, when the body **10** is circular-shaped machine, in order to further improve the effectiveness of along the edge, the edge portion of the auxiliary cleaning disk **3021** is preferable to extend beyond the edge of the maximum width of the body **10**, to achieve the cleaning along the edge; certainly, part of the edge of the auxiliary cleaning disk **3021** extends beyond the body **10**, but not to extend the edge of the maximum width of the body **10**, although the cleaning along the edge can be achieved, the area of cleaning along the edge is relatively small.

[0310] As shown in FIG. 4 to FIG. 7, due to the width of the square-shaped machine is smaller than the length of the body **10** along the forward direction, on the forward direction of the body **10**, the rolling brush **403** of the dry cleaning module **40** is disposed in front of the driving wheel **801**; however, when the body **10** is circular-shaped machine, the maximum width of the body **10** is greater than the maximum width of the body **10** of the square-shaped machine, the space between the two driving wheels **801** can hold the rolling brush **403**, therefore, place at least part of the rolling brush **403** within the region between the two driving wheels **801**, the dust box **401** is disposed behind the rolling brush **403**, in addition, the layout of the exhaust duct of the main fan **402** is disposed between the housings of the two second regions **104** in priority, the layout of other structures (i.e. edge brush, the second driving structure **201**, the water replenishing mechanism **50**, the buffer **70**, the driving wheel **801** and the dust exhaust channel **404**) is same as the square-shaped machine, Please refer to the description of the embodiment 1 for detailed information, details are not described herein again.

## Embodiment 2

[0311] The embodiment provides a cleaning robot, comprises the aforementioned body **10**, the dry cleaning module **40**, the main cleaning module **20**, the auxiliary cleaning module **30**, the edge brush, the water replenishing mechanism **50**, the perception system, the locomotion system **80** and the buffer **70**, etc.

[0312] The body **10** is circular-shaped machine, the main cleaning module **20** comprises the second driving structure **201**, the first lift structure and the main cleaning assembly **202**, the first lift mechanism is configured to drive the main cleaning disk **2021** to implement ascending or descending motion, the second driving structure **201** is configured to drive the main cleaning assembly **202** to oscillate or twist reciprocally, to enable the main cleaning assembly **202** to mop the floor. The first driving structure **302** and the second lift mechanism can use one motor to drive,

or use two motors, one motor drives the main cleaning assembly **202** to ascend or descend, the other motor drives the main cleaning assembly **202** to oscillate or twist reciprocally.

[0313] As shown in FIG. **29**, the first lift structure **303** can be a rope pulling structure, the two ends of the pulling rope are connected to the mounting base, driving the mounting to ascend through wrapping and relaxing stretching.

[0314] As shown in FIG. **23**, FIG. **24**, FIG. **25** and FIG. **29**, the main cleaning assembly **202** is flat mop, the flat mop comprises the mounting base **2023**, a vibrating plate **20232** disposed on the mounting base **2023**, a main cleaning component at least disposed on the bottom of the vibrating plate **20232**, for example, the main cleaning component is main mop **2022**. The second driving structure **201** is disposed on the mounting base **2023** or the body **10**, the second driving structure **201** is configured to drive the vibrating plate **20232** to oscillate or twist reciprocally, such that the friction between the main cleaning component and the floor bears force, enhancing the cleaning effectiveness. The first lift structure drives the mounting base **2023** to ascend or descend, to drive the whole flat mop to ascend or descend.

[0315] The aforementioned auxiliary cleaning module **30** is disposed on the mounting base **2023** as a whole, when the first lift structure is driving the mounting base **2023** to ascend or descend, the auxiliary cleaning module **30** ascends or descends synchronously with the flat mop as a whole, to stay in the mopping position and the lifting position synchronously, and in the mopping position, the main mop **2022** and the auxiliary mop **3022** of the auxiliary cleaning assembly **302** mop the floor synchronously. Due to the auxiliary cleaning module **30** ascends or descends synchronously with the flat mop as a whole, there is no need to set the aforementioned second lift structure on the auxiliary cleaning module **30** to drive the auxiliary cleaning disk **3021** to ascend or descend, only need to set the first driving structure **302** to drive the auxiliary cleaning disk **3021** to rotate to mop the floor. That is the auxiliary cleaning module **30** comprises the first driving structure **302** and the auxiliary cleaning assembly **302**, the first driving structure **302** drives the auxiliary cleaning assembly **302** to rotate to mop the floor. The auxiliary cleaning assembly **302** is same as the auxiliary cleaning assembly **302** in the embodiment 1, comprises a circular auxiliary cleaning disk **3021** and a main mop **3022** disposed on the bottom of the auxiliary cleaning disk **3021**.

[0316] As to the setting method of the mounting base **2023** and the vibrating plate **20232**, preferentially, the mounting base **2023** comprises a top plate **20231**, bottom plate **20233** disposed on the bottom of the top plate **20231**, the bottom plate **20233** is provided with a mounting hole, the vibrating plate **20232** embeds inside the mounting hole; the main mop **2022** sticks on the vibrating plate **20232** and the bottom plate **20233**, the main mop **2022** cover the vibrating plate **20232** and the surface of the bottom of the bottom plate **20233**, the main mop **2022** comprises a main part corresponds to the vibrating plate **20232**, and an auxiliary part corresponds to the bottom plate **20233**, the auxiliary part is wrapped around the outer circumference of the main part in one circle. The second driving structure **201** is disposed on the body **10** or the top plate **20231**, to drive the vibrating plate **20232** to oscillate or twist reciprocally, increasing the frictional force between the main part and the floor; under the action of reciprocal vibration or twisting of the main part, the auxiliary part of the main mop **2022** bears a part of force, but the auxiliary part stays on the bottom plate **20233** corresponding to the main part, due to the auxiliary part and the main part stays on the same plane, the auxiliary part and the main part can mop the floor synchronously.

[0317] In this implementation method, for example, the second driving structure **201** is disposed on the top plate **20231**, located beneath the base tray **101** of the body **10**, or an avoidance recess region is disposed on the base tray **101**, the avoidance recess region recesses upwardly towards the inner cavity of the body **10**, the first lift structure is disposed within the avoidance recess region, when staying in the lifting position, the top surface of the top plate **20231** is level or close to the bottom surface of the base tray **101**, the first lift structure does not occupy the height space, increasing the ascending height of the flat mop; correspondingly, the first lift structure is disposed in the inner cavity of the body **10**, to drive the second lift structure to ascend or descend through driving the



whole mounting base **2023** to ascend or descend.

[0318] Or, the mounting base **2023** is only equipped with the top plate **20231**, without the bottom plate **20233**, the mounting hole is disposed inside the top plate **20231**, the vibrating plate embeds into the mounting hole, similarly, the main mop **2022** comprises a main part corresponds to the vibrating plate **20232**, and an auxiliary part corresponds to the bottom surface of the bottom plate **20233**. Due to the mounting hole is disposed on the top plate **20231** for mounting the vibrating plate **20232**, the second lift structure **201** and the first lift structure are both disposed within the inner cavity of the body **10**, the second lift structure **201** and the first lift structure are same set of structures, and share one motor.

[0319] In order to ensure no cleaning-missed cases occur between the cleaning area of the main mop **2022** and the cleaning area of the auxiliary mop **3022**, the second implementation of no cleaning-missed cases in the embodiment 1 is used, the mounting base **2023** is provided with the first part **901**, the auxiliary cleaning disk **3021** is provided with the second part **902**, along the forward direction of the body **10**, the cleaning area of the first part **901** and the cleaning area of the second part **902** have an overlapping region **903H**.

[0320] On the forward direction of the body **10**, due to the main mop **2022** occupies the rear portion of the body **10**, there is no space reserved for the auxiliary cleaning disk **3021** at the rear portion of the body **10**, in order to avoid affecting the cleaning area and cleaning effectiveness of the main cleaning rag **2022**, on the forward direction of the body **10**, the auxiliary cleaning disk **3021** is disposed in front of the mounting base **2023**, the auxiliary mop **3022** on the auxiliary cleaning disk **3021** cleans firstly, and the main mop **2022** cleans afterwards, due to the second part **902** is at front, the first part **901** of the auxiliary mop **3022** is at back, the main mop **2022** on the second part **902** cleans firstly, and the auxiliary mop **3022** of the first part **901** cleans afterwards, the cleaning area cleaned by the second part **902** firstly and the cleaning area cleaned by the first part **901** afterwards have the overlapping region **903**, to prevent the occurrence of the cleaning-missed cases.

[0321] For example, due to the vibrating plate **20232** on the flat mop oscillates or twists reciprocally, which is different with the rotating motion of the auxiliary cleaning disk **3021**, in order to avoid the oscillating or twisting reciprocally of the vibrating plate **20232**, in this implementation method, along the forward direction of the body **10**, there is a gap between the auxiliary cleaning disk **3021** and the mounting base **2023**, the rotation of the auxiliary cleaning disk **3021** and the reciprocally oscillating or twisting of the vibrating plate **20232** are independent, without affecting each other. Or, the auxiliary cleaning disk **3021** and the mounting base **2023** are disposed adjacently or closedly, but move independently, without affecting each other.

[0322] The edge brush and the buffer **70** are both disposed on the bottom of the front portion of the body **10**; along the width direction of the body **10**, the auxiliary cleaning disk **3021** and the edge brush are both disposed on the right side of the body **10**, to form a right edge; the two driving wheels **801** of the locomotion system **80**, the two driving wheels **801** are disposed on the bottom of the body **10** symmetrically.

[0323] Along the forward direction of the body **10**, the flat mop is disposed behind the driving wheel **801**, the auxiliary cleaning disk **3021** is disposed in front of the flat mop; along the width direction of the body **10**, at least part of the auxiliary cleaning disk **3021** is disposed within the region on the outside of the right side driving wheel **801**, such that a part of the auxiliary cleaning disk **3021** extends beyond the edge of the maximum width of the body **10**, to achieve the cleaning along the edge.

[0324] Due to the main mop **2022** of the flat mop covers the rear portion of the body **10**, in order to avoid affecting the normal cleaning of the flat mop, the auxiliary cleaning disk **3021** is disposed on the outside of the right side driving wheel **801**, without affecting the movement of the right side driving wheel **801** while the auxiliary mop **3022** is achieving the cleaning along the edge, no other structures are disposed within the region on the outside of the right side driving wheel **801** on the

base tray **101**, therefore, taking the advantage of setting the auxiliary cleaning disk **3021** within the region on the outside of the right side driving wheel **801**, the layout of other structures and the function achieved are not affected.

[0325] Even if the downward-looking sensor is disposed within the region on the outside of the right side driving wheel **801** on the base tray **101**, in order to set the auxiliary cleaning disk **3021**, the downward-looking sensor can be disposed within the region on the base tray **101**, the region is between the right side driving wheel **801** and the flat mop, the function of the downward-looking sensor will not be affected, the auxiliary cleaning disk **3021** can be disposed without changing the layout of the driving wheel **801**, the flat mop, the rolling brush **403** (part of or all of the rolling brush **403** is disposed between the two driving wheels **801**) and the edge brush on the base tray **101**, to achieve the cleaning effectiveness along the edge, such that the layout of the structures on the whole base tray **101** is compact.

[0326] Furthermore, along the forward direction of the body **10**, the rolling brush **403** is disposed in front of the auxiliary cleaning disk **3021**, to ensure that the rolling brush **403** and the edge brush of the dry cleaning module **40** can both clean at first, then using the wet type flat mop and the auxiliary cleaning disk **3021** to mop the floor.

[0327] Due to the auxiliary cleaning module **30** is disposed on the mounting base **2023**, there is no need to enable the second lift structure to ascend or descend, the mounting base **2023** is disposed beneath the base tray **101**, the base tray **101** is provided with the first avoidance region, such that the first driving structure **302** mounts on the top of the mounting base **2023**, and extends into the inner cavity of the body **10** through the first avoidance region.

[0328] As shown in FIG. **30**, the first driving structure **302** comprises the second motor, and the second transmission mechanism **204** transferring the driving force of the second motor to the auxiliary cleaning disk **3021**, to drive the auxiliary cleaning disk **3021** to rotate.

[0329] For example, the base tray **101** is provided with a first avoidance hole, the output end of the second transmission mechanism is provided with a fifth mounting cavity recessed upwardly, the output end passes through the first avoidance hole to connect to the mounting protrusion **2023** of the auxiliary cleaning disk **3021**, such that the auxiliary cleaning disk **3021** is disposed beneath the base tray **101**. The mounting protrusion **2023** of the auxiliary cleaning disk **3021** can be detachably installed inside the fifth mounting cavity through a magnetic suction method or with a snap-fastener method. One end of the second transmission mechanism facing away from the output shaft of the second motor extends in the direction towards the right side driving wheel **801**, and avoid the driving wheel **801**, such that the auxiliary cleaning disk **3021** is disposed within the region on the outside of the right side driving wheel **801**, the second transmission mechanism can be gear transmission, to reduce the rotational speed of the auxiliary cleaning disk **3021**. Similar to the embodiment 1, the area of the auxiliary cleaning disk **3021** is smaller than the area of the mounting **2023**, such that the auxiliary mop **3022** forms small rag, the main mop **2022** forms big rag cleaning.

[0330] The layout of other structures inside the inner cavity of the body **10**, the main fan **402** of the dry cleaning module **40** is distributed at the rear portion of the dust box chamber **108**, the dust exhaust channel **404** is distributed at the right side corner or right side of the dust box **401**, the second driving structure **201** is disposed within the avoidance recess region of the base tray **101** (i.e. the inner cavity of the body **10** is provided with a correspondent avoidance cam **304**), as shown in FIG. **29**, the main fan **402** is distributed near the dust exhaust channel **404**, the avoidance cam is distributed on the right side of the main fan **402**, the first lift structure is distributed on the left side of the main fan **402**.

[0331] When the auxiliary cleaning module **30** is not set, the inlet channel on the right side of the main fan **402** inside the body **10** is connected with the air inlet of the dust box **401**, the discharge end of the dust suction fan on the base station is connected with the inlet channel, the suction end is connected with the dust exhaust channel **404**, to form a dust collection mode of one blow and

one suction.

[0332] When the auxiliary cleaning module **30** is set, in order to supply avoidance space for the first driving structure **302**, the inlet channel can be omitted, such that the second transmission mechanism of the first driving structure **302** extends towards the outside of the right side driving wheel **801**. When the body **10** is connected with the exterior, the region connected with the air inlet can serve as the intake area.

[0333] As an alternative implementation method of the embodiment 2, the main cleaning module **20** is a track but not a flat mop, the mounting base **2023** is a track cover, the main cleaning component can be a track rotatably mounted on the track cover and disposed beneath the track cover, the second transmission mechanism drives the track to move so as to clean the surface to be cleaned such as floor, the auxiliary cleaning disk **3021** is also disposed on the outside of the right side driving wheel **801**, and is disposed at the same side with the edge brush, to form a right edge mode.

[0334] The auxiliary cleaning module **30** is disposed on the track cover as a whole, the first lift structure drives the track cover to ascend or descend, driving the auxiliary cleaning module **30**, the track cover and the track to ascend or descend synchronously.

[0335] Above all, the auxiliary cleaning assembly **302** does not swing, the auxiliary cleaning assembly **302** is fixed on the body **10** or the main cleaning assembly **202**, at least part of the auxiliary cleaning assembly **302** is always disposed outside the edge of the body **10**, to achieve the cleaning along the edge. The main cleaning assembly **202** and the auxiliary cleaning assembly **30210** achieves the function of no cleaning-missed cases, supply the avoidance space for the installation of the auxiliary cleaning module **30** without changing or only changes the layout of the water replenishing mechanism **50**, while enabling the auxiliary component on the auxiliary cleaning disk **3021** to achieve cleaning along the edge, there is little or no impact on other structures on the body **10**.

[0336] As an alternative implementation method of the embodiment 2, the auxiliary cleaning module **30** (flat mop or track) also can be disposed on the body **10** but not on the mounting base **2023**, the first driving structure **302** uses the first driving structure **302** of the embodiment 1 to drive the auxiliary cleaning disk **3021** to rotate, ascend or descend to mop the floor.

[0337] As an alternative implementation method of any one of the aforementioned embodiment, the auxiliary cleaning disk **3021** can remain stationary without setting the first driving structure **302**, but to set the second lift structure to drive the auxiliary cleaning disk **3021** to ascend or descend, when mopping the floor, the auxiliary cleaning disk **3021** can achieve the cleaning along the edge without rotating.

### Embodiment 3

[0338] The implementation method provides a base station, wherein, the base station comprises a main body, the main body is provided with a cleaning chamber, the cleaning chamber is provided with at least one main cleaning area and auxiliary cleaning area; when the cleaning device of any one of the embodiment 1 or the embodiment 2 returns to the base station, the main cleaning area and the auxiliary cleaning area are respectively configured for cleaning the main mop **2022** of the main cleaning assembly **202** and the auxiliary mop **3022** of the auxiliary cleaning assembly **302** disposed on the cleaning device.

[0339] The base station of this implementation method, when corresponding to the two main cleaning disks **2021** and the auxiliary cleaning disk **3021** of the embodiment 1, two main cleaning areas and auxiliary cleaning area are disposed on the main body, when the main mop **2022** and/or the auxiliary rag **3022** is needed to be cleaned, the robot returns to the basic containment chamber of the base station, the cleaning chamber is disposed on the bottom of the containment chamber, each main cleaning area is correspondent to one main mop **2022**, the auxiliary cleaning area is correspondent to the auxiliary mop **3022**, achieving the cleaning to the two main mops **2022** and the auxiliary mop **3022**. The layout of the main cleaning area and the auxiliary cleaning area is

correspondent to the layout of the two main mops **2022** and the auxiliary mop **3022** in the embodiment 1.

[0340] Specifically, at least one main protruding rib protruded upwardly is disposed within the main cleaning area, to clean the main mop **2022** through the friction between the main protruding rib and the main mop **2022**; at least one auxiliary protruding rib protruded upwardly is disposed within the auxiliary cleaning area, to clean the auxiliary mop **3022** through the friction between the auxiliary protruding rib and the auxiliary mop **3022**.

[0341] Or, a cleaning disk is disposed on the bottom of the containment chamber of the body **10**, the cleaning disk is provided with the main cleaning area and the auxiliary cleaning area, at least one main protruding rib protruded upwardly is disposed within the main cleaning area, to clean the main mop **2022** through the friction between the main protruding rib and the main mop **2022**; at least one auxiliary protruding rib protruded upwardly is disposed within the auxiliary cleaning area, to clean the auxiliary mop **3022** through the friction between the auxiliary protruding rib and the auxiliary mop **3022**. The main protruding rib and the auxiliary protruding rib are disposed on the cleaning disk, facilitating to remove the cleaning disk from the containment chamber of the base station to clean the cleaning disk.

[0342] In order to enhance the cleaning effectiveness, during the process of cleaning, the main cleaning disk **2021** drives the main mop **2022** to rotate, such that a rotational friction is formed between the main mop **2022** and the main protruding rib, increasing the effectiveness of frictional cleaning. Or the main cleaning disk does not rotate, the main protruding rib rotates, such that the rotational friction is formed between the main protruding rib and the main mop **2022**.

[0343] Similarly, during the process of cleaning, the auxiliary cleaning disk **3021** drives the auxiliary mop to rotate, such that a rotational friction is formed between the auxiliary rag **3022** and the auxiliary protruding rib, increasing the effectiveness of frictional cleaning. Or the auxiliary cleaning disk does not rotate, the auxiliary protruding rib rotates, such that the rotational friction is formed between the auxiliary protruding rib and the auxiliary rag **3022**.

[0344] The base station of this implementation method, when corresponding to the flat mop and the auxiliary cleaning disk **3021** of the embodiment 2, the main body is provided with one main cleaning area and auxiliary cleaning area, when the main mop **2022** and/or the auxiliary rag **3022** is needed to be cleaned, the robot returns to the basic containment chamber of the base station, the cleaning chamber is disposed on the bottom of the containment chamber, the main cleaning area is correspondent to one main mop **2022**, the auxiliary cleaning area is correspondent to the auxiliary mop **3022**, achieving the respectively cleaning to the main mop **2022** and the auxiliary mop **3022**. The layout of the main cleaning area and the auxiliary cleaning area is correspondent to the layout of the main mop **2022** and the auxiliary mop **3022** in the embodiment 2.

[0345] Specifically, at least one main protruding rib protruded upwardly is disposed within the main cleaning area, to clean the main mop **2022** through the friction between the main protruding rib and the main mop **2022**; at least one auxiliary protruding rib protruded upwardly is disposed within the auxiliary cleaning area, to clean the auxiliary mop **3022** through the friction between the auxiliary protruding rib and the auxiliary mop **3022**.

[0346] Or, a cleaning disk is disposed on the bottom of the containment chamber of the body **10**, the cleaning disk is provided with the main cleaning area and the auxiliary cleaning area, at least one main protruding rib protruded upwardly is disposed within the main cleaning area, to clean the main mop **2022** through the friction between the main protruding rib and the main mop **2022**; at least one auxiliary protruding rib protruded upwardly is disposed within the auxiliary cleaning area, to clean the auxiliary mop **3022** through the friction between the auxiliary protruding rib and the auxiliary mop **3022**. The main protruding rib and the auxiliary protruding rib are disposed on the cleaning disk, facilitating to remove the cleaning disk from the containment chamber of the base station to clean the cleaning disk.

[0347] In order to enhance the cleaning effectiveness, during the process of cleaning, the vibrating

plate **20322** oscillates or twists reciprocally to drive the main mop **3022** to oscillate or twist reciprocally, such that a slidable friction is formed between the main mop **2022** and the main protruding rib, increasing the effectiveness of frictional cleaning. Or the vibrating plate **20322** does not drive the main mop **3022** to oscillate or twist reciprocally, the main protruding rib moves reciprocally, such that a slidable friction is formed between the main protruding rib and the main mop **2022**, scrape off the dirt or grime on the main mop **2022** on the flat mop.

[0348] Similarly, during the process of cleaning, the auxiliary cleaning disk **3021** drives the auxiliary mop **3022** to rotate, such that a rotational friction is formed between the auxiliary mop **3022** and the auxiliary protruding rib, increasing the effectiveness of frictional cleaning. Or the auxiliary cleaning disk does not rotate, the auxiliary protruding rib rotates, such that a rotational friction is formed between the auxiliary protruding rib and the auxiliary mop **3022**.

#### Embodiment 4

[0349] This embodiment provides a cleaning system, the cleaning system comprises the cleaning device of any one of the implementation methods in the embodiment 1 or the embodiment 2, and any one of the base stations in the embodiment 3.

[0350] The cleaning system of this implementation method, due to comprise the cleaning device of the embodiment 1 or the embodiment 2, and the base station of the embodiment 3, in the cleaning system, part of the auxiliary cleaning disk **3021** always extend beyond the edge of the body **10** to achieve the cleaning along the edge, the cleaning device can return to the base station to perform self-cleaning on the main mop **2022** and the auxiliary mop **3022**.

[0351] It should be noted that the above embodiments are only intended to illustrate the technical solutions of the present application, and not to limit them; although detailed descriptions have been provided for the aforementioned embodiments, those skilled in the art should understand that modifications can still be made to the technical solutions described in the embodiments, or equivalent substitutions can be made to some or all of the technical features; such modifications or substitutions do not depart from the scope of the technical solutions of the various embodiments of the present application.

## Claims

1. A cleaning device, wherein the device comprises: a body; a main cleaning module, the main cleaning module is disposed on the body; the main cleaning module comprises a first lift structure, at least one main cleaning assembly; the first lift structure is configured to drive the main cleaning assembly to ascend or descend; an auxiliary cleaning module, the auxiliary cleaning module comprises at least one auxiliary cleaning assembly, the auxiliary cleaning assembly is non-swingable relative to the body, at least a part of the auxiliary cleaning assembly is always disposed outside the edge of the body, to clean along the edge; the auxiliary cleaning module is disposed on the main cleaning assembly, and the auxiliary cleaning module, under the driving of the first lift structure, ascends or descends synchronously with the main cleaning assembly, such that the main cleaning assembly and the auxiliary cleaning assembly are in a lifting position and a mopping position synchronously.
2. The cleaning device according to claim 1, wherein the main cleaning assembly comprises a mounting base, and a main mop disposed on the bottom of the mounting base; the auxiliary cleaning module is disposed on the mounting base, the first lift structure drives the main cleaning assembly and the auxiliary cleaning assembly to ascend or descend synchronously by driving the mounting base to ascend or descend.
3. The cleaning device according to claim 2, wherein the mounting base is disposed beneath the base tray of the body; the mounting base is a flat mop, the flat mop comprises a top plate, a bottom plate disposed on the bottom of the top plate, the bottom plate is provided with a mounting hole or an avoidance opening, and a vibrating plate embedded into the mounting hole or the avoidance

opening; the main mop is disposed on the bottom of the vibrating plate and the bottom plate; the auxiliary cleaning module is disposed on the top plate; the vibrating plate reciprocally vibrates or twists to drive the main mop to move, to clean the surface to be cleaned.

**4.** The cleaning device according to claim 2 wherein the auxiliary cleaning assembly comprises an auxiliary mop, no area is cleaning-missed between the cleaning area of the main mop and the cleaning area of the auxiliary mop along the width direction of the body, the width direction of the body is perpendicular to the forward direction of the body.

**5.** The cleaning device according to claim 4, wherein the main cleaning assembly at least comprises a first part and the auxiliary cleaning assembly at least comprises a second part, and the cleaning area of the first part and the cleaning area of the second part have an overlapping region along the forward direction of the body.

**6.** The cleaning device according to claim 5, wherein along the forward direction of the body, the first part is disposed behind the second part, such that the second part cleans firstly, and the first part cleans afterwards, the cleaning area cleaned by the second part firstly and the cleaning area cleaned by the first part afterwards have the overlapping region.

**7.** The cleaning device according to claim 6, wherein the area of the main mop is greater than the area of the auxiliary mop, the main mop and the auxiliary mop are both configured for wet cleaning; and/or the auxiliary cleaning assembly further comprises an auxiliary cleaning disk, the auxiliary mop is disposed on the bottom of the auxiliary cleaning disk, the mounting base is provided with the first part, the auxiliary cleaning disk is provided with the second part, such that the auxiliary mop disposed on the second part cleans firstly, the main mop disposed on the first part cleans afterwards, the area of the auxiliary cleaning disk is smaller than the area of the mounting base.

**8.** The cleaning device according to claim 6, further comprising an edge brush and a locomotion system, the edge brush is disposed on the bottom of the front portion of the body; along the width direction of the body, the auxiliary mop and the edge brush are both disposed at the right side of the body, to form a right edge; the locomotion system at least comprises two driving wheels, the two driving wheels are disposed on the bottom of the body symmetrically; along the forward direction of the body, the main cleaning assembly is disposed behind the driving wheel, the auxiliary mop is disposed in front of the main mop, such that the auxiliary cleans firstly, the main mop cleans afterwards; along the width direction of the body, at least a part of the auxiliary mop is disposed within the region on the outside of the right side driving wheel.

**9.** The cleaning device according to claim 8, wherein the auxiliary cleaning module further comprises a first driving structure, the first driving structure is disposed on the top of the mounting base, the first driving structure is configured to drive the auxiliary mop to rotate to mop the floor.

**10.** The cleaning device according to claim 9, wherein the first driving structure comprises a second motor, and a second transmission mechanism configured to transfer the driving force of the second motor to the auxiliary mop; the second motor is disposed on the mounting base, one end of the output shaft of the second transmission mechanism facing away from the second motor extends in the direction towards the right side driving wheel, and avoids the driving wheel, such that the auxiliary mop is within the region on the outside of the right side driving wheel.

**11.** The cleaning device according to claim 10, wherein the auxiliary cleaning assembly further comprises an auxiliary cleaning disk, the auxiliary mop is disposed on the bottom of the auxiliary cleaning disk; the auxiliary cleaning disk is disposed in front of the mounting base, such that the auxiliary mop cleans firstly, the main mop cleans afterwards; the second transmission mechanism drives the auxiliary cleaning disk to rotate so as to drive the auxiliary mop to rotate, the auxiliary cleaning disk is disposed within the region on the outside of the right side driving wheel, such that the auxiliary mop is disposed within the region on the outside of the right side driving wheel.

**12.** The cleaning device according to claim 9, wherein the mounting base is disposed beneath the base tray of the body, the base tray is provided with a first avoidance region, such that the first

driving structure is mounted on the top of the mounting base.

**13.** The cleaning device according to claim 8, further comprising a water replenishing mechanism, the water replenishing mechanism is configured to replenish water to the main mop and the auxiliary mop, such that the main mop and the auxiliary mop perform wet cleaning; along the forward direction of the body, the edge brush disposed in front is configured for dry cleaning, the auxiliary mop disposed at back is configured for wet cleaning.

**14.** The cleaning device according to claim 8, further comprising a rolling brush rotatably disposed on the base tray of the body, the rolling brush is configured for dry cleaning; along the forward direction of the body, the edge brush is disposed in front of the rolling brush, the main cleaning assembly and the auxiliary cleaning assembly are both disposed behind the rolling brush, and the main cleaning assembly and the auxiliary cleaning assembly are configured for wet cleaning.

**15.** The cleaning device according to claim 14, wherein the number of the rolling brush is two, the rotational directions of the two rolling brushes are opposite.

**16.** The cleaning device according to claim 8, further comprising at least one downward-looking sensor, one of the downward-looking sensor is disposed on the bottom of the base tray of the body, the downward-looking sensor is disposed between the right-side driving wheel and the mounting base along the forward direction of the body.

**17.** The cleaning device according to claim 1, wherein in the mopping position, the main cleaning assembly and the auxiliary cleaning assembly both clean the surface to be cleaned.

**18.** A base station, wherein comprises a main body, the main body is provided with a cleaning chamber, the cleaning chamber is provided with at least one main cleaning area and auxiliary cleaning area; when the cleaning device of claim 1 returns to the base station, the main cleaning area and the auxiliary cleaning area are respectively configured for cleaning a main cleaning component of the main cleaning assembly and an auxiliary cleaning component of the auxiliary cleaning assembly on the cleaning device.

**19.** The base station according to claim 18, wherein at least one main protruding rib protruded upwardly is disposed within the main cleaning area, the main cleaning component is cleaned through the friction between the main protruding rib and the main cleaning component; and/or at least one auxiliary protruding rib protruded upwardly is disposed within the auxiliary cleaning area, the auxiliary cleaning component is cleaned through the friction between the auxiliary protruding rib and the auxiliary cleaning component.

**20.** The base station according to claim 19, wherein during the process of cleaning, the main protruding rib moves reciprocally, such that sliding friction is formed between the main protruding rib and the main cleaning component, so as to scrape off dirt or grime from the main cleaning component; and/or during the process of cleaning, the auxiliary cleaning component rotates, such that rotating friction is formed between the auxiliary protruding rib and the auxiliary cleaning component.

**21.** A cleaning system, wherein the system comprises the cleaning device according to claim 1, and the base station according to claim 18.

---