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Swimming pool cleaning robot

Abstract

A swimming pool cleaning robot is provided. The swimming pool cleaning robot includes a body, a water absorbing assembly, a walking assembly, a transmission assembly, and a front rolling brush. The walking assembly includes a front walking wheel and a driving assembly, the front walking wheel is disposed close to a front end of the body, and the front rolling brush includes a first state and a second state. In a pool wall cleaning mode of the robot, when the body moves to the pool wall, a water discharge of the water absorbing assembly is reduced or closed, until the driving assembly drives the front rolling brush to switch.

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Background/Summary

CROSS-REFERENCE TO RELATED APPLICATION (1) This application is a continuation application of U.S. Ser. No. 19/031,837 filed on Jan. 18, 2025 which claims priority to Chinese Patent Application No. 202423172376.9 entitled “SWIMMING POOL CLEANING ROBOT” filed on Dec. 21, 2024, the entire content of which is incorporated herein by reference.

FIELD

(1) This disclosure relates to the field of swimming pool cleaning technologies, and in particular, to a swimming pool cleaning robot.

BACKGROUND

(2) Swimming pool cleaning is an important process for keeping water quality of a swimming pool clean and safe. Regular swimming pool cleaning can not only ensure cleanliness and hygiene of water, but also prolong a service life of a swimming pool device. Generally, cleaning work of a swimming pool mainly relies on manual cleaning or an automatic cleaning device. Because efficiency of the manual cleaning is relatively low, the automatic cleaning device is becoming more and more popular.

(3) The automatic cleaning device introduces, by using a water absorbing assembly, water containing impurities from a water inlet to a filter assembly of a machine, and performs filtration processing to clean the swimming pool. The filter assembly, the water absorbing assembly, a

driving motor driving assembly, and a transmission assembly are dispersed at various positions and heights of a robot, and an improper layout may reduce a cleaning ability of the robot.

(4) For example, in a case, because a space layout among the assemblies is improper, effective dust collecting space of the filter assembly is limited. After the water absorbing assembly is started, water flows through the filter assembly for filtering, and a filtering position of a garbage basket is easily blocked. Alternatively, if the filter assembly is blocked, a front rolling brush may be far away from a cleaning surface, and the front rolling brush pulls a wheelie or the entire machine floats, affecting a cleaning effect of the entire machine, and increasing inconvenience of the user during using. In another case, because the space layout among the assemblies is improper, when the automatic swimming pool cleaning device is in a pool wall cleaning mode, the robot may first move from a pool bottom to a pool wall, and the front rolling brush may pull a wheelie before reaching the pool wall position. Alternatively, after the robot moves to the pool wall position, the front rolling brush has an excessively small area of contact with the wall, and the front rolling brush has a relatively small friction on the pool wall. Consequently, the wall at a joint position between the pool bottom and the pool wall cannot be cleaned, resulting in a poor pool wall cleaning capability.

SUMMARY

(5) To resolve the prior-art problem in which a front rolling brush of an automatic swimming pool cleaning robot easily pulls a wheelie in advance before meeting a pool wall, and cannot satisfy a usage requirement of a user for an overall cleaning capability in a pool wall cleaning mode, this disclosure provides a swimming pool cleaning robot. Through a proper layout of each component, a probability that the front rolling brush pulls a wheelie before meeting the pool wall in the pool wall cleaning mode may be reduced, and an overall cleaning effect of the robot may be effectively improved.

(6) To achieve the foregoing objective, embodiments of this disclosure provide the following technical solutions.

(7) A first aspect of the embodiments of this disclosure provides a swimming pool cleaning robot, the swimming pool cleaning robot is able to move in water to perform cleaning, and the swimming pool cleaning robot includes: a body, where along a forward direction of the robot, the body has a front end and a rear end, the body has a housing and an accommodating cavity, the housing is provided with a water inlet communicating with the accommodating cavity, and the water inlet is disposed on a lower surface of the housing; a water absorbing assembly; a filter assembly, where the filter assembly is disposed in the accommodating cavity, the filter assembly has a filter cavity, the filter assembly is provided with a dust port, the dust port communicates with the water inlet and the filter cavity, and the water absorbing assembly is configured to suck a water flow, so that a water flow containing impurities passes through the water inlet and the dust port, and is drained outside the housing through filtration of the filter cavity; a walking assembly, where the walking assembly includes a front walking wheel, and the front walking wheel is rotatably disposed at the front end; a driving assembly, where the driving assembly is close to the front end, the driving assembly includes a driving motor and a first output gear, the driving motor includes a motor rotation axis, and the motor rotation axis is connected to the first output gear; a front rolling brush, where the front rolling brush is rotatably disposed at the front end, the front rolling brush is configured to clean a to-be-cleaned surface, the front rolling brush includes a first state and a second state, in the first state, the front rolling brush abuts against a pool wall and a pool bottom, and in the second state, the front rolling brush abuts against only the pool wall; and a transmission assembly, where the transmission assembly includes at least a rolling brush transmission group; the first output gear is in transmission connection with the front rolling brush by using the rolling brush transmission group; and the robot includes a pool wall cleaning mode, and in the pool wall cleaning mode, the body moves to the pool wall, and a water discharge of the water absorbing assembly is reduced, or the water absorbing assembly is turned off, until the driving assembly drives the front

rolling brush to switch from the first state to the second state.

(8) It should be further noted that, in this embodiment, the walking assembly may drive the body to move in a preset direction in water of a swimming pool, where “in water” includes underwater and water surface. “Underwater” indicates that the swimming pool cleaning robot is completely submerged below a water line, and “water surface” indicates that the swimming pool cleaning robot is at least partially exposed above the water line. The water absorbing assembly is configured to provide a suction force, so that a negative pressure is generated at a position of the water inlet on the housing. After the water absorbing assembly is started, under the action of the suction force, after the water flow containing impurities passes through the water inlet, the dust port, and the filter cavity, garbage in the water is retained in the filter cavity. The water flow filtered by the filter cavity is drained out of the housing.

(9) Compared with the prior art, in this embodiment, both the driving assembly and the front walking wheel are close to the front end of the body. The front rolling brush is in transmission connection with the first output gear by using the rolling brush transmission group. Through cooperation of defining positions of the front rolling brush, the driving motor, and the front walking wheel, and transmission connection between all components and the transmission assembly, all components at a position of the front end of the body are arranged compactly, space of the filter assembly is increased, and mass at a position of the front rolling brush may be increased. After the water absorbing assembly is started, because the filter space of the filter assembly may effectively reduce a probability that the filter assembly is blocked, in this arrangement, in the pool wall cleaning mode, after the body moves to the pool wall, a water discharge of the water absorbing assembly is reduced or closed. In this way, an absorption force at a position of the water inlet may be reduced. Further, when the rolling brush is lifted relative to the pool bottom is actively controlled, and the contact area between the front rolling brush and the to-be-cleaned surface is increased during the process of assisting the front rolling brush in switching from the first state to the second state, thereby improving the cleaning effect of the swimming pool cleaning robot at the edge position of the pool bottom when switching between the pool wall and the pool bottom.

(10) A second aspect of the embodiments of this disclosure provides a swimming pool cleaning robot that is able to move in water to perform cleaning, and the swimming pool cleaning robot includes: a body, where along a forward direction of the robot, the body has a front end and a rear end, the body has a housing and an accommodating cavity, the housing is provided with a water inlet communicating with the accommodating cavity, and the water inlet is disposed on a lower surface of the housing; a water absorbing assembly, where the water absorbing assembly is configured to suck a water flow from the water inlet into the accommodating cavity, and then drained to an outside of the housing; a walking assembly, where the walking assembly includes a front walking wheel, and the front walking wheel is rotatably disposed at the front end; a driving assembly, where the driving assembly is close to the front end, the driving assembly includes a driving motor and a first output gear, the driving motor includes a motor rotation axis, and the motor rotation axis is connected to the first output gear; a front rolling brush, where the front rolling brush is rotatably disposed at the front end, the front rolling brush is configured to clean a to-be-cleaned surface, the front rolling brush includes a first state and a second state, in the first state, the front rolling brush abuts against a pool wall and a pool bottom, and in the second state, the front rolling brush abuts against only the pool wall; and a transmission assembly, where the transmission assembly includes at least a rolling brush transmission group; the first output gear is in transmission connection with the front rolling brush by using the rolling brush transmission group; and the robot includes a pool wall cleaning mode, and in the pool wall cleaning mode, the body moves to the pool wall, and a water discharge of the water absorbing assembly is reduced, or the water absorbing assembly is turned off, until the driving assembly drives the front rolling brush to switch from the first state to the second state, and the driving assembly drives the front rolling brush to move to the water line along the pool wall.

(11) In this embodiment, both the driving assembly and the front walking wheel are close to the front end of the body. The front rolling brush is in transmission connection with the first output gear by using the rolling brush transmission group. Through cooperation of defining positions of the front rolling brush, the driving motor, and the front walking wheel, and transmission connection between all components and the transmission assembly, all components at a position of the front end of the body are arranged compactly, space of the filter assembly is increased, and mass at a position of the front rolling brush may be increased. The water absorbing assembly sucks a water flow, and in a process in which the water flow passes through the water inlet and the accommodating cavity, and is drained, a negative pressure may be formed at the water inlet of the swimming pool cleaning robot. In this way, in the pool wall cleaning mode, after the body moves to the pool wall, a water discharge of the water absorbing assembly is reduced or closed, the negative pressure at the water inlet can be reduced, and an absorption force of the swimming pool cleaning robot on the pool bottom or the pool wall may be reduced. Further, the swimming pool cleaning robot actively controls when the rolling brush is lifted relative to the pool bottom, effectively assists the front rolling brush in switching from the first state to the second state, increases the contact area between the front rolling brush and the to-be-cleaned surface, and better cleans a dead zone between the pool bottom and the pool wall, thereby improving the cleaning effect of the swimming pool cleaning robot at the edge position of the pool bottom when switching between the pool wall and the pool bottom.

(12) According to the swimming pool cleaning device provided in this embodiment of this disclosure, the body is provided with a detection assembly, the detection assembly is configured to detect environment information, the environment information includes wall surface information of the pool wall, in a horizontal direction, a length of the swimming pool cleaning robot is $L1$, and in a vertical direction, a width of the swimming pool cleaning robot is $W1$; and in the pool wall cleaning mode, the body moves to the pool wall. In a case that the pool wall is a first wall surface, and when the robot is unable to continue to move toward a water line along the first wall surface, the front walking wheel and the front rolling brush move to a side away from the first wall surface; and in a case that the pool wall is a second wall surface, the front walking wheel and the front rolling brush continue to move toward the water line along the second wall surface, until the robot reaches the water line, where along the forward direction of the robot, the first wall surface is a concave arc surface, the first wall surface has an access opening, a maximum value of a vertical caliber of the access opening is $L2$, a maximum value of a horizontal caliber of the access opening is $W2$, $L2 > L1$, $W2 > W1$, and the second wall surface is a vertical wall.

(13) It should be further noted that, in this embodiment, the detection assembly is configured to collect environment information in the swimming pool, and the swimming pool cleaning robot adjusts a motion mode and a cleaning mode of the body by using the environment information collected by the detection assembly. In this embodiment, after the detection assembly detects the environment information, both the driving motor and the front walking wheel are close to the front end of the body, the front walking wheel is in transmission connection with the first output gear by using a walking wheel transmission group, and the front rolling brush is in transmission connection with the first output gear by using the rolling brush transmission group. Through cooperation of defining positions of the front rolling brush, the driving motor, and the front walking wheel, and transmission connection between all components and the transmission assembly, all components at a position of the front end of the body are arranged compactly. Compared with other positions of the swimming pool cleaning robot, mass at a position of the front rolling brush may be increased. In this arrangement, in the pool wall cleaning mode, after the body moves to the pool wall, in a case that the pool wall is a first wall surface, and when the robot is unable to continue to move toward a water line along the first wall surface, the front walking wheel and the front rolling brush move to a side away from the first wall surface, to increase a contact area between the front rolling brush and the pool wall. In this way, a boundary position between the first wall surface and the pool

bottom may be cleaned, and energy consumption of the cleaning robot may be effectively reduced. When the pool wall is the second wall surface, that is, when the pool wall is a vertical wall, a water discharge of the water absorbing assembly is reduced or closed, so that an absorption force at the position of the water inlet is reduced. Further, when the rolling brush is lifted relative to the pool bottom is actively controlled, and a contact area between the front rolling brush and the to-be-cleaned surface is increased during a process of assisting the front rolling brush in switching from the first state to the second state, thereby improving the cleaning effect of the swimming pool cleaning robot at the edge position of the pool bottom when switching between the pool wall and the pool bottom.

(14) According to the swimming pool cleaning device provided in this embodiment of this disclosure, in a vertical direction, a rotation axis of the front walking wheel is located in a first plane, a bottom of the front walking wheel is located in a second plane, and a rotation axis of the first output gear is located between the first plane and the second plane; and connection lines between a rotation center of the first output gear, a rotation center of the front walking wheel, and a rotation center of the front rolling brush form three angles, where an angle using the rotation center of the front walking wheel as a vertex is a first angle β , and $\beta < 150^\circ$.

(15) It should be further noted that, in this embodiment, both the driving motor and the front walking wheel are close to the front end of the body. The front walking wheel is in transmission connection with the first output gear by using the walking wheel transmission group. The front rolling brush is in transmission connection with the first output gear by using the rolling brush transmission group, so that the first angle $\beta < 150^\circ$. Further, the front rolling brush, the driving motor, the front walking wheel, and the first output gear are concentrated at the front end of the body and are close to the bottom of the body, so that all components at the position of the front rolling brush and the front end of the body are arranged more compactly. In this arrangement, when the robot is in a pool bottom cleaning mode or the pool wall cleaning mode, the front rolling brush can be effectively prevented from lifting relative to the pool bottom under unexpected circumstances, which is helpful to increase the contact area between the front rolling brush and the to-be-cleaned surface, and improve the cleaning effect of the swimming pool cleaning robot at a dead zone between the pool bottom and the pool wall when switching between the pool wall and the pool bottom.

(16) According to the swimming pool cleaning device provided in this embodiment of this disclosure, in the pool wall cleaning mode, when the front rolling brush abuts against only the pool wall, the water absorbing assembly is started, or a water discharge of the water absorbing assembly is increased.

(17) In this embodiment, in the pool wall cleaning mode, when the front rolling brush abuts against only the pool wall, the water discharge of the water absorbing assembly is increased, a suction force at the bottom of the entire robot is improved, a contact area between the front rolling brush and the pool wall is further increased, and a friction force between the front rolling brush and the pool wall is increased, thereby improving a cleaning effect of the front rolling brush on the pool wall, improving stability of the body moving on the pool wall, and preventing the robot from sliding from the pool wall to the pool bottom.

(18) According to the swimming pool cleaning device provided in this embodiment of this disclosure, the transmission assembly further includes a walking wheel transmission group, the first output gear is in transmission connection with the front walking wheel by using the walking wheel transmission group, the rolling brush transmission group includes an internal gear, the first output gear is located on an inside of the front walking wheel, the internal gear is disposed on an inner wall of the front walking wheel, and the first output gear is in meshing transmission with the internal gear.

(19) It should be further noted that the first output gear is located on the inside of the front walking wheel and is in meshing transmission with the internal gear to drive the front walking wheel to

rotate relative to the body, drive the body to move relatively, and may further limit the position of the first output gear, so that the driving motor and the first output gear are further concentrated on a side of the front walking wheel, and a spatial integration effect of the front end of the body is improved.

(20) According to the swimming pool cleaning device provided in this embodiment of this disclosure, the rolling brush transmission group includes a first external gear, a second external gear, and a rolling brush transmission gear, the first external gear is disposed on the inside of the front walking wheel and rotates coaxially with the front walking wheel in a same direction, an outer diameter of the first external gear is smaller than an inner diameter of the internal gear, the rolling brush transmission gear is disposed on a rotation axis of the front rolling brush, the second external gear is disposed between the first external gear and the rolling brush transmission gear, and the second external gear is in meshing transmission with the first external gear and the rolling brush transmission gear.

(21) It should be further noted that, the first external gear, the second external gear, and the rolling brush transmission gear are concentrated at the front end of the body, so that a rotation direction of the first output gear is the same as a rotation direction of the front rolling brush and the front walking wheel, that is, the first output gear, the front rolling brush, and the front walking wheel simultaneously rotate clockwise or simultaneously rotate anticlockwise, thereby facilitating control on the rotation direction of the front rolling brush, and facilitating the robot to calculate the rotation direction of the front walking wheel, to measure a mileage of the robot.

(22) According to the swimming pool cleaning device provided in this embodiment of this disclosure, in a vertical direction, a rotation center of the front walking wheel is located in the first plane, a bottom of the front walking wheel is located in the second plane, the rotation center of the front walking wheel, a rotation center of the second external gear, and a rotation center of the rolling brush transmission gear are all located between the first plane and the second plane, and a rotation center of the first output gear is located in the first plane, or the rotation center of the first output gear is located between the first plane and the second plane.

(23) It should be further noted that, the front walking wheel, the second external gear, the first output gear, and the rolling brush transmission gear are enabled to close to the second plane, to further improve stability at a position at which the front end of the body is close to the bottom, and further raise the front rolling brush.

(24) According to the swimming pool cleaning device provided in this embodiment of this disclosure, in a vertical direction, a rotation center of the front walking wheel is located in the first plane, a bottom of the front walking wheel is located in the second plane, the rotation center of the front walking wheel, a rotation center of the second external gear, and a rotation center of the rolling brush transmission gear are all located between the first plane and the second plane, and along a vertical upward direction, a rotation axis of the first output gear is located above the first plane. It should be further noted that, in this embodiment, the front walking wheel, the second external gear, and the rolling brush transmission gear are close to the second plane, so that the first output gear is located above the first plane and is in transmission connection with the internal gear, and the first output gear, the front rolling brush, and the front walking wheel simultaneously rotate clockwise or simultaneously rotate anticlockwise, thereby facilitating control on the rotation direction of the front rolling brush, and facilitating the robot to calculate the rotation direction of the front walking wheel, to measure a mileage of the robot.

(25) According to the swimming pool cleaning device provided in this embodiment of this disclosure, the first external gear is integrally formed with the front walking wheel.

(26) It should be further noted that, in this embodiment, the inner wall of the front walking wheel is provided with the internal gear, and the rotation center of the front walking wheel is provided with the first external gear and is in transmission connection with the internal gear by using the first external gear. After the first output gear drives the internal gear to rotate, synchronous rotation of

the first external gear and the front walking wheel can be implemented, thereby improving stability of the transmission assembly in a transmission process.

(27) According to the swimming pool cleaning device provided in this embodiment of this disclosure, the first external gear is detachably connected to the front walking wheel, the rolling brush transmission group in the transmission assembly further includes a second output gear, the second output gear and the first output gear are disposed on the motor rotation axis at an interval along an axial direction of the rotation axis of the driving motor, the first output gear and the second output gear rotate in a same direction, and the second output gear is in transmission connection with the first external gear.

(28) It should be further noted that, in this embodiment, the front walking wheel is detachably connected to the first external gear. When the front walking wheel needs to be maintained, the first external gear does not need to be separated, thereby improving convenience during maintenance of the walking assembly. The second output gear is in transmission connection with the first external gear, so that the first output gear, the front rolling brush, and the front walking wheel simultaneously rotate clockwise or simultaneously rotate anticlockwise, thereby facilitating control on the rotation direction of the front rolling brush, and facilitating the robot to calculate the rotation direction of the front walking wheel, to measure a mileage of the robot. According to the swimming pool cleaning device provided in this embodiment of this disclosure, in a vertical direction, the first wall surface has a top, the top is located on an inside of the access opening, and a distance between the top and a horizontal plane on which the pool bottom is located is $L3$, where $L3 > L2$.

(29) In this embodiment, when $L3 > L2$, the swimming pool cleaning robot cannot clean an arc surface between the top of the first wall surface and the top of the access opening, and the front walking wheel and the front rolling brush move to the side away from the first wall surface.

(30) According to the swimming pool cleaning device provided in this embodiment of this disclosure, along a vertical upward direction, a curvature of the first wall surface gradually increases.

(31) In this embodiment, because the curvature of the first wall surface gradually increases, and the front rolling brush gradually gets away from the first wall surface, the friction force between the front rolling brush and the first wall surface decreases. After recognizing a state of the first pool wall, the detection assembly may control the front walking wheel and the front rolling brush to move to the side away from the first wall surface.

(32) In this embodiment, the swimming pool cleaning device includes a body, a water absorbing assembly, a filter assembly, a walking assembly, a transmission assembly, and a front rolling brush. The walking assembly includes a front walking wheel, a driving assembly and the front walking wheel are disposed close to a front end of the body, and the front rolling brush includes a first state and a second state. In a pool wall cleaning mode of the robot, when the body moves to the pool wall, a water discharge of the water absorbing assembly is reduced or closed, until the walking assembly drives the front rolling brush to switch from the first state to the second state. Compared with the prior art, the swimming pool cleaning device provided in this disclosure can improve effective filtering space of the filter assembly, and prevent the front rolling brush from pulling a wheelie before meeting the pool wall. When the swimming pool cleaning robot switches from the pool bottom to the pool wall, the contact area between the front rolling brush and the to-be-cleaned surface is increased, thereby improving an overall cleaning effect of the swimming pool cleaning robot.

Description

BRIEF DESCRIPTION OF DRAWINGS

(1) To describe technical solutions in embodiments of this disclosure or in the prior art more

clearly, the following briefly describes accompanying drawings required for describing embodiments or the prior art. Apparently, the accompanying drawings in the following descriptions show some embodiments of this disclosure, and a person of ordinary skill in the art may still derive other drawings from these accompanying drawings without creative efforts.

- (2) FIG. 1 is a schematic diagram of a structure of a swimming pool cleaning robot according to an embodiment of this disclosure;
- (3) FIG. 2 is a schematic diagram of a partial sectional structure of a swimming pool cleaning robot according to an embodiment of this disclosure;
- (4) FIG. 3 is a schematic diagram of a state in which a front rolling brush of a swimming pool cleaning robot is not in contact with a pool wall according to an embodiment of this disclosure;
- (5) FIG. 4 is a schematic diagram of a state in which a front rolling brush of a swimming pool cleaning robot is in contact with a pool wall according to an embodiment of this disclosure;
- (6) FIG. 5 is a schematic diagram of another state in which a front rolling brush of a swimming pool cleaning robot is in contact with a pool wall according to an embodiment of this disclosure;
- (7) FIG. 6 is a schematic diagram of a state in which a front rolling brush of a swimming pool cleaning robot is in contact with only a pool wall according to an embodiment of this disclosure;
- (8) FIG. 7 is a schematic diagram of a state in which a front rolling brush of a swimming pool cleaning robot is in contact with a first wall surface and a pool bottom according to an embodiment of this disclosure;
- (9) FIG. 8 is a schematic diagram of a state in which a front rolling brush of a swimming pool cleaning robot is in contact with only a first wall surface according to an embodiment of this disclosure;
- (10) FIG. 9 is a schematic diagram of a state in which a swimming pool cleaning robot slides down along a first wall surface in FIG. 11 according to an embodiment of this disclosure;
- (11) FIG. 10 is a schematic diagram of a state in which a front rolling brush of a swimming pool cleaning robot is in contact with only a second wall surface and moves to a position of a water line according to an embodiment of this disclosure;
- (12) FIG. 11 is a schematic diagram of a partial state in which a first output gear is in transmission connection with a transmission assembly according to an embodiment of this disclosure;
- (13) FIG. 12 is a schematic diagram of a simplified state in which a first output gear is in transmission connection with a transmission assembly shown in FIG. 11 according to an embodiment of this disclosure;
- (14) FIG. 13 is a schematic diagram of another state in which a first output gear is in transmission connection with a transmission assembly of a swimming pool cleaning robot according to an embodiment of this disclosure; and
- (15) FIG. 14 is a schematic diagram of another simplified state in which a first output gear is in transmission connection with a transmission assembly of a swimming pool cleaning robot according to an embodiment of this disclosure.

DESCRIPTIONS OF REFERENCE NUMERALS

- (16) **10**. body; **101**. front end; **102**. rear end; **103**. housing; **131**. water inlet; **132**. water outlet; **104**. accommodating cavity; **105**. detection assembly; **11**. water absorbing assembly; **12**. filter assembly; **121**. filter cavity; **122**. dust port; **13**. walking assembly; **131**. driving assembly; **1301**. driving motor; **1311**. motor rotation axis; **1312**. first output gear; **1302**. front walking wheel; **14**. transmission assembly; **141**. walking wheel transmission group; **1411**. internal gear; **142**. rolling brush transmission group; **1421**. first external gear; **1422**. second external gear; **1423**. rolling brush transmission gear; **1424**. second output gear; **15**. front rolling brush; **16**. first wall surface; **161**. access opening; **17**. second wall surface; **100**. first state; **200**. second state; **300**. water line; **400**. pool wall; **500**. pool bottom; **B**. first angle; **18**. first plane; and **19**. second plane.

DESCRIPTION OF EMBODIMENTS

- (17) To make the objectives, technical solutions, and advantages of the embodiments of the present

invention clearer, the following clearly and completely describes the technical solutions in the embodiments of the present invention with reference to the accompanying drawings in the embodiments of the present invention. Apparently, the described embodiments are merely some embodiments of the present invention rather than all of the embodiments. All other embodiments obtained by a person of ordinary skill in the art based on the disclosed embodiments without creative efforts shall fall within the protection scope of the present invention.

(18) To reduce a probability that a front rolling brush **15** pulls a wheelie before meeting a pool wall **400** in a pool wall **400** cleaning mode of a swimming pool cleaning robot, improve effective space of a filter cavity **121** of a filter assembly **12**, prevent the filter assembly **12** from being blocked, increase a contact area between the front rolling brush **15** and a to-be-cleaned surface, and further improve a cleaning effect of an edge position between the front rolling brush **15** and the pool wall **400** or between the pool wall **400** and a pool bottom **500**.

(19) In an operating state of the swimming pool cleaning robot, the front rolling brush **15** may mix dirty of the to-be-cleaned surface. With rotation of the front rolling brush **15**, a water flow is driven to a position of the filter assembly **12**, and a water absorbing assembly **11** generates a suction force, to drain a water flow containing impurities outside a housing **103** through filtration of a filter cavity **121** after passing through a water inlet **131** and a dust port **122**. In this process, if the filter cavity **121** of the filter assembly **12** is blocked, a requirement for filtering the impurities in the water cannot be met, a negative pressure cannot be generated by the water absorbing assembly **11** at the water inlet **131**, and the swimming pool cleaning robot cannot clean the pool wall **400**, or in the pool wall **400** cleaning mode, the robot may slide down from the pool wall **400**, resulting in a poor cleaning effect.

Embodiment 1

(20) A first aspect of the embodiments of this disclosure provides a swimming pool cleaning robot, the swimming pool cleaning robot is able to move in water to perform cleaning, and the swimming pool cleaning robot includes: a body **10**, where along a forward direction of the robot, the body **10** has a front end **101** and a rear end **102**, the body **10** has a housing **103** and an accommodating cavity **104**, the housing **103** is provided with a water inlet **131** communicating with the accommodating cavity **104**, and the water inlet **131** is disposed on a lower surface of the housing **103**; a water absorbing assembly **11**; a filter assembly **12**, where the filter assembly **12** is disposed in the accommodating cavity **104** and is close to the rear end **102** of the housing **103**, the filter assembly **12** has a filter cavity **121**, the filter assembly **12** is provided with a dust port **122**, the dust port **122** communicates with the water inlet **131** and the filter cavity **121**, and the water absorbing assembly **11** is configured to suck a water flow, so that a water flow containing impurities passes through the water inlet **131** and the dust port **122**, and is drained outside the housing **103** through filtration of the filter cavity **121**; a walking assembly **13**, where the walking assembly **13** includes a front walking wheel **1302**, and the front walking wheel **1302** is rotatably disposed at the front end **101**; a driving assembly **131**, where the driving assembly **131** is close to the front end **101**, the driving assembly includes a driving motor **1301** and a first output gear **1312**, the driving motor **1301** includes a motor rotation axis **1311**, and the motor rotation axis **1311** is connected to the first output gear **1312**; a front rolling brush **15**, where the front rolling brush **15** is rotatably disposed at the front end **101**, the front rolling brush **15** is configured to clean a to-be-cleaned surface, the front rolling brush includes a first state **100** and a second state **200**, in the first state **100**, the front rolling brush **15** abuts against a pool wall **400** and a pool bottom **500**, and in the second state **200**, the front rolling brush **15** abuts against only the pool wall **400**; and a transmission assembly **14**, where the transmission assembly **14** includes at least a rolling brush transmission group **142**; the first output gear **1312** is in transmission connection with the front rolling brush **15** by using the rolling brush transmission group **142**; and the robot includes a pool wall **400** cleaning mode, and in the pool wall **400** cleaning mode, the body **10** moves to the pool wall **400**, and a water discharge of the water absorbing assembly **11** is reduced, or the water absorbing assembly **11** is turned off, until the

driving assembly **131** drives the front rolling brush **15** to switch from the first state **100** to the second state **200**.

(21) In this embodiment, the walking assembly **13** may drive the body **10** to move in a preset direction in water of a swimming pool, where “in water” includes underwater and water surface. “Underwater” indicates that the swimming pool cleaning robot is completely submerged below a water line **300**, and “water surface” indicates that the swimming pool cleaning robot is at least partially exposed above the water line **300**. The water absorbing assembly **11** is configured to provide a suction force, so that a negative pressure is generated at a position of the water inlet **131** on the housing **103**. After the water absorbing assembly **11** is started, under the action of the suction force, after the water flow containing impurities passes through the water inlet **131**, the dust port **122**, and the filter cavity **121**, garbage in the water is retained in the filter cavity **121**. The water flow filtered by the filter cavity **121** is drained out of the housing **103**. In some embodiments, the housing **103** is provided with a water outlet **132**, and a filtered water flow is drained out of the housing **103** through the water outlet **132**. The water outlet **132** may be disposed at a top of the housing **103**, or may be disposed at another position of the housing **103**, a position of the water outlet **132** relative to the housing **103** is not limited in this embodiment and other embodiments, and a person skilled in the art may adjust the position of the water outlet according to an actual use situation, which are all fall within the scope of the examples of the embodiments of this disclosure. Further, the water absorbing assembly **11** provides a suction power for a water flow from the water inlet **131** to the water outlet **132**.

(22) In this embodiment, as shown in FIG. 1, FIG. 2, and FIG. 14, both the driving motor **1301** and the front walking wheel **1302** are close to the front end **101** of the body **10**. The front walking wheel **1302** is in transmission connection with the first output gear **1312** by using the rolling brush transmission group **142**, the front rolling brush **15** is in transmission connection with the first output gear **1312** by using a walking wheel transmission group **141**. Through cooperation of defining positions of the front rolling brush **15**, the driving motor **1301**, and the front walking wheel **1302**, and transmission connection of the transmission assembly **14**, all components at a position of the front end **101** of the body **10** are arranged compactly, space of the filter assembly **12** is increased, and mass at a position of the front rolling brush **15** may be increased. After the water absorbing assembly **11** is started, because the filter space of the filter assembly **12** may effectively reduce a probability that the filter assembly **12** is blocked, in this arrangement, in the pool wall **400** cleaning mode, after the body **10** moves to the pool wall **400**, a water discharge of the water absorbing assembly **11** is reduced or closed. In this way, an absorption force at a position of the water inlet **131** may be reduced. Further, when the rolling brush is lifted relative to the pool bottom **500** is actively controlled, and the contact area between the front rolling brush **15** and the to-be-cleaned surface is increased during the process of assisting the front rolling brush **15** in switching from the first state **100** to the second state **200**, thereby improving the cleaning effect of the swimming pool cleaning robot at the edge position of the pool bottom **500** when switching between the pool wall **400** and the pool bottom **500**, and better cleaning a dead zone between the pool bottom and the pool wall.

(23) Further, the filter assembly **12** is disposed at a position close to the rear end **102** of the body **10**, and the front rolling brush **15** and the driving assembly **131** are disposed at a position close to the front end **101** of the body **10**, to provide larger space for the filter assembly **12** in the accommodating cavity **104**. The following further describes, with reference to the accompanying drawings of the specification, each state of the swimming pool cleaning robot in which the swimming pool cleaning robot starts to climb a wall and clean the pool wall **400** in the pool wall **400** cleaning mode in detail.

(24) As shown in FIG. 3, it is a state in which the front rolling brush **15** is not in contact with the pool wall **400**. In this embodiment, after the water absorbing assembly **11** sucks a water flow from the water inlet **131** at the bottom of the housing **103**, the water flow is drained through the water

outlet **132** at the top of the housing **103**. The driving assembly **131** drives the front rolling brush **15** to rotate relative to the body **10**, and the front rolling brush **15** mixes the water flow to a side of the water inlet **131**. Garbage in the water, especially on the surface of the pool bottom **500**, is rolled up by the front rolling brush **15**, a negative pressure is generated at a position of the water inlet **131** due to the action of the water absorbing assembly **11**, and a water discharge at the water outlet **132** is relatively large. With reference to FIG. 2, the garbage in the water enters the filter cavity **121** after passing through the water inlet **131** and the dust port **122**, and impurities in the water are retained in the filter cavity **121** disposed at the rear, and a filtered water flow is drained through the water outlet. Because both the transmission assembly **14** and the driving assembly **131** described above are close to the front end **101** of the body **10**, the filter cavity **121** has a large effective filtering area and is not easy to be blocked, and accommodation space of impurities is increased.

(25) As shown in FIG. 4, the front rolling brush **15** is in contact with the pool wall **400** and the pool bottom **500**, that is, the front rolling brush **15** is in the first state **100** at this time. Different from the state shown in FIG. 3, in this case, a water discharge of the water absorbing assembly **11** is reduced, further, the negative pressure at the water inlet **131** is reduced. The front walking wheel **1302** and the front rolling brush **15** keep rotating, and further, the front rolling brush **15** may clean a boundary position between the pool wall **400** and the pool bottom **500**, that is, an edge region of the pool bottom **500**. In this state, there is a friction force between the front rolling brush **15** and the pool wall **400**. When the driving assembly **131** drives the front rolling brush **15** to continue to move toward the pool wall **400** by using the rolling brush transmission group **142**, it is convenient for the front rolling brush **15** to lift up relative to the pool bottom **500** and move along the pool wall **400** to the water line **300**.

(26) As shown in FIG. 5, this state is different from the state shown in FIG. 4. In this case, the water absorbing assembly **11** is closed, that is, the water discharge of the water absorbing assembly **11** is zero. When the driving assembly **131** drives, by using the rolling brush transmission group **142**, the front rolling brush **15** to continue to move in a direction of the pool wall **400**, compared with the state of the water absorbing assembly **11** shown in FIG. 4, the swimming pool cleaning robot may more easily lift the front rolling brush **15** relative to the pool bottom **500**. A person skilled in the art adjusts the operating state of the water absorbing assembly **11** as shown in FIG. 4 or FIG. 5 in the pool wall **400** cleaning mode for different situations of the swimming pool. For example, when there is a relatively large quantity of impurities at an edge position between the pool wall **400** and the pool bottom **500**, a state of the water absorbing assembly **11** is enabled to be shown in FIG. 4. A water discharge is reduced, but the water discharge is not equal to zero. In another case, when faced with a complex shape of the pool wall **400**, the swimming pool robot has difficulty in climbing the wall, the state of the water absorbing assembly **11** of the swimming pool cleaning robot is adjusted as shown in FIG. 5, and the water absorbing assembly **11** is turned off.

(27) As shown in FIG. 6, this state is different from the state shown in FIG. 4 and FIG. 5. In this case, the front rolling brush **15** is in contact with only the pool wall **400**, that is, the front rolling brush **15** is in the second state **200**. In the state shown in FIG. 4 and FIG. 5, after the driving assembly **131** continues to drive the front rolling brush **15** to rotate, the front rolling brush **15** may be switched from the first state **100** to the second state **200**. The front rolling brush **15** rotates relative to the pool wall **400** and mixes impurities on the pool wall **400** to move toward the position of the water inlet **131**, thereby cleaning the pool wall **400**.

(28) Further, in an embodiment, the swimming pool cleaning robot further includes a water absorbing assembly **11**. In the pool wall **400** cleaning mode, when the front rolling brush **15** abuts against only the pool wall **400**, the water absorbing assembly **11** is started, or a water discharge of the water absorbing assembly **11** is increased.

(29) In this embodiment, in the pool wall **400** cleaning mode, when the front rolling brush **15** abuts against only the pool wall **400**, the water discharge of the water absorbing assembly **11** is increased, a suction force at the bottom of the entire robot is improved, a contact area between the front

rolling brush **15** and the pool wall **400** is further increased, and a friction force between the front rolling brush **15** and the pool wall **400** is increased, thereby improving a cleaning effect of the front rolling brush **15** on the pool wall **400**, improving stability of the body **10** moving on the pool wall **400**, and preventing the robot from sliding from the pool wall **400** to the pool bottom **500**.

Embodiment 2

(30) A second aspect of the embodiments of this disclosure provides a swimming pool cleaning robot that is able to move in water to perform cleaning, and the swimming pool cleaning robot includes: a body **10**, where along a forward direction of the robot, the body **10** has a front end **101** and a rear end **102**, the body **10** has a housing **103** and an accommodating cavity **104**, the housing **103** is provided with a water inlet **131** communicating with the accommodating cavity **104**, and the water inlet **131** is disposed on a lower surface of the housing **103**; a water absorbing assembly **11**, where the water absorbing assembly **11** is configured to suck a water flow from the water inlet **131** into the accommodating cavity **104**, and then drained to an outside of the housing **103**; a walking assembly **13**, where the walking assembly **13** includes a front walking wheel **1302**, and the front walking wheel **1302** is rotatably disposed at the front end **101**; a driving assembly **131**, where the driving assembly **131** is close to the front end **101**, the driving assembly **131** includes a driving motor **1301** and a first output gear **1312**, the driving motor **1301** includes a motor rotation axis **1311**, and the motor rotation axis **1311** is connected to the first output gear **1312**; a front rolling brush **15**, where the front rolling brush **15** is rotatably disposed at the front end **101**, the front rolling brush **15** is configured to clean a to-be-cleaned surface, the rolling brush includes a first state **100** and a second state **200**, in the first state **100**, the front rolling brush **15** abuts against a pool wall **400** and a pool bottom **500**, and in the second state **200**, the front rolling brush **15** abuts against only the pool wall **400**; and a transmission assembly **14**, where the transmission assembly **14** includes at least a rolling brush transmission group **142**; the first output gear **1312** is in transmission connection with the front rolling brush **15** by using the rolling brush transmission group **142**; and the robot includes a pool wall **400** cleaning mode, and in the pool wall **400** cleaning mode, the body **10** moves to the pool wall **400**, and a water discharge of the water absorbing assembly **11** is reduced, or the water absorbing assembly **11** is turned off, until the driving assembly **131** drives the front rolling brush **15** to switch from the first state **100** to the second state **200**.

(31) Different from Embodiment 1, in Embodiment 2, a function of the water absorbing assembly **11** is defined again. The water absorbing assembly **11** is only configured to suck a water flow from the water inlet **131** into the accommodating cavity **104**, and then drained to an outside of the housing **103**, and a technology related to the filter assembly **12** is not described. Refer to the previous embodiment or another prior art for the related technology. In this embodiment, there is not much description about the filter assembly **12**. In this embodiment, for the description of the relevant state and function of the swimming pool cleaning robot in the pool wall **400** cleaning mode, refer to the foregoing embodiment, and only the beneficial effects of this embodiment compared with the prior art are briefly described below.

(32) In this embodiment, compared with the prior art, both the driving assembly **131** and the front walking wheel **1302** are close to the front end **101** of the body **10**. The front rolling brush **15** is in transmission connection with the first output gear **1312** by using the rolling brush transmission group **142**. Through cooperation of defining positions of the front rolling brush **15**, the driving motor **1301**, and the front walking wheel **1302**, and transmission connection between all components and the transmission assembly **14**, all components at a position of the front end **101** of the body **10** are arranged compactly, space of the filter assembly **12** is increased, and mass at a position of the front rolling brush **15** may be increased. Through suction of the water absorbing assembly **11**, in a process in which the water flow passes through the water inlet **131** and the accommodating cavity **104**, and is drained, a negative pressure may be formed at the water inlet **131** of the swimming pool cleaning robot. In this way, in the pool wall **400** cleaning mode, after the body **10** moves to the pool wall **400**, a water discharge of the water absorbing assembly **11** is

reduced or closed, the negative pressure at the water inlet **131** can be reduced, and an absorption force of the swimming pool cleaning robot on the pool bottom **500** or the pool wall **400** may be reduced. Further, the swimming pool cleaning robot actively controls when the rolling brush is lifted relative to the pool bottom **500**, effectively assists the front rolling brush **15** in switching from the first state **100** to the second state **200**, increases the contact area between the front rolling brush **15** and the to-be-cleaned surface, thereby improving the cleaning effect of the swimming pool cleaning robot at the edge position of the pool bottom **500** when switching between the pool wall **400** and the pool bottom **500**.

Embodiment 3

(33) A third aspect of the embodiments of this disclosure provides a swimming pool cleaning robot, the swimming pool cleaning robot is able to move in water to perform cleaning, and the swimming pool cleaning robot includes: a body **10**, where the body **10** has a front end **101** and a rear end **102**, the body **10** is provided with a detection assembly **105**, the detection assembly **105** is configured to detect environment information, the environment information includes wall surface information of the pool wall **400**, in a horizontal direction, a length of the swimming pool cleaning robot is $L1$, and in a vertical direction, a width of the swimming pool cleaning robot is $W1$; a walking assembly **13**, where the walking assembly **13** includes a front walking wheel **1302** disposed close to the front end **101**; a driving assembly **131**, where the driving assembly **131** is close to the front end **101**, the driving assembly **131** includes a driving motor **1301** and a first output gear **1312**, the driving motor **1301** includes a motor rotation axis **1311**, and the motor rotation axis **1311** is connected to the first output gear **1312**; a transmission assembly **14**, where the transmission assembly **14** includes a rolling brush transmission group **142**; and a front rolling brush **15**, where the front rolling brush **15** is rotatably disposed at the front end **101**, the front rolling brush **15** is configured to clean a to-be-cleaned surface, and the first output gear **1312** is in transmission connection with the front rolling brush **15** by using the rolling brush transmission group **142**.

(34) The swimming pool cleaning robot includes a pool wall **400** cleaning mode. In the pool wall **400** cleaning mode, the body **10** moves to the pool wall **400**. In a case that the pool wall **400** is a first wall surface **16**, and when the robot is unable to continue to move toward a water line **300** along the first wall surface **16**, the front walking wheel **1302** and the front rolling brush **15** move to a side away from the first wall surface **16**; and in a case that the pool wall **400** is a second wall surface **17**, the front walking wheel **1302** and the front rolling brush **15** continue to move toward the water line **300** along the second wall surface **17**, until the robot reaches the water line **300**, where along the forward direction of the robot, the first wall surface **16** is a concave arc surface, the first wall surface **16** has an access opening **161**, a maximum value of a vertical caliber of the access opening **161** is $L2$, a maximum value of a horizontal caliber of the access opening **161** is $W2$, $L2 > L1$, $W2 > W1$, and the second wall surface **17** is a vertical wall.

(35) A difference between Embodiment 3 and Embodiment 2 is that, in Embodiment 3, impact of the water absorbing assembly **11** on a cleaning state of the swimming pool cleaning robot is not emphasized. Refer to Embodiment 1, Embodiment 2, or another prior art for the related technology. In this embodiment, there is not much description about the filter assembly **12** and the water absorbing assembly **11**, but it is emphasized that the body **10** is provided with a detection assembly **105**. Environment information in the swimming pool may be detected by using the detection assembly **105**, where the environment information includes information about the pool wall **400**. A cleaning mode of the swimming pool cleaning robot is detected and controlled by using the detection assembly **105**, thereby implementing intelligent cleaning, and further reducing energy consumption.

(36) As an example, the detection assembly **105** includes a distance sensor, an image acquisition sensor, a line laser, an IMU, an odometer, or the like disposed on the body **10**. A movement attitude of the robot is detected by using the IMU, or a driving distance of the robot is detected by using the odometer, to determine a driving distance or a moving position of the swimming pool robot.

(37) It should be further noted that, in this embodiment, the detection assembly **105** is configured to collect environment information in the swimming pool, and the swimming pool cleaning robot adjusts a motion mode and a cleaning mode of the body **10** by using the environment information collected by the detection assembly **105**. In this embodiment, after the detection assembly **105** detects the environment information, both the driving motor **1301** and the front walking wheel **1302** are close to the front end **101** of the body **10**, the front walking wheel **1302** is in transmission connection with the first output gear **1312** by using a walking wheel transmission group **141**, and the front rolling brush **15** is in transmission connection with the first output gear **1312** by using the rolling brush transmission group **142**.

(38) Through cooperation of defining positions of the front rolling brush **15**, the driving motor **1301**, and the front walking wheel **1302**, and transmission connection between all components and the transmission assembly **14**, all components at a position of the front end **101** of the body **10** are arranged compactly, and compared with other positions of the swimming pool cleaning robot, mass at a position of the front rolling brush **15** may be increased.

(39) Further, in the pool wall **400** cleaning mode, after the body **10** moves to the pool wall **400**, and the pool wall **400** is the first wall surface **16**, the robot is unable to continue to move toward the water line **300** along the first wall surface **16**, and the front walking wheel **1302** and the front rolling brush **15** move to a side away from the first wall surface **16**, to increase a contact area between the front rolling brush **15** and the pool wall **400**. In this way, a boundary position between the first wall surface **16** and the pool bottom **500** may be cleaned, and energy consumption of the cleaning robot may be effectively reduced.

(40) Further, in the pool wall **400** cleaning mode, after the body **10** moves to the pool wall **400**, when the pool wall **400** is the second wall surface **17**, that is, when the pool wall **400** is a vertical wall, a water discharge of the water absorbing assembly **11** is reduced or closed, so that an absorption force at the position of the water inlet **131** is reduced. Further, when the rolling brush is lifted relative to the pool bottom **500** is actively controlled, and a contact area between the front rolling brush **15** and the to-be-cleaned surface is increased during a process of assisting the front rolling brush **15** in switching from the first state **100** to the second state **200**, thereby improving the cleaning effect of the swimming pool cleaning robot at the edge position of the pool bottom **500** when switching between the pool wall **400** and the pool bottom **500**.

(41) Different cleaning states for the first wall surface **16** and the second wall surface **17** in which the swimming pool cleaning robot is in the pool wall **400** cleaning mode in Embodiment 3 are described in detail below.

(42) As shown in FIG. 7, FIG. 7 is a schematic diagram of a state in which the front rolling brush **15** of the swimming pool cleaning device is in contact with both the first wall surface **16** and the pool bottom **500**. The walking assembly **13** continues to drive the body **10** to move toward the first wall surface **16**, and the front rolling brush **15** is in contact with the first wall surface **16**. The detection assembly **105** detects information about the pool wall **400** in real time, for example, inclined angle information of the pool wall **400** relative to the pool bottom **500**, or a movement distance of the body **10** in the pool wall **400**. The front rolling brush **15** rotates at a boundary position between the pool bottom **500** and the first wall surface **16**, and may clean the boundary position between the first wall surface **16** and the pool bottom **500** well when driven by friction force of the front rolling brush **15**. When the front rolling brush **15** is rotated until the front rolling brush **15** is in contact with only the first wall surface **16**, as shown in FIG. 8, the body **10** gradually moves from the access opening **161** formed by the first wall surface **16** to a concave arc region of the first wall surface **16**. Because $L2 > L1$ and $W2 > W1$, in a state shown in FIG. 9, after moving for a movement distance along the first wall surface **16** to a position of the water line **300**, the swimming pool cleaning robot cannot continue to move to the position of the water line **300**, and the swimming pool cleaning robot moves to a side away from the first wall surface **16**. As an example, the front rolling brush **15** moves along the first wall surface **16** in a vertical downward

direction, and gradually moves until the front rolling brush **15** is completely in no contact with the first wall surface **16**. In this way, even if the swimming pool cleaning robot needs to clean the first wall surface **16** in the pool wall **400** cleaning mode, it can ensure that at least part of the first wall surface **16** and the boundary position between the first wall surface **16** and the pool bottom **500** can be well cleaned.

(43) Further, according to the swimming pool cleaning device provided in this embodiment of this disclosure, in a vertical direction, the first wall surface **16** has a top, the top is located on an inside of the access opening **161**, and a distance between the top and a horizontal plane on which the pool bottom **500** is located is $L3$, where $L3 > L2$.

(44) In this embodiment, when $L3 > L2$, the swimming pool cleaning robot cannot clean an arc surface between the top of the first wall surface **16** and the top of the access opening **161**, and the front walking wheel **1302** and the front rolling brush **15** move to the side away from the first wall surface **16**.

(45) According to the swimming pool cleaning device provided in this embodiment of this disclosure, along a vertical upward direction, a curvature of the first wall surface **16** gradually increases.

(46) In this embodiment, because the curvature of the first wall surface **16** gradually increases, and the front rolling brush **15** gradually gets away from the first wall surface **16**, the friction force between the front rolling brush **15** and the first wall surface **16** decreases. After recognizing a state of the first pool wall **400**, the detection assembly **105** may control the front walking wheel **1302** and the front rolling brush **15** to move to the side away from the first wall surface **16**.

(47) As shown in FIG. **10**, different from the cleaning state shown in FIG. **7** to FIG. **9**, in this case, the pool wall **400** is the second wall surface **17**, and the second wall surface **17** is a vertical wall. The front rolling brush **15** is in contact with the second wall surface **17**, and the driving assembly **131** drives the front rolling brush **15** to gradually move from the pool bottom **500** along the second wall surface **17** to the water line **300**, to clean the second wall surface **17**.

Embodiment 4

(48) A fourth aspect of the embodiments of this disclosure provides a swimming pool cleaning robot, the swimming pool cleaning robot is able to move in water to perform cleaning, and the swimming pool cleaning robot includes: a body **10**, where along a forward direction of the robot, the body **10** has a front end **101** and a rear end **102**; a walking assembly **13**, where the walking assembly **13** includes a front walking wheel **1302** close to the front end **101**; a driving assembly **131**, where the driving assembly **131** is close to the front end **101**, the driving assembly **131** includes a driving motor **1301** and a first output gear **1312**, the driving motor **1301** includes a motor rotation axis **1311**, and the motor rotation axis **1311** is connected to the first output gear **1312**; in a vertical direction, a rotation axis of the front walking wheel **1302** is located in a first plane **18**, a bottom of the front walking wheel **1302** is located in a second plane **19**, and a rotation axis of the first output gear **1312** is located between the first plane **18** and the second plane **19**; a transmission assembly **14**, where the transmission assembly **14** includes a walking wheel transmission group **141**; and a front rolling brush **15**, where the front rolling brush **15** is rotatably disposed at the front end **101** and is configured to clean a to-be-cleaned surface, the first output gear **1312** is in transmission connection with the front rolling brush **15** by using the rolling brush transmission group **142**, and connection lines between a rotation center of the first output gear **1312**, a rotation center of the front walking wheel **1302**, and a rotation center of the front rolling brush **15** form three angles, where an angle using the rotation center of the front walking wheel **1302** as a vertex is a first angle β , and $\beta < 150^\circ$.

(49) A difference between Embodiment 4 and Embodiment 1 is that in Embodiment 4, impact of the water absorbing assembly **11** and the filter assembly **12** on the swimming pool cleaning robot is not emphasized. Refer to Embodiment 1 or another prior art for the related technology. In this embodiment, there is not much description about the filter assembly **12** and the water absorbing

assembly **11**. In this embodiment, for the description of the relevant state and function of the swimming pool cleaning robot in the pool wall **400** cleaning mode, refer to the foregoing embodiment, and only the beneficial effects of this embodiment compared with the prior art are briefly described below.

(50) As shown in FIG. **11** and FIG. **12**, it should be further noted that, in this embodiment, both the driving motor **1301** and the front walking wheel **1302** are close to the front end **101** of the body **10**. The front walking wheel **1302** is in transmission connection with the first output gear **1312** by using the walking wheel transmission group **141**. The front rolling brush **15** is in transmission connection with the first output gear **1312** by using the rolling brush transmission group **142**, so that the first angle $\beta < 150^\circ$. Further, the front rolling brush **15**, the driving motor **1301**, the front walking wheel **1302**, and the first output gear **1312** are concentrated at the front end **101** of the body **10** and are close to the bottom of the body **10**, so that all components at the position of the front rolling brush **15** and the front end **101** of the body **10** are arranged more compactly. In this arrangement, when the robot is in a pool bottom **500** cleaning mode or the pool wall **400** cleaning mode, the front rolling brush **15** can be effectively prevented from lifting relative to the pool bottom **500** under unexpected circumstances, which is helpful to increase the contact area between the front rolling brush **15** and the to-be-cleaned surface, and improve the cleaning effect of the swimming pool cleaning robot at the edge position of the pool bottom **500** when switching between the pool wall **400** and the pool bottom **500**.

(51) The following further describes some structural components. These structural components may be selectively used in Embodiment 1, Embodiment 2, Embodiment 3, and Embodiment 4. Through the arrangement of these structural components, the cleaning effect of the swimming pool cleaning robot described in Embodiment 1, Embodiment 2, Embodiment 3, and Embodiment 4 may be improved.

(52) According to the swimming pool cleaning device provided in this embodiment of this disclosure, the swimming pool cleaning robot further includes a water absorbing assembly **11**. In the pool wall **400** cleaning mode, when the front rolling brush **15** abuts against only the pool wall **400**, the water absorbing assembly **11** is started, or a water discharge of the water absorbing assembly **11** is increased.

(53) In this embodiment, in the pool wall **400** cleaning mode, when the front rolling brush **15** abuts against only the pool wall **400**, the water discharge of the water absorbing assembly **11** is increased, a suction force at the bottom of the entire robot is improved, a contact area between the front rolling brush **15** and the pool wall **400** is further increased, and a friction force between the front rolling brush **15** and the pool wall **400** is increased, thereby improving a cleaning effect of the front rolling brush **15** on the pool wall **400**, improving stability of the body **10** moving on the pool wall **400**, and preventing the robot from sliding from the pool wall **400** to the pool bottom **500**.

(54) According to the swimming pool cleaning device provided in this embodiment of this disclosure, the transmission assembly **14** further includes a walking wheel transmission group **141**, the first output gear **1312** is in transmission connection with the front walking wheel **1302** by using the walking wheel transmission group **141**, the rolling brush transmission group **142** includes an internal gear **1411**, the first output gear **1312** is located on an inside of the front walking wheel **1302**, the internal gear **1411** is disposed on an inner wall of the front walking wheel **1302**, and the first output gear **1312** is in meshing transmission with the internal gear **1411**.

(55) As shown in the figure, it should be further noted that the first output gear **1312** is located on the inside of the front walking wheel **1302** and is in meshing transmission with the internal gear **1411** to drive the front walking wheel **1302** to rotate relative to the body **10**, drive the body **10** to move relatively, and may further limit the position of the first output gear **1312**, so that the driving motor **1301** and the first output gear **1312** are further concentrated on a side of the front walking wheel **1302**, and a spatial integration effect of the front end **101** of the body **10** is improved.

(56) According to the swimming pool cleaning device provided in this embodiment of this

disclosure, the rolling brush transmission group **142** includes a first external gear **1421**, a second external gear **1422**, and a rolling brush transmission gear **1423**, the first external gear **1421** is disposed on the inside of the front walking wheel **1302** and rotates coaxially with the front walking wheel **1302** in a same direction, an outer diameter of the first external gear **1421** is smaller than an inner diameter of the internal gear **1411**, the rolling brush transmission gear **1423** is disposed on a rotation axis of the front rolling brush **15**, the second external gear **1422** is disposed between the first external gear **1421** and the rolling brush transmission gear **1423**, and the second external gear **1422** is in meshing transmission with the first external gear **1421** and the rolling brush transmission gear **1423**.

(57) It should be further noted that, the first external gear **1421**, the second external gear **1422**, and the rolling brush transmission gear **1423** are concentrated at the front end **101** of the body **10**, so that a rotation direction of the first output gear **1312** is the same as a rotation direction of the front rolling brush **15** and the front walking wheel **1302**, that is, the first output gear **1312**, the front rolling brush **15**, and the front walking wheel **1302** simultaneously rotate clockwise or simultaneously rotate anticlockwise, thereby facilitating control on the rotation direction of the front rolling brush **15**, and facilitating the robot to calculate the rotation direction of the front walking wheel **1302**, to measure a mileage of the robot.

(58) As shown in FIG. 2 and FIG. 11, according to the swimming pool cleaning device provided in this embodiment of this disclosure, in a vertical direction, a rotation center of the front walking wheel **1302** is located in the first plane **18**, a bottom of the front walking wheel **1302** is located in the second plane **19**, the rotation center of the front walking wheel **1302**, a rotation center of the second external gear **1422**, and a rotation center of the rolling brush transmission gear **1423** are all located between the first plane **18** and the second plane **19**, and a rotation center of the first output gear **1312** is located in the first plane **18**, or the rotation center of the first output gear **1312** is located between the first plane **18** and the second plane **19**.

(59) It should be further noted that, the front walking wheel **1302**, the second external gear **1422**, the first output gear **1312**, and the rolling brush transmission gear **1423** are enabled to close to the second plane **19**, to further improve stability at a position at which the front end **101** of the body **10** is close to the bottom, and further raise the front rolling brush **15**.

(60) According to the swimming pool cleaning device provided in this embodiment of this disclosure, in a vertical direction, a rotation center of the front walking wheel **1302** is located in the first plane **18**, a bottom of the front walking wheel **1302** is located in the second plane **19**, the rotation center of the front walking wheel **1302**, a rotation center of the second external gear **1422**, and a rotation center of the rolling brush transmission gear **1423** are all located between the first plane **18** and the second plane **19**, and along a vertical upward direction, a rotation axis of the first output gear **1312** is located above the first plane **18**.

(61) As shown in FIG. 13, it should be further noted that, in this embodiment, the front walking wheel **1302**, the second external gear **1422**, and the rolling brush transmission gear **1423** are close to the second plane **19**, so that the first output gear **1312** is located above the first plane **18** and is in transmission connection with the internal gear **1411**, and the first output gear **1312**, the front rolling brush **15**, and the front walking wheel **1302** simultaneously rotate clockwise or simultaneously rotate anticlockwise, thereby facilitating control on the rotation direction of the front rolling brush **15**, and facilitating the robot to calculate the rotation direction of the front walking wheel **1302**, to measure a mileage of the robot.

(62) According to the swimming pool cleaning device provided in this embodiment of this disclosure, the first external gear **1421** is integrally formed with the front walking wheel **1302**.

(63) It should be further noted that, in this embodiment, the inner wall of the front walking wheel **1302** is provided with the internal gear **1411**, and the rotation center of the front walking wheel **1302** is provided with the first external gear **1421** and is in transmission connection with the internal gear **1411** by using the first external gear **1421**. After the first output gear **1312** drives the

internal gear **1411** to rotate, synchronous rotation of the first external gear **1421** and the front walking wheel **1302** can be implemented, thereby improving stability of the transmission assembly **14** in a transmission process.

(64) According to the swimming pool cleaning device provided in this embodiment of this disclosure, the first external gear **1421** is detachably connected to the front walking wheel **1302**, the rolling brush transmission group **142** further includes a second output gear **1424**, the second output gear **1424** and the first output gear **1312** are disposed on the motor rotation axis **1311** at an interval along an axial direction of the rotation axis of the driving motor **1301**, the first output gear **1312** and the second output gear **1424** rotate in a same direction, and the second output gear **1424** is in transmission connection with the first external gear **1421**.

(65) As shown in FIG. **13**, it should be further noted that, in this embodiment, the front walking wheel **1302** is detachably connected to the first external gear **1421**. When the front walking wheel **1302** needs to be maintained, the first external gear **1421** does not need to be separated, thereby improving convenience during maintenance of the walking assembly **13**. The second output gear **1424** is in transmission connection with the first external gear **1421**, so that the first output gear **1312**, the front rolling brush **15**, and the front walking wheel **1302** simultaneously rotate clockwise or simultaneously rotate anticlockwise, thereby facilitating control on the rotation direction of the front rolling brush **15**, and facilitating the robot to calculate the rotation direction of the front walking wheel **1302**, to measure a mileage of the robot.

(66) In this embodiment, the swimming pool cleaning device includes a body **10**, a water absorbing assembly **11**, a filter assembly **12**, a walking assembly **13**, a transmission assembly **14**, and a front rolling brush **15**. The walking assembly **13** includes a front walking wheel **1302**, a driving assembly **131** and the front walking wheel **1302** are disposed close to a front end **101** of the body **10**, and the front rolling brush **15** includes a first state **100** and a second state **200**. In the pool wall **400** cleaning mode of the robot, when the body **10** moves to the pool wall **400**, a water discharge of the water absorbing assembly **11** is reduced or closed, until the walking assembly **13** drives the front rolling brush **15** to switch from the first state **100** to the second state **200**. Compared with the prior art, the swimming pool cleaning device provided in this disclosure can improve effective filtering space of the filter assembly **12**, and prevent the front rolling brush **15** from pulling a wheelie before meeting the pool wall **400**. When the swimming pool cleaning robot switches from the pool bottom **500** to the pool wall **400**, the contact area between the front rolling brush **15** and the to-be-cleaned surface is increased, thereby improving an overall cleaning effect of the swimming pool cleaning robot.

(67) Each embodiment or implementation of this specification is described in a progressive manner, each embodiment focuses on the difference from other embodiments, and the same and similar parts between the embodiments may refer to each other.

(68) In the descriptions of this disclosure, it should be understood that an orientation or positional relationship indicated by the term “center”, “longitudinal”, “transverse”, “length”, “width”, “thickness”, “above”, “beneath”, “front”, “back”, “left”, “right”, “vertical”, “horizontal”, “top”, “bottom”, “internal”, “external”, or the like is based on an orientation or positional relationship shown in the accompanying drawings, and is merely for ease of describing this disclosure and simplifying description, but does not indicate or imply that an apparatus or an element referred to needs to have a specific orientation or be constructed and operated in a specific orientation, and therefore cannot be understood as a limitation on this disclosure.

(69) In the descriptions of this disclosure, it should be understood that terms “include”, “have” and any other variants used in this specification are intended to cover non-exclusive inclusion, for example, a process, method, system, product, or device that includes a list of steps or units is not necessarily limited to those expressly listed steps or units, but may include other steps or units not expressly listed or inherent to such a process, method, product, or device.

(70) Unless specifically defined and limited otherwise, terms “installed”, “linked”, “connected”,

“fixed”, and the like should be understood in a broad sense, for example, it may be a fixed connection, a detachable connection, or a whole; it may be a direct link or an indirect link through an intermediary, and it may be an internal connection between two elements or an interaction relationship between two elements. A person of ordinary skill in the art may understand the specific meanings of the foregoing terms in this disclosure according to specific situations. Moreover, the terms such as “first” and “second” are used only for the purpose of description and cannot be understood as indicating or implying relative importance or implicitly indicating the number of technical features denoted.

(71) Finally, it should be noted that: the foregoing embodiments are merely used for describing the technical solutions of this disclosure, but are not intended to limit this disclosure. Although this disclosure is described in detail with reference to the foregoing embodiments, it should be appreciated by a person of ordinary skill in the art that, modifications may still be made to the technical solutions described in the foregoing embodiments, or equivalent replacements may be made to the part or all of the technical features; and these modifications or replacements will not cause the essence of corresponding technical solutions to depart from the scope of the technical solutions in the embodiments of this disclosure.

Claims

1. A swimming pool cleaning robot, wherein the swimming pool cleaning robot is able to move in water to perform cleaning, and the swimming pool cleaning robot comprises: a body, wherein along a forward direction of the swimming pool cleaning robot, the body has a front end and a rear end, the body has a housing and an accommodating cavity, the housing is provided with a water inlet communicating with the accommodating cavity, and the water inlet is disposed on a lower surface of the housing; a detection assembly is arranged on the body and is configured to detect environment information, which comprises wall surface information of the pool wall, and the detection assembly comprises one of a distance sensor, an image acquisition sensor, a line laser, an IMU, an odometer; a water absorbing assembly, wherein the water absorbing assembly is configured to suck a water flow from the water inlet into the accommodating cavity and then drained to an outside of the housing; a walking assembly, wherein the walking assembly comprises a front walking wheel, and the front walking wheel is rotatably disposed at the front end; a driving assembly, wherein the driving assembly is close to the front end, the driving assembly comprises a driving motor and a first output gear, the driving motor comprises a motor rotation axis, and the motor rotation axis is connected to the first output gear; a front rolling brush, wherein the front rolling brush is rotatably disposed at the front end, the front rolling brush is configured to clean a to-be-cleaned surface, the front rolling brush comprises a first state and a second state, in the first state, the front rolling brush abuts against a pool wall and a pool bottom, and in the second state, the front rolling brush abuts against only the pool wall; and a transmission assembly, wherein the transmission assembly comprises at least a rolling brush transmission group; the first output gear is in transmission connection with the front rolling brush by using the rolling brush transmission group; and the robot comprises a pool wall cleaning mode, and in the pool wall cleaning mode, the body moves to the pool wall, and a water discharge of the water absorbing assembly is reduced, or the water absorbing assembly is turned off, until the driving assembly drives the front rolling brush to switch from the first state to the second state, in a case that the pool wall is a first wall surface, and when the swimming pool cleaning robot is unable to continue to move toward a water line along the first wall surface, the front walking wheel and the front rolling brush move to a side away from the first wall surface; and in a case that the pool wall is a second wall surface, the front walking wheel and the front rolling brush continue to move toward the water line along the second wall surface, until the swimming pool cleaning robot reaches the water line, wherein along the forward direction of the swimming pool cleaning robot, the first wall surface is a concave arc

surface, the second wall surface is a vertical wall.

2. The swimming pool cleaning robot according to claim 1, wherein in a horizontal direction, a length of the swimming pool cleaning robot is $L1$, and in a vertical direction, a width of the swimming pool cleaning robot is $W1$; and the first wall surface has an access opening, a maximum value of a vertical caliber of the access opening is $L2$, a maximum value of a horizontal caliber of the access opening is $W2$, $L2 > L1$, $W2 > W1$; in the first state, the front rolling brush abuts against a pool wall and a pool bottom, the front rolling brush rotates at a boundary position between the pool bottom and the first wall surface, and may clean the boundary position between the first wall surface and the pool bottom well when driven by friction force of the front rolling brush; in the second state, the front rolling brush abuts against only the pool wall, the body gradually moves from the access opening formed by the first wall surface to a concave arc region of the first wall surface, when the front rolling brush moves along the first wall surface to the water line and cannot continue to move to the water line, and the swimming pool cleaning robot moves to a side away from the first wall surface, and the front rolling brush moves along the first wall surface in a vertical downward direction, and gradually moves until the front rolling brush is completely in no contact with the first wall surface, the front rolling brush may clean at least part of the first wall surface and the boundary position between the first wall surface and the pool bottom.

3. The swimming pool cleaning robot according to claim 1, wherein in a vertical direction, a rotation axis of the front walking wheel is located in a first plane, a bottom of the front walking wheel is located in a second plane, and a rotation axis of the first output gear is located between the first plane and the second plane; and connection lines between a rotation center of the first output gear, a rotation center of the front walking wheel, and a rotation center of the front rolling brush form three angles, wherein an angle using the rotation center of the front walking wheel as a vertex is a first angle β , and $\beta < 150^\circ$.

4. The swimming pool cleaning robot according to claim 1, wherein in the pool wall cleaning mode, when the front rolling brush abuts against only the pool wall, the water absorbing assembly is started, or the water discharge of the water absorbing assembly is increased.

5. The swimming pool cleaning robot according to claim 1, wherein the transmission assembly further comprises a walking wheel transmission group, the first output gear is in transmission connection with the front walking wheel by using the walking wheel transmission group, the rolling brush transmission group comprises an internal gear, the first output gear is located on an inside of the front walking wheel, the internal gear is disposed on an inner wall of the front walking wheel, and the first output gear is in meshing transmission with the internal gear.

6. The swimming pool cleaning robot according to claim 5, wherein the rolling brush transmission group comprises a first external gear, a second external gear, and a rolling brush transmission gear, the first external gear is disposed on the inside of the front walking wheel and rotates coaxially with the front walking wheel in a same direction, an outer diameter of the first external gear is smaller than an inner diameter of the internal gear, the rolling brush transmission gear is disposed on a rotation axis of the front rolling brush, the second external gear is disposed between the first external gear and the rolling brush transmission gear, and the second external gear is in meshing transmission with the first external gear and the rolling brush transmission gear.

7. The swimming pool cleaning robot according to claim 6, wherein in a vertical direction, a rotation center of the front walking wheel is located in the first plane, a bottom of the front walking wheel is located in the second plane, the rotation center of the front walking wheel, a rotation center of the second external gear, and a rotation center of the rolling brush transmission gear are all located between the first plane and the second plane, and a rotation center of the first output gear is located in the first plane, or the rotation center of the first output gear is located between the first plane and the second plane.

8. The swimming pool cleaning robot according to claim 6, wherein in a vertical direction, a rotation center of the front walking wheel is located in a first plane, a bottom of the front walking

wheel is located in a second plane, the rotation center of the front walking wheel, a rotation center of the second external gear, and a rotation center of the rolling brush transmission gear are all located between the first plane and the second plane, and along a vertical upward direction, a rotation axis of the first output gear is located above the first plane.

9. The swimming pool cleaning robot according to claim 6, wherein the first external gear is integrally formed with the front walking wheel.

10. The swimming pool cleaning robot according to claim 6, wherein the first external gear is detachably connected to the front walking wheel, the rolling brush transmission group in the transmission assembly further comprises a second output gear, the second output gear and the first output gear are disposed on the motor rotation axis at an interval along an axial direction of the rotation axis of the driving motor, the first output gear and the second output gear rotate in a same direction, and the second output gear is in transmission connection with the first external gear.

11. The swimming pool cleaning robot according to claim 1, wherein the detection assembly detects a relative position information between the body and the pool wall, so as to dynamically adjust the water discharge of the water absorbing assembly.

12. The swimming pool cleaning robot according to claim 1, wherein in the pool wall cleaning mode, the detection assembly may detect at least a relative position information between the body and the pool wall, the body moves to the pool wall, in a case that the pool wall is the first path, and the swimming pool cleaning robot is unable to continue to move toward the water line along the first path, or before the swimming pool cleaning robot reaches the water line, the front walking wheel and the front rolling brush move to a side away from the pool wall; and in a case that the pool wall is a second path, the front walking wheel and the front rolling brush continue to move toward the water line along the second path, until the swimming pool cleaning robot reaches the water line, wherein along the forward direction of the swimming pool cleaning robot, the first path is a concave arc surface, the first path has an access opening, a maximum value of a vertical caliber of the access opening is $L2$, a maximum value of a horizontal caliber of the access opening is $W2$, $L2 > L1$, $W2 > W1$, and the second path is a vertical path.

13. A swimming pool cleaning robot, wherein the swimming pool cleaning robot is able to move in water to perform cleaning, and the swimming pool cleaning robot comprises: a body, wherein along a forward direction of the swimming pool cleaning robot, the body has a front end and a rear end, the body has a housing and an accommodating cavity, the housing is provided with a water inlet communicating with the accommodating cavity, and the water inlet is disposed on a lower surface of the housing; a detection assembly is arranged on the body and is configured to detect environment information, which comprises wall surface information of the pool wall, and the detection assembly comprises one of a distance sensor, an image acquisition sensor, a line laser, an IMU, an odometer; a water absorbing assembly, wherein the water absorbing assembly is configured to suck a water flow from the water inlet into the accommodating cavity and then drained to an outside of the housing; a walking assembly, wherein the walking assembly comprises a front walking wheel, and the front walking wheel is rotatably disposed at the front end; a driving assembly, wherein the driving assembly is close to the front end, the driving assembly comprises a driving motor and a first output gear, the driving motor comprises a motor rotation axis, and the motor rotation axis is connected to the first output gear; a front rolling brush, wherein the front rolling brush is rotatably disposed at the front end, the front rolling brush is configured to clean a to-be-cleaned surface, the front rolling brush comprises a first state and a second state, in the first state, the front rolling brush abuts against a pool wall and a pool bottom, and in the second state, the front rolling brush abuts against only the pool wall; and a transmission assembly, wherein the transmission assembly comprises at least a rolling brush transmission group; the first output gear is in transmission connection with the front rolling brush by using the rolling brush transmission group; and the robot comprises a pool wall cleaning mode, and in the pool wall cleaning mode, when the detection assembly detects that the pool wall is a first path, the body moves to the pool

wall, and a water discharge of the water absorbing assembly is reduced, or the water absorbing assembly is turned off, until the driving assembly drives the front rolling brush to switch from the first state to the second state, the front rolling brush sequentially cleans the pool bottom, the boundary position between the pool wall and the pool bottom, and at least part of the pool wall along the first path, and the first path comprises an arc-shaped path section connected to the pool bottom and extending to the water line, with the front rolling brush may clean at least a part of the arc-shaped path along the first path.

14. The swimming pool cleaning robot according to claim 13, wherein the body is provided with a detection assembly, the detection assembly is configured to detect environment information, the environment information comprises wall surface information of the pool wall, in a horizontal direction, a length of the swimming pool cleaning robot is $L1$, and in a vertical direction, a width of the swimming pool cleaning robot is $W1$; and in the pool wall cleaning mode, the body moves to the pool wall, in a case that the pool wall is the first path, and when the swimming pool cleaning robot is unable to continue to move toward a water line along the first path, the front walking wheel and the front rolling brush move to a side away from the first path; and in a case that the pool wall is a second path, the front walking wheel and the front rolling brush continue to move toward the water line along the second path, until the swimming pool cleaning robot reaches the water line, the swimming pool cleaning robot adjusts an effective contact cleaning area of the front rolling brush according to the type of the pool wall, wherein along the forward direction of the swimming pool cleaning robot, the first path is a concave arc surface, the first path has an access opening, a maximum value of a vertical caliber of the access opening is $L2$, a maximum value of a horizontal caliber of the access opening is $W2$, $L2 > L1$, $W2 > W1$, and the second path is a vertical wall.

15. The swimming pool cleaning robot according to claim 14, wherein in a vertical direction, the first path has a top, the top of the first path is located on an inside of the access opening, and a distance between the top of the first path and a horizontal plane on which the pool bottom is located is $L3$, wherein $L3 > L2$, the detection assembly may control the front walking wheel and the front rolling brush to clean an effective cleaning path, which comprises the pool bottom and at least a part of the arc-shaped first path, but excludes the arc-shaped path between the top of the first path and the top of the access opening.

16. The swimming pool cleaning robot according to claim 14, wherein along a vertical upward direction, a curvature of the first path gradually increases, a least one of the detection assembly may control the front walking wheel and the front rolling brush to clean an effective cleaning path, which comprises the pool bottom and at least a part of the arc-shaped first path.

17. The swimming pool cleaning robot according to claim 13, wherein the detection assembly detects a relative position information between the body and the pool wall, so as to dynamically adjust the water discharge of the water absorbing assembly.

18. The swimming pool cleaning robot according to claim 13, wherein in the pool wall cleaning mode, the detection assembly may detect at least a relative position information between the body and the pool wall, the body moves to the pool wall, in a case that the pool wall is the first path, and the swimming pool cleaning robot is unable to continue to move toward the water line along the first path, or before the swimming pool cleaning robot reaches the water line, the front walking wheel and the front rolling brush move to a side away from the pool wall; and in a case that the pool wall is a second path, the front walking wheel and the front rolling brush continue to move toward the water line along the second path, until the swimming pool cleaning robot reaches the water line, wherein along the forward direction of the swimming pool cleaning robot, the first path is a concave arc surface, the first path has an access opening, a maximum value of a vertical caliber of the access opening is $L2$, a maximum value of a horizontal caliber of the access opening is $W2$, $L2 > L1$, $W2 > W1$, and the second path is a vertical path.

19. The swimming pool cleaning robot according to claim 13, wherein the detection assembly detects the wall surface information of the pool wall; when along a vertical upward direction, a

curvature of the first path gradually increases, an effective cleaning path of the front rolling brush comprises the arc-shaped path of a transition between the pool wall and the pool bottom, in configured to increase the contact area between the front rolling brush and the pool wall under the arc-shaped path.

20. A swimming pool cleaning robot, wherein the swimming pool cleaning robot is able to move in water to perform cleaning, and the swimming pool cleaning robot comprises: a body, wherein along a forward direction of the swimming pool cleaning robot, the body has a front end and a rear end, the body has a housing and an accommodating cavity, the housing is provided with a water inlet communicating with the accommodating cavity, and the water inlet is disposed on a lower surface of the housing; a water absorbing assembly; a detection assembly is arranged on the body and is configured to detect environment information, which comprises wall surface information of a pool wall, and the detection assembly comprises one of a distance sensor, an image acquisition sensor, a line laser, an IMU, an odometer; the robot comprises a pool wall cleaning mode, and in the pool wall cleaning mode, the detection assembly detects the relative position between the body and the pool wall, the body moves towards the pool wall, and a water discharge of the water absorbing assembly is reduced, or the water absorbing assembly is turned off, to decrease the suction force at the water inlet, in order to cause a front part of the body to lift relative to a pool bottom and abuts against the pool wall.
